

5ESS® SWITCH
LOCAL AND TOLL SYSTEM FEATURES FEATURE DOCUMENT
5E10 and Later Software Releases

Document: 235-190-115
Issue Date: October 1999
Issue Number: 9.00J

Legal Notice

Copyright ©1999 Lucent Technologies, Inc. All Rights Reserved.

This electronic information product (IP) is protected by the copyright and trade secret laws of the United States and other countries. The complete document may not be reproduced, distributed, or altered in any fashion. Selected sections may be copied or printed with the utilities provided by the viewer software as set forth in the contract between the copyright owner and the licensee to facilitate use by the licensee, but further distribution of the data is prohibited.

For permission to reproduce or distribute, call:

1-800-645-6759 (From inside the continental United States)

1-317-322-6847 (From outside the continental United States).

Notice

Every effort was made to ensure that the information in this IP was complete and accurate at the time of publication. However, information is subject to change.

This IP describes certain hardware, software, features, and capabilities of Lucent Technologies products. This IP is for information purposes; therefore, caution is advised that this IP may differ from any configuration currently installed.

Lucent Technologies is the successor to the business and assets of AT&T Network Systems business unit.

Mandatory Customer Information

Interference Information: Part 15 of FCC Rules - Refer to the 5ESS[®] Switch Product Specification IP.

Trademarks

4ESS is a trademark of Lucent Technologies.

5ESS is a registered trademark of Lucent Technologies.

A-I-Net is a registered trademark of Lucent Technologies.

AnyMedia is a trademark of Lucent Technologies.

AUTOPLEX is a registered trademark of Lucent Technologies.

CALL-STALKER is a registered trademark of Lucent Technologies.

Common Language is a registered trademark, and CLEI, CLLI, CLCI, and CLFI are trademarks of Bell Communications Research, Inc.

Dataphone is a registered trademark of AT&T.

DIRECTOR is a registered trademark of AT&T.

ESS is a trademark of Lucent Technologies.

MACSTAR is a registered trademark of Lucent Technologies.

MARCH is a registered trademark of Bell Communications Research.

MIZAR is a servicemark of Bell Communications Research.

Pentium is a registered trademark of Intel Corporation.

Pinnacle is a registered trademark of Lucent Technologies.

Spots is a registered trademark of Lucent Technologies.

TELETYPE is a registered trademark of Memorex, Telex.

UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company Ltd.

VT100 is a trademark of Digital Equipment Corporation.

Warranty

Warranty information applicable to the 5ESS® switch may be obtained from the Lucent Technologies Account Management organization. Customer-modified hardware and/or software is not covered by this warranty.

Ordering Information

This IP is distributed by the Lucent Technologies Customer Information Center in Indianapolis, Indiana.

The order number for this IP is 235-190-115. To order, call:

1-888-LUCENT8 (1-888-582-3688) or fax to 1-800-566-9568 (From inside the continental United States)

1-317-322-6847 or fax to 1-317-322-6699 (From outside the continental United States).

Support Telephone Numbers

Information Product Support Telephone Number: To report errors or ask nontechnical questions about this or other IPs produced by Lucent Technologies, call 1-800-645-6759.

Technical Support Telephone Numbers: For initial technical assistance, call the North American Regional Technical Assistance Center (NARTAC) at 1-800-225-RTAC (1-800-225-7822). For further assistance, call the Customer Technical Assistance Management (CTAM) Center:

1-800-225-4672 (From inside the continental United States)

1-630-224-4672 (From outside the continental United States).

The CTAM center is staffed 24 hours a day, 7 days a week.

Acknowledgment

Developed by Lucent Technologies Customer Training and Information Products.

1. INTRODUCTION

1.1 PURPOSE

The *5ESS® Switch Local and Toll System Features* document provides information on switch-based features. The information presented for each feature consists of descriptions, operation, interactions, limitations, restrictions, system resources required, and administration.

The purpose of this document is to aid telephone personnel in performing the tasks of traffic and service planning, engineering, installation, and marketing.

1.2 UPDATE INFORMATION

This document covers software releases 5E10 and later, and is being reissued to include new information.

This document will be reissued as required to reflect new and/or changed information, and to correct errors. As the *5ESS®* switch continues to evolve with new capabilities and technologies, this document will be updated to cover these future software releases.

This issue adds technical information concerning the following features:

- 99-5E-7395, Distinctive Remote Module (See Section 5.69)
- 99-5E-7427, Inhibit Delete Display for Route Indices (See Section 6.46)
- 99-5E-7395, TSI Nail-up of Consecutive DS0s for DNU-S (See Section 2.7)
- 99-5E-4732, Tandem to Tandem E911 (See Section 9.16)

1.2.1 Supported Software Releases

In accordance with the *5ESS®* Switch Software Support Plan, the 5E11 software release is rated Discontinued Availability (DA) as of November 13, 1999. The information supporting 5E11 and earlier is being removed over time, instead of concurrently, from all documentation.

If you are supporting offices that use a software release prior to 5E12 and you have a need for the information that is being removed, retain the associated pages as they are removed from the paper documents, or retain the earlier copy of the CD-ROM.

1.2.2 Telcordia Technologies

As of March 18, 1999, Bellcore officially changed its name to Telcordia Technologies. Not all pages of this document are being reissued to reflect this change; instead, the pages will be reissued over time, as technical and other changes are required. Customers on standing order for this document may see that, on previous-issue pages, the Bellcore name is still exclusively used.

Customers receiving new orders for this document will see the Telcordia Technologies name used as appropriate throughout the document, and the Bellcore name used only to identify items that were produced under the Bellcore name. Exceptions may exist in software-influenced elements such as input/output messages, master control center screens, and recent change/verify screens. These elements will not be changed in this document until such time as they are changed in the software code. Document updates will not be made specifically to remove historical references to Bellcore.

1.2.3 National ISDN

National ISDN is an evolving platform in which new features will continue to be introduced for new revenue opportunities, improved operational efficiencies, and for support of specific applications. NI 1, NI 2, and NI 3 represent specific features as documented in Bellcore SRs 1937, 2120, and 2457. The industry is migrating to an additional terminology to more specifically denote the availability of National ISDN features: NI 95, NI 96, etc. A feature is included in a specific version (such as, NI 96) if it is available by the switch vendors by the first quarter of the year.

1.2.4 International Telecommunications Union

As a result of the World Telecommunications Standardization Conference held March 1-12, 1993, the International Telegraph and Telephone Consultative Committee (CCITT), no longer exists as an organization under the International Telecommunication Union (ITU). According to the ITU, the CCITT is now referred to as the International Telecommunication Union - Telecommunication Standardization Sector (ITU-TS).

For new and revised Recommendations issued by the ITU-TS, the term "CCITT Recommendation X.xxx" will be replaced by the "ITU-T Recommendation X.xxx" designation. For a transition period from 1993 to 1997, if the Recommendation had a previous CCITT designation, the new name will include "(formerly CCITT Recommendation X.xxx)". Names of existing CCITT Recommendations will not change unless revised.

1.3 5ESS® Switch

This 5ESS® switch document may contain references to the 5ESS® switch, the 5ESS-2000 switch, and the 5ESS AnyMedia Switch. The official name of the product has been changed back to the 5ESS® switch. The documentation will not be totally reissued to change these references. Instead, the changes will be made over time, as technical changes to the document are required. In the interim, assume that any reference to the 5ESS-2000 switch or the 5ESS AnyMedia Switch is also applicable to the 5ESS® switch. It should be noted that this name change may not have been carried forward into software-influenced items such as input and output messages, master control center screens, and recent change/verify screens.

1.4 ORGANIZATION

This document is organized into sections which divide the features into one of eleven major feature categories. The sections in this document are as follows:

- (1) "Introduction," Section 1
- (2) "Toll/Tandem Capabilities," Section 2
- (3) "Carrier Interconnection," Section 3
- (4) "Interoffice Signaling and Supervision (Non-CCS)," Section 4
- (5) "Call Processing," Section 5
- (6) "Administration," Section 6
- (7) "Maintenance," Section 7
- (8) "Recorded Announcements," Section 8
- (9) "911 Emergency Service," Section 9
- (10) "Leased Network Features," Section 10
- (11) "Coin and Charge-A-Call Features," Section 11

(12) "Data Services," Section 12

(13) Glossary

The Glossary defines all nonstandard or ambiguous acronyms, abbreviations, and terms used in this document.

1.5 USER FEEDBACK

The producers of this document are constantly striving to improve quality and usability. Please use the enclosed user feedback form for your comments and to advise us of any errors. If the form is missing or your comments will not fit, you can write to the following address:

Lucent Technologies
Documentation Services
2400 Reynolda Road
Winston-Salem, NC 27106

Please include the issue number and/or date of the document, your complete mailing address, and telephone number. We will answer all correspondence within 30 days, informing you of the disposition of your comments.

You may also call our Documentation HOTLINE if you need an immediate answer to a documentation question. This HOTLINE is not intended to eliminate the use of the user feedback form, but rather to enhance the comment process. The HOTLINE number is 1-800-645-6759 and it is available from 7:30 a.m. to 6:00 p.m. Eastern Standard time. Outside of those hours, the line is served by an answering machine. You can leave a message on the answering machine and someone will return your call the following business day.

Document users who have access to electronic mail facilities may send comments via electronic mail. The electronic address is **hotline5@wrddo.lucent.com**. When sending comments via electronic mail please make sure that the document title, document number, document issue number and/or document date are included in the mail along with the sender's name, phone number, and address.

1.6 DISTRIBUTION

This manual is distributed by the Lucent Technologies Customer Information Center in Indianapolis, Indiana. Most operating telephone companies should place orders through their documentation coordinator. Some companies may allow customers to order directly from the Customer Information Center; however, the majority do not. Companies that use documentation coordinators to manage their orders receive a significant discount. If you do not know the name/number of the documentation coordinator for your company, you may call **1-888-LUCENT-8** (1-888-582-3688) to obtain the name and telephone number.

Customers not represented by a documentation coordinator and Lucent Technologies employees can order the documentation for the 5ESS[®] switch directly from the Lucent Technologies Customer Information Center. Proper billing information must be provided. These orders may be mailed to:

Lucent Technologies
Customer Information Center
Order Entry
2855 N. Franklin Road
Indianapolis, IN 46219

Orders may also be called in on 1-888-LUCENT-8 (1-888-582-3688) within the continental United States and +1-317-322-6416 from outside the continental United States. Orders may be faxed in on 1-317-322-6484.

1.7 TECHNICAL ASSISTANCE

Technical assistance for the 5ESS[®] switch can be obtained by calling the North American Regional Technical Assistance Center (NARTAC) at **1-800-225-RTAC**. This telephone number is monitored 24 hours a day, 7 days a week. During regular business hours, your call will be answered by your local NARTAC. Outside of normal business hours, all calls will be answered at a centralized technical assistance center where service-affecting problems will be dispatched immediately to your local NARTAC. All other problems will be referred to your local NARTAC on the next regular business day.

1.8 REFERENCES

The following is a list of other Lucent Technologies documents that are referred to in this document.

- 201-526-010, 5ESS[®] Switch Service Announcement System Workstation User's Guide
- 235-040-100, 5ESS[®] Switch OA&M Planning Guide
- 235-060-120, 5ESS[®] Switch Engineering Procedures — Operator Services Position System
- 235-070-100, 5ESS[®] Switch Administration and Engineering Guidelines (and Appendix 1, Traffic and Plant Measurements)
- 235-080-100, 5ESS[®] Switch Translations Guide (TG-5)
- 235-105-110, 5ESS[®] Switch System Maintenance Requirements and Tools
- 235-105-200, 5ESS[®] Switch Precutover and Cutover Procedures
- 235-105-210, 5ESS[®] Switch Routine Operations and Maintenance Procedures
- 235-105-220, 5ESS[®] Switch Corrective Maintenance Procedures
- 235-105-231, 5ESS[®] Switch Hardware Change Procedures - Growth
- 235-105-24x, 5ESS[®] Switch Software Release Retrofit Procedures
- 235-105-331, 5ESS[®] Switch Hardware Change Procedures - Degrowth
- 235-105-34x, 5ESS[®] Switch Software Release Update Procedures
- 235-105-44x, 5ESS[®] Switch Software Release Update Procedures
- 235-106-10x, 5ESS[®] Switch Software Release Retrofit Procedures
- 235-106-20x, 5ESS[®] Switch Software Release Update Procedures
- 235-106-30x, 5ESS[®] Switch Large Terminal Growth Procedures
- 235-118-2xx, 5ESS[®] Switch Recent Change Procedures
- 235-118-2xx, 5ESS[®] Switch Recent Change Reference
- 235-190-103, 5ESS[®] Switch Business And Residence Feature Descriptions
- 235-190-104, 5ESS[®] Switch ISDN Feature Descriptions
- 235-190-120, 5ESS[®] Switch Common Channel Signaling Service Features

- 235-190-125, 5ESS® Switch Advanced Services Platform, Release 0 And 0.1A
- 235-190-126, 5ESS® Switch Advanced Services Platform, Release 0.1B
- 235-190-127, 5ESS® Switch Number Portability User's Guide
- 235-190-130, 5ESS® Switch Local Area Signaling Services
- 235-190-300, 5ESS® Switch Billing Features and Specifications
- 235-200-100, AUTOPLEX® System Wireless Applications
- 235-600-400, 5ESS® Switch Audits Manual
- 235-600-500, 5ESS® Switch Asserts Manual
- 235-600-700, 5ESS® Switch Input Messages Manual
- 235-600-750, 5ESS® Switch Output Messages Manual
- 235-900-303, 5ESS® Switch ISDN Application Processor Interface Specification
- 235-900-308, 5ESS® Switch TR-NWT-000303 Interface Specification
- 250-518-111, 5ESS® Switch OSPS Recent Change Manual
- 506-410-400, 5ESS® Switch Telset 1C, D, E, 2C & 2D Type Coin Telsets Identification, Installation & Maintenance
- 533-402-120, 5ESS® Switch Enhanced 911: Network Architecture, Service Considerations, and Transitioning Guide
- 901-360-100, 5ESS® Switch Loop Carrier Analysis Program and Long Feeder Route Analysis Program—LCAP2/LFRAP— General Input

NOTE: An "x" or "x"s in the last three positions of a release specific document number indicate the digits that change from release to release. Refer to 235-001-001, *Documentation Description and Ordering Guide* for the document number associated with each software release.

This document also contains information concerning the Compact Digital Exchange (CDX) and the Very Compact Digital Exchange (VCDX), which are switching systems based on the 5ESS® switch. This document is a standard 5ESS® switch document that is also applicable to the CDX and VCDX switching systems. Information applicable only to CDX or VCDX may be found in the following manuals:

- 235-120-010, 5ESS® Switch Compact Digital Exchange (CDX) Reference Guide
- 235-120-020, 5ESS® Switch Compact Digital Exchange (CDX) User's Guide
- 235-120-110, 5ESS® Switch Very Compact Digital Exchange (VCDX) Reference Guide

NOTE: As of the 5E14 Software Release, the 235-120-110, 5ESS® Switch Very Compact Digital Exchange (VCDX) Reference Guide will be rated DA. This is a result of an effort to collapse this information product and the VCDX User's Guide into one document. For the 5E14 and later software releases, see

the 235-120-120, 5ESS[®] Switch Very Compact Digital Exchange (VCDX) User's Guide.

- 235-120-120, 5ESS[®] Switch Very Compact Digital Exchange (VCDX) User's Guide

This document also contains information concerning the MultiService Module (MSM) and refers readers to the following MSM documents:

- *PortMaster Office Router Wizard Release Note*
- *PMconsole for Windows Administrator's Guide*
- *Command Line Reference*
- *RADIUS Administrator's Guide*
- *PortMaster Office Router Hardware Installation Guide*
- *Communications Server Hardware Installation Guide*
- *Internetwork Router Hardware Installation Guide*
- *ChoiceNet Administrator's Guide*
- *PortMaster Routing Guide*
- *PortMaster Troubleshooting Guide*
- *RADIUS ABM Administrator's Guide*
- *PortMaster Configuration Guide*
- *RADIUS for Windows NT Admin Guide*
- *PortMaster 4 Installation Guide*
- *ComOS 3.9 Release Note for PortMaster 3*
- *ComOS 4.0 Release Note for PortMaster 4*

These documents are available on the World Wide Web at:
<http://www.livingston.com>

This document also contains information concerning Asymmetric Digital Subscriber Line (ADSL) Network Services and refers readers to the following AnyMedia[™] ADSL Element Manager System documents:

- 363-211-300, AnyMedia[™] ADSL Element Manager System: Administrator's Guide
- 363-211-301, AnyMedia[™] ADSL Element Manager System: User's Guide

This document also contains information concerning the Distinctive Remote Module (DRM) and refers readers to the following document:

- 235-200-150, 5ESS[®] Switch Distinctive Remote Module (DRM) User's Guide

2. TOLL/TANDEM CAPABILITIES

2.1 TOLL FEATURES

2.1.1 Toll Switching Capability

2.1.1.1 Description

This document describes the Basic Local/Toll feature as provided by the 5ESS[®] switch. The Local/Toll feature allows a 5ESS[®] switch to provide toll features in addition to handling local switching in the same office. The interface for the Carrier Interconnect feature is also covered.

The Basic Local/Toll feature is available with the 5ESS[®] switch equipped with the 5E6 or later software release.

2.1.1.2 Definition

Toll switching is the ability to perform trunk-to-trunk switching in a toll hierarchy consistent with toll transmission requirements. An office where this ability is provided in conjunction with line-to-line, line-to-trunk, and trunk-to-line switching is a local/toll office. An office with the Basic Local/Toll feature is a class 4/5 office. The Basic Local/Toll feature permits the 5ESS[®] switch to provide centralized automatic message accounting (CAMA) toll billing capabilities, support different trunk types, and toll service.

The CAMA capabilities provide the 5ESS[®] switch with the ability to collect the toll billing data for offices which home on a 5ESS[®] switch and are not provided with automatic message accounting (AMA) equipment.

The interface for the Carrier Interconnect feature can be either trunks or lines, depending on the feature group provided. These lines and trunks are used to connect the local office with the carrier. These carriers may serve inter-local access and transport area (LATA) traffic, intra-LATA traffic, or international traffic. Carriers may only provide intra-LATA service with special permission. Carriers may provide their own operator services.

Trunking and other office features are required for an office to function as a local/toll office or as an equal access end-office for carrier interconnect. These features include the following:

- (a) Toll trunks to interconnect a local/toll office with other local offices, operator systems, and the toll network within the United States.
- (b) Call processing features required in processing toll calls
- (c) Interoffice signaling for toll calls
- (d) Arrangements for collecting, storing, and recording billing data or transmitting the data to a centralized recording center
- (e) Lines and trunks to connect the carrier to the end-office
- (f) Provide billing for carrier interconnect calls.

2.1.1.3 Operation

A combination of trunking and other features are required to permit toll office operation. This part provides functional descriptions of the trunks and other features employed in performing the toll function required in a local/toll office.

2.1.1.3.1 Domestic Toll Office Trunks

A variety of trunk types is available for a 5ESS® switch to operate as a local/toll office. The incoming, outgoing, and 2-way toll trunks available as of the 5E6 software release, and functional descriptions of these trunks, are listed in Table 2-1, Table 2-2, and Table 2-3, respectively. Figure 2-1 illustrates the application of these trunks in interconnecting a typical 5ESS® switch local/toll office with other offices, with operator systems, and with the networks. Figure 2-2 illustrates the trunks as they might appear on the 5ESS® switch.

Table 2-1 Basic Local/Toll Incoming Trunk Types

APPLICATION	INTERFACE	PULSING	START SIGNAL
Toll access	4-W E&M	DP	Wink
	4-W E&M	MF	Wink
	2-W Loop	DP	Wink
	2-W Loop	MF	Wink
Intertoll	4-W E&M	MF	Wink
	4-W E&M	MF	Delay dial
	4-W E&M	DP	Immediate
Operator	4-W E&M	MF	Wink
	2-W E&M	MF	Wink
Toll tandem, delayed call, and busy-verify	4-W E&M	MF	Wink
CAMA	4-W E&M	DP	Immediate
	4-W E&M	MF	Wink
	2-W Loop	DP	Immediate
	2-W Loop	MF	Null

Table 2-2 Basic Local/Toll Outgoing Trunk Types

APPLICATION	INTERFACE	PULSING	START SIGNAL
Toll completing	4-W E&M	MF	Wink
	4-W E&M	DP	Wink
	4-W E&M	DP	Immediate
	2-W Loop	MF	Wink
	2-W Loop	MF	Delay dial
	2-W Loop	DP	Wink
	2-W Loop	DP	Immediate
	2-W Loop	DP	Immediate
Intertoll	4-W E&M	MF	Wink
	4-W E&M	MF	Delay dial
	4-W E&M	DP	Wink
	4-W E&M	DP	Immediate
Operator assistance, leave-word, and residual trunks to switchboards	4-W E&M	None	Wink
Directory assistance and rate and route	4-W E&M	None	Wink
Operator assistance, and leave-word via TSPS	4-W E&M	MF	Wink
CAMA operator	4-W E&M	MF	Wink

Table 2-3 Basic Local/Toll 2-Way Trunk Types

APPLICATION	INTERFACE	PULSING		START SIGNAL	
		INC.	OGT.	INC.	OGT.
Intertoll	4-W E&M	MF	MF	Wink	Wink
	4-W E&M	MF	MF	Delay dial	Delay dial
	4-W E&M	MF	DP	Wink	Immediate
	4-W E&M	MF	DP	Wink	Wink
	4-W E&M	DP	DP	Immediate	Immediate

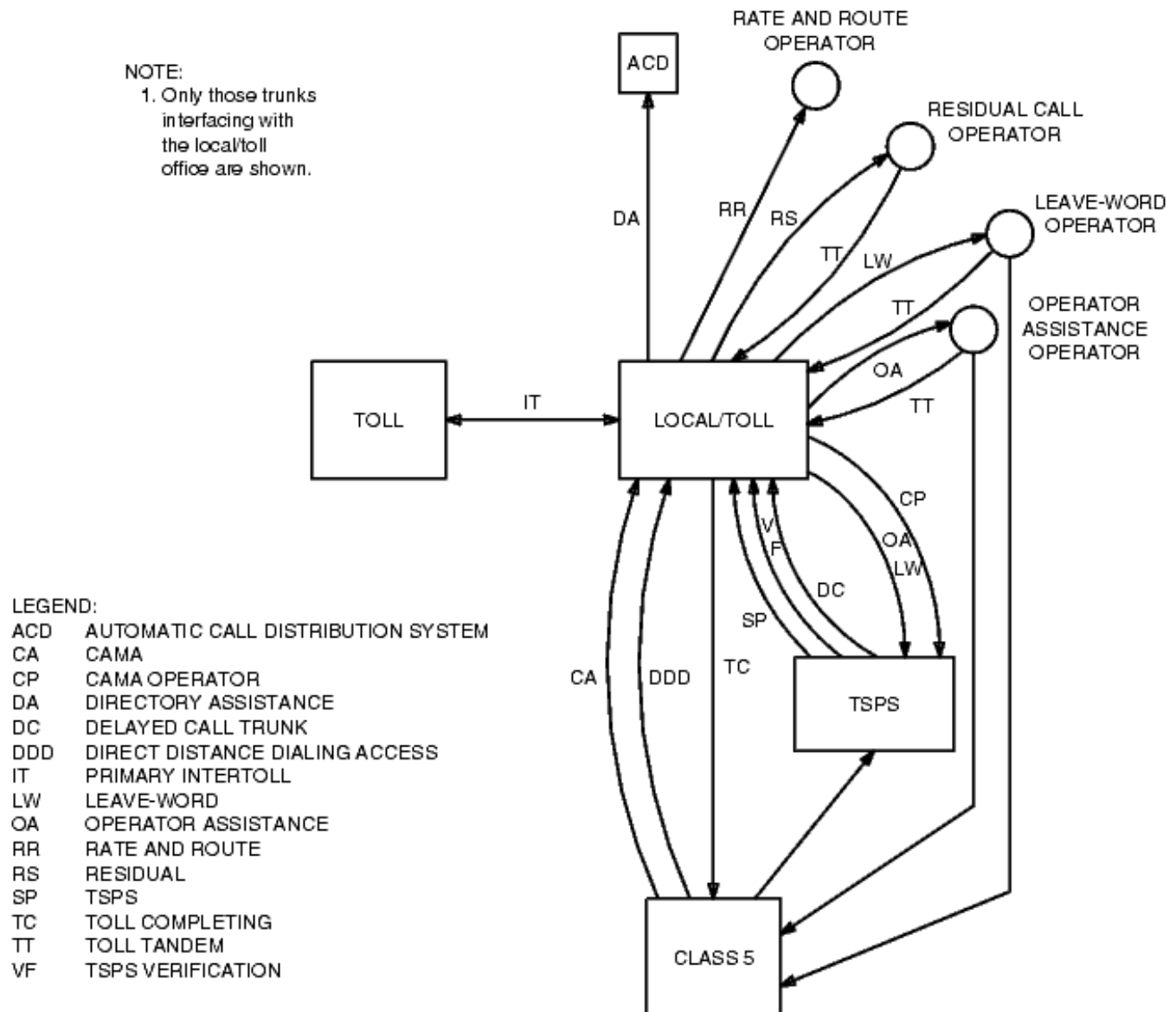


Figure 2-1 Toll Trunk Applications

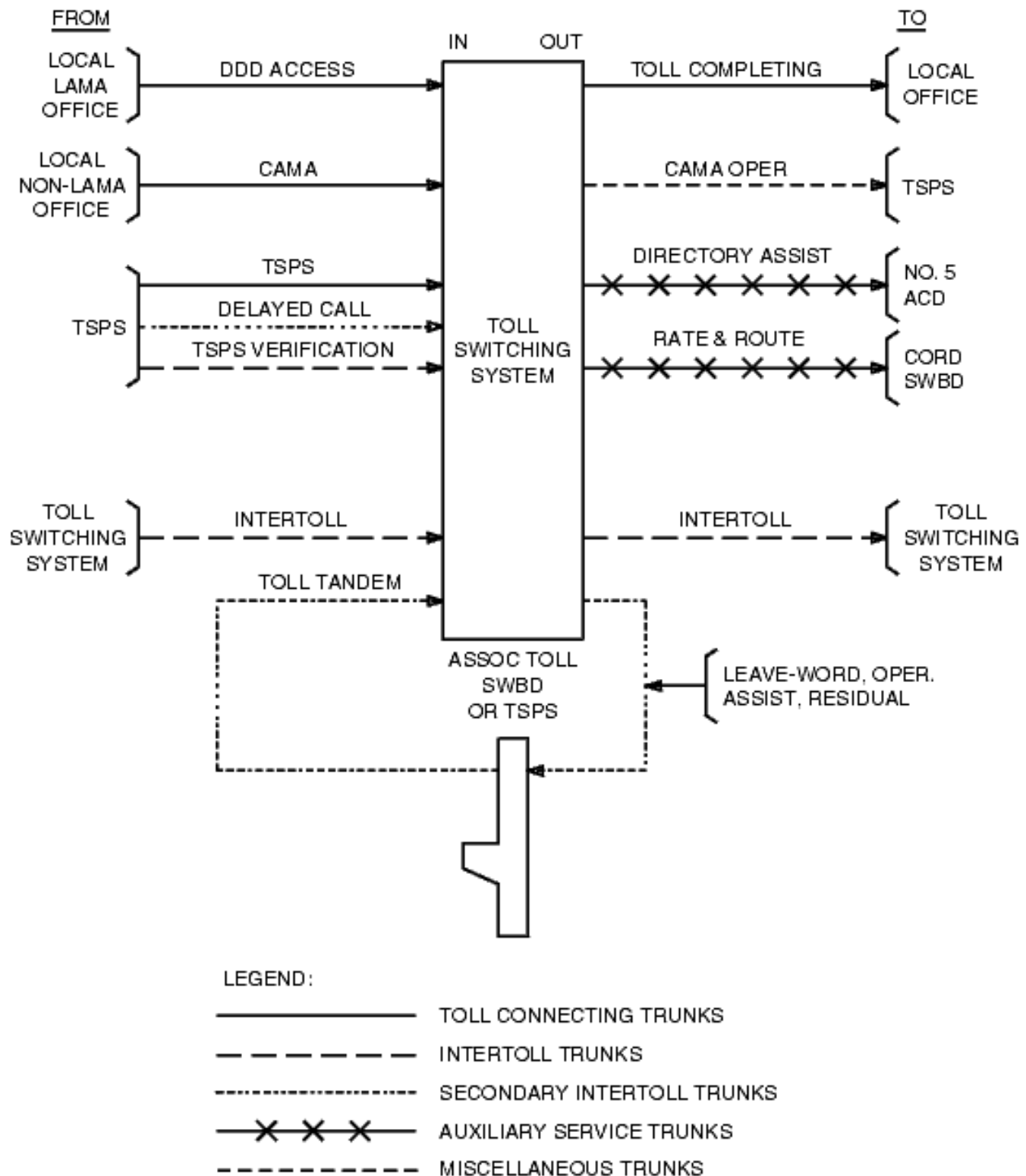


Figure 2-2 Basic Local/Toll Trunk Types

2.1.1.3.1.1 Toll Connecting Trunks

Toll connecting trunks are the trunks that interconnect a local office without toll features to a toll office. These trunks may be 1-way local to toll, 1-way toll to local, or 2-way. Trunks included in this group are as follows:

- Network access trunks
- CAMA trunks
- Operator trunks
- Terminating toll trunks.

2.1.1.3.1.1.1 Network Access

The network access trunks are 1-way trunks from a class 5 office to the toll office. The trunks are used for noncoin toll traffic. Operator assistance for number identification is not provided.

2.1.1.3.1.1.2 CAMA Trunks

The CAMA trunks are 1-way incoming trunks from offices requiring identification to a toll office. These trunks are used for noncoin toll traffic. Recording and timing for calls is done at the toll office. The automatic number identification (ANI) is normally used for the identification of the billing number of the calling party. Certain kinds of calls, such as those from multiparty lines or those encountering an ANI failure in the local class 5 office, require identification to be provided verbally. In these cases, calls are routed to a CAMA operator for operator number identification (ONI) of the calling party.

2.1.1.3.1.1.3 Traffic Service Position System (TSPS) Trunks

The TSPS trunks are 1-way trunks from a class 5 (local) office to a TSPS and from there to the toll office. These trunks are used for directory assistance, special toll, coin, and noncoin traffic. The toll office is an outlet to the network calls to a class 5 office. The TSPS does the call rating and charge recording functions. The TSPS operators collect coins, redirect calls when necessary, initiate charge timing, and perform other operator functions.

2.1.1.3.1.1.4 Toll Completing Trunks

Toll completing trunks are 1-way outgoing trunks from a toll office to a class 5 (local) office.

2.1.1.3.1.2 Intertoll Trunks

Intertoll trunks are used to connect any class 1 through class 4 toll office with any other class 1 through class 4 office. The TSPS verification trunks are included in this group.

2.1.1.3.1.2.1 Primary Intertoll Trunks

Primary intertoll trunks are required to connect any class 1 through class 4 toll office with any other class 1 through class 4 toll office.

2.1.1.3.1.2.2 TSPS Verification Trunks

The TSPS verification trunks are 1-way trunks from a TSPS to a toll office. A verification trunk is used by a TSPS operator to reach (through the toll office) either a toll connecting or an intertoll trunk dedicated for verification service. These dedicated trunks can be used by a TSPS operator to verify the busy or idle status of a called line in a prearranged selection of nearby or distant class 5 offices.

2.1.1.3.1.3 Secondary Intertoll Trunks

Secondary intertoll trunks include trunks from the local/toll office to associated switchboards and from switchboards (or a TSPS) to the local/toll office. Trunks included in this group are as follows:

- Toll tandem trunks
- Operator-assistance and leave-word trunks
- Residual trunks
- Delayed call trunks.

2.1.1.3.1.3.1 Toll Tandem Trunks

Toll tandem trunks are 1-way trunks from a switchboard to a toll office. They are used for originating outward traffic and for the completion of proper assistance and leave-word traffic where a TSPS is not available. Residual traffic received from TSPS operators is also completed by switchboard operators via toll tandem trunks.

2.1.1.3.1.3.2 Operator-Assistance and Leave-Word Trunks

Operator-assistance and leave-word trunks are used to connect the local/toll office to an assistance operator or to a leave-word operator at cord switchboards. Both types of operators are only accessible by operators at their own center or by operators at some distant toll center. Assistance operators and leave-word operators assist other operators at switchboards or a TSPS. These operators may be in the same area or at a distant location. They can help with actions such as verification of busy lines, completion of calls to mobile or marine stations, and the completion of calls originated earlier by a customer in the toll center where the leave-word operator is located. Leave-word and assistance operators can advance the call through the toll office using toll tandem trunks. They can also use toll switching trunks or operator office trunks directly to a class 5 office, if such trunks are provided.

Operator-assistance and leave-word trunks should also be installed between a local/toll office and a TSPS when this type of traffic is to be handled by a TSPS operator. Operator-assistance and leave-word trunks associated with a TSPS are joined at the TSPS through their respective trunk circuits to the equivalent of toll tandem trunks. These trunks are used by a TSPS operator to complete operator-assistance and leave-word traffic through the toll office. This is necessary since a TSPS operator does not have direct access to toll switching trunks or to operator office trunks similar to the access available to cord switchboard operators.

2.1.1.3.1.3.3 Residual Trunks

The TSPS operators handle most types of calls without requiring assistance from another operator. The category of calls that a TSPS operator is not equipped to handle is called residual calls. Residual calls are advanced by a TSPS operator through the associated toll office via a residual trunk to an operator at a 3CL switchboard. This operator position is called the special operator service traffic (SOST) board (or equivalent). The operator at the SOST board then advances the call, via a toll tandem trunk, as appropriate. Typical calls that may require a residual call operator include marine, mobile, and conference calls. The TSPS operators can provide control of some of these calls using special wink signals.

2.1.1.3.1.3.4 Delayed Call Trunks

A delayed call trunk is used by a TSPS operator to reach both calling and called parties by setting up two separate connections through the toll office. The calling and called parties are joined at the TSPS through the delayed call trunk circuit which has two appearances at the toll office. The delayed call trunk is treated at the toll office as two separate and distinct incoming trunks.

2.1.1.3.1.3.5 Auxiliary Service Trunks

Auxiliary service trunks are required for some services but are not used in advancing calls to other offices. The auxiliary service trunks available are as follows:

- Rate and route trunks
- Directory assistance trunks.

2.1.1.3.1.3.6 Rate and Route Trunks

Rate and route trunks are 1-way trunks from a toll office to operators at cord switchboards or desks. Originating operators place calls to these operator positions via rate and route trunks to obtain dialing information (that is, area codes, etc.) and charging rates for operator-assisted calls to infrequently called localities. After obtaining any needed information, the originating operator releases a connection to one of these positions and then completes the call in a normal manner.

2.1.1.3.1.3.7 Directory Assistance Trunks

Directory assistance trunks are 1-way trunks between a toll office and an Automatic Call Distribution System (ACDS) through which directory assistance operators are reached.

2.1.1.3.1.4 CAMA Operator Trunks

The CAMA operator trunks interconnect a toll office with an operator position for ONI of the calling party. Although operator positions used for the ONI function in some systems could include CAMA switchboards, 3CL switchboards, or TSPS positions, calls requiring ONI are handled by TSPS operators for early issues of the software release.

Two trunks are required between the toll office and the position used for the CAMA function. One trunk is used for verbal communication between the operator and customer, and the other trunk is used for the operator to key the calling number into the toll office for AMA recording purposes. As mentioned previously typical local/toll trunk types are listed in Tables 2-1 , 2-2 , and 2-3 . Trunks that are not supported in local/toll applications are listed in Table 2-4 .

Table 2-4 Trunks Not Supported in Basic Local/Toll

TRUNK TYPE	DESCRIPTION
Toll connecting trunks	Combined operator office (between small CDO and toll switchboard operators)
Intertoll trunks	Emergency access (toll switchboard operator access to intertoll trunks)
	Regular access (routine operator access to intertoll trunks)
Auxiliary service trunks	Rate Quote (to audio response system)
	Time and weather (to announcement system)
Miscellaneous trunks	Data processing (direct to data processing system)
	Trouble reporting (direct to data processing system)
	CAMA calls waiting and CAMA suspensions signaling (to non-CAMA positions)

Toll signaling available for a local/toll office is as follows:

- 130-volt simplex signals for ring forward
- Incoming off-hook idle delay dial and loop supervision trunks
- Overlap outpulsing.

2.1.1.3.1.5 Carrier Interconnect Trunks

Trunks for carrier interconnect may connect an equal access end office to a carrier or to operator services. Signaling for these trunks is the equal access signaling plan and is covered in the Carrier Interconnect Feature section.

2.1.1.3.2 Call Processing Features

The Call Processing features necessary for offices to operate as local/toll offices are included in Table 2-5 .

Table 2-5 Call Processing Features for Local/Toll Service

FEATURE SUBGROUP	FEATURE NAME
3-Digit translation	Trunk-to-Trunk Connections
	0/1XX Terminating Toll Center and Operator Codes
	NXX Central Office and Special Purpose Codes NXX Area Codes
	NXX Area Codes
	6-Digit Translation
	Digit Deletion
	Digit Prefixing
	Code Conversion
	Route Advance Logic
	International Direct Distance Dialing (IDDD) Via Function
	Recorded Announcement Service (Toll)

2.1.1.3.2.1 Trunk-to-Trunk Connections

The Trunk-to-Trunk Connections feature permits an office to set up and disconnect stable connections between various trunks and service, or test circuits in response to TTY request, or as a part of the switching function. Any such connections should meet the necessary toll transmission requirements.

2.1.1.3.2.2 Three-Digit Translation

Three-Digit Translation features available and necessary for toll operations include the following:

- 0/1XX terminating and toll center codes
- central office and special purpose codes
- NPA area codes.

2.1.1.3.2.2.1 0/1XX Terminating Toll Center Codes

This feature permits the translation of the 200 3-digit codes of the form 0/1XX. These are made available to operators or generated by call processing for certain toll calls to modify routing or call handling logic.

2.1.1.3.2.2.2 Central Office and Special Purpose Codes

This feature permits the translation of toll-free Service Access Codes (SACs) such as 800, 877 or 888. These include central office codes and special purpose codes such as 555 for toll directory assistance, and service codes such as 411 and 911.

2.1.1.3.2.2.3 NPA Area Codes

This feature permits the translation of area codes in either the 0/1XX or three-digit form.

2.1.1.3.2.3 Six-Digit Translation

This feature permits the selection of a preferred route when a foreign numbering plan area (FNPA) can be reached

by more than one route. Up to or more than the first six digits of the 10-digit number (area code and office code) of each call to that area are translated to select the preferred route. Six-digit translations are also used under some conditions with office and toll center codes and subsequent digits.

2.1.1.3.2.4 Digit Deletion

This feature permits a number of digits to be deleted before they are outpulsed to the next office. The number of digits which can be deleted is independent of the number of digits translated for routing. Any combination of digits translated and digits deleted may be used. Digit deletion always begins with the first digit received. Some of the more important uses of the Digit Deletion feature are as follows:

- (a) Send forward all digits received. (Delete nothing.)
- (b) Drop an area code. (Delete three.)
- (c) Drop an office code. (Delete three.)
- (d) Drop both the area and office codes. (Delete six.)
- (e) Drop an area and/or office code and prefix.
- (f) Drop part of an office code. (Delete one or two.)

2.1.1.3.2.5 Digit Prefixing

This feature permits prefixing from one to six digits to a group of incoming digits. An example is the prefixing of the extra digits required for switching through a step primary center.

2.1.1.3.2.6 Code Conversion

This feature permits a local/toll 5ESS[®] switch to substitute some or all of the routing digits received before transmitting them to other offices. This provides for flexibility. For example, a 5ESS[®] switch local/toll office may need to supply routing digits. The 5ESS[®] switch can delete some of the digits received and replace them with the digits required.

2.1.1.3.2.7 Route Advance Logic

This feature provides the ability to determine alternate routing based on the received digits.

2.1.1.3.2.8 International Direct Distance Dialing (IDDD)

After receiving a 6-digit international prefix and country code, a connection may be to a trunk to route the call to a gateway office.

2.1.1.3.2.9 Recorded Announcement Service (Toll)

The recorded announcement feature for a toll office provides connections for incoming trunks to verbal announcements for certain conditions. An incoming trunk is connected to an announcement for the following reasons:

- Partial dial
- Blockage

- Disaster conditions
- Vacant code.

Announcements can be provided on a non-barge-in basis. Answer supervision is not returned to originating offices.

2.1.1.3.2.10 Carrier Interconnect Service

There are several ways to access the Carrier Interconnect feature. Access to a carrier may be gained by dialing a 10XXX prefix, by dialing a 950-XXXX prefix, or by being presubscribed to a particular carrier. A carrier may provide inter-LATA, international, or combined service.

2.1.1.3.3 Additional Features Available for Local/Toll Service

Additional features are available for local/toll service. These include Toll Signaling, Line and Trunk Test, Billing, and Office Measurement features. The features are listed in Table 2-6 and are described in the following sections.

Table 2-6 Additional Features Available for Local/Toll Service

FEATURE GROUP	FEATURE SUBGROUP	FEATURE NAME
Toll Signaling		Interoffice Trunk Signaling (Toll)
Trunk Test Features	Test Lines	101-Type Test Line
		103-Type Test Line
		104-Type Test Line
		Multiple Trunk Test Capability
		Selection of Transmission Test Levels (TLP2, TLP3)
		2-Way Trunk Maintenance
Billing		Toll CAMA billing through Automatic Message Accounting Teleprocessing (AMATPS) or Local Automatic Message Accounting (LAMA)
Office Measurements		Traffic Measurements (Toll)
		Plant Measurements (Toll)

Signaling between toll exchanges is essentially the same as between local exchanges. Additional signaling types associated with operator systems used with toll exchanges are:

- Ring forward
- Double-ring forward
- IDDD wink.

Ring forward, or rering is a signal used by an operator at the calling end to recall an operator at the called end of an established connection. Double-ring forward signaling is used by the TSPS operators to signal cordboards that the originating station has disconnected. The IDDD wink signal is used as a start signal for outpulsing to a gateway office.

The Trunk Test, Office Measurements, and Billing features are listed in Table 2-6 .

2.1.1.3.4 Feature Operation

2.1.1.3.4.1 Local/Toll Operation

In a local/toll office, the CAMA feature provides toll billing service. A local/toll office also provides switching of toll

trunks not associated with the CAMA feature (non-CAMA) in much the same way as trunks involving the CAMA features. The local/toll offices collect and store toll information and message unit billing data on CAMA calls. The billing data includes the called number, the calling number, time of answer and disconnect, plus other information.

To perform the CAMA function, a local/toll office must recognize a service request from a local office, perform called number reception and identification on either an ONI or ANI basis, identify the called party, complete the call, and collect the billing data.

The following paragraphs provide the description of a typical call through a local/toll CAMA office and into the network. Figure 2-3 illustrates the interfaces involved in non-local automatic message accounting (LAMA) calls. Figure 2-4 is a feature flow diagram of the CAMA function.

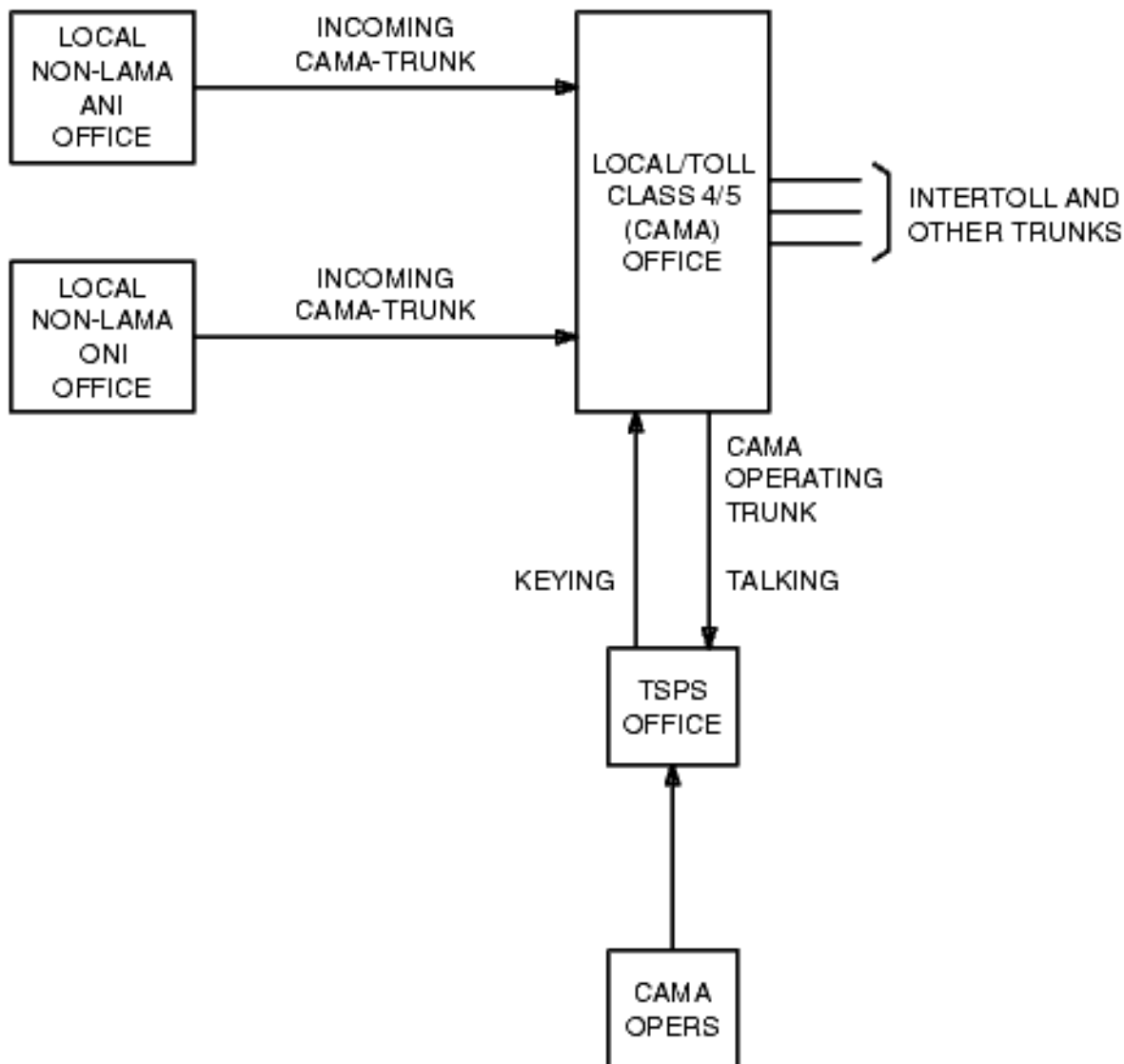


Figure 2-3 Interfaces From Non-LAMA Offices to a Local/Toll Office for CAMA Function

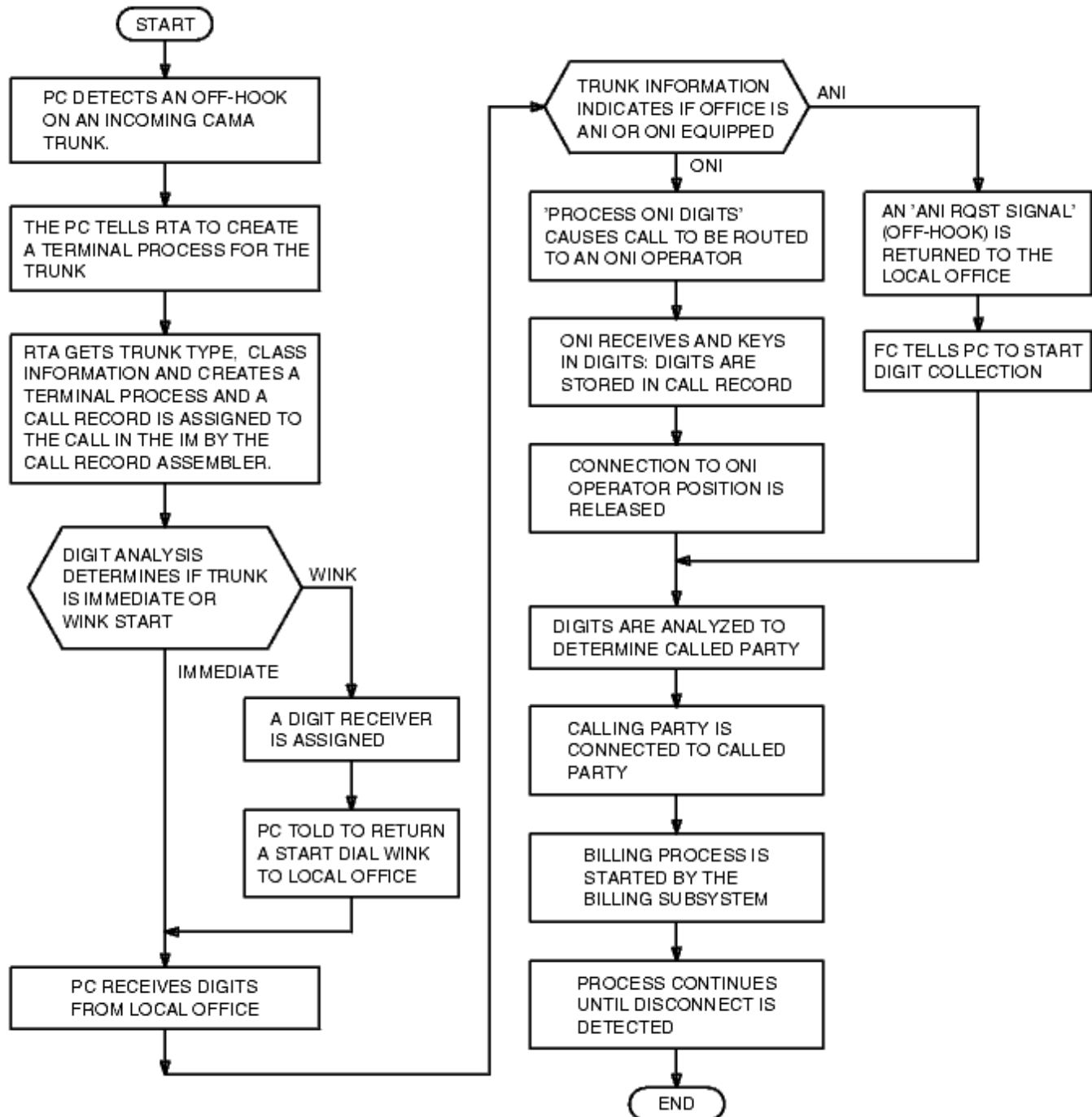


Figure 2-4 Performing the CAMA Function for Local ONI and ANI Offices - Feature Flow Diagram

When an origination occurs on an incoming CAMA trunk, peripheral control (PC) detects the incoming seizure. The PC then informs the routing and terminal allocation subsystem in the switching module (SM) to create a terminal process for the trunk. The routing and terminal allocation subsystem gathers information concerning trunk type, service class, etc., for the trunk and creates a terminal process with the trunk information. A call record is assigned to the call in the SM by the call record assembler. The record is used to store data concerning the call as it is processed. The PC subsystem then sends a start signal to the distant end to start outpulsing if a start-dial signal is required (when not immediate start). Digit analysis in PC initializes the digit analysis data block and retrieves trunk information, timing, and digit translation information from the office dependent data (ODD).

An ANI request (off-hook) message is returned to the CAMA trunk if applicable and the customer state is changed to indicate dialing. The feature control (FC) subsystem then sends PC a message to signal the start of ANI digit collection.

If ONI treatment is requested, a path to an ONI operator position is defined, and an operator terminal process is generated. This terminal process informs the originating terminal process to set up the network path. When the path setup is complete, audible ring is applied back to the CAMA trunk.

When the ONI operator answers, audible ringing is removed, the customer is connected to the operator, the call status is changed, and digits can then be keyed by the operator. The keyed digits are then stored in the call record, and the path to the operator is released. The call is then routed the same as a non-CAMA call.

When the call is answered, AMA data collection is accomplished by the billing subsystem which communicates with call processing via the administrative subsystem. The administrative subsystem inserts data that is used by the billing subsystem into the call record at different stages of the call.

2.1.1.3.4.2 Carrier Interconnect Operation

The Carrier Interconnect feature provides customers access to their choice of long distance carriers. Access is gained by dialing the proper prefix number. If a customer has presubscribed to a particular carrier, then it is not required to dial an access code, and any inter-LATA call is automatically routed to the customer's carrier. Billing records may be made at both originating and terminating offices. If a carrier is not specifically selected, then the call will be routed to an office primary carrier. Screening is performed on all calls. Calls may be blocked if the customer is a nonpayer or for other reasons. Appropriate announcements are provided to indicate to the customer the type of problem that has occurred with the call.

2.1.1.4 Feature Assignment

Trunking necessary for the feature is added, as needed, by first adding the hardware and then equipping the trunk by entering appropriate recent change (RC) input messages or by an office data administration (ODA) run.

2.1.1.5 Limitations and Restrictions

2.1.1.5.1 Limitations

Every 5ESS[®] switch local/toll office must have access to Traffic Service Position System (TSPS) operators if the CAMA-ONI function is needed.

2.1.1.5.2 Restrictions

Access to the toll network can be restricted. This is done by using line class codes.

Restriction for carriers is performed by the Carrier Interconnect feature. Customers may be restricted from all carriers, only selected carriers, only international carriers, or combinations of the above.

2.1.1.6 System Resources

2.1.1.6.1 Hardware

Toll service trunks are required for local/toll operations in addition to nontoll message service trunks. The toll service trunk types and their application in 5ESS[®] switch toll operations are covered in Tables 2-1, 2-2, and 2-3. These tables list the incoming, outgoing, and 2-way trunks, respectively. The type of interfacing, pulsing, and start signals used by each of the trunk types are included. To interface with analog trunks, one circuit pack which contains four trunk circuits is required. One circuit pack is required to terminate each T1 line. The circuit packs required for the toll

service trunks are listed in Table 2-7 .

NOTE: Digital trunks derived from directly interfaced T1 lines can also be used in place of some analog trunks.

Table 2-7 Circuit Packs Required for Toll Service

LIST NUMBER	CP EQUIP NUMBER	CODE	DESCRIPTION
8	SN112	TLS0	Toll 2-wire loop supervision outgoing
9	SN113	TLSI	Toll 2-wire loop supervision incoming
10	SN114	T4EM	Toll 4-wire E&M supervision
11	SN115	T2EM	Toll 2-wire E&M supervision

2.1.1.6.2 Software

The 5E6 software release provides all the necessary software for local/toll operation and carrier interconnect.

2.1.1.7 Feature Assignments

The translations necessary for local/toll features are only those required to define the trunks and trunk groups, digit analysis, restriction, etc. The translation to define the individual trunk groups and members of each trunk group can be made via the initial ODA run, RC messages, or the Remote Memory Administration System (RMAS). The translation arrangements for both the ODA and RC can be made via video display terminal using the interactive process provided by the RC or ODA menus and views. The same views are used for both ODA and RC.

Adding, deleting, and changing the status of trunks and trunk groups required for toll service can be done using the appropriate RC methods. Refer to 235-118-2xx, *5ESS® Switch Recent Change Procedures* for more information concerning recent change.

For the 5E6 software release [man-machine language (MML)], use the following input message to access the RC menus and views. RCV:MENU:DATA,APPRC [,PRINT] [,DETAIL] [,SUMMARY];. Refer to 235-600-700, *5ESS® Switch Input Messages Manual*, for additional details.

The following RC views are used to define the trunk groups and trunk circuits used in a 5ESS® switch.

- TRUNK GROUPS_TRUNK GROUP VIEW
- TRUNKS_TRUNK GROUP & MEMBER VIEW

To implement the Carrier Interconnect feature requires changes to many different views. Views that are changed include Line Views, Line Miscellaneous and Group Views, Trunk and Trunk Group Views, and Digit Analysis Views. Refer to the Carrier Interconnect Feature for more information.

Local/toll offices have the option to use a LAMA or Automatic Message Accounting Teleprocessing System (AMATPS) for billing purposes. Office billing parameters are configured in the MISCELLANEOUS_OFFICE PARAMETERS VIEW. All the office parameters are initially set during the ODA process but can be altered by RC procedures.

Refer to 235-118-2xx, *5ESS® Switch Recent Change Procedures*, for detailed information on recent change.

When offices are provided with either a LAMA or AMATPS billing system, a special maintenance input message must also be entered to indicate the characteristics unique to each system. The input message to set the characteristics for offices using MML conventions is: SET:AMA;CONTROL:{OFFICEID=a EXPDATE=b START=c STOP=d MT=e OPTION=f AMATPSWD=g HOCPSWD=h BACKSWD=i OFFTYPE=j};.

An explanation of the contents of the input message is as follows:

- a = Office identification
- b = Number of days (1-99) until AMA tape expires
- c = Hour and minute of start time, in the form of hh,mm
- d = Hour and minute of stop time, in the form of hh,mm
- e = Default tape drive number for the automatic tape writing process
- f = Option TP - Teleprocessing option or TAPE - Tape option
- g = AMATPS password
- h = Host collector password
- i = Backup host collector password
- j = Office type.

Other input messages are available to change characteristics, obtain status, etc. These input messages and their descriptions are provided in the Input Messages Manual.

The following switch forms are available for recording trunk circuit information which can be used for office record purposes.

- (a) **5202-Trunk Group Record:** Used to define each trunk group.
- (b) **5204-Trunk Features and Assignment Record:** Used to define each member of a trunk group.
- (c) **5271.1-Trunk Equipment Record:** Used to define the analog equipment location for each member of a trunk group.
- (d) **5271.2-Digital Equipment Record:** Used to define the digital equipment location for each member of a trunk group.

For more detailed information on these forms, refer to the *5ESS[®] Switch Translations Guide (TG-5)*.

2.1.1.8 Local Testing

Trunk testing capabilities are provided to test the trunks in a *5ESS[®]* switch toll office. Trunk tests are available through the trunk and line work stations (TLWS), or as part of the automatic progression testing (APT) routine, or as part of the Automatic Trunk Test Scheduler (ATTS). The ATTS is a secured feature that can be optionally purchased. Trunks are tested after installation, on a routine basis, and when troubles occur.

Two additional test lines are provided in local/toll offices for testing toll trunks. These are the 103-type and 104-type test lines.

- (a) **101-Type Test Line:** The 101-type test line provides a communication and test line. It is used for reporting trouble, making transmission tests, etc.
- (b) **103-Type Test Line:** The 103-type test line provides for the overall testing of the supervisory and signaling functions of intertoll trunks with ring forward (rering) features.
- (c) **104-Type Test Line:** The 104-type test line provides a test termination for 2-way loss measurements and

1-way noise checking.

- (d) **Multiple Trunk Test Capability:** The multiple trunk test capability feature permits personnel operating TLWSSs and centralized trunk test units (CTTUs) to do simultaneous testing on two or more trunks.
- (e) **Selection of Transmission Test Levels:** Some local and toll trunks operate at different transmission levels. The 5ESS[®] switch is arranged to automatically adjust the loss on the incoming side of the test trunk to obtain the appropriate test signals from trunks under test.
- (f) **2-Way Trunk Maintenance:** The 2-way trunk maintenance feature provides bidirectional maintenance states for 2-way trunks. One state is used to block calls in both directions. The other state is used to block outgoing calls while not blocking incoming calls. This latter state is called the lockout state.

2.1.1.9 Measurements

Traffic and plant measurements for trunks in a local/toll office are similar to those made from offices without the Toll feature. Some additional traffic measurements and some specialized plant measurements, however, are provided for toll operation. Information on the additional measurements for toll operation is included in the following paragraphs. For additional information, refer to 235-070-100, 5ESS[®] *Switch Switch Administration Guidelines*.

2.1.1.9.1 Traffic Measurements

Standard traffic measurements for a local/toll office include the following:

- Division of revenue measurements
- Network management measurements.

2.1.1.9.2 Plant Measurements

Plant measurements in the service group are made on the CAMA trunks in toll offices.

2.1.1.9.2.1 Base Measurements

The measurements included in the base measurements group on CAMA calls include CAMA seizures and CAMA-ONI calls.

The number of CAMA seizures is the same as a traffic trunk group attempt measurement for any non-CAMA trunk. The CAMA-ONI calls count is the number of seizures on ONI trunks as well as on ANI trunks indicated to be on a multiparty line.

2.1.1.9.2.2 Service Measurements

The measurements included on CAMA CAMA-ONI ineffective attempts.

The CAMA-ANI troubles are the total number of CAMA seizures for which ANI failure digits are received. This count includes the following:

- CAMA-ANI failure (ANF)
- CAMA-ANI local office failure (AIF)
- CAMA-ANI office failure (AOF).

CAMA free calls are the total number of CAMA seizures which are not blocked and do not result in proper AMA entries. Plant measurements are generated once every 24 hours and are sent to the switching control center and the master control center once a day. The reports generated in the last 24 hours can also be requested on demand. After a new 24-hour total is accumulated, the preceding one is not stored in the 5ESS[®] switch.

The CAMA ineffective attempts count provides the total number of CAMA seizures which result in ineffective attempts due to improper operator handling.

2.1.2 Software Defined Network Network Access Point

2.1.2.1 Feature Definition

The network access point (NAP) capability consists of a set of features which provide switched access to a 4ESSTM switch action point (ACP) for software defined network (SDN) service. A NAP is a local switch (5ESS[®] switch) which processes SDN calls and routes them to the Network and Computing Services (NCS) network. The SDN is a set of capabilities in the ACP which can emulate private line networks within the public switched network (PSN). The SDN service provides many new features and service alternatives to those currently using private line networks.

2.1.2.2 Availability

This feature is available with the 5E6 and subsequent software releases.

2.1.2.3 Application

The SDN service is aimed at large businesses, often to replace existing private line networks currently in use. The only new interface that will be required for new or existing customers will be the addition of dedicated SDN facilities between the customer and the 5ESS[®] switch.

2.1.2.4 Feature Operation

The SDN provides end-to-end voice and data communications between prespecified customer locations. The SDN service is provided by the interaction of ACP switches, network control point (NCP) data bases, and the service management system (SMS). Phase 1 of the SDN service was implemented in the 4ESSTM switch with the 4E9 software release which is acting as an ACP. The SDN service is provided to customers by two means: customers may be directly connected to the 4ESSTM switch (directly homed on an ACP) or they can be connected through another office (switched access architecture).

The NAP must be able to distinguish SDN calls from any other calls. All SDN calls will arrive at the NAP over facilities dedicated to SDN except those served by a centrex arrangement. Calls coming from a centrex arrangement will require that a single-digit prefix be used to access SDN.

2.1.2.4.1 On-Net Calls

The SDN on-net calls are calls from one station on a particular SDN "virtual" network to another station on the same SDN network. The SDN on-net calls may be either in the form 8 plus a NANP DN without the NPA or 8-N(0/1)X-XXX-XXXX.

The caller dials "8 plus a NANP DN without the NPA" where the "8" identifies the SDN call, and the rest of the digits identify the called party. The PBX recognizes the "8" as a request for a dedicated SDN line. The PBX absorbs the "8" and sends the a NANP DN without the NPA over a dedicated SDN line to the NAP.

The NAP recognizes this call as an SDN call by its arrival over the dedicated SDN line. The NAP routes the call with the dialed digits and the ANI corresponding to the incoming line to the 4ESSTM switch ACP over dedicated SDN

CAMA trunks or non-dedicated CCS7 trunks.

The ACP identifies this call as SDN by arrival over the dedicated SDN trunk. The ACP formulates a query containing the ANI and the dialed digits and sends this to the NCP. The ACP cannot route the call until the query response is received.

The NCP uses the ANI to find the customer record and determines if the call is allowable by checking its customer privileges. If the call is allowable, the NCP translates the dialed digits into a 10-digit routing number and returns it to the ACP along with instructions to create an SDN billing record. If the call is not allowable, the NCP returns that indication to the ACP.

The originating ACP routes the call according to the 10-digit routing number along with the SDN traveling class mark. If the indication from the NCP is that the call is not allowable, the call is routed to an announcement.

When the terminating ACP receives the call, it detects the traveling class mark and determines that this is an SDN call. If the destination station is homed on a PBX that is directly connected to this ACP, the call will be routed over these facilities. If the destination station is homed on a NAP, the ACP will route the call over dedicated trunks to the NAP.

The terminating NAP recognizes this as an SDN call by its arrival over dedicated trunks and routes this call to the terminating PBX. In this case, the terminating PBX routes the call to the desired station.

2.1.2.4.2 Off-Net Calls

An off-net call is a call that originates at an SDN station and terminates at a non-SDN station. The caller dials "8 plus the full North American Numbering Plan (NANP) Directory Number (DN). In other words, "8" plus the plain old telephone service (POTS) number of the station being called. The actions are identical to the on-net call until the NCP is reached. At the NCP, the screening and customer privileges are still checked but no translation of the dialed digits occurs. The ACP is then instructed to route the call and to create an SDN billing record.

2.1.2.5 Limitations

The number of dedicated SDN CAMA trunks between the 5ESS[®] switch NAP and the 4ESSTM ACP must be engineered to the appropriate level for the number of originating SDN customers. The number of dedicated SDN CAMA trunks will be a physical limitation and, as such, should be engineered with this in mind.

2.1.3 Distributed Manual Call Gapping

2.1.3.1 Feature Definition

The Manual Call Gapping (MCG) feature is a network management code control that regulates the rate at which calls for a specified set of dialed digits or destination codes are forwarded from the 5ESS[®] switch. This was implemented in the AM in past software releases and called prior to routing. In order to accommodate certain distributed call processing features of the 5E6 software release, a portion of the MCG functions was copied to the SM. This feature decouples the matching of dialed digits to digits in the control list from the route request and allows the function to be performed either in the AM or in the SM.

For additional information about the Network Management features, refer to Section 6 .

2.1.3.2 Feature Operation

2.1.3.2.1 System Perspective

This feature simply copies existing code control (MCG) distributing functions previously performed only in the AM to the SM, and adds the necessary interprocessor communication. The specific functions copied to the SM are not

toll-free-type call specific, but are general purpose functions. Administration of MCG controls (adding, deleting, modifying according to network management controls or on-site requests) and the gapping phase of manual call gapping remain in the AM. However, the control structures must be updated in the SM.

The matching phase of manual call gapping resides in both the AM and the SM. Certain calls [for example, POTS, and inward wide area telecommunications service (INWATS) calls] in non-direct link node (DLN) offices invoke matching in the AM. However, INWATS calls in DLN offices and all switching service point (SSP) calls invoke matching in the SM. The capabilities mentioned distribute common channel signaling (CCS) direct signaling data base query handling for toll-free-type services. The DLN for CCS Capacity Improvement feature moves the processing of INWATS numbers from the AM to the SM, in offices that have the DLN. The Service Switching Point feature handles the Bell Operating Companies version of toll-free numbers using the DLN, thus processing the toll-free numbers in the SM/DLN.

2.1.3.2.2 Changes (Network Management Controls or On-Site Changes)

In the AM, the network management administration system process accepts the control change request and generates a message to network management control containing the change data. The AM control list and search tree are subsequently updated. Code controls discretizes and measurement counts are also administered, in addition to a global status flag indicating whether or not any controls are active. The SM copy of this flag is updated, and messages are broadcast to each SM updating the SM control list, search tree, and status flag.

2.1.3.2.3 Applying Controls

Checking for code controls, the matching phase is called on either the SM or AM. If a match occurs in the SM, a message is sent from the originating terminal process to the AM. The AM performs the gapping phase for all calls by determining whether the call should be blocked or not.

2.1.3.2.4 Periodic Polling of the SMs

Periodic polling of the number of controls in the SMs is performed to verify inter-processor data integrity. Polling is performed twice daily (7:47 and 19:47) prior to the busy hours and consists of the AM sending each SM the number of controls it has installed. If any SM has the incorrect number of controls, the SM initializes its control list from the master copy in the AM.

2.1.3.2.5 Audits

A system audit is run routinely, can be requested via I/O, or if the above functions find an error and triggers an assert an audit is called. When an error is detected in the control list or search tree, two actions can be taken; an audit can be scheduled or, as mentioned above, if the error is the SM, the control list can be initialized from the master copy in the AM. The audit consists of two parts; auditing the control list and auditing the search tree. The search tree search depends on the control list, therefore, the control list must be verified first. If any errors are found in the control list, the invalid control is removed from the list. Once the control list is determined to be correct, the search tree is checked. If any errors are found in the search tree, it is rebuilt from the data in the control list. The existing audit was copied to the SM. Each processor audits its own list and tree. The periodic polling and SM list initialization from the AM master keep the individual processors data in synch.

2.1.3.3 Availability

The Distributed Manual Call Gap feature is available in 5E6 and later software releases.

2.1.4 MAC-OSS/Multiple Entry Recent Change Interface

2.1.4.1 Feature Description

This feature provides a data link interface to the Machine Administration Center Operations Support System (MAC-OSS) utilizing the standard *UNIX*® RTR operating system BX.25 session layer. Changes to the 5ESS® switch ODD data base can be made using existing batch capabilities, existing single-command text recent change capabilities, and new text interface options to batch.

The MAC-OSS/Multiple Entry Recent Change has the ability via the new data link interface, to assign multiple trunks, multiple codes, or multiple route indexes on a single RC/V form. The 30-minute traffic, hourly traffic separations, 24-hour plant, and daily traffic separations reports are available to MAC-OSS upon request. Also MAC-OSS/Multiple Entry Recent Change feature is able to request trunk, trunk group, route index, and local digit translator (LDIT) office records by non-key values. This includes the ability to obtain a total routing pattern for a given trunk group number (TGN) and code pair.

2.1.4.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

2.1.5 MAC-OSS Access of Batch Recent Change

2.1.5.1 Feature Description

The MAC-OSS Access of Batch Recent Change feature provides MAC-OSS and on-site craft with the ability to make changes to the 5ESS® switch ODD using existing batch capabilities through text recent change interface. Additionally, this feature provides the ability for MAC-OSS to access batch history reports through the craft shell interface.

2.1.5.2 Feature Operation

2.1.5.2.1 User Perspective

MAC-OSS is a central operations and support system, developed and operated by NCS. In early software releases, the MAC-OSS interface feature provided a data link interface between a 5ESS® switch and MAC-OSS utilizing the standard *UNIX*® RTR operating system BX.25 session layer. Using this interface, MAC-OSS can assign multiple trunks, multiple codes, or multiple route indexes on a single RC/V form. This feature provides the following additional functions:

- The ability for MAC-OSS and on-site craft to access batch recent change from text recent change.
- The ability for MAC-OSS to access batch history reports.

2.1.5.2.1.1 Accessing Batch Recent Change From Text Recent Change

The MAC-OSS interface feature provided MAC-OSS with a recent change interface by allowing the MAC-OSS interface controller to create the text program by passing additional parameters (mode, clerkid) in prior software releases. The recent change application text used these additional parameters to invoke the batch recent change mechanism. The on-site craft interface was not changed.

The 5E6 software release MAC-OSS access of batch recent change feature allows MAC-OSS to invoke the recent change application text without any additional parameters. The batch capability of text recent change is provided by the addition of a new input line after the text recent change is invoked, giving the on-site craft the same capabilities as MAC-OSS. Also added to text recent change is the ability to do a batch mode release of previously batched recent changes, and the ability to switch back to the mode of applying recent changes immediately. This text batch recent change capability allows text recent change access and control over batch recent change by the interactive user (on-site craft) and electronic user (MAC-OSS). This feature enables the MAC-OSS and on-site personnel to

perform the following functions:

- Enter recent change forms that are to be applied immediately to the data base.
- Enter forms to be batched and applied on demand (DEMAND) or applied at a specified release date and time (TIMEREL).
- Change the release date or the release time or both of TIMEREL type batched forms.
- Delete TIMEREL type batched forms.
- Release either DEMAND or TIMEREL type batched forms so that the forms are applied to the data base.
- Change the input mode of form entries between being applied to the data base immediately and being batched.

When the Text Recent Change process is invoked, the user may input a combination of input lines to achieve the desired functions. These input lines to text recent change are listed in program documentation standards (PDS) format, but they may be entered in man-machine language (MML) format. (Input lines in items 2 through 7 provide the new capabilities.)

- (1) FORM (view,action),att val,att val,...,action
- (2) MODE BMI,{DEMAND|TIMEREL},CLERK=clerkid
- (3) MODE BMR,CLERK=clerkid
- (4) MODE IM
- (5) VFYMODE
- (6) LASTSO
- (7) NEXTSO

view	Represents the form view.
action	The action to be taken on the form. Action may be CHG, NEW, or OUT.
att val	Attributes and value pairs to specify key and data items and their assigned value.
BMI	Batch mode input (BMI) causes subsequent form entries to be matched.
DEMAND	Sets the batch type allowing batch form entries to be released on demand.
TIMEREL	Sets the batch type allowing batched form entries to be released at a specified date and time.
clerkid	Specifies the file where batched form entries are stored.
BMR	Batch mode release (BMR) releases previously batched FORM entries. Typically used to release demand batch type batched FORM entries; but can be used to release TIMEREL batch type form entries.
IM	Causes subsequent FORM entries to be applied to the data base immediately.
VFYMODE	Causes the current mode to be displayed.

LASTSO Causes the key of the last service order, (that is, ORDNO, ITNO, MSGNO) to be displayed.

NEXTSO Causes the key of the next service order to be displayed.

When the MODE BMI input line of DEMAND type is entered, all subsequent recent change form entries are stored in the file indicated by the clerkid, and applied to the data base on demand. If the MODE BMI input line of TIMEREL type is entered, a BV1 form entry is expected in the following input line. This BV1 form contains service order information comprised of an order number, an item number, a message number, and the date and time that the forms are to be released. Recent change form entries that follow a BV1 form are stored in the file indicated by the clerkid and released on the date and time specified in the BV1 form.

All the recent changes batched in the CLERK file (either DEMAND or TIMEREL type) are applied to the data base when the MODE BMR input line is entered.

Any entry of the MODE IM input line causes all subsequent recent change form entries to be applied immediately. This is the mode where text recent change works currently. Immediate mode is the default mode for the 5E6 software release implementation.

Recent change application text returns information concerning the current mode along with the clerkid, if applicable, when a VFYMODE input line is entered. For subsequent recent changes which are applied immediately, the value IM is returned (for example, "OK IM"). For subsequent recent changes that are batched, the value BMI is returned along with either TIMEREL or DEMAND and the clerkid (for example, OK BMI DEMAND CLERK=f or OK BMI TIMEREL CLERK=f).

If a LASTSO input line is entered, the recent change application text returns the value of variables (that is, srv_ord, item_no, msg_n) for the last recent change form entered. This input is relevant only in the BMI mode of TIMEREL.

When a NEXTSO input line is entered, recent change returns the service order variables for the next recent change form entry. This also is only relevant when the mode is BMI of TIMEREL type.

Input lines MODE BMI, MODE IM, VFYMODE, MODE BMR, LASTSO and NEXTSO, must appear on a line by themselves. Input appearing on the same line will be flushed without warning.

The MAC-OSS interface controller sends requests and receives responses from batch recent change. When the MAC-OSS sends a recent change file to the 5ESS[®] switch, the entire file is scanned for level 1 (syntax) and level 2 (consistency) errors. All recent changes which fail are rejected, and a list of error messages is sent to MAC-OSS immediately.

2.1.5.2.1.2 Accessing Batch History Reports

When the 5ESS[®] switch MAC-OSS interface controller receives a batch history request from MAC-OSS, the request message (PDS format) is forwarded to a "craft shell" process where it is parsed and sent to the recent change batch controller. This craft shell provides the ability to redirect output which is normally spooled to the read-only printer (ROP) to a specified logical device.

In addition to the request input, the return destination information is also sent to the batch controller. The batch controller processes the message and sends the requested batch history information back to the batch history subroutine via a "named pipe" specified in the destination information.

The request from MAC-OSS is in the same format as the REPT:RCHIST craft input message and consists of two formats.

- (1) ACTIVITY<RETURN>
- (2) CLERK clerkname[,FORMAT {SUMARY|DETAIL}] [,ALL] [,PENDING] [,COMPLETE] [,ERROR] [,DEMAND]

[,TIME (MMDDYYHHMM,MMDDYYHHMM)] <RETURN>

clerkname	Clerkname entered on request.
SUMMARY	For each record selected by this report, format by key only.
DETAIL	For each record selected for this report, format the entire recent change record.
ALL	Select report of all recent changes. Recent changes selected could be pending, completed, error, or demand.
PENDING	Select report of pending recent changes.
COMPLETE	Select report of released recent changes that were successfully completed.
ERROR	Select report of recent changes released with error
DEMAND	Select report of demand recent changes.
TIME	The range of times between records are selected.

The first format request batches recent change information listing the activity of recent changes for every clerk that has entered batch recent change. The second format generates a summary or detailed report specific to a clerk who entered batch recent changes.

The output of the batch history request is the same output currently being sent to the ROP. Instead, the output is sent to the MAC-OSS interface controller. The MAC-OSS controller will not reformat the output in any form.

2.1.5.2.2 System Perspective

2.1.5.2.2.1 Accessing Batch Recent Change

Text batch recent change provided to on-site craft is also provided to MAC-OSS through the MAC-OSS interface controller BX.25 data link interface. Existing recent change subsystem functions of the MAC-OSS interface controller provides an interface to recent change application text. The MAC-OSS interface controller handles both immediate and batch recent changes. The MAC-OSS may send input lines in either PDS or MML format. When the MAC-OSS receives a text recent change request, it branches off a new process and establishes standard I/O channel pipes between the MAC-OSS process and the new process.

Once the application process has been initiated, recent change subroutines are called to process the data in the data field of the MAC-OSS request. The data, which consists of the input lines discussed previously, is sent to the recent change application text. If the input line is a form entry, it is split into fields and sent to the application text one field at a time. A response is collected for each field. If an error occurs while inputting a field, the application text is sent a command to destroy all changes made to the current form. Processing is continued with the next input line. Input lines that are not form entries are not split and are sent to application text.

Once the application text session is started, it continues until either the MAC-OSS interface receives an application text session termination request from MAC-OSS, or the MAC-OSS interface controller session is terminated. This session terminates either when it receives a disconnect from MAC-OSS, or if it times out.

2.1.5.2.2.2 Accessing Batch History Reports

Batch history requests from MAC-OSS are sent to the 5ESS[®] switch MAC-OSS interface controller with PDS formatted batch history input messages in the data field of the request. More than one PDS message can be sent in

the MAC-OSS request package; individual messages are separated by a <RETURN>. Upon receiving a batch history request, the MAC-OSS controller branches off creating a new process and establishing standard I/O channel pipes between the controller and the new process. Communications over these pipes is verified to insure that the new process is created successfully. The craft shell is executed over this new (child) process.

After the craft shell process has been started, the MAC-OSS craft shell function passes the PDS messages to it, and collects the output messages from the designated named pipe and sends the output back to the MAC-OSS. An individual output reply message is sent to the MAC-OSS with continuation flag set for each PDS message sent to the craft shell. After all PDS messages are processed, another reply message is sent back with the continuation flag reset, indicating that the entire request was processed successfully. If a PDS message sent to the craft shell returns an error (for example, syntax, invalid parameters) on the message, the error information is captured by the MAC-OSS controller and returned to the MAC-OSS.

2.1.5.2.3 Availability

The MAC-OSS Access of Batch Recent Change feature is available in 5E6 and later software releases.

2.1.6 RMS-D3/5ESS® Switch Interface

2.1.6.1 Feature Descriptions

2.1.6.1.1 Feature Definition

The RMS-D3 is a microprocessor based system providing message trunk testing and maintenance of digital and analog switched circuits. The 5ESS® toll switch interface to the RMS-D3 is via a control link (X.25 level 3) and a T1 interface. This control link includes a control program for commands from RMS-D3 as well as responses transmitted by the 5ESS® switch, and special routing facilities for the test trunks. The T1 interface provides access to the RMS-D3 test ports.

The TOPAS controls testing of trunks through the RMS-D3, via its control link and test trunks to the 5ESS® switch.

The 5ESS® switch performs the following capabilities for RMS-D3:

- Routing of 104, 105, 109, and 606 calls to RMS-D3 ports.
- Routing of 101 test positions calls to RMS-D3 ports and rerouting them to a trunk and line work station (TLWS) if these ports are busy.
- Origination of test calls from RMS-D3, test call with or without outpulsing, signaling test access with or without outpulsing, monitor connection, split talk access, and out-tandem connection.
- Mapping of trunk groups and test position numbers, RMS-D3 test access trunks (TATs) digital equipment numbers (DENs) and test position numbers, TOPAS test position number and status (attended/unattended).
- Reconfiguring test access trunks to meet testing needs during any given time.

2.1.6.1.2 Feature Operation

2.1.6.1.2.1 User Perspective

2.1.6.1.2.1.1 RMS-D3

The RMS-D3 is actually composed of two parts: a 3B2 system controller and the digital test unit (DTUs). The system

controller talks to the 5ESS[®] switch and the DTUs via BX.25 links. The DTUs are attached to the 5ESS[®] switch via DS-1 links.

2.1.6.1.2.1.2 Control Program

The control program for the 5ESS[®] switch interprets messages from RMS-D3 using the BX.25 level protocol. The control program essentially handles all data link communications between RMS-D3 and the 5ESS[®] switch. Messages from RMS-D3 are resolved into component parts, validated, and converted into an internal message format. These messages are routed to other system processes and/or terminal processes for command execution.

The control program also controls unsolicited messages sent to it by the 5ESS[®] switch. These messages are formatted and sent to the RMS-D3.

Additionally, this control program includes a method of keeping track of circuit access conditions that remain in effect after setup.

2.1.6.1.2.1.3 RMS-D3/5ESS[®] Switch Messages

The following messages are used for communication between the 5ESS[®] switch and RMS-D3.

Clear Machine: Directs the 5ESS[®] toll switch to release a signaling test access set up by the get trunk message.

DS-1 Access Restoral: Issued by RMS-D3 to inform the 5ESS[®] switch of the DS-1 link restoral or when the RMS-D3 regains sanity after a failure. RMS-D3 sends this message after ensuring that all channels on DS-1 are on-hook. Each test access trunk terminating on the 5ESS[®] switch is idled in the RMS-D3 dynamic data.

DS-1 Access Tear-Down: Issued by the RMS-D3 when an RMS-D3 or DS-1 failure occurs releasing all the DS-0 circuit accesses that may be active on a specified DS-1 channel. Therefore, a DS-1 channel is synonymous with a T1 carrier because it contains 24 test access trunks, and a DS-0 circuit is synonymous with a test access trunk.

Get Trunk: This command accesses trunks. Circuit access modes and far-end test line information (if any) must be passed as parameters to this command. The test access DEN specified for this command is used to connect the circuit requested to the RMS-D3. (Switch monitored access (trunk access requiring two RMS-D3 DS-0 connections) uses the specified test access trunk GPORT and the paired GPORT as defined in the test access trunk assignment data.) The get trunk command corresponds to the TTY message CONN:TAT used in the TOPAS/5ESS[®] switch interface.

Make Position Busy: Disables 101 test calls for a specified position; however this command does not affect 101 calls that are already in progress. The 5ESS[®] switch marks the position unattended even if the position is already in the busy (unattended) condition.

Remove Position Busy: Directs the 5ESS[®] switch to remove a position busy condition for a specified position. The 5ESS[®] switch performs this request by marking the position attended.

Remove Trunk: Directs the 5ESS[®] switch to remove a circuit from service by putting it in the specified out-of-service status.

Report TAT Assignment: Generated by the 5ESS[®] switch both at system initialization and every 15 minutes thereafter acting as an audit for the dynamic data being updated. This command directs RMS-D3 to return its test access trunk assignment map. The RMS-D3 responds by sending a maximum of three commands back to the 5ESS[®] switch.

Restore Trunk: Directs the 5ESS[®] switch to restore a specified circuit by deleting the specified out-of-service

condition. A message is sent to the port status administrator (PSA) system process to remove the out-of-service status from the trunk.

Set Digital Loopback: Directs the 5ESS[®] switch to set up or release a digital loopback. The channel specified with this command can be any DS-0 channel terminating on the host 5ESS[®] switch or any RSM site. If the DS-0 channel specified in this command is for a switched circuit, then the 5ESS[®] switch either establishes or releases a DS-0 loopback depending on the desired action specified in the type of action parameter. A set digital loopback operation is only allowed by the 5ESS[®] switch if a message trunk is idle. A release digital loopback is allowed only if a digital loopback is active.

TAT Assignment: This message is generated by RMS-D3 for system initialization or due to any change in RMS-D3 TAT assignments because of reconfiguration or resource availability status changes. This message directs the 5ESS[®] switch to update the following relations reflecting TAT assignments of RMS-D3.

- Port type to port number
- List heads/port type to port number
- Test position status
- Control area/test position status
- Master control area/test position status.

The 5ESS[®] switch maintains a copy of this data for test call processing.

Test Position Status: Directs the 5ESS[®] switch to report the busy/idle (unattended/attended) status of the test positions, kept in the 5ESS[®] switch.

Trace: Directs the 5ESS[®] switch to return the name of the circuit currently connected to the specified DEN. The 5ESS[®] switch returns the DEN or TEN of the connected trunk. The DEN specified in this command does not have to be connected to an RMS-D3 TAT. The DEN can be any circuit terminating on the host 5ESS[®] switch or any associated RSM.

Transmit Double Ring Forward: This command causes two on-hook flashes to be sent over the trunk under test and is used to sequence a 103 test call.

Transfer 101 Calls: Transfers an incoming call to another position in the event that the craft is busy and is unable to provide for 101 test call assistance.

Verify Circuit Name: Directs the 5ESS[®] switch to provide the signaling information on a specific circuit. This command is normally used to support an outgoing tandem operation or the testing of switched special service circuits that require knowledge of the trunk signaling and addressing types.

RMS-D3 sends a message over the data link to the RMS-D3 AM system process, parameter checking is performed. If the message passes, an interprocessor message is sent to the SM containing the trunk. A message is returned containing the desired information and is relayed to RMS-D3 by the AM system process.

2.1.6.1.2.1.4 Mapping

Test call routing (101, 104, 105, 109, and 606) requires mapping between trunk groups and test positions. This mapping is changeable via recent change procedures. A test position attended map (actually a relation) is also needed for 101 test call routing in addition to a test position to DEN of the RMS-D3 test access trunk map. These two maps are updated using the test access trunk assignment command. The test position attended map is also

updated by the make position busy and remove position busy commands.

The control program uses the report test access trunk assignment RTA5 command to verify that the data in the 5ESS[®] switch is consistent with the data being kept by the RMS-D3.

To provide for test call routing and for RMS-D3 port reconfiguration, an RMS-D3 port type to DEN map is needed. This map is updated by the test access trunk assignment command.

2.1.6.1.2.2 System Perspective

2.1.6.1.2.2.1 Requests From RMS-D3

Incoming messages from RMS-D3 are received by the terminal maintenance data link controller link reader *UNIX*[®] system process. These messages are passed on to a control program OSDS system process in the AM to validate the commands and do basic parameter sanity checking. If the command includes a DEN, system processes determine what SM the DEM terminates on before routing the message to the corresponding system process in the SM.

The control program tests the AM for overload conditions before the processing of each message. If an overload condition exists in the AM, the control program sends an overload error message to RMS-D3. An error message is returned to RMS-D3, if the AM is in a minimum configuration mode (no call processing is taking place). Once the message arrives at its destination processor (AM or appropriate SM) it is routed to the appropriate system or terminal process to perform the actual work.

Responses are returned to the control program system process in the AM which formats the message and sends it to RMS-D3. Each response to RMS-D3 is associated with the appropriate input message by a logical sequence member (LSN) and test sequence member (TSN). The control program, as mentioned previously, handles unsolicited messages sent by the 5ESS[®] switch and forwards these messages to the RMS-D3. For these unsolicited messages the LSN is set to 224 and the TSN is set to zero.

2.1.6.1.2.2.2 Test Call Routing

The 5ESS[®] switch routes 101, 104, 105, 109, and 606 test calls to the RMS-D3 ports (109 and 606 test lines do not exist in the 5ESS[®] switch). Additionally, queuing of 104 and 105 test calls and screening of RBOC 105 test calls and directing them to existing transmission test function (TTF) is performed. The following paragraphs define the functions performed by RMS-D3 and the 5ESS[®] switch for routing test calls and providing access to test lines. However, once the test call is terminated on the RMS-D3, the RMS-D3 provides the tests.

2.1.6.1.2.2.3 101 Test Calls

When the 5ESS[®] switch receives the digits 101-xx from an originating office, it routes the call to the test position designated by the xx suffix dialed. The ODD for the trunk group includes the associated test positions. If the position is attended and at least one test access trunk is idle, the 5ESS[®] switch continuously signals RMS-D3 with a flashing supervisory signal (intermittent 1-second on-hooks and off-hooks) and returns audible tone to the caller. When the RMS-D3 answers, the 5ESS[®] switch completes the connection; if RMS-D3 does not go off-hook (such as when the TOPAS craft does not answer the phone), the caller must abandon the call attempt. The 101 test call originator seizes a trunk in the same group of trunks where the faulty trunk belongs. One of two test access trunks assigned to each test position is used for communication with the craft in the terminating TOPAS. The other test access trunk is used to test the faulty trunk in that trunk group.

The 5ESS[®] switch drops the connection if either party disconnects. If the position is not attended or the position number is invalid, reorder tone is returned. If both TATs are busy, busy tone is returned.

If the 5ESS® switch receives a 101 test call with no test position specified, the test position is determined by referencing the test position attribute (101 calls are only routed to RMS-D3 TATs defined as TOPAS test positions TATs).

When the digits 101-xxx are received, the call is routed to a specific test position and TAT. The right most digit is the TAT (0 or 1). However, if the test position is unattended, the position number is invalid, or the TAT number is invalid, reorder tone is given. If the specified test access trunk is busy, busy tone is returned.

When the RMS-D3 is down or all ports are busy, 101 test calls can be rerouted to the TLWS. This is accomplished by calling an RMS-D3 data base routine to find a 101 port. If the return code indicates that no port is available forces routing to continue and routes to an existing TLWS port.

2.1.6.1.2.2.4 104 Test Calls

The 104 test line provided by RMS-D3 supports manual transmission testing. When the 5ESS® switch receives a 104 test call from an originating office, an attempt is made to terminate the call to a 104 test access trunk. If a test access trunk is not available, routing tries to queue the call. If the queue is full, busy is returned to the calling party. An idle 104 test line access trunk or successful queuing of the call results in the calling party receiving off-hook (or CCS address complete and answer type message). Upon receiving off-hook, a 300 ms quiet timing period is initiated. Following the 300 ms quiet period, a test progress tone is returned to the calling party for 1 second. The test progress tone can continue for up to 2 minutes; after 2 minute timing expires, the call will be torn down.

If a 104 test line becomes available before the call times out, the call is taken off the queue; off-hook is given to the RMS-D3 trunk, and the test progress tone is removed. If RMS-D3 answers the call, the 5ESS® switch cuts the call through; if RMS-D3 does not answer, the 5ESS® switch waits for the calling party to disconnect.

2.1.6.1.2.2.5 105 Test Lines

The 105 test line is used to support transmission testing. To distribute the load of 105 test lines, screening of the incoming carrier flag, that is, checking the class-of-service attribute of the trunk in the process control block link area (PCBLA) is performed. If the class of service of the trunk is not primarily intertoll or secondary intertoll, the call is routed to the existing TTF facility.

When a 105 test call is received, the 5ESS® switch tries to terminate the call to a 105 test line. If no 105 test line test access trunks are available, routing tries to queue the call. However, if the queue is full, busy-tone is returned to the calling party. If an idle 105 test access trunk is found or the call is queued successfully, the calling party is given off-hook. A 300 ms quiet timing period is initiated; after the 300 ms quiet period, a test progress tone (that is, 225 Hz) is returned to the calling party for 1 second. This test progress tone continues for 2 minutes; if 2 minute timing expires, the call is torn down.

If a 105 test line test access trunk becomes available before the call times out, the call is removed from the queue; off-hook is given to the RMS-D3 trunk, and the test progress tone is removed. When the RMS-D3 answers the call, the 5ESS® switch cuts the call through. If the RMS-D3 does not answer, the 5ESS® switch waits for the calling party to disconnect. For successful calls, the 5ESS® switch tears down the call when the calling party disconnects.

2.1.6.1.2.2.6 109 Test Calls

The 109 test line is used to test performance of the echo canceler located at the test line end of the circuit. Upon receiving a 109 test call from an originating office, the 5ESS® switch routes the call to a hunt group of TATs that are linked to an RMS-D3 that has 109 test lines equipped. Address complete is given on CCS trunks, and the RMS-D3 is required to answer the off-hook flash of the 5ESS® switch. When RMS-D3 does not answer, the 5ESS® switch waits for the calling party to disconnect. If the 5ESS® switch is unable to route the call, it returns busy tone.

During the test, the 5ESS[®] switch passes on-/off-hook flashes from the test line to the calling party (reanswer/clear-back type messages if CCS). Additionally, it passes along ring forward signals from the calling party to the RMS-D3.

2.1.6.1.2.2.7 606 Test Calls

Code 606 test lines provides a continuous digital loopback for the purposes of checking of digital circuit continuity and bit error rate. When the 5ESS[®] switch receives a 606 test call from the originating office, it routes the call to a hunt group of TATs linked to a RMS-D3 equipped with 606 test lines. If it unable to complete the call, the 5ESS[®] switch routes to "all circuits busy" (60 ipm). No supervisory signal is sent by the 5ESS[®] switch to RMS-D3 to indicate seizure or release of the trunk terminating on the 606 test line.

Upon termination of a call, the port number to port type relation is referenced. If the port is an RMS-D3 port, the port's data is moved from the busy port list to an idle port list.

2.1.6.1.3 Limitations and Restrictions

Maintenance type commands from RMS-D3 are handled one command at a time. Administrative type commands can have 16 commands outstanding at once. Test class commands have an LSN assigned per test session. Only one command is active at a time per LSN. Approximately 32 LSNs can be outstanding at any one time (assuming one per craft). One DTU is configured to have 8 test lines and 16 test ports for message trunks per 8 craftspersons. For special message trunks, 24 craftspersons can be on test ports (2 DTUs).

The mix of test lines can be changed by time of day or office configuration. The maximum number of ports is 72 (3 T1 carrier links at 24 channels each).

Routine machine-driven nighttime trunk testing will probably consume the most link usage. For this, 12 remote office test lines (ROTLs) may be required. Each port runs a test about every 30 seconds and sends one message each way; amounting to 4 messages per 30 seconds per port, a total of 1.6 messages per second.

2.1.6.1.4 Availability

The 5ESS[®] Switch/RMS-D3 Interface feature is available in 5E6 and later software releases.

2.1.6.2 System Resources - Hardware

The 5ESS[®] switch hardware interface to RMS-D3 consists of a control link (X.25 level 3) and a T1 interface. The commands from RMS-D3 and responses transmitted by the 5ESS[®] switch utilize the control link. The T1 interface provides access to the RMS-D3 test ports.

2.1.7 Service Switching Point/800 Service

2.1.7.1 Feature Description

2.1.7.1.1 Feature Definition

The Service Switching Point feature provides the 5ESS[®] switch with a structure to provide number services calls to telephone operating company customers. Number services calls are a collection of services that are triggered by a dialed number, provide inward call management capabilities, and usually require access to a network data base to complete the call. The 800 service is the first implementation of number services. The Service Switching Point feature can be resident at an equal access end-office, or an access tandem office.

The Service Switching Point feature provides front-end processing for number services calls (for example, 800 Services calls). This capability includes the ability to:

- (a) Recognize the special dialed numbers that indicate a request for a number services call
- (b) Generate a data base query at the service switching point switch [using the transaction capabilities (TCAP) of Common Channel Signaling System 7 (CCS7)].
- (c) Use the information returned from the data base to route the call.

NOTE: The 800 Service is not limited to the 800 NPA if the switch has implemented a toll-free treatment feature that allows additional toll-free service access codes (SAC) such as 877 or 888.

2.1.7.1.2 Feature Operation

Number services line origination can occur at any office with the Service Switching Point feature. This office can be an equal access end-office, a tandem office or an access tandem office. Digit analysis identifies number service calls based on a 3- to 6-digit (toll-free SAC-office code) translation of the dialed number. However number services calls require a query to and a response from the switching control data base to determine the proper routing. All digits dialed and line identification information are required for the query. When the dialed digits are collected and the line is identified, a query is sent to an external service control point data base to determine the true directory number used to route the call. The response indicates whether the call is an intra-LATA or inter-LATA directory number call.

Trunk originations digit analysis is performed on the 3- or 6-digit of the dialed number (toll-free SAC-office code) or on 3-digit translations for access tandem (0ZZ of the sequence, 0ZZ-XXX). In access tandem service switch point, calls that originate from equal access end offices send the sequence KP+0ZZ+XXX+ST. The sequence 0ZZ indicates to digit analysis to collect the next three digits as the carrier identification without digit analysis. The signaling that is used for trunk originations affects how the ANI is determined after the call has been identified as a number services origination.

Equal Access Signaling: Three-digit translations on the equal access digit sequence (KP+0ZZ+XXX+ST) results in the digits 0ZZ being identified as access via a tandem. The next three digits collected are the carrier ID. Using the carrier ID and the destination index (obtained from digit analysis), an attempt is made to obtain routing information. After failing to obtain the routing information, the carrier type is examined to determine if it is a pseudo carrier. If so, the call is returned to digit analysis with an indication that this call is a number service origination, and a second stage of signaling is required. A wink is returned by the access tandem to the equal access end-office requesting second stage outpulsing. The ANI information digits are collected, and the ANI is stored in the call record. After the ANI sequence is received, and the calling party has finished dialing, the equal access end-office sends the dialed number which is collected in the dialed data field of the digit analysis data block. Once the dialed digits are collected, the access tandem returns an acknowledgment wink to the equal access end-office after a 0.7 second nominal delay.

When the destination type is determined, a query is sent to the service control point gaining access to the data base to determine the true routing for the call.

Traditional Signaling: Calls that originate from nonconforming end-offices can use traditional signaling to the access tandem. Nonconforming end-offices send the called number sequence KP+ the full NANP DN to the access tandem. The access tandem identifies the call as a number services call origination based on the 3- to 6-digit translation of a called number. A 00Y code can replace the numbering plan area (NPA) of the called number to indicate the NPA of the originator, LATA number of the originator, and if the call originated from a coin line. Traditional signaling type trunks expect no ANI data; therefore the ANI must be determined. If a 00Y code is received, the NPA is determined via this code and is used for the ANI. The NPA determined from the 00Y code supersedes the trunk group ANI. If no 00Y code is received, the trunk group relation is used to get the ANI for the query.

CAMA Signaling: Calls that originate over CAMA trunks receive the called sequence KP+a full NANP DN, similar to traditional signaling. A steady off-hook signal is returned to the originating end-office indicating that an ANI sequence should be returned to the access tandem. The ANI sequence is in the form of a single information digit and the calling party address (a NANP DN without the NPA). The special code 00Y can also be used for a CAMA origination to identify attributes of the originator. If an ANI failure occurs, the ANI (NPA or NPA-office code) is determined from the trunk group or 00Y code. If the NPA is determined from the 00Y code, it supersedes the use of the trunk group ANI. If no 00Y code or ANI is received then a trunk group relation (RLRT_TRKG) is read to determine the ANI for the query.

2.1.7.1.2.1 Service Control Point Query

As mentioned previously, number service calls require a query to and a response from the service control point (5ESS[®] switch interface to a service provider data base) to determine the proper carrier. This query is to obtain the true directory number to route the call. When the appropriate information is obtained for the query, call processing passes the appropriate information about the call to TCAP to format the query message.

The TCAP protocol for the service switching point feature involves sending and receiving messages through the common network interface (CNI) hardware in the 5ESS[®] switch into the CCS7 network. The access point to CNI is either the administrative module (AM) or the direct link node (DLN), if the office is equipped with a DLN. A system process in the AM receives and sends direct signaling messages from the switching module (SM) to the CNI and from the CNI to the SM.

The query message formatted by TCAP is sent to CCS transport. The CCS transport provides the interface between the 5ESS[®] switch and the CNI ring, for both outgoing TCAP messages (from the 5ESS[®] switch to the CNI and signal transfer point network) and incoming TCAP messages (from the signaling network to the 5ESS[®] switch). The CCS transport supplies the toll-free number to ACG to check for active ACG controls. The ACG network management feature affects the per-call flow of number services calls in the AM or DLN. The ACG performs matching and gapping and returns the status of the call (that is, blocked or not blocked) to CCS transport. Matching is performed by searching the ACG search tree. Gapping is performed by simply comparing the current time against the NEXT time and DURATION time in the ACG list. If the current time is greater than the NEXT time and less than the DURATION time, the call is not blocked. If the call is blocked, a response is sent to TCAP. A failure message is sent to the SM indicating the reason for failure. If the call is not blocked due to ACG controls, the query is sent to CNI.

The query message is sent to the service control point data base to obtain the true directory number to route the call. A response message is sent from the service control point to the service switching point 5ESS[®] switch via the CNI. The response is received from CNI by CCS transport. Any ACG information from the response message is sent to ACG/NM. After CCS transport performs all ACG processing of the response message, the TCAP message is forwarded to the TCAP system process for further parsing and then to the originating terminal process in the SM indicated by the transaction ID in the transaction portion of the response message. When the message is received by the originating terminal process in the SM, the TCAP parsing system process determines if a send notification indication is present in the message and sends the routing and billing information to call processing. If a send notification indicator is present, the operating terminal process is notified to send a termination notification message when the call terminates.

2.1.7.1.2.2 Service Control Point Responses

Responses from the service control point data base to a query sent because of a number service call origination (toll-free call) are:

- Play announcement
- Return error code

- Reject
- Normal.

Play Announcement: The play announcement response (message) is examined in the TCAP message receiving function in the AM/DLN to determine if the message contains any ACG controls. If ACG data is present, it is copied into an internal 5ESS[®] switch message format message and sent to the AM/DLN. Once the message is sent, the TCAP message is sent to the TCAP system process for further parsing and then to the originating terminal process indicated by the transaction ID in the transaction portion of the message. Upon receiving the message, the call is routed to the announcement indicated by the standard announcement parameter.

Return Error Code: The return error code message is received from the service control point as a result of improper or invalid data in the query message. When this message is received by the TCAP message receiving function in the AM/DLN, it is forwarded directly to the originating terminal process in the SM. The call is routed to reorder.

Reject: The reject message is received from the service control point as the result of a protocol error in the query message. When the reject message is received by the originating terminal process, the call is routed to reorder.

Normal: Normal response messages from the service control point contain the results of the query. Additionally, optional ACG data, plus a send notification indicating that the originating terminal process notifies the service control point when the call terminates can be found.

The results of the query is routing data (that is, carrier ID, routing number, call type, billing number, and call processing data). If the call is to be routed via an inter-LATA carrier, carrier routing must be performed; if not, normal digit routing is performed.

2.1.7.1.2.3 Intra-LATA Routing

If the query routing data indicates that the call is an intra-LATA call, digit analysis is performed again. This analysis obtains the routing information for the translated POTS number received from the service control point data base. To perform digit analysis again, the NPA digits must be deleted from the directory number of the translated directory number if they match the home NPA of the switch. Successful digit analysis results in the destination type indicating a normal POTS call translation. Unsuccessful digit analysis fails in its attempt to translate the number correctly, and the call is routed to reorder.

2.1.7.1.2.4 Inter-LATA Routing

Inter-LATA calls require a second digit analysis (similar to intra-LATA calls) to determine if the call is a special World Zone 1 or International call. The carrier returned from the switching control point data base is used when digit analysis is called the second time. Three types of carrier interconnect calls are expected after digit analysis:

- Inter-LATA
- World Zone 1
- International.

Inter-LATA: After identifying the call as inter-LATA, the return code is examined to verify that the route "normal" was returned in the query. If the code indicated to route the call international, the call is routed to reorder, and a return error message is returned to switching control point data base. If the return code indicates normal routing, the number services route index and the destination index are selected for the carrier to complete routing.

World Zone 1: The return code is verified as route normal. A return code indicating international is also routed to

reorder, and a return error message is sent to the data base. If the return code is route normal, the destination type is set indicating the call is an toll-free type call and normal routing continues.

International: The return code is verified as route international. A return code indicating route normal is routed to reorder, and a return error message is sent to the service control point data base. If the return code is route international, the destination type is set indicating the call is an toll-free type call and normal routing continues.

2.1.7.1.3 Interactions

Number services calls require the use of the CNI to send messages to and receive messages from the service control point data base. Each number service call received at the switching control point switch requires that 1 to 2 CCS7 TCAP messages be delivered to the CCS network by the CNI ring. One message is also received from the CCS network by the CNI ring for each number service call. Either the AM or the DLN are used to query messages to and receive responses from the switching control point data base but not both depending on the office configuration.

The operation of the SSP/800 feature is impacted by the TCAP Improvements For A Switch Spanning Multiple LATAs feature (99-5E-2708), which allows a switch to serve subscribers in more than one LATA.

The queries to the SCP data base for SSP/800 calls can query using the same A-link regardless of the LATA. The TCAP query specifies the LATA of the originating subscriber, but the SSP/800 capability has assumed that one end office serves one LATA. However, the TCAP Improvements For A Switch Spanning Multiple LATAs feature allows the switch to associate a LATA with a set of lines, so with the TCAP Improvements feature, this is the LATA that is included in an SSP/800 TCAP query. (See Figure 2-5 .)

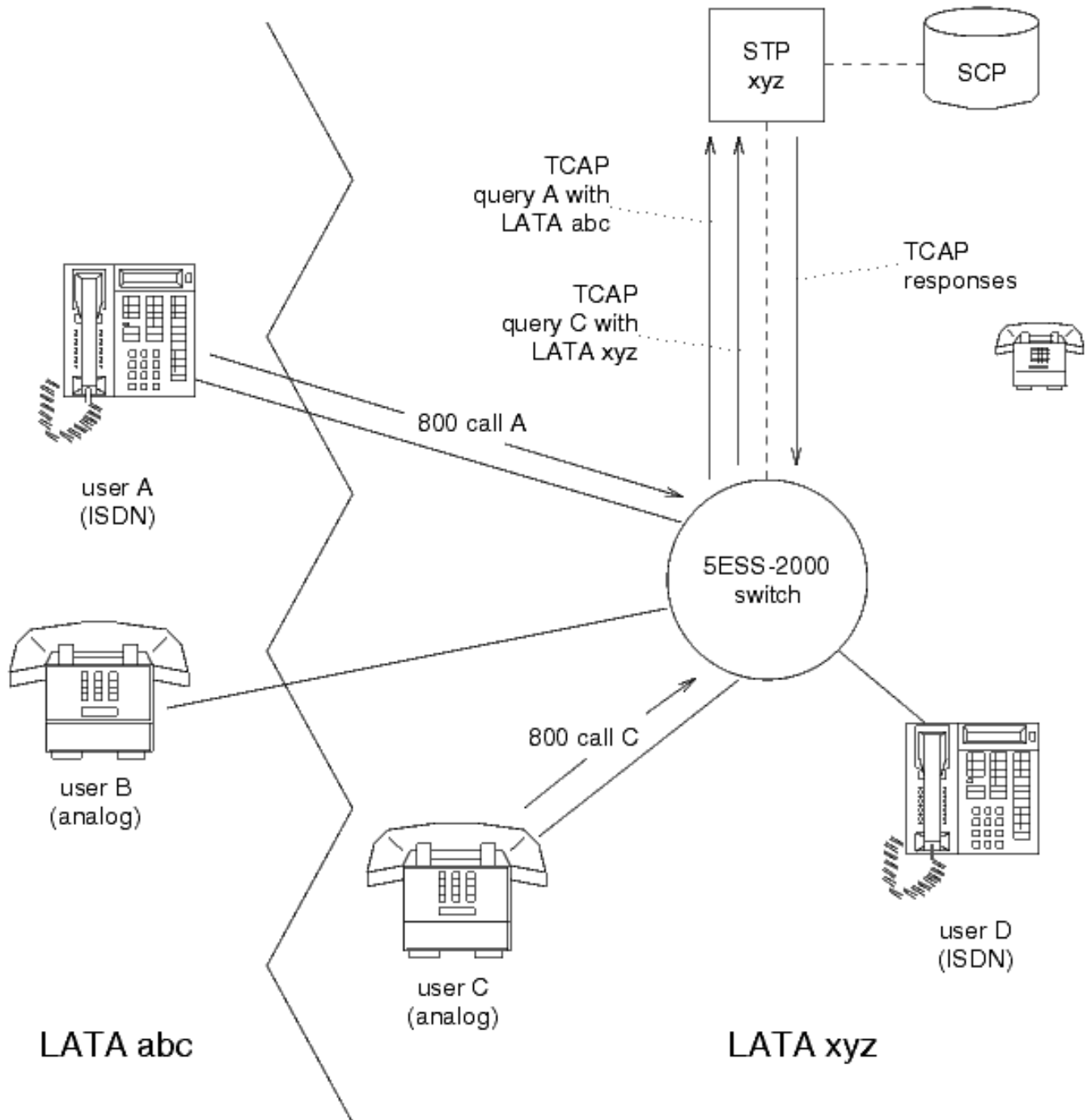


Figure 2-5 Multiple-LATA SSP/800 Queries

For more information on the TCAP Improvements For A Switch Spanning Multiple LATAs feature, see 235-190-120, *5ESS® Switch Common Channel Signaling Service Features*.

2.1.7.1.4 Availability

The Service Switching Point/800 Service feature is available with the 5E6 and later software releases for the 5ESS® switch.

2.1.7.2 System Resources - Hardware

The basic toll-free service provided by this feature requires no additional system hardware resources than used for normal carrier interconnect calls. Access tandem offices receiving a number services call using equal access (EA) signaling require additional resources [that is, multifrequency (MF) receivers] to collect the dialed digits and the ANI digits. This results in additional holding time of MF receivers. An MF transmitter is required to outpulse the routing number and the ANI digits to the carrier.

2.1.8 TOPAS/5ESS[®] Switch Interface

2.1.8.1 Feature Description

The Testing, Operations, Provisioning, and Administration System (TOPAS) is an operation support system developed to provide centralized trunk maintenance and administration for trunks terminating on 5ESS[®] toll switches in the NCS network. The TOPAS/5ESS[®] switch capabilities include:

- (1) Preservice testing, trouble isolation, and repair verification via Remote Measurement System - Digital 3 (RMS-D3).
- (2) Current status of all trunks on the 5ESS[®] switch through trunk state changes reports from the 5ESS[®] switch and periodic audits.
- (3) Direct facility failure reports from the 5ESS[®] switch to Facility Administrative Surveillance System (FAST).

This feature essentially provides the craft at TOPAS with a set of TTY input and output messages that enables communication with the 5ESS[®] switch to perform trunk maintenance.

2.1.8.2 Feature Operation

Communication between the 5ESS[®] switch and TOPAS is supported by a control program, which provides an interface to the BX.25 session layer protocol, and supports three switched virtual circuits (SVCs). Communication over these SVCs consists of sessions controlled by the TOPAS. The 5ESS[®] switch accepts and terminates these sessions as directed by TOPAS. However, an SVC can support only one session at a time, and a perpetual session uses one of the SVCs.

The control program receives commands from TOPAS and relays them to the 5ESS[®] switch craft shell. Additionally, the control program passes the response from the 5ESS[®] switch to TOPAS.

2.1.8.2.1 Data Link Communication

To send a request to the 5ESS[®] switch, TOPAS issues a connect request over an SVC. Two SVCs exist; one for inputting messages to TOPAS and one for the 5ESS[®] switch to send MSG responses back to TOPAS. The session layer handler (SLH) of the BX.25 protocol determines which session is to be used from information in the connect request message and creates a *UNIX*[®] system process to handle the request. The sessions to be used for TOPAS requests are known as demand sessions.

The connect request is received over the link by the terminal process which creates an instance in the craft shell and passes the message to the shell via a *UNIX*[®] system pipe. When the craft shell is created, an environment variable is set to indicate which pipe should be used for output.

The output SVC has a named pipe that allows the link interface process, for a session, to get the output for that session. The spooler input process (SIP) writes the output into the named pipe. The named pipes associated with

each session are:

5ESSOUT1	/dev/ttyA
5ESSIN1	/dev/ttyB
5ESSPERP	/dev/TOPperp

The craft shell checks the message for syntax errors; if the message is correct, it is passed to the appropriate client process for handling, and an acknowledgment message is returned through the craft shell to the link handler process via a *UNIX*[®] system pipe. All output responses to an input message are passed to the pipe and formatted for output. The message is read by the link handler process and sent to TOPAS over the SVC. Each output message associated with an input request is processed essentially the same way. The two demand SVCs are set up by TOPAS and left up continuously. If no new request is received after 20 minutes, the process kills the shell.

Some automatically generated (unrequested) messages are generated by the 5ESS[®] switch such as an RMV TRK message which occurs when the 5ESS[®] switch removes a trunk from service because of failure rate. The 5ESS[®] switch sends these messages to a spooler output process which writes the messages to a named pipe. When data is received from the spooler output process via the named pipe, it is sent out over the TOPASPERP SVC to TOPAS. This session is used for 5ESS[®] switch to TOPAS communication; no input message is received from TOPAS over this SVC. This session is part of the perpetual session because it is active all the time.

One input message is handled by a demand session at a time. As mentioned previously, if there is output that needs to be sent on one of the demand sessions and the session has been terminated, the output is routed over the perpetual session from the 5ESS[®] switch to TOPAS. The demand session and perpetual session are active simultaneously.

2.1.8.2.2 Demand Sessions

Two SVCs on the BX.25 link handle input messages (requests and office responses) from TOPAS. An interface process, TOPAS demand controller, is associated with each of these SVCs. This process is created by the SLH upon successful completion of a BX.25 connect sequence initiated by TOPAS on one of the demand SVCs. (The 5ESSOUT1 SVC is set up first.) After creation, this process (TOPAS demand controller) creates an entry in the craft shell, initializes the session, and receives an input message from TOPAS on that SVC. The craft shell contains an environment variable indicating which named pipe the system should use for output. The interface process sends the message to the shell via a *UNIX*[®] system pipe. An acknowledgment is sent back from the shell via another *UNIX*[®] system pipe. The output associated with the input message is directed to the named pipe associated with the output SVC. If not, further connection is initiated by TOPAS on that SVC within 20 minutes; the interface process kills the craft shell and dies.

Data link events are used to signal the TOPAS demand controller that there is information on the link from TOPAS. The information could be in the form of an incoming 5ESS[®] switch output message, a request from TOPAS to disconnect the session, or an indication that the session has been aborted. If the TOPAS demand controller is blocked from reading the pipe, the event although pegged, is not sufficient enough to get out of the read process. To prevent a read of indefinite duration, a timer signals the process to check link, if the link has not been checked within the past 5 seconds.

2.1.8.2.3 Perpetual Session

Automatically generated (unsolicited) messages dealing with trunk maintenance are sent to TOPAS on a perpetual session. Formatted output messages are sent to the controlling spooler output process (CSOP) to decide all the output destinations. This is determined by checking the message class of service. The named pipe associated with the TOPAS perpetual link is added to list of destinations where the messages should be sent. The CSOP sends the output message to a spooler output process that writes the messages to the named pipe. When the data is read, it is sent out on the perpetual session to TOPAS. Similar to the demand sessions, the perpetual session is entirely under the control of TOPAS.

If the session is not connected when an output message for TOPAS is received, the 5ESS[®] switch queues the message. Up to 50 messages can be queued; after 50 messages, any subsequent message is discarded. However, when TOPAS initiates this session, it sends an OP:LIST message over a demand session. The OP:LIST message gets a current view of all trunk states for TOPAS.

2.1.8.2.4 New Tests

TOPAS has the capability to initiate three new operational test calls at the 5ESS[®] switch. These test calls are set up using the TTY message TST:TRK, and are part of the base load. These calls are:

- Phase II centrex synchronous test call
- Phase III centrex synchronous test call
- Step-by-step test call.

The test requirements for Phase II and Phase III centrex requirements are identical from the 5ESS[®] switch point of view. Centrex test calls are used for testing the supervisory features of trunks that terminate on a No. 5 Crossbar office equipped for either of these phases of centrex service. The 5ESS[®] switch originates the centrex test calls as follows:

- (1) Seize the trunk to be tested.
- (2) Outpulse the directory number of the associated test line.
- (3) Attach a tone detector to receive audible ringing, busy tone, reorder tone, voice announcement or pretrip failure. This tone detector receives audible ringing or test progress tone of 700 ms. Start timing for a maximum of 60 seconds to receive the first synchronizing pulse. More than two periods of audible ringing or test progress tone indicates a trip relay. Audible ringing or test progress tone interrupted at 120 interruptions per minute indicates a pretrip failure.
- (4) After the first synchronizing pulse (off-hook for approximately 1.3 seconds) is received, and the 60-second timing period is halted, five additional pulses occur. The test is concluded when six pulses and the last off-hook pulse from the test line have been received.

The step-by-step test call is used by 5ESS[®] switch offices which have trunks terminating in a step-by-step office. The 5ESS[®] switch originates the test call as follows:

- Seize the trunk to be tested.
- Outpulse the directory number of the associated test line.
- Attach a tone detector to receive audible ringing, busy tone, reorder tone, voice announcement, or pretrip failure. The tone detector receives audible ringing or test progress tone for 700 ms. Start timing (for a maximum of 60 seconds) for the initial off-hook pulse.
- Stop the 60-second timing interval once the initial off-hook pulse is received. The 5ESS[®] switch times the off-hook pulses and the test is complete after three pulses are counted, although five pulses are sent.

The step-by-step test call transmits a low tone (480+620 Hz) with each off-hook. After five off-hook to on-hook signals, the step-by-step test line gives repeated cycles of on-hook (2.0 seconds) and off-hook (5.5 seconds) until disconnect is received from the calling office.

The TTY message CONN:TAT directs the 5ESS[®] switch to connect a test access trunk (TAT) from a test facility to a designated trunk under test facility. The CONN:TAT has the ability to connect to test lines similar to the TTY message TST:TRK. The difference between TST:TRK and CONN:TAT is the location of the test equipment that is to be used analyzing the results. The TST:TRK test equipment is part of the 5ESS[®] switch, but the CONN:TAT test equipment such as a digital access test set, is connected to the 5ESS[®] switch via a TAT.

The CONN:TAT can set seven possible type of connections:

- (1) A no outpulse connection with the TAT simply connected to the trunk under test (TUT).
- (2) Seize with outpulsing on a specified trunk.
- (3) Seize with outpulsing on an associated trunk in the same trunk group as the TUT.
- (4) A signaling test access connection without outpulsing; TAT to TUT connection is with signaling supervision turned off.
- (5) A signaling test access connection with outpulsing on a specified trunk, used to connect a 606 test line.
- (6) Monitor connection.
- (7) Split and talk connection.

If craft personnel request a test call connection to be set up, this function sends a route request to the routing and terminal allocation (RTA) subsystem to route to the switching module of the test access trunk. A terminal process is created to control setup of the test access trunk.

2.1.8.2.5 Messages

The TTY input and output messages that enables communication with the 5ESS[®] switch and TOPAS are listed and described briefly in the following paragraphs.

2.1.8.2.5.1 Input Messages

CONN:TAT	Sets up a connection between a trunk under test and a test access trunk for various modes of testing.
DISC:TAT	Directs the 5ESS [®] switch to release a signaling test access setup by the CONN:TAT message.
OP:JOBSTATUS	Reports the status of all active terminal maintenance jobs initiated through the port maintenance task administrator. A new message class assignment is required in order to route this message to TOPAS.
OP:TGCNT	Provides certain information for a single trunk group, a range of trunk groups, or for all of the trunk groups in the office. The data is given for trunk groups which have trunks out of service. The data provided on a per-trunk-group basis is: • The trunk group number • The trunk group size (numbers of members) • The number of in-service trunks • The number of out-of-service trunks.

ORD:DLOOP	Applies or removes a digital loopback on a digital trunk toward the far-end office.
ORD:SCAN	Reads the incoming supervision state of a digital trunk for on-/off-hook.
ORD:TONE	Applies or removes a 1004-Hz tone on a digital trunk.
ORD:TRK	Reads or sets the outgoing supervision state of a digital trunk on-/off-hook.
RMV:DFI/HDFI/RDFI	Removes a digital facility interface from service. A new message class of service is required to route this message to TOPAS.
RST:DFI/HDFI/RDFI	Restores a DFI back to an in-service state. A new message class assignment is required to properly route this message to TOPAS.
RMV:FAC	Requests a remote switching module T1 facility to be removed from service. This message requires a new message class assignment to properly route this message to TOPAS.
RST:FAC	Requests that a remote switching module T1 facility be placed in service. This message requires a new message class assignment for routing to TOPAS.
RMV:TRK	Requests that a trunk be removed from service.
RST:TRK	Requests that a trunk be placed back in service.
Set AML	Sets the automatic maintenance limit to an integer percentage between zero and a hundred. The message used to accomplish this is a text recent change message RCV:APPTXT.
TST:TRK	Test an individual trunk, trunk group, or consecutive trunks in a trunk group, with or without CCS.

2.1.8.2.5.2 Output Messages

CONN TAT	Reports the result of a CONN:TAT input message
DISC TAT	Reports that a connection established by the CONN:TAT message was removed.
OP JOBSTATUS	Identifies the status of all active terminal maintenance jobs initiated through the port maintenance task administrator. A new message class assignment is required for routing to TOPAS.
OP TGCNT	Reports the service condition of trunks in a trunk group(s). Service condition indicates whether a trunk is in-service or out-of-service.
ORD DLOOP	Reports the application of a digital loopback on a digital trunk
ORD SCAN	Reports the incoming supervision state of a particular digital trunk on-/off-hook.
ORD TONE	Reports that a 1004-Hz tone was applied on a digital trunk.
ORD TRK	Reports the current outgoing supervision state or if a digital trunk was set on-/off-hook.
REPT CGA	Reports a carrier group alarm or the crossing of an error threshold by a digital facility interface circuit.
RMV DFI/HDFI/RDFI	Reports the removal of a digital carrier group (that is, digital facility interface) from service. A new message class assignment is required to route this message to TOPAS.
RST DFI/HDFI/RDFI	Report the restoration of a digital facility [trunk(s) or trunk group(s)] back to an IS state. A new

message class assignment is required to route this message to TOPAS.

RMV FAC	Reports the removal of a T1 facility from service. A new message class assignment is required to route this message to TOPAS.
RST FAC	Reports the restoration of a T1 facility. A new message class assignment is required to route this message to TOPAS.
RMV TRK	Reports the removal of a trunk from service. Some previously unprinted RMV TRK messages are routed to TOPAS (for example, trunks that go "High & Wet").
RST TRK	Reports the restoration of a trunk to service. Some previously unprinted RST TRK messages are routed to TOPAS.
TST TRK	Reports the test of an individual trunk, trunk group, or consecutive trunks in a trunk group. These trunks could be CCS or non-CCS. Included in the testing of non-CCS trunks are 103 tests, synchronous, Phase II centrex, Phase III centrex and step-by-step tests.

2.1.8.3 Availability

The TOPAS/5ESS[®] Switch Interface feature is available in the 5E6 and later software releases.

2.1.9 Fully Coded Addressing

2.1.9.1 Definition

The Fully Coded Addressing (FCA) feature is a common channel signaling (CCS) single-stage protocol used to route international outbound calls in a uniform and simple manner. This document describes how FCA will be used in the NCS domestic network. The FCA international calls are being routed towards 4ESSTM switch international switching centers (ISCs). The CCS network will support common channel interoffice signaling number 6 (CCIS6) and common channel signaling number 7 (CCS7) integrated services digital network user part (ISUP). The calls will be prefixed by a 2-digit code (0/1X) when necessary to prevent misrouting. The prefix code identifies the appropriate ISC to each of the intermediate toll switches in the network.

This feature also allows a 5ESS[®] gateway switch to route calls over MF trunks across the border. There will be no 2-digit code (0/1X) prepended for these phone calls because this gateway switch is not an ISC.

Starting in the 5E6 software release, international outbound calls entering a 5ESS[®] toll switch will be processed using FCA. Calls to an NCS point of presence (POP) switch will use either equal access (EA) 3-stage or traditional 2-stage signaling. Calls to an NCS via switch can be routed through a previous 4ESSTM toll switch or 5ESS[®] toll switch, in which case the call will use the CCS single-stage protocol. If the call came from a previous toll switch which is not a 4ESSTM switch or a 5ESS[®] switch, the call will use traditional 2-stage signaling. Under FCA, when an international outbound call is routed to a 5ESS[®] toll switch, that switch will collect all the digits and route the call as a single-stage CCS call towards the appropriate ISC.

2.1.9.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

2.1.9.3 User Operation

There are several changes brought on by this capability that will affect operating company personnel. There are two new recent change screens that craft will be able to use. There are new peg counts and new or modified machine

detected interoffice irregularities (MDIIs) that will be sent to the read only printer (ROP) that craft need to understand. The routing tables will need to be set up in a special way for the 5ESS[®] gateway switch. The biggest change is that NCS will no longer be required to build separate multifrequency (MF) trunk groups between switching offices to route international traffic.

2.1.9.4 Feature Operation

2.1.9.4.1 Incoming Call Treatment

In the 5E6 software release, international traffic may enter a 5ESS[®] toll switch in the NCS network through three different protocols. These calls are as follows:

- (1) Calls using EA 3-stage signaling.
- (2) Calls using traditional 2-stage signaling.
- (3) Calls using the CCS single-stage protocol (for via switches only).

2.1.9.4.1.1 Calls Using EA 3-Stage Signaling

An international outbound call using EA signaling will reach the POP switch on a LATA-connect trunk. The first stage of an EA 3-stage call includes the international carrier (INC) which should handle the call. Calls being routed to a non-NCS INC are not processed using FCA. When a 5ESS[®] toll switch receives the first stage of a call that is to use a different INC, the switch will only process the first stage of the call. The call will be routed to the other carrier, and the second and third stages of outpulsing will be transparent to the NCS switch.

If the first stage indicates that the call is to be routed through the NCS network, all three stages are processed. The 5ESS[®] toll switch will return a second start dial (SSD) wink to the EAEO to request the next address sequence. This SSD wink will be a standard acknowledgement wink which may range from 140 milliseconds to 290 milliseconds. To acknowledge receipt of the second and third stages from an EAEO, the 5ESS[®] toll switch must return a post address wink (PAW) signal on the incoming trunk to the end office. This PAW signal will be a standard acknowledgement wink which may range from 140 milliseconds to 290 milliseconds. The 5ESS[®] toll switch must delay 200 milliseconds before returning the PAW, and the EAEO must receive the signal within 7.5 seconds after outpulsing the second and third stages.

Overlap outpulsing may be used by some EAEOs to deliver the three address sequences to the 5ESS[®] toll switch. To prevent the abnormal holding of 5ESS[®] toll switch resources, two recent changeable overlap outpulsing timers (normal and overload) were introduced in the switch. They represent the maximum time allowed from the receipt of the last digit (ST) of the second stage to the receipt of the first digit (KP) of the third stage.

The first 2 digits of the second stage of an equal access call, if present, are information digits (II). At this time, only calls with II digits 00, 06, 07, 10, 20, and 95 will be allowed. To keep this flexible, an ODD table is used for this information instead of keeping it in a local (hard-coded) table.

2.1.9.4.1.2 Calls Using Traditional 2-Stage Signaling

Some nonconforming end offices (EOs) will route international traffic to an NCS toll switch with traditional 2-stage outpulsing. For FCA, a 5ESS[®] toll switch will process both stages of the call. The 5ESS[®] toll switch receives the first stage of the call which will be either 011+PCC or 18X. If the incoming trunk is an MF trunk, the 5ESS[®] toll switch will delay 700 milliseconds and return a 450-millisecond SSD wink. If the incoming trunk is a dial pulse (DP) trunk, the 5ESS[®] toll switch will attach a universal tone detector (UTD) to the incoming trunk. After a 700-millisecond delay, the 450-millisecond SSD wink is returned. If the incoming trunk is a CCS trunk, the 5ESS[®] toll switch may attach a continuity check loop to the incoming trunk and expect a continuity (COT) message within 10 seconds. After the

COT is received, the 5ESS[®] switch will remove the continuity loop from the trunk, attach a UTD to it, wait 700 milliseconds, and return an SSD message. The EO will MF-outpulse the second stage over the trunk when it receives the SSD. The 5ESS[®] toll switch will not return a PAW after the second stage is received.

2.1.9.4.1.3 Calls Using CCS Single-Stage Protocol

The FCA feature has no new requirements for handling CCS calls from 4ESS[™] toll switches or 5ESS[®] toll switches. No change is necessary for handling these calls. Domain routing to support the international outbound domain (domain 81) for both CCIS6 and CCS7-ISUP is currently available in the 5ESS[®] switch.

2.1.9.4.2 Outgoing Call Treatment

The call is determined to be an international outbound call after translation of the first stage (first address sequence). If a pseudo country code (PCC) is received in the second stage of a traditional 2-stage call, the country code (CC) will be retrieved out of a relation, the key for which will be the PCC. All of the above mentioned international outbound call types will be routed towards 4ESS[™] switch ISCs using the CCS single-stage protocol. To route a call using the CCS single-stage protocol in the 5E6 software release, some traveling class marks (fields) in the initial address message (IAM) must be set to indicate that the call is an international outbound call.

If the called number is insufficient in the network to prevent misrouting, a 2-digit code (0/1X) identifying the ISC must be prefixed before the IAM is loaded. This number will be from a new relation; the key will be the CC. This prefix code will be administratively controlled by NCS. Because cable-only routing is only required for cordboard (manual operator position) and some operator-assisted calls, the cable-only information in the IAM must be set to zero. Additionally, the proper bearer capability information must be set to voice in the CCS7 ISUP IAM.

2.1.9.5 Interactions

No interactions with other features have been identified.

2.1.9.6 Limitations and Restrictions

International failure announcements are not available in the 5E6 software release. The 5ESS[®] switch is restricted to using the equivalent domestic failure announcements instead.

2.1.9.7 System Resources

2.1.9.7.1 Hardware

This feature requires no new hardware or hardware interfaces.

2.1.9.7.2 Software

This feature requires approximately 13576 bytes of AM memory for text, 9370 bytes of SM memory for text, and 2200 bytes of SM memory for office dependent data (ODD).

2.1.9.8 Implementation

2.1.9.8.1 Routing Setup

In each 5ESS[®] toll switch, the routing tables must be set up to route international outbound calls that are processed using FCA to a CCIS6 or CCS7 ISUP outgoing trunk. Make sure that alternate routing for these types of calls are set up to route to a CCIS6 or CCS7 ISUP trunk. An FCA international outbound call that is misrouted to a trunk with inband signaling should be blocked. The reason is that with a single stage containing only the true CC and national

number (NN) (CC + NN) there are no means for the next office to determine whether the call is international outbound or domestic. Therefore, it could lead to having an international outbound call abnormally completing to a domestic residence.

All FCA calls that are blocked will cause a BLFCA MDII to be printed on the ROP. The BLFCA MDII will contain the identification of the trunk where the call was misrouted. It will also specify the address digits ([0/1X]+CC+NN) of the international call that was blocked. If this BLFCA MDII is issued, it is the responsibility of that office to correct the routing tables to avoid future misrouting of FCA international outbound calls.

The 5ESS[®] switch gateway offices are examples of offices that will require FCA international outbound calls to be routed to trunks with inband signaling. These offices can receive an FCA call that will be routed to a MF trunk group and have only the national number outpulsed. Any 5ESS[®] switch toll office that must send FCA international outbound calls out on a trunk with inband signaling must assign the FCIDDDSTST destination type instead of the FCIDDDFCA destination type to the address digits ([0/1X]+CC+NN) that are translated with a digit analysis selector (DAS) of 81. For example, the 5ESS[®] switch gateway office must have digit analysis assign FCIDDDSTST destination type to the address digits of 52 + NN to allow the call to be routed over an MF trunk and not be blocked.

NOTE: The destination type is synonymous to call type on recent change view 10.3.

2.1.9.8.2 Turning FCA On/Off

Each 5ESS[®] switch toll office will have the ability to turn on or turn off the FCA of incoming equal access 3-stage or traditional 2-stage international outbound calls. If for some reason the FCA feature must be turned off, whether it be that no CCIS6 or CCS7 ISUP trunks are available to route the FCA call to, or billing cannot be performed for equal access 3-stage calls, or for some other reason, the ODD must be changed. Assigning the FCSTG1FCA destination type to the first stage of an international outbound call will turn on the FCA feature for that type of call. To turn off the FCA feature, the FCIDDDSTST destination type must be assigned to the first stage of the international outbound call. The first stage of an international outbound call is always translated in the POTS domain, that is, the DAS associated with the incoming trunk. This method of turning on/off the FCA feature gives each 5ESS[®] switch toll office the flexibility of having FCA turned on for international calls coming in on certain trunk groups but turned off for international calls coming in on other trunk groups. It also allows the FCA feature to be turned on or off based on the type of international outbound call received, either equal access 3-stage or traditional 2-stage.

2.1.9.8.3 Billing

The requirement for billing of an equal access 3-stage international outbound call that is processed using FCA is to generate structure codes associated with the station paid call code (060). In order to have these structure codes filled out when an equal access 3-stage international call is being billed, each office must assign the station paid call code to a charge index in charge index recent change view 10.11. This charge index must be assigned in the screening recent change view 10.10 for all FCA equal access 3-stage international outbound calls in order to have the correct billing structure codes populated.

2.1.9.8.4 Data Population Considerations

The FCA feature requires digit analysis data to be populated on DAS 81 to translate the address sequence ([0/1X]+CC+NN) for an international outbound call. The digit analysis for DAS 81 may be populated using the LDIT or IDDD forms in a 5ESS[®] switch toll office.

2.1.9.9 Measurements

The measurements for international outbound call attempts, completed (or processed) calls and ineffective call attempts are included in the existing measurements (that is, with no distinction between domestic and international outbound calls). The existing incoming equal access signaling (EAS) peg count and EAS total usage count are used for domestic and international outbound calls using EAS.

Four new measurements (peg counts) are provided for the 5ESS[®] toll switch to peg call attempts and ineffective attempts made in the second stage of traditional 2-stage signaling. The new peg counts are the following:

- (1) Traditional second stage calls
- (2) Traditional second stage partial dial time-out (PDT)
- (3) Traditional second stage permanent signal time-out (PST)
- (4) Traditional second stage vacant code (VCA).

The measurements for international outbound call attempts, calls completed (or processed) and ineffective call attempts will continue to be reported on a scheduled or demand basis. This report does not distinguish between international outbound calls and domestic calls. The two EAS peg counts mentioned previously will continue to be reported in Section 12 of the 30-minute traffic report. The four new peg counts listed in the previous paragraph which are associated with the second stage of traditional 2-stage signaling have been added to the existing hourly and 24-hour plant reports.

2.1.10 OSO AMA Recording

2.1.10.1 Definition

The 5ESS[®] switch can serve as an originating screening office (OSO) for toll-free Service (INWATS) calls. This feature allows the OSO to generate the INWATS per-call automatic message accounting (AMA) records. The new AMA record format includes the calling number, the dialed toll-free number, and the routing number returned from the INWATS data base. The call may subsequently receive domain routing or DDD routing.

NOTE: The 800 Service is not limited to the 800 NPA if the switch has implemented a toll-free treatment feature that allows additional toll-free service access codes (SAC) such as 877 or 888.

2.1.10.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

2.1.10.3 User Operation

The revenue accounting office is required to process the new billing structures 01130 and 01131 with call code 360.

2.1.10.4 Feature Operation

The call processing steps for OSO AMA Recording are as follows:

- (1) A caller dialed toll-free call accesses a 5ESS[®] switch OSO via local exchange carrier (LEC) access lines.
- (2) The OSO queries the INWATS data base (IDB) network control point (NCP) with the dialed toll-free number and the originating numbering plan area (NPA).
- (3) The IDB NCP returns to the OSO a routing number (typically a POTS number), an AMA recording indicator (R), an toll-free service indicator code (SIC), and a POTS versus direct egress voice (DEV) routing indicator (PD).
- (4) If the R field in the IDB NCP INWATS success message contains a 1, indicating a record must be made, the OSO makes an AMA record for a call. Otherwise no record is made. The OSO does not interpret the SIC, but merely converts it from binary representation to binary coded decimal (BCD) characters and formats the SIC

into the AMA record.

- (5) If the PD field contains a 0, indicating the call must be routed in the POTS domain, the OSO routes the call through the network in the POTS domain. If the PD field contains a 1, the call must be routed in the DEV domain. The routing selection is independent of how the recording indicator is set.
- (6) If the call is answered, answer supervision is returned through the network to the OSO. Answer supervision returned to the OSO is also passed backwards to preceding offices, for example, LEC offices.
- (7) On receipt of answer supervision, the OSO begins elapsed timing. If the R field contains a 1, the OSO generates an AMA record for unanswered as well as answered calls.

2.1.10.5 Interactions

No interactions with other features have been defined.

2.1.10.6 Limitations and Restrictions

This capability results in a significant increase in AMA recording at the OSO. The only limit on this capability is the call processing capacity of the switch and the amount of disk space reserved for AMA recording.

2.1.10.7 System Resources

2.1.10.7.1 Hardware

This capability will not change system hardware resource utilization.

2.1.10.7.2 Software

Approximately 3700 bytes of SM memory are required for this capability.

2.1.10.7.3 Real Time

This capability will result in a reduction in call processing capability at the OSO of 1 percent in the AM and 0.5 percent in the SMs.

2.1.10.8 Implementation

The OSO records only when instructed to do so by the IDB NCP. Therefore, the IDB NCP is responsible for the transition to OSO AMA recording.

2.1.10.9 Measurements

There is no change to measurements required due to adding this capability.

2.1.11 Software Defined Network

2.1.11.1 Definition

The Software Defined Network (SDN) feature for NCS provides virtual private network capabilities, using the public switched telephone network, for multilocation business customers of NCS. The 5ESS[®] switch functions as an action point (ACP) for SDN. The 5ESS[®] switch interfaces with a data base, the network control point (NCP), using CCS7 direct signaling transaction capability (TCAP).

For SDN calls, the ACP sends queries to an NCP and processes the calls based on the instructions returned in the responses. This may include routing, billing, and network management instructions. No interface to a customized announcement system such as the network services complex (NSC) is provided. All calls requiring the use of such a system are handed-off to or service assisted by a 4ESSTM switch equipped with an NSC.

2.1.11.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

2.1.11.3 User Operation

There is no major impact on the subscriber or the office personnel as a result of this capability.

2.1.11.3.1 Subscriber

The private network customer will not see any changes in their dialing patterns once they are served by the SDN network. The uniform numbering plan should allow the dialing patterns to remain intact. The customer will be allowed to dial international numbers. Customers may be prompted for authorization codes.

2.1.11.3.2 Operating Company Personnel

Administration personnel are affected by the new recent change data required for the new access/egress types, new call code/structure code assignments, etc. Also additional measurements are added for the SDN service feature. Network management counts and discrettes as well as automatic code gapping (ACG) controls are added by the SDN service feature.

New I/O messages for craft are affected by the additions/modifications to I/O messages for traps and different tests.

Billing Centers are affected by the new AMA records for SDN.

2.1.11.4 Feature Operation

The following sequence is an example of the general actions performed at an ACP. This scenario illustrates only the most basic case. It does not cover the hand-off or assist cases.

- (1) At the originating switch, an incoming call is recognized as an SDN access call. The dialed digits are collected, and the calling number, also referred to as ANI, is either collected or determined from the ODD. The originating switch recognizes the call as SDN by means of dedicated customer access facility (line, PBX trunk).
- (2) If the originating switch is not an ACP, it performs the network access point (NAP) function and forwards the call to an ACP. The NAP passes customer identification (ANI) and service identification (SDN) to the ACP.
- (3) The ACP recognizes the service requested by dedicated customer access (PBX trunk), dedicated switched access (CAMA or EAMF trunk), or service indicator in the trunk signaling (CCS7 ISDN-UP).
- (4) The ACP formulates a query package, checks for Network Management (NM) controls on the query, and then sends the query to the NCP. The query includes the dialed digits along with the ANI number.
- (5) In the simplest case, the NCP replies to the ACP with a Charging - Bill Call operation and a Connection Control - Connect operation. The Charging - Bill Call operation tells the ACP to create an AMA record for the call, and some of the information to put in that record. The Connection Control - Connect operation tells the ACP how to route the call. It includes a routing number (which may be a POTS number or a number in a special numbering plan), routing domain information, and other information necessary for routing the call.

- (6) The ACP then takes the routing number it receives from the NCP and translates it based on the specified routing domain. For example, the dedicated egress voice (DEV) domain may be specified, and so the DEV digit analysis selector (DAS) is used in translating the digits. The call is routed to the terminating switch within the SDN network.
- (7) The terminating switch receives the call and routes it to the egress line or trunk.

2.1.11.5 Interaction

The ACP capability introduces new CCS7 TCAP messages and may impact the capacity of the CM and AM/DLN by increasing the number of messages processed per call. The ACP capability is supported for both the DLN and non-DLN configurations.

2.1.11.6 Limitations and Restrictions

The reply message from the NCP should be received within 4 seconds after the query is sent. The same 4-second time-out value also applies to any subsequent replies expected from the NCP (unless instructed by the NCP to set a longer time-out via a refresh operation). If a reply is not received within 4 seconds, the call is routed to reorder tone.

2.1.11.7 System Resources - Hardware

All SDN calls require the use of the CNI hardware, either with or without the DLN equipped. No additional system hardware resources are utilized other than those used for non-SDN calls.

2.1.11.8 Measurements

This capability is responsible for generating, collecting, and reporting the proposed new measurement counts listed in "Traffic and Plant Measurements Definition Requirements," Section 2.1.11.8.1 and "ANI Services Network Management Counts and Discretes," Section 2.1.11.8.2. All of these counts are total office counts.

2.1.11.8.1 Traffic and Plant Measurements Definition Requirements

This section identifies the new measurement counts that are reported on the 30-Minute traffic report and the 24-hour plant report. A new section for the 30-Minute Traffic Report is required. The first three traffic counts appear on the 24-hour report.

The first three counts are traffic counts while the rest are call irregularities.

- (a) **Total Originating SDN/ANI Services Attempts** - This is the number of SDN calls coming into the ACP, excluding Service Assist and Hand-offs.
- (b) **Total SDN/ANI Services Queries to Data Base** - This is the total number of SDN queries (Provide Instruction-Start) that were sent to NCP.
- (c) **Total Completed SDN/ANI Services Calls Successfully Outpulsed** - This is the number of completed SDN calls that were successfully outpulsed.
- (d) **Failure to Obtain ANI on a CAMA Trunk** - This irregularity occurs whenever the ACP tries and fails to receive ANI on a dedicated CAMA trunk.
- (e) **Failure to Obtain ANI through ONI on a CAMA Trunk** - This irregularity occurs whenever the ACP tries and fails to receive ANI on a dedicated CAMA trunk and fails to obtain the number through ONI.
- (f) **Call Processing Failure-Transaction Inactive** - This irregularity occurs when an ACP call is terminated

while a transaction is inactive because of a hardware or software initialization by the switch or because of a failure in the normal call processing routine. This count includes any call processing failure that can be detected by the ACP.

- (g) **Call Processing Failure - Transaction Active** - This irregularity occurs when an ACP call is terminated while a transaction is active because of a hardware or software initialization by the switch or because of a failure in the normal call processing routine. This count includes any call processing failure that can be detected by the ACP.
- (h) **TC Signaling Failure, Blocked at Switch** - This is a count of the number of SDN calls that were blocked by the ACP due to the following reasons:
 - NM ACG controls
 - Controls applied to the call due to the TCAP message returned from the SCCP.
- (i) **TC Signaling Failure Time-out at the Switch** - This is a count of the number of times the ACP timed out while waiting for a reply or command from the NCP.
- (j) **TC Signaling Failure, Blocked in CCS Network** - This count is pegged whenever a successfully launched TCAP message is returned with a failure reply. Some examples are the following:
 - CCS network blockage or congestion
 - NCP congestion
 - Unequipped user
 - Subsystem failure
 - CCS No translation data.
- (k) **Invalid TC Message/Component** - This count is pegged whenever the ACP receives a message from the NCP that is undecipherable or has bad data.
- (l) **Invalid TC Command Sequence Received** - This count is pegged whenever the ACP receives a reply from the NCP that is either a Return Error or a Reject message.
- (m) **TC Return Error Received** - This count is pegged whenever the ACP receives a Return Error reply when the components for the message are out-of-sequence from the NCP.
- (n) **TC Reject Received** - This count is pegged whenever the ACP receives a Reject message from the NCP.
- (o) **TC Abort Received** - This count is pegged whenever the ACP receives an Abort reply from the NCP.
- (p) **TC Terminate Received due to Failure** - This count is pegged whenever the NCP commands the ACP to terminate the call with a standard error termination such as reorder or reorder announcement because a failure occurred at the NCP or ACP.
- (q) **Abandon Before Initial Query** - This count is pegged whenever an on-hook signal is received before the ACP initiates a query to the SDN NCP.
- (r) **Abandon After Initial Query, Before Reply** - This count is pegged whenever an on-hook signal is received after the ACP initiates a query to the SDN NCP, but before the ACP outpulses.

- (s) **Abandon After Outpulsing Before Answer** - This count is pegged whenever the on-hook signal is detected from the calling party before the call is answered.

2.1.11.8.2 ANI Services Network Management Counts and Discretes

Network Management counts are reported on the 5-Minute Surveillance Data Report sent to EADAS/NM, and/or RNMC, and ONSITE (local printer) as requested.

2.1.11.8.2.1 30-Second Discretes

Once a discrete is set, it is locked on until polled by RNMC or EADAS/NM on a 30-second basis. After a poll it is cleared, and set on again if another message is blocked. The following discretes are required for ACP:

- (a) **General TCAP Message Failure Discrete** - This discrete indicates that TCAP messages were blocked in the last 30-second interval. It should be set when a TCAP message fails, that is, the message was returned because of problems in the CCS network. It should also be set when a TCAP message is blocked by an automatic NM control for CCS network problems. Other network management controls (including NCP initiated controls) should not be reflected in this discrete.
- (b) **Data Base-Activated Control Discrete** - This discrete indicates that TCAP queries were blocked in the last 30-second interval by ACG controls transmitted from the SDN NCP.

2.1.11.8.2.2 ANI Services 5-Minute Counts

- (a) **Total Originating SDN/ANI Service Attempts** - Total number of SDN calls reaching the ACP in the last 5-minute interval.
- (b) **SDN/ANI Service Calls Blocked Due to CCS Problems** - The number of SDN calls canceled because an SDN Query Package TCAP message associated with the call was denied access to some portion of the network or because it was canceled by automatic controls taken in response to SDN Query Package TCAP message failures.
- (c) **SDN/ANI Service Calls Blocked by Data Base Overload Controls** - The number of SDN calls blocked by ACG controls for NCP overloads in the last 5-minute clock interval.
- (d) **SDN/ANI Services Calls Blocked by OSS-Initiated Controls** - The number of SDN calls blocked by ACG controls initiated by OSS in the last 5-minute clock interval.
- (e) **Control Lists Overflow** - This is a count of the number of times an ACG control or TCAP message failure control cannot be taken on a code because the control list is already full. This count combines the overflow of both 6-digit and 10-digit SDN control lists.

2.1.12 Special Access Phase 1

2.1.12.1 Definition

The Special Access Phase 1 capability provides the 5ESS[®] toll switch with limited direct voice and voice-grade transmission capabilities in the 5E6 software release. The capability enables NCS to connect an analog or digital PBX to a digital trunk unit of the 5ESS[®] toll switch via a DS-1 connection. The ISDN PBXs are not addressed by this capability. Both originating and terminating traffic may be routed on the direct connections from and to the PBXs, respectively. For incoming traffic from the PBXs to the 5ESS[®] switch, an NCS special access customer may originate either Special Access WATS or MEGACOM[®] telecommunications service calls. For outgoing traffic from

the 5ESS[®] switch to the PBXs, the 5ESS[®] switch is able to terminate either Special Access Basic 800 or MEGACOM[®] 800 service calls to an NCS special access customer.

NOTE: The 800 Service is not limited to the 800 NPA if the switch has implemented a toll-free treatment feature that allows additional toll-free service access codes (SAC) such as 877 or 888.

2.1.12.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

2.1.12.3 User Operation

Once the Special Access capability is fully operational in the 5ESS[®] switch, no additional routine user actions are required.

2.1.12.4 Call Processing

The 5ESS[®] toll switch processes the calls that are originated from or terminated to the special access PBX customers. For Special Access WATS and MEGACOM[®] telecommunications service calls originating from the special access customers, the 5ESS[®] switch serves as an originating toll switch in the network. For Special Access Basic 800 and MEGACOM[®] 800 service calls terminating to the customers, the switch serves as a terminating toll switch in the network. The call processing requirements for the switch are discussed in this section.

2.1.12.4.1 Special Access WATS

A 7- or 10-digit number is originated (dialed) by the Special Access WATS customers and routed on dedicated TGs to the 5ESS[®] switch. A call origination is identified as a Special Access WATS call based on TG information and is routed to succeeding switches in the domestic network. Based on the 7- or 10-digit called number, which must conform to the North American Numbering Plan, the 5ESS[®] switch translates and routes the calls in the network.

The switch either allows or blocks interstate and intrastate calling. Intrastate calling is offered only on a full-state basis. Both interstate and intrastate calls may be routed on the TG to the switch. Blocking on interstate calling is based on the value of the 6th digit of the customer billing number. Blocking on intrastate calling is based on the value of the 4th digit of the customer billing number. In addition, the following call types (dialed numbers) are blocked:

- 0- or 0+ dialing
- 1+ dialing
- # or * prefixed dialing
- N11 calls (where N is a digit from 2 to 9)
- N00 dialed calls (where N is a digit from 2 to 9)
- Nondomestic NPAs including nondomestic portion of 809 dialed calls.

The 5ESS[®] switch applies the existing call failure treatment to all the blocked calls. A vacant code announcement is returned to the callers when appropriate.

For interstate Special Access WATS service, a customer subscribes to a service band (or bands) that may be from 1 to 6. When more than one band is subscribed by a Special Access customer, a dedicated TG and billing number

is assigned for each band. Calls to a service area that is not subscribed by the customer are blocked by the switch. Band screening on interstate calling is based on the calling party NPA, the called party NPA, and the 6th digit of the billing directory number. There are no satellite avoidance requirements for Special Access WATS.

2.1.12.4.2 MEGACOM[®] Telecommunications Service

A 7- or 10-digit number is originated (dialed) by the MEGACOM[®] telecommunications service customers and routed on dedicated TGs to the 5ESS[®] switch. A call origination is identified as a MEGACOM[®] telecommunications service call based on TG information and is routed to succeeding switches in the domestic network. Based on the 7- or 10-digit called number, which must conform to the North American Numbering Plan, the 5ESS[®] switch translates and routes the calls in the network.

The switch allows or blocks interstate and intrastate calling based on information found in the customer billing number. Intrastate calling is offered only on a full-state basis. Both interstate and intrastate calls may be routed on the same TG to the switch. Blocking on intrastate calling is based on the value of the 4th digit of the customer billing number. Since MEGACOM[®] telecommunications service includes the full service band range, interstate calling is assumed. A MEGACOM[®] telecommunications service customer can not subscribe to only intrastate MEGACOM[®] telecommunications service. In addition, the following call types (dialed numbers) are blocked:

- 0- or 0+ dialing
- 1+ dialing
- # or * prefixed dialing
- N11 calls (where N is a digit from 2 to 9)
- N00 dialed calls (where N is a digit from 2 to 9)
- Nondomestic NPAs including nondomestic portion of 809 dialed calls.

The 5ESS[®] switch applies the existing call failure treatment to all the blocked calls. A vacant code announcement is returned to the callers when appropriate.

Permissive in-state routing, which is administratively controlled by the carrier, is available and such calls are rated as interstate calls. Answer supervision is always returned to the MEGACOM[®] telecommunications service customers. Satellite avoidance is provided to customers when calls are routed in the common channel signaling (CCS) network. Any satellite avoidance arrangements for MEGACOM[®] telecommunications service customers are administratively controlled using trunk provisioning and routing assignments.

2.1.12.4.3 Special Access Basic 800

This capability provides the terminating Special Access Basic 800 service. Each terminating Special Access Basic 800 call appears to the switch as a POTS call to a nondialable 7- or 10-digit customer billing directory number. This nondialable number is administratively controlled by the carrier. Basic toll-free calls entering the terminating 5ESS[®] switch in the network are identified from TG information after translation. They are translated in the proper domain and routed on dedicated TGs to Special Access customers. If all trunks in the TG are busy, the call is not routed to an alternate TG, but is routed to a circuit busy announcement. Both interstate and intrastate calls may be routed on the same TG to a given Special Access Basic 800 customer.

2.1.12.4.4 MEGACOM[®] 800 Service

This capability provides the terminating MEGACOM[®] 800 service. The MEGACOM[®] 800 service calls are routed in

the domestic network in the dedicated egress voice (DEV) domain using the action point numbering (APN) plan. The MEGACOM 800 service calls entering the terminating 5ESS[®] switch in the network are identified from TG information after translation. Each MEGACOM[®] 800 service call appears to the switch as a call with a routing number of SSS-TTT-XXXX in the 5E6 software release. The first 3 digits (SSS) of the routing number identify a proper terminating toll switch in the network. Subsequent 3 digits (TTT) translation results in a selection of the dedicated TG to a Special Access customer. The last 4 digits (XXXX) of the routing number are available for the customers use. The routing number is translated in the proper domain and routed on dedicated TGs to the Special Access customer. If all trunks in the TG are busy, the call is not routed to an alternate TG, but is routed to a circuit busy announcement. Both interstate and intrastate calls may be routed on the same TG to a given MEGACOM[®] 800 service customer.

2.1.12.5 Interactions

This capability is not affected by any other new or existing capability.

2.1.12.6 Limitations and Restrictions

Call processing and billing for Special Access WATS, MEGACOM[®] telecommunications service, Special Access Basic 800 and MEGACOM[®] 800 service calls take no more real time than any other normal billed call. The elimination of the local switch between the PBX and the 5ESS[®] Toll Switch reduces the time needed for call setup and increases the clarity of the call.

2.1.12.7 System Resources - Hardware

The following interfacing hardware is required for the indicated PBXs:

- A 2-wire dial pulse originating channel unit for the Loop Start Supervision PBX
- A 2-wire dial pulse terminating channel unit for the Loop Reverse-Battery Supervision PBX
- A 2PBX channel unit and a 20-hz ringing current generator for the Ground Start Supervision PBX
- A 4-wire E&M channel unit for a 4-Wire E&M Supervision PBX
- A 2-wire E&M channel unit for a 2-Wire E&M Supervision PBX.

2.1.12.8 Implementation

This capability requires no major retrofit procedures as a result of its software being installed in a 5ESS[®] toll switch. The channel units described in the preceding hardware paragraph need to be installed (if not already present) and the appropriate data populated when connecting a PBX to a 5ESS[®] toll switch. Data population includes customer billing information, routing information (tables), NPA data tables for band screening, dedicated trunk group information, etc.

2.1.12.9 Measurements

The following four new measurement (peg) counts for the Special Access capability are supplied for the 5ESS[®] toll switch:

- (1) Number of outgoing special access WATS calls
- (2) Number of outgoing MEGACOM[®] telecommunications service calls

- (3) Number of incoming special access basic toll-free calls
- (4) Number of incoming *MEGACOM*® 800 service calls.

2.1.13 Original Caller's Facility Restriction Level on an Attendant-Extended Call

2.1.13.1 Definition

The Original Caller's facility restriction level (FRL) On Attendant-Extended Calls enhancement is an option being added to the Automatic Route Selection (ARS) feature for release link trunks (RLTs). This enhancement causes the FRL of the calling party to be used when the attendant extends a call using an RLT. This restricts the caller from using the FRL of the attendant, and prevents the caller from possibly increasing his/her calling privileges.

2.1.13.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the *5ESS*® switch.

2.1.13.3 User Operation

2.1.13.3.1 Original Caller Perspective

When a caller routes to an attendant, the caller can obtain information verbally and disconnect or request the attendant to extend the call. The caller can reach the attendant by dialing the attendant directly or by default. In routing to the attendant the caller can use an authorization code (ATH); however, the caller will not be able to enter another ATH on an attendant extended call. The FRL value associated with the ATH used to reach the attendant will be used on the attendant extended call. If alternate FRLs are active, the alternate FRL will be used in routing to the attendant and on the extended call.

On attendant-extended calls, the original caller will be put on hold while the attendant is extending the call. If the call is successfully extended, the caller will be bridged back on the call normally during audible ring.

Since the caller is on hold, the caller will not hear a busy tone, etc. Information on the status of the call will be conveyed to the original caller verbally by the attendant.

If the original caller hangs up while the attendant is extending the call, the call will not be torn down until the attendant disconnects after attempting to bridge the caller back on the call.

The terminal FRL of the caller is used in routing to the attendant and in the attendant extended call.

2.1.13.3.2 Attendant Perspective

Upon receiving a call, the attendant can either verbally give information to the caller and hang up or extend the call. When the attendant extends the call, the attendant flashes along the RLT to the branch *5ESS*® switch indicating that an attendant extended originating call is to be attempted. When the attendant receives dial tone, he/she dials the DN and the switch attempts to complete the call.

If the called party is busy, a busy tone is returned to the attendant and the attendant disconnects from the extended call. The attendant verbally informs the caller of the status of the call and disconnects from the caller.

An audible ring is returned if the call can be completed. Normally, the attendant bridges the original caller back on the call at this time unless the attendant has activated call splitting. The attendant usually disconnects from the call before the called party answers. This idles the RLT to accept other calls to the attendant.

If the FRL of the original caller is not sufficient to extend the call, and the original caller did not use an ATH to reach

the attendant, the attendant is prompted for an ATH. The attendant disconnects from the extended call and verbally gets the ATH from the caller. The attendant then extends the call again and enters the ATH when prompted. However, if the original caller entered an ATH to reach the attendant, and the FRL is insufficient to extend the call, the attendant receives reorder and verbally notifies the caller of the status of the call.

Alternate FRLs are inhibited on attendant extended calls; therefore, they are not supported.

2.1.13.4 Feature Operation

The FRL that is used when an attendant makes call extensions for a caller is the FRL that was used in routing the original caller to the attendant. This may be the terminal FRL of the originating facility used by the original caller, the FRL associated with a traveling class mark (TCM) used on the original caller's originating facility, the FRL associated with an ATH used by the original caller, or an alternate FRL used when routing to the attendant.

If the attendant is allowed to extend a multiple number of calls for the original caller, the original caller's FRL is used for the call extensions, but only for those made while the original caller is connected. In other words, if the original caller disconnects at some point after calling the attendant, all call extensions made by the attendant after the original caller's disconnect are made with the attendant's FRL.

If the attendant attempts to extend a call for the original caller and the original caller's FRL is insufficient, the attendant is prompted for an ATH only if the original caller did not use an ATH to reach the attendant. If an ATH was used by the original caller to reach the attendant, the attendant is treated as if the ATH feature was not active, and the call is routed to reorder.

If an MDR record is to be written for a call extended over an RLT by an attendant, the original caller's FRL is written into the MDR record. If the attendant was required to enter an ATH in order to extend the call, the FRL associated with the ATH is written into the MDR record.

If alternate FRLs are being used on RLTs, they are not used in place of the FRL used in routing the original caller to the attendant. In other words, the FRL used in routing the extended call is always the FRL used in routing the original caller to the attendant. The assumption made here is that the FRL used in routing the original caller to the attendant was already an alternate FRL. Therefore, an inaccurate FRL is used for extending the call if an attempt is made to find an alternate FRL for the original caller's alternate FRL.

2.1.13.5 Interactions

2.1.13.5.1 Automatic Route Selection

The attendant must have the capability to extend a call only if the original caller has the appropriate calling privileges. This and other functionality is provided by the ARS feature, and is required to be assigned to the RLT trunk group.

2.1.13.5.2 Authorization Codes

If the ATH feature is assigned to the RLT trunk groups, the attendant is prompted for an authorization code during a call extension if the original caller's FRL is insufficient for routing. The ATH entered by the attendant is obtained verbally from the original caller.

2.1.13.5.3 Automatic Message Accounting

Calls extended for a caller by an attendant are required to be billed using AMA. Therefore, the AMA feature must be assigned to RLT trunk groups. The AMA for RLTs enhancement requires that for calls extended by an attendant, the AMA record billing number be that of the original caller, not the attendant. The AMA record also indicates that the call was assisted by an attendant.

2.1.13.5.4 Message Detail Recording

The MDR feature can be assigned to the RLT trunk group and causes an MDR record to be generated for each call extended by the attendant, and the first call to the attendant. The value of the FRL field in the MDR record is the original caller's FRL.

2.1.13.5.5 Multiway Calling

The Multiway Calling (MWC) feature must be assigned to the RLT trunk group so that the attendant has the capability to extend calls for the original caller. This is a requirement of the centralized attendant services/release link service (CAS/RLS) capability.

2.1.13.6 Limitations and Restrictions

This capability imposed no new limits or restrictions on the 5ESS[®] switch software or hardware.

2.1.13.7 System Resources

This capability is not using any additional system hardware resources.

2.1.13.8 Implementation

The operating company personnel are able to set and remove the FRL transfer enhancement using RC/V views 12.11, 5.21, and 6.21. The corresponding office records generated are e5608-1 and e5608-5. It is the responsibility of the service provider to insure that the RLT trunk groups are properly constructed.

2.1.13.9 Measurements

There are no new measurements requirements for this capability.

2.1.14 Authorization Code Screening for Senderized PBXs and Station Group Designators

2.1.14.1 Definition

In a leased network, a caller can use authorization codes (ATHs) to upgrade network calling privileges. By entering an ATH, a caller can override calling restrictions associated with the originating access facility. These restrictions are determined both by the FRL and feature set assigned to the originating access facility at the network switch.

This feature extends ATH capabilities to callers who are served by a senderized PBX, centrex, or use an attendant service. The calling restriction from these systems are determined by the FRL and the feature set assigned the originating access facility or by a traveling class mark sent to the network switch by a PBX or centrex to identify the FRL of a calling station.

2.1.14.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

2.1.14.3 Interactions

No interactions with other features have been identified.

2.1.14.4 Limitations and Restrictions

This capability imposed no new limits or restrictions on the 5ESS[®] switch system software or hardware.

2.1.14.5 Systems Resources

This capability is not using any additional system hardware resources.

2.1.14.6 Measurements

There are no new measurements requirements for this capability.

2.1.15 AMA Recording for Centralized Attendant Service/Release Link Service

2.1.15.1 Definition

This feature provides AMA records for calls assisted and/or transferred by an attendant in a leased network. This feature, when optioned, requires that two AMA records, with the same call type code, be written for transferred calls. The first record records the original call to the attendant. The second record records the transferred call, specifying the assisted caller as the originator and indicating that an attendant assisted the call.

2.1.15.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

2.1.15.3 User Operation

When a caller terminates to an attendant via an RLT, the attendant has the potential of extending up to 4 calls. The originating 5ESS® switch could generate up to 5 AMA records. The AMA record written for the first call to the attendant would not be changed by the AMA for RLT enhancement. This enhancement modifies the contents of the AMA records having a call type code of 099 written for the extended calls. These AMA records identify the original caller as the originator of the extended calls so that the assisted party is billed and not the attendant.

If the assisted party disconnects during a multiway connection between the attendant and the extended party(s), the assisted party is billed for the additional time of each extended call that the attendant remains connected to. However, the attendant is billed for any additional extended calls that the assisted party is no longer involved in.

2.1.15.4 Interactions

2.1.15.4.1 Authorization Codes

If an authorization code (ATH) is used when an original caller calls the attendant or on an attendant extended call, the ATH must be reflected in the AMA record in the ATH/account code field.

2.1.15.4.2 Account Code

If an account code is used by the original caller, the account code must be reflected in the AMA record. If an ATH and account code are both used on a call, the ATH will be reflected in the ATH/account code field in the AMA record.

2.1.15.4.3 Automatic Message Accounting

Calls extended for a caller by an attendant are required to be billed using AMA. Therefore, the AMA feature must be assigned to RLT trunk groups. The AMA for RLTs enhancement requires that for calls extended by an attendant, the AMA record billing number be that of the original caller, not the attendant. The AMA record also indicates that the call was assisted by an attendant.

2.1.15.4.4 Multiway Calling

The multiway calling (MWC) feature must be assigned to the RLT trunk group so that the attendant has the capability to extend calls for the original caller. This is a requirement of the centralized attendant services/release link service (CAS/RLS) capability.

2.1.15.5 Limitations and Restrictions

This capability imposed no new limits or restrictions on the 5ESS[®] switch software or hardware.

2.1.15.6 System Resources

This capability is not using any additional system hardware resources.

2.1.15.7 Implementation

The operating company personnel are able to set and remove the AMA on RLT enhancement using RC/V Views 12.11, 5.21, and 6.21. The corresponding office records generated are e5608-1 and e5608-5. It is the responsibility of the service provider to insure that the RLT trunk groups are properly constructed.

2.1.15.8 Measurements

There are no new measurements requirements for this capability.

2.1.16 Toll Connecting Routing and Billing Enhancement

2.1.16.1 DESCRIPTION

The Toll Connecting Routing and Billing Enhancement feature provides enhanced routing and billing capabilities for access services to inter-exchange carriers. This feature allows a competitive access carrier's (CAP) toll switch to accept equal access end office (EAEO) multi-frequency (MF) or Signaling System 7 (SS7) Feature Group D (FGD) signaling from an EAEO or an access tandem (AT) switch, and then switch the traffic to an inter-exchange carrier (IXC) for completion. This allows interworking of incoming EAEO carrier signaling to outgoing EAEO carrier signaling.

The CAP generates standard FGD automatic message accounting (AMA) records.

This feature is secured (SFID 154) and requires that a right-to-use (RTU) fee be paid to Lucent Technologies before enabling information is made available.

2.1.16.2 CROSS REFERENCES

- feature number: 99-5E-2851
- Bellcore specifications: TR-394

2.1.16.3 BACKGROUND

Previously, no means existed for competitive access providers (CAP) to generate AMA records when switching a call from a CAP access tandem (AT) to an inter-exchange Carrier. This feature provides that capability.

2.1.16.4 AVAILABILITY

This feature will be available as a software update to the 5E9(1) and 5E9(2) software releases and will be included in 5E10 and later software releases.

2.1.16.5 FEATURE ENVIRONMENT

This feature is supported on the 5ESS[®] switch and assigned on a per-switch basis.

2.1.16.6 FEATURE OPERATION

The Toll Connecting Routing and Billing Enhancement feature determines routing from the incoming SS7 initial address message (IAM) which contains a full NANP DN, an automatic number identification (ANI) and an originating line identity (OLI) or an incoming equal access multi-frequency (EAMF) trunk. Routing proceeds to either an SS7 outgoing trunk group and then to an inter-LATA carrier (IC) or to an EAMF group and then an IC. The called number, ANI and OLI is passed to the IC.

If the IAM contains an international destination, the feature also determines routing.

The 0+ and 0- calls received on an SS7 or EAMF incoming group can also be routed to either an SS7 outgoing trunk group or an EAMF outgoing trunk group.

This feature records Feature Group D originating LATA (FGDOL) AMA records on calls received on TTOLLCON trunk classes. The carrier ID will be recorded if received from the local exchange carrier (LEC).

This feature also handles the circuit reservation message (CRM) from the LEC.

2.1.16.7 USER OPERATION

2.1.16.7.1 For Subscribers

No subscriber actions are associated with this feature.

2.1.16.7.2 For Switch Personnel

Switch personnel install and activate this feature.

2.1.16.8 ENGINEERING

2.1.16.8.1 Hardware Resources

This feature does not affect hardware resources.

2.1.16.8.2 Software Resources

This feature does not affect software resources.

2.1.16.8.3 Transition Considerations

The competitive access provider (CAP) must make arrangements with the local service provider for service and interconnecting trunks. The CAP must also develop a means to process AMA billing data, if not already available.

2.1.16.9 INTERACTIONS AND LIMITATIONS

This feature has no interactions or limitations.

2.1.16.10 INCOMPATIBILITIES

This feature has no incompatibilities.

2.1.16.11 DEPENDENCIES

This feature has no dependencies.

2.1.16.12 ISOLATION CONSTRAINTS

This feature has no isolation restraints.

2.1.16.13 FEATURE IMPLEMENTATION

2.1.16.13.1 Office Data Administration (ODA) Provisioning

The following table provides a cross-reference between ODA forms and the associated Recent Change views. The ODA forms must reflect the same information shown in "Recent Change Provisioning," Section 2.1.16.13.2.

ODA FORM	OFFICE	ASSOC
tkgrp	5202	5.1
das	5300-1	9.1
ldit	5300-3,5	9.3
indit	5309	9.5
cdim	5300-6	9.7
rtdix	5303	10.2
rar	5301	10.10
cgidx	5302-1	10.11
ckrcode	5311	10.23

NOTE: Refer to 235-080-100, *5ESS® Switch Translation Guide* for details on translations forms.

2.1.16.13.2 Recent Change Provisioning

2.1.16.13.2.1 Feature Enabling

The service provider enables the Toll Connecting Routing and Billing Enhancement feature by populating Recent Change view 8.22 as follows:

FIELD	VALUES
FEATURE ID	154
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

NOTE: See 235-118-2xx, *5ESS® Switch Recent Change Reference* for detailed information on allowed values.

2.1.16.13.2.2 Feature Activation

NOTE: Additional information, including allowed values for all Recent Change views, may be found in 235-118-2xx, *5ESS® Switch Recent Change Reference*.

The Toll Connecting Routing and Billing Enhancement feature requires no new or changed routing and charging translations. Routing and charging translations for domestic calls that provide signaling without the inter-exchange carrier ID are constructed the same as tandem routing translations in the *5ESS®* switch. The following are verification procedures and all Recent Change screens are to be accessed in the REVIEW mode. Required changes because of inconsistencies are left to the discretion of the service provider based on local needs and office records.

Use Recent Change view 5.1 (TRUNK GROUP) and set field **TGN** to the trunk group selected for enhancement by this feature. Use the same digit analysis selector (DAS) defined by RC view 5.1 as an input to RC view 9.1 [DIGIT ANALYSIS SELECTOR (OFFICE DIALING)] field **DAS**. The INDIT and LDIT generated from RC view 9.1 is then

used as an input to either RC view 9.3 [LOCAL DIGIT (OFFICE DIALING)] or RC view 9.5 [INCOMING TRUNK DIGITS (OFFICE DIALING)]. Review RC view 9.3 or 9.5 setting fields **INDIT** or **LDIT** and field **INCOMING DIGITS** with appropriate values. Field **CALL TYPE** should reflect a value of **NORMAL** and field **TYP CI CALL** a value of **NONCI**. Conflict resolution [to distinguish between a NANP DN without the NPA and a full NANP DN] may be resolved by setting field **CALL TYPE** to a value of **CONFLICT**.

Use the value for field **SCR** displayed from the previous review of RC view 5.1 and the value from RC view 9.3 or 9.5 for field **CODE INDEX** as an input to RC view 10.10 [SCREENING(CHARGING)] fields **CDI** and **SCR**. A review of RC view 10.10 will display values for fields **RTI** and **CHGI** in the row corresponding to a value of **NONE** (the only valid value for this feature) for field **PFX**. The value displayed for **CHGI** (from RC view 10.10) is then used as input to RC view 10.11 [CHARGE INDEX EXPANSION (CHARGING)] which in turn displays a value for field **AMA TYPE**.

NOTE: **FGDOL** is the most commonly used **AMATYPE**. An alternate service feature code (ALT SFC) may be entered on the 10.11 view to record information such as the trunk group on which the call entered the switch. This requires separate screening index (SCR) codes for each trunk group (use RC view 5.1) needing special AMA identification.

The value for field **RTI** generated from RC view 10.10 is used as input to RC view 10.2 [ROUTE INDEX (ROUTING)]. On this view, field **SIG PRO** must be populated with a value of **TRAD** for an SS7 trunk group or **EA** for an equal access multi-frequency trunk group.

Translation for international and domestic calls that are signaled with the inter-exchange carrier ID is the same as calls handled by a local exchange carrier (LEC) access tandem (AT). Again, the following are verification procedures and all Recent Change screens are to be accessed in the REVIEW mode. Required changes because of inconsistencies are left to the discretion of the service provider based on local needs and office records.

Use Recent Change view 5.1 (TRUNK GROUP) and set field **TGN** to the trunk group selected for enhancement by this feature. Use the same digit analysis selector (DAS) defined by RC view 5.1 as an input to RC view 9.1 [DIGIT ANALYSIS SELECTOR (OFFICE DIALING)] field **DAS** to obtain an incoming digit interpreter table number (INC DIT) value.

If the incoming trunk group is SS7 use the initial address message (IAM) to obtain the three digit circuit code (CKT CODE) which is then used as input to field **CKT CODE** in RC view 10.23 (CIRCUIT CODE TO DIGIT TRANSLATION). A digit string value will be displayed in field **DIG**. Use this digit string value along with RC view 9.1 the INC DIT value as input to verify that RC view 9.5 displays values of **AVT** for domestic calls or **INC** for international calls in field **TYP CI CALL**. RC view 9.5 also generates a code index (CDI) that is used in RC view 9.7 [CARRIER DESTINATION (OFFICE DIALING)]. Populate view 9.7 field **CODE INDEX** with code index (CDI) and field **CARRIER ID** with the inter-exchange carrier ID obtained from the IAM address. Field **FEAT GRP** is **D**. Verify that the final carrier ID contained in field **CARRIER CDI** is correct.

Use the value for field **SCR** displayed from the previous review of RC view 5.1 and the value from RC view 9.3 or 9.5 field **CODE INDEX** as an input to RC view 10.10 fields **CDI** and **SCR**. A review of RC view 10.10 will display values for fields **RTI** and **CHGI** in the row corresponding to a value of **NONE** (the only valid value for this feature) for field **PFX**. The value displayed for **CHGI** (from RC view 10.10) is then used as input to RC view 10.11 [CHARGE INDEX EXPANSION (CHARGING)] which in turn displays a value for field **AMA TYPE**.

NOTE: **FGDOL** is the most commonly used **AMATYPE**. An alternate service feature code (ALT SFC) may be entered on the 10.11 view to record information such as the trunk group on which the call entered the switch. This requires separate screening index (SCR) codes for each trunk group (use RC view 5.1) needing special AMA identification.

The value for field **RTI** generated from RC view 10.10 is used as input to RC view 10.2 [ROUTE INDEX (ROUTING)]. On this view, field **SIG PRO** must be populated with a value of **INC** for international calls or **EA** for domestic calls.

2.1.16.13.3 Customer Premises Equipment (CPE)

No special CPE is required for this feature.

2.1.16.14 MAINTENANCE CONSIDERATIONS

There are no maintenance considerations associated with this feature.

2.1.16.15 ADMINISTRATION

2.1.16.15.1 Measurements

No new measurements are introduced by this feature.

2.1.16.15.2 Billing

This feature allows the switch to record Feature Group D originating LATA (FGDOL) AMA records on those calls received through TTOLLCON trunk class trunks. FGDOL AMA records use structure code 0625.

2.1.17 IXE Tandem Calls Via 2 Local Access Tandems

2.1.17.1 Description

The *IXE Tandem Calls via 2 Local Access Tandems* feature (99-5E-3112) allows service providers to economically route low-usage inter-exchange carrier (IXC) traffic between two different 5ESS[®] switch access tandem (AT) offices.

A single small carrier trunk group routes all small carrier traffic from one access tandem switch to a second access tandem switch thus providing consolidation of all small carrier traffic. The second access tandem switch then routes the small carrier traffic directly to the small IXC carriers. Using a single trunk group and a second access tandem switch provides an economical alternative to using direct trunk groups for each small IXC carrier.

This feature is secured (SFID 188) and requires that necessary arrangements be made between the service provider and Lucent Technologies. These arrangements include paying a right-to-use (RTU) fee before Lucent Technologies provides enabling information.

2.1.17.2 Cross References

- Feature number: 99-5E-3112
- Bellcore specifications: N/A

2.1.17.3 Background

Multiple trunk groups are available to small low-usage carriers as well as larger carriers. As a result, the low-usage small carriers using these direct trunk groups generate costly inter-LATA traffic.

2.1.17.4 Availability

The *IXE Tandem Calls via 2 Local Access Tandems* feature is available as a software update to the 5E9(2) and 5E10 software releases and will be part of the 5E11 software release.

2.1.17.5 Feature Environment

This feature is available on a per-switch basis and can be assigned on a per-trunk group basis. It works in both digital and analog environments.

2.1.17.6 Feature Operation

The *IXE Tandem Calls via 2 Local Access Tandems* feature is installed in access tandem switch number 1 (AT1) (see Figure 2-6) and uses a single trunk group (or single point of presence) to convey traffic to access tandem switch number 2 (AT2). All end offices are combined to route low-usage IXC inter-LATA traffic through AT1 over the single trunk group to the small IXCs served by AT2.

The originating end office (OEO) routes the call using ISUP7 trunk signaling to AT1. AT1 then signals AT2 using Feature Group D (FGD) signaling as required for communication between an equal access end office (EAEO) and an access tandem. This feature provides the enhancement at the AT1 switch as required by the EA/ISUP7 signaling.

The call then arrives at AT2 and is switched to the appropriate IXC small carrier A.

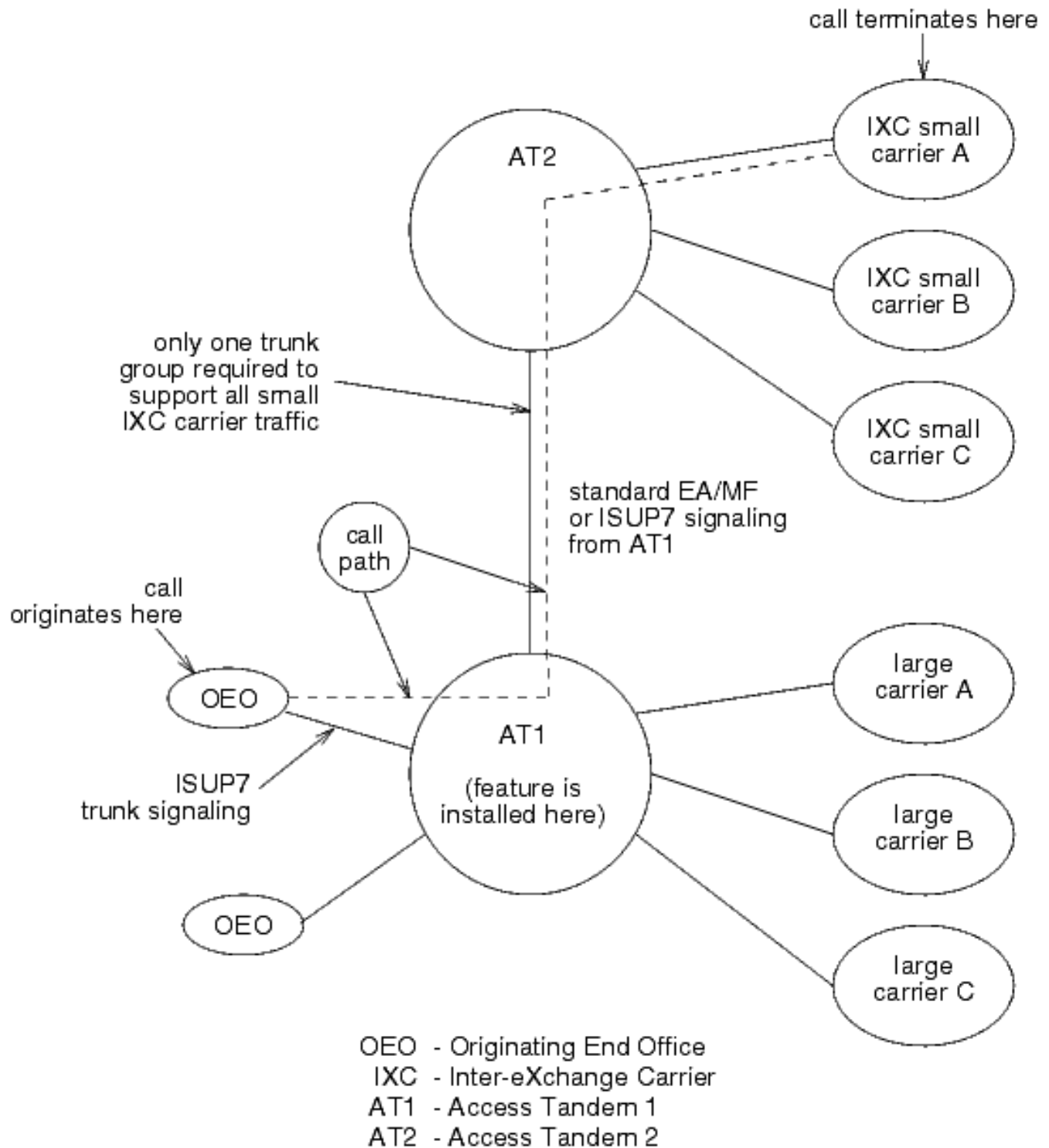


Figure 2-6 Small Carrier IXC Traffic Over Single Trunk Group

2.1.17.7 User Operation

2.1.17.7.1 For Subscribers

No subscriber actions are required.

2.1.17.7.2 For Switch Personnel

No switch personnel actions are required.

2.1.17.8 Engineering

2.1.17.8.1 Hardware Resources

No new hardware resources are associated with this feature.

2.1.17.8.2 Software Resources

No new software resources are associated with this feature.

2.1.17.8.3 Transition Considerations

No transition considerations are associated with this feature.

2.1.17.9 Interactions and Limitations

There are no interactions or limitations associated with this feature.

2.1.17.10 Incompatibilities

There are no incompatibilities associated with this feature.

2.1.17.11 Dependencies

The access tandem on which this feature is installed along with the associated network must be equipped for Signaling System 7 (SS7) trunk signaling.

2.1.17.12 Isolation Constraints

There are no isolation constraints associated with this feature.

2.1.17.13 Feature Implementation

2.1.17.13.1 Office Data Administration (ODA) Provisioning

The following table provides a cross-reference between ODA forms and the associated Recent Change views. The ODA forms must reflect the same information shown in "Recent Change Provisioning," Section 2.1.17.13.2 .

ODA FORM	OFFICE	ASSOC
rtidx	5303	10.2
tkgrp	5202	5.1

NOTE: Refer to 235-080-100, 5ESS[®] *Switch Translation Guide* for details on translations forms.

2.1.17.13.2 Recent Change Provisioning

The service provider enables the *IXE Tandem Calls via 2 Local Access Tandems* feature by populating Recent Change view 8.22 as follows:

FIELD	VALUES

FEATURE ID	188
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

NOTE: The small carrier trunk group to which reference is made in the following provisioning sequence is the trunk group that carries small carrier IXC traffic between AT1 and AT2 (refer to Figure 2-6).

To activate the *IXE Tandem Calls via 2 Local Access Tandems* feature, populate Recent Change View 10.2 [ROUTE INDEX (ROUTING)], field **TGN** with the appropriate trunk group number to route calls over a single small carrier trunk group. Field **RT DES TYP** should be set to a value of **STG** and field **SIG PRO** must be set to a value other than **TRAD** because FGD signaling is used.

RC view 5.1 (TRUNK GROUP) field **TRK CLASS** must be set to a value of **LTOLLCON** or **IC** for the small carrier trunk group.

NOTE: Allowed values for all Recent Change views may be found in 235-118-2xx, *5ESS® Switch Recent Change Procedures*.

2.1.17.13.3 Customer Premises Equipment (CPE)

No additional CPE is required by this feature.

2.1.17.14 Maintenance Considerations

Not applicable.

2.1.17.15 Administration

2.1.17.15.1 Measurements

No new measurements are introduced by this feature.

2.1.17.15.2 Billing

This feature does not affect billing.

2.2 CARRIER FEATURES

The carrier features enable the 5ESS® switch to be used as a toll switch for the carrier network. The carrier network consists of inter-LATA carriers and/or international carriers. A LATA is a defined geographical area where an equal access end office (EAEO) and/or access tandem (AT) can provide a carrier access to the local exchange. Refer to Carrier Interconnection Section 3 for information on how the local telephone company connects to the carrier.

The carrier toll office can be connected to customers via the local telephone company, via cellular mobile carriers (CMCs), via direct connect lines, via private branch exchange (PBX), or via remote switch module (RSM). (See Figure 2-7 .) Calls enter the carrier network over CAMA trunks, LATA connect trunks, or trunks from the CMC.

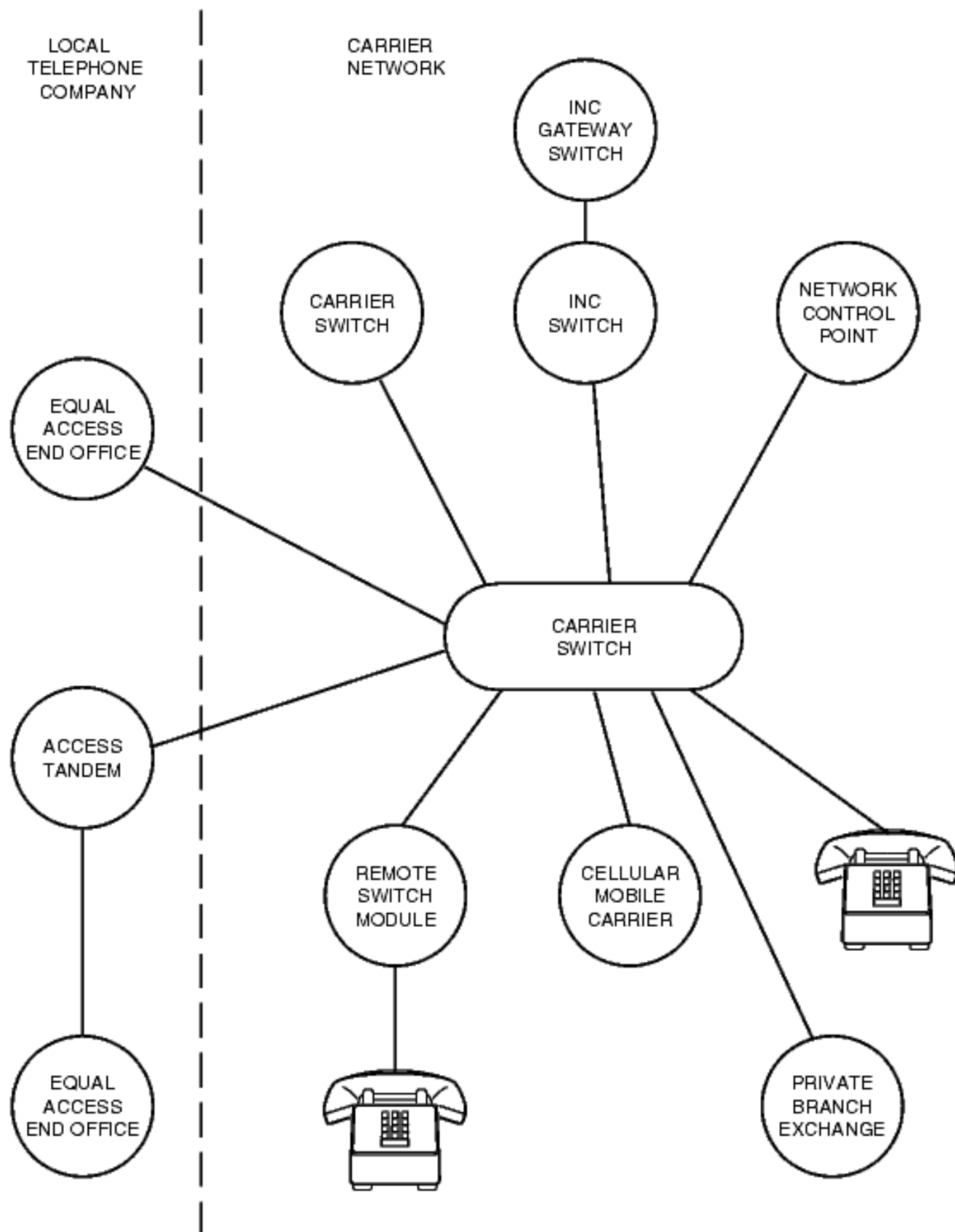


Figure 2-7 Carrier Network Interface

2.2.1 Equal Access Signaling

Signaling used between the local telephone company switching systems and the inter-LATA carrier network is EAS or traditional MF signaling. The toll switch can receive traditional MF signaling as well as EAS over the same trunks.

The EAS is an MF-based trunk signaling protocol for use with wink-start LATA-connecting trunks. These trunks can be 2-wire E&M, 4-wire E&M, or loop. The EAS differs from traditional MF signaling in the digit format and timing intervals. An additional acknowledgment signal is also used for EAS.

Traditional MF signaling for LATA-connecting trunks consists of only one digit sequence. This sequence contains the called number preceded by a key pulse (KP) and followed by a start pulse (ST).

The EAS protocol consists of two digit sequences, the ANI sequence, and the destination sequence. The ANI sequence contains the optional ANI number plus two information digits (II). Information digits are used to indicate the call type or line class as shown in Table 2-8.

Table 2-8 Information Digits, II, Assignment Table

INFORMATION DIGITS ^a	DESCRIPTION
00	Identified Line - No special Treatment
01	ONI (Multiparty)
02	ANI Failure
03	-
04	-
05	-
06	Hotel Without Room Identification
07	Coinless, Hospital, Inmate, etc.
08	Inter-LATA Restriction - Regular Line ^b
09	-
10	Test Call
12	Reserved
13	Reserved
14	Reserved
15	Reserved
16	Reserved
17	Reserved
18	Reserved
19	Reserved
20	AIOD - Listed DN Sent (not used for 5ESS [®] switch)
21	Reserved
22	Reserved
27	Coin Call
68	Inter-LATA Restricted - Hotel Line ^b
78	Inter-LATA Restricted - Coinless, Hospital, Inmate, etc. ^b
95	Reserved for Test Call
Notes:	
a. Information digits 12 through 19 are not assigned in order to avoid conflicting with the 1NX codes (used with the INC capability).	
b. Information digit pairs 08, 68, and 78 are sent only to the carrier for which inter-LATA restriction applies. Digit pair 08 takes precedence over all other digit pairs, except 68 and 78.	

The destination sequence contains the called number.

Alternate start pulses (ST', ST'', ST''') indicate cut-through calls for the EAS protocol. The ST' indicates a cut-through call using the long-term dialing plan (10XXX + #). The ST'' indicates a cut-through call on the long-term plan from an office not equipped for long-term EAS. The ST''' indicates a cut-through call using the transition dialing plan (950-WXXX).

Originations on LATA-connecting trunks require that call processing determine whether EAS or MF signaling is to be used. Call processing also detects and handles erroneous EAS calls. Additional supervisory signals are required for EAS.

Traditional MF signaling is distinguished from EAS by analyzing the first two digits of the initial sequence and by checking the number of digits in the sequence. Refer to Table 2-9 for traditional MF digit sequences.

Table 2-9 Traditional Multifrequency Signaling Digit Sequences

TYPE OF CALL	SEQUENCE ^a	DIGIT COUNT
Normal 7-Digit	KP+NXX+XXXX+ST	7
Normal 10-Digit	KP+NPA+NXX+XXXX+ST	10
International	KP+011+CCC+ST	6
Call to Mexico	KP+180+8D+ST	11
Operator Codes	KP+NPA+TTC+OPC+ST	9, 10, or 11
	KP+NPA+OPC+ST	6, 7, or 8
	KP+TTC+OPC+ST	6, 7, or 8
	KP+OPC+ST	3, 4, or 5
Test Calls	KP+958+X+ST	4
	KP+958+XX+ST	5
	KP+958+XXX+ST	6
	KP+958+XXXX+ST	7
Notes:		
a. TTC is of the form 0XX or 1XX but can not be 011. OPC is of the form XXX, 11XX, or 11XXX.		

Refer to Table 2-10 for initial EAS digit sequences.

Table 2-10 Initial EAS Digit Sequences

TYPE OF CALL	SEQUENCE	DIGIT COUNT
ANI Not Provided	KP+ST ^a	0
ONI or ANI Failure (II = 01 or 02)	KP+II+NPA+ST ^a	5
ANI Provided	KP+II+NPA+7D+ST ^a	12
Test Call	KP+10X+ST	3
Test Call	KP+95X+XXXX+ST	7
International Call	KP+1NX+XXX+CCC+ST	9
Notes:		
a. The start pulse ST can be ST', ST'', or ST'''.		

For information on EAS from the EAEO, refer to the Carrier Interconnect section.

2.2.1.1 Feature Operation

The following events occur for EAS:

- (1) The local telephone company switch seizes a trunk to the carrier network.
- (2) The carrier switch responds with a wink.
- (3) The local telephone company switch outpulses the two sequences of digits.
- (4) The carrier switch responds with an acknowledgment wink.
- (5) The carrier switch routes the call to the desired destination and talking path is established.

2.2.1.2 International EAS

International EAS uses two stages of outpulsing. The carrier code and country code are contained in the first stage. Upon receipt of the first stage, the switch routes the call and establishes a connection to an international carrier

(INC) switch. The second stage is outputted to the INC switch.

The first stage of international EAS typically has the form KP + 1NX + XXX + CCC + ST. The N of the 1NX cannot be zero or one and the X identifies operator or nonoperator service. The XXX identifies the carrier, and CCC is the 3-digit country code.

The second stage contains the optional ANI and the called number.

Refer to Table 2-11 for the international EAS format.

Table 2-11 International EAS Signaling Format

CUSTOMER DIALS	SITUATION			OUTPULSING SEQUENCE
10XXX+011+CC+NN or 011+CC+NN	First Stage	Tandem Case	From EAEO to AT and Repeated to Carrier	KP+1NX+XXX+CCC+ST
		Non-tandem Case	From EAEO to Carrier	
	Second Stage	From EAEO to Carrier		KP+(II+ANI)+ST+ KP+CC+NN+ST
		From EAEO to Carrier		
10XXX+01+CC+NN or 01+CC+NN	First Stage	Tandem Case	From EAEO to AT and Repeated to Carrier	KP+1N'X+XXX+CCC+ST
		Non-tandem Case	From EAEO to Carrier	
	Second Stage	From EAEO to Carrier		KP+(II+ANI)+ST+ KP+CC+NN+ST
		From EAEO to Carrier		
10XXX+(1)+10D or (1)+10D	First Stage	Tandem Case	From EAEO to AT and Repeated to Carrier	KP+1NX+XXX+01R+ST
		Non-tandem Case	From EAEO to Carrier	
	Second Stage	From EAEO to Carrier		KP+(II+ANI)+ST+ KP+10D+ST
		From EAEO to Carrier		
10XXX+0+10D or 0+10D	First Stage	Tandem Case	From EAEO to AT and Repeated to Carrier	KP+1N'X+XXX+ 01R+ST
		Non-tandem Case	From EAEO to Carrier	
	Second Stage	From EAEO to Carrier		KP+(II+ANI)+ ST+KP+0+10D+ ST
		From EAEO to Carrier		
	First Stage	Tandem Case	From EAEO to AT and Repeated to Carrier	KP+1NX+XXX+000+ST
		Non-tandem Case	From EAEO to Carrier	
	Second Stage	From EAEO to Carrier		KP+(II+ANI)+ST'
		From EAEO to Carrier		
10XXX+0	First Stage	Tandem Case	From EAEO to AT and Repeated to Carrier	KP+1N'X+XXX+000+ST
		Non-tandem Case	From EAEO to Carrier	

	Second Stage		From EAEO to Carrier	KP+(II+ANI)+ST+ KP+0+ST

International EAS follows this order of events:

- (1) The local telephone company switch seizes a trunk to the carrier switch.
- (2) The carrier switch responds with a wink.
- (3) The local telephone company switch outputpulses the first stage.
- (4) The carrier switch routes the call to an INC switch and establishes a connection to the INC's gateway switch.
- (5) The gateway switch responds with a wink which is relayed to the local telephone company switch.
- (6) The local telephone company switch outputpulses the second stage.
- (7) The gateway switch responds with an acknowledgment wink.

2.2.1.3 Administration - Measurements

Two measurements in the 30-minute traffic report associated with EAS are as follows:

- Incoming EAS peg count
- EAS total usage (measured in hundred call seconds).

These two measurements are reported on a trunk-group basis and are used to indicate the usage of EAS.

2.2.2 Billing

2.2.2.1 Feature Definition

The AMA capability provides the ability to generate detailed per-call billing records for all direct connect customers and all calls transmitted with ANI via EAS. This capability uses the billing features described in 235-190-300, *5ESS[®] Switch Billing Features And Specifications* to record call data, format AMA records, and teleprocess records.

The AMA records can be used to measure the service to outgoing wide area telephone service (OUTWATS) customers directly connected to the *5ESS[®]* switch. Originating INWATS calls generate station-paid records. Calls from CMC trunks also generate AMA records. Records are kept for calls blocked due to network call denial. Tracer records are kept to insure the integrity of the AMA records.

The AMA recording can be turned on/off on a per-trunk basis. The office also has the option of blocking calls using EAS with no ANI.

Calls are not prohibited from completing due to billing difficulties.

2.2.2.2 Feature Operation

2.2.2.2.1 Calls From Local Telephone Company

An AMA record is made for calls from the local telephone company that enters the carrier network using EAS with ANI. A record is not made if AMA recording has been disabled for the trunk group on which the call is received. These records are call code 060. Call code 060 uses structure codes 00001, 00002, 00101, and 00500 (Table 2-12

).

Table 2-12 Single Entry Data Fields for the 060 Call Type

DATA FIELDS	STRUCTURE CODES ^a			
	00500	00101	00001	00002
Call Type	X	X	X	X
Sensor Type	X	X	X	X
Sensor Identifier	X	X	X	X
Recording Office Type	X	X	X	X
Recording Office Identifier	X	X	X	X
Date	X	X	X	X
Timing Indicator	X	X	X	X
Study Indicator		X	X	X
Answer	X	X	X	X
Service Observed/Traffic Sampled		X	X	X
Operator Action		X	X	X
Service Feature	X	X	X	X
Originating NPA	X	X	X	X
Originating Number	X	X	X	X
Overseas Indicator	X	X	X	X
Terminating NPA	X	X	X	X
Terminating Number	X	X	X	X
Connect Time	X	X	X	X
Elapsed Time	X	X	X	X
Circuit Date				X
Circuit Time				X
Present Date		X		
Present Time		X		
Notes:				
a. X indicates that the data field is recorded.				

A high runner, answered call uses structure code 00500 with ANI recorded in the originating number field. The service feature field is set to 00, and the answer field is set to 0. A high runner, unanswered call also uses structure code 00500, but the answer field set to 1.

A detailed record is produced for incompleteness before answer or incompleteness after answer. The first case uses structure code 00001 with ANI as the originating number, the service feature field equal to 00, and the answer field set to 0. The second case also uses 00001, but the answer field is set to 1.

Long duration call records are made upon disconnect for calls which continued through two midnights. Structure code 00101 is used with the timing indicator set to 5.

Test calls use structure code 00001 with the fourth digit of the study indicator set to 1.

An AMA record is made for calls that are denied access due to the network call denial capability. Records made before answer use structure code 00002 with the answer field set to 3. Records made after answer use 00001 with the answer field set to 4.

Test calls over any trunk from the local telephone company cause AMA records to be made. Structure code 00001 is used with fourth digit of the study indicator field set to 1.

2.2.2.2.2 Calls From Cellular Mobile Carrier

Records with a call code of 306 are made for calls from CMC trunks for the purpose of billing the CMC. Call code 306 uses structure code 00020, 00021, 00120, and 00501 (Table 2-13).

Table 2-13 Single Entry Data Fields for the 306 Call Type

DATA FIELDS	STRUCTURE CODES ^a			
	00501	00120	00020	00021
+Call Type	X	X	X	X

+Sensor Type b	X	X	X	X
+Sensor Identifier b	X	X	X	X
+Recording Office +Type b	X	X	X	X
+Recording Office +Identifier b	X	X	X	X
+Date	X	X	X	X
+Timing Indicator		X	X	X
+Study Indicator		X	X	X
+Answer	X	X	X	X
+Service Observed/ +Traffic Sampled		X	X	X
+Operator Action		X	X	X
+Service Feature	X	X	X	X
+Originating NPA	X	X	X	X
+Originating Number	X	X	X	X
+Overseas Indicator	X	X	X	X
+Terminating NPA	X	X	X	X
+Terminating Number	X	X	X	X
+Connect Time	X	X	X	X
+Elapsed Time	X	X	X	X
+WATS Indicator		X	X	X
+WATS Band or MBI	X	X	X	X
+Circuit Date				X
+Circuit Time				X
+Present Date		X		
+Present Time		X		
Notes:				
a. X indicates that the data field is recorded.				
b. These data fields are inserted into the AMA record by either the HOC (AMATPS) or by the AMA tape writing process (LAMA).				

The WATS related fields do not apply and are filled with zeroes. The calling number recorded is a billing number associated with the CMC.

High runner calls from the CMC produce a record with structure code 00501. The service feature field equals 00, and the answer field equals 0.

Detailed records are produced for calls which are incompleting before answer or incompleting after answer. The first case uses structure code 00020, and the second case uses structure code 00021.

2.2.2.2.3 Calls From Direct Connect Lines and PBX Trunks

Records are made for calls from direct connected lines and PBX trunks. Call code 060 with structure code 00500 is used for POTS traffic. The service feature field is set to a value of 45 to indicate that this call was from a line or PBX trunk directly connected to the carrier switch.

The OUTWATS calls use call codes 007 and 068 (Table 2-14 and 2-15). The INWATS calls use call code 008 (Table 2-16).

Table 2-14 Single Entry Data Fields for the 007 Call Type

DATA FIELDS	STRUCTURE CODES ^a					
	00135	00035	00054	00055	00056	00155
Call Type	X	X	X	X	X	X
Sensor Type b	X	X	X	X	X	X
Sensor Identifier b	X	X	X	X	X	X
Recording Office Type b	X	X	X	X	X	X
Recording OfficeHC Identifier b	X	X	X	X	X	X
Date	X	X	X	X	X	X
Timing Indicator	X	X	X	X	X	X
Study Indicator	X	X	X	X	X	X
Answer	X	X	X	X	X	X

Service Observed/ Traffic Sampled	X	X	X	X	X	X
Operator Action	X	X	X	X	X	X
Service Feature	X	X	X	X	X	X
Originating NPA	X	X	X	X	X	X
Originating Number	X	X	X	X	X	X
Overseas Indicator	X	X	X	X	X	X
Terminating NPA	X	X	X	X	X	X
Terminating Number	X	X	X	X	X	X
Connect Time	X	X	X	X	X	X
Elapsed Time	X	X	X	X	X	X
WATS Indicator	X	X	X	X	X	X
WATS Band or MBI	X	X	X	X	X	X
WATS Administration	X	X	X	X	X	X
Circuit Date			X		X	
Circuit Time			X		X	
Customer Identifier				X	X	X
Present Date	X					X
Present Time	X					X

Notes:

- a. X indicates that the data field is recorded.
- b. These data fields are inserted into the AMA record by either the HOC (AMATPS) or by the AMA tape writing process (LAMA).

Table 2-15 Single Entry Data Fields for the 068 Call Type

DATA FIELDS	STRUCTURE CODES ^a					
	00135	00035	00054	00055	00056	00155
Call Type	X	X	X	X	X	X
Sensor Type	X	X	X	X	X	X
Sensor Identifier	X	X	X	X	X	X
Recording Office Type	X	X	X	X	X	X
Recording Office ID	X	X	X	X	X	X
Date	X	X	X	X	X	X
Timing Indicator	X	X	X	X	X	X
Study Indicator	X	X	X	X	X	X
Answer	X	X	X	X	X	X
Service Observed/ Traffic Sampled	X	X	X	X	X	X
Operator Action	X	X	X	X	X	X
Service Feature	X	X	X	X	X	X
Originating NPA	X	X	X	X	X	X
Originating Number	X	X	X	X	X	X
Overseas Indicator	X	X	X	X	X	X
Terminating NPA	X	X	X	X	X	X
Terminating Number	X	X	X	X	X	X
Connect Time	X	X	X	X	X	X
Elapsed Time	X	X	X	X	X	X
WATS Indicator	X	X	X	X	X	X
WATS Band or MBI	X	X	X	X	X	X
WATS Administration	X	X	X	X	X	X
Circuit Date			X		X	
Circuit Time			X		X	
Customer ID				X	X	X
Present Date	X					X
Present Time	X					X

Notes:

- a. X indicates that the data field is recorded.

Table 2-16 Single Entry Data Fields for the 008 Call Type

DATA FIELDS	STRUCTURE CODES ^a		
	00127	00027	00097
Call Type	X	X	X
Sensor Type	X	X	X
Sensor Identifier	X	X	X
Recording Office Type	X	X	X
Recording Office Identifier	X	X	X

Date	X	X	X
Timing Indicator	X	X	X
Study Indicator	X	X	X
Answer	X	X	X
Service Observed/ Traffic Sampled	X	X	X
Operator Action	X	X	X
Service Feature	X	X	X
Originating NPA	X	X	X
Originating Number	X	X	X
Connect Time	X	X	X
Elapsed Time	X	X	X
WATS Administrator	X	X	X
Circuit Date			X
Circuit Time			X
Present Date	X		
Present Time	X		
Notes:			
a. X indicates that the data field is recorded.			

Statistical overflow INWATS records are made hourly. These records contain the cumulative count of the number of overflow calls due to busy INWATS terminating lines. These counts are formatted and placed on the AMA stream every hour. The counts are reset daily at 4 a.m. The structure code for this record is 09003. Daily overflow INWATS records are made at 4 a.m. before the counts are reset. Structure code 09003 is also used for this record.

2.2.2.3 Implementation - Setting Up the ODD for AMA

The trunk group views are used to create a trunk group with a LATA-connect trunk as a member. The CMC value must be set to NO, ATT BILL and BLK NO ANI to YES, and CMC ID undefined (blank).

The CMC trunks require that CMC and ATT BILL be set to YES. The CMC ID value is set the same as the CMC ID value in the cellular mobile carrier view. The cellular mobile carrier view is used to set up trunk group information for CMC trunks. The CMC ID value is set to a value in the range 1 to 60 and set CMC BILL to a 10-digit number.

For additional information on these views, refer to 235-118-2xx, *5ESS® Switch Recent Change Procedures*.

2.2.3 Common Channel Signaling Transport

The common channel signaling (CCS) transport capability provides 56 kilobits per second (kb/s) access from the 5ESS® switch to the No. 2 signal transfer point (STP) signaling network. The CCS transport capability uses the common network interface/interprocess message switch (CNI/IMS) ring architecture in the carrier switch, STP, and the network control point (NCP).

This capability is optional on a switch basis. A feature indicator in the ODD marks the presence or absence of CCS in the office.

The primary purpose of the capability is to provide a mechanism for moving CCS signaling messages to or from SMs and CCS signaling links. For the 5E6 software release, the originating screening office/INWATS (OSO/INWATS) capability uses CCS transport for direct signaling to access a centralized data base.

The destination-routed CCIS6 (DCIS6) signaling is used for the CCS transport capability.

Refer to 235-190-120, *5ESS® Switch Common Channel Signaling Service Features* for additional information on CCS service features.

2.2.3.1 CNI/IMS Ring

All messages for CCS transport enter and leave the 5ESS® switch at the CNI/IMS. Refer to Figure 2-8 for the CNI/IMS ring configuration. The CNI/IMS ring contains two types of ring nodes, ring peripheral controllers (RPCs) and link nodes (LNs). The RPC transports signaling messages and internal control CNI/IMS messages between the

AM processor and the ring. The 5ESS[®] switch uses two RPCs.

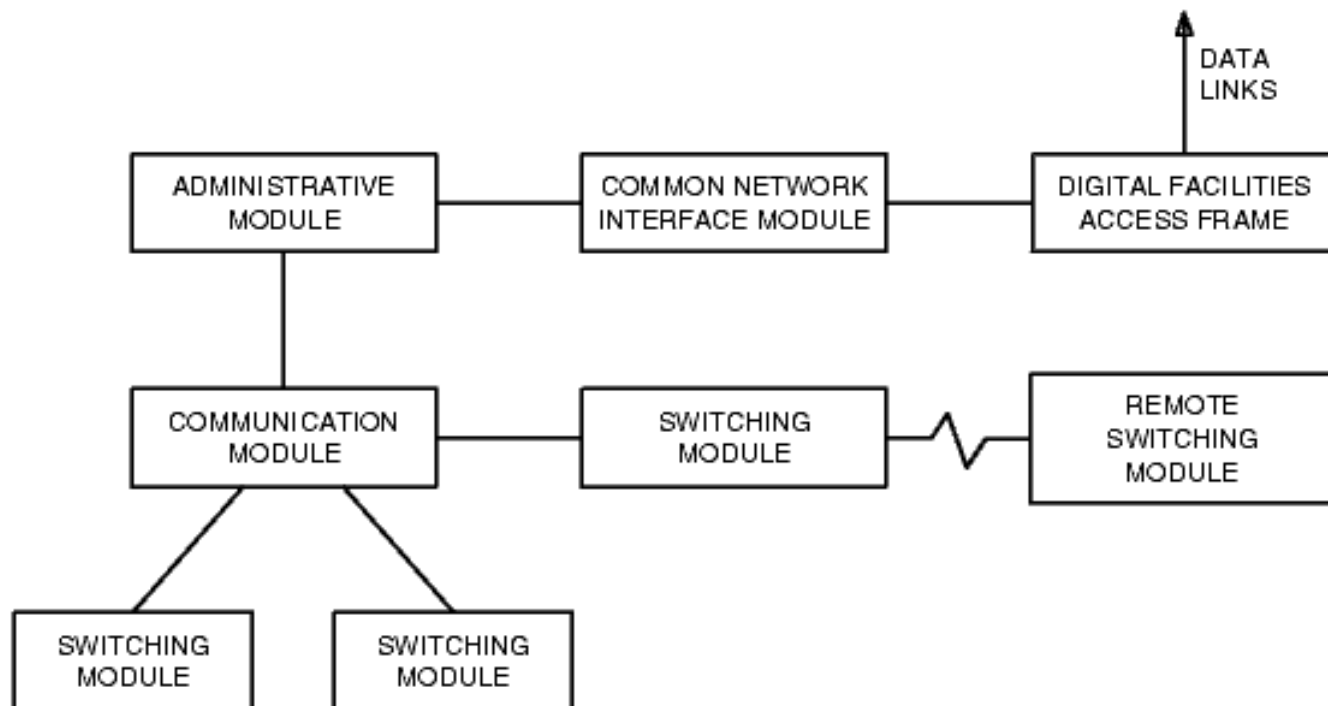


Figure 2-8 Common Channel Signaling Architecture

Link nodes consist of an IMS user node (IUN) and a link interface (LI) unit. The IUN consists of a ring interface (RI) unit and a node processor (NP). Two LNs are used.

A CCS message from the signaling network enters the 5ESS[®] switch at the link node on the CNI/IMS ring (Figure 2-9). The message is routed around the ring to a ring peripheral controller node. The ring peripheral controller is connected to the AM by a dual serial channel. The message is transferred by the CNI/IMS to the AM via direct memory access and routed to the appropriate SM.

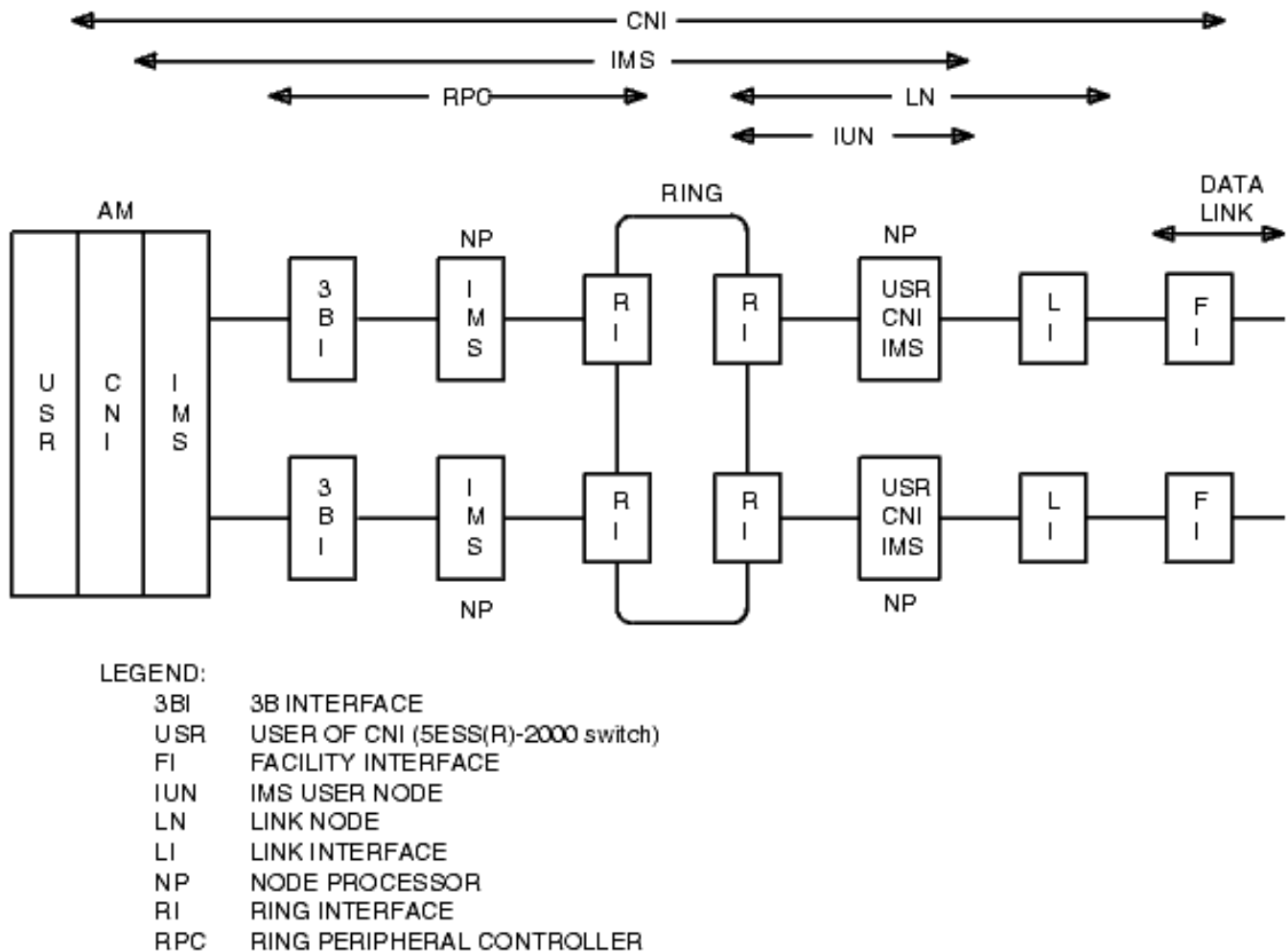


Figure 2-9 CNI/IMS Architecture

Messages from the SM are formatted in the AM and transferred via direct memory access to the ring. The message enters the link node as indicated by the CNI header contained in the message. The message is then transmitted to the STP.

Refer to 235-190-120, *5ESS® Switch Common Channel Signaling Service Features* for additional information on CCS service features.

2.2.3.2 System Resources

2.2.3.2.1 Hardware

The CNI requires a CNI cabinet and a digital facilities access frame. Two RPCs and two LNs are mounted in a single equipment bay of the CNI cabinet. The digital facilities access frame contains digital service units which connect to the digital data system network. One digital service unit is required for each LN equipped in the CNI cabinet.

Three scan points are used for the power control panel.

Two signal distribute points are used by the CNI bay for office alarms.

Two duplex dual serial bus selector links to the AM are used for control of the CNI cabinet. Two ports are used to

accommodate these links.

2.2.3.2.2 AM Memory

Since the CCS transport capability is optional, offices not using the capability are not required to use the AM main memory and real-time overhead associated with the CNI/IMS ring configuration.

Approximately 2.5 megabytes of main memory are required in the AM for the CCS transport capability.

2.2.3.2.3 Real Time

Approximately 1.9 ms of AM real time is required for CCS processing on each OSO/INWATS call.

2.2.3.3 Administration

2.2.3.3.1 Measurements

The CNI generates IMS and CNI measurements in the AM and in the nodes. Every 5 minutes, these measurements are collected in the measurement buffers in the AM.

Measurement data is presented in the form of formatted measurement data. Total office reports provide measurements accumulated over a 24-hour interval. The "Signaling Network Performance Report (Part 1)" contains CNI common measurements applicable to the 5ESS[®] switch. The "CNI Performance Report" contains summarized equipment performance measurements for the CNI. Total office reports are output on a daily basis and cannot be inhibited.

Detailed performance reports are used to isolate equipment that is performing poorly. These reports are output on a daily basis. The "Signaling Network Performance Report (Part 2)" contains measurements on a per-link basis. The "Signaling Equipment Performance Report" contains node performance measurements on a per-equipment basis.

Reports on critical events are output on occurrence or logged for 90 minutes.

Exception reports are generated at the end of each half-hour during which one or more of the marginal performance or automatic recovery thresholds have been reached or exceeded in one or more signaling links. Quantities that have been reached or exceed a threshold are indicated on the report.

The "56 kb/s Signaling Link Demand Signaling Quality and Availability Report" provides per signaling link information concerning the signaling quality and availability on demand.

Maintenance personnel can use input/output messages to do the following:

- Request the retained measurement reports on demand
- Inhibit specific automatic reports and output log files
- Report network critical events.

For additional information on traffic measurements refer to 235-070-100 (Appendix 1), *5ESS[®] Switch Administration And Engineering Guidelines — Appendix 1, Traffic And Plant Measurements*.

2.2.3.3.2 Recent Change and Verify Function

The recent change and verify function allows maintenance personnel access to the CNI data base. The recent change function is used to update the data base. The verify function allows maintenance personnel to query the data base to determine its contents.

2.2.3.4 Maintenance

Maintenance personnel can use input messages to obtain the status of the ring and ring nodes.

Input messages can be used to obtain the status of signaling links.

Initialization levels for the CNI can be invoked using input messages.

2.2.3.4.1 CNI/IMS Hardware

A faulty node is automatically detected, isolated, and diagnosed. Maintenance personnel is notified of the trouble, suspected faulty circuit, diagnostic results, action taken, and required manual action. Maintenance personnel can request more diagnostics. When repair is complete, the correction can be verified, and the equipment can be returned to service.

2.2.3.4.2 Signaling Link

The CNI reports events associated with signaling link maintenance as follows:

- Link failure
- Link recovery
- Link pair status change
- Link set status change
- Path status change.

Maintenance personnel are also informed whenever a signaling link maintenance event occurs which might affect the CCS message transmitting capability of the office.

2.2.3.4.3 Transmission Link

The Common Signaling Maintenance Center at the No. 2 STP is responsible for sectionalizing trouble to either the signaling terminals or the transmission link. When a signaling link is out of service due to a hard fault or consistent marginal performance, near-end diagnostics are automatically conducted at both the No. 2 STP and the 5ESS[®] switch. Diagnostics are performed on link nodes and data service units.

2.2.3.4.4 CCS Network

Maintenance personnel can use input messages to output the contents of the link interface transmit and receive buffers. This can be done for one link or more than one link simultaneously.

The CCS message sampling allows for maintenance personnel to sample incoming and outgoing messages on any single link. The input message must specify the following:

- A bit pattern to be matched
- A sample rate (1 to 100) which specifies how many of the matched bit patterns are to be output
- The number of messages to be output before sampling is automatically terminated
- The links to be sampled

- The direction of traffic to be sampled (incoming or outgoing)
- The device or file that is to receive the sampled output.

The logic analyzer is an extension of the CCS message sampling capability. It allows output of the previous or subsequent messages (up to 100) received at a particular node. This can be done at the ring peripheral controller and the link node.

2.2.4 CCS AM Real-Time Relief

2.2.4.1 Feature Description

2.2.4.1.1 Feature Definition

The CCS AM Real-Time Relief feature removes all per-call CSS message processing from the AM and restores the CCS office capacity to the non-CCS level. This feature introduces Software Release 2 of the CNI ring architecture, and uses the DLN, a new type of ring node, to relieve the real-time capacity constraint caused by CCS. This is accomplished by moving CCS signaling message processing from the AM to the DLN. The CCS related features are supported including OSO/INWATS, network call denial, CCIS6 and CCS7 ISUP trunk signaling, and OSPS related CCS queries for centralized flexible rating, calling card services, and customer account services.

2.2.4.1.2 Feature Operation

In the 5E3 software release version of CNI, all signaling messages to or from the signaling network pass through the AM and require per message processing. This creates a significant real-time capacity limitation in the AM. The function of the DLN is to eliminate the AM real-time capacity limitations caused by CCS. The DLN consists of the following components:

- Interprocess message switch (IMS) software including the interfaces with the ring and the application processor (AP)
- CNI software which includes various routing and signaling connection control part (SCCP) functions
- The AP operating system (OSDS-AP)
- 5ESS[®] switch specific software which performs user functions in the application processor of the DLN.

The DLN IMS software consists of the ring message switch, real-time executive (RTX) operating system, a maintenance package, a 3BI driver, and the application processor communication interface. The ring message switch provides a reliable ring interface for the application to send/receive messages to/from the ring as well as handle abnormal conditions (that is overload, overflow, and ring interface errors). The 3BI driver allows the application processor to perform I/O operations with the 3B using little knowledge of the 3B hardware. The maintenance package handles various IMS maintenance activities as well as measurements. The application processor communication interface extends IMS channels to the AP. The AP opens an IMS channel for receiving messages and sends IMS messages to the ring via the node processor.

The CNI functions in the DLN are associated with link selection, direct signaling, SCCP management for user flow control, and building headers for messages from the CM to the ring.

The OSDS-AP is the operating system for the AP. Using OSDS for the AP in the DLN, makes easier the porting of existing 5ESS[®] switch CCS software from the AM to the DLN.

The AP of the DLN performs 5ESS[®] switch specific functions. These functions, performed by the Administrative

Module (AM), include translations for trunk signaling, INWATS reply index table, network management interface for direct signaling, interface to CNI, and interface to the CM (OSDS header formatting and logical link map).

2.2.4.1.2.1 DLN Messages

The DLN is equipped as two independent simplex ring nodes operating in the active/standby mode. One DLN is active while the other is in the standby mode, ready to be switched to active. When a DLN is active, all signaling messages incoming to the link nodes are routed to that DLN by CNI, and this DLN is accessing the DLN-AM queues. When a DLN is standby, it is not accessing the DLN-AM queues, and no signaling messages are routed to it. The standby DLN has access to an up-to-date data base and is handling recent change and maintenance messages from the AM.

Call-related messages are routed on the CNI ring to the DLN instead of the existing ring peripheral controller. The DLN uses direct memory access (DMA) buffers in the AM dedicated to CCS signaling messages to communicate with the CM in the 5ESS[®] switch. These buffers are allocated within the AM, and are accessed by DMA by both the DLN and the message switch control unit (MSCU). The CCS processes in the SM address all CCS signaling messages to the DLN-AM buffers using the DLN processor code recognized by the MSCU.

The data stream linking a CM with a DLN flows through AM main memory. One segment is required for each bidirectional stream. Since both CM sides are active, two segments are required. Ring maintenance, link security, and administrative messages are still processed in the AM via the ring peripheral controller.

The CCS messages are direct memory accessed through the AM and passed between the DLN and the CM to the SM. This feature uses DLNs to do per-message processing relieving AM processing and consequently real time. Incoming calls (for example, 800 number services) initial processing takes place in an originating terminal process in the SM. This processing includes checking parameters indicating if the office is equipped with a DLN. If the office is not equipped with a DLN, an INWATS query message is sent to the CCS transport processor identifier in the AM; if the office is equipped with a DLN, the query message is sent to the CCS transport process in the DLN. When there is a DLN, all messages received at an office are received at the DLN since CNI cannot discriminate between message types.

2.2.4.1.2.2 Receiving Messages From the Ring

The CCS messages are routed through AM and passed to the DLN by the CCS link node. Messages arrive at the DLN and are placed in the ring receive buffer. The DLN node processor, at a polled interval, segregates maintenance messages bound for DLN from signaling messages. Signaling messages are passed to the AP via shared memory. The DLN-AP performs the message processing for all CCS messages destined to or originating from the SM. Additionally, the application in the DLN-AP is an interface with CNI and IMS in the DLN-AP handling the actual transfer of messages to and from the ring and AM memory. Message routing internal to the 5ESS[®] switch uses the operating system for distributed switching (OSDS) format. The AP formats the OSDS header and performs trunk ID processing (or direct signal processing). The CM runs in active/active mode. To send an interprocessor OSDS message, a logical link map is used to determine the side of the CM (CM0 or CM1) to be used for access to the destination processor. The logical link map is used to route messages through the CM. Two DMA buffers in the AM are required for the DLN. The active DLN communicates with both of the active CM sides. The AP selects the CM side using the logical link map and places messages in the appropriate DLN shared memory buffer.

In order to receive messages from the ring, the application in the DLN-AP calls an interprocess message switch function to open an interprocess message switch channel. The result of this is that at a regular polling interval, the network processor interrupts the AP to inform it that a block of received messages is available in the dual-port buffer.

During its base level cycle, the CM detects a new signaling message in the AM buffer and initiates a DMA transfer. To read data from the AM memory, the AP calls an interprocess message switch function to initiate a DMA transfer. When the transfer is complete, an interrupt informs the AP that the requested data is available in the dual-port

buffer.

2.2.4.1.2.3 Sending Messages to the CNI Ring

The CM sends signaling messages to AM memory buffers via the DMA. The data stream linking the CM with the DLN flows through the AM main memory. The DLN, at its polling interval, initiates block DMA(s) from the AM to DLN shared memory. The AP is notified of arrival of signaling messages and performs direct signaling processing (if applicable). All access to the CNI ring is performed by the DLN-NP at the request of the DLN-AP. Communication between the two processors is via processor interrupts and a 64-kilobyte dual-ported memory buffer. The interprocess message switch controls this interface.

The 5ESS[®] switch DLN software passes messages to CNI in the AP for CNI/IMS header formatting and link selection. The message header is formatted, and the message is passed via shared memory to the node processor. During a polled interval, the message is written to the CNI ring.

2.2.4.1.3 Availability

The CCS AM Real-Time Relief feature is available in 5E6 and later software releases.

2.2.4.2 System Resources - Hardware

The DLN consists of interprocess message switch user node hardware with an attached DLN-AP (application processor board) and a 3B interface board.

The interprocess message user node hardware consists of a node processor board (Intel 8086 processor), and two ring interface boards.

The DLN-AP contains an MC68000 microprocessor with two megabytes of memory, plus an interface to the node processor bus. Communication between the node processor and the AP is via a 64-kilobyte shared memory buffer.

The 3B interface board is connected to the 3B dual serial channel (DSCH) via a duplex dual serial bus selector board. Both the DLN and the CM are on DSCH 12. The CM is devices 0 and 1 (highest priority on channel 12), the (RPCs) are devices 2 and 3, and the DLNs are devices 4 and 5. All devices on DSCH 12 are at *UNIX*[®] RTR operating system level 10.

The introduction of the DLN in a 5ESS[®] switch required that two DLN units be added to a CNI frame.

The 5ESS[®] switch provides the cabling to interface the DLN with the other existing nodes in the CNI ring. Interconnection of the DLN is via the ring bus which basically connects the output of one node to the input of another.

2.2.5 CCS Enhancements

2.2.5.1 Feature Definition

The CCS enhancements feature provides traveling class mark routing by assigning translation domains to calls sent over CCS trunks in the 5ESS[®] switch. Domain-controlled routing for CCS ISDN User Part (ISUP), Common Channel Interoffice Signaling 6 (CCIS6) calls can be derived from one or two types of routing sources in the 5ESS[®] switch. One source is the translation data, namely digit analysis selectors (DAS). Another source is the CCS initial address message where the routing category yields the domain information.

2.2.5.2 Feature Operation

2.2.5.2.1 User Perspective

The CCS enhancements feature enables the 5ESS[®] switch to provide special routing for CCS calls that indicate the need for special routing. Special routing is determined by comparing information in the initial address domain with its incoming trunk domain. The information required to determine if a call needs a new translation domain is as follows:

- Routing category in the initial address message is for CCIS6 or ISDN User Part (ISDN-UP) signaling.
- Bearer capability in the initial address message is for ISDN-UP signaling.
- Forward call indicator in the initial address message is for ISDN-UP signaling.

This feature is provided for direct egress and international calls, and supports teleconferencing for non-POTS domains.

Using translation domains for routing may cause calls to be misrouted or unintentionally affected by network management reroute or code controls; therefore, calls routed in non-POTS domains are exempted from network management reroute and code controls.

Domain routing is provided for CCS calls incoming with either CCIS6 or ISUP signaling.

2.2.5.2.2 System Perspective

The arrival of a CCS call at the 5ESS[®] switch of CCIS6 or ISUP signaling types is the stimulus to activate domain routing. The initial address message of these types is checked to see if the call is to be routed in a non-POTS domain.

2.2.5.2.2.1 CCIS6 Calls

The traveling class mark (TCM) information in the initial address message indicates if a call is either direct egress or international outbound. The routing category (routing indicator field) is examined to determine if the TCM information indicates domain routing other than that specified by the incoming trunk domain. If a domain change (domain overwrite) is required, a field is set in an feature control (FC) structure (digit data collection block) to indicate the domain overwrite to digit analysis. If no domain change is required, the field is set to null. If a non-POTS domain is used to route the call, a bit is set in the FC structure, and this structure is passed in the route request message to the AM. Network management code exempts the call from reroutes and code controls when a non-POTS domain is indicated in the FC structure and in the initial address message.

2.2.5.2.2.2 ISUP Calls

The TCM information in the initial address message indicates if a call is either direct egress or international outbound. The routing category (routing indicator field) and bearer capability is examined to determine if the TCM information indicates domain routing other than that specified by the incoming trunk domain. The ISUP provides additional information in the bearer capability required to support additional domains. The bearer capability in the initial address message indicates the type of origination and thus the routing domain needed for the call. If a domain overwrite is required, a field is added in an FC structure to specify the domain (digtree) value to be used to translate the call. After the call to obtain the terminal parameters for a call, a check is made to determine if the digtree associated with the trunk is to be overridden with a new value. The value indicated in the digit collection block is used as the digtree for the call.

The digtree value provides entry to translation tables. Any numeric value 0-99 may be used. For CCS calls, the following digtree values are available for the indicated services.

81	International Outbound
82	Circuit-Switched Data Capability

89	Dedicated Egress - Voice
90	Dedicated Egress - Data
91	64-kb Clear - Single Circuit
92	64-kb Restricted - Single Circuit
97	Dedicated Egress - Voice - CCS7 Preferred
98	Dedicated Egress - Data - CCS7 Preferred.

Offices with any trunk that has an in_sigtype = DBISUP7 or an out_sigtype = DBISUP7 in the FC_TRUNK relation must reserve and populate the digtree values of 81, 82, 89, 91, 92, 97, and 98. Offices with any trunk with in_sigtype = DBCCIS6 or out_sigtype = DBCCIS6 must reserve and populate only the digtree values of 81, 82, 89, and 90.

If no domain change is required, the field is set to null. If a non-POTS domain is used to route the call, a bit is set in the FC structure and this structure is passed in the route request message to the AM. Network management code exempts the call from reroutes and code controls when a non-POTS domain is indicated in the FC structure and in the initial address message.

2.2.5.3 Limitations and Restrictions

The current limit on the number of digit analysis selector values is 99. Certain digit analysis selector values have certain meaning. If an office has CCS, the digit analysis selector values 80 through 99 are used for specific classes of traffic. This feature places restrictions on how some of the values can be assigned.

2.2.5.4 Interactions

To ensure correct routing of non-POTS domain calls, they must be exempt from network management reroute and code controls. Translation domains may be misrouted or affected by network management controls. Reroute controls route calls to trunk groups that are not in the normal alternate routing scheme. This can allow non-POTS calls to be routed to trunk groups not engineered to handle certain domains. Code controls are applied to a call based on the number of digits being translated. The same digits may be translated differently in different domains; code controls may affect a call not intended to be controlled.

2.2.5.5 Availability

The CCS enhancements feature is available with 5E6 and later software releases of the 5ESS[®] switch.

2.2.6 Originating Screening Office/Inward Wide Area Telecommunications Service

2.2.6.1 Feature Definition

The OSO/INWATS feature allows the 5ESS[®] switch to function as an originating screening office for INWATS (800 Service) calls. The feature provides routing information for INWATS calls entering the carrier network. Routing information is obtained by accessing a remote INWATS data base at a network control point. The INWATS data base provides the direct distance dialed (DDD) number used to route the call, or it responds with failure messages indicating conditions such as a vacant 800 service number.

The OSO/INWATS feature uses the CCS7 network for INWATS data base access. The protocol used on the CCS7 data links between the OSO and the network control point is destination-routed common channel interoffice signaling 6 (DCIS6).

2.2.6.2 Feature Operation

When an 800 service call reaches an OSO, it is recognized as an INWATS call. The originating numbering plan area (NPA) is determined by the OSO and sent to the INWATS data base for rate band evaluation. Network management controls are also checked for the 800 service number.

To obtain a DDD number for routing the call, a query is sent to the INWATS data base. One of the 64 reply indices is selected and saved during the query to relate the reply to the call.

The reply can be an INWATS success reply, an ineffective attempt reply, or a signaling failure reply. Each reply contains a destination address that is compared to the destination address of the switch. If a mismatch occurs, the message is discarded, and the direct signaling misrouted message peg count is incremented.

The INWATS success reply contains the 10-digit DDD number which is used in routing the call.

The ineffective attempt reply contains an indication of failure conditions. The error conditions and call treatment are as follows:

- Vacant 800 + XXX - vacant code announcement
- Vacant line number - vacant code announcement
- Out of band NPA - unauthorized INWATS announcement
- INWATS data base overload - reorder announcement
- All lines busy - 60 interruptions per minute tone
- Miscellaneous error - reorder announcement.

The signaling failure reply is returned because of trouble in the signaling network. The failure conditions and call treatment are as follows:

- Network overload - reorder announcement
- Network blockage - no circuit announcement
- No routing data for destination - reorder announcement
- Destination unequipped - reorder announcement.

2.2.6.3 Administration - Measurements

Measurement counts used by the OSO/INWATS feature are reported on the 30-minute traffic report as follows:

- Total INWATS calls peg count
- INWATS queries sent peg count
- Successful INWATS replies peg count
- No INWATS reply peg count
- Direct signaling incoming reorder peg count

- Direct signaling network management code control peg count
- Direct signaling misrouted message peg count
- Direct signaling ineffective attempt reply peg count.

Two counts are impacted due to INWATS related events. An INWATS call which is unsuccessful for any reason is included in the incoming call setup trouble count. This count is output on the 24-hour plant report. An INWATS call which is abandoned during the inquiry phase is included in the incoming calls abandoned count. This count is output on the 30-minute traffic report.

2.2.7 Operations, Administration, and Maintenance

The operations, administration, and maintenance (OA&M) capability enhances the overall capabilities of the 5ESS[®] switch as an office in the carrier network. The capability allows for enhancements to the recent change/verify function and plant measurement function.

2.2.7.1 Recent Change/Verify Function

The following enhancements are available:

- A multiple number of trunk recent changes can be made on a single recent change form
- Trunk group and trunk group member attributes can be changed without a delete and insert operation
- Trunk group and trunk group member attributes can be updated without taking the trunk group out of service if the updated attributes are not service affecting
- Trunk groups can be verified by an alphanumeric name
- All trunk group member numbers assigned in a trunk group can be listed when verifying a trunk group
- A long verify can be aborted.

Refer to 235-118-2xx, 5ESS[®] *Switch Recent Change Procedures* for more information.

2.2.7.2 24-Hour Plant Report

Measurements added to the existing 24-hour plant report are:

- Peg count of centralized automatic message accounting/automatic number identification calls
- Peg count of incoming time-outs and abandons
- Peg count of no path or service circuits
- Peg count of abandonment from queues
- Peg count of vacant codes
- Peg count of no circuits
- Peg count of network management blocked
- Peg count of tone decoder attachment delay.

Additional header information is added which indicates the reporting office, reporting interval, current software release, report type, date, time, report period, and data validity.

An hourly report, containing a subset of the 24-hour report information, is provided. The header information is the same as the 24-hour report. The following measurements are provided:

- (a) Service measurements - base counts
 - Base counts
 - Requests.
- (b) Service measurements - ineffective attempts
 - Call set-up troubles
 - Transient calls lost
 - False starts
 - Time-outs and abandons
 - Vacant code
 - No circuit
 - Network management blocked
 - No path/no service circuit
 - Abandons from queues.
- (c) Service measurements
 - Cut-off calls
 - Billing troubles
 - Tone decoder attachment delay.
- (d) Performance measurements
 - Communication module processor (CMP) performance
 - Initialization (AM, SM and CMP)
 - Equipment performance
 - System performance
 - SM performance.

For additional information about Administration features, refer to Section 6. For additional information about Maintenance features, refer to Section 7.1.

2.2.8 Common Channel Signaling Trunk Signaling

2.2.8.1 Feature Definition

The common channel signaling (CCS) feature employs data links, distinct from the voice paths, to transfer information between signal transfer points (STPs) in the 5ESS[®] switch network. The information transferred consists of supervisory and address signals, as well as supplementary information needed to implement new customer services and network features.

2.2.8.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

2.2.9 CCS7 Improved ISUP

2.2.9.1 Feature Definition

The CCS7 Improved Integrated Services Digital Network-User Part (ISUP) feature performs the signaling functions necessary for intra-LATA call setup, call tear-down and trunk maintenance. The most significant advantage of ISUP is the use of CCS7 for trunk signaling. CCS7 provides the basis for an almost unlimited variety of trunk signaling for new and improved features. Other advantages of ISUP include improved speed and efficiency of interoffice call setup.

This feature implements Bellcore TS-TRY-000317 recommendations on the 5ESS[®] switch. This feature aligns CCS7 ISUP protocol with Bellcore recommendations for the (TR-317) procedures required for the establishment and release of call connections using Signaling System No. 7 (SS7) protocol (referred to as ISUP protocol).

The CCS7 feature helps meet the needs for a revised, international standard for CCS. The ISUP feature of CCS7 is based on the T1X1.1, April 1985 draft protocol requirements. Modifications to the T1 standards are contained within Bell Communication research draft TR-TSY-000317 (TR317; January 1987)

The CCS7 provides a widely accepted standard for common channel interoffice signaling systems with all the capabilities of CCIS6. However, it is more flexible and more adaptable to different switching systems. With CSS7, many new features may be developed without feature dependent work to the overall structure of the ISUP protocol.

2.2.9.2 Feature Operation

The CCS7 ISUP capability consists of:

- Translating and formatting of ISUP messages
- Initialization and control of the CCS originating and terminating terminal processes
- A system process responsible for receiving messages from the transport interface dispenser and dispensing the message to the appropriate process
- Interworking CCS user parts with existing 5ESS[®] switch line and trunk signaling types.

Translating and Formatting ISUP Messages — The ISUP translating is provided by CCS in the AM and SM. The CCS messages arrive at a primary message dispenser either through the CNI ring or through the packet switch unit (PSU). The primary message dispenser for the CNI ring resides in the AM. The primary message dispenser for the

PSU resides in the SM containing the packet switch interface unit (PSIU). The protocol of each individual message is passed to the primary message dispenser. Using the protocol, the message type is determined. The message type distinguishes the different types of messages (that is, call processing, trunk maintenance, network management, or system integrity messages).

CCS Originations and Terminations — Inputs to the CCS terminal processes are common events representing the CCS messages received over a data link. ISUP translating messages in the SM are collectively referred to as the ISUP message formatter/interpreter. For TR-317, the design modifies ISUP message formatting for the application software in the AM and SM. The ISUP message and parameter formats are modified, the unsuccessful backward setup (UBS) message is deleted, and the released (RLSD) message which is no longer required in the release (REL) message sequence is eliminated. The RLSD is removed and replaced by the REL message and the UBS message is replaced by the REL. The release message is mapped to one of two common event structures depending on the cause value passed in the message. If the value is set to "normal release" or "normal unspecified" then the REL is translated into a release common event structure; otherwise it is translated into a UBS.

ISUP Dispensing — Messages from the transport interface dispenser are received and dispensed to the appropriate terminal process. The message dispenser assigns a message type and class for each ISUP message.

ISUP Interworking — Allows CCS originations and terminations to work with non-CCS originations and terminations.

2.2.9.3 Availability

The CCS7 Improved ISUP feature is available in 5E6 and later software releases.

2.2.10 Circuit-Switched Trunk (CST)

2.2.10.1 Definition

The Circuit Switched Trunk Service is a Number Service providing call routing capability from end-users to Enhanced Service Providers (ESP) based on the dialed number. End users in equal access end offices (EAEs) or at a CST Tandem at co-located stations dial a 7- or 10-digit access code to place a call to the ESP. The 7- or 10-digit access code is assigned to the CST service. The CST Tandem performs 7- or 10-digit translations on the dialed digits received to select the dedicated outgoing trunk group to route the call to the ESP.

2.2.10.2 Availability

This feature is available with 5E6 and later software releases. The feature is available for the 5E6 software release via software update 89-0060.

NOTE: Consult your Lucent Technologies Account Executive for availability.

2.2.10.3 Feature Provision Basis

This secured feature is administered on a per-office basis.

This secured feature is not enabled until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature enabling is provided upon ordering. Please contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

2.2.10.4 User Perspective

2.2.10.4.1 User Profile

Subscribers in an equal access end office use this feature to place a call to an enhanced service provider.

2.2.10.4.2 User Operation

Subscribers originate a CST call, from an EAEO or CST Tandem co-located station to an ESP, by dialing a CST access code.

2.2.10.4.3 Activation

The subscriber dials an access code consisting of a NANP DN without the NPA or a full NANP DN. The office code or the Numbering Plan Area (NPA) and office code of the access code are dedicated to the CST service. Digit analysis identifies CST calls based on office code or NPA-office code translation of the dialed number. When the call is identified as a CST call, first stage signaling is sent to the CST tandem.

2.2.10.4.4 Interactions

The CST feature interacts with the VPATH feature which enables end offices to outpulse a dialed DN (a NANP DN without the NPA) field to Access Tandems. The VPATH feature must be loaded and operational in EAEO's for the dialed DN (a NANP DN without the NPA) to be outpulsed.

2.2.10.5 Engineering

2.2.10.5.1 Special Planning Considerations

The 5ESS[®] switch must be equipped with an operational and fully tested SSP/800 feature.

The office must be a Service Switching Point.

At least one trunk group is dedicated to an ESP. No trunk groups are shared among ESPs.

Optional alternate routing arrangements are available for CST service. Normal POTS alternate routing applies.

2.2.10.5.2 System Resources - Software

Significant resources could be used if the customer implements greatly expanded 10-digit translations for CST. Resource impact is lessened by the following:

- (1) Opening as few CST NPAs as possible.
- (2) Opening new codes in the least significant digits first.

2.2.10.6 Assignment Guidelines

2.2.10.6.1 Forms and Views

2.2.10.6.1.1 TG-5 Forms

No ODA forms are added or modified.

The check "When CARRIER TYPE = **PSEUDO**, DIG ROUTING must = **N**," is removed.

The check "if ICF.CARRTP = **PSEUDO** and ICF.DIG ROUTING = **Y**, the CST secured feature must have been purchased," is added.

2.2.10.6.1.2 Recent Change Views

No recent change (RC) views are added or modified.

On RC View 10.3 (INTERLATA CARRIER), a CARRIER TYPE of **PSEUDO** with a DIG ROUTING field entry of **Y** (yes) enables a CST call.

2.2.10.6.2 Assigning to Customer

Assign this secured feature using the following RC views:

- (1) Obtain assistance from the Lucent Technologies Secured Feature Administrator (SFA) to enable this secured feature. In a new start office, the Lucent Technologies SFA enables the feature through ODA. In an existing office, the Lucent Technologies SFA provides instructions, including the necessary password, for using RC View 8.22.
- (2) On RC View 10.3 (INTERLATA CARRIER):
 - Enter the carrier identification in the CARRIER ID field.
NOTE: Bell Communications Research (BCR) maintains assignment and administration of these codes.
 - Enter **PSEUDO** in the CARRIER TYPE field.
 - Enter **Y** (yes) in the DIG ROUTING field.

2.2.10.6.3 Deleting Customer Service

Delete this secured feature using the following RC views:

- (1) Obtain assistance from the Lucent Technologies Secured Feature Administrator (SFA) to delete this secured feature. The Lucent Technologies SFA provides instructions, including the necessary password, for using RC View 8.22.
- (2) On RC View 10.3 (INTERLATA CARRIER):
 - Enter the carrier identification in the CARRIER ID field.
NOTE: Bell Communications Research (BCR) maintains assignment and administration of these codes.
 - Enter **PSEUDO** in the CARRIER TYPE field.
 - Enter **N** (no) in the DIG ROUTING field.

2.2.10.7 Administration - Measurements

No new measurement counts are required for the CST feature. Specific Number Services counts used for CST are found in Section 91 of the 30-minute traffic report. The following counts are pegged for CST:

- (1) Number Service calls originating at the switch.
- (2) Number Service calls received from other switches.
- (3) Failure to receive second signaling stage on an EA trunk.

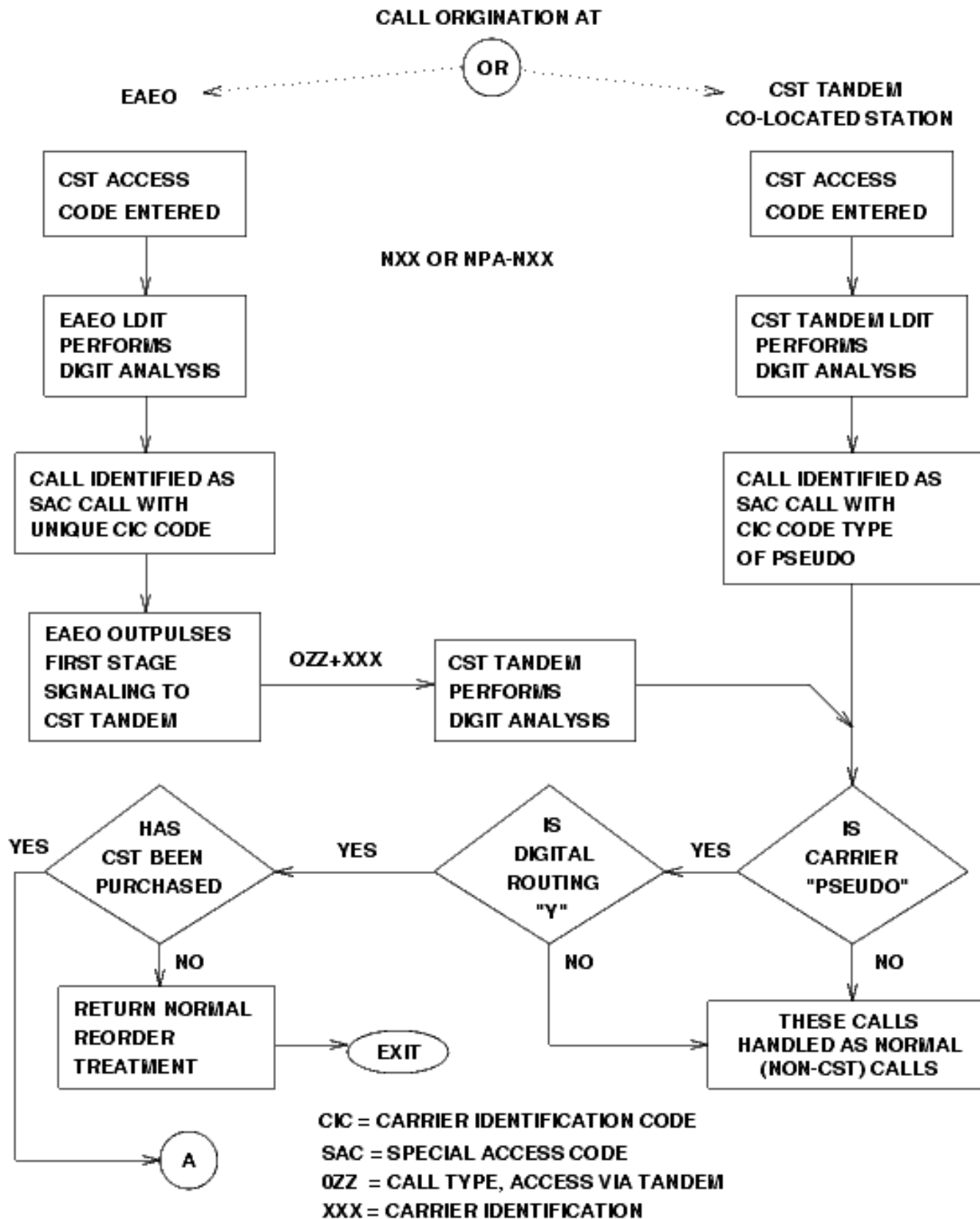
- (4) Call processing failure before initial query.

NOTE: There are no external queries for CST calls.

- (5) Abandon before outpulsing.

2.2.10.8 System Operation

System operation is shown in Figure 2-10 .



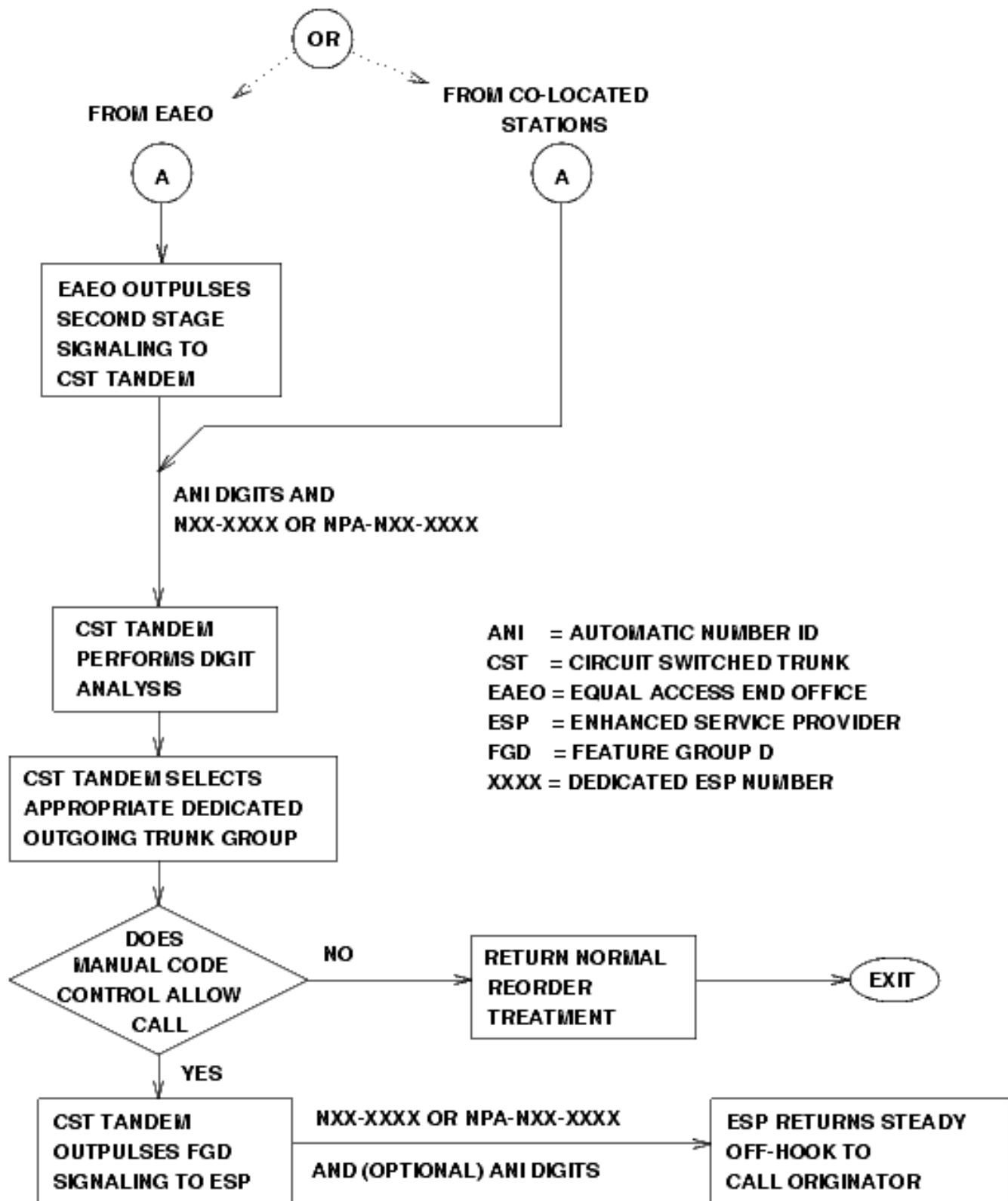


Figure 2-10 Circuit-Switched Trunk Data Flow

2.3 CIRCUIT-SWITCHED TRUNK (CST) ENHANCEMENT

2.3.1 Definition

The Circuit-Switched Trunk Enhancement (CSTE) special feature builds on the existing functionality of the Circuit Switch Trunk (CST) special feature. For details on the base CST feature, refer to Section 2.2.10 .

The CSTE feature provides the ability to block certain non-CST calls at the CST tandem office to prevent the possibility of fraudulent calls. A unique digit analysis selector (DAS) may be associated with CST calls incoming from an Equal Access End Office (EAEO). By populating the digit analysis tables associated with the unique DAS that only has legitimately dialable CST digits, CST calls are routed in their own dialing plan and fraudulent calls are blocked.

2.3.2 Cross-References

The following cross-references are applicable to the CSTE feature:

- Feature number: 99-5E-1492
- NSEP/5SEP code: Not available.

2.3.3 Background

The CST tandem switches route CST calls to Enhanced Service Providers (ESPs) based on the dialed digits. Fraudulent calls occurred when a casual user dialed 10XXX (where XXX was the CST pseudo-carrier ID) followed by a non-CST directory number (DN). By routing CST calls in their own dialing plan, 10XXX followed by a non-CST DN will be blocked at the CST Tandem.

2.3.4 Availability

This is a secured/restricted feature and is available as an update to the 5E8 and later software releases. Because this is a secured feature, it will not be enabled until the purchaser has made the necessary financial arrangements with Lucent Technologies. Information on feature enabling is provided upon ordering. Please contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

2.3.5 Feature Application

This secured feature is administered on a per-office basis.

2.3.6 User Perspective

2.3.6.1 User Profile

Subscribers in an EAEO use the CST feature to place a call to an ESP. To avoid the possibility of fraudulent calls, the CSTE feature should be used.

2.3.6.2 Customer Premises Equipment (CPE)

There is no special CPE required.

2.3.7 User Operation

Subscribers originate a CST call, from an EAEO or CST tandem collocated station to an ESP, by dialing a NANP DN without the NPA or a full NANP DN access code. The office code or the Numbering Plan Area (NPA) and office

code of the access code are dedicated to the CST service. Digit analysis identifies CST calls based on an office code or NPA-office code translation of the dialed number, and the call is routed to the CST tandem switch. The CST Tandem then performs digit analysis and translation of the dialed digits using the CST DAS.

2.3.7.1 Activation

Because this is a secured feature, it will not be enabled until the purchaser has made the necessary financial arrangements with Lucent Technologies. Information on feature enabling is provided upon ordering. Contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

After the feature is purchased, craft personnel need to define the DAS on Recent Change Verify (RC/V) View 9.1 and populate the dialing plan with legitimate CST numbers per normal procedures. They should then assign the new defined DAS to be used for CST calls. The new DAS is assigned on RC/V View 8.1 in the field "CST DAS."

2.3.7.2 Deactivation

To deactivate this secured feature, obtain assistance from the Lucent Technologies Secured Feature Administrator (SFA). The SFA provides instructions, including the necessary password, for using RC/V View 8.22.

2.3.8 Engineering - Special Planning Considerations

There are no additional planning considerations needed for the CSTE feature other than those for the CST feature.

2.3.9 Dependencies

The CST feature must be available and active for the CSTE feature to be turned on.

2.3.10 Feature Implementation - Recent Change Procedures

To use the CSTE feature, craft personnel should assign a new DAS to be used for CST calls. The new DAS is assigned on RC/V View 8.1 in the field "CST DAS." Prior to assigning the "CST DAS," the DAS must be defined on RC/V View 9.1 and the dialing plan populated with legitimate CST numbers per normal procedures.

2.3.11 Feature Operation

The CST calls can originate at EAEOs or at CST tandems with collocated lines. A CST call from the EAEO arrives at the CST access tandem over a shared trunk group using Equal Access Multifrequency signaling. The CSTE feature will use the CST DAS to route the calls in the CST dialing plan.

The CST calls can also originate from collocated lines at the CST access tandem. Fraud cannot occur on these CST calls. If a user dials 10XXX followed by a non-CST number, the call is blocked during carrier selection.

2.4 LANDLINE CELLULAR OPTION

2.4.1 Overview

2.4.1.1 Description

The Landline Cellular Option (LCO) feature (99-5E-2525) allows a service provider to handle both wireless and landline traffic on a single 5ESS[®] switch. The wireless traffic may consist of frequency division multiple access (also called analog cellular) or time division multiple access (a digital cellular scheme).

The landline traffic may consist of:

- Plain old telephone service (POTS)
- Business and residential custom services (BRCS)
- Integrated services digital network (ISDN) - custom
- *A-I-Net*®

Landline Cellular Option is not a secured feature; however, a right-to-use (RTU) fee must be paid to Lucent Technologies.

2.4.1.2 Background

LCO was developed because service providers did not wish to maintain two separate switches.

With LCO, service providers reduce their initial cost by deploying a single (versus separate) switch for both landline and wireless traffic. With a single switch, service providers also reduce maintenance costs as well as the amount of floor space required.

2.4.1.3 Availability

The Landline Cellular Option feature is available as a software update for 5E9(2) and later software releases.

2.4.1.4 Feature Environment

The Landline Cellular Option feature is available on a per-switch basis.

2.4.2 Feature Operation

The Landline Cellular Option feature builds on the advanced mobile phone services (AMPS) technology where the 5ESS® switch serves as the mobile switching center interfacing with the executive cellular processor complex (ECPC) and series I and series II cell sites. Using loop-around trunks, this feature allows the 5ESS® switch to control both landline and cellular traffic.

Wireless and landline calls retain their respective features and operations. For landline calls, the 5ESS® switch provides the switching fabric, call processing and trunk/route selection to public switched telephone network (PSTN) trunks. For wireless calls, the 5ESS® switch provides the switching fabric while the AUTOPLEX® System 1000 ECPC provides the call processing and route/trunk selection to PSTN trunks.

2.4.3 User Operation

2.4.3.1 For Subscribers

The Landline Cellular Option feature is transparent to subscribers.

2.4.3.2 For Switch Personnel

The service provider can provision services to allow the subscriber to originate calls from:

- the PSTN and terminate to the 5ESS® switch (with digital cellular capabilities) landline
- the 5ESS® switch (with digital cellular capabilities) landline and terminate to the PSTN
- the landline and terminate to a mobile station on the same or on a different switch module (SM)

- the mobile station and terminate to a landline on the same or a different SM

2.4.4 Engineering

2.4.4.1 Hardware Resources

No hardware considerations are associated with this feature.

2.4.4.2 Software Resources

No software considerations are associated with this feature.

2.4.4.3 Transition Considerations

The executive cellular processor complex (ECPC) requires software version 6.0 to work with the LCO feature.

2.4.5 Interactions And Incompatibilities

There are no interactions associated with this feature.

2.4.6 Dependencies And Limitations

2.4.6.1 Dependencies

No other features need to be installed or activated for this feature to work.

2.4.6.2 Limitations

Because the switch does not support direct interworking between cellular and landline customers, loop-around trunks are used to originate and terminate these type of calls on the same 5ESS[®] switch.

If the service provider chooses multi-frequency (MF) loop-around trunks, the trunks can originate and terminate on the same switch module (SM). If ISDN user-part (ISUP) loop-around trunks are chosen, the trunks must originate and terminate on different SMs.

2.4.6.3 Isolation Constraints

This feature will not operate if communication breaks down (a rare occurrence) between any of the four units:

- Executive cellular processor complex (ECPC)
- Interprocessor message switch (IMS) ring
- Common network interface (CNI) ring
- 5ESS[®] switch's administrative module (AM)

It also will not operate if the link between the SMs that carry wireless traffic and the communication module (CM) is disrupted.

2.4.7 Feature Implementation

2.4.7.1 Office Data Administration Provisioning

Refer to 235-080-100 *5ESS® Switch Translations Guide (TG-5)* for information on ODA provisioning of loop-around trunks.

2.4.7.2 Recent Change Provisioning

Refer to 235-200-100, *AUTOPLEX® System Wireless Applications* for information on Recent Change provisioning of loop-around trunks.

2.4.7.3 Customer Premise Equipment

There is no new customer premise equipment required for this feature.

2.4.8 Maintenance Considerations

Not applicable.

2.4.9 Administration

2.4.9.1 Measurements

This feature does not introduce any new measurements.

2.4.9.2 Billing

This feature does not affect billing.

2.5 TR-303 INTERFACE ON DNU-S

2.5.1 Description

The TR-303 Interface On Digital Network Unit (DNU)—Synchronous Optical Network (SONET) (or DNU-S) feature (99-5E-2466) provides a TR-303 interface that is identical to the same interface on the Integrated Digital Carrier Unit (IDCU), which means that a TR-303 Remote Digital Terminal (RDT) can be assigned to DS1 facilities terminating on a DNU-S.

The TR-303 Interface On DNU-S feature is a new, more efficient way to terminate Next Generation Digital Loop Carrier (NGDLC) systems on the *5ESS®* switch. This capability lowers the cost per DS0 on Integrated Digital Loop Carrier (IDLC) lines. Also, providing the *5ESS®* switch with a SONET-compatible TR-303 interface enables the *5ESS®* switch to handle such applications as combined telephony/cable television systems and Radio Port Control Units (RPCUs) for Personal Communication Services (PCS).

The DS1 Loopback for TR303 On DNU-S feature (99-5E-4155) adds a DS1 far-end [at Remote Data Terminal (RDT)] Loopback Capability.

2.5.2 Availability

The TR-303 Interface on DNU-S feature (99-5E-2466) is available for the 5E12 and later software releases.

The DS1 Loopback for TR-303 On DNU-S feature (99-5E-4155) is available as a software update to 5E12, and is part of 5E13 and later software releases.

2.5.3 Environment

This feature is provided on a per-office basis.

2.5.4 Cross References

The following cross references apply to this feature:

- Feature Number:
 - 99-5E-2466, TR-303 Interface On Digital Network Unit (DNU)—Synchronous Optical Network (SONET) (or DNU-S)
 - 99-5E-4155, DS1 Loopback for TR-303 On DNU-S
- This feature is in compliance with the following Bellcore Technical References (TRs):
 - TR-NWT-000303 Issue 2, Supplement 1

2.5.5 Background

For detailed information on the 5ESS[®] switch TR-303 interface, see 235-900-308, *5ESS[®] Switch TR-NWT-000303 Interface Specification*.

2.5.6 Feature Operation

Figure 2-11 shows the hardware interface utilizing the PSU PIDBs to provide semi-permanent connections for D-Channels and Permanent Packet-B channels.

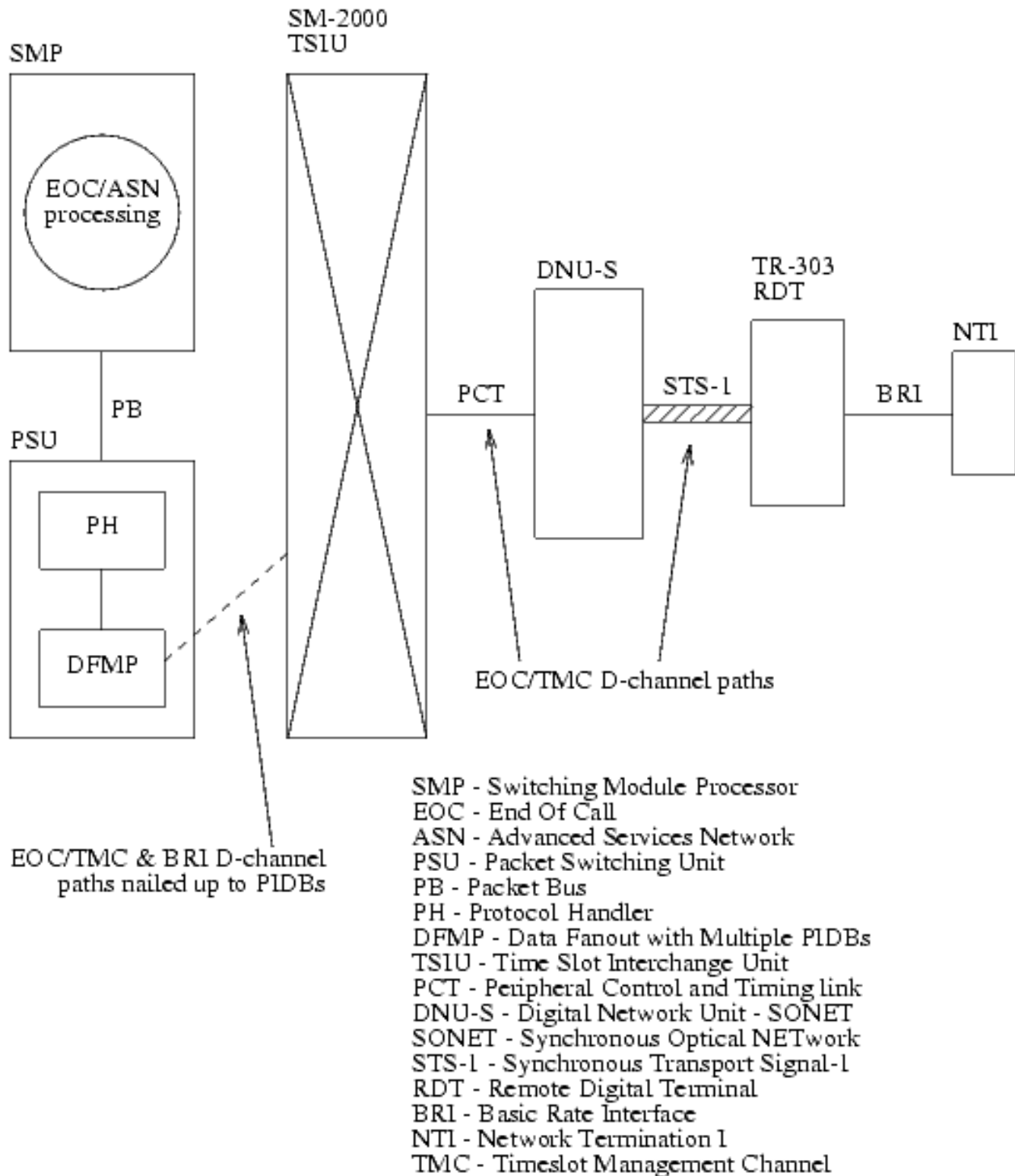


Figure 2-11 How the TR-303 On DNU-S Interface Provides Semi-Permanent PSU Connections

2.5.7 User Operation

2.5.7.1 For Subscribers

No subscriber actions are associated with this feature.

2.5.7.2 For Switch Personnel

Switch personnel can grow/degrow TR-303 RDT to DNU-S facilities via RC/V view 18.15, "REMOTE TERMINAL (IDCU-RT)."

(A complete list of impacted I/O messages may be found in the "TR-303 On DNU-S Maintenance Capability High Level Design" [MAINTHLD].)

2.5.8 Engineering

2.5.8.1 Hardware Resources

The TR-303 Interface On DNU-S feature uses the existing DNU-S hardware, which only operates on switches with the SM-2000. However, this feature does not require any changes to the DNU-S or any other 5ESS[®] switch hardware.

2.5.8.2 Software Resources

No software considerations are associated with this feature.

2.5.8.3 Transition Considerations

No transition considerations are associated with this feature.

2.5.9 Interactions and Limitations

The Time Slot Interchanger (TSI) Nail-up of Consecutive Digital Signal Level 0s (DS0s) for Digital Networking Unit-Synchronous Optical Network (DNU-S) feature (99-5E-7395) allows Intra-/Inter-Switch Module (SM) Dual-Digital Data Service (DDS) nail-ups between:

- a TR-303 on DNU-S line and a DNU-S trunk
- a TR-303 on DNU-S line and a Digital Line and Trunk Unit (DLTU) trunk

Dual-DDS service is provided between TR303 lines hosted on a DNU-S and any digital trunks, assigned on consecutive OEs within the same Digital Signal Level 1 (DS1), terminated on any SM-2000 in the office. The trunk can be hosted by both DLTU2 and DNU-S. Routing of Dual-DDS service is not allowed between a TR303 Remote Digital Terminal (RDT) hosted on a DNU-S and a TR303/TR08/PUB43801 facility on an Integrated Digital Carrier Unit (IDCU).

For more information, see Section 2.7

2.5.10 Incompatibilities

No incompatibilities are associated with this feature.

2.5.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

2.5.12 Isolation Constraints

No isolation constraints are associated with this feature.

2.5.13 Recent Change Provisioning

No RC provisioning is required for this feature.

2.5.14 Customer Premises Equipment (CPE)

Not applicable.

2.5.15 Maintenance Considerations

The TR-303 interface on the DNU-S is identical to the IDCU TR-303 interface, except for the following maintenance considerations:

- DS1 Protection Line Switching (PLS) is not needed nor supported on the DNU-S, and therefore, neither is DS1 Bit Error Rate (BER).
- Hairpins are not needed nor supported.
- Master Control Center (MCC) pages - Trunk Line and Work Station (TLWS) MCC pages have been modified to handle the Integrated digital loop carrier Network Equipment Number (INEN) for DNU-S TR-303 lines and trunks. MCC screens for the DNU-S have been added to support DNU-S TR-303 RDT. The STS-1 Facility Status MCC screen has been modified to support indication of degraded conditions for DNU-S TR-303 DS1 facilities. For detailed information on MCC displays, see 235-105-110, *5ESS® Switch System Maintenance Requirements & Tools*.
- Alarms - The currently supported use of the Extended Super Frame/Facility Data Link (ESF/FDL) on the DNU-S is used for alarm indication on both TR-303 and non-TR-303 services on the DNU-S. The TR-303 On DNU-S feature increases the number of provisionable environmental alarm sensor IDs from the two available with the IDCU to fourteen. With the TR-303 On DNU-S feature, the DNU-S now supports the TR-303 RDT power alarms, environmental alarms, and equipment alarms. For detailed information on alarms, see 235-600-700, *5ESS® Switch Input Messages* and 235-600-750, *5ESS® Switch Output Messages*.

2.5.16 Administration

2.5.16.1 Measurements

The following measurements are pegged by the TR-303 On DNU-S feature:

- Print 30 minute traffic reports of attempts, usage, and time slot quantities per RDT.
- Initiate Subscriber Line Busy (SLB) studies for DNU-S lines.
- Initiate Blocked Call Indication (BCI) reports for DNU-S lines
- Collect measurements of usage and attempts for lines on a DNU-S

Traffic and Plant Measurements for DNU-S TR-303 RDTs are supported the same as IDCU TR-303 RDT measurements. DS1 traffic and usage measurements provided for DNU-S TR-303 RDTs are identical to those provided for IDCU TR-303 RDTs. On-Demand B-channel (ODB) measurements provided for DNU-S TR-303 lines

are identical to those provided for IDCU TR-303 lines (ODB section of traffic 30 report).

Measurements are provided for the PSU Shelf-traffic of all DNU-Ss on the same SM-2000, which include:

- the total number of attempts to seize a PSU shelf time slot to set up an on-demand B-channel connection,
- the total number of attempts to seize a PSU shelf time slot to set up an on-demand B-channel connection that were denied because an idle time slot was not available,
- the total traffic usage, based on 100-second scans, of a DNU-S PSU shelf time slots for on-demand B-channel calls plus the maintenance usage of the time slots,
- the maintenance usage of a DNU-S' PSU shelf time slots, which is the cumulative amount of time that each PSU shelf time slot was not available to carry traffic and includes maintenance activity for a DNU-S that makes PSU shelves unavailable for service,
- the total number of PSU shelf time slots connected to a DNU-S, which is computed based on the data available from the static data base—the state of a PSU shelf being in service or out of service does not affect this number—, and
- the number of PSU shelf time slots available for on-demand B-channel calls, which is computed based on the data available from the static data base—the state of a PSU shelf being in service or out of service does not effect this number—which excludes PSU shelf time slots used for provisioned B channels, D channels, EOCs, and TMCs.

Existing peg and usage counts in the existing traffic and plant measurements (15 minute traffic, hourly plant, 24 hour plant, monthly plant) operate the same for DNU-S TR-303 RDTs as for IDCU TR-303 RDTs.

For more detailed information on measurements, see 235-070-100, *5ESS® Switch Administration and Engineering Guidelines*.

2.5.16.2 Billing

This feature does not impact billing.

2.6 SUPPORT 4-WIRE SUBSCRIBER ON DNU-S

2.6.1 Description

The Support 4-Wire Subscriber Line On DNU-S feature (99-5E-3611) provides 4-Wire individual line support via trunk interface on Digital Network Unit (DNU)—Synchronous Optical NETwork (SONET) or DNU-S. This feature provides the ability for the Digital Network Unit (DNU)—Synchronous Optical Network (SONET) (or DNU-S) trunk port to be provisioned with the 4WINDIV class of service and a Directory Number (DN) or with the 4WINDIV class of service and a Multi-Line Hunt Group (MLHG) member.

Once assigned the 4WINDIV class of service, the DNU-S trunk port is treated like a non-hunted line with a DN or as a hunted MLHG member. BRCS features can also be assigned to that DN or MLHG member. The set of features supported on a DNU-S 4-Wire Line is the same set of features supported on a Trunk Unit (TU) 4-Wire Line or Digital Trunk/Line Unit (DLTU) 4-Wire Line.

2.6.2 Availability

The Support 4-Wire Subscriber On DNU-S feature (99-5E-3611) is available as a software update for the 5E11 software release and is included in the 5E12 and later releases.

2.6.3 Environment

This feature is provided on a per-office basis.

2.6.4 Cross References

The following cross references apply to this feature:

- Feature Number:
 - 99-5E-3611, Support 4-Wire Subscriber On DNU-S

2.6.5 Background

Not applicable.

2.6.6 Feature Operation

The Support 4-Wire Subscriber Line On DNU-S feature operates in basically the same way as the existing 4-Wire FX Lines Via DFI feature (99-5E-2536). (See Section 4.2.41, "4-Wire FX Lines Via DFI.") The only difference is that the call is coming in on wire through the DNU-S instead of a wire through the DFI.

2.6.7 User Operation

2.6.7.1 For Subscribers

No subscriber actions are associated with this feature.

2.6.7.2 For Switch Personnel

No switch personnel action is associated with this feature.

2.6.8 Engineering

2.6.8.1 Hardware Resources

This feature is designed for use with the Digital Network Unit (DNU)—Synchronous Optical Network (SONET) (or DNU-S). 4-wire line service requires that there be appropriate hardware between the DNU-S DS1 and 4-wire line telephones. This is the same hardware used for the existing 4-Wire on DFI feature (99-5E-2536), which provides the interface between the DFI T1 and the 4-Wire lines. This same hardware can now be used to provide an interface between a DNU-S DS1 and 4-Wire lines. (See Section 4.2.41, "4-Wire FX Lines Via DFI.")

2.6.8.2 Software Resources

No software considerations are associated with this feature.

2.6.8.3 Transition Considerations

No transition considerations are associated with this feature.

2.6.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

2.6.10 Incompatibilities

BRCS features that are incompatible with the 4-Wire FX Lines Via DFI feature (99-5E-2536) are also incompatible with the Support 4-Wire Subscriber Line On DNU-S feature. (See Section 4.2.41 , "4-Wire FX Lines Via DFI.")

2.6.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

2.6.12 Isolation Constraints

No isolation constraints are associated with this feature.

2.6.13 Recent Change Provisioning

The same RC/V provisioning is used to provision a 4-Wire line on DNU-S service as is used to provision a 4-Wire on DFI. (See Section 4.2.41 , "4-Wire FX Lines Via DFI.")

2.6.14 Customer Premises Equipment (CPE)

Not applicable.

2.6.15 Maintenance Considerations

The remove line (RMV), restore line (RST), and Trunk and Line Work Station (TLWS) capabilities available with regular analog lines also apply to 4-wire lines.

2.6.16 Administration

2.6.16.1 Measurements

This feature does not impact measurements.

2.6.16.2 Billing

Standard line type billing is used for calls to and from 4-wire line telephones.

2.7 TSI NAIL-UP OF CONSECUTIVE DS0s FOR DNU-S

2.7.1 Description

The Time Slot Interchanger (TSI) Nail-up of Consecutive Digital Signal Level 0s (DS0s) for Digital Networking Unit-Synchronous Optical Network (DNU-S) feature (99-5E-7395) allows Intra-/Inter-Switch Module (SM) Dual-Digital Data Service (DDS) nail-ups between:

- a TR-303 on DNU-S line and a DNU-S trunk
- a TR-303 on DNU-S line and a Digital Line and Trunk Unit (DLTU/DLTU2) trunk

Dual-DDS nail-ups are nail-ups in which two time slots (DS0s) are used per end of the nail-up. One of the time slots is designated as the primary and the other time slot is designated as the secondary. The primary time slot carries data while the secondary time slot carries error correction information. The primary time slot must always precede the secondary time slot in any frame; therefore, frame integrity is essential. Double buffering is required to maintain

frame integrity for Dual-DDS nail-ups.

Dual-DDS service is provided between TR303 lines hosted on a DNU-S and any digital trunks, assigned on consecutive OEs within the same Digital Signal Level 1 (DS1), terminated on any SM-2000 in the office. The trunk can be hosted by both DLTU/DLTU2 and DNU-S. Routing of Dual-DDS service is not allowed between a TR303 Remote Digital Terminal (RDT) hosted on a DNU-S and a TR303/TR08/PUB43801 facility on an Integrated Digital Carrier Unit (IDCU).

2.7.2 Availability

The TSI Nail-up of Consecutive DS0s for DNU-S feature (99-5E-7395) is available as a software update for 5E13 and 5E14 and is included in the 5E15 and later software releases.

2.7.3 Environment

This feature is provided on a per-office basis.

2.7.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-7395

2.7.5 Background

Currently, Dual-DDS is implemented only for IDCU hairpin and nail-ups between two TR-303 on DNU-S lines.

The TSI Nail-up of Consecutive DS0s for DNU-S feature extends the Dual-DDS nail-up capability to DNU-S and DLTU/DLTU2 trunks, where one end of the nail-up would be a TR-303 on DNU-S line, and the other end would be either a DNU-S or a DLTU/DLTU2 trunk.

2.7.6 Feature Operation

A Dual-DDS nail-up is established through RC/V views 1.6 and 7.11. One end of the nail-up is specified as a controlling Office Equipment (OE) number and the other end as a non-controlling OE number. The operator decides whether the TR-303 on DNU-S line or a DNU-S/DLTU/DLTU2 trunk is the controlling one.

2.7.7 User Operation

2.7.7.1 For Subscribers

No subscriber actions are associated with this feature.

2.7.7.2 For Switch Personnel

Switch Personnel can verify the Dual-DDS nail-up by using the following commands:

- (1) `op:nailup,inen=< OE # >;`
- (2) `op:nailup,den=< OE # >;`
- (3) `op:nailup,nen=< OE # >;`

If the result from a 'op:nailup' command indicates one of the ports is Out Of Service (OOS), the port can be restored by using the following commands:

- (1) `rst:line,inen=< OE # >,all,ucl;`
- (2) `rst:trk,den=< OE # >,all,ucl;`
- (3) `rst:trk,nen=< OE # >,all,ucl;`

Switch personnel can call trace a Dual-DDS nail-up by using the following commands:

- (1) `trc:util,port=<SM#>-h<port#>,dds=[1|2];`
- (2) `trc:util,inen=<OE#>,dds=[1|2];`
- (3) `trc:util,den=<OE#>,dds=[1|2];`
- (4) `trc:util,nen=<OE#>,dds=[1|2];`

NOTE: A call-traced command can be specified with either dds=1 or dds=2.

- dds=1 call traces on the first nail-up path.
- dds=2 call traces on the second nail-up path.

Switch personnel can also call trace using poke commands. Poke commands 401, 407, 410, 414, and 424 now have an extra optional parameter to specify the nailup path. The parameter dds=[1|2] can be added to the end of the poke command when tracing a Dual-DDS nailup connection.

2.7.8 Engineering

2.7.8.1 Hardware Resources

No hardware considerations are associated with this feature.

2.7.8.2 Software Resources

No software considerations are associated with this feature.

2.7.8.3 Transition Considerations

No transition considerations are associated with this feature.

2.7.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

2.7.10 Incompatibilities

No incompatibilities are associated with this feature.

2.7.11 Dependencies

The TR-303 Interface on DNU-S feature (99-5E-2466) must be active for the TSI Nail-up of Consecutive DS0s for DNU-S feature to work.

2.7.12 Isolation Constraints

No isolation constraints are associated with this feature.

2.7.13 Recent Change Provisioning

See 235-118-254 for 5E13, *Recent Change Reference*, 235-118-255 for 5E14, *Recent Change Reference* for detailed information on allowed values.

The service provider enables the TSI Nail-up of Consecutive DS0s for DNU-S feature by populating the following fields in RC/V view 8.22, SECURED FEATURE UPGRADE:

FIELD	VALUES
FEATURE ID	349
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

Activate or deactivate the TSI Nail-up of Consecutive DS0s for DNU-S feature by populating the following fields in Recent Change:

RC/V VIEW	VIEW NAME	FIELD	ALLOWED VALUES
1.6 ^a	COMPOSITE LINE (LINE ASSIGNMENT)	TR303 NAILUP	Y or N
7.11	NAIL-UP AND HAIRPIN SPECIFICATION	C OE	<controlling OE>
		NC OE	<non-controlling OE>
		SIGMODE	NOSIG
		HAIRPIN	N
		DDS	Y
		PATH NUM	2
Notes:			
a. RC/V view 1.6, field "TR303 NAILUP", is updated only if the TR303 port is assigned a DN number. A DN number is not needed to establish a nailup.			

2.7.14 Customer Premises Equipment (CPE)

The TSI Nail-up of Consecutive DS0s for DNU-S feature is available only on SM-2000.

2.7.15 Maintenance Considerations

Not applicable.

2.7.16 Administration

2.7.16.1 Measurements

This feature does not impact measurements.

2.7.16.2 Billing

This feature does not impact billing.

3. CARRIER INTERCONNECTION

3.1 CARRIER INTERCONNECT

3.1.1 Feature Definition

The Carrier Interconnect (CI) feature provides the local exchange network interconnection for inter-LATA carriers (ICs) and international carriers (INCs). A local access and transport area (LATA) is a defined geographical area where an equal access end office (EAEO) and/or access tandem (AT) can provide a carrier access to the local exchange. The operating telephone companies (OTCs) have the option of providing connection directly to end offices having this feature or connection via AT switches serving a given LATA.

Calls between LATAs (inter-LATA) are typically handled by an IC. Calls between customers within a LATA (intra-LATA) are typically handled by the OTC. Intra-LATA calls can also be handled by an IC if the calling party specifically selects the carrier by dialing a carrier access code (10XXX). The IC must have regulatory approval to carry intra-LATA traffic.

A carrier desiring to serve a LATA must specify one or more points of presence within the LATA for connection of the carrier facilities with those of the OTC. The OTC provides access to/from the local exchange via one or more EAEOs and/or ATs (Figure 3-1). An EAEO provides access only to collocated stations. An AT can provide access to collocated stations as well as subtending end offices. Intermediate switches between the EAEO and the AT or between the AT and the carrier are not normally allowed.

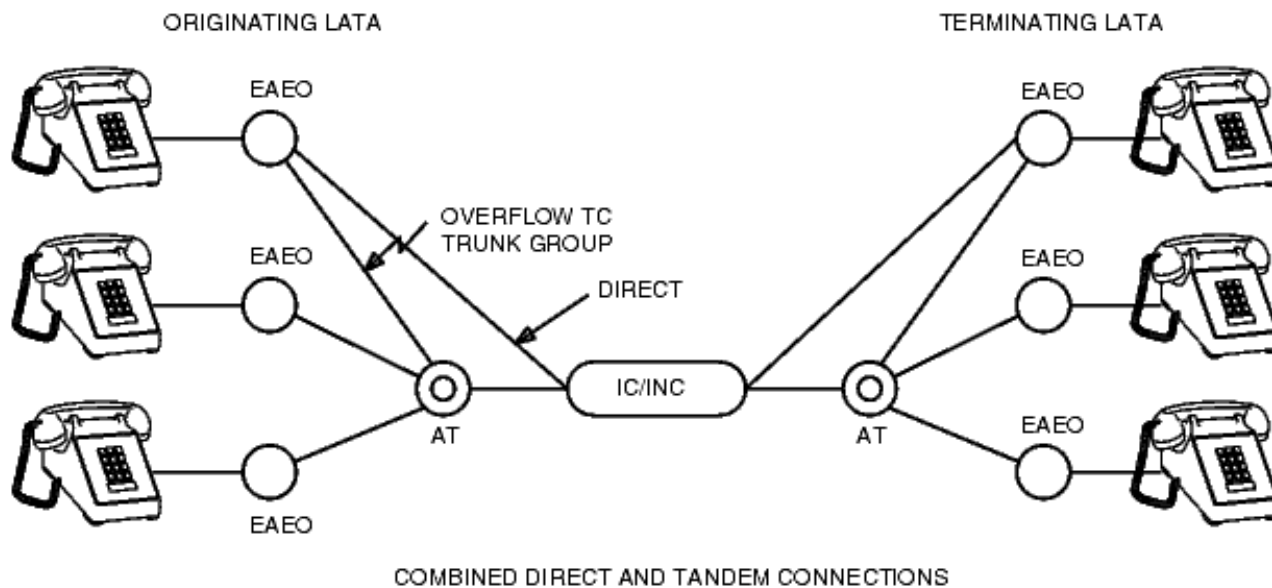
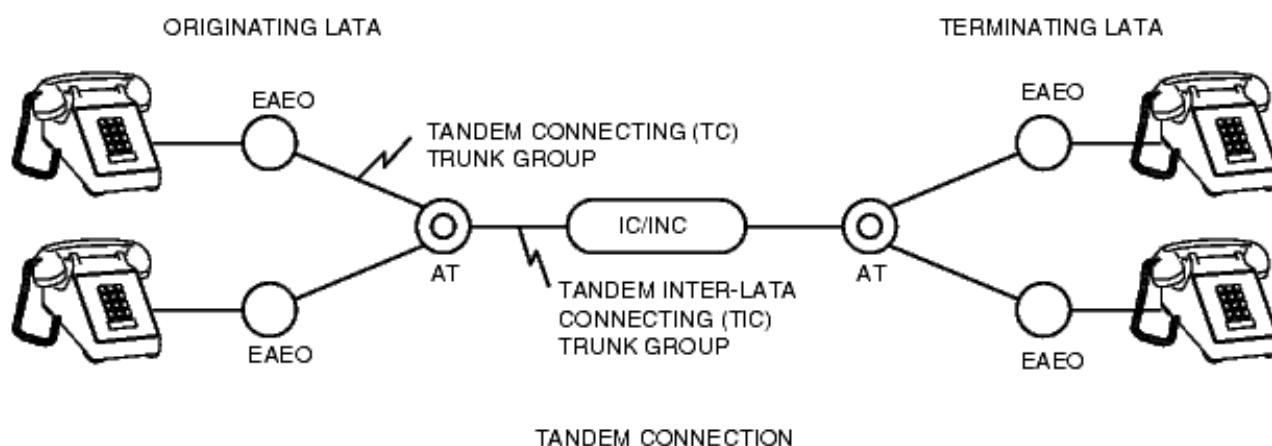
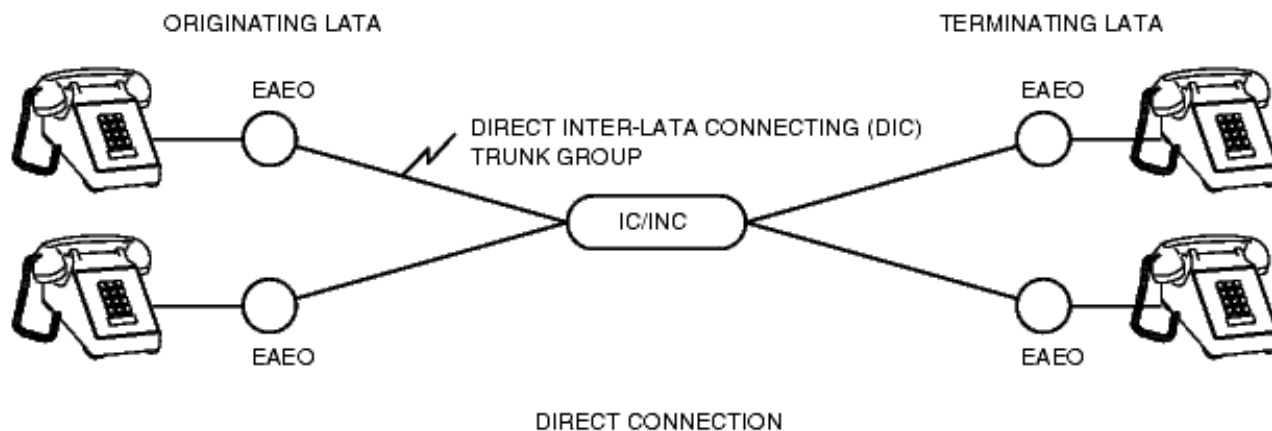
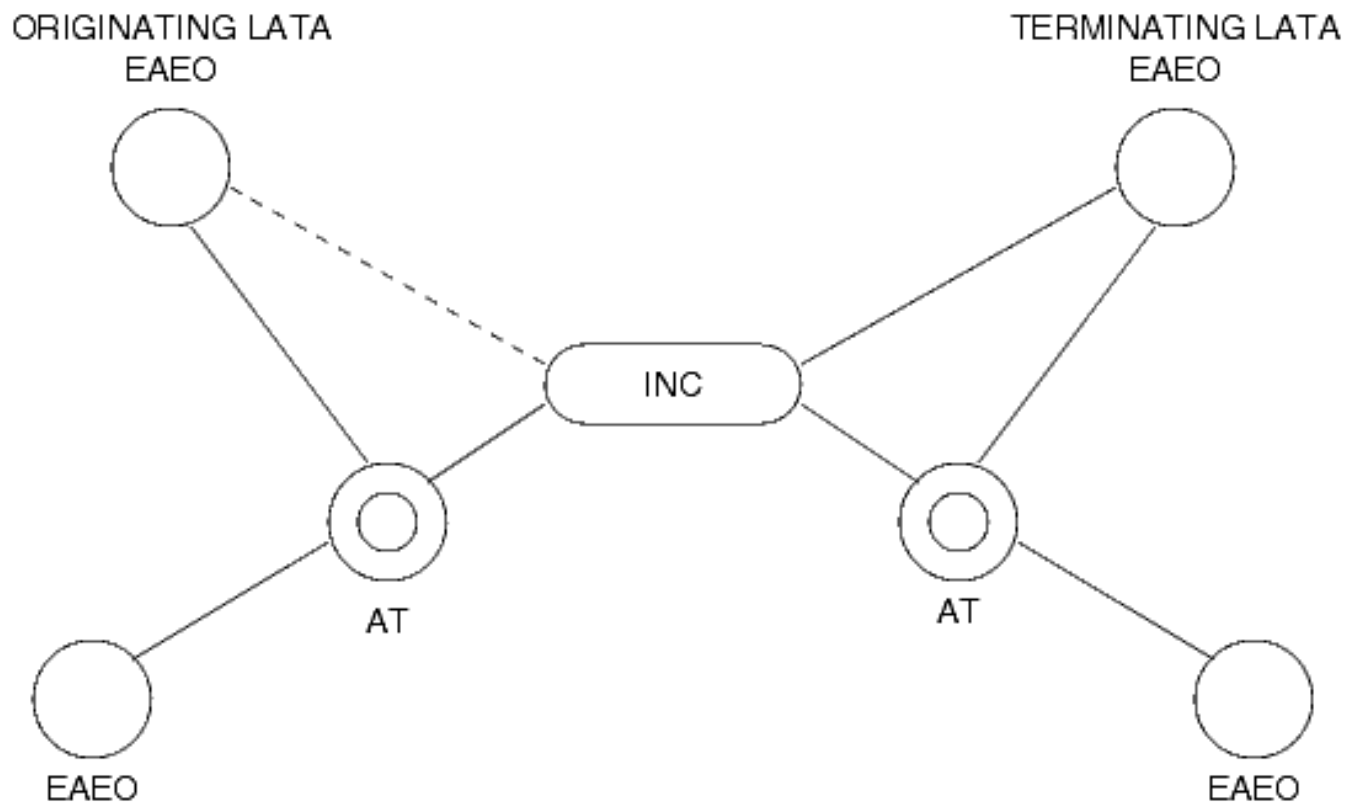


Figure 3-1 IC/INC Interconnection

A carrier is not required to serve all LATAs. A carrier does not have to provide connections to all ATs in a LATA. Each EAEO may connect to only one AT. An IC trunk group between the EAEO and AT can share traffic with other IC traffic as well as with intra-LATA traffic. Trunks between the AT and the IC or between the EAEO and the IC are dedicated to the IC. All IC calls entering a LATA should terminate to directory numbers in that LATA.

International calls are typically handled by an INC. An INC can have trunk connections directly to a LATA (Figure 3-2). In this case, the IC connection rules also apply to the INC. An INC can also use an IC to transport calls to their gateway switches (Figure 3-3). A carrier capable of handling both IC traffic and INC traffic is a combined carrier.

**Figure 3-2 INC Interconnection - Direct Interface**

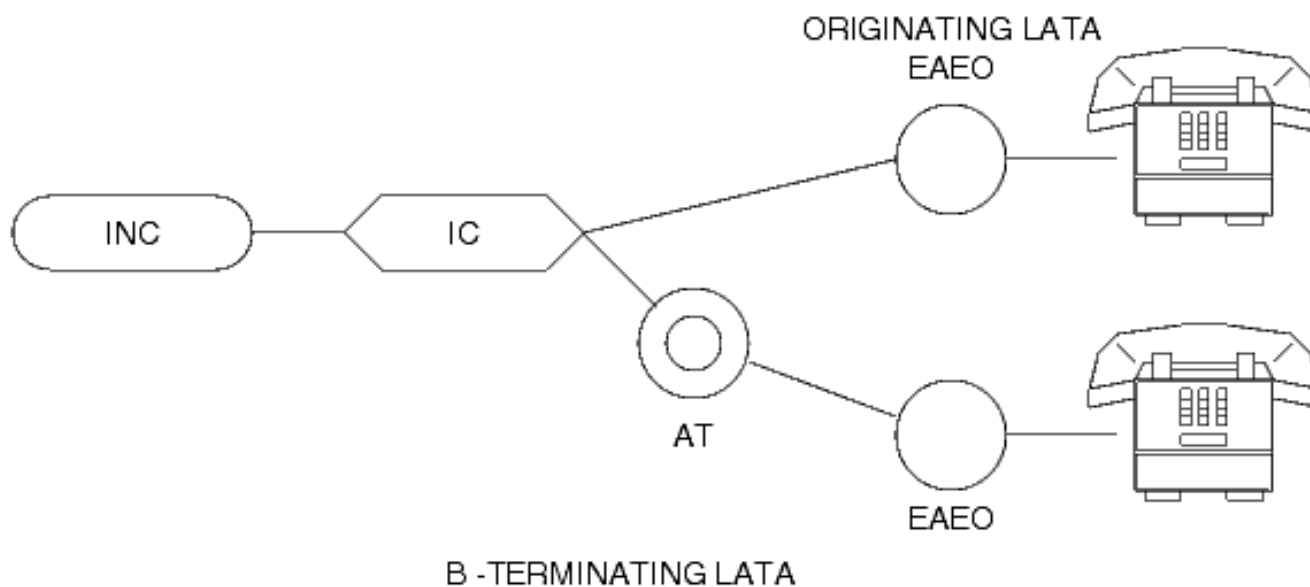
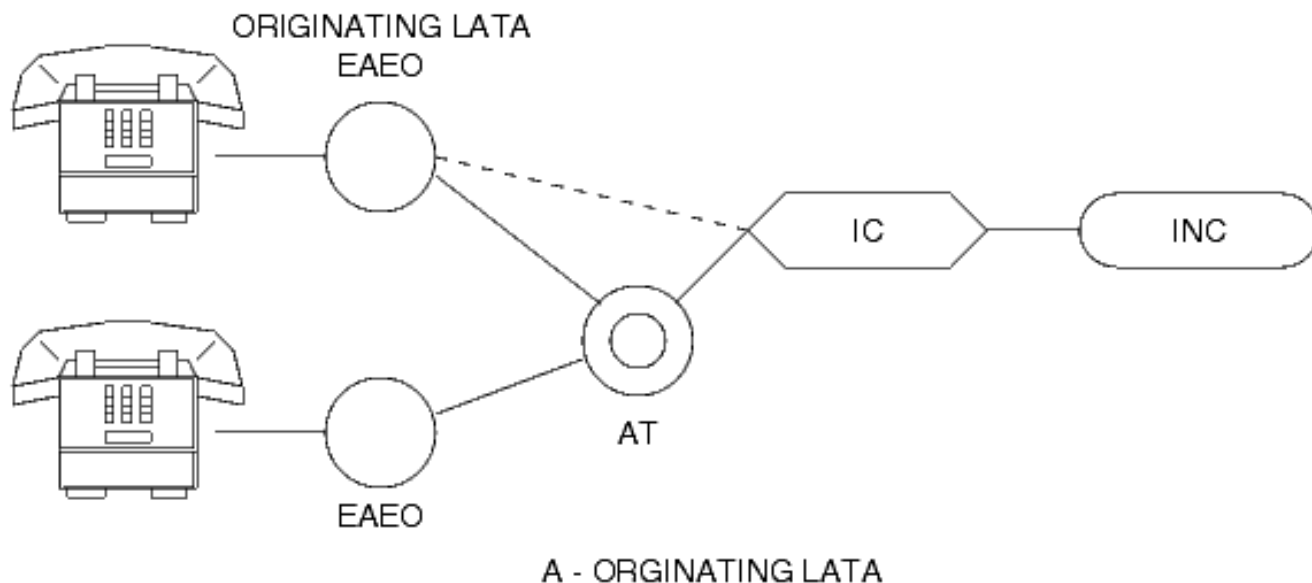


Figure 3-3 INC Interconnection - Indirect Interface

In certain abnormal situations where trunks are out of service, an OTC switch may be interposed between the EAEO and the AT or between the AT and the carrier in order to preserve service to carriers without direct trunks.

So that a carrier can properly bill calls from stations such as public and hotel/motel, such calls are identified to the carrier via information digits if the carrier has specified automatic number identification (ANI) (Table 3-1).

Table 3-1 Information Digits, II Assignment Table

INFORMATION DIGITS ^a	DESCRIPTION
00	Identified Line - No special Treatment
01	ONI (Multiparty)

02	ANI Failure
03	-
04	-
05	-
06	Hotel Without Room Identification
07	Coinless, Hospital, Inmate, etc.
08	Inter-LATA Restriction - Regular Line ^b
09	-
10	Test Call
12	Reserved
13	Reserved
14	Reserved
15	Reserved
16	Reserved
17	Reserved
18	Reserved
19	Reserved
20	AIOD - Listed DN Sent (not used for 5ESS [®] switch)
21	Reserved
22	Reserved
27	Coin Call
68	Inter-LATA Restricted - Hotel Line ^b
78	Inter-LATA Restricted - Coinless, Hospital, Inmate, etc. ^b
95	Reserved for Test Call

Notes:

a. Information digits 12 through 19 are not assigned in order to avoid conflicting with the 1NX codes (used with the INC capability).

b. Information digit pairs 08, 68, and 78 are sent only to the carrier for which inter-LATA restriction applies. Digit pair 08 takes precedence over all other digit pairs, except 68 and 78.

The digits outputted to the IC/INC and the sequence of winks and off-hooks used in the EA plan are not the same as those used previously. This new signaling arrangement is referred to as EA signaling. Only MF, wink start outpulsing is allowed for EA signaling. For transition purposes, the prior signaling method is available.

The EA signaling plan uses a 2-stage outpulsing scheme on calls routed via the AT.

Carriers may elect to serve World Zone 1 only, traffic outside the Continental United States only, or all traffic. Screening is provided to enforce the selection.

Operator services requiring features such as operator hold and operator recall are provided over direct trunks from the end office to the operator facility.

3.1.1.1 Feature Group A

Feature Group A provides line connections with per-access billing to inter-LATA carriers. Feature Group A corresponds to existing exchange network for interstate access (ENFIA) A arrangements. Carriers are accessed by dialing a directory number which varies from office to office. It also provides capabilities to support inter-LATA private lines (for example, FX lines) and associated tariffs. (See Figure 3-4 .) Feature Group A is available with the 5E6 and later software releases.

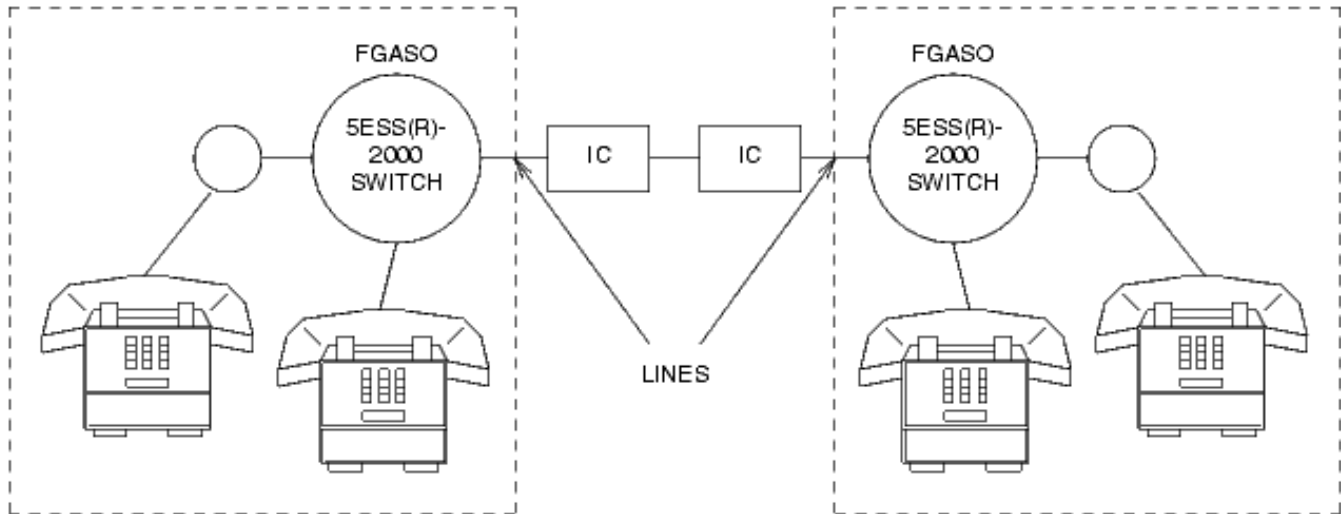


Figure 3-4 Feature Group A

3.1.1.2 Feature Group B

The Feature Group B (FGB) feature provides trunk connections to inter-LATA carriers (Figure 3-5). Carriers are accessed by dialing 950-XXXX where XXXX is the carrier identification code. The FGB feature allows customers to use a 950-XXXX dialing pattern to seize a trunk to the carrier. At the discretion of the OTC, FGB terminating calls may or may not terminate to 555-1212. Although the FGB capability is similar to the Feature Group D transition dialing plan, the FGB feature is a separate option which bills the carrier at a different usage rate by having distinct AMA call types. Feature Group B is available with all active software releases.

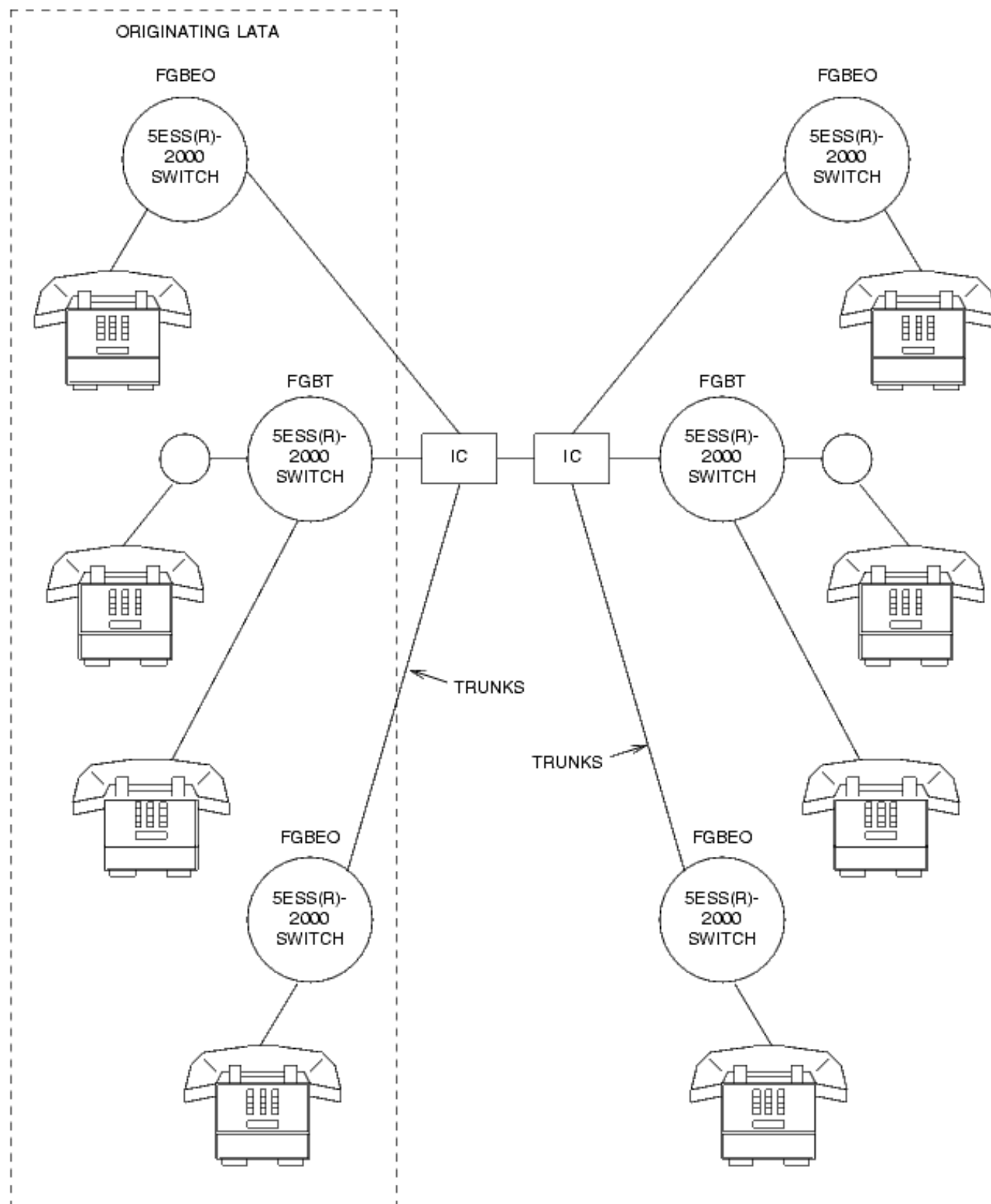


Figure 3-5 Feature Group B

3.1.1.3 Feature Group C

Feature Group C is a transitional group that contains the majority of the arrangements of intercity services. It includes the arrangements used to provide direct distance dialing (DDD) and operator-handled calling including coin service. Feature Group C calls are toll calls and are recorded as such. Feature Group C is characterized as a trunk side connection to the end office with no access code necessary, for the purpose of origination or termination of calls to or from subscribers served by that end office. Feature Group C only pertains to the present arrangements used to connect the local network to the toll network. Feature Group C is available with all active software releases.

3.1.1.4 Feature Group D

Feature Group D provides full access to all carriers. Carriers are accessed by dialing a 10XXX prefix or by dialing 10XXX + # (cut-through call). A customer can also presubscribe to a primary inter-LATA carrier (PIC). The PIC can be used for inter-LATA and/or international calls without dialing the 10XXX carrier access code. Included are options for long term, international, and operator services signaling as well as the 950-WXXX transitional type of signaling. The Feature Group C signaling is also included for transitional purposes. Feature Group D is available with all active software releases.

3.1.2 Feature Operation - User Perspective

From the customer's point of view, the CI feature allows them access to their choice of carriers. A customer can presubscribe to a carrier (line PIC) and/or dial the 10XXX prefix to select a carrier. If the prefix digits associated with the PIC are dialed, the call is routed to the PIC. The customer's inter-LATA and international calls are routed to the line PIC if prefix digits are not dialed. These calls are routed to the office PIC if the line PIC is not assigned.

The OTC determines which IC is to receive service access calls (SACs). These types of calls are possibly toll-free Service Access Codes (SAC) (such as 800, 877 or 888 calls) or 900 service calls. The 10XXX prefix should not be dialed for these calls. Variable routing can be done depending on the office code dialed.

3.1.2.1 Inter-LATA (Noninternational) Calls

To place an inter-LATA call via a carrier other than the PIC, a customer dials as follows with items in () being optional:

- 10XXX + (1) + a full NANP DN or 10XXX + (1) + a NANP DN without the NPA [Non-operator-assisted call]
- 10XXX + 0 + a full NANP DN or 10XXX + (1) + a NANP DN without the NPA [Operator-assisted call]
- 10XXX + 0 (#) or 10XXX + 00 [Operator call]
- 10XXX + # [Cut-through call]
- (1) + SAC + a NANP DN without the NPA [SAC call]
- 950 + WXXX [Public station or hotel/motel call].

To place an inter-LATA call via the PIC, a customer dials as follows:

- (1) + a full NANP DN or (1) + a NANP DN without the NPA [Non-operator-assisted call]
- 0 + a full NANP DN or 0 + a NANP DN without the NPA [Operator-assisted call]
- 00 [Operator call].

There are several errors which either return an announcement or reorder tone to the customer. Announcements are assigned by the OTC. Errors which can return an announcement to the customer are as follows:

- Customer does not dial an access code and no primary carrier is assigned.
- An intra-LATA number is dialed, and the carrier does not accept intra-LATA calls.
- An invalid access code is dialed.
- The carrier is unable to process calls.
- The customer does not finish dialing (partial dial) or dials # in wrong place.
- Number is not valid in called LATA.
- The customer dials 10XXX for a SAC call.

3.1.2.2 International Calls

International traffic is carried by an INC or combined carrier. If 10XXX is not dialed, the call is routed to the PIC if the PIC is capable of handling international traffic.

A customer can dial international calls and calls outside the continental United States but in World Numbering Zone 1 (for example, calls to Bermuda) without the 10XXX access code if the PIC is to be used.

International calls can be dialed as follows: Items in () are optional, CC is the country code, and NN is the national number.

- 10XXX + 011 + CC + NN [Non-operator-assisted call]
- 10XXX + 01 + CC + NN [Operator-assisted call].

Calls within World Numbering Zone 1 but outside the continental United States can be handled by INC, IC, or combined carriers. The following dialing patterns are used:

- 10XXX + (1) + a full NANP DN [Non-operator-assisted call]
- 10XXX + 0 + a full NANP DN [Operator-assisted call].

The customer can utilize the facilities of an INC by dialing as follows:

- 10XXX + 0 or 10XXX + 00 [Operator call]
- 00 [PIC operator call]
- 10XXX + # [Cut-through call].

3.1.3 System Perspective

3.1.3.1 Originating Treatment

3.1.3.1.1 Inter-LATA Call Using EA Signaling Via Access Tandem

Upon receipt of all but the last four digits (overlap outpulsing) and while continuing to receive the remaining digits (or upon receiving a speed calling code), the EAEO seizes a trunk to the AT. The AT responds to the trunk seizure with a wink. Upon receipt of a wink (all winks are standard unless otherwise specified) from the AT, the EAEO outpulses KP + 0ZZ + XXX + ST and waits for a second wink to trigger the second stage of outpulsing. The digits 0ZZ are chosen from available spare toll center codes in the LATA and signify to the AT that translation of the XXX digits is necessary for this call. In addition, the 0ZZ digits may be used to identify the types of call. The digits XXX are the carrier identifier and are the same as the last three digits of the 10XXX access code. The AT, upon receipt of the above sequence, seizes an outgoing trunk to the appropriate carrier. The carrier responds with a wink to start the second stage of outpulsing. The carrier returns the wink to the AT within 4 seconds from the time of seizure of the trunk. (If not, the AT releases the trunk to the carrier, returns off-hook to the EAEO, and connects an announcement. The AT delays 1.4 seconds after sending the off-hook before the start of the announcement). The AT then cuts through the talking path and repeats the wink to the EAEO.

On 1-way trunks, if an off-hook is received by the AT instead of the wink to initiate the second stage of outpulsing, the AT drops the connection to the carrier and goes off-hook to the EAEO. Upon receipt of this off-hook, the EAEO cuts through the connection to the customer and the AT returns an announcement after a delay of 1.4 seconds.

Receipt of an off-hook instead of a wink on 2-way trunks is considered glare. The AT will try another trunk. If an on-hook is seen on the second attempt, the EAEO cuts through the connection to the customer and the AT returns an announcement after a delay of 1.4 seconds.

Upon receipt of the repeated wink, the EAEO outpulses the sequence KP + II + ANI (NPA or a full NANP DN) + ST if the carrier requested ANI. The two digits II are information digits (Table 3-2). If ANI is not provided, only KP + ST is outpulsed. If the originating party can be identified, the ANI information consists of the area code plus the billing number. If the originating party cannot be identified (for example, multiparty lines), only the 3-digit area code is sent.

When the calling party completes dialing, the sequence KP + (0) + a full NANP DN + ST is outpulsed to the carrier. The carrier passes a second wink (acknowledgment) back to the AT, which repeats the wink to the EAEO. If no acknowledgment wink is received from the IC within 4 seconds from the end of outpulsing from the EAEO, the EAEO returns an announcement to the calling party and releases the connection. This action is also followed if an off-hook is received instead of a wink. Upon completion of outpulsing, the EAEO cuts through the talking path. Further processing of the call is handled by the carrier.

If the AT does not seize a trunk to the carrier, it returns a steady off-hook to the EAEO within 8 seconds. The EAEO then cuts through the path to the calling party. If a trunk is not seized because all trunks to the carrier were busy, an announcement is returned. For any other reason, reorder tone is returned. If no signal is passed back to the EAEO within 12 seconds after completion of the first stage of outpulsing, the EAEO provides reorder tone to the calling party, and the forward connection is released.

In the event that trunk-side interconnection arrangements are used by the carrier in the terminating LATA, when the called party goes off-hook in the terminating LATA, this off-hook is passed to the carrier from that LATA. The carrier passes this off-hook to the AT in the originating LATA and the AT passes this off-hook to the originating EAEO.

If a carrier has arranged to receive intra-LATA calls, such calls dialed with a 10XXX prefix are handled as described previously. However, if the LATA includes central offices in more than one NPA and the call is dialed on an a NANP DN without the NPA basis, the NPA of the number is sent to the carrier when a code conflict has to be resolved.

Optionally, a carrier is able to specify that it does not want overlap outpulsing, either on all calls, or on certain types of calls. In this case, seizure of the outgoing trunk occurs upon completion of dialing without trunk reservation.

3.1.3.1.2 Inter-LATA Calls Using EA Signaling Via Direct Trunks

Upon receipt of all but the last four digits (overlap outpulsing) or speed calling code, the EAEO/AT seizes a trunk to the appropriate carrier. If a direct trunk to the carrier (when there is no overflow route via AT) cannot be seized because all trunks to the carrier are busy, an announcement is provided to the calling party. The carrier responds to

the seizure with a wink. If this wink is not received within the normal time-out period, an announcement is provided to the calling party. Upon receiving the wink, the EAEO/AT outpulses KP + II + ANI (NPA or a full NANP DN) + ST if ANI is used. If ANI is not used, only KP + ST is outpulsed. When the calling party has finished dialing, the sequence KP + (0) + a NANP DN without the NPA/a full NANP DN + ST is outpulsed to the carrier. When the carrier has received the digits, it passes a second wink (acknowledgment) back to the EAEO/AT. The EAEO/AT then cuts through the talking path. The carrier then handles the call in accordance with its own procedures. Answer and disconnect supervision are provided to or from the carrier.

Optionally, a carrier is able to specify that it does not want overlap outpulsing, either on all calls or on certain types of calls. In this case, seizure of the outgoing trunk occurs upon completion of dialing without trunk reservation. In all other aspects, outpulsing is exactly as described above.

3.1.3.1.3 Cut-Through Call

Upon receipt of #, the EAEO (in the case of a tandem connection) seizes a trunk to the AT, the AT returns a wink, and the EAEO outpulses KP + 0ZZ + XXX ST. The AT seizes a trunk to the carrier and the carrier returns a wink. The AT cuts through the talking path and repeats the wink to the EAEO. The EAEO then outpulses KP + (II + ANI) + ST' to the carrier depending upon whether the carrier has specified ANI or not. The carrier, upon receipt of the digits, returns an acknowledgment wink.

For a direct EAEO or AT (serving collocated stations) connection to a carrier, the call setup is the same as the normal direct trunk call setup except that the sequences KP + II + ANI + ST' or KP + ST' are outpulsed to the carrier.

3.1.3.1.4 Transition Plan

3.1.3.1.4.1 950-WXXX Call From a Nonpublic Station in an EAEO Office Without Direct Trunks to a Transition Carrier

Upon receipt of the 950-WXXX digits, the EAEO seizes a trunk to the serving AT. The AT returns a wink start. The EAEO then outpulses the sequence KP + 0ZZ + XXX + ST to the AT. The AT then seizes a trunk to the carrier which responds with a wink start. The AT then cuts through the talking path to the EAEO from the carrier and repeats the wink to the EAEO. The EAEO, upon receipt of the second wink, outpulses KP + II + ANI (NPA or a full NANP DN) + ST''' to the carrier if ANI is used or KP + ST''' if ANI is not used. The EAEO then cuts through the talking path. The unique start signal is the indication to the carrier that the call was dialed 950-WXXX. The information digits and ANI sequence are identical to those used in the EAP. Upon receipt of the digits, the carrier returns a wink to the AT. The AT repeats the wink to the EAEO. Further processing of the call is handled by the carrier.

3.1.3.1.4.2 950-WXXX Call From Nonpublic Stations Collocated With an AT Office or From an EAEO With Direct Trunks to a Transition Carrier

Upon receipt of the 950-WXXX digits, the EAEO/AT seizes a trunk to the appropriate carrier and the carrier returns a wink. The EAEO/AT then outpulses the following sequence to the carrier: KP + II + ANI + ST''' (or KP + ST''' if ANI is not specified). The carrier returns an acknowledgment wink to the EAEO/AT. The EAEO/AT then cuts through the talking path to the calling party.

3.1.3.1.4.3 950-WXXX Call From a Public Station or a Hotel/Motel Line From an Office Equipped for the EAP During and After the Transition Period

This section is identical to the previous sections except that ST'' is substituted for ST''' in the sequences KP + II + ANI + ST''' and KP + ST'''.

3.1.3.1.4.4 950-WXXX Call From an Office Not Equipped for the EAP During and After the Transition Period

Upon receipt of the digits 950-WXXX, the end office seizes a trunk to the AT using traditional signaling. The end office then outputs KP + 950-WXXX + ST (or possibly 50-WXXX or 0-WXXX from SXS offices) to the AT. The AT seizes a trunk to the proper carrier and the carrier returns a wink. The AT then outputs KP + ST" to the carrier. This sequence indicates to the carrier that the calling party is served by an end office not equipped for the EAP. The carrier returns an acknowledgment wink to the AT, and the AT repeats the wink to the end office. The AT cuts through the talking path. The signaling from this point on is identical to that in the interim plan.

3.1.3.1.4.5 950-WXXX Call for a Carrier That Does Not Handle 950 Calls

A carrier may not handle calls dialed 950-WXXX. In this case, such calls received at EAEO offices are routed to an announcement indicating that the call should not have been dialed with the 950 prefix. Calls received at an AT from non-EAEO offices are given similar treatment.

3.1.3.1.5 INC Call Originating Treatment

For an international call to an INC with direct trunks or to an INC using an IC for transport, the following actions are performed.

The EAEO seizes a trunk to the IC or INC. The carrier responds with a wink. The EAEO then outputs the sequence KP + 1NX + XXX + CCC + ST to the carrier. The 1NX is a spare toll center code signifying that this call is destined for an INC. The digits XXX identify a carrier. The CCC is the padded country code (that is, the 1- through 3-digit country code preceded by enough zeroes to expand it to three digits). Upon receiving a second wink from the carrier, the EAEO outputs KP + (II + ANI) + ST + KP + CC + NN + ST, and the carrier returns an acknowledgment wink. The CC is the country code and NN is the national number.

If the EAEO routes the call to the IC or INC via an AT, the following actions are performed.

The EAEO seizes a trunk to the AT. The AT returns a wink to the EAEO. The EAEO outputs KP + 1NX + XXX + CCC + ST to the AT. The AT seizes a trunk to the indicated carrier. The carrier responds with a wink to the AT. This wink can be repeated to the EAEO for AMA purposes. Repeating of this wink is optional on a per-trunk-group basis for the AT and is optional on an office basis for the EAEO. The AT outputs KP + 1NX + XXX + CCC + ST to the carrier. The AT cuts through the path and repeats the carrier wink to the EAEO. Upon receipt of a second (or third) wink, the EAEO outputs KP + (II + ANI) + ST + KP + CC + NN + ST, and the carrier returns an acknowledgment wink.

3.1.3.2 Terminating Treatment

3.1.3.2.1 Call Completed as Required

When a carrier terminates a call to a LATA, it seizes a trunk to the appropriate AT or EAEO in the LATA, which returns a wink. The carrier then MF outputs a NANP DN without the NPA or a full NANP DN to the EAEO/AT to permit completion of the call to the appropriate station in the LATA. If the call is routed to an AT, the AT screens the call, only allowing calls to be completed to stations subtending the AT. If the carrier attempts to complete a call to a valid station not subtending that AT, the terminating AT returns an announcement. If the carrier attempts a call to an invalid station (vacant NPA-office code), the AT provides the standard vacant code announcement treatment. Similar screening is provided on calls terminating directly on an EAEO. The EAEO/AT either terminates the call to the proper collocated station or, in the case of an AT, routes the call to the appropriate end office subtending the AT for completion to the designated station.

If the called party goes off-hook, called party answer is passed back to the carrier by the terminating LATA. This off-hook is returned by the terminating end office on all calls, including calls to free lines. This implies the use of separate trunk groups between the AT and the EAEOs for noncarrier traffic if free line service is to be provided.

If the called party is busy or does not go off-hook or if the call cannot be completed for some other reason, the

appropriate call progress tone is returned to the carrier.

On an answered call, if the called party disconnects before the calling party, on-hook is passed to the carrier and disconnect timing is performed at the EAEO/AT at which the call enters the LATA. Upon 11- to 40-second time-out or upon receipt of an on-hook from the carrier, all connections are released. Immediately upon receipt of on-hook from the terminating EAEO/AT, the carrier passes this on-hook to the originating LATA. If the called party goes back off-hook before time-out or before an on-hook is received from the carrier, an off-hook is sent to the carrier which passes it to the originating LATA. Standard disconnect timing applies to the carrier which passes off-hook to the originating LATA. Standard disconnect timing applies to the terminating end office in a tandem connection.

3.1.3.2.2 Call Cannot Be Completed as Required

(A) System Response to Irregular Actions

- (1) **Partial Dial/Abandonments:** Generates a billing record using as much accurate information as possible.
- (2) **Vacant XXX Codes:** If a customer dials a vacant 10XXX code or a vacant 950-WXXX code, the call is routed to an announcement.
- (3) **Call to a Number Outside LATA:** If a carrier attempts to terminate a call to a directory number not subtending the EAEO/AT at which the call enters the LATA, that office, upon receipt of the called digits, returns an announcement to the carrier. The call is not completed. No answer supervision is returned.
- (4) **Call Dialed on Wrong Basis:** If a call is dialed on a 950-WXXX basis where it should have been dialed on a 10XXX basis, it is routed to an announcement. If a call is dialed on a 10XXX basis when it should have been dialed on a 950-WXXX basis, the call is routed to an announcement.
- (5) **10XXX Plus Intra-LATA Code:** If the customer dials 10XXX plus an intra-LATA office code, the call is routed to an announcement unless the IC selected has arranged to carry intra-LATA traffic. An intra-LATA code dialed with no 10XXX prefix is routed by the OTC to the proper station in the LATA. The N11 calls are intra-LATA calls. When these calls are dialed with a 10XXX prefix, they are routed to announcement except for 10XXX + 911 calls. The 10XXX + 911 calls are routed as though 10XXX had not been dialed.
- (6) **10XXX (Corresponding to a Carrier Serving Only International Traffic) Plus Domestic Number:** An announcement is given if the customer attempts to make a domestic call via a carrier serving only international traffic.
- (7) **10XXX (Corresponding to IC) Plus International Prefix:** An announcement is given if the customer attempts to make a 011+ or 01+ international call via a carrier that only serves domestic traffic.
- (8) **10XXX Call From a Customer Restricted From Dialing 10XXX:** If a customer restricted from dialing 10XXX dials a 10XXX prefix, the call is routed to an announcement.

(B) System Response to Internal Failures

- (1) If the AT does not seize a trunk to the carrier or if it cannot perform the required outpulsing, it returns a steady off-hook to the EAEO. If all trunks are busy, an announcement is returned. Otherwise, reorder tone is returned. If no signal is passed back to the EAEO within 12 seconds (20 seconds for an international call) after completion of the first stage of outpulsing, the EAEO provides reorder tone to the calling party, and the forward connection is released.
- (2) The IC should return the wink to the AT to start outpulsing of the ANI sequence on a domestic call

within 4 seconds from time of trunk seizure. The carrier should return a wink within 4 seconds to the AT to receive the first stage of outpulsing for an international call. A second wink to start the outpulsing of called international digits should be received within 20 seconds at the EAEO (12 seconds at the AT). If not, the AT returns steady off-hook to the EAEO, connects an announcement, and releases carrier connection. On 2-way trunks, standard glare treatment is performed while waiting for the first wink from the carrier. While waiting for an acknowledgment wink, glare is not possible.

3.1.3.2.3 Terminating Treatment for INC Calls

Terminating treatment for INC calls is the same as terminating treatment for IC calls. No special information is passed to the LATA to indicate the source of the call.

3.1.3.3 Release Treatment

If the called party disconnects before the calling party, the EAEO/AT at which the IC/INC call enters the LATA should pass the disconnect to the carrier and start disconnect timing. Upon 11- to 40-second time-out or upon receipt of an on-hook from the carrier, all connections should be released. Immediately upon receipt of on-hook from the terminating LATA, the carrier should pass this on-hook to the originating LATA.

3.1.4 Signaling

3.1.4.1 Customer Signaling - Announcements

To provide customers with feedback when a problem is encountered, several announcements are provided. The capability of local announcements for each of the following situations is provided. However, in a given office, a single announcement can be used for more than one situation, at the discretion of the OTC.

- Wink not returned by carrier or off-hook returned instead of wink after trunk seizure or after outpulsing of called number.
- Call received in terminating LATA for a station not subtending or collocated at the office at which the call entered the LATA.
- Customer dials an intra-LATA call with a 10XXX prefix of a carrier that has elected not to handle intra-LATA calls. Customer dials a SAC call with a 10XXX prefix. Customer dials an N11 call (with the exception of 911) with a 10XXX prefix. A customer that is restricted from dialing 10XXX dials a call with a 10XXX prefix. A WATS customer dials a call with a 10XXX prefix.
- Customer dials 10XXX prefix and XXX code is not assigned, dials an international call with a domestic 10XXX prefix, or dials a domestic call with an international 10XXX prefix.
- Customer dials 950-WXXX and XXX is not assigned.
- Customer dials 10XXX prefix and call should have been dialed 950-WXXX.
- Customer dials 950-WXXX and call should have been dialed with 10XXX prefix. (This treatment applies to any carrier that does not have the 950-WXXX dialing plan, at least not from that originating office.)
- All trunks busy between the EAEO or the AT and the carrier.
- Customer dials an inter-LATA call or an international call without a 10XXX prefix, and the line does not have a PIC assigned to it for the type of call (inter-LATA or international) dialed.
- Incorrect number of digits received from carrier in terminating LATA.

3.1.4.2 System Signaling

3.1.4.2.1 Intersystem DC Signaling

3.1.4.2.1.1 Originating LATA

The EAEO/AT seizes the trunk to the carrier by changing from on-hook to off-hook supervision. The carrier returns a standard wink within 4 seconds after trunk seizure to initiate outpulsing. On EAEO to AT connections, the AT immediately repeats this wink to the EAEO. If no wink is received within 4 seconds, the AT changes supervision to off-hook on the trunk from the EAEO.

Upon completion of outpulsing from the LATA, the IC returns a standard wink within 8 seconds as an acknowledgment. On the EAEO to AT connections, the AT repeats this wink to the EAEO as soon as possible. The acknowledgment wink for an INC call, which may range from 140 ms to 1.5 seconds as viewed at the EAEO, is returned within 4 seconds of the completion of outpulsing and arrives at the EAEO within 8 seconds.

When the carrier receives called party answer from the terminating LATA, the carrier changes supervision from on-hook to off-hook and, upon receiving called party disconnect from the terminating LATA, the carrier changes supervision from off-hook to on-hook on the trunk from the originating LATA.

Upon receiving calling party disconnect, the EAEO/AT changes supervision from off-hook to on-hook on the trunk to the carrier. In the case of a tandem connection, the EAEO changes supervision from off-hook to on-hook on the trunk to the AT, and the AT repeats this to the carrier.

3.1.4.2.1.2 Terminating LATA

The carrier seizes the trunk to the EAEO/AT by changing from on-hook to off-hook supervision. Upon receiving calling party disconnect, the carrier changes supervision from off-hook to on-hook on the trunk to the terminating LATA.

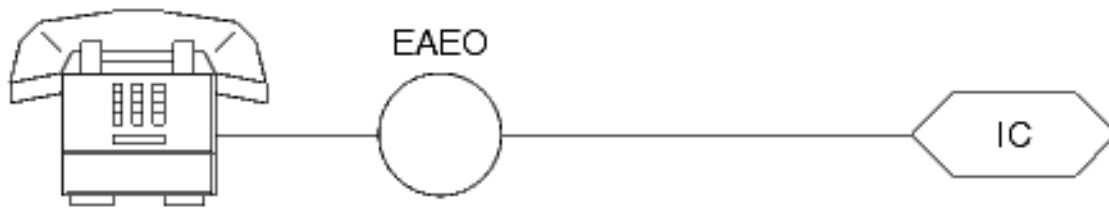
The central office returns a standard wink upon seizure of the trunk by the carrier to initiate outpulsing. Upon called party answer, the central office changes supervision on the incoming trunk from on-hook to off-hook. Upon called party disconnect, supervision on the incoming trunk is changed from off-hook to on-hook.

3.1.4.2.2 Intersystem MF Signaling

All address and ANI information is sent via MF signaling between the EAEO and the AT and between the EAEO or the AT and the carrier.

EA signaling is a signaling method introduced by the CI feature. The EA signaling provides ANI to the carrier in a layered overlap outpulsed fashion. The ANI information contains station identification, two ANI information digits, and the calling number. Refer to Table 3-1 for a listing of the ANI information digits. The general sequence for a call with ANI is KP + II + ANI + ST + KP + a NANP DN without the NPA or a full NANP DN + ST. The sequence for a call without ANI is KP + ST + KP + a NANP DN without the NPA or a full NANP DN + ST. Figures 3-6, 3-7, 3-8, 3-9, and 3-10 and Table 3-2 summarize the outpulse sequences for the EA signaling plan.

ORIGINATING SIGNALING SEQUENCE - DIRECT CONNECTION



AFTER THE CUSTOMER DIALS "(10XXX) + (0/1) + (NPA) + NXX"

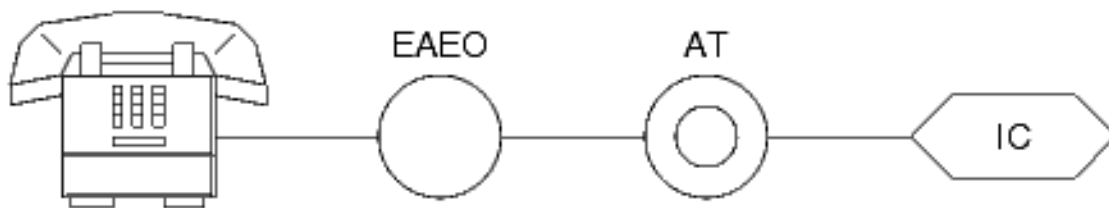
1. SEIZE →
2. ← WINK
3. KP + II + ANI + ST →
- OR
- KP + ST

AFTER THE CUSTOMER HAS COMPLETED DIALING, "XXXX".

4. KP + (0) + 7/10D + ST →
5. ← WINK
6. ← ANS. SUPV

Figure 3-6 Originating Signaling Sequence - Via Direct Connection

ORIGINATING SIGNALING SEQUENCE - VIA ACCESS TANDEM



AFTER THE CUSTOMER DIALS "(10XXX) + (0/1) + (NPA) + NXX"

1. SEIZE →
2. ← WINK
3. KP + OXX + XXX + ST →
4. SEIZE →
5. ← WINK
6. ← WINK
7. KP + II + ANI + ST →
- OR
- KP + ST

AFTER THE CUSTOMER HAS COMPLETED DIALING, "XXXX".

8. KP + (0) + 7/10D + ST →
9. ← ACK. WINK
10. ← ACK. WINK
11. ← ANS. SUPV.
12. ← ANS. SUPV.

Figure 3-7 Originating Signaling Sequence - Via AT

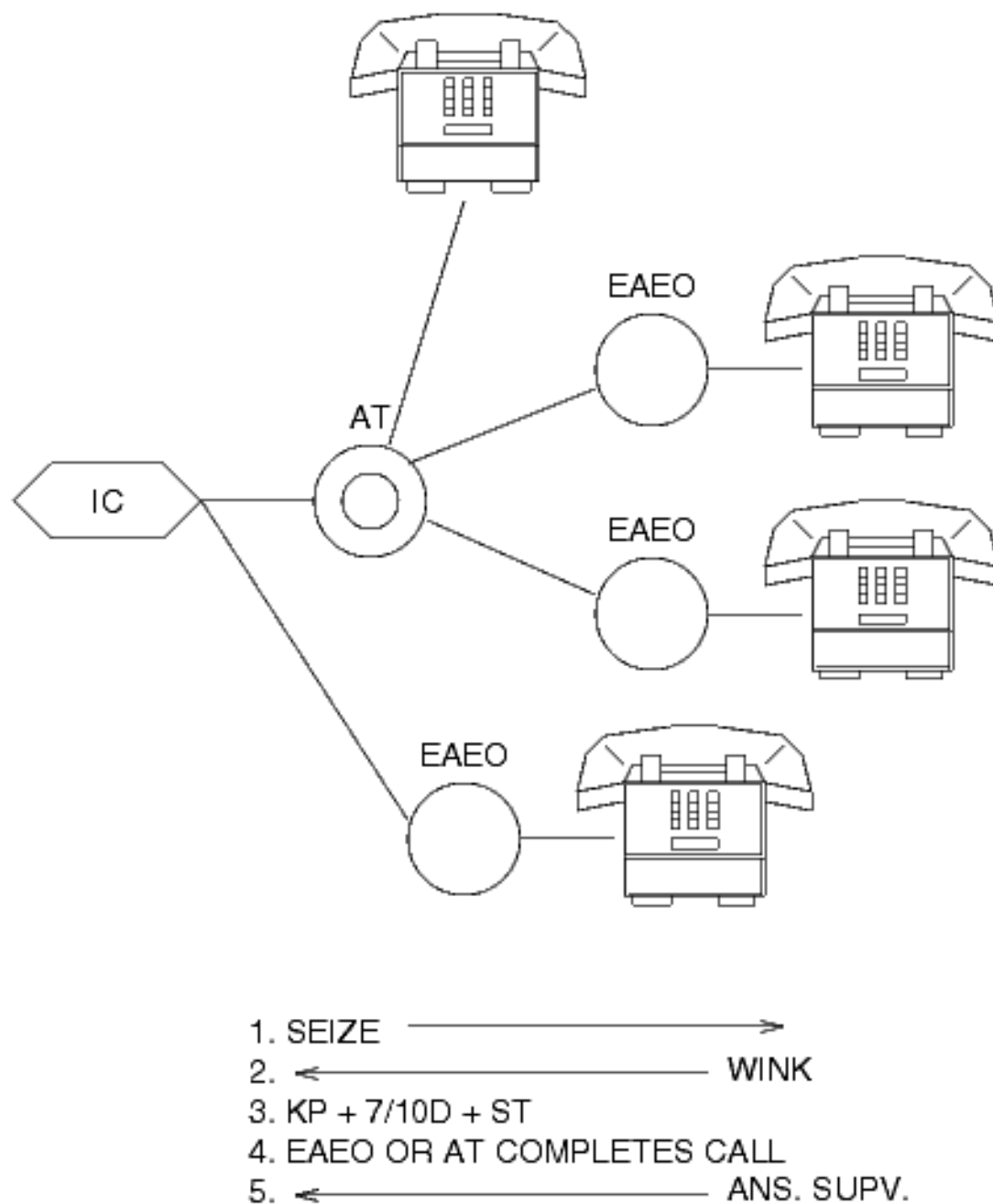
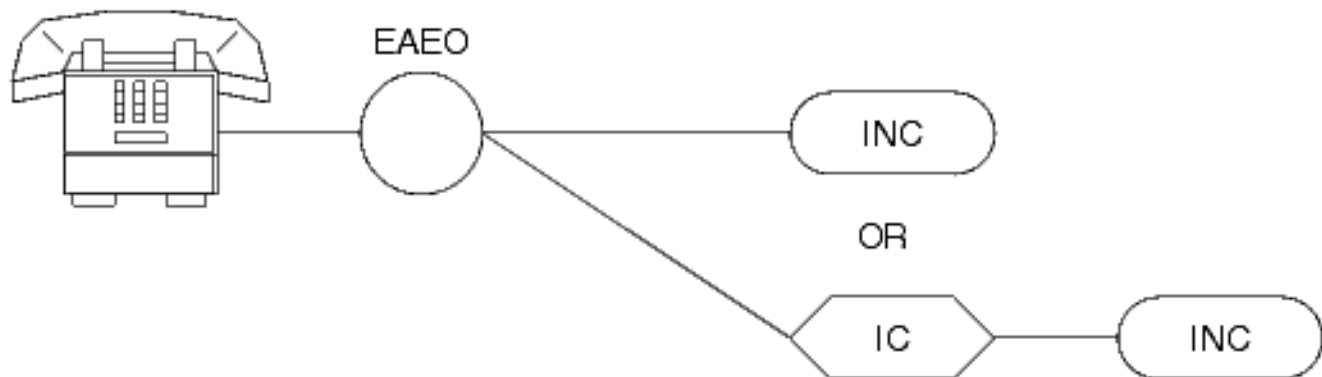


Figure 3-8 Terminating Signaling Sequence - Via AT



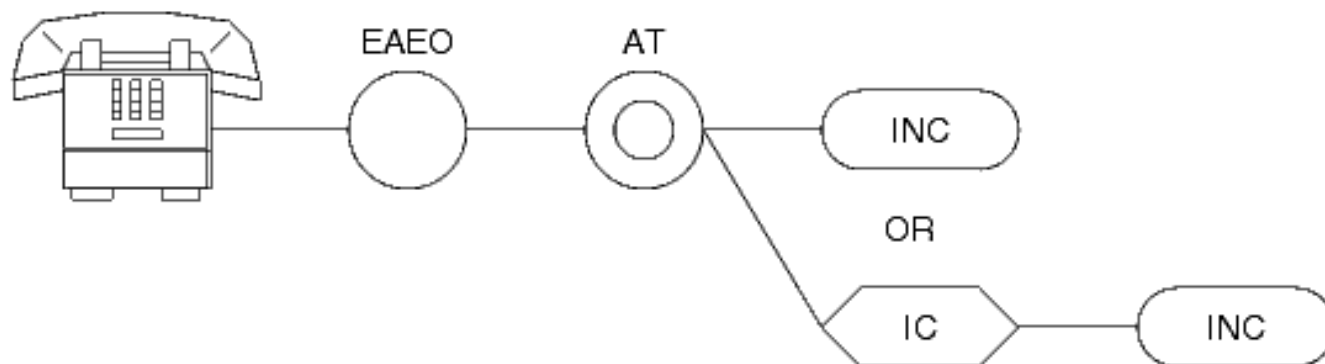
AFTER THE CUSTOMER DIALS "(10XXX) + 011 + (OR 01) + CC"

1. SEIZE →
2. ← WINK
3. KP + 7/10D + ST →
4. ← WINK
5. KP + II + ANI + ST →
- OR
- KP + ST

AFTER THE CUSTOMER DIALS "(10XXX) + 011 + (OR 01) + CC"

6. KP + CC + NN + ST
7. → ACK. WINK
8. → ANS. SUPV.

Figure 3-9 Signaling - Direct Connection to INC



AFTER THE CUSTOMER DIALS "(10XXX) + 011 + (OR 01) + CC"

1. SEIZE →
2. ← WINK
3. KP + 1NX + XXX + CCC + ST →
4. SEIZE →
5. ← WINK
6. KP + 1NX + XXX + CCC + ST →
7. ← WINK
8. ← WINK
9. KP + II + ANI + ST
OR
KP + ST

AFTER THE CUSTOMER HAS COMPLETED DIALING, "NN".

10. KP + CC + NN + ST →
11. ← ACK. WINK
12. ← ACK. WINK
13. ← ANS. SUPV.
14. ← ANS. SUPV.

Figure 3-10 Signaling - AT Connection to INC

Table 3-2 IC Equal Access Plan Outpulsing

SITUATION	ANI	NO ANI
10XXX+(1)+7/10 digits	KP+II+ANI+ST+KP+7/10 digits+ST	KP+ST+KP7/10 digits+ST
10XXX+0+7/10 digits	KP+II+ANI+ST+KP+0+7/10 digits+ST	KP+ST+KP+0+7/10 digits+ST
950-WXXX from transition EAEO/AT	KP+II+ANI+ST"	KP+ST"
950-WXXX from public station during and after the transition	KP+II+ANI+ST"	KP+ST"
950-WXXX from an end office not equipped for long-term plan via an AT equipped for long-term plan	KP+ST"	KP+ST"
10XXX+#	KP+II+ANI+ST'	KP+ST'
10XXX+0	KP+I+ANI+ST+KP+0+ST	KP+ST+KP+0+ST

3.1.4.2.3 Operator Service Signaling

An IC can have operator services (OS) facilities similar to TSPS. The OS signaling is provided to support the OS facility connections for all ICs. Per-call billing records are generated on calls routed to OS facilities. The OS signaling is available only on direct trunks between the EAEO and the IC. It is not available on connections through an AT. However, it is available for stations collocated at an AT.

The signaling of an OS call is as follows:

- After all digits have been dialed, the EAEO seizes an outgoing trunk to the OS facility. (There is no layered overlap outpulsing for OS signaling.)
- The OS facility responds with a wink.
- The EAEO outpulses the called number.
- The OS facility returns a steady off-hook.
- ANI, which is always provided with OS signaling, is outpulsed. This ANI information contains the 2-digit information sequence followed by a 0/a NANP DN without the NPA calling number.

The OS signaling is very similar to existing TSPS signaling. Customer flashes are repeated to the OS facility as it is done in the TSPS connection. Ringback, coin control, and operator attach and release signals sent from the OS facility also function as with TSPS. Two ANI information digits are used in OS signaling. Only one ANI information digit is used in TSPS signaling. Normal TSPS disconnect procedures should be used. Refer to Tables 3-3 and 3-4 for a summary of OS signaling.

Table 3-3 IC Operator Service Signaling - Inter-LATA Calls

SITUATION	CALLED NUMBER	CALLING NUMBER
Non-coin: (10XXX) + (1) + 7/10D (10XXX) + 0 + 7/10D 10XXX + 0	KP + 7/10D + ST" KP + 7/10D + ST" KP + ST"	KP + II + 0/7D + ST KP + II + 0/7D + ST KP + II + 0/7D + ST
Coin: (10XXX) + (1) + 7/10D (10XXX) + 0 + 7/10D 10XXX + 0	KP + 7/10D + ST' KP + 7/10D + ST' KP + ST'	KP + II + 0/7D + ST KP + II + 0/7D + ST KP + II + 0/7D + ST

Table 3-4 IC Operator Service Signaling - Intra-LATA Calls

SITUATION	CALLED NUMBER	CALLING NUMBER
Non-coin: (1) + 3/7/10D 0 + 3/7/10D 10XXX + 0	KP + 3/7/10D + ST" KP + 3/7/10D + ST" KP + ST"	KP + II + 0/7D + ST' KP + II + 0/7D + ST' KP + II + 0/7D + ST'
Coin: (1) + 3/7/10D 0 + 3/7/10D 0	KP + 3/7/10D + ST KP + 3/7/10D + ST' KP + ST'	KP + II + 0/7D + ST' KP + II + 0/7D + ST' KP + II + 0/7D + ST'

The three special ANI information digit pairs (II) are used for the operator service facility to handle calls from inter-LATA restricted lines.

- 08 Inter-LATA Restricted - Regular Line
- 68 Inter-LATA Restricted - Hotel Line
- 78 Inter-LATA Restricted - Coinless, Hospital, etc., Line.

These information digit pairs are only sent on calls to the operator service facility serving the carrier for which inter-LATA restriction applies.

Signaling used for OS when processing OTC calls is different. Note that the ST' on the calling number distinguishes OTC calls from carrier calls. However, if a carrier has arranged to handle intra-LATA calls, such calls dialed with the 10XXX prefix are sent with the carrier indication.

Differences between this method of OS signaling and the signaling used prior to CI on calls to TSPS are as follows:

- (1) ST' on the calling number is sent to indicate an OTC call.
- (2) Two ANI information digits are sent instead of one.
- (3) Inter-LATA restricted indications have been added.

3.1.4.2.4 INC Signaling

The INC signaling plan optionally allows layered overlap outpulsing. The first portion or stage of outpulsing contains the 1NX code, the carrier identification, and the country code. The second stage contains the calling and called numbers.

All INCs can choose to use this signaling plan whether they have direct access to an exchange or whether they use an IC to transport traffic. The following defined terms are used in describing INC signaling.

- (1) The CC is the country code padded to three digits with leading zeros.
- (2) The XXX is the same identifier used in the 10XXX code.
- (3) The 01R is a 3-digit sequence used on calls to World Zone 1 and some areas in Mexico. It is composed of the padded country code of "1" and an R to distinguish the region. The region may be either in a noncontinental United States World Zone 1 area or a location in Mexico which is dialed 10XXX + (0/1) + a full NANP DN.
- (4) The 1NX and 1N'X codes are distinct 3-digit codes which begin with 1, have middle digit which is not 0 or 1, and X may be any digit. These codes are used to route codes through an AT when there is more than one trunk group to the specified INC. The selected trunk group from the AT is indicated in the first stage of outpulsing from the EAEO. The N and N' are used to distinguish between nonoperator and operator-assisted calls. The carrier may have a total of up to four of these codes.

The following scenarios show the different INC signaling protocols.

- 10XXX + 011 + CC + NN is dialed to an INC (international, IDDD call). The EAEO seizes a trunk to the carrier and receives a wink. The EAEO outpulses KP + 1NX + XXX + CC + ST to the carrier. The carrier returns a wink. At this time, the EAEO outpulses KP + (II + ANI) + ST + KP + CC + NN + ST. After receiving this sequence, the INC sends back an acknowledgment wink.
- INC calls dialed 10XXX + 01 + CC + NN are handled in the same manner as the previous scenario, except that 1N'X replaces 1NX in order to identify this as an operator call.
- 10XXX + (1) + a full NANP DN is dialed (noncontinental, World Zone 1 call to an INC). The EAEO seizes a trunk to the carrier and receive a wink. The EAEO outpulses KP + 1NX + XXX + 01R + ST to the carrier and receives a wink. The EAEO outpulses KP + (II + ANI) + ST + KP + a full NANP DN + ST and receives an acknowledgment wink.
- INC calls which are dialed 10XXX + 0 + a full NANP DN are handled the same way as calls dialed

10XXX + (1) + a full NANP DN except that 1N'X replaces 1NX, and a 0 precedes the a full NANP DN in the second stage of outpulsing.

- INC calls which are dialed 10XXX + 0 are handled in the same manner as calls dialed 10XXX + 0 + a full NANP DN except that 000 replaces 01R in the first stage of outpulsing, and the a full NANP DN are omitted from the second stage of outpulsing.
- For INC calls dialed 10XXX + #, the first stage of outpulsing is KP + 1NX + YXX + 000 + ST. The second stage is KP + II + ANI + ST'.

3.1.5 Limitations and Restrictions

3.1.5.1 Limitations

The following limitations apply to the CI feature.

- Overlap outpulsing cannot be done from 2-party, 8-party semiselective, coin, or charge-a-call (CAC) lines.
- No overlap outpulsing is used on overlap routes if the first direct route did not have overlap. Overlap carries through from direct to indirect route.
- A maximum of 100 carriers is allowed by the 5ESS[®] switch 5E2(1) software release.
- Dial-pulse repeating trunks are not available on the 5ESS[®] switch.
- Interoffice call trace is not possible in the AT on calls tandeming through the office using EA signaling. As a result of feature requirements, this is a cut-through arrangement where the AT is never aware of the called number.
- Attributes assigned in the EAEO determine signaling characteristics on the trunk from the AT to the IC independent of the attributes assigned to the outgoing trunk at the AT. Due to feature requirements, the call is cut-through the AT.

3.1.5.2 Restrictions

There are several restriction options available for the CI feature. A line can be denied origination service for IC/INC calls. This restricts the customer from placing any IC/INC originating calls but allows the customer to receive IC/INC calls.

Nonpayer Screening: Nonpayer screening is provided for only one carrier. A line can be restricted from originating calls using one particular carrier if the call would result in charges and the line is identified as a nonpayer with respect to that particular carrier. This does not affect the termination of calls to the line. The line is not denied access to other carriers.

Charge-A-Call Screening: The individual carriers have the option of accepting or not accepting CAC screening.

OTC Exception: Trunking arrangements from an office in one LATA to an adjacent office in another LATA are permitted where they exist today. All calls between these offices, which are dialed without the 10XXX prefix and which do not require routing to a TSPS, are routed directly by the OTC and treated as intra-LATA calls. Calls dialed with a 10XXX prefix are routed to the designated carrier as inter-LATA calls.

IC Transition to the EA Plan: A carrier can choose to have a transition period before converting from ENFIA service to the long-term signaling plan introduced by CI. Each carrier can specify if and how long it will provide these

950-WXXX services. During a carrier's transition, a customer can reach the specified carrier by dialing either 950-WXXX or 10XXX. After the transition period, only hotel/motel lines and public stations are allowed to place calls via the 950-WXXX dialing plan. The 950-WXXX dialing plan can be completely eliminated if requested by the carrier. The 950-WXXX calls dialed after the transition period are routed to an announcement indicating that 950-WXXX calls are no longer allowed.

Non-EAEO Offices: A non-EAEO is an end office, not equipped for the EA signaling plan, which only allows 950-WXXX dialing for IC access. The 950-WXXX calls can be routed to a 5ESS[®] switch (serving as an EAEO or an AT) for carrier access.

Operator Services: All calls dialed 10XXX + 0- or 10XXX + 0 + a full NANP DN are routed to the specified IC. Calls dialed 00- are routed to the PIC operator. An IC can provide an operator services facility for these types of calls and for coin and hotel/motel traffic. An IC can specify that its operator services traffic be routed over a separate direct trunk group to an IC operator facility. Calls dialed 0- complete to the local operator service, regardless of whether the calling line is presubscribed to a carrier. Cut-through calls are not allowed to route to operator trunks.

Coin Telephone Service: Inter-LATA sent-paid and non-sent-paid calls can be allowed from coin stations. Customers are able to access any IC. Also, 950-WXXX calls can be allowed from coin stations even when prohibited from noncoin lines (carrier's option). Initial coin deposits are returned for inter-LATA calls. If the IC has the ability to send standard coin control signals and has a direct connection to the EAEO, coins can be collected for sent-paid inter-LATA calls.

An IC can specify that all of its coin traffic be routed over a separate direct group or coin traffic can be mixed with other types of traffic. Coin calls are identified via information digits if ANI is required.

Hotel/Motel Calls: Inter-LATA calls are allowed from hotel/motel stations. Customers are able to access any IC. Also, 950-WXXX calls can be allowed from hotel/motel stations even when prohibited from normal lines. An IC can specify that all of its hotel/motel traffic be routed over a separate direct trunk group (for example, to an operator services facility) or such calls can be identified via information digits if ANI is required.

3.1.6 Interactions

3.1.6.1 Features

The following lists possible interactions of other residential and small business (noncentrex) features with the CI feature.

4- and 8-Party Line: Only 3-digit ANI can be provided. Information digits for 4- and 8-party lines are sent to the carrier if ANI has been purchased. A single PIC can be associated with 4- and 8-party lines. Different PICs cannot be assigned to the individual parties of a 4- or 8-party line. Overlap outpulsing cannot be done for 8-party semiselective lines.

Individual Line: Interactions with an individual line to the CI feature is covered throughout this entire document.

2-Party Line: A customer on a 2-party line has the same capabilities as an individual line. Each party may presubscribe to different carriers if the office uses 2-party ANI. Overlap outpulsing cannot be done for 2-party lines.

Manual Line: Manual line calls are routed to the OTC operator.

Direct Connect Service: Inter-LATA (international) calls are routed via the presubscribed carrier when one exists. Changes are made by service order.

Denied Originating Service: All IC/INC calls may be received, but they may not be originated.

Denied Terminating Service: All IC/INC calls may be originated but may not terminate at the line.

Toll and Code Restriction: If a customer whose line class indicates toll restriction/diversion (code restriction/diversion) attempts to dial an inter-LATA call, normal toll restriction/diversion (code restriction/diversion) is provided. A customer can choose to have toll restriction/diversion (code restriction/diversion) on calls to specific office code or NPA-office codes and/or on all inter-LATA calls. This screening is independent of the carrier chosen for the call.

Series Completion: Individual stations can presubscribe to individual carriers.

Multiline Hunt Group: Individual terminals of a multiline hunt group can presubscribe to individual carriers.

Speed Calling: There are two types of speed calling available for the CI feature. The AD1 speed calling refers to 1-digit speed calling. The AD2 speed calling refers to 2-digit speed calling. The 10XXX carrier access code can be stored on the speed calling list for both 1- and 2-digit speed calling. If 10XXX is not stored, the PIC is used.

3-Way Calling: Either or both legs of a 3-way call can be carrier calls.

Usage-Sensitive 3-Way Calling: Either or both legs of a usage sensitive 3-way calling call can be carrier calls.

Call Forwarding Variable: A 10XXX (+1) + a full NANP DN or a NANP DN without the NPA number can be the remote number whether the Call Forwarding Variable feature is activated by the customer or by recent change procedure. Calls terminating from an IC/INC can be forwarded. When call forwarding is initiated without a 10XXX prefix, calls are forwarded via the presubscribed carrier.

The remote number must be an a full NANP DN or a NANP DN without the NPA number, but call forwarding can also be initiated by means of AD2 by dialing the "call forwarding activation code" + 10XXX + "speed calling number."

During Call Forwarding activation, either by a Customer Originated Recent Change (CORC), or via Recent Change, the 5ESS[®] switch does not support limiting the remote address from FGB access. Once the forwarding occurs to the FGB carrier, the trunk seized expects the receipt of subsequent digits, which, if entered, could complete the call through the FGB carrier. If no digits are entered, the trunk connection times out and the call is dropped.

The ANI forwarded is that of the forwarded station.

Calls can not be forwarded outside World Zone 1 except for a full NANP DN North American Numbering Plan calls to Mexico.

A call forwarding variable customer activates the feature in two ways. In one way, the customer follows the activation procedure and the attempted call is answered, activating the feature. In the second way, the call is not answered. But if the entire activation procedure is repeated within 2 minutes to the same directory number, then the feature is activated. In the second method, the customer need not indicate the same carrier in both activation attempts (using 10XXX or presubscription). The carrier specified on the second attempt is the one used for forwarded calls.

Remote Call Forwarding: Calls can be forwarded via any IC/INC.

The selection of the remote directory number and carrier is done via service order and is not customer changeable.

Calls cannot be forwarded via an INC outside World Zone 1.

Usage-Sensitive Call Forwarding: This feature has the same interactions as call forwarding variable.

International Direct Distance Dialing (IDDD) Via Traffic Service Position System (TSPS): International calls can be routed over operator service trunks or over nonoperator service trunks to an IC/INC.

PBX Line: The billing number listed in translations for the PBX is the number in the ANI information sent to the IC/INC.

Hotel/Motel Calls Route to TSPS: Hotel/Motel calls can be routed over operator service trunks or over nonoperator trunks to an IC/INC.

Information digits indicating a Hotel/Motel line are sent to the IC/INC if ANI has been purchased.

Coin Line: The 950-WXXX calls as well as 10XXX can be accepted from a coin line during and after the transition period of the IC. The carrier can also have the option that 10XXX must be dialed from all coin stations.

Information digits indicating a coin call are sent to the IC/INC if ANI has been purchased. Overlap outpulsing is not used for coin lines.

Basic Emergency Service (911): Calls dialed either 911 or 10XXX + 911 are routed to the 911 bureau, even if the 10XXX dialed is invalid.

3.1.6.2 Operator Services

There is a new operator services (OS) signaling method for use with CI. The old OS signaling is the same as that used with TSPS. For a smooth transition from the existing OS signaling to the new OS signaling, both types of signaling are provided on a per-route basis.

3.1.6.3 OUTWATS

Three types of wide area telephone service (WATS) are provided: intra-LATA WATS, inter-LATA/intrastate WATS, and inter-LATA/interstate WATS.

Intra-LATA WATS is provided by the OTC and includes all the LATA, plus privileged and extended area service destinations. Current type AMA records are made on these calls.

Inter-LATA WATS is provided by ICs. The IC WATS call type AMA records are made on these calls. The WATS lines are presubscribed to the particular IC and calls are placed without a 10XXX prefix. Inter-LATA WATS calls dialed with the 10XXX prefix are blocked. The WATS bands are uniform for all ICs.

The inter-LATA/intrastate WATS band includes all the state except the local LATA. The WATS bands do not include any area outside the Continental United States.

3.1.6.4 BRCS

Interaction between the Business and Residence Custom Services (BRCS) feature and the CI feature occurs in the centrex and custom calling features categories. The following is a list of interactions.

- It is possible to specify a group primary inter-LATA carrier (GPIC) for lines sharing an individual dialing plan (IDP). This is customer changeable via dialed codes on a control line.
- Measurements are available on the use of the GPIC by the IDP.
- 10XXX dialing for intercom calls is available for IC or INC calls.
- 10XXX can be generated from the intercom number as part of the DN.
- The last route in an automatic route selection (ARS) route list can be direct distance dialed via a designated IC.
- A carrier can be designated in the route list.
- Outgoing WATS calls can overflow to DDD via a designated IC.
- A different carrier can be used for each WATS band if band hunting is to be done.

- 10XXX can be specified as part of the stored speed calling number.
- 10XXX can also be used with call forwarding.
- Multiway calls can be carrier calls.

3.1.6.5 RSM Compatibility

The CI feature is compatible with all aspects of the remote switching module (RSM), except when the RSM is in the stand-alone mode. Carrier calls are able to originate and terminate to any RSM.

3.1.6.6 Loop Carrier Compatibility

The CI feature is compatible with loop carrier systems.

3.1.7 System Resources

3.1.7.1 Memory Requirements

3.1.7.1.1 Dynamic Memory Space

3.1.7.1.1.1 Call Record Dynamic Memory Space

There are 23 bytes added to each call record in an SM. There are 513 call records in an SM, therefore, each SM requires 11,799 bytes of additional memory.

3.1.7.1.1.2 Billing Dynamic Memory Space

Dynamic memory is increased in each SM by 4 bytes and is used for tracer counts.

3.1.7.1.1.3 Measurements Dynamic Memory Space

Each SM requires 3100 additional bytes of dynamic data base area. In the AM, an additional 2500 bytes of dynamic data base area are required. This space is used to record CI-related peg and usage counts.

3.1.7.1.2 ODD Memory Space

3.1.7.1.2.1 Call Processing ODD Memory Space

For purposes of ODD memory requirements, carriers are categorized as complex, medium, or simple carriers. Most carriers will fit in the simple category. A complex carrier is defined as having 7 distinct originating destination indices (DIs), 20 route indices (RTIs), and 6 trunk groups. A medium carrier is defined as having 2 distinct DIs, 8 distinct RTIs, and 2 trunk groups. A simple carrier is defined as having no unique DIs, 1 distinct RTI, and 1 trunk group. A split NPA is an NPA which is partially contained in the LATA and was formerly translated to only 3 digits.

Equal Access End Office: The ODD impact in the EAEO is estimated as follows in the SM:

- 13,500 bytes/complex carrier
- 4,000 bytes/medium carrier
- 100 bytes/simple carrier
- 20,000 bytes fixed

- 12,500 bytes/split NPA
- 5 bytes/existing trunk group
- 25 bytes/net trunks added.

The memory required in the EAEO AM is as follows:

- 13,500 bytes/complex carrier
- 4,000 bytes/medium carrier
- 50 bytes/simple carrier.

Access Tandem: The AT memory requirements are as follows in the SM:

- 500 bytes/complex carrier
- 250 bytes/medium carrier
- 150 bytes/simple carrier
- 13,000 bytes fixed
- 5 bytes/existing trunk group
- 25 bytes/net trunks added.

Memory requirements in the AM are:

- 300 bytes/complex carrier
- 150 bytes/medium carrier
- 50 bytes/simple carrier
- 12,000 bytes fixed.

EAEO/AT: The SM memory requirements for an office carrying end office and tandem traffic are as follows:

- 14,000 bytes/complex carrier
- 4,500 bytes/medium carrier
- 150 bytes/simple carrier
- 35,000 bytes fixed
- 12,500/split NPA
- 5 bytes/existing trunk group
- 25 bytes/net trunks added.

Memory required in the AM is:

- 13,500 bytes/complex carrier
- 4,200 bytes/medium carrier
- 50 bytes/simple carrier.

3.1.7.1.2.2 Billing ODD Memory Space

Billing requires a small increase in ODD memory due to the addition of new call codes.

3.1.7.1.3 Text Memory Space

3.1.7.1.3.1 Call Processing Text Memory Space

Approximately 22,900 bytes of text memory are required in the SM, and 1,300 bytes are required in the AM.

3.1.7.1.3.2 Call Record Text Memory Space

Approximately 2800 bytes of text memory are required in the SM, and 50 bytes are required in the AM.

3.1.7.1.3.3 Billing Text Memory Space

Approximately 6780 bytes of text memory are required in the SM and 50 are required in the AM.

3.1.7.1.3.4 Terminal Maintenance Text Memory Space

About 5000 bytes of memory are required in the SM and about 300 bytes in the AM.

3.1.7.1.3.5 SES II Text Memory Space

Service evaluation uses approximately 600 additional bytes in the AM and 1400 additional bytes in the SM.

3.1.7.1.3.6 Measurements Text Memory Space

Measurements uses approximately 4000 additional bytes in the SM and 7800 bytes in the AM.

3.1.7.1.3.7 RC/V Text Memory Space

The RC/V uses approximately 7800 additional bytes in the AM.

3.1.7.2 Processor Occupancy

The estimated real time per billed call to produce each of the three major types of CI records is shown in Table 3-5 .

Table 3-5 AM and SM Real-Time Usage

RECORD TYPE	TIME	
	SM	AM
Originating Access Record	16.9 ms	1.15 ms
Detailed Terminating Access Record	15.0 ms	0.98 ms
Short Terminating Access Record	10.8 ms	0.68 ms

3.1.8 Data Base Additions and Modifications

The following text describes the additions made to the 5ESS[®] switch data base for the CI feature. These additions are made to the recent change views. There are also additions and changes made to the 5ESS[®] switch forms utilized in the office data administration (ODA). Refer to the TG-5 for the ESSTM switch forms. Additions and modifications to the RC views are explained in the view where they are first encountered. For additional information on CI fields, refer to 235-118-2xx, *5ESS[®] Switch Recent Change Procedures*.

The following 5ESS[®] switch forms are applicable to the CI feature. This list does not include forms added for specific features which may have CI-related information.

- ESS 5300-6 — CDIM
- ESS 5305 — ICF
- ESS 5109-1/2 — LINE
- ESS 5111-1/2 — MLHLN
- ESS 5202-1/2 — TKGRP
- ESS 5300-2 — PDIT
- ESS 5300-3/5 — LDIT
- ESS 5301 — RAR
- ESS 5301-1 — FIXRT
- ESS 5302-1 — CGIDX
- ESS 5303 — RTIDX
- ESS 5306 — LCC
- ESS 5309 — INDIT
- ESS 5506 — AMACT
- ESS 5509 — OFCOPT
- ESS 5511 — TLWS
- ESS 5512 — ROTL
- ESS 5518 — CTTU
- ESS 5520 — TIMING.

3.1.8.1 Line Views

Line views are used in the 5ESS[®] switch to assign characteristics and capabilities to a customer's line. The CI feature uses the line views to assign a PIC to a customer's line, to indicate the line's carrier dialing privileges, and to designate a feature group A line.

3.1.8.1.1 Views Affected

The views that are modified are as follows:

- Composite Telephone Number (View 1.6)
- Nonmultiline Hunt Telephone Number (View 1.1)
- Nonmultiline Hunt LEN & PTY (View 2.1)
- Multiline Hunt Telephone Number (View 1.2)
- Multiline Hunt LEN & PTY (View 2.2)
- Multiline Hunt MLHG & MEMB (View 3.2)
- 2, 4, 5, 8, & 10 PTY Telephone Number (View 1.3)
- 2, 4, 5, 8, & 10 PTY LEN & PTY (View 2.3)
- Coin Telephone Number (View 1.4)
- Coin LEN & PTY (View 2.4).

Three new fields have been added to the views listed. Since the procedures used to populate the new fields are similar, they are discussed as a group.

3.1.8.1.2 New/Modified Fields

PIC (New Field): The PIC field indicates the primary carrier that is assigned to the line. It is a 3-digit number with a range of 000 to 999, indicating the XXX digits of the desired primary carrier.

CIDIAL (New Field): The CIDIAL field indicates the line's carrier dialing privileges. The values allowed are: ALLOW, DENY, REQ, TALLOW, TDENY, and TREQ. The values beginning with a T indicate test lines. The ALLOW value indicates that the customer is allowed to dial the 10XXX carrier access code or use an assigned PIC when making an inter-LATA call. This is the default value. The DENY value indicates that the customer cannot dial 10XXX when making an inter-LATA call. The PIC must be assigned for the customer to make inter-LATA calls. The REQ value indicates that the carrier access code must be dialed for inter-LATA calls. The line PIC is ignored.

FGA (New Field): The FGA field indicates whether or not the line is a feature group A line. Feature group A lines are either lines to inter-LATA carriers or inter-LATA foreign exchange lines. The field is set to either Y or N (Yes or No).

3.1.8.2 Line Miscellaneous and Group Views

The LINE CLASS CODE VIEW (View 4.1) is the only view in this class that is modified by the CI feature.

LINESCRN: This attribute indicates whether or not this class of line receives any special screening. Valid values for this attribute are Y and N (Yes and No).

3.1.8.3 Trunk and Trunk Group Views

TRK CLASS: This field indicates the trunk service class of this trunk group. One new value, IC, has been added to the valid values. This indicates that the trunk group is directly connected to an IC/INC.

CARRIER ID: If this trunk group is connected directly to an IC/INC, then this field indicates the identity of the IC/INC. The value may range from 000 to 999.

FREE ANS: This field indicates whether or not answer supervision should be returned on this trunk group in cases where the call eventually completes to a free call. Valid values for this field are Y and N (Yes and No).

FGBBILL: This field describes the type of billing that should be done for incomplete call conditions where it is not possible to determine the billing type by other means. This field is only relevant for trunks directly connected to an IC/INC. Valid values for this field are Y and N (Yes and No). The value Y indicates FGB billing and the value N indicates FGD billing.

3.1.8.4 Digit Analysis Views

The digit analysis views are used to recognize feature invocations, dialed prefixes, and valid dialing patterns. Modifications to the digit analysis views extend the digit analysis capabilities to recognize dialing patterns peculiar to CI. The digit analysis views are also enhanced to classify directory numbers with respect to a set of CI call types.

The following views were modified to support CI:

- Prefix/Feature Digit Interpreter Table (View 9.2)
- Local Digit Interpreter Table (View 9.3)
- Incoming Trunk Digit Interpreter Table (View 9.5)
- Carrier Destination (View 9.7)
- International Direct Distance Dialing (View 9.6).

3.1.8.4.1 Prefix/Feature Digit Interpreter Table View

This view was modified to recognize dialing patterns peculiar to CI. The PREFIX/FEATURE DIGIT INTERPRETER TABLE view must be populated to identify legal "10XXX" dialing patterns.

CALL TYPE (Modified View): This field describes the prefix/feature digit interpreter call type for the digit sequence table. The value CICUT, indicating 10XXX + # (CI cut-through) is added to the list of values.

TYPE CI CALL (New Field): This field was added to all three digit interpreter views (9.2, 9.3, and 9.5). It is used to classify digit patterns based on characteristics pertinent to CI. The values for the TYPE CI CALL that are valid are INTRA, INTER, CICUT, and NONCI. The INTRA value indicates that the call is an intra-LATA call. INTER indicates an inter-LATA call within the continental United States. The value CICUT indicates a carrier cut-through call. The value NONCI indicates non-CI tandem traffic or a feature activation code.

3.1.8.4.2 Local Digit Interpreter View

This view was modified to classify directory numbers from line originations with respect to a set of CI call types.

TYPE CI CALL (New Field): This field classifies the call according to CI criteria. The values are as follows:

- INTRA - Call is intra-LATA
- INTER - Call is inter-LATA and within the continental United States
- WZ1 - Call is to World Zone 1 outside continental United States

- IDDD - Call is outside World Zone 1
- SAC - Service access code call
- TRANS - 950-WXXX dialed call
- NONCI - Non-CI tandem traffic or feature activation code
- PRIV - Inter-LATA call that can be handled by the local telephone company
- CONFL - An a NANP DN without the NPA conflict where the "1" or "0" prefix determines whether the call is intra- or inter-LATA.
- COMP - Call to a directory number which the OTC carrier and other carriers compete for on an equal basis.

WZ1 REGION (New Field): This field specifies the World Zone 1 region for calls with a TYPE CI CALL value of WZ1, that is, calls outside the domestic United States, but still in World Zone 1. The value range for WZ1 REGION is from 0 to 9.

SAC OWNER (New Field): This field indicates which carrier is handling calls to this SAC code. This can be either an IC (000-999) or the OTC carrier. Valid values are from 000 to 999 or LEC (OTC carrier).

3.1.8.4.3 Incoming Trunk Digit Interpreter View

This view is modified to classify directory numbers from trunk originations with respect to a set of CI call types.

TYPE CI CALL (New Field): The values for this field are as follows:

- TRANS - Call dialed 950-WXXX
- NONCI - Non-CI tandem traffic or feature activation code
- AVT - 0ZZ-XXX call in an AT
- INC - 1NX-XXX-CCC call in an AT
- EMRR - Emergency reroute; 0ZZ or 1NX-XXX-CCC digits received at an extra intermediate office that has been interposed due to an emergency situation that is preventing normal routing from the EAEO to the carrier.

3.1.8.4.4 Carrier Destination View (New View)

This view provides carrier specific code indices (CDIs) for incoming 0ZZ and 1NX digits at an AT. The view is also used for calls to carriers that have the DIG ROUTING option.

CODE INDEX: This field is a key attribute for this view. It is a noncarrier specific code index from one of the digit interpreter tables. It could represent a code index derived from an 0ZZ or 1NX digit sequence received in an AT from an EAEO, or it could represent a code index derived from a locally dialed digit sequence if this is being used for a carrier with the DIG ROUTING option. A valid value is from 0 to 4095.

CARRIER ID: This is the second key attribute for this view. A valid IC 3-digit code (000-999) is entered.

CARR CDI: This field is the carrier specific code index. A valid value is from 0 to 4095.

CARR RTI: This field is the carrier specific route index. A valid range for this field is from 0 to 16383.

REMARKS: Any remark up to 16 characters long is accepted.

3.1.8.4.5 International Direct Distance Dialing View

No new attributes were added for CI in this view.

3.1.8.5 Miscellaneous Views

The following views were modified for the CI feature.

- Misc - Office Parameters (View 8.1)
- Misc - Timing (View 8.5)
- Remote Office Test Line (View 14.2)
- Trunk Line Work Station (View 14.3)
- Centralized Trunk Test Unit (View 14.4).

3.1.8.5.1 Misc - Office Parameters

Several new or modified fields are added by the CI feature.

IMPLDNPA (New Field): This field indicates the NPA used when a call is dialed with only a NANP DN without the NPA. This field must be populated for the CI feature to work properly. Any 3-digit NPA can be entered.

ICTERM (New Field): This field indicates whether or not terminating call recording should be done on calls received from IC/INCs. Valid values for this field are Y or N (Yes or No).

ICSUPV (New Field): This field indicates whether or not the switch supervisory unit number should be recorded for answered inter-LATA calls. Valid values are Y or N (Yes or No).

CARRID (New Field): This field indicates the office PIC. Inter-LATA calls from lines that have neither a line PIC nor a group PIC are routed to the carrier identified by this office parameter. If this field is null, such calls are routed to an announcement. Any valid carrier XXX code from 000 to 999 can be entered. The value can also be null (unknown).

CARIDLEN (New Field): This indicates whether 2- or 3-digit carrier codes are being used in this office. (Note that after this parameter was added, a decision was made that only 3-digit codes will be used in the network.) For this field, a valid value of 3 is mandatory.

3.1.8.5.2 Misc - Timing View

This view is used to assign the start signal and various dialing/signaling time-out values for a given class of service.

ORIG (Modified Field): This field is the key attribute to this view. It gives the originating class of service for which timing information is supplied in the rest of the view. The value IC is used for all trunks directly connected to a carrier on which originations can occur. This value is also used on most direct trunks to a carrier on which originations can not occur.

3.1.8.5.3 Remote Office Test Line

This view is used to indicate the directory number to be used on callbacks to a CAROT office.

CARRIER ID (New Field): This view is modified by the addition of a carrier XXX code. This allows callbacks to be

inter-LATA calls. This field specifies which carrier is to be used for callbacks. Valid values range from 000 to 999. The value may also be null (unknown).

3.1.8.5.4 Trunk Line Work Station

Used to specify attributes of trunk line work stations and 101-type test lines.

CARRIER ID (New Field): This view is modified by the addition of a carrier XXX code. This allows callbacks to remote trunk line work stations to be inter-LATA calls. Valid values range from 000 to 999. This value may also be null (unknown).

3.1.8.5.5 Central Trunk Test Unit

This view is used to populate central trunk test unit security and callback data and central trunk test unit global data.

CARRIER ID (New Field): This view is modified by the addition of a carrier XXX code. This allows callbacks to be inter-LATA calls. Valid values range from 000 to 999. This value may also be null (unknown).

3.1.8.6 Routing and Charging Views

The routing and charging views are used to specify how calls are to be handled. The inter-LATA carrier fixed route, route index, and screening views determine which line, trunk group, or announcement a call will be routed to, as well as information about the handling of the call on the chosen route (for example, signaling protocol, digits to be prefixed/deleted). The screening, charge index expansion, AMA call type, and inter-LATA carriers views (along with a few unmodified views) determine how calls will be recorded for billing purposes.

The following views are affected:

- Fixed Route (View 10.1)
- Route Index (View 10.2)
- Screening (View 10.10)
- Charge Index Expansion (View 10.11)
- Automatic Message Accounting Call Type (View 10.12)
- Inter-LATA Carriers (View 10.3).

3.1.8.6.1 Fixed Route

This view is modified by the addition of several new error types. These new values result from new errors that become possible in the CI environment.

TRMT (Modified Field): This field is the key attribute for this view. It indicates a type of error. The rest of the view indicates the treatment to be given for this error type. The values added for CI are as follows:

- NO10XX - 10XXX dialed when not allowed
- ANSTO - Time-out waiting for answer on FGB or IDDD call
- INVNODIG - Invalid number of digits received on an incoming FGD call
- INV10XX - Invalid 10XXX prefix dialed

- 10XXERR - 10XXX dialed when 950-WXXX should have been dialed
- 950ERR - 950-WXXX dialed when 10XXX should have been dialed
- INV PIC - The line PIC does not handle the type of call dialed
- REQ10XX - 10XXX must be dialed for inter-LATA calls from this line
- NOSTART - No start signal was received from the carrier
- OSANITO - Time-out waiting for ANI request from an operator facility
- NOACK - No acknowledgment wink received from the carrier
- NOSSD - No second start dial wink received from the carrier
- SSDOFHK - Off-hook received instead of second start dial wink
- DCOFHK - No second start dial wink received on a direct trunk from an IC
- IECFAIL - General termination failure during signaling
- UNCFAIL - Unconditional termination failure during overlap outpulsing.

3.1.8.6.2 Route Index

This view is used to specify the characteristics of routes. Several fields are added or modified by the CI feature.

PREF DIG (Modified Field): For calls using traditional LAMA/CAMA signaling, this field indicates the digits to be prefixed for outpulsing. In this case, one to six digits may be entered. For calls using EA or INC signaling, this field indicates the spare toll center code (0ZZ or 1NX) to be used in the initial outpulsing sequence from the EAEO to the AT. In this case, three digits are required.

SIG PRO (New Field): This field specifies the signaling protocol to be used on this route. Valid values are as follows:

- TRAD (default value) - Traditional LAMA/CAMA signaling
- EA - Equal access signaling
- INC - Equal access international signaling
- FGB - Signaling for FGB carriers.

ANI IND (New Field): When the SIG PRO value is EA or INC, this field indicates whether or not an ANI sequence should be outpulsed. With other SIG PRO values, this field is ignored. Valid values for this field are Y or N (Yes or No).

OVLAP IND (New Field): This field indicates whether or not overlap outpulsing is allowed on this route if it is being attempted. Valid values are Y or N (Yes or No).

RT DES TYP (New Field): This field provides additional description of the route type. Sometimes more than one route index is required to specify related entries in this field even though they point to the same trunk group. For example, if overflow from direct trunk groups to carriers and overflow on OTC trunk groups route to the same announcement, it is still necessary to define two route indices so that distinct route description types can be provided

for measurements. The values are as follows:

- OTHER (default value) - The route is of an unspecified type (this value should not be used for a route index leading to a tone or announcement)
- DIG - The route leads to a direct trunk group to a carrier
- STG - Leads to a trunk group from an EAEO to an AT and is used for calls bound for a carrier
- DTGOFL - Leads to an announcement after overflow from a direct trunk group to a carrier (for cases where there is no overflow to a shared trunk group)
- STGOFL - Leads to an announcement after overflow on a shared trunk group from an EAEO to an AT
- ALTRKBSY - Leads to an announcement due to an all trunks busy condition (not to be used with DTG or STG)
- GENANN - Leads to an unspecified announcement
- NMFAIL - The route leads to an announcement due to network management blocking
- ICRSTRCT - Leads to an IC restriction announcement
- BADLATA - Leads to an announcement due to the carrier routing the call to the wrong AT.

3.1.8.6.3 Screening

This view is used to specify the routing for calls based on the screening index (SCR) associated with the originating line or trunk, and the CDI associated with the dialed digits and the carrier chosen for the call.

IECR (New Field): This field indicates whether or not the originating line is a nonpayer for the carrier chosen to carry the call. Valid values are Y or N (Yes or No).

CBLK (New Field): This field is used only on carrier calls. In the cases where it is necessary to do carrier independent screening, that is, using the CDI from the digit interpreter tables, this field indicates whether or not the screening table entry should be used. If the entry is not to be used, screening is done again with the carrier specific CDI. The CBLK field found on this carrier specific entry is ignored. Valid values for this field are Y or N (Yes or No).

3.1.8.6.4 Charge Index Expansion

This view is used to populate the charge index expansion table. This table specifies the billing characteristics of a given charge index.

AMATYPE (Modified Field): This field classifies the AMA call type of calls with the specified charge index. Additional values for this field made by CI are as follows:

- WATISB - WATS station billed (AMA call code 7)
- WATSB - WATS billing number for intra-LATA call (code 68); station billing number used if WATS billing number not available
- FGDOL - FGD originating LATA calls (code 110)
- WATSBL - WATS station billed for inter-LATA call (code 111)
- FGDTL - FGD terminating LATA calls (code 119)

- FGDWBL - WATS billing number for inter-LATA calls (code 114); station billing number used if WATS billing not available
- FGBOL - FGB originating LATA calls (code 134)
- FGBTL - FGB terminating LATA calls (code 135).

3.1.8.6.5 Automatic Message Accounting Call Type

This view is used to specify the type of billing treatment that is given for the various AMA call types. Modifications support access charge billing to carriers.

AMATYPE: This is the key attribute for the view. The rest of the view describes the billing treatment that is appropriate for this AMA call type. Several new call types have been added for the CI feature. The values are as follows:

- WATISB - WATS station billed for intra-LATA call (AMA call code 7)
- WATSB - WATS billing number for intra-LATA call (code 68); station billing number used if no WATS billing available
- FGDOL - FGD originating LATA calls (code 110)
- WATSBL - WATS station billed for inter-LATA calls (code 111)
- FGDWBL - WATS billing number for inter-LATA calls (code 114); station billing number used if no WATS billing number available
- FGDTL - FGD terminating LATA calls
- FGAOL - FGA originating LATA calls (code 131)
- FGATL - FGA terminating LATA calls (code 132)
- FGBOL - FGB originating LATA calls (code 134)
- FGBTL - FGB terminating LATA calls (code 135).

TRACE: This field indicates the type of tracer count to make for this AMA call type. The value INTERLATA is added to indicate that the inter-LATA type AMA tracer counts should be made.

DATA CALLED: This field indicates the type of data that will be transmitted for the given AMA call type. The value INTERLATA is added to indicate that the data transmitted is inter-LATA.

3.1.8.6.6 Inter-LATA Carriers (New View)

This view is used to specify the characteristics of inter-LATA carriers.

CARRIER ID: This field indicates the identity of the carrier as represented by the three digits XXX. The values for this case are from 000 to 999.

CARRIER TYPE: This required field indicates the type of carrier. The values are as follows:

- IC (default value) - The carrier is an inter-LATA carrier allowed to handle only calls within World Zone 1

- INC - International carrier allowed to handle only noncontinental United States calls
- CONSOL - Consolidated carrier allowed to handle both World Zone 1 and noncontinental United States calls
- LEC - OTC carrier allowed to handle only intra-LATA calls.

ACCESS TYPE: This field indicates the type of dialing access that the carrier accepts. There are two access methods available. One is the interim method where the customer uses 950-WXXX, and the second is the long-term method where the customer dials the number with an optional 10XXX prefix. This is a required field. The values are as follows:

- BOTH (default value) - Carrier accepts both the interim and long-term dialing access methods
- LTRM - Carrier accepts only the long-term dialing access method
- 950 - Carrier accepts only interim dialing access method
- TBOTH Carrier accepts interim and long-term dialed calls from test lines TLTM - Carrier accepts only long-term dialed calls from test lines
- T950 - Carrier accepts only interim dialed calls from test lines.

LONG TERM: This field indicates whether or not detailed (long) terminating billing records should be made on calls from this carrier. The values for this case are Y or N (Yes or No).

DIG ROUTING: This field indicates whether or not choosing RTIs and CDIs based on the TYPE CI CALL value is sufficient for this carrier. Choosing RTIs and CDIs based solely on the TYPE CI CALL value may be insufficient if the OTC wishes to obtain more flexibility in controlling which calls they allow a given carrier to handle. Only exceptions need to be populated in the carrier destination mapping view. For CDIs not found in the carrier destination mapping view, the appropriate CDI or RTI in the ICF view is used. The values for this case are Y or N (Yes or No).

INTRA LATA: This field indicates whether or not the carrier accepts intra-LATA calls. The values for this case are Y or N (Yes or No).

CI CUT: This field indicates whether or not the carrier accepts CI cut-through calls. The values for this case are Y or N (Yes or No).

OVERLAP: This field indicates whether or not the carrier uses overlap outpulsing on any of its non-SAC routes. The values for this case are Y or N (Yes or No).

SAC OVERLAP: This field indicates whether or not the carrier uses overlap outpulsing on SAC calls. The values for this case are Y or N (Yes or No).

CAC SCRNING: This field indicates whether the carrier wants traditional screening, which blocks nonfree calls, done on charge-a-call lines. A side effect of not having this traditional screening is that prefix dialing errors from charge-a-call lines will not be blocked. The values for this case are Y or N (Yes or No).

DOMES CDI: This field indicates the code index used for non-operator-assisted calls dialed (10XXX)+(1)+a NANP DN without the NPA or (10XXX)+(1)+a full NANP DN to a carrier with the CARRIER TYPE equal to IC or CONSOL. This includes both continental United States calls and noncontinental United States World Zone 1 calls. The range of values for this case is from 0 to 4095.

DOMES RTI: This field indicates the primary route index used for non-operator-assisted calls dialed (10XXX)+(1)+a

NANP DN without the NPA or (10XXX)+(1)+a full NANP DN to a carrier with CARRIER TYPE equal to IC or CONSOL. This includes both continental United States calls and noncontinental United States World Zone 1 calls. The range of values for this case is from 0 to 16383.

TRANS CDI: This field indicates the code index used for 950-WXXX calls to this carrier. The range of values for this case is from 0 to 4095.

TRANS RTI: This field indicates the primary route index used for 950-WXXX calls to this carrier. The range of values for this case is from 0 to 16383.

INTL CDI: This field indicates the code index used for non-operator-assisted international calls to a carrier with CARRIER TYPE equal to INC or CONSOL. These are dialed (10XXX)+011+a NANP DN without the NPA or (10XXX)+011+a full NANP DN. The INTL CDI is also used for non-operator-assisted noncontinental United States World Zone 1 calls to a carrier with CARRIER TYPE equal to INC dialed (10XXX)+(1)+a NANP DN without the NPA or (10XXX)+011+a full NANP DN. The range of values for this case is from 0 to 4095.

INTL RTI: This field indicates the primary route index used for non-operator-assisted international calls to a carrier with CARRIER TYPE equal to INC or CONSOL. These are dialed (10XXX)+011+digits. The INTL RTI field is also used for non-operator-assisted noncontinental United States World Zone 1 calls to a carrier with CARRIER TYPE equal to INC [dialed (10XXX)+(1)+(10XXX)+(1)+a NANP DN without the NPA or (10XXX)+(1)+a full NANP DN]. The range of values for this case is from 0 to 16383.

ZMINUS CDI: This field indicates the code index used for 10XXX+0 calls to this carrier. This includes 10XXX+0 calls to a carrier with CARRIER TYPE equal to INC. The range of values for this case is from 0 to 4095.

ZMINUS RTI: This field indicates the primary route index used for 10XXX+0 and 00- calls to this carrier. This includes calls to a carrier with CARRIER TYPE equal to INC. The range of values for this case is from 0 to 16383.

CI CUT CDI: This field indicates the code index used for CI CUT (10XXX+#) calls to this carrier. The range of values for this case is from 0 to 4095.

CI CUT RTI: This field indicates the primary route index used for CI CUT (10XXX+#) calls to this carrier. The range of values for this case is from 0 to 16383.

ZPLUS CDI: This field indicates the code index used for operator-assisted calls dialed (10XXX)+0+a NANP DN without the NPA or (10XXX)+0+a full NANP DN to a carrier with CARRIER TYPE equal to IC or CONSOL. This includes both continental United States calls and noncontinental United States World Zone 1 calls. The range of values for this case is from 0 to 4095.

ZPLUS RTI: This field indicates the code index used for operator-assisted calls dialed (10XXX)+0+a NANP DN without the NPA or (10XXX)+0+a full NANP DN to a carrier with CARRIER TYPE equal to IC or CONSOL. This includes both continental United States calls and noncontinental United States World Zone 1 calls. The range of values for this case is from 0 to 16383.

INTL OP CDI: This field indicates the code index for operator-assisted international calls to a carrier with CARRIER TYPE equal to INC or CONSOL. The INTL OP CDI is also used for operator-assisted noncontinental United States World Zone 1 calls to a carrier with CARRIER TYPE equal to INC [dialed (10XXX)+0+a NANP DN without the NPA or (10XXX)+0+a full NANP DN]. The range of values in this case is from 0 to 4095.

INTL OP RTI: This field is the primary route index used for operator-assisted international calls to a carrier with CARRIER TYPE equal to INC or CONSOL. The INTL OP RTI is also used for operator-assisted noncontinental United States World Zone 1 calls to a carrier with CARRIER TYPE equal to INC [dialed (10XXX)+0+a NANP DN without the NPA or (10XXX)+0+a full NANP DN]. The range of values for this case is from 0 to 16383.

3.1.9 Implementation and Administration

3.1.9.1 Implementation

3.1.9.1.1 Initialization

While it is necessary to engineer the hardware on the 5ESS[®] switch before a software release retrofit, very little of the traditional preconditioning of the ODD that was necessary on some older switches applies. The sizing of head tables and other internal data structures that had to be done manually on these switches is now accomplished automatically with the ODA decompile/recompile process. For more detailed information refer to 235-105-24x, *5ESS[®] Switch Software Release Retrofit Procedures*.

3.1.9.1.1.1 Expanding Digit Interpretation for LATA Discernment

Although the preceding procedure saves a lot of work, there are a few useful steps recommended for the preconditioning interval. Each dialed digit sequence must be classified and assigned a TYPE CI CALL value. Most offices will have some digit sequences that are not translated out far enough to unambiguously identify a proper TYPE CI CALL value. For example, if a neighboring NPA is only partially included in the same LATA as the switch in question, it may have been possible in the past to only translate the NPA. With CI, it will be necessary to translate the NPA-office code to be able to identify whether the TYPE CI CALL value should be INTER or INTRA. Many other examples exist. While it will not be possible to populate the TYPE CI CALL values prior to the retrofit, preconditioning the ODD by changing the digit interpreter tables to translate through the NPA-office code for these cases should be useful. It is recommended that this be done by expanding the tables one digit at a time. This allows use of the recent change ability to simultaneously add the same information for all ten n+1 digit sequences resulting from the modification of a given n digit sequence simultaneously. This keeps calls from being misrouted due to a transient condition in the tables. In addition to making the post-retrofit changes more straightforward, this preconditioning allows digit table code assignments to be brought in line with the population rule that previously disallowed the sharing of code indices between inter-LATA and intra-LATA codes. This requires duplicating some code indices that would otherwise be reached through both an inter-LATA code and an intra-LATA code. The screening tables also have to be updated to reflect the new code indices.

In addition to the expansion of the existing digit tables, the INDIT for incoming carrier trunks should be built. The INDIT is used for screening out carrier calls that are not subtending to an office code.

An alternate approach to this preconditioning step is to construct totally new tables after the retrofit. Once the tables are constructed, the Digit Analysis - Selector view is used to point each relevant data auxiliary set to the newly constructed tables. At that point, the old tables can be removed.

3.1.9.1.1.2 Eliminating Intra/Inter-LATA Sharing of Charge Indices

Another related restriction made by CI is that charge indices cannot be shared between intra-LATA and inter-LATA codes. For this reason, it is advisable to incorporate reassigning of charge indices in the previous digit interpreter table and screening table modification. Additions also need to be made using the charge index expansion view to duplicate charge indices where necessary.

3.1.9.1.1.3 Establish Inter-LATA Nonpayer Screening

One or more new line class codes (LCCs) should be set up for customers who are nonpayers to the inter-LATA restricted carrier. (See RC/V view 10.3.) These LCCs contain one or more unique screening indices (SCRs). Multiple SCRs are necessary because SCRs can still be used to do class of service routing for the OTC and other carriers. Before assigning these LCCs to any lines, the screening tables should be populated to route intra-LATA and toll-free calls normally for the new SCRs, but to block inter-LATA calls that are not dialed 0+. (See view 7.3.) Note that this can be accomplished only after the previous digit interpretation preconditioning is completed. Once the LCCs and associated screening data are in place, nonpayers can be assigned the LCC. Assuming these nonpayers were being denied service completely along with customers who were nonpayers for the OTC, it is necessary to change the SUSO and SUST to N using the appropriate line RC view so that the customers are no longer totally

denied service. In offices where there are no nonpayers who are strictly inter-LATA nonpayers, this preconditioning step is not appropriate. In offices where such nonpayers do exist, this preconditioning step should be considered optional.

3.1.9.1.1.4 Establish New WATS Bands

With the introduction of CI, there is a new WATS band created corresponding to the local LATA. The WATS band numbers 0, 8, and above 8 are reserved for use by the OTC. It is suggested that one of these be used for this new band. The WATS band numbers are given by the MBI attribute in the CHARGE INDEX EXPANSION view when the AMATYPE is WATSB, WATISB, FGDWBL, or WATSBL.

3.1.9.1.1.5 Establish Separate AT to EAEO Trunk Groups for Inter-LATA Traffic

It is useful to establish, in advance, separate AT to EAEO trunk groups to eventually handle traffic incoming to the LATA from carriers. This is necessary because this traffic must have answer supervision returned from the terminating office even when the calls terminate to free lines. This is not always done for intra-LATA OTC traffic tandeming through the AT.

3.1.9.1.1.6 Other Possible ODD Preconditioning

Other ODD preconditioning is possible, but not explained in depth in this document. It is possible to populate in advance some of the screening, routing, charging, and trunk group information that needs to be in place for handling calls to given carriers. This is not recommended because this data population cannot be readily tested and cannot be completed since access to the new CI data fields is not available at this point.

In addition to providing automatic sizing of the ODD, the ODA process has been enhanced for the CI feature by the addition of the transitional line PIC (TLPIC) option. This enhancement allows easy assignment of an office dependent PIC to all the lines in an office as part of the ODD recompile.

Depending on the office in question, some additional hardware may be needed for the CI feature. If the OTC decides to provide very specific announcements for the various types of customer dialing errors possible with the CI feature, it may be necessary to order and install an additional 13A announcement frame. Whether a new frame is installed or not, it is recommended that any new CI announcements be installed on the 13A frame(s) during this interval. It may also be necessary to install additional trunk circuits to handle new trunks to carriers. Any ODD changes needed to allow installation of these trunks should be accomplished at the same time. Should these or any other additions or modifications to hardware be necessary as a result of the CI feature, the changes should be accomplished in this preconditioning interval.

3.1.9.1.2 Post-Retrofit Population and Testing

This section addresses the populating and testing of CI data that is not specific to a given carrier. This section also addresses population sequencing and other special considerations. If screening and routing for the office in question is to be compacted to take advantage of the revised screening and routing capabilities, it is recommended that this compaction occur prior to the data base population scenario outlined in the following text.

3.1.9.1.2.1 Data Population Alternatives for PIC Information

The requirement to route calls to a customer's preferred carrier necessitated the addition of the PIC field to the data for each line. This is a problem because of the amount of time it would require to enter this data using RC/V on a per-line basis. Further complicating this data population problem is the fact that not all customers choose a PIC in the desired time frame. This section explains the data population alternatives available.

ODA Process: A special option will be provided on the ODA forms so that on a per-office basis, any carrier (or no carrier if desired) can be specified as the TLPIC. The TLPIC will be stored in every active line's individual line data as the PIC for that line. If used, this saves the OTC the trouble of doing per-line recent changes for one carrier.

As a consequence of storing the TLPIC against every line, lines for which no further work is done will be routed to the TLPIC carrier when the TLPIC is activated. There is, however, no restriction on which carrier may be chosen as the TLPIC. It should also be noted that if a TLPIC carrier is specified and the OTC does not wish customers who have not chosen a PIC to route to the TLPIC, it will be necessary to do per-line recent changes to set the PIC for these lines to null.

Any recent changes done between the final dump of the ODD and the software release retrofit will cause the PIC of the changed lines to be set to null when the recent changes are rolled forward to the new software release. This implies both that the number of such changes should be kept to a minimum, and that the identity of these lines should be saved so that the PIC field can be set properly with per-line recent changes after the roll forward.

Remote Memory Administration System (RMAS): The RMAS is a store and forward system used to provide flexible, off-site recent change capability. For the CI feature, an additional menu not available on the 5ESS[®] switch will be provided. This menu will allow the assignment of a PIC and CI DIAL field to ten lines at once, thus saving significant amounts of time for the OTC craft. Additional flexibility will be provided through the ability to store up to 3000 PIC-related recent changes for a given office before the office retrofits to the 5E2(1) software release. It is thought that 3000 will be sufficient for the cases where the TLPIC or mass presubscription carrier options are correctly used. If the options are either not used or not used optimally, 3000 may not be sufficient. In this case, additional work would be needed after the software release retrofit.

Mass Presubscription Carrier: An option exists to specify a CARRID on the recent change office parameters view (view 8.1). If populated, this carrier is used for inter-LATA calls from customers who have neither PIC nor a GPIC. This option provides a convenient means to presubscribe most of the office to a single carrier. It is then necessary to use one of the other methods to populate the exceptions. Functionally, this method has the same effect as using the TLPIC method; the difference is that, in this case, the individual line PICs remain set to null. If individual lines need to be kept from using this mass presubscription carrier, the CI DIAL attribute in the line data can be set to REQ, that is, the line is required to dial 10XXX explicitly to get routed to any carrier. This could be used in the case where new customers added after the CI feature became active were not supposed to automatically get routed to the mass presubscription carrier, but were required to either choose a PIC or always dial 10XXX.

Per-Line Recent Change: For the OTCs who are unwilling to use TLPIC or mass presubscription carrier methods and also do not have access to RMAS, they will be forced to do per-line recent changes to assign PICs to lines. This can be done either in real time or in batch mode. Note that these recent changes can not be done until after the retrofit to the 5E2(1) software release.

Batch Recent Change: Batch recent change provides for deferring the application of recent changes to the ODD, that is, instead of recent changes immediately changing the ODD, they are stored in an intermediate form in a batch file. The file can then be time-released or demand-released. A time-released file is applied to the ODD at a prespecified time; a demand-released file is applied to the ODD when explicitly requested. The advantage to this approach is that the OTC craft do not have to wait between recent changes, that is, the same menus are used and the same form checks are applied. Another advantage is that by time-releasing the batch files during periods of low activity, there is even less of an effect on switch performance.

3.1.9.1.2.2 Sequencing of Data Population

The following sections address the sequence in which new CI-related data should be populated. For simplicity, one workable approach is described. Other sequences may be used. The only mandatory part of the sequence is that the first step must be entering the carriers in the test state, and the last step must be modifying the digit interpreter tables. Order does not matter for the other items described in this section, except where noted otherwise.

Carriers Entered in the Test State: The first step in populating CI-related ODD should be to populate the carrier data (view 7.9) for every carrier that is going to be involved in the initial activation of the feature and for every carrier that will be entered as a PIC, GPIC, or mass presubscription carrier. If a carrier was entered using the TLPIC process, this carrier should be included as well. The ACCESS TYPE for each of these carriers should be either

TBOTH, TLTM, or T950. A carrier with one of these three ACCESS TYPEs is referred to as being "in the test state." The rest of the data on the view should be populated as per the instructions in the Recent Change Procedures Manual. If the correct data is unknown, it is not necessary at this point for the data to correctly describe the carrier involved, it is only necessary that the information be consistent so that it will pass the form checks done on the view. In particular, it will be necessary that the correct CDIs and RTIs be populated, though it will be sufficient to enter any dummy value in the correct range, as the data is not yet actually being used.

Population of PIC, GPIC, and Mass Presubscription Carrier: Once a given carrier's IC view is populated, the carrier can be used as a PIC, GPIC, or mass presubscription carrier. All known values for these attributes may now be populated. The CIDLAL fields for each line may also be populated.

It is **absolutely required** that a PIC, GPIC, or mass presubscription carrier (CARRID on the OFFICE PARAMETER view) be applicable to every line in the office in the interval between changing the digit interpreter tables to incorporate the new TYPE CI CALL values and activating the initial group of carriers. Lines for which no carrier can be found will not be able to make calls outside the local LATA. This is true because the prohibition against the OTC handling inter-LATA traffic is built into the 5E2(1) software release, that is, as soon as destinations are marked inter-LATA, the OTC can not route it. Since 10XXX can not be dialed prior to the initial activation of carriers, the only way to make calls to these destinations is through a PIC, GPIC, or mass presubscription carrier. These calls will then get NONCI routing. After the initial set of carriers is activated, it is not necessary for a PIC, GPIC, or mass presubscription carrier to apply to every line, so that the mass presubscription carrier can be removed if it was in place only for this purpose.

Line Class Code - Line Screen Population: Populate the line screen attribute correctly for each line class code.

Screening on Carrier Calls: The CBLK fields should all be set to their correct values.

Announcement Population: The FIXED ROUTE view (view 10.1) is used to set up routing information for the new types of errors possible with the CI feature.

Charging Information Population: The AMA CALL TYPE view (view 10.12) specifies the billing treatment for the new CI AMA call types. Data for existing AMA call types should also be reviewed at this time to see if the default values inserted for the new CI-related fields are appropriate. If not, they should be changed as well. Once the AMA call type data is correctly populated, the CHARGE INDEX EXPANSION view (view 10.11) is used to update the AMA call type fields for the inter-LATA charge indices added during the preconditioning interval. Any additional charge indices that are needed should also be populated.

Charge on Free Trunk Groups: If the office is an EAEO, the FREE ANS bit on any trunk groups incoming from the AT that are to handle incoming carrier traffic should be set to Y.

Digit Analysis Population: Once the initial set of carriers are in the test state, the correct TYPE CI CALL values should be populated in the digit interpreter tables. Any other adjustments to the tables should be made at this time as well, for example, the data needed for recognizing 10XXX dialing. The sequence of this population is not critical. Even after this population is complete, routing continues as before for customers. The CI logic that selects CDIs and RTIs based on the dialed digits converts all TYPE CI CALL values to NONCI for customer calls to carriers in the test state. This is not true for calls actually dialed with an explicit 10XXX sequence. These calls are blocked with the announcement chosen via the FIXED ROUTE view for the INV10XX error. Special CI test lines will not receive this TYPE CI CALL conversion; they receive normal CI routing. This allows full testing of the routing, screening, and charging data using these special CI test lines while normal customers continue to receive treatment they expect. The CI test lines are identified by having a CIDLAL value of TALLOW, TDENY, or TREQ. These values correspond to ALLOW, DENY, and REQ for normal customer lines.

OUTWATS Conversion: Prior to CI, the OTC was able to offer OUTWATS facilities that covered more than just the local LATA. After CI, the OTC is allowed to provide only intra-LATA OUTWATS. At some point, routing for these customers receiving OUTWATS from the OTC that covers more than just the local LATA will have to be changed. There are basically two options. The first is OUTWATS service becomes strictly intra-LATA OUTWATS; the second,

that OUTWATS service is provided by an IC and becomes strictly inter-LATA OUTWATS. Option one will take effect if the line is assigned the OTC as its PIC and the digit interpreter tables are populated. Option two can be implemented by assigning another carrier as the line's PIC or by not assigning a line PIC and using the mass presubscription carrier option in the office.

3.1.9.1.2.3 Testing CI Data Not Specific to One Carrier

Testing of data that is not specific to a given carrier requires the population of data specific to one or more carriers.

3.1.9.1.3 Population and Testing of Per-Carrier Data

Once all the non-carrier-specific data is in place, it is necessary to populate some carrier-specific data so that the nonspecific data can be tested. If an IC/INC emulator is available, it should be used to emulate the carrier side of the signaling protocol. If an emulator is not available, a "friendly" carrier should be chosen to assist with the testing. Testing should continue until the OTC personnel feel confident that the nonspecific data is correctly populated. Population of the carrier data for either the emulated carrier or the friendly carrier should be done using the following procedure for populating data for other carriers.

Once the nonspecific data has been tested, it is possible to begin an iterative approach of entering the data for a given carrier and completely testing it.

3.1.9.1.3.1 Adding a New Carrier Before CI Feature Activation

At this point, data population for other carriers involved in the initial activation of the CI feature can proceed. Because only CI test lines are affected initially, the sequence of populating the screening, routing, charging, and trunk group data for these carriers is not critical. Only one workable sequence will be described.

Trunk Group Data: The trunk group data for all trunk groups directly connected to the IC/INC should be entered. The appropriate RC view is View 5.1 - TRUNK GROUP view.

Routing Data: The routing data for the carrier should be entered. Note that the trunk group number (TGN) field should include only trunk groups directly connected to the IC/INC or "shared" EAEO to AT trunk groups.

Charging Data: It will probably not be necessary to add new charge indices (CHGIs) for most carriers. If it does become necessary to add these, they should first be defined using the CHARGE INDEX EXPANSION view (View 10.11).

Screening Data: The screening data for the carrier should be entered using view 10.10 - SCREENING. Note that only route indices (RTIs) populated in the immediately preceding step should be used in the RTI fields.

Carrier Description Data: The data that describes the carrier characteristics should be entered via view 10.3 - INTERLATA CARRIER view. The CDIs and RTIs entered here should correspond to key values used in the previous population of screening and routing. If the carrier, for some reason, needs DIG ROUTING, the Carrier Destination View forms should be populated at this time as well. The CARRIER CDIs and RTIs should also be values used in the previous population.

Testing of Per-Carrier Data: The per-carrier data population may now be tested by making the appropriate calls from the CI test lines. It is beyond the scope of this document to describe all the different combinations of tests that will be necessary for various carriers. It is basically up to the OTC to make all the test calls necessary to assure that the data has been populated correctly. It should not be difficult to derive the necessary set of tests from the information provided to the OTC by the carrier to describe the screening and routing arrangements desired.

3.1.9.1.3.2 Special Testing Considerations

For testing in an EAEO with connections through an AT, it is necessary to coordinate data population in the two

switches. The general requirement is that the AT be converted to an equal access software release before or coincident with conversion of any subtending EAEOs. It is also necessary for the per-carrier data in the AT to be populated correctly for EAEO testing to proceed. Loop-around trunks in conjunction with clever data population can make the office look like both the EAEO and the AT. This can be useful both in the initial conversion of the ATs (since there will not be any EAEOs to test with), as well as in initial testing of EAEOs (to avoid having to coordinate with the AT before the EAEO has even major errors removed).

3.1.9.1.4 Feature Activation

Activation of the CI feature is accomplished on a per-carrier basis. A carrier is activated by changing the ACCESS TYPE on the INTERLATA CARRIER view (View 10.3) from a test value (TLTM, TBOTH, or T950) to a corresponding nontest value (LTRM, BOTH, or 950). This is referred to as "taking the carrier out of the test state." Once a carrier is out of the test state, customer lines receive normal treatment on calls to the carrier.

It is assumed that the initial activation of the CI feature in an office will involve multiple carriers. Per-carrier activation does not preclude this; since only one menu change per carrier is required, essentially simultaneous activation of an initial set of carriers is possible by sequentially activating each carrier over a short period of time. Presumably, this would be done after all the carrier data had been tested as described in the previous section.

3.1.9.1.5 Adding Additional Carriers After Feature Activation

The procedure for adding new carriers to an office in which CI is already active is very much the same as the procedure for adding the initial set of carriers. It is suggested that entering the carrier as a PIC or GPIC be avoided until the carrier has been activated. This is suggested because NONCI routing is used for inter-LATA calls dialed without a 10XXX when the PIC is a carrier in the test state.

3.1.9.1.6 Special Considerations for New Start Offices

If a new start office comes up with the CI feature turned off, for CI purposes, it is just like a retrofit office. The activation procedure is just as described earlier. The steps described previously as preconditioning should be done through the ODA process. If the new start office comes up with CI turned on, data population for the initial set of carriers is all done in advance using the ODA process. This allows complete testing before the cutover. Once the office is cut over, new carriers can be added using the same procedures as outlined previously.

3.1.9.2 Data Base Population

This section will describe how the new data can be configured along with existing data to provide the capabilities of the CI feature. The first subsection follows the normal sequencing of data use by the call processing logic, explaining which pieces of data are used in each phase of a call. It is explained how the RC forms should be populated to provide various types of calls. The second subsection focuses on specific CI capabilities and shows how the data should be populated to provide the capability. The third subsection explains the data population required to provide the administrative and operation capabilities provided by the CI feature.

3.1.9.2.1 General CI Data Base Population

This section follows the normal progression of call processing, explaining how the RC forms should be populated to provide the various types of calls that exist in the post-CI environment.

The following capabilities will be discussed.

- (1) **Digit Pattern Recognition:** The CI feature introduces several new valid dialing sequences. The section on Digit Pattern Recognition describes how the digit interpreter table views can be populated so that these new sequences are recognized and properly handled.
- (2) **Code Index and Regular Route Index Determination:** The section on Code Index and Regular Route

Index Determination describes the population requirements for the digit interpreter table views, the INTERLATA CARRIER view, and the CARRIER DESTINATION view as they pertain to the selection of code indices and a regular route index and route Type.

- (3) **Screening and Route Selection for OTC Calls:** This section addresses population of the screening view for screening and route selection on OTC calls.
- (4) **Screening and Route Selection for Carrier Calls:** This section addresses population of the line class code and screening views for screening and route selection on carrier calls.
- (5) **Charging Determination:** This section addresses data population in the screening view and various other views to provide proper charging treatment.
- (6) **Signaling Options:** The section on Signaling Options describes how the route index views as well as various trunk views are used to specify the types of signaling to be used for a call.

3.1.9.2.1.1 Digit Pattern Recognition

The CI feature introduces several new valid dialing sequences. These sequences, as well as sequences that were valid before CI, must be classified in the data base with respect to a set of attributes. These attributes, which correspond to fields on the RC/V digit interpreter table views, are used by the call processing logic in determining how to handle calls. This section describes how these fields should be populated for each dialing sequence in order for the corresponding calls to be handled properly.

The remainder of this section is organized by RC view.

Prefix/Feature Digit Interpreter Table View: The following are descriptions of digit sequences either introduced or modified by CI and translated (at least partially) in the PREFIX/FEATURE DIGIT INTERPRETER table view. For each of the sequences, the fields pertinent to Digit Pattern Recognition (DIGITS TO INTERPRET, CALL TYPE, and TYPE CI CALL) are shown.

(a) Modified Digit Patterns

- The 0- dialed calls are intended for the local OTC operator.
DIGITS TO INTERPRET: 0
TYPE CI CALL: INTRA
CALL TYPE: OPER
- Depending on the actual digits 0+ dialed calls may go to either the local OTC operator or a carrier operator. Regardless of whose operator the calls use, they are translated in the prefix/feature digit interpreter table.
DIGITS TO INTERPRET: 02-09
TYPE CI CALL: NULL
CALL TYPE: LDIT
- All 1+ calls will be translated more fully in the LOCAL DIGIT INTERPRETER table view.
DIGITS TO INTERPRET: 12 - 19
TYPE CI CALL: NULL
CALL TYPE: LDIT
- All international operator calls will be translated more fully in the LOCAL DIGIT INTERPRETER table view.
DIGITS TO INTERPRET: 012 - 019
TYPE CI CALL: NULL
CALL TYPE: LDIT

- All international direct distance dialed calls will be translated more fully in the LOCAL DIGIT INTERPRETER table view.
 DIGITS TO INTERPRET: 0112 - 0119
 TYPE CI CALL: NULL
 CALL TYPE: LDIT
- The digit strings associated with feature invocation must also be entered in this view. If a digit string is part of a larger feature invocation digit string, use the CALL TYPE FEATURE. Otherwise, use the CALL TYPE COMB.
 DIGITS TO INTERPRET: feature invocation digits
 TYPE CI CALL: NULL
 CALL TYPE: FEATURE or COMB
- Other 1- or 2-digit codes, that begin with the digits 2 through 9, are presumably the first digits of directory numbers. These digits must be present in the PREFIX/FEATURE DIGIT INTERPRETER table view so that they can be translated more completely by data in the LOCAL DIGIT INTERPRETER table view. (Note: The first digit of every possible dialable code must be present.)
 DIGITS TO INTERPRET: other digit patterns
 TYPE CI CALL: NULL
 CALL TYPE: LDIT

(b) New Digit Patterns

- Calls dialed 00- are routed to the PIC operator.
 DIGITS TO INTERPRET: 00
 TYPE CI CALL: INTER
 CALL TYPE: OPER
- Calls dialed 10XXX + 0 are intended for the carrier operator.
 DIGITS TO INTERPRET: 10X0
 TYPE CI CALL: INTER
 CALL TYPE: OPER
- Calls dialed 10XXX + 0 + dialed digits are carrier operator-assisted calls.
 DIGITS TO INTERPRET: 10X02 - 10X09
 TYPE CI CALL: NULL
 CALL TYPE: LDIT
- Calls dialed 10XXX + 1 + dialed digits are 1+ carrier calls.
 DIGITS TO INTERPRET: 10X12 - 10X19
 TYPE CI CALL: NULL
 CALL TYPE: LDIT
- Calls dialed 10XXX + 01 + dialed digits are international operator carrier calls.
 DIGITS TO INTERPRET: 10X012 - 10X019
 TYPE CI CALL: NULL
 CALL TYPE: LDIT
- Calls dialed 10XXX + 011 + dialed digits are international direct-dialed carrier calls.
 DIGITS TO INTERPRET: 10X0112 - 10X0119
 TYPE CI CALL: NULL
 CALL TYPE: LDIT
- Calls dialed 10XXX + # are carrier cut-through calls.

DIGITS TO INTERPRET: 10X#
 TYPE CI CALL: CICUT
 CALL TYPE: CICUT

- Calls dialed 10XXX + N are 1-digit speed calling calls.
 DIGITS TO INTERPRET: 10X2 - 10X9
 TYPE CI CALL: NONCI
 CALL TYPE: FEATURE
- Calls dialed 10XXX + 2N, 10XXX + 3N, 10XXX + 4N are 2-digit speed calling calls.
 DIGITS TO INTERPRET: 10X22 - 10X29, 10X32 - 10X39, and 10X42 - 10X49
 TYPE CI CALL: NONCI
 CALL TYPE: COMB

Local Digit Interpreter Table View: The only new required dialing sequence for the LOCAL DIGIT INTERPRETER table view is the 950-WXXX sequence used for reaching carriers.

- The W is an office-dependent digit. It will usually be 1 but may be populated as follows:
 INCOMING DIGITS: 950W
 TYPE CI CALL: TRANS
 CALL TYPE: NORMAL
- Though no other new dialed sequences are introduced in the LOCAL DIGIT INTERPRETER table view, each existing dialed sequence must have a TYPE CI CALL value assigned. In some cases, a value is required in the new WZ1 REGION and SAC OWNER fields as well. Refer to 235-118-2xx, *5ESS® Switch Recent Change Procedures*, for more information.

Incoming Trunk Digit Interpreter Table View: The following are descriptions of digit sequences either introduced or modified by CI and translated (at least partially) in the INCOMING TRUNK DIGIT INTERPRETER table view. For each of the sequences, the fields pertinent to digit pattern recognition (INC DIGS, CALL TYPE, and TYPE CI CALL) are shown.

- Transition (950-WXXX) calls are impulsed on trunks from non-EAEOs. If the non-EAEO is a step-by-step office, it is possible for 50-WXXX or even 0-WXXX to be impulsed. In all cases, the digits are translated through the W.
 INC DIGS: 950-W, 50-W, or 0-W as appropriate
 TYPE CI CALL: TRANS
 CALL TYPE: NORMAL
- Domestic carrier traffic via an AT are calls that are incoming on a trunk group from an EAEO. The sequence 0ZZXXX is impulsed. The 0ZZ refers to selected spare toll center codes that have been selected in a given AT for the use of calls being tandemed to a carrier. The XXX is a carrier ID. This sequence is only translated through the 0ZZ.
 INC DIGS: 0ZZ
 TYPE CI CALL: AVT
 CALL TYPE: NORMAL
- International carrier traffic via an AT are calls at an AT that are incoming on a trunk group from an EAEO. The sequence 1NX-XXX-CCC is impulsed. The 1NX refers to selected spare toll center codes that have been selected in a given AT for the use of international calls being tandemed to a carrier. The XXX is a carrier ID; the CCC is a padded country code. Translation is done through the 1NX.
 INC DIGS: 1NX

TYPE CI CALL: INC
CALL TYPE: NORMAL

- Emergency rerouted carrier traffic is used in cases where, for some reason, an EAEO is unable to directly reach the normal AT. It is possible to route traffic from one EAEO to an intermediate office, and only then to the AT. This section refers to the transactions necessary in the extra, intermediate office. The impulsed sequence is either 0ZZXXX or 1NX-XXX-CCC. The meanings are the same as in the previous cases. Data population is as follows.

INC DIGS: 1NX or 0ZZ
TYPE CI CALL: EMRR
CALL TYPE: NORMAL

- The digit interpreter table population for traffic incoming from a carrier is the same as for OTC incoming traffic. Data population differences between calls from a carrier and normal OTC incoming traffic are seen in other data, such as screening and charging.

INC DIGS: as appropriate
TYPE CI CALL: NONCI
CALL TYPE: NORMAL

3.1.9.2.1.2 Code Index and Regular Route Index Determination

Proper assignment of code indices and regular route indices is not easily explained. Because of the large degree of flexibility allowed, it is beyond the scope of this document to anticipate or describe all the possible ways these items can be configured. For this reason, this section primarily concentrates on how these data items are used, rather than on how they should be populated to handle specific cases.

Code indices are the means by which destination information about the dialed digit sequence is input to the screening, routing, and charging process. Prior to CI, a code index was associated strictly with a logical grouping of NPAs and NPA-office codes. The set of NPAs and NPA-office codes in each group was determined in such a way that no destination information needed for routing, screening, or charging was lost. Calls to all the NPAs and NPA-office codes in a given group received identical screening, routing, and charging treatment. These code indices were determined by data populated in the digit interpreter table views. Two additional data items are passed to the screening, routing, and charging process. One is the regular route index and the other is a carrier code index.

Regular Route Index Selection on Noncarrier Calls: For noncarrier calls, the regular route index is stored in the digit interpreter tables along with the code index. This route index is passed to the screening, routing, and charging process to use in "normal" cases. "Normal" cases are just those cases where it is not necessary to get a special route index from the screening tables. In other words, the regular route index is a default. "Normal" cases are indicated in the screening tables by either not entering a route index or by entering a route index of 0. In these cases, the office code field should also be left empty or 0. Only in unusual cases where screening based on the screening index or prefix dialed applies is it necessary to override the regular route index with a special route index from the screening tables. In many cases, one or more of the groups of codes (as determined by code index assignments) have identical handling of exceptions (that is, screening treatment), as well as identical charging treatment. This implies they differ only in the route chosen on normal calls. By having this, the regular route determined at digit interpretation time rather than by reading the screening tables, many of these groups defined by code index assignments can be merged. This reduces the number of code indices needed, and hence the size of the screening tables. This reduction in memory use is one of the main reasons behind adding the regular route index.

Carrier Code Indices and Regular Route Indices: The carrier code index is a code index that reflects both destination information and carrier identity information. The process of choosing the carrier code index and regular route index differs slightly depending on whether the office is an EAEO or an AT.

Calls Routing Directly From an EAEO to an IC/INC: For most carriers, the carrier code index is retrieved from the

INTERLATA CARRIER view based on the TYPE CI CALL value associated with the call. For these carrier calls, a regular route index is also retrieved from the INTERLATA CARRIER view in the same manner. For SAC calls, the carrier code index comes directly from the LDIT.

If choosing a carrier code index and regular route index based on the TYPE CI CALL value is insufficient for a given carrier, then the DIG ROUTING attribute should be set to Y in the INTERLATA CARRIER view and the CARRIER DESTINATION view should be populated. In general, this can become necessary any time screening, routing, and charging treatment for a given carrier can not be determined with the amount of destination information that is inferred from the TYPE CI CALL value. This is expected to be an unusual situation. When necessary, the CARRIER DESTINATION view provides carriers with whatever degree of flexibility in choosing code indices and route indices that the OTC wishes to provide. This is true because the carriers options are limited to assigning a carrier code index and regular route index for each code index that appears in the digit interpreter tables. This implies that each group of NPAs and NPA-office codes that are implicitly defined by the carrier code index assignments will be composed of one or more of the groups defined by the digit interpreter table code index assignments. Thus the CARRIER DESTINATION view essentially maps one or more of the original code index groups into each new carrier code index group by translating the code index that defined the original group into the carrier code index that defines the new carrier code index groups. This does not imply that, in some cases, the OTC may want to avoid merging code index groups if some carrier wishes to treat the groups differently. Stored with each carrier code index is a carrier route index which becomes the regular route index.

Calls Through an AT: In the EAEO data base, each route index form that represents a route through an AT contains an 0ZZ or 1NX code. These are used to provide flexible routing. In the AT, these calls will be identified by having a TYPE CI CALL value of AVT or INC. For AVT and INC calls, the digit interpreter table code index along with the carrier ID is used to access the carrier code index and carrier route index through data populated in the CARRIER DESTINATION view. This data is then used as described in the following text for screening and routing.

Suggestions on Carrier Use of Code Indices in an EAEO: As implied previously, one of the big determinants of how much memory is needed by the screening tables is the number of code indices used in the office. Engineering estimates for the 5ESS[®] switch have assumed that, where possible, the use of unique code indices will be avoided. For example, the data describing most carriers does not need to include any distinct code indices at all, because they do not have any screening that is unique to them. For these cases, use of a shared set of code indices (one for normal traffic, one for operator bound traffic, and eight for the 0ZZ and 1NX codes, etc.) should be sufficient. Routing to various trunk groups is accomplished using the carrier-dependent regular route indices.

Screening and Route Selection for OTC Calls: For OTC calls, the screening tables are accessed using the code index from the digit interpreter tables, the screening index from the line class code information, and the prefix dialed (that is, 0+, 1+, or none). In the normal case for outgoing calls, the accessed screening record will indicate that everything is normal. This is done by having the route index and office code be either null or 0 entries. This can also be done by having the route index be "REGL." In this case, routing proceeds using the regular route index to access the routing tables. The routing tables contain the outgoing trunk group number. In the normal case of an intraoffice call, the screening table will generally contain null or 0 entries for the route index, and the office code is already available. The office codes are now entered in the digit interpreter table views in the same manner as the regular route indices. This office code is then used to enter directory number translations for routing the call. In some cases, the screening table record will contain a valid route index. This route index will be referred to here as the special route index. In the cases where it exists, it is based on the screening index of the originating line, that is, for things like WATS band screening and toll/code restriction/diversion.

3.1.9.2.1.3 Screening and Route Selection for Carrier Calls

Screening and route selection for carrier calls is complicated by the use of the new, carrier-specific code index. In the most usual case, the exact sequence of events described previously for OTC screening and routing occurs. The only exception is that the carrier code index is used in place of the digit interpreter table code index, that is, a carrier-specific screening record is used. Also as previous, the regular route index will usually be used to route the call. The regular route index is from either the INTERLATA CARRIER view or the CARRIER DESTINATION view.

In cases where carrier-independent screening needs to be done, it is necessary to first access the screening record that would be used for noncarrier calls. This is done using the code index from the digit interpreter tables. If the CBLK field of this record is set to N, then the rest of the information in the record is ignored, and routing proceeds as in the normal case, that is, using the carrier code index. If the CBLK field is set to Y, then this carrier-independent screening record is used to route the call just as if it were not a carrier call at all. In these cases, a valid route index should be found in the screening record since this is not a case of a call routing normally and the regular route index will not get used. These are generally calls that are being blocked, that is, the route index will lead to an announcement.

Generally, carrier-independent screening only occurs when the LINE SCREEN attribute on the LINE CLASS CODE view for the line making the call is set to Y. This implies that the LINE SCREEN attribute should be set to Y only for classes of lines that need some form of carrier-independent screening such as WATS band screening or toll/code restriction. In certain cases where carrier-independent screening needs to be done for other reasons, the call processing logic overrides the value of the LINE SCREEN attribute and does carrier-independent screening regardless of its value. This occurs for a full NANP DN calls dialed without a 1+ or 0+ prefix. Carrier-independent screening is done in this case to make sure the calls get routed to a prefix required announcement if desired. This also occurs for all a NANP DN without the NPA calls (again, for prefix dialing errors) and for some charge-a-call screening calls.

While it may seem like this covers most cases, and that the attribute is being overwritten more often than not, this is not the case. It should be remembered that the attribute is only relevant for carrier calls, and that a very large percentage of carrier calls will be 1+ dialed a full NANP DN calls.

For this to work correctly, screening records that implement these types of screening must have the CBLK attribute set to Y.

3.1.9.2.1.4 Charging Determination

An additional field in the screening tables is the charge index. The charge index is a key to the CHARGE INDEX EXPANSION view which contains information on appropriate charging treatment. This is used for billing purposes, as well as for more general purposes such as determination of whether or not to use hardware registers on hotel/motel calls and how to charge for coin calls. The charge indices from one or both screening records used for a given call are passed to billing logic. The more general uses involve separate accesses to the screening tables outside the normal flow of call processing.

3.1.9.2.1.5 Signaling Options

A number of new signaling options are introduced with the CI feature. These options include signaling protocol (either traditional, EA, international, or FGB), as well as whether or not overlap outpulsing should be performed and whether or not ANI should be sent. The TRK CLASS field of the ROUTE INDEX view must be set correctly to get the desired type of signaling. The following is a summary of the required values from the route index and trunk group views for various types of signaling arrangements that are relevant to CI.

- (1) **Traditional LAMA Signaling for OTC Traffic:** This is the traditional LAMA signaling used between OTC offices for handling normal OTC traffic.
 TRK CLASS: LTOLLCON, TOLL, TTOLLCON, PRINTOLL, or SCINTOLL as appropriate
 SIG PRO: TRAD
 PREF DIG: as appropriate
 ANI IND: not used
 OVLAP IND: not used
 RT DES TYP: OTHER
- (2) **Traditional CAMA Signaling to TSPS for OTC Traffic:** This traffic is most likely bound for a TSPS office on which the OTC is leasing space. This signaling is appropriate only if the TSPS office has not yet converted to

the new OS signaling protocol.

```
TRK CLASS: TSPS
SIG PRO: TRAD
PREF DIG: null
ANI IND: not used
OVLAP IND: not used
RT DES TYP: OTHER
```

- (3) **New Operator Services Signaling:** This is for signaling to operator services positions that have converted to the new EA operator services signaling protocol.

```
TRK CLASS: TSPS
SIG PRO: EA
PREF DIG: null
ANI IND: not used
OVLAP IND: N
RT DES TYP: DTG or OTHER, as appropriate
```

- (4) **Signaling to an FGB Carrier Requesting ANI:** This is for traffic to an FGB carrier. The FGB signaling with ANI is available only on direct connections.

```
TRK CLASS: CAMA
SIG PRO: FGB
PREF DIG: as requested by carrier
ANI IND: not used
OVLAP IND: not used
RT DES TYP: DTG
```

- (5) **Signaling to an FGB Carrier That Does Not Get ANI:** This is FGB signaling for a carrier that does not want ANI. This signaling is available for either direct connections or connections through a tandem. The following data is for the office actually connecting to the carrier. An end office connecting through a tandem would use traditional LAMA signaling to the tandem.

```
TRK CLASS: IC
SIG PRO: FGB
PREF DIG: as requested by carrier
ANI IND: not used
OVLAP IND: not used
RT DES TYP: DTG
```

- (6) **EA Signaling, Direct Connection:** This is for signaling to a carrier with the long-term EA signaling arrangements which has direct connection to an EAEO or to an AT with collocated stations.

```
TRK CLASS: IC
SIG PRO: EA
PREF DIG: not used
ANI IND: Y or N, carrier option
OVLAP IND: Y or N, carrier option
RT DES TYP: DTG
```

- (7) **EA Signaling, Connection Through an AT (EAEO Data Base):** This is for signaling to a carrier with the long-term EA signaling arrangements. This route is for routing through an AT.

```
TRK CLASS: LTOLLCON
SIG PRO: EA
PREF DIG: the 0ZZ code should be put here
ANI IND: Y or N, carrier option
OVLAP IND: Y or N, carrier option
RT DES TYP: STG
```

- (8) **EA Signaling, Connection Through an AT (AT Data Base):** This is for signaling to a carrier with long-term EA signaling. This route is for routing to the carrier from the AT for a call originating in an EAEO. An additional item of particular importance for these calls is the TRK CLASS of the trunk incoming at the AT from the EAEO. It is absolutely necessary that it be TTOLLCON for the feature to operate correctly.
- TRK CLASS: IC
 SIG PRO: EA
 PREF DIG: not used
 ANI IND: not used
 OVLAP IND: not used
 RT DES TYP: DTG
- (9) **INC Signaling, Direct Connection:** This is for signaling to an international or consolidated carrier with the long-term INC signaling arrangements which has a direct connection to an EAEO or to an AT with collocated stations.
- TRK CLASS: IC
 SIG PRO: INC
 PREF DIG: the INC code
 ANI IND: Y or N, carrier option
 OVLAP IND: Y or N, carrier option
 RT DES TYP: DTG
- (10) **INC Signaling, Connection Through an AT (EAEO Data Base):** This is for signaling to a carrier with the long-term INC signaling arrangements. This route is for routing through the AT.
- TRK CLASS: IC
 SIG PRO: INC
 PREF DIG: the INX code
 ANI IND: Y or N, carrier option
 RT DES TYP: STG
- (11) **INC Signaling, Connection Through an AT (AT Data Base):** This is for signaling to a carrier with the long-term INC signaling arrangements. This route is for routing to the carrier from the AT for a call originating in an EAEO.
- TRK CLASS: IC
 SIG PRO: INC
 PREF DIG: not used
 ANI IND: not used
 OVLAP IND: not used
 RT DES TYP: DTG
- (12) **Emergency Reroute Traffic (Intermediate Office Data Base):** This is for traffic that has been rerouted through an extra EAEO or AT because the connection from an EAEO to an AT has been broken. This could be for either EA signaling traffic or INC signaling traffic. The routing information will be as described previously, depending on the position of the intermediate office in the network, that is, these calls will share routes with other traffic. These routes may be any of the six immediately preceding types.

3.1.9.2.2 Data Base Population for Specific CI Capabilities

This section explains how to populate both new and old data items to provide specific CI capabilities. In some cases, specific values are given for attributes; in other instances, a more general discussion of the relationships between data items was deemed appropriate.

3.1.9.2.2.1 Flexible Routing

This section addresses ODD population necessary to provide flexible routing to the carriers.

Flexible Routing With Direct Trunk Groups: The requirement is that an end office be capable of routing on a separate trunk group to the carrier for any combination of class of service, prefix dialed, and SAC code dialed. For the 5ESS® switch, it is customary to assign a distinct screening index for each class of service, that is, routing based on class of service should mean the same thing as routing based on the screening index. Prefixed dialed means 0+, 0-, 011, 01, or 1+. These requirements translate into being able to get to a direct record in the ROUTE INDEX view for any combination of the above.

Despite the requirements, it is expected that the most common routing arrangements for carriers initially will be all traffic going to a single trunk group. Note that this uses none of the power of flexible routing, and only requires that each route index populated in the INTERLATA CARRIER view have the TGN in the corresponding ROUTE INDEX view. Whether or not the route indices in the INTERLATA CARRIER view are all identical is dependent on whether or not the carrier also wants the same signaling protocol to be used for all the calls. (Signaling protocol is mostly a per-route index decision)

The most likely request from carriers that actually involves the use of flexible routing is that 0+, 0-, hotel/motel, coin, and multiparty traffic be routed on one trunk group, and everything else on another trunk group. This corresponds to a carrier with one operator trunk group and one normal trunk group. This case will require using one distinct code index for each carrier of this type. Operator traffic that would be distinguished by dialing a special prefix can be routed to the operator route by using the corresponding route index as the ZMINUS RTI, ZPLUS RTI, and INTL OP RTI in the INTERLATA CARRIER view. The associated CDIs could be virtually any code index that received minimal screening. The new distinct code index would be needed for the DOMES CDI, INTL CDI, and AD1 CDI. This code index would be populated in screening such that together with a class of service of hotel/motel, coin, or multiparty a screening record would be accessed that had a valid route index in it, that is, the operators route index. This route index would override the primary route index, that is, the RTI from the INTERLATA CARRIER view. Other screening records for this code index would not contain a valid route index, and the RTIs from the inter-LATA Carrier view would be used. They would all be the nonoperator route index.

A distinct route index can be based on a SAC code. Since the carrier CDI and RTI come directly from the LDIT for SAC calls, a unique primary route index can be assigned in the LDIT view. Note that the SAC owner field also needs to be assigned. As long as the code index assigned is one with little or no associated screening, all calls to this SAC code will then route using the distinct route index. If it is necessary to get several route indices based on the SAC code as well as the prefix dialed and/or class of service, a unique code can be assigned. This, together with appropriate population of the screening tables, could conceivably get to a completely unique route for every combination of SAC code, class of service, and prefix (0+, 1+, or none).

Other combinations besides those described are possible. In general, they are easily achieved by combining the following in an appropriate fashion.

- (1) Routing based on prefix can be achieved by populating distinct values in the RTI fields in the INTERLATA CARRIER view (except in combination with SAC codes which do not use the RTIs and CDIs in the carrier view.)
- (2) Routing based on class of service requires getting to different RTIs depending on what screening record is accessed and generally requires that one or more distinct CDIs be populated in the INTERLATA CARRIER view.
- (3) Routing based on SAC code generally requires distinct RTIs, routing on SAC code combined with other flexible routing requires distinct CDIs in the digit interpreter tables.
- (4) Routing based on the previous combinations usually requires doing most of what is necessary for both individual cases. The previous examples given are probably more useful than any further generalization.

Flexible Routing on Calls Through an AT: The requirements for flexible routing for calls through an AT is that it be possible to choose a separate trunk group based on any combination of 0ZZ or 1NX code and incoming trunk group. It is also necessary to be able to route 950 calls on a separate trunk group from the EA signaling traffic. It is required that up to four 0ZZ and four 1NX codes be provided. The 0ZZ/1NX codes should be chosen in the EAEO such that each distinct value indicates a separate trunk group from the AT to the IC/INC.

Consider again, the carrier described in the previous section with one normal route and one operator route. Data was populated in the EAEO to reach one of two route index records; one of which had the operator TGN, and one of which had the normal TGN. In the case of routing through an AT, the routing index records would both have the TGN of the trunk group from the EAEO to the AT, but they would have different 0ZZ codes in the PREF DIG field. The AT data base would then have one record in the CARRIER DESTINATION view for each of the two 0ZZ codes in combination with the relevant carrier ID. One record would have a route index for a route with the TGN of a trunk group to the carrier's operator facility, the other record would have a route index for a route with a TGN of a trunk group for nonoperator routing.

In a similar fashion, any type of flexible routing that can be provided directly at an EAEO can be provided through an AT by using distinct 0ZZ/1NX codes in the EAEO and having the codes lead to distinct routes through the CARRIER DESTINATION view.

If a carrier wishes to route based on the incoming trunk group as well, it will be necessary to give special screening indices to each group of trunk groups the carrier wishes to have routed separately. It will also be necessary to assign one or more new distinct code indices for this carrier in the CARRIER DESTINATION view and a corresponding set of screening records.

The TRANS CDI and RTI in the INTERLATA CARRIER view is used to route calls that are impulsed 950-WXXX, so routing these calls on a separate route is as simple as assigning a new unique route index for the RTI.

3.1.9.2.2.2 Service Protection (Emergency Reroute)

Service protection is a term used to describe certain routing and signaling situations when the normally used routes are not functioning. These are not standard arrangements and should not be used for routing traffic in nonemergency situations. Several varieties exist. In all of these cases, redirecting the traffic is normally done via network management trunk group reroutes. If the delay is considered tolerable, modifications to the routing tables can also accomplish the rerouting.

Rerouting Through a Different AT: This example is a case where an end office has lost its connection to its normal AT, and it is able to use connections it has in place to another AT (normally used for OTC traffic only) for routing to carriers. The data population requirements here are no different than in the normal case. Just like with the normal case, coordination is required between the EAEO and the AT to make sure that the AT has the 0ZZ/1NX populated in the INDIT. It is also necessary to make sure that the meanings of the 0ZZ/1NXs are consistent. Since there will not be time to change the 0ZZ/1NXs in the EAEO, the AT should be prepared to accept the EAEO normal set of 0ZZ/1NXs even if this differs from the AT set of 0ZZ/1NXs. Population is simplified considerably if the 0ZZ/1NX sets are the same.

Routing Through an Extra Intermediate Office: This refers to any case where instead of calls routing from an EAEO through an AT and then to the carrier, calls are routed from an EAEO through two offices and then to the carrier. This can be either case as follows.

EAEO - EAEO - AT - IC/INC

EAEO - AT - AT - IC/INC

In the first case, the AT may or may not be the EAEO's normal AT. In the second case, the EAEO's normal AT can be in either AT spot. In all of these cases, the originating EAEO should not have to alter its data base other than to reroute the affected trunk groups. The second office in the chain must have INDIT set up to translate the 0ZZ/1NXs code to a TYPE CI CALL value of EMRR. After normal routing based on the code index and route index from INDIT,

a trunk group to the next office will be seized, and the office will simply repeat the impulsed sequence on the outgoing trunk and cut through. This has the effect of making the existence of the intermediate office completely transparent to the other two offices involved. The third office in the connection must be coordinated with the original EAEO in terms of 0ZZ/1NX codes as in the previous section.

Terminating Service Protection: Terminating calls may also be rerouted. Some flexibility is lost due to the screening normally done in ATs to verify that an impulsed code is for an office subtending the AT. Several scenarios are possible. Calls normally terminating directly to an EAEO may usually be tandemed through the EAEO's AT. It is also possible to interpose an extra office between the AT and the EAEO, as long as the INDIT in the intermediate office is set up properly to handle these calls. It does not seem necessary to go into any more detail in this section. Calls terminating to a LATA are handled in essentially the same fashion as OTC traffic with the exception of the special screening described previously. Even this screening is implemented through the addition of one new fixed route combined with the normal screening capabilities.

Other Considerations: It is very important to realize that these rerouting scenarios are not something that can be implemented in a short period of time when an emergency arises by simply rerouting the affected trunk groups. It can be done easily only with much advance planning and testing of every arrangement that may be used. The data population required for these schemes to work correctly is not a trivial matter that can be accomplished in a few minutes. The data needs to be there in advance.

3.1.9.2.2.3 Announcements

The new error conditions possible with CI are enumerated in the section on Routing and Charging Views. While the flexibility is provided to route each of these error types to a distinct announcement, the following set of announcements is recommended.

- (1) We're sorry, the carrier access code you dialed must be preceded by the digits 950. Please hang up and try your call again.
- (2) We're sorry, it is not necessary to dial the digits 950 before dialing your carrier access code. Please hang up and dial your call again.
- (3) We're sorry, your call cannot be completed as dialed from the telephone you are using. Please read your instruction card or ask your attendant to help you.
- (4) We're sorry, your call cannot be completed as dialed. Please check the number and dial again.
- (5) We're sorry, it is not necessary to dial a carrier access code for the number you have dialed. Please hang up and dial your call again.
- (6) We're sorry, the number you dialed cannot be reached with the carrier access code you dialed. Please check the code and dial again or call your carrier for assistance.
- (7) We're sorry, all circuits are busy. Will you please try your call again later.
- (8) We're sorry, the carrier you have selected is unable to complete your call at this time. Please try your call again later.
- (9) We're sorry your call did not go through. Will you please try your call again.

The following lists the error types for CI and gives the recommended announcement for each condition from the previous list.

- (1) ANSTO - Invalid time-out of FGB or IDDD call. (8)

- (2) INVNODIG - Invalid number of digits on an incoming FGD call. (8)
- (3) NO10XX - 10XXX dialed when not allowed. (3 or 5)
- (4) INV10XX - Invalid 10XXX prefix dialed. (5)
- (5) 10XXERR - 10XXX dialed when 950-WXXX should have been dialed. (1)
- (6) 950ERR - 950-WXXX dialed when 10XXX should have been dialed. (2)
- (7) INVPIC - The PIC of the line making the call does not handle the type of call dialed. (5)
- (8) REQ10XX - This customer must dial the 10XXX prefix for inter-LATA calls. (4)
- (9) NOSTART - No-start signal was received from the IC/INC. (8)
- (10) OSANITO - Time-out waiting for ANI request from an operator facility. (8)
- (11) NOACK - No acknowledgment wink received from an IC/INC. (8)
- (12) NOSSD - No second start dial wink received from an INC. (8)
- (13) SSDOFHK - Off-hook received instead of second start dial wink. (8)
- (14) DCOFHK - No second start dial wink received on a direct trunk from an IC. (8)
- (15) IECFAIL - General termination failure during signaling. (9)
- (16) UNCFAIL - Unconditional termination failure during overlap outpulsing. (9)

3.1.9.2.2.4 OUTWATS

This section will address only physical OUTWATS facilities. Other OUTWATS facilities are provided as part of the BRCS feature. In the post-CI environment there are three types of physical OUTWATS facilities.

- (1) Intra-LATA WATS, provided by the OTC
- (2) Inter-LATA/Intrastate WATS, provided by the ICs
- (3) Inter-LATA/Interstate WATS, provided by the IC/INCs.

It is also possible for the OTC to make contractual arrangements with given ICs to provide combined intra-LATA/inter-LATA services in some states. The WATS bands will be the same for all carriers. Typically, one new WATS band is added which corresponds to the local LATA.

Intra-LATA WATS: A few new data population requirements exist for OTC physical OUTWATS lines. In offices with any TYPE CI CALL value of COMP, the line must have the XXX of the OTC for its PIC. This is also needed in offices using a mass presubscription carrier. It is also necessary (in all offices) to set the CI DIAL attribute to DENY. This keeps the lines from being able to reach IC/INCs, as required.

Inter-LATA/Intrastate WATS and Inter-LATA/Interstate WATS: Data population for carrier OUTWATS facilities is quite similar to that just described. In all offices, the line must have the XXX of the IC for its PIC (with the exception of lines receiving OUTWATS service from the mass presubscribed carrier - in this case a line PIC is not needed) and the CI DIAL attribute must be set to DENY. This keeps the lines from being able to reach other ICs, as required. It is also necessary for the line class code of these lines to have the LINE SCREEN attributes set to Y and the SCR

set to some value unique for WATS facilities to a given set of WATS bands. This will prevent the lines from reaching locations inside the LATA, as well as locations in other WATS bands. Note that the intrastate WATS band includes all of the state, except for the local LATA.

OTC and IC Combined Arrangements: Data population requirements for these facilities are identical to those in the previous section, except that the screening table for these lines allows calls to the intra-LATA WATS band. The implication for any digit sequences marked COMP is that they will be handled by the IC used as the PIC.

3.1.9.2.2.5 Toll/Code Restriction and Diversion

These are all per-line screening features that are implemented on a carrier-independent basis. For this reason, the line class code for lines with any of these features must have the LINE SCREEN attribute set to Y. This will cause carrier-independent screening to occur even on carrier calls.

Restriction: For restriction, the carrier-independent screening table entries that lead to anything but normal routing must have the CBLK attribute set to Y. For cases where a screening entry has the CBLK set to yes is encountered, calls will route exactly as they would had no carrier been involved. For cases where a screening entry with CBLK set to N is encountered, screening continues with the carrier-specific entry in the screening tables.

Diversion: Data population for this feature was not significantly changed for reverse battery diversion. In addition, diversion to attendant has been added by the BRCS features. For reverse battery diversion, a new critical data population requirement is that the CBLK attribute on the relevant screening table entries be set to N. This is required so that the call will be able to continue from the carrier-independent screening entry on to the carrier-dependent screening entry in cases where the reverse battery warning is ignored and the call is to be processed.

3.1.9.2.2.6 Nonpayer Screening

Establishment of nonpayer screening for a single carrier is described fully in the previous text under "Preconditioning." Though it is not required, it is possible on the 5ESS[®] switch to provide this nonpayer screening for more than one carrier. Two options are possible. One is to let multiple carriers share the same set of nonpayers, and the other is to screen on a per-carrier basis.

Common Set of Nonpayers for Multiple Carriers: The set of nonpayers will most likely be determined by the inter-LATA restricted carrier, that is, the carrier for which the OTC is doing billing. These nonpayers are assigned distinct LCCs and SCRs as described in the previous text under "Preconditioning." If other carriers wish to have calls from this same group of customers blocked, it is necessary to have the screening table entries corresponding to the SCRs and the code indices used by these carriers route to the same announcement used for blocking calls to the inter-LATA restricted carrier. This will prevent this group of carriers from sharing code indices with carriers who do not want these calls blocked. It does not prevent sharing of code indices within the group.

Nonpayer Screening on a Per-Carrier Basis: While this is possible on the 5ESS[®] switch, it drastically increases the size of the screening tables if done for very many carriers or a set of carriers. As with nonpayer screening for the inter-LATA restricted carrier, separate sets of LCCs and SCRs must be set up for each group that wants to have its own set of nonpayers. A further complication is that a new set of LCCs and SCRs must be set up for each possible "intersection" of the nonpayer sets. This leads to a combinatorial explosion, for example, if there were 5 distinct groups who each had their own sets of nonpayers, 31 new sets of LCCs and SCRs would be required. This is not at all practical for more than two or three groups of carriers at the most.

3.1.9.2.2.7 Intra/Interstate Considerations

There exists the possibility that some state utility commissions will require special treatment for intrastate calls to some ICs. The sum of the requests seem to be three distinct items.

The first request is to block intra-LATA/intrastate traffic to selected ICs while at the same time allowing intra-LATA/interstate traffic for these carriers to route successfully. This can be done by marking all

intra-LATA/interstate digit sequences as "privileged." This is done in the local digit interpreter table by setting the TYPE CI CALL value to INTRA and PRIV, respectively. At this point, the OTC would receive both intra-LATA/intrastate and intra-LATA/interstate traffic that was dialed without a 10XXX prefix. All carriers would be allowed to handle intra-LATA/interstate traffic dialed with a 10XXX prefix, and only those carriers with the "INTRA" attribute on the INTRALATA CARRIER view set to "Y" would be allowed to handle intra-LATA/intrastate traffic dialed with a 10XXX prefix.

The second request is to block inter-LATA/intrastate traffic for selected ICs, without blocking inter-LATA/interstate traffic to these ICs. This can be done through an extension of the previously described population rules for code indices and the use of DIG ROUTING for such carriers. The existing population rule for code indexes requires that a given code index not be assigned to both inter-LATA and intra-LATA digit sequences. The effect is to segregate code indexes into two sets, intra-LATA and inter-LATA. The required extension is to allow code indexes to be assigned to digit sequences of only one of the following four types:

- Intra-LATA/intrastate
- Intra-LATA/interstate
- Inter-LATA/intrastate
- Inter-LATA/interstate.

This has the effect of segregating the code indexes into four corresponding disjoint sets. It is further necessary to set the DIG ROUTING attribute (on the INTERLATA CARRIER views) to Y and to populate several carrier destination forms for each selected carrier. It is necessary to populate (for each carrier selected) one form for each digit analysis table CODE INDEX corresponding to any digit sequence the carrier is not allowed to handle, and should be a code index and route index that will route to an announcement (via screening tables). All CDIs that should route successfully will default back to the carrier form.

It should be noted that this is a more general method than that described to handle the first request previously. In particular, this method could be used as an alternative for satisfying the first request previously, or for cases where both capabilities described previously are needed.

The third request is to be able to use locally specified routes for intra-LATA/intrastate calls to selected carriers (for example, to route these over OTC routes even though they are dialed 10XXX), the flexible scheme described previously can be used. It is necessary to populate the CARR CDI and CARR RTI with OTC specific code indices and route indices. This is sufficient to both route the call over OTC facilities and to avoid generation of FGD access charge AMA records.

3.1.9.2.2.8 World Zone Screening

This is a term that refers to allowing ICs to receive only domestic and WZ1 traffic and allowing INCs to receive only nondomestic traffic. This is accomplished automatically by populating the digit interpreter tables and inter-LATA carrier views correctly.

3.1.9.2.2.9 Terminating Screening

Two types of screening are required for calls incoming to a LATA. First, the call must be bound for a directory number belonging to the office at which the call enters the LATA or to an end office subtending that office. If not, the call is to be routed to an announcement informing the customer that the IC has misrouted the call. This is easily accomplished by setting up the INDIT so that calls to nonsubtending numbers translate to an RTI that leads to the appropriate announcement. It is important that the routing table entry be marked with a RT DES TYP of BADLATA. It may be possible for these trunks to share an INDIT with other trunks since the incoming carrier trunks will normally have separate SCRs. In this case, the RTI reached for these calls by "normal" trunks should route

successfully.

The other requirement is that incoming FGB calls not be allowed to terminate to directory assistance. This is done by assigning all FGB trunk groups to a separate INDIT. In the FGB INDIT, "555" will be assigned an RTI that leads to the same announcement used in the first case. This should not be the same RTI. This RTI's routing table entry should have RT DES TYP set to GENANN rather than BADLATA.

An alternative implementation to handle the previous screening requirements is to assign a unique SCR to incoming FGD trunks and another unique SCR to incoming FGB trunks. The digit interpreter and screening tables can then be populated to accomplish the required screening.

3.1.9.2.2.10 Coin Telephone Service

For coin telephone service, the most likely case will be to receive only non-sent-paid coin traffic and for the carriers to use either a second dial tone for these calls or have them routed to an operator services facility. In the first case, it will not be necessary for the OTC office to have any special screening or routing for coin calls. The calls are distinguishable at the carrier's office by the ANI information digits. In the case of routing to an OS facility, the carrier will need to be provided with a unique code index so that class of service routing can be done.

At least one carrier is expected to receive sent-paid coin traffic. Note that this is feasible if some sort of a contractual arrangement is made with the OTC so that the money deposited in the coin box is actually paid to the carrier. It is also necessary for the carrier to have direct trunk groups to the offices on which this service is to be provided. The reason behind this is that coin control signals can not be passed through an AT.

3.1.9.2.2.11 Hotel/Motel Service

It is expected that most carriers will treat hotel/motel traffic just like non-sent-paid coin, that is, either use a second dial tone arrangement or have the traffic routed on a separate trunk group to an OS facility.

3.1.9.2.2.12 2-Party Service

There is little interaction between 2-party service and CI. Because it is possible to distinguish between the two parties on originations, each is allowed to choose a PIC. Overlap outpulsing is not used on originations from 2-party lines.

3.1.9.2.2.13 Multiparty Service

Because it is not possible to determine the identity of the originating party with 4-, 5-, -8 and 10-party service, it is not generally possible for these customers to choose a PIC. The CI feature on the 5ESS[®] switch does, however, provide the ability through recent change to assign a PIC to these customers. This has the side effect of also assigning the same PIC to all other customers on the party line. If the customers and the OTC are able to agree on a common PIC to be assigned to all the parties in a given group, then there is no reason why it can not be done.

For these same reasons mentioned previously, only 3-digit ANI (the NPA) is available to carriers for calls from these lines.

3.1.9.2.2.14 Charge-a-Call Screening

Historically, calls from charge-a-call lines have been restricted to the same set of calls that would not require a coin deposit were they being made on a dial-tone-first coin phone rather than on a charge-a-call phone. This includes 0-, 0+, 01+, toll-free, directory assistance, and N11 codes. There is no indication concerning which 10XXX+ dialed calls should be added to this list, yet none of these 10XXX+ dialed calls require a coin deposit if dialed from a dial-tone-first coin phone. Given this lack of requirements, the 5ESS[®] switch implementation of CI makes this screening optional on a per-carrier basis. If the CAC SCRNING attribute equals Y in the INTERLATA CARRIER

view, then the only 10XXX+ calls allowed are those calls that are allowed without the 10XXX. If the CAC SCRNING attribute is set to N, then 10XXX+ calls are not blocked due to charge-a-call screening for this carrier. This has the side effect of disabling all prefix dialing error screening for this carrier for calls from charge-a-call lines, that is, the carrier-independent portion of screening is skipped entirely for these cases.

All screening table entries used to block selected a NANP DN without the NPA calls for charge-a-call screening purposes should have the CBLK attribute set to Y. For those carriers who have charge-a-call screening, carrier-independent screening is done through overriding the LINE SCREEN value in the LINE CLASS CODE view.

3.1.9.2.2.15 Billing for an Inter-LATA Carrier

It is required that only full billing and associated nonpayer screening be done for one carrier. Since the billing is accomplished outside the local switch using AMA records that are made on every call to a carrier, there is no reason (in the local switch) why billing service alone could not be provided to multiple carriers.

3.1.9.2.2.16 Division of Revenue

The 5ESS[®] switch far exceeds the requirement for at least 16 incoming and 16 outgoing separation classes (INSEPs and DESEPs). The 5ESS[®] switch provides 256 of each.

3.1.9.2.3 Data Base Population for CI Administrative Capabilities

3.1.9.2.3.1 Setting Up the ODD for AMA

Several new options and modifications were added to the ODD for billing record modifications. The following fields have been added.

- (1) **ICTERM:** This field indicates whether or not terminating call recording should be done on calls received from IC/INCs. Refer to Section 3.1.8.5, "Miscellaneous Views" for further information.
- (2) **LONG REC:** This field indicates whether detailed (long) terminating billing records should be made on calls from this carrier. Refer to Section 3.1.8.6, "Routing and Charging Views" for further information.
- (3) **Charge Index:** The charge index was expanded to include seven new codes for the CI feature. All the necessary changes are explained in Section 3.1.8.6.4, "Charge Index Expansion."

3.1.9.2.3.2 Setting Up the ODD for SES II

In the fixed route view, there are several new error types that have to be populated. If these error types are routed to a tone, then SES II will never select the call to be evaluated. The following are the error types that should be routed to an announcement.

- NO10XX - Call incorrectly dialed without the 10XXX prefix.
- INV10XX - Invalid 10XXX prefix dialed.
- 10XXERR - 10XXX dialed when 950-WXXX should have been dialed.
- INV PIC - The PIC of the line making the call does not handle the type of call dialed.
- REQ10XX - This customer must dial the 10XXX prefix for inter-LATA calls.

3.1.10 Terminal Maintenance Input/Output Message Changes

The craft output messages that are being changed for CI are:

- MDII
- RMV:TRK
- RST:TRK
- OP:LIST
- OP:STATUS
- REPT:CAMPON
- OP:CAMPON.

Two new fields have been added to the MDII message, CARRFLAG and CARRID. CARRFLAG can have three possible values.

- (1) NC = Not a carrier call
- (2) IC = Call over a direct trunk to an IC or INC
- (3) TIC = Outgoing call to an IC or INC through an AT.

CARRID will have the XXX of the carrier if the CARRFLAG is IC or TIC. Otherwise it will be blank.

The other trunk related messages will have the field IC=XXX if the trunk listed is a direct trunk to an IC or INC. Otherwise the field will be blank.

3.1.10.1 New Assert Codes

Four new assert codes are added by the CI feature, all related to data base inconsistencies.

3.1.10.1.1 Invalid TYPE CI CALL

Assert code FC0046 is used for this error. It indicates that the TYPE CI CALL value from the digit interpreter tables is not valid. This could be from:

- (1) The value null resulting from the complete translation of a dialed sequence
- (2) The data base not being set up properly to block a call dialed "#" without the preceding 10XXX
- (3) An out-of-range TYPE CI CALL value somehow getting into the digit interpreter tables.

The digit tree, digit count, dialed digits, and TYPE CI CALL are printed on the ROP.

3.1.10.1.2 Missing Carrier Destination View Data

The assert code FC0047 is used for this error. This assert indicates that an entry could not be found in the CARRIER DESTINATION view data for the carrier and digit interpreter table code index being used. This could indicate a missing entry in the CARRIER DESTINATION view for this carrier, or an inappropriate code index in the digit interpreter table. The digit tree, digit count, dialed digits, TYPE CI CALL, digit interpreter table code index, and carrier ID will be printed on the ROP.

3.1.10.1.3 Missing World Zone One Region Information

The assert code FC0048 is used for this error. This assert indicates that a TYPE CI CALL value of WZ1 has been encountered, but the WZ1 REGION attribute was not populated. The NPA dialed is printed on the ROP.

3.1.10.1.4 Invalid Country Code Length

The assert code FC0049 is used for this error. This assert indicates that a country code has been encountered with an invalid length, that is, not 1, 2, or 3. The country code length, country code dialed, digit tree, and TYPE CI CALL value are printed on the ROP.

3.1.10.2 Measurements Counts

3.1.10.2.1 30-Minute Traffic Report

Three counts are added to a new section (Section 24) of the 30-minute traffic report. All of the new counts in Section 24 are traffic, usage, or peg counts on tandem trunks (EAEO to AT). The following is a list of the new counts and a definition for each one.

- (1) **Tandem Outgoing Attempts Peg Count:** The measurement macro MSSTGOPC is invoked once per successful attempt on a carrier call to find an outgoing trunk in a tandem trunk group. It is also invoked when no available trunk is found in a given tandem trunk group before going to announcement or reorder. The tandem outgoing attempts counter is incremented for the specified carrier.
- (2) **Overflow on Tandem Trunks Peg Count:** The measurement macro MSSTGOFL is invoked on a carrier call when overflow to an announcement or reorder occurs from a tandem trunk group. The overflow on tandem trunks counter is incremented for the specified carrier.
- (3) **Traffic Usage on Tandem Trunks:** The measurement macro MSSTGTUS is invoked for each shared trunk found busy on a carrier call during the 100-second scanning of call records. The traffic usage on shared trunks counter is incremented for the specified carrier.

3.1.10.2.2 24-Hour Plant Report

Seven counts are added to a new part (Part 6) of the 24-hour plant report. All of the new counts in Part 6 are MDII, routed tandem, direct incoming, or outgoing peg counts. The following is a list of the new peg counts and a definition for each one.

- (1) **Direct Incoming Call Attempts Peg Count:** The measurement macro MSDTGIPC is invoked for each incoming request on a direct trunk group from an IC/INC. The direct incoming peg counter is incremented for the specified carrier.
- (2) **Routed Direct Outgoing Call Attempts Peg Count:** The measurement macro MSDTGOPC is invoked once per successful attempt to find an outgoing trunk in a trunk group that connects directly to an IC/INC. The routed direct outgoing attempt counter is incremented for the specified carrier.
- (3) **Direct Incoming MDII Peg Count:** The measurement macro MSDINCST is invoked whenever a carrier call on a direct trunk from an IC/INC experiences incoming call setup trouble. The direct incoming MDII counter is incremented for the specified carrier.
- (4) **Direct Outgoing MDII Peg Count:** The measurements macro MSDOTGCST is invoked whenever a carrier call on a direct trunk to an IC/INC experiences an outgoing call setup trouble. The direct outgoing MDII counter is incremented for the specified carrier.

- (5) **Routed Tandem Outgoing Attempts Peg Count:** The measurements macro MSRSTGOPC is invoked once per successful attempt on a carrier call to find an outgoing trunk in a tandem trunk group. The attempt counter is incremented for the specified carrier.
- (6) **Tandem Outgoing Second Start Dial Wink MDII Peg Count:** The measurement macro MSSOTGSSD is invoked whenever a carrier call on a shared trunk experiences an outgoing failure up to and including time-out at the EAEO waiting for the SSD wink from the AT. The shared SSD MDII counter is incremented for the specified carrier.
- (7) **Tandem Outgoing Acknowledgment Wink MDII Peg Count:** The measurement macro MSSOTGACK is invoked whenever a carrier call on a shared trunk experiences an outgoing failure after the SSD is received at the EAEO up to and including time-out at the EAEO waiting for the acknowledgment wink from the IC/INC. The shared outgoing ACK MDII counter is incremented for the specified carrier.

3.1.10.3 Measurements Input/Output TTY Messages

3.1.10.3.1 30-Minute Traffic Report

The output messages that are being changed and added for the 30-minute traffic report for the CI feature are OP:TRFC30-IC STATUS, REPT:TRFC30, ALW:TRFC30, INH:TRFC30, and OP:TRFC30-IC. The REPT, ALW, and INH are modified to include Section 24 (IC) of the 30-minute traffic report. The OP:TRFC30-IC STATUS and OP:TRFC30-IC are new output messages for Section 24 of the 30-minute traffic report. Section 24 of the 30-minute traffic report is a variable length report which is dependent on the number of ICs presented in the switch. Output of the 30-minute traffic report can be directed to EADAS, Traffic Channel and the ROP. The entire 30-minute traffic report is output to EADAS and traffic channel while selected sections are output to the ROP. For the 30-minute traffic report, if the section is a variable length section, then the craft must select which members of the section to be output. For Section 24, there can be up to ten ICs chosen to be output to the ROP. See the following examples.

There are three input messages that were changed for Section 24 of the 30-minute traffic report that enables the craft to inhibit, allow, or demand Section 24 to be output. These messages are ALW:TRFC30:IC, INH:TRFC30:IC, and OP:TRFC30:IC. All three input messages have standard format input which requires the craft to specify which IC is required on the 30-minute traffic report going to the ROP. See examples that follow.

The following are examples of the three modified input messages with their corresponding TTY output messages.

- (1) **ALW:TRFC30:IC=10-20-1** (with 1 being an invalid carrier ID) OP:TRFC30:IC STATUS ALLOWED
INTERLATA CARRIERS 10 20 INVALID INTERLATA CARRIERS 1 NUMBER OF INTERLATA CARRIERS ALLOWED = 2
- (2) **INH:TRFC30:IC=10-21** (with 21 being an invalid carrier ID) OP:TRFC30:IC STATUS ALLOWED INTERLATA CARRIERS 20 INVALID INTERLATA CARRIERS 21 NUMBER OF INTERLATA CARRIERS ALLOWED = 1
- (3) **OP:TRFC30:IC=10-20-30**
OP:TRFC30:IC
TIME 18:0:15

SECTION 24: INTERLATA CARRIERS - TANDEM TRUNKS			
IC	OUTGO	OVFL	USAGE
10	0	0	0
20	0	0	0
30	0	0	0

3.1.10.3.2 24-Hour Plant Report

Part 6 of the 24-hour plant report is output only when there are inter-LATA carriers present in the switch (including inter-LATA carriers in the test state). This is output with the rest of the 24-hour plant report and can also be requested using the TTY message OP:PLNT24.

3.1.10.4 Billing Record Modifications - Hourly Billing Records

There were two hourly billing records that were modified for the CI feature.

The Inter-LATA Carrier Overflow Record: The inter-LATA carrier overflow record will be output only when there are direct overflow counts in the past hour. For example, if in the past hour there were no direct trunk group overflow (EAEO to IC), then there would not be an inter-LATA overflow record produced.

AMA Tracer Record: There are two different sensor tracer records that can be output by the 5ESS[®] switch. If there are no ICs present in the switch, then the existing AMA sensor tracer record will output (structure code 09026), or else a new sensor tracer record will be output (structure code 09028). There are four new counts in the new sensor tracer record that are related to ICs. The four new counts are:

- (1) AMA Records Not Output Inter-LATA Answer and Unanswer
- (2) AMA Records Not Output Inter-LATA Long Duration A and B Answer and Unanswer
- (3) AMA Records Output Inter-LATA Answer and Unanswer
- (4) AMA Records Output Inter-LATA Long Duration A and B Answer and Unanswer.

The tracer count, AMA record not output inter-LATA answer and unanswer or long duration A and B, will be pegged for each call which does not output an inter-LATA terminating record due to the ICTERM field in the OFFICE PARAMETERS view or for any other reason.

3.1.10.5 Service Evaluation

3.1.10.5.1 Background Information

Service evaluation of dial lines is a required feature for end offices serving more than 3000 lines. The No. 2 Service Evaluation System (SES II) will evaluate both normal calls that originate from a line, as well as Mechanized Evaluation of Call Completion Anomalies (MECCA) calls. Traffic and call disposition data are used to measure network quality.

The CI feature made the necessary modifications to the 5ESS[®] switch software to accommodate SES II changes made due to divestiture. These changes consist of recording the IC of an evaluated call, selection of a call, and recording the time when the call was cut through. In a multicarrier environment, this information is useful in determining the responsibility for call failures.

There were three 5ESS[®] switch SES II interface messages which were modified for the CI feature. The change common to all three messages were the reassignment of the AUG7 and AUG10 fields. (AUG7 and AUG10 represent augmented a full NANP DN and a NANP DN without the NPA dialed numbers, respectively. The AUG7/AUG10 calling areas are not necessarily the same as intra/inter-LATA calling areas.) Under the CI feature, all references in SES messages to the AUG7 field will be replaced by references to an intra-LATA field.

Similarly, references to the AUG10 field are to be replaced by reference to an inter-LATA field.

3.1.10.5.2 Selection of a Call

The Call Request message will request calls of the following types for evaluations:

- Intra-LATA (AUG7)
- Inter-LATA (AUG10)
- MECCA
- Intra-LATA or Inter-LATA
- Intra-LATA or MECCA
- Inter-LATA or MECCA
- Intra-LATA or Inter-LATA or MECCA.

The specific codes for these requests are the same as those used in the previous software release (5ESS[®] switch and SES II), except that the AUG7 codes now refer to intra-LATA call types, and AUG10 codes now refer to the inter-LATA call type. If a line originating call is not classified as a CI call then the call will be selected based on how many digits were dialed. For example, if SES II was selecting an intra-LATA call and the call was classified as non-CI, and if the digit count field was equal to 7, then the call would be classified as a intra-LATA call and be selected to be evaluated by SES II.

3.1.10.5.3 Interactions With CI Feature Activation

Pre-CI Feature Activation: The selection of the call will be done based on the number of digits that were dialed, that is, either 7 or 10.

During CI Feature Testing - Pre-Activation: In this mixed mode CI environment, some calls will be selected as non-CI calls, and others will be selected as CI calls. The selection of the call will be based on the TYPE CI CALL value. If the call was classified as non-CI, then the call will be selected based on the number of digits that were dialed, or else the call will be selected based on whether it was intra-LATA or inter-LATA.

Post-CI: The selection of the call will be done based on the TYPE CI CALL value. All calls will be classified as an intra-LATA or inter-LATA calls.

3.1.10.5.4 SES II Software Release

The SES II software release 3.1 will have all the necessary changes for the CI feature. Older software releases of SES II will work with the 5E2(1) software release due to AUG7 mapping to intra-LATA and AUG10 mapping to inter-LATA.

3.2 NETWORK AND COMPUTING SERVICES CCS7 NETWORK INTERCONNECTION

3.2.1 Overview

3.2.1.1 Definition

The Common Channel Signaling System 7 (CCS7) Network Interconnection provides an out-of-band signaling interface between local exchange carriers (LECs) and inter exchange carriers (IECs) networks. This feature (99-5E-0555) covers the capabilities needed for a 5ESS[®] switch in the Network and Computing Services (NCS) network functioning as a toll switch to provide this network signaling interconnection. This feature provides the protocol, billing, screening, and operations, administration, and maintenance functions necessary to support CCS7 trunk signaling across this network interface.

This feature provides an equal access (EA) version of ISDN User Part (ISUP) functionality equivalent to EA MF

signaling and supports access to the following services:

- LDS
- IDDD
- SDS
- ISDS
- 900 Service
- 800 Service
- 700 Dial It
- SDN
- WATS.

This feature does not support operator signaling, domestic transport, and pre-translated 800 service.

NOTE: The 800 Service is not limited to the 800 NPA if the switch has implemented a toll-free treatment feature that allows additional toll-free service access codes (SAC) such as 877 or 888.

3.2.1.2 Availability

This feature is provided with the 5E6 and subsequent software releases of the 5ESS[®] switch.

3.2.1.3 Feature Provision Basis

This feature is provided per 5ESS[®] switch.

3.2.2 User Perspective

3.2.2.1 User Profile

This feature was primarily designed for users of the 5ESS[®] switch functioning as a toll switch.

3.2.2.2 User Operations

3.2.2.2.1 Subscriber

This capability provides for an end user to be connected across LATA boundaries via the CCS7 network. Many LASS features are supported across LATA boundaries.

3.2.2.2.2 Operating Company Personnel

Operating company personnel are provided with many new ISUP measurements.

3.2.2.3 Interactions

This feature will not support Stand-Alone operation since ISUP7 trunks require services in the AM to perform call processing functions.

3.2.3 System Resource - Hardware

No new hardware is required to support this feature.

3.2.4 Assignment Guidelines

This feature is assigned when the 5ESS[®] switch in the NCS network is equipped with the 5E6 software release.

3.2.5 System Operation

The ISDN EA functionality across network boundaries is achieved by use of new messages and parameters. Private parameters in the NCS network and in the LEC network are not allowed to cross network boundaries. The integrity of each network is achieved by strict enforcement of the interface across network boundaries.

3.2.6 Administration - Measurements

3.2.6.1 30-Minute Traffic Report

The following list describes the required 30-minute NI measurements:

- Total ISUP messages sent
- Total ISUP messages received
- Unreasonable messages received - This means that a switch received a known message in a call state when it does not expect such a message.
- Release initiated due to abnormal conditions - This means that a switch received a release (REL) message which contained a cause other than "Normal Release."
- Circuit blocked - A BLO message was received on an in-service trunk.
- Termination failure due to glare - The terminating terminal process encountered glare, backed out of the route request, and initiated a rehunt to another circuit.
- Continuity failure - The terminating terminal process attempted to run a continuity test and failed.
- Initiation of a trunk rehunt for any other reason - The terminating terminal process aborted and initiated a rehunt to another trunk for any reason other than glare or continuity failure.
- Total unsuccessful attempts - This means that the terminating terminal process failed to complete the ISUP7 call for any reason.

The following items are counted at the "controlling switch." This means the most forward switch in the sequence which is handling the call when the problem was encountered. A REL message is issued to earlier switches in the call chain. Counts are tallied only at the "controlling switch."

- Switching congestion - This means that the switch failed the call due to congestion or overload.
- No circuit available - This means that no circuit is available to route the call.
- Address incomplete - This means that the switch has attempted to analyze the called party number (CdPN) in the incoming initial address message (IAM) and has been unable to make sense out of it.

- Temporary failure - This means that the call was failed in this switch and a RELEASE with cause 41 was sent out.
- Unallocated number - This means that the switch tried to look up the CdPN in the data base and could not find a tuple.
- Busy - This means that the called subscriber was busy.
- Destination out of service - This means that the switch has completed trunk hunt and attempted to terminate at the chosen port. However, when the switch tried to send out the IAM message, the line of the far switch was out-of-service.
- Other causes - This means that the call failed for a reason other than the foregoing listed reasons. This is the default case.

3.2.6.2 24-Hour Plant Measurement Report

All 24-hour plant measurements also appear on the monthly report. Refer to 235-070-100, Appendix 1, *5ESS® Switch Administration And Engineering Guidelines — Appendix 1, Traffic and Plant Measurements*, for additional information.

3.2.6.2.1 IC/INC Oriented 24-Hour Plant Measurements Report

The following items are counted per IC/INC and reported per-office basis on the daily report in an IC/INC part:

- COT failures - COT failures after two attempts (at End office and Access Tandem)
- Total incoming MDIs - For CCS7 circuit groups directly connected to an IC/INC (at End office and Access Tandem)
- Total outgoing MDIs - For CCS7 circuit groups directly connected to an IC/INC (at End office and Access Tandem)

3.2.6.2.2 Other 24-Hour Plant Measurements Report

Expiration of timer Tcra and total incoming and outgoing MDIs for each CCS7 circuit group are reported on the daily maintenance report as follows:

- Tcra - Due to expiration of timer Tcra at a gateway toll office for CCS7 circuit groups connected to an LEC Access Tandem [The Tcra timer measures the time after sending circuit reservation acknowledgement (CRA) awaiting IAM or REL. It has a range of 20 to 25 seconds. Refer to 235-190-120, *5ESS® Switch Common Channel Signaling Service Features*, for additional information on the timers.]
- Total incoming MDIs - For CCS7 circuit connected to an LEC End office or Access Tandem (at a gateway toll office)
- Total outgoing MDIs - For CCS7 circuit groups connected to an LEC End office or Access Tandem (at a gateway toll office).

3.3 PRE-COMPLIANT FEATURE GROUP B (FGB) CARRIER IDENTIFICATION CODE (CIC) EXPANSION

3.3.1 Overview

3.3.1.1 Definition

The Pre-compliant Feature Group B (FGB) Carrier Identification Code (CIC) Expansion special feature expands the number of FGB CICs which can be processed by the 5ESS[®] switch in both End Office and Access Tandem applications. Prior to this feature, FGB CICs in the range 000 to 999 were supported. The CICs are allocated by Bellcore for FGB and Feature Group D (FGD) carriers, and the number of 3-digit codes available for allocation is being exhausted. To delay exhaustion, this Pre-compliant feature provides support for 4-digit FGB CICs in the 2000 to 9999 range. (Bellcore has been consulted regarding the development of this feature.) The range of CIC values for FGD remains 000-999.

NOTE: Existing use of 3-digit FGB CIC codes [950-WXXX (W = 0 or 1, X = 0 to 9)] remain unchanged.

3.3.1.2 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 99-5E-0698
- NSEP Number: PCFGBCC.

3.3.1.3 Availability

This feature is available with 5E7 and later software releases. The feature is also available for the 5E6 software release via software update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

3.3.1.4 Feature Provision Basis

This feature is provided to a telephone company on a per-office basis.

This secured feature is not enabled until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature enabling is provided upon ordering. Please contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

3.3.2 User Perspective

3.3.2.1 User Profile

The subscriber makes use of this feature when dialing 4-digit FGB carriers.

3.3.2.2 User Operation

The dialing pattern for FGB calls is not changed by this feature, with the exception that the carrier identification code (CIC) can be a 4-digit number.

The subscriber impacts are:

- Existing or new 3-digit FGB carriers are dialed as 950-WXXX, where W is 0 or 1, and XXX is the CIC, range 000 to 999.
- New 4-digit FGB carriers are dialed as 950-ZXXX, where ZXXX is in the range 2000 to 9999.

With this feature, the service provider can get AMA records with the 4-digit CIC in the "IEC/INC Prefix" field.

3.3.2.3 Operational Limitations

If an-end user dials 950-ZXXX (Z = 2 to 9, X = 0 to 9), containing a non-existing 4-digit CIC, the call is routed to blank number or vacant code announcement.

Calls made using a 4-digit FGB CIC may only use the FGB signaling protocol (SIGPRO = FGB).

A 4-digit CIC can only be used for FGB. It cannot be used for FGD.

3.3.2.4 Interactions

The transitional capability between FGB and FGD remains as it is currently. That is, 950-WXXX (W = 0 or 1) dialing in conjunction with equal access signaling, is only available using the current provisioning method for 3-digit CICs.

The Engineering Analysis and Data Acquisition System (EADAS), EADAS Remote Network Monitoring System (EADAS RNMS), and Switching Center Control System (SCCS) currently receive combined FGB/FGD measurement reports containing CIC information. This is maintained for both FGB and FGD carriers utilizing 3-digit CICs. However, this is not supported for 4-digit FGB CICs using pre-compliant FGB.

The following 5ESS® Switch Input/Output Messages which utilize CIC information are not supported by this feature for 4-digit FGB CICs.

- RMV TRK TKGMN
- RST TRK TKGMN
- OP STATUS TKGMN
- REPT MDII
- OP CAMPON
- OP LIST TRUNKS.

A customer at a Centrex line is able to dial 9-950-XXXX or the proper network access sequence for the Centrex group. The sequence 950-XXXX may be stored in a speed call list.

The Regional Bell Operating Companies (RBOCs) have the option to allow a given feature group A (FGA) customer to input 950-XXXX for FGB or to specify that FGB calls from the FGA customer are routed to announcement. When FGB calls are allowed for an FGA customer, AMA records for both FGB and FGA are made on the calls.

3.3.3 Engineering - System Resources

Not applicable.

3.3.4 Assignment Guidelines

3.3.4.1 Forms and Views

3.3.4.1.1 Translation Guide Forms

Not applicable.

3.3.4.1.2 Recent Change Views

Existing capabilities of recent change (RC) Views 9.3 (LOCAL DIGIT), 9.5 (INCOMING TRUNK DIGITS), 10.2 (ROUTE INDEX), and 5.1 (TRUNK GROUP) are used to configure this feature. Carrier definition is performed by modification to dialing and screening which bypasses existing carrier selection.

Recent change Views 9.7 (CARRIER DESTINATION) and 10.3 (INTERLATA CARRIER) continue to apply to 3-digit CICs, but are not used for 4-digit FGB CICs supported by this feature.

3.3.4.2 Feature Assignment

Assign this feature to a customer using the following procedure:

- (A) Obtain assistance from the Lucent Technologies Secured Feature Administrator (SFA) to enable this secured feature. In a new start office, the Lucent Technologies SFA enables the feature through ODA. In an existing office, the Lucent Technologies SFA provides instructions for using RC View 8.22, including the necessary password.
- (B) For ORIGINATING End Office and Access Tandem Switches:
 - (1) On RC View 5.1 (TRUNK GROUP), if not already existing, insert a form for the trunk group which will connect to the IC or to the FGB Tandem switch.
 - Set TRK CLASS based on Table 3-6 .

Table 3-6 Data Configurations Supported by Pre-Compliant FGB CIC Expansion

CONFIGURATION		RECENT CHANGE VIEWS						
SPAN	ANI	9.3/9.5	10.2					5.1
		CI CALL TYPE	SIG PRO	PREF DIG	ANI IND	OVLAP IND	RTDES TYP	TRK CLASS
EO to IC	YES	NONCI	FGB	(OPT) ^a	N	N	DGT	CAMA
EO to IC	NO	NONCI	FGB	(OPT) ^a	N	N	DGT	IC
EO to FGBT	YES	NONCI	FGB	(NU) ^b	N	N	SGT	CAMA
EO to FGBT	NO	NONCI	FGB	(NU) ^b	N	N	SGT	LTOLLCON
FGBT to IC	(NA) ^c	NONCI	FGB	(OPT) ^a	N	N	DGT	IC
Notes: a. Option as requested by carrier. b. Not used. c. Not available.								

- CARRIER ID is required for IC trunks. Since 4-digit carriers are not supported on RC View 5.1, insert a 3-digit carrier code (for example, 000) that will not be used by FGB or FGD carriers.
- (2) On RC View 10.2 (ROUTING), insert a form with the options from Table 3-6 that are selected by the carrier.
 - (3) For each screening index for which FGB calls are to be allowed, insert a copy of RC View 10.10 (SCREENING) with the following:
 - The code index which is assigned to the a NANP DN without the NPA translation in Step 5.

- A route index which points to the desired trunk and will agree with the route index to be entered on RC View 9.3 (or 9.5 for an Access Tandem switch) or, enter a route index of REGL to cause the route index from 9.3 (or 9.5) to be used.
- A charge index which points to an AMA call type of FGBOL.
- A route index of **REGL** for Prefix = NONE. Other prefixes should have route indexes pointing to an announcement or reorder.

(4) Isolate existing 3-digit FGB CICs on RC View 9.3 (or 9.5):

- Eliminate non-FGB uses of the digits 950-XXXX (X = 0 to 9) on RC View 9.3 or (9.5).
- If existing calls are routed based on 950, insert forms for 9500 and 9501. Set call type for both strings to **TRANS** (FGB), and set NBR OF DIGITS to **7**.

NOTE: The **TRANS** string continues to perform carrier selection with RC View 10.3.

(5) Open space in the digit tree on RC View 9.3 (or 9.5). (For example, assume "2123" is the CIC for a new carrier to be served):

- If not already existing, insert the forms 9502 through 9509 and set CALL TYPE to **VACANT** and NBR OF DIGITS to **7**.
- If not already existing, insert the form 95021 setting CALL TYPE to **VACANT** and NBR OF DIGITS to **7**.

NOTE: Forms 95020 through 95029 will be created automatically.

- If not already existing, insert the forms 950212 setting CALL TYPE to **VACANT** and NBR OF DIGITS to **7**.

NOTE: Forms 950210 through 950219 will be created automatically.

- Insert the form 9502123, setting CALL TYPE to **NORMAL**, TYPE CI CALL to **NONCI**, and NBR OF DIGITS to **7**. Set the RTI and CODE INDEX to values that are to be used to route the call.

(C) For TERMINATING End Office and Access Tandem Switches:

NOTE: A unique screening index per office is suggested for use with incoming FGB calls from carriers with 4-digit CICs.

At the carrier's entry point to the LATA (Access Tandem or End Office):

- For the selected screening index, use RC View 10.10 to insert a form for each of the code indexes currently being used for trunks carrying incoming FGB calls. On each form:

- Enter a route index (or REGL), or an OFF CODE, as appropriate.
- Enter a charge index pointing to a DMRTM call type.

NOTE: This step need only be done once, when a terminating connection is being made to the first 4-digit FGB carrier.

(2) On RC View 5.1:

- If not already existing, insert a form for the trunk group which will connect to the IC.

NOTE: This step should be repeated for each new 4-digit FGB carrier being connected to the EO or AT.

- Set the incoming trunk class to private facility (**PF**).
- Set the BILLING DN to **950ZXXX** (where ZXXX is the 4-digit CIC for the carrier being served).
- Set the screening index to that selected in Step 1.

This configuration causes the terminating FGB call to be billed with call code 001 (Detailed Message Rate, Timed, with MBI, DMRTM), with 950ZXXX in the Originating Number field.

NOTE: A terminating FGB call to a vacant number does not produce an AMA record with this arrangement.

3.3.4.3 Deleting Feature Service

Obtain assistance from the Lucent Technologies Secured Feature Administrator (SFA) to delete this secured feature. The SFA provides instructions for using RC View 8.22, including the necessary password.

3.3.4.4 Assignment Limitations

Equal Access (Transition Plan) signaling supports 3-digit CICs, but does not currently support 4-digit FGB CICs.

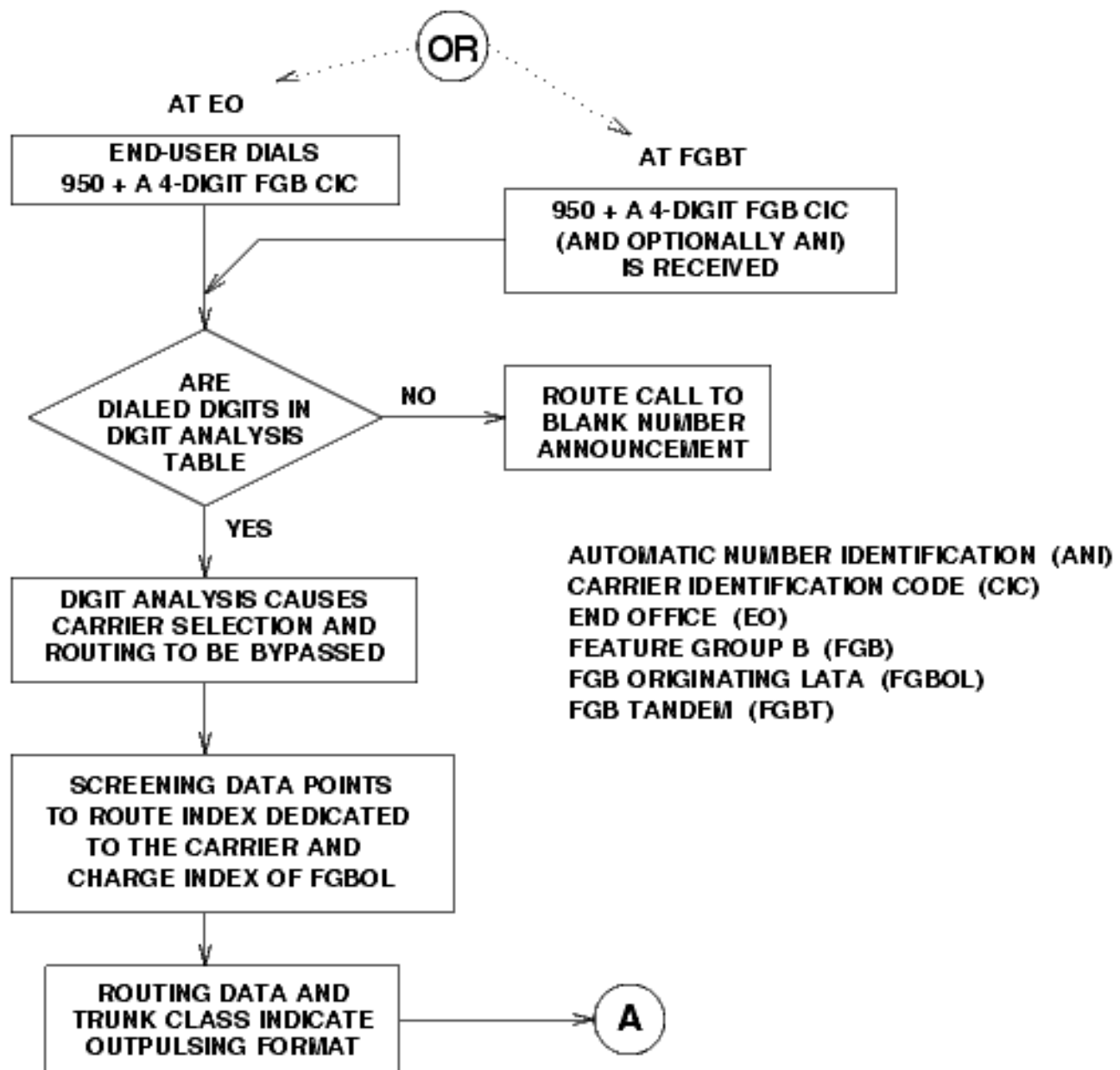
Software releases prior to 5E6 are not provided for this feature and do not support 4-digit FGB CICs.

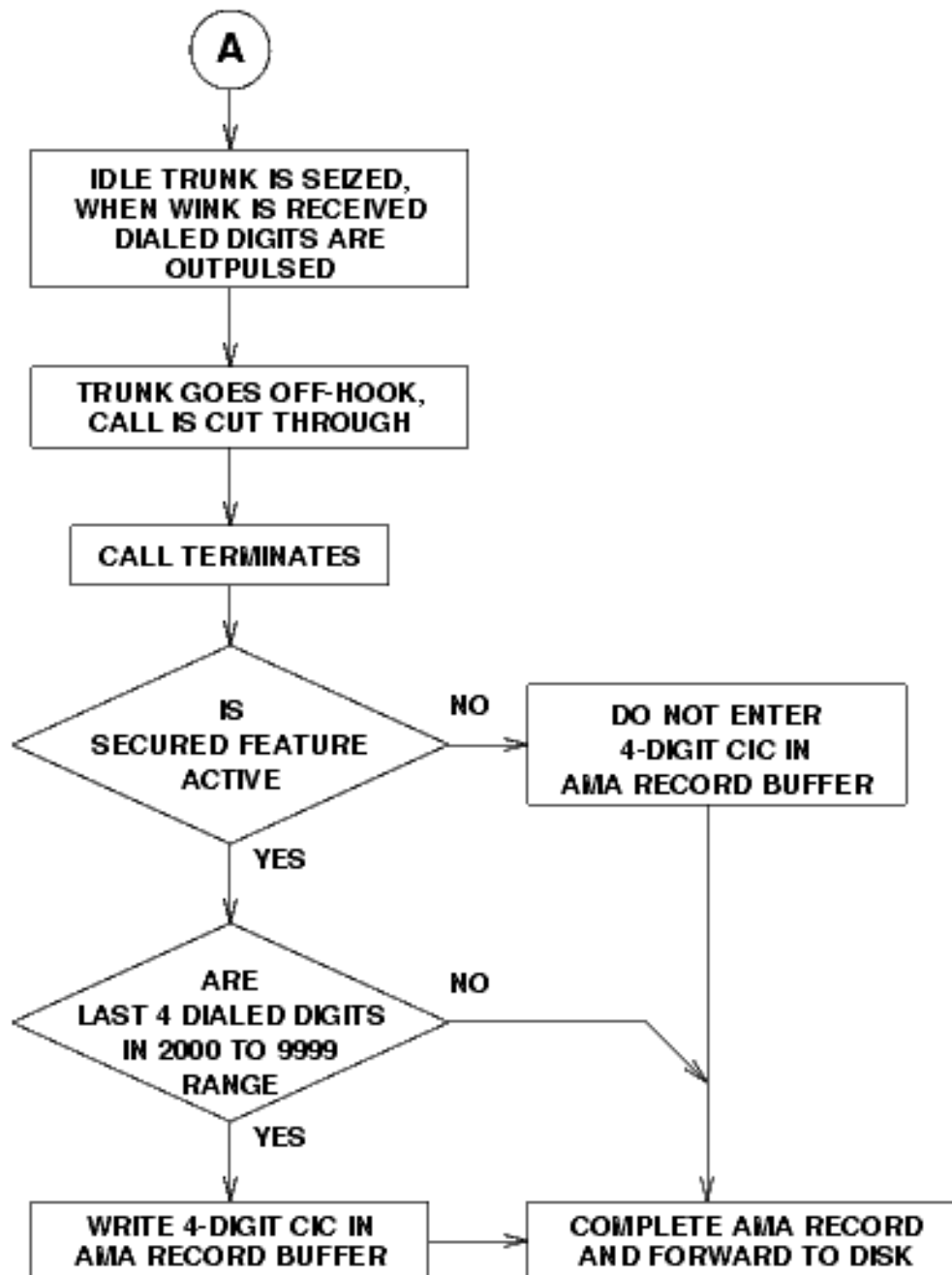
This feature does not provide 4-digit FGB CIC support for the Operator Services Position System (OSPS). Four-digit FGB CIC for the OSPS will be provided in a separate software update.

Selective Carrier Denial is not supported for 4-digit FGB CICs.

3.3.5 System Operation

Call sequence, utilizing 4-digit FGB CICs, at an originating end office (EO) or feature group B tandem (FGBT), is shown in Figure 3-11. Call sequence, utilizing 4-digit FGB CICs, at a terminating EO is shown in Figure 3-12.





**AUTOMATIC MESSAGE ACCOUNTING (AMA)
CARRIER IDENTIFICATION CODE (CIC)**

Figure 3-11 Pre-compliant FGB CIC Call Sequence at Originating Office

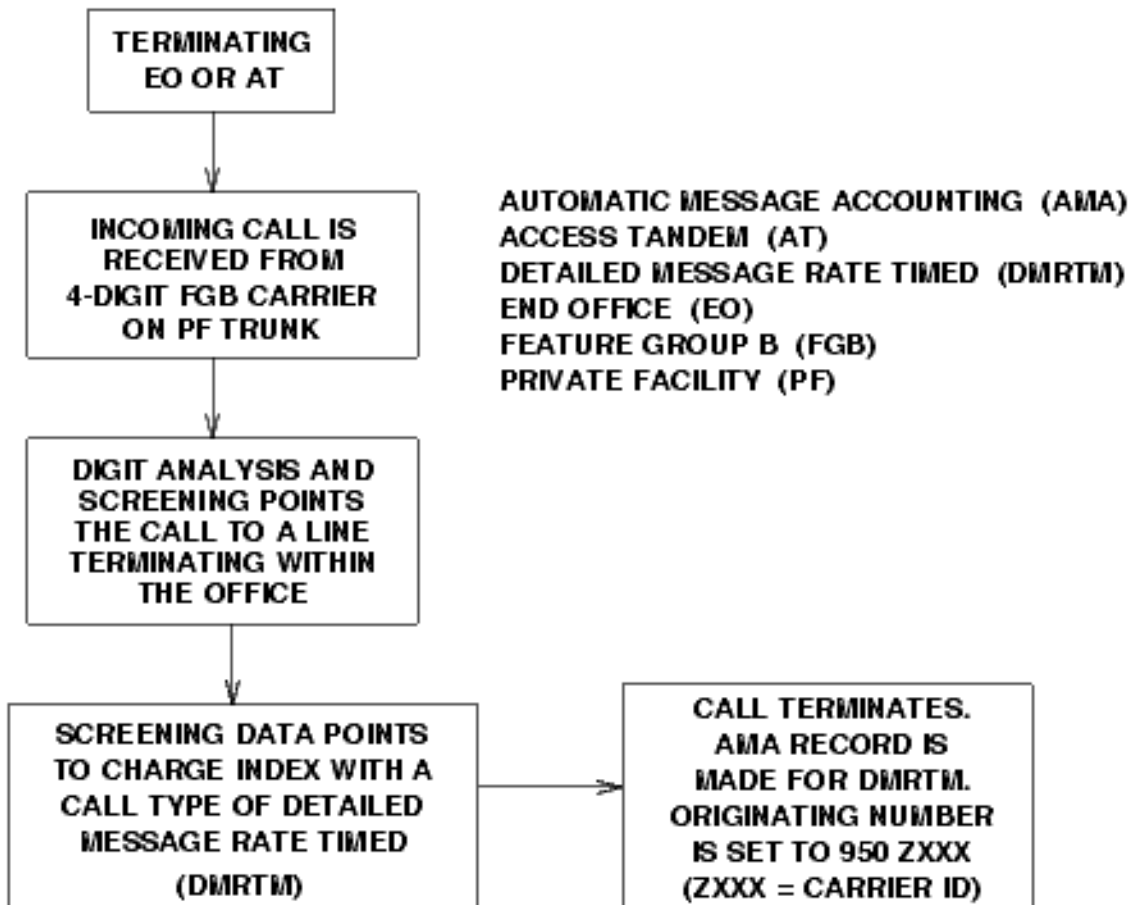


Figure 3-12 Pre-compliant FGB CIC Call Sequence at Terminating End Office

3.3.6 Administration

3.3.6.1 Measurements

Carrier-specific measurements continue to be supported for 3-digit CICs, but are not provided for 4-digit FGB CICs. These measurements include:

- The Traffic 30 report, Section 24
- The Plant 24 report, Section 6, and the corresponding monthly plant report
- The Five-Minute Network Management reports, packages 16, 23, and the Network Management Carrier Audit.

However, existing trunk measurements can be used to obtain measurements for trunks serving 4-digit FGB carriers.

3.3.6.2 Billing

Originating side billing -

- AMA recording for 3-digit CICs remain unchanged (FGBOL, AMA call code 134).
- Calls using 4-digit FGB CICs record the most significant digit of the CIC (the Z digit in the 950-ZXXX, Z = 2 to 9)

in the 1000's digit of the IEC/INC prefix.

Terminating side billing -

- Calls from 3-digit FGB carriers continue to record as AMA call code 135, FGBTL.
- Calls from 4-digit FGB CICs are recorded as Detailed Message Rate, Timed, with MBI (DMRTM, call code 001). The calling number field contains the 950-ZXXX (Z = 2 to 9, X = 0 to 9) value where ZXXX corresponds to the carrier connected to the PF trunk.

3.4 TANDEM ACCESS FOR INTER-LATA SENT-PAID COIN CALLS

3.4.1 Overview

3.4.1.1 Definition

The Tandem Access for Inter-LATA Sent-Paid Coin Calls (TAISP) feature introduces a new signaling protocol to route sent-paid coin calls through an access tandem (AT). (A sent-paid coin call is a call made from a public coin telephone that is not reversed charge accepted or charged to a third party.) This new protocol, modified equal access (MEA) signaling, can be specified on dedicated trunks used for sent-paid coin traffic between the following:

- End office and a carrier
- End office and an AT
- AT and a carrier.

This feature does not eliminate or replace any existing forms of signaling arrangements. The EA signaling without the enhancement of this feature and operator services (OS), traditional, and TSPS signaling continue to be supported and are not affected by this feature.

3.4.1.2 Background

Prior to Carrier Interconnection, most coin calls were routed directly to an operator system. With divestiture, callers from coin lines should have been able to place calls through any carrier. At that time, arrangements for handling such calls were in place for a single carrier, including direct dedicated operator trunks to most offices and the equipment in its toll network, to process the calls. The state of technology at that time required direct trunks, putting a large cost burden on a carrier setting up a network. Because of this, a waiver was granted to the operating companies to divert all coin traffic to the single carrier. In 1989, the waiver expired for 0+ coin traffic and the owners of coin lines could presubscribe to any interexchange carrier (IEC). Sent-paid traffic continued to be routed to the original single carrier. This was accomplished in the end office translations by pointing sent-paid routes for all carriers to the trunk groups owned by the original single carrier. The billing record showed a different carrier, but also indicated that it was a sent-paid call, so that the regional Revenue Accounting Office could issue a bill to the proper carrier.

With the advent of requirements for Exchange Access for Operator Services Signaling (EAOSS) and its deployment in some parts of the local networks (using non-Lucent Technologies switches), the court ordered that the Local Exchange Carriers (LECs) stop diverting calls to the original single carrier. The EAOSS feature provides, among other things, for tandemming of sent-paid traffic; thus, avoiding the costly direct trunks. The TAISP feature is a subset of EAOSS providing tandemming of sent-paid coin traffic. This tandemming is accomplished using MEA signaling, including provisions for domestic and international calls.

3.4.1.3 Availability

This feature is available with 5E7 and later software releases. The feature is also available for the 5E6 software release via software update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

3.4.1.4 Feature Provision Basis

This feature is provided on a per-switch basis.

3.4.2 User Perspective

3.4.2.1 User Profile

The end-user for this feature is the user of a public coin telephone having a coin class of service. From the switch perspective, this feature is transparent to such end-users, in that inter-LATA coin calls made prior to this feature (to the original single carrier) are handled the same way to other ICs. End-users may perceive differences based on the different interexchange carrier/international carrier (IC/INC) handling of the call (for example, different coin deposit prompts), but such differences are the domain of the IC/INC Operator Services System (OSS) involved.

3.4.2.2 Customer Premises Equipment

There are no new requirements on customer premises equipment (CPE) due to this feature. The CPE used is a normal Dial Tone First or Coin First coin telephone having a coin class of service.

3.4.2.3 User Operation

Calls affected by this feature are inter-LATA calls from coin lines, generally dialed as follows:

- 0/1 + a NANP DN without the NPA or 0/1 + a full NANP DN [domestic calls using the IC/INC for the line's primary inter-LATA carrier (PIC)].
- 01/011 + 7-12 digits (international call using the IC/INC for the line's PIC).
- 10XXX + 0/1 + a NANP DN without the NPA or 10XXX + 0/1 + a full NANP DN (domestic call specifying the IC/INC with 10XXX dialing).
- 10XXX + 01/011 + 7-12 digits (international call specifying the IC/INC with 10XXX dialing).
- 00- (using the IC/INC for the line's PIC).
- 10XXX + 0- (specifying the IC/INC with 10XXX dialing).

NOTE: Service access code (for example, toll-free) calls from coin phones are not treated as sent-paid coin calls, and are unaffected by this feature.

The end-user may flash the switch-hook to recall the operator if such service is provided by the IC/INC.

3.4.2.4 Operational Limitations

Industry and local signaling system general requirements (LSSGR) standards for development of this feature with CCS7 Network Interconnect are currently unavailable.

The MEA signaling supports only equal access multifrequency (EA/MF) signaling as shown in Table 3-7 .

NOTE: For software release 5E6, the international steering digits are provisioned with 4NX and the domestic steering digits are provisioned with 4ZZ. For 5E7 and later software releases, the international steering digits are provisioned with 1NX and the domestic steering digits are provisioned with 0ZZ. In the earlier releases, steering digits provisioned with a leading digit of "4" are outpulsed as shown in the table.

Table 3-7 Multifrequency Signaling Supported by TAISP

END OFFICE			
TYPE	FIRST STAGE ^b	SECOND STAGE ^b	THIRD STAGE ^b
Direct Domestic	KP-1NX-XXX-CCC-ST	KP-II-ANI-ST	KP-(0)-ADDR-ST
Direct International		KP-II-ANI-ST	KP-CC-NN-ST
Tandem Domestic	KP-0ZZ-XXX-ST	KP-II-ANI-ST	KP-(0)-ADDR-ST
Tandem International	KP-1NX-XXX-CCC-ST	KP-II-ANI-ST	KP-CC-NN-ST
ACCESS TANDEM			
TYPE	INCOMING ^b	OUTGOING ^b	
Tandem Domestic	KP-0ZZ-XXX-ST		
Tandem International	KP-1NX-XXX-CCC-ST	KP-1NX-XXX-CCC-ST	
Notes:			
a. ^a			
LSSGR specification references two INC steering digit sequences: 1NX is used for non-operator calls, and 1N'X for operator calls. No distinction is made in this table, but both are supported.			
b. ^b			
Legend:			
ANI - Automatic Number Identification			
CCC - Country code, 3-digit format			
ADDR - Dialed address digits			
KP - Key pulse digit			
ST - Start digit			
0ZZ - Tandem steering digits (EA)			
XXX - Carrier ID			
II - Identifier digits			
NN - National number			
1NX - Steering digits (INC)			

Modified EA signaling, as implemented in the 5ESS[®] switch AT, does not interwork with any other type of signaling. For example, it is not possible to use modified EA signaling from an EAEO to a 5ESS[®] switch AT, and then signal from the AT to an IC/INC using another signaling type like TSPS or OS signaling, and vice versa.

For operator hold on a call using modified EA signaling, expanded inband signaling is the only supported form of coin signaling; nonexpanded inband signaling and multiwink signaling are not supported.

This feature does not provide the ability to make coin automatic message accounting (AMA) records for revenue allocation as described in the Improved Public Telephone Service (IPTs) feature.

The access tandem must reproduce the initial off-hook from the operator to the end office in less than 10 ms.

Off-hook (rather than acknowledgement wink) is expected from the IC/INC (or AT, if used) after outpulsing. An error condition exists if no off-hook is received or if a wink is received instead of an off-hook. This error causes the end office to send a coin return signal to the coin phone and tear down the call.

When the originator goes on-hook, a 4-minute timer is started at the end office. Any expanded inband signaling (EIS) signal by the operator causes this timer to restart. At the access tandem, a 3-minute, 52-second timer is maintained in the same manner for calling party disconnect. If the originator stays on-hook and the operator does not take repeated actions when the timer(s) expire, the call is released, and the operator trunk is placed in a maintenance "high and wet" state.

3.4.2.5 Interactions

This feature interacts with the Expanded Inband Signaling feature. All switch actions associated with the receipt of expanded inband signals must be performed when these signals are received in conjunction with modified EA signaling.

The TAISP feature does not support four-digit carrier identification codes (CICs). Changes to the TAISP feature to support four-digit CICs will be developed as part of the feature group D (FGD) CIC Expansion feature.

Because flash features (for example, Three-Way Calling, Six-Way Calling and Call Waiting) are not allowed on coin lines, an end-user flash is always treated as a signal to the operator system.

This feature does not apply to Intelligent Public Phones, because to the switch such phones are treated as normal POTS lines rather than coin lines.

3.4.3 Engineering

3.4.3.1 Special Planning Considerations

This feature has the potential of making changes in the switch trunk group usages as IC/INC, other than the original single carrier, begin to support inter-LATA sent-paid calls. Sent-paid calls supported by IC/INC, other than the original single carrier, must be directed over a shared operator trunk group to the AT, and then to the appropriate IC/INC. Trunk group traffic measurements must be examined to determine if adjustments in the trunk group size are needed.

Overflow from a direct MEA route to a tandem MEA route must be provided in the end office.

Coordination in the network is needed to insure that an EAEO does not begin to use this feature until the AT to which it directs calls has been equipped for that signaling. Similarly, an EAEO or an AT must not begin the use of modified EA signaling to an IC/INC until that carrier is prepared to accept the modified EA signaling.

The EAEO may set up the routing translations for a particular IC/INC to divert some traffic to another IC/INC by specifying an appropriate route. For such diverted calls, it remains the responsibility of the local exchange carrier (LEC) to modify the appropriate AMA records to reflect the actual IC/INC used.

3.4.3.2 System Resources - Hardware

This feature does not introduce new hardware; however, additional trunk groups to handle the TAISP traffic are required.

3.4.4 Assignment Guidelines

3.4.4.1 Forms and Views

3.4.4.1.1 Translation Guide Forms

The 5303 (Route Index) office data administration (ODA) form is used to implement this feature.

3.4.4.1.2 Recent Change Views

The recent change (RC) views used to implement this feature are as follows:

- RC View 10.2, Route Index (Routing)
- RC View 10.3, Inter-LATA Carrier
- RC View 10.25, Alternate Route Indices (Routing).

3.4.4.2 Assigning to Customer

Routes are designated with MEA using either an explicit signaling protocol [MEA or international carrier modified (INCM) in 5E7 and later software releases], or the existing equal access signaling protocols (EA or INC) where the leading prefix digit is 4.

Table 3-8 summarizes the changes required in ODA and RC to implement the TAISP feature.

Table 3-8 TAISP ODA AND RC REQUIRED CHANGES

SOFTWARE RELEASES PRIOR TO 5E7			SOFTWARE RELEASES 5E7 AND LATER		
PREFIX DIGITS	SIGNALING PROTOCOL	CI ROUTE TYPE	PREFIX DIGITS	SIGNALING PROTOCOL	CI ROUTE TYPE
4ZZ	EA	DTG		MEA	DTG
4ZZ	EA	STG	0ZZ	MEA	STG
4NX	INC	DTG	1NX	INCM	DTG
4NX	INC	STG	1NX	INCM	STG

To assign the TAISP feature for software releases prior to 5E7, include the following changes on ODA Form 5303, and RC Views 10.2, 10.3, and 10.25:

- (1) OVLAP IND field, set to **Y** (enables overlap outpulsing) or **N** (disables overlap outpulsing) as negotiated with the carrier.
- (2) PREF DIG field, enter:
 - (a) **4ZZ** for a domestic route or
 - (b) **4NX** for an international route.

NOTE: Valid values for Z and X are 0 through 9. Valid values for N are 2 through 9. The leading prefix digit is a 4, which identifies calls on which MEA signaling is to be used.
- (3) SIG PRO field, enter:
 - (a) **EA** for a domestic route or
 - (b) **INC** for an international route.
- (4) RT DES TYP field enter:

- (a) **DTG** for direct trunk group or
- (b) **STG** for shared trunk group.

To enable overlap outpulsing for MEA traffic on a carrier, enter the following:

```
exc:envir:uproc,fn="/no5text/rcv/TAISP.OVLP",args="XXX"- "Y"
;
```

Where: XXX = carrier number and Y = yes.

To disable overlap outpulsing for MEA traffic on a carrier, enter the following:

```
exc:envir:uproc,fn="/no5text/rcv/TAISP.OVLP",args="XXX"- "N"
;
```

Where: XXX = carrier number and N = no.

To assign the TAISP feature for 5E7 and later software releases, include the following changes on ODA Form 5303, and RC Views 10.2 and 10.25:

- (1) OVLAP IND field, set to **Y** (enables overlap outpulsing) or **N** (disables overlap outpulsing) as negotiated with the carrier.
- (2) PREF DIG field, enter:
 - (a) **0ZZ** for a domestic route or
 - (b) **1NX** for an international route.

NOTE: Valid values for Z and X are 0 through 9. Valid values for N are 2 through 9.

- (3) SIG PRO field, enter:
 - (a) **MEA** for a domestic trunk or
 - (b) **INCM** for an international trunk.

NOTE: The new signaling protocol values (MEA or INCM) are used to identify calls on which MEA signaling is to be used.

- (4) RT DES TYP field enter:
 - (a) **DTG** for direct trunk group or
 - (b) **STG** for shared trunk group.

To allow the overlap option for 5E7 and later software releases, on RC View 10.3 set the SENT PAID OVLAP field to **Y**.

3.4.4.3 Assignment Limitations

For modified EA signaling, inter-LATA operator traffic from lines having a coin class of service must be assigned to a separate dedicated coin trunk group from the EAEO to AT.

Route indexes associated with the modified EA signaling protocol introduced by this feature must **not** have a CCS7 ISUP trunk group assigned to them.

Trunk group numbers for routes using modified EA signaling must have a class of service of TSPS.

This feature is not required for intermediate switch point (ISP) tandems in the local network. The ISP switches, can tandem operator traffic to an IC/INC using traditional TSPS or OS signaling. However, each IC/INC so served requires a separate dedicated trunk from the end office to the ISP tandem.

3.4.5 System Operation

With modified EA signaling, following signaling of a call from an EAEO to an IC/INC, an off-hook rather than an acknowledgement wink is expected to be received from the IC/INC. The off-hook initiates operator hold for the call.

Direct Trunking Connection with Modified EA Signaling

On direct trunking connections between an EAEO and an IC/INC OSS, the EAEO must be prepared to accept and process the winks associated with expanded signaling from the IC/INC. The EAEO passes calling party switch-hook flashes to the IC/INC.

When the originating user goes on-hook, the EAEO begins timing for a signal from the IC/INC OSS. If any valid signal is received from the IC during the operator hold disconnect time-out interval, the time-out period is reinitiated. The EAEO releases the connection only when a disconnect signal (an on-hook of greater than 450 milliseconds) is received from the IC/INC or the originating station has remained on-hook longer than the operator hold time-out interval. If a disconnect signal is received, the timer is canceled and all connections are released. If no signal is received, the trunk from the EAEO receives standard "high and wet" treatment.

Tandem Access Connection with Modified EA Signaling

On AT connections between an EAEO and an IC/INC OSS, the AT recognizes calls requiring operator handling via special **0ZZ/XXX** or **1NZ/XXX** codes sent by the EAEO in the first stage of outpulsing. An off-hook, rather than an acknowledgement wink, is returned by the IC to the AT after the called number outpulsing sequence. When the off-hook is received, the AT places the call in the hold condition and passes the off-hook to the EAEO.

While in the operator hold condition initiated by the IC/INC, an AT must pass the winks associated with operator services from the IC to the EAEO so that they conform to the requirements for those signals.

During an IC/INC initiated operator hold condition, the AT must also pass supervision changes from the EAEO to the IC/INC without releasing the connection.

When an on-hook is received from the end-user, the AT and the EAEO both start timers to avoid holding up the connection for an extended period. If a disconnect signal is received from the IC/INC during the time-out interval, the AT passes it to the EAEO and both switches cancel their timers, all connections are released. If a time-out is detected at the AT, a disconnect signal is sent to the EAEO, and the trunk from the AT receives standard "high and wet" treatment. If any valid EIS wink (not a full signal) is received from the IC/INC during the operator hold disconnect time-out interval, the time-out period in the AT is reinitiated and the wink is relayed to the end office. If any valid EIS wink and MF tone signal is received by the end office during the operator hold disconnect time-out interval, the time-out period in the EAEO is reinitiated.

The routing and trunking configuration for the TAISP feature is shown in Figure 3-13 .

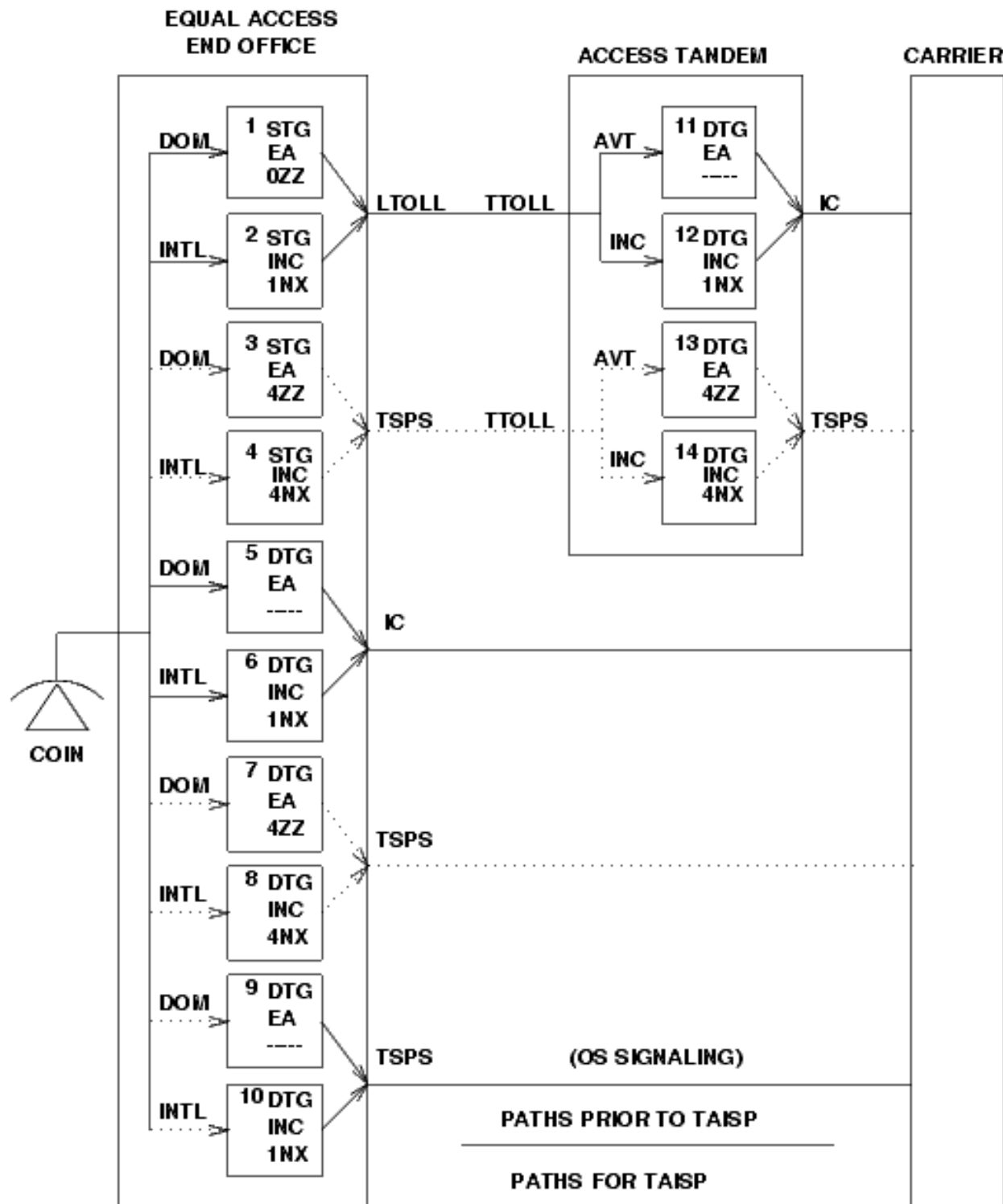


Figure 3-13 TAISP Routing and Trunking

Figures 3-14 , 3-15 , 3-16 , and 3-17 show modified equal access inter-LATA signaling for domestic and international calls. The steering digits are as follows:

- **1NX** (for international calls)
- **0ZZ** (for domestic calls).

NOTE: Valid values for N are 2 through 9. Valid values for X and Z are 0 through 9.

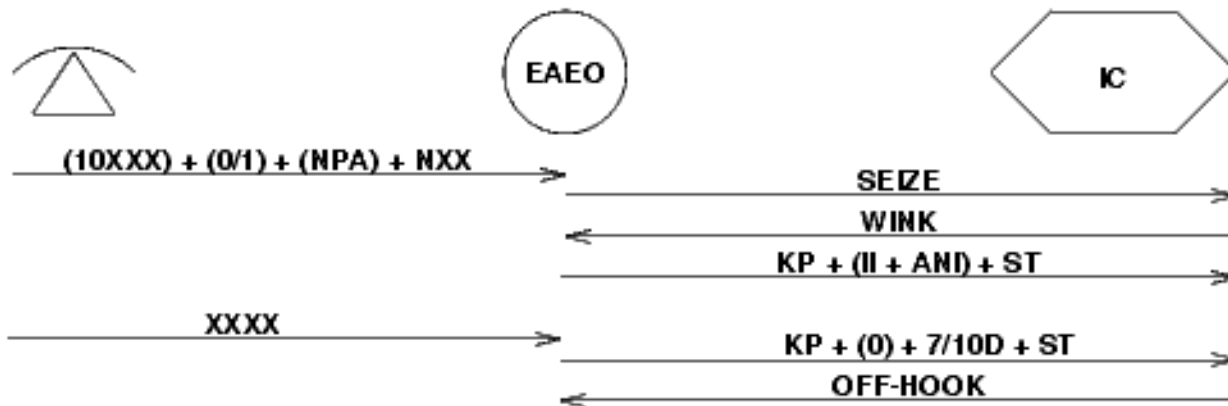
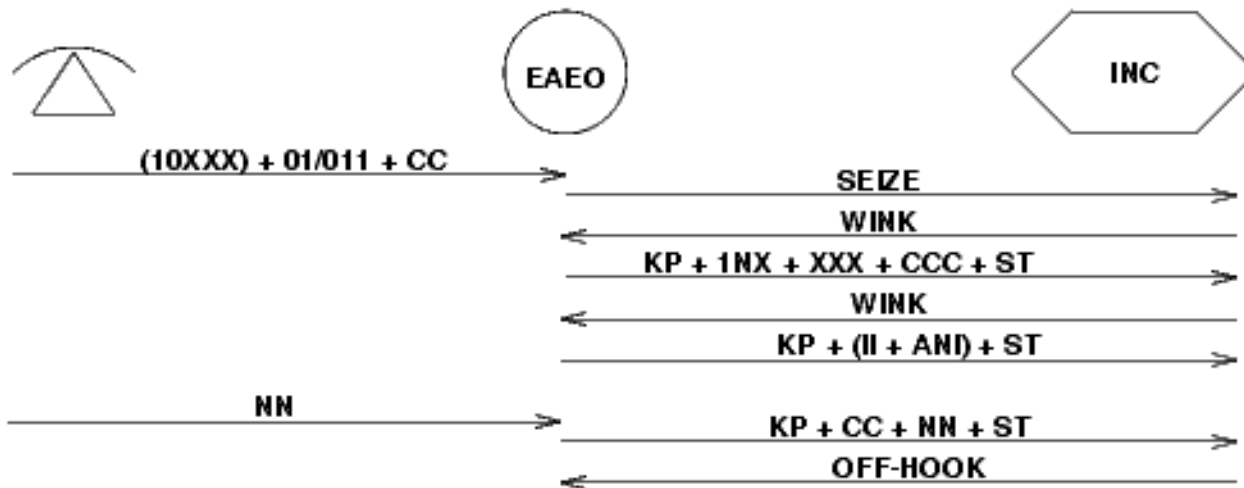


Figure 3-14 Modified EA Inter-LATA Signaling for Direct Connect Domestic Calls



NOTE: NO DISTINCTION IS MADE BETWEEN OPERATOR AND NON-OPERATOR CALL SIGNALING FOR THE STEERING DIGITS. ONLY ONE 1NX CODE IS SHOWN.

Figure 3-15 Modified EA Inter-LATA Signaling for Direct Connect International Calls

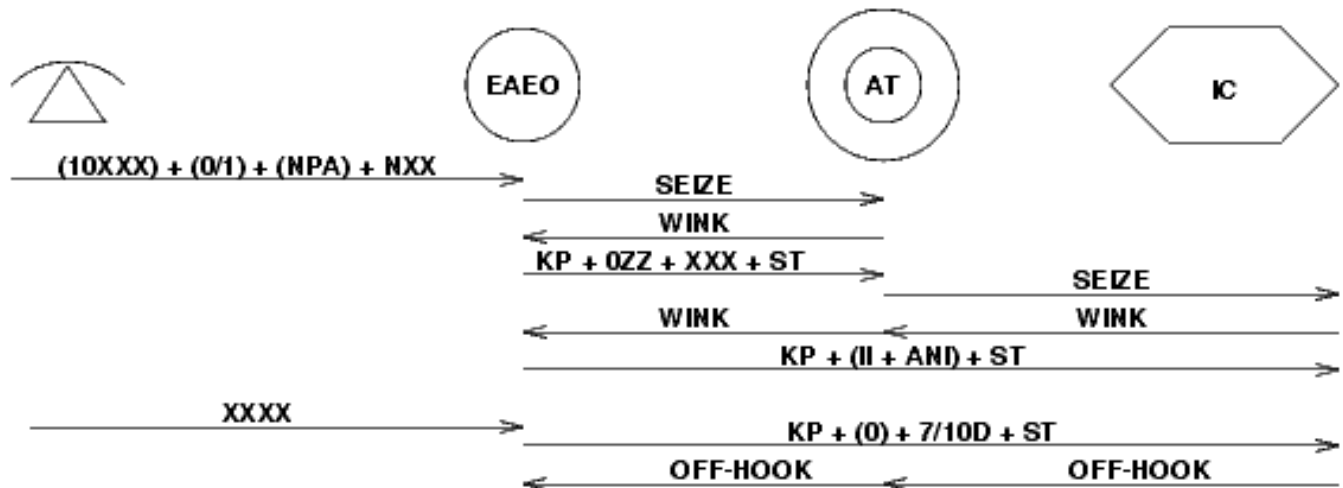
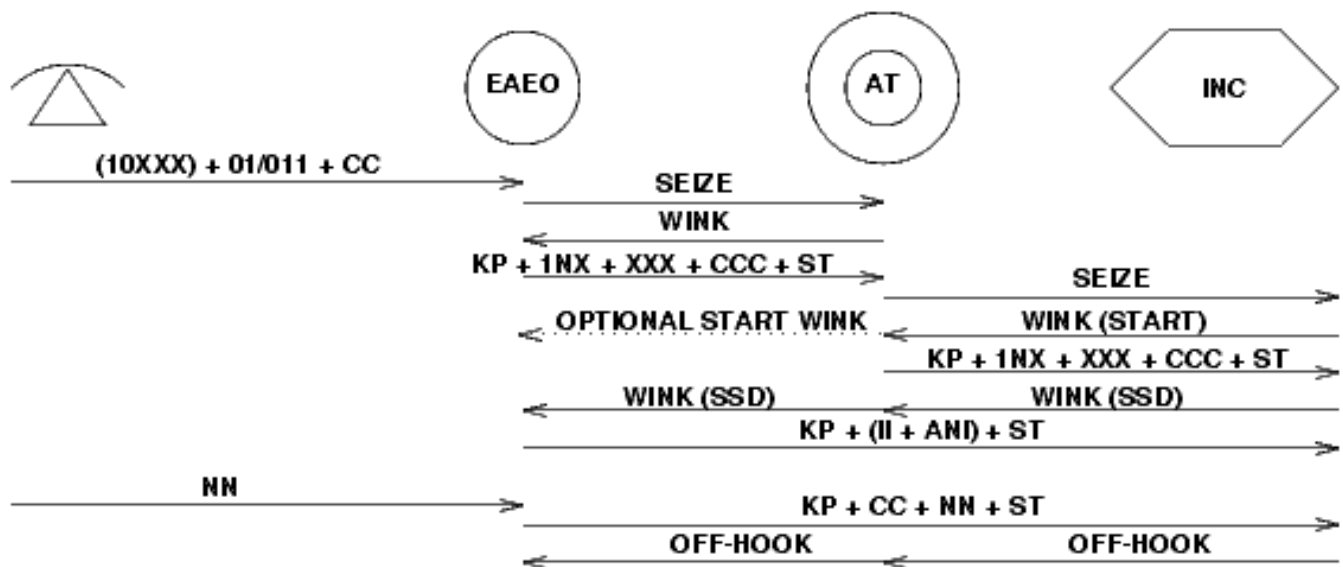


Figure 3-16 Modified EA Inter-LATA Signaling for Tandem Connect Domestic Calls



NOTE: THE 1NX CODE RELAYED TO THE CARRIER NEED NOT MATCH THAT SENT FROM THE EAEO. NO DISTINCTION IS MADE FOR THE TWO 1NX CODES NORMALLY USED FOR NON-OPERATOR AND OPERATOR TRAFFIC.

Figure 3-17 Modified EA Inter-LATA Signaling for Tandem Connect International Calls

3.4.6 Administration

3.4.6.1 Measurements

This feature does not introduce any new measurements or reports.

Overflow/busy counts are pegged on a trunk group basis in the SM or the CMP during the execution of existing measurement programs. The counts pegged are as follows:

- Direct trunk group overflows (in the hourly AMA report)
- Shared trunk group overflows (in the 30-minute traffic report)

- Direct trunk group usage
- Shared trunk group usage.

3.4.6.2 Billing

Normal FGD Originating LATA AMA records are made at the EAEO. If an off-hook is received instead of acknowledge wink, it is recorded as such (that is, value 005) in the IC/INC Call Event Status field of the AMA record. Such calls are recorded as inter-LATA operator calls, and the disconnect entry is made at the time of operator release or at the point of time-out waiting for operator release.

This feature does not provide the ability to make coin AMA records for revenue allocation as described in the Improved Public Telephone Service (IPTS) feature.

3.5 FEATURE GROUP B (FGB) CARRIER IDENTIFICATION CODE (CIC) EXPANSION

3.5.1 Overview

3.5.1.1 Definition

The FGB CIC Expansion feature expanded the FGB dialing plan to accommodate 10,000 CICs by changing the dialing from 950-WXXX to 950-XXXX where W is 0 or 1 and X is 0 through 9. The linkage between FGB and FGD CICs has been eliminated. Previously existing FGB and FGD services continue to be provided, so that offices which serve only carriers with 3-digit codes and which keep their dialing plan see no operational change. Transition access capability to reach a FGD carrier via 950 dialing continues to be provided. Interfaces to Operation Support Systems (OSSs) have been upgraded to provide the 4-digit FGB CICs and an indication of FGB or FGD carrier from the 5ESS[®] switch to the OSS. The CICs have been identified as either FGB or FGD in traffic reports and to network management. The AMA Table 57 (IEC/INC Prefix) has been modified to record either a 3- or 4-digit CIC. When a 3-digit CIC is recorded, the most significant digit is padded equal to 0. A maximum of 200 carriers may be measured at any one time.

3.5.1.2 Transition Plan Definition

The Transition Plan is the ability of an office to evolve the signaling of calls dialed 950-WXXX to equal access format. Transition Plan calls are dialed 950-WXXX, but are handled as FGD calls over FGD carrier XXX network facilities.

3.5.1.3 Interim Plan Definition

The Interim Plan is the ability of an office to signal (and/or receive) the FGB signaling format.

3.5.1.4 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 99-5E-0823
- NSEP Number: Not available at date of publication.

3.5.1.5 Background

The Carrier Interconnect feature, developed in early 5ESS[®] software releases, implemented both Feature Group B (FGB) and Feature Group D (FGD) in the 5ESS[®] switch. These features provided equal access dialing to all

inter-exchange carriers, as required by the Modification of Final Judgement (MFJ) agreement and subsequent federal statutes.

The FGB was originally intended as a temporary mechanism for deployment of equal access in the public network. Subscribers would dial 950-WXXX [where W is 0 or 1, X is 0 through 9 and XXX is the carrier identification code (CIC)] to reach an inter-exchange carrier (IC) until the IC could conform to FGD (10XXX or presubscription) and the subscribers could be educated to use the FGD access. However, FGB remains popular, largely due to its attractive rate structure.

In addition to unregulated long distance carriers, the FGB is being used by various Enhanced Service Providers (ESPs). In accordance with an FCC order, Bellcore must allocate CICs in a non-discriminatory manner; thus, ESPs as well as ICs must be granted a CIC on request. This caused a recent increase in the number of FGB carriers threatening exhaust of the range of available CIC numbers.

Bellcore requested FBG CIC expansion in the following two phases:

- (1) Phase I - Pre-Compliant FGB CIC Expansion Special Feature which implemented a reduced set of requirements and permitted basic assignment, dialing, routing, and signaling for 4-digit CICs.
- (2) Phase II - Split administration of FGB from FGD and expand FGB CICs from 3- to 4-digits. The dialable range of FGB carriers changes from 950-WXXX to 950-XXXX, where W is 0 or 1 and X is 0 through 9. The FGB and FGD CICs remain discrete and are identified by type to measurements and Operational Support Systems (OSSs).

3.5.1.6 Availability

This feature is available with the 5E8 and subsequent software releases of the 5ESS[®] switch.

3.5.1.7 Feature Application

This feature is provided per 5ESS[®] switch acting as an end-office or tandem office.

3.5.2 User Perspective

This feature was primarily designed for telephone subscribers wishing to gain access to unregulated long distance carriers or Enhanced Service Provider facilities.

3.5.3 User Operation

3.5.3.1 Activation

The telephone subscriber activates this feature by dialing 950-XXXX, where X is 0 through 9 and XXXX is the carrier identification code (CIC).

3.5.3.2 Deactivation

Not applicable.

3.5.3.3 Restriction Capability

Not applicable.

3.5.4 Compatibilities

This feature is compatible with all other features assignable to the 5ESS[®] switch.

3.5.5 Interactions

Interim plan 4-digit FGB calls are not blocked by the Selective Carrier Denial feature.

3.5.6 Engineering

3.5.6.1 Special Planning Considerations

There are no special planning considerations associated with this feature.

3.5.6.2 Hardware

There is no hardware unique to this feature.

3.5.7 Assignment Dependencies and Limitations

3.5.7.1 Dependencies

This feature is not dependent on any other features or services being operational in the switch or assigned to the customer.

3.5.7.2 Limitations

The number of carriers that can have measurements enabled at any one time is a combined limit of 200 for FGB and FGD. Selection is done by the operating telephone company via RC View 10.3. There is no limit on how many carriers of each type can receive measurements as long as the combined total is less than or equal to 200.

3.5.8 Feature Implementation Procedures

3.5.8.1 Office Data Administration (ODA) Implementation

The FGB carriers are administered separately from the FGD carriers in the 5ESS[®] switch. This is a departure from 5E7 and earlier software releases in which there were simply carriers which provided FGB access, FGD access, or both. The major reason for this split administration is the change in the number of CIC values available for FGB in the 5E8 software release. The FGB carriers may be provisioned in the range 0 through 9999, while the FGD carriers are still restricted to the range 0 through 999. Both FGB and FGD carriers are provisioned via RC View 10.3. The FGB carrier is distinguished from the FGD carrier by the addition of the key field 2. FEAT GRP set to B. Each FGB carrier must be explicitly provisioned as an interim plan carrier or as a transition plan carrier by specification of field 3. ACCESS TYPE as ITRM or TRAN on View 10.3.

The Feature Group B (FGB) Carrier Identification Code (CIC) Expansion feature (99-5E-0823) changes the translations for inter-LATA carriers introduced by the 5E8 Software Release retrofit. It is necessary to maintain FGB CIC service and prevent potential service disruptions during retrofit.

FGB CIC access has been expanded to provide a uniform 950-XXXX access code to reach entities that have trunk-side interconnection to LEC switches. The feature provides for the expansion of the CIC from three digits to four digits. This feature modifies the format of the access code (formerly 950-WXXX, where W = 0 or 1) to 950-XXXX. The CICs are currently assigned by Bellcore as a three-digit number for FGB or FGD access in the 5E6/5E7 Software Releases. The XXX digits identify the inter-LATA carrier.

FGB and FGD signaling are required for the use of these codes. The CICs are used in both dialing plans and within signaling sequences to indicate the desired IC for a call. Currently, CICs are three digits long which provides 1,000

codes for carrier identification within the range of 000 to 999.

In 5E6 or 5E7 Software Releases, a single CIC is mapped into one, two, or three CICs. This mapping is dependent on the following:

- The carrier type
- Access type
- Signaling protocol.

Each carrier has the option to have measurements collected for it up to the limit of 200 CICs. These carriers can be any mixture of FGB and FGD CICs.

In the 5E8 Software Release, FGB CICs have been expanded to four digits with this feature. All seven digits of the FGB CIC are analyzed by the switch for FGB calls. Administration of the CICs has been separated between FGB and FGD carriers. This makes it necessary to identify each carrier on the switch as either FGB or FGD. Expansion of the 3-digit codes to 4-digits codes for Feature Group B CIC allows 10,000 carriers to be identified within the range of 0000 to 9999.

ODA creates 2 FGB CICs (0XXX and 1XXX) during data base evolution processing for every 5E6/5E7 Software Release CIC. This is done for each CIC with the following:

- A carrier type of IC or CONSOL
- An access type of BOTH
- A carrier type of IC
- An access type of 950.

NOTE 1: This feature does not change the digits to be interpreted in the LDIT or INDIT for ``950" type entries.

NOTE 2: If the service provider was using 950-NXXX, where N is 2 through 9, for any other purpose such as office code, the usage of ``950" for other purposes must change.

If the 950-WXXX dialing plan is not supported, service provider must delete the FGB CIC on the ODA Inter-LATA Carrier Feature (ICF) form (5305-1/2). After retrofit, the service provider must delete the FGB CIC in Recent Change view 10.3. The Intermediate Switching Point (ISP) and OSPS Toll and Assistance offices must also delete the corresponding FGB CIC in the ODA DIOPR form (5418) or via Recent Change view 26.25. OSPS Toll and Assist (T&A) offices must delete the corresponding FGB CIC in the ODA RSMCAR form (5421) or via Recent Change view 26.22.

OSPS has a separate capability which is necessary to support FGB CIC expansion for OSPS and ISP applications. Before using 4-digit FGB CIC codes, it is necessary for each subtending switch in the network to be upgraded.

The Selective Carrier Denial special feature no longer blocks FGB calls. If it is used in the office, it will continue to work as it did prior to retrofit.

Specific action must be taken by the service provider through ODD administration to convert from the FGB Pre-Compliant feature to the fully compliant FGB CIC feature activation.

For OSPS T&A switches supporting FGB carriers, ODA cross-check errors will occur on the ICF form. The evolution described above will generate carriers with non-uniqueness. The unnecessary FGB carrier(s) must be deleted from

the ODA ICF form, and the ODA DIOPR and RSMCAR forms should be updated for consistency. Alternately, the ICF forms may be updated to provide unique Carrier names.

CICs created by ODA during the retrofit to 5E8 will have measurement collection set to ``YES" by default. The 5E8 Software Release will support measurements for a maximum of 200 CICs. If more than 200 CICs are created by ODA, an ODA error will be reported. The service provider must choose no more than 200 CICs for measurements using the ODA ICF form.

Table 3-9 shows the 5E8 FGB and FGD CICs that will be created for each 5E6/5E7 CIC.

Table 3-9 5E8 FGB and FGD CIC Created for Each 5E6/5E7 CIC

5E6/5E7			5E8	
CARRIER TYPE	ACCESS TYPE	RTI SIGPRO of TRANS RTI	CIC & ACCESS TYPE	
			FGB	FGD
LEC, IC, INC, CONSOL	LTRM			XXX LTRM
PSEUDO	BOTH			XXX LTRM
IC	950	NOT EA	0XXX ITRM 1XXX ITRM	
IC	950	EA	0XXX TRAN 1XXX TRAN	XXX ``950"
IC CONSOL	BOTH	NOT EA	0XXX ITRM 1XXX ITRM	XXX LTRM
IC CONSOL	BOTH	EA or RTI=0	0XXX TRAN 1XXX TRAN	XXX BOTH

The 5E8 FGB CIC Expansion feature is fully compliant with Bellcore TR-TSY-000698, Feature Group B, and the Industry Carriers Compatibility Forum (ICCF) CIC Administrative Guidelines. For more information, see 235-080-100, *5ESS® Switch Translation Guide (TG-5)*, and 235-040-100, *5ESS® Switch OA&M Planning Guide*, or contact your next level of technical support.

3.5.8.2 Recent Change Procedures

3.5.8.2.1 FGB Interim Plan Carrier Provisioning

If the FGB carrier uses the interim plan for signaling, the ACCESS TYPE field is entered as ITRM. Routing of the FGB calls to the carrier is done via the FGB CDI and FGB RTI specified in fields 10 and 11 respectively on View 10.3. Screen 2 of this view pertains only to FGD carriers and is not used at all for provisioning the FGB carriers.

On RC View 10.3, set field 1. CARRIER ID to XXXX, field 2. FEAT GRP to B, field 3. ACCESS TYPE to ITRM, and field 10. FGB CDI and field 11. FGB RTI to appropriate values for this carrier.

3.5.8.2.2 FGB and FGD Carrier Provisioning for Transition Plan Calls

To make transition plan calls, it is necessary to provision both a FGB carrier and a FGD carrier with corresponding CIC values. Transition plan FGB carriers are restricted to the CIC values 0 through 1999, with corresponding FGD carrier CICs in the range 0 through 999.

3.5.8.2.2.1 Provisioning FGD Carrier to Handle Both Transition Plan and FGD Calls

First, it is necessary to provision the FGD carrier to handle the transition plan calls. On RC View 10.3, set field 1. CARRIER ID to 0XXX, field 2. FEAT GRP to D, and field 3. ACCESS TYPE to BOTH. Leave FEATURE GROUP B ONLY fields 10, 11, and 12 blank. On SCREEN 2, data appropriate for the FGD carrier may be filled in. SCREEN 2 of the data controls only the routing of calls dialed 10XXX or 1+a full NANP DN. It has no effect on routing of transition plan calls dialed 950-WXXX.

3.5.8.2.2.2 Provisioning The FGD Carrier To Handle Only Transition Plan

On RC View 10.3 set field 1. CARRIER ID to 0XXX, field 2. FEAT GRP to D, and field 3. ACCESS TYPE to 950. Leave FEATURE GROUP B ONLY fields 10, 11, and 12 blank. On SCREEN 2 set field 13. CARRIER TYPE to IC and field 16. OVERLAP to N. The remaining fields on SCREEN 2 are ignored for a carrier which is supporting only transition plan calls.

3.5.8.2.2.3 Provisioning The FGB Carrier For Transition Plan

In mapping the FGB CIC value to the FGD CIC value, the first digit (0 or 1) is ignored. This follows the dialing pattern permitted in the 5E7 and earlier software releases, where FGB calls were dialed 950-WXXX and the W could be either 0 or 1. The translation of the dialed digits ignored the W, leaving XXX as the CIC. This now results in ambiguity in CIC values 1XXX and 0XXX for transition plan calls, in that both imply the same FGD CIC of XXX. The FGB carrier 0XXX is provisioned to make transition plan calls indicating FGD carrier XXX as TRANS CARRIER in field 12 of RC View 10.3. It is also possible to provision FGB carrier 1XXX to map to FGD carrier XXX.

On RC View 10.3, set field 1. CARRIER ID to 0XXX, field 2. FEAT GRP to B, field 3. ACCESS TYPE to TRAN, field 10. FGB CDI and field 11. FGB RTI to appropriate values, and field 12. TRANS CARRIER to XXX, the CIC for the corresponding FGD CIC.

3.5.8.2.3 Digit Routing Provisioning for FGB Calls

If field 6. DIG ROUTING is set to Y on RC View 10.3 for the FGB carrier, then the carrier-specific destination index and route index will be taken from RC View 9.7.

The CODE INDEX key (destination index) value must be the value which is entered on RC View 9.3 which translates the dialed digits 950-XXXX. This destination index is also referred to as the regular destination index.

Field 4. FEAT GRP must be set to B to associate this RC View 9.7 with the FGB carrier. This is true for both interim plan and transition plan access.

On RC View 9.7 set field 1. CODE INDEX to the value taken from field 13. CODE INDEX on RC View 9.3 for this FGB carrier. Set field 3. CARRIER ID to XXXX for this FGB carrier, and set field 4. FEAT GRP to B. Field #4. CARRIER CDI and field #5. CARRIER RTI must be filled in with the carrier specific destination index and route index, which will override the regular values obtained from digit analysis.

3.5.8.3 Assignment Verification

Review all of the required RC Views to assure they have been completed properly. If no errors are found on the RC Views, follow local problem-escalation practices.

3.5.9 Feature Operation

The 5ESS[®] switch uses the information entered on RC View 10.3 to route calls dialed with a 4-digit CIC to the appropriate carrier for call processing.

3.5.10 Administration

3.5.10.1 Measurements

No new measurements are provided, as existing carrier interconnection measurements are used. However, measurement reports have been modified to support a 4-digit FGB CIC and a carrier type B or D indicator.

A maximum of 200 carriers (FGB plus FGD) may be selected to have measurements collected. Carriers to be measured must be selected for measurement on RC View 10.3 for the carrier by setting field 5. MEASUREMENT to

Y.

A list of carriers currently provisioned for measurements can be obtained by using the new input command **OP:MEASIC**.

3.5.10.2 Billing

3.5.10.2.1 Originating Call Charging

Billing records are generated in the originating end office for FGB calls using call code 134, structure codes 625, 626, 627, and 628. The charge index for these calls must be AMA call type FGBOL on RC View 10.11.

3.5.10.2.2 Terminating Call Charging

Billing records are generated in the terminating end office for FGB calls which terminate in an end office via IC trunks (that is direct trunks from the carrier). Billing records are call code 135, structure codes 653 and 654. The charge index for these calls must be AMA call type FGBTL on RC View 10.11.

The IC trunks which terminate FGB traffic in an end office should be marked Feature Group B on RC View 5.1 for the IC trunk group. The CIC of the FGB carrier is also entered on RC View 5.1.

3.6 INTERMEDIATE SWITCH POINT

3.6.1 Feature Description

This feature allows operator calls to be routed through a 5ESS[®] switch serving as an intermediate switching point (ISP) to an operator system not integrated with the switch. The feature would typically be used by a BOC access tandem switch to route inter-LATA operator calls to an operator system. On operator-assisted calls, the connection between the calling party and the operator must be under control of the operator system. Thorough supervision allows multiwink and inband control signals to bypass from the operator system to the local office. When the 5ESS[®] switch is equipped with the OSPS feature to serve all or a portion of the incoming operator traffic, the portion of the traffic to be served can be split off, based on trunk group identification, signaling, dialed digits, ANI identification, and/or ANI search, and sent to OSPS operators. The remaining traffic continues to be routed to the appropriate external operator system(s).

3.6.2 Availability

This feature is available with the 5E6 and subsequent software releases.

3.7 INTERMEDIATE SWITCHING POINT (ISP) FEATURE GROUP B (FGB) CARRIER IDENTIFICATION CODE (CIC) EXPANSION

3.7.1 Overview

3.7.1.1 Definition

The ISP Feature Group B CIC Expansion feature allows an access tandem with ISP capabilities to interface with FGB carriers when FGB CICs are 4 digits in length. It also provides split administration of FGB and FGD CICs. The ISP Pre-Compliant FGB CIC Expansion feature (98-5E-0386), which provided a temporary solution for handling FGB traffic with 4-digit CICs, and this feature can co-exist in the 5E8 software release.

The CICs are used within signaling sequences and in customer interfaces to indicate the desired carrier for a call. Callers dial 950-XXXX for FGB access, where XXXX is a 4-digit CIC and X is 0-9. Initially CICs were 3 digits in length, but Bellcore requested expansion to 4-digit CICs to accommodate the expected number of carriers.

This feature allows access tandem offices with ISP capabilities to route, via normal carrier data, operator system calls of the form 950-XXXX. Any billing records generated for these calls contain the 4-digit CIC.

The FGB CIC Expansion feature (99-5E-0823) is required to provide the basic capability to identify, route, and signal FGB carrier calls with 4-digit CICs. If the 5ESS[®] switch has OSPS capabilities, the OSPS Feature Group B CIC Expansion feature (98-5E-0379) is also required.

3.7.1.2 Transition Plan Definition

The Transition Plan is the ability of an office to evolve the signaling of calls dialed 950-WXXX to equal access format. Transition Plan calls are dialed 950-WXXX, but are handled as FGD calls over FGD carrier XXX network facilities.

3.7.1.3 Interim Plan Definition

The Interim Plan is the ability of an office to signal (and/or receive) the FGB signaling format.

3.7.1.4 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 98-5E-0428
- NSEP Number: OFGBCIC.

3.7.1.5 Background

The ISP Carrier Interconnect feature, developed in the 5E4(2) software release, implemented both ISP Feature Group B (FGB) and ISP Feature Group D (FGD) in the 5ESS[®] switch. These features provided equal access dialing to all interexchange carriers, as required by the Modification of Final Judgement (MFJ) agreement and subsequent federal statutes.

The FGB was originally intended as a temporary mechanism for deployment of equal access in the public network. Subscribers would dial 950-WXXX (where W is 0 or 1, X is 0 through 9 and XXX is the CIC) to reach an interexchange carrier (IC) until the IC could conform to FGD (10XXX or presubscription) and the subscribers could be educated to use the FGD access. However, FGB remains popular, largely due to its attractive rate structure.

In addition to unregulated long distance carriers, FGB is being used by various Enhanced Service Providers (ESPs). In accordance with an FCC order, Bellcore must allocate CICs in a non-discriminatory manner; thus, ESPs as well as ICs must be granted a CIC on request. This caused a recent increase in the number of FGB carriers threatening exhaust of available CIC numbers.

Bellcore requested FGB CIC expansion in the following two phases:

- (1) Phase I - Pre-Compliant FGB CIC Expansion Special Feature which implemented a reduced set of requirements and permitted basic assignment, dialing, routing, and signaling for 4-digit CICs.
- (2) Phase II - Split administration of FGB from FGD and expand FGB CICs from 3 to 4 digits. The dialable range of FGB carriers changes from 950-WXXX to 950-XXXX, where W is 0 or 1 and X is 0 through 9. The FGB and FGD CICs remain discrete and are identified by type to measurements and Operational Support Systems (OSSs), when not otherwise implicit.

3.7.1.6 Availability

This feature is available with the 5E8 and subsequent software releases of the 5ESS[®] switch.

3.7.1.7 Feature Application

This feature is provided per 5ESS[®] switch serving as an ISP.

3.7.2 User Perspective

This feature was primarily designed for use by telephone subscribers to gain access to inter-LATA carriers and operators.

3.7.3 User Operation

3.7.3.1 Activation

The ISP Feature Group B (FGB) CIC Expansion feature begins operation when the 5ESS[®] switch comes out of retrofit as opposed to being activated.

3.7.3.2 Deactivation

Not applicable.

3.7.3.3 Restriction Capability

The telephone company administration can control which carriers receive fully-compliant or precompliant treatment through the use of carrier data provisioning.

3.7.4 Compatibilities

This feature can coexist with all other features and/or hardware.

3.7.5 Interactions

There are no new interaction issues for this capability.

3.7.6 Engineering

3.7.6.1 Special Planning Considerations

There are no special planning considerations associated with this feature.

3.7.6.2 Hardware

There is no hardware unique to this feature.

3.7.7 Assignment Dependencies and Limitations

3.7.7.1 Dependencies

The Feature Group B Carrier Identification Code Expansion feature (99-5E-0823) must be provisioned in the 5ESS[®] switch prior to provisioning this feature. If there is a collocated OSPS, the OSPS Feature Group B CIC Expansion feature (98-5E-0379) is also required.

3.7.7.2 Limitations

There are no assignment limitations associated with this feature other than those imposed by FGB CIC Expansion feature 99-5E-0823.

3.7.8 Feature Implementation Procedures

3.7.8.1 Office Data Administration (ODA) Implementation

To support the expansion of the FGB CICs to 4 digits, ODA form 5418, DIOPR, has been modified. This record defines the type of carrier and traffic group that can access an operator system. Form 5418 has a new second key that specifies whether or not the carrier is FGB. The current key, CARRIER ID, has been expanded from 3 to 4 digits. During retrofit, office data will be modified as follows:

- (1) For all instances of form 5418, convert the value of CARRIER ID from XXX to 0XXX.
- (2) For each CARRIER ID on form 5418, perform the following applicable step:
 - If the CARRIER ID is equal to 288 and it appears on form 5417 under INTRA CARR ID, INTER CARR ID, or INTL CARR ID, set the new second key to N (not an FGB carrier).
 - If the CARRIER ID is not equal to 288 and it appears on form 5417 under INTRA CARR ID, INTER CARR ID, or INTL CARR ID, set the new second key to N (not an FGB carrier) keeping only the FGD data on the form. Also, insert a new form 5418, copying the FGB relevant data. Change the new second key to Y (FGB carrier.)
 - If the CARRIER ID does not appear on form 5417 under INTRA CARR ID, INTER CARR ID, or INTL CARR ID, set the second key to Y (FGB carrier.)

3.7.8.2 Recent Change Procedures

Recent Change View 26.25 provides the capability for specifying or verifying routing information associated with Toll and Assistance Operator Systems. For more information on RC/V views, see 235-118-2xx, *5ESS® Switch Recent Change Reference*.

The following information explains the new and changed fields on RC View 26.25.

(1) 1. CARRIER ID

Inter-LATA carrier identification code. When the carrier is an FGB carrier, this key field must exist in the inter-LATA carrier View 10.3. This field has been expanded to allow 4-digit FGB CICs. Enter LEC or a number from 0 to 9999 where the following apply:

- 0 to 999 = All carriers except local exchange carriers
- 0000 to 9999 = FGB carriers
- LEC = Local exchange carriers.

There is no default value for field 1. CARRIER ID.

(2) 2. B CARRIER

This new key field indicates whether this is an FGB carrier. Enter Y for yes or N for no. The default value is N. If B CARRIER equals N, the following restrictions apply:

- Field 8. NC950 ALT CDI must be unspecified.
- Field 9. C950 1+ALT CDI must be unspecified.
- Field 10. C950 0+ALT CDI must be unspecified.

If B CARRIER EQUALS Y, field 11. TELECONF ALT CDI must be unspecified.

NOTE: If CARRIER ID is 0288 or LEC, B CARRIER must equal N. If CARRIER ID is 1000 through 9999, B CARRIER must equal Y.

3.7.8.3 Assignment Verification

Test lines are available via the base 5ESS[®] switch feature. If problems arise, check craft asserts and ensure that RC View 26.25 has been properly completed.

If there are no craft asserts and RC View 26.25 is correct, follow local problem escalation practices.

3.7.9 Feature Operation

The 5ESS[®] switch configured as an ISP uses the information entered on RC View 26.25 to route calls dialed with a 4-digit CIC to the appropriate carrier for call processing.

3.7.10 Administration

3.7.10.1 Measurements

No new traffic or plant measurements are introduced by this feature.

3.7.10.2 Billing

If the call is handled by the ISP only and is not routed to a co-resident OSPS, the ISP generates the AMA records using structure codes 10625, 10627 and call type code 134 with the CIC recorded in Table 57.

3.8 FEATURE GROUP D (FGD) CARRIER IDENTIFICATION CODE (CIC) EXPANSION

3.8.1 Overview

3.8.1.1 Definition

Feature Group D (FGD) Carrier Identification Code (CIC) Expansion allows the 5ESS[®] switch end-office or access tandem to interface with FGD carriers when CIC codes are 4-digits in length.

The CICs are used within signaling sequences to indicate the desired carrier for a call. The CICs are also used in subscriber interfaces to override a presubscribed inter-LATA carrier and appear in input and output messages as well as reports to operations systems. Initially, CICs were three digits in length, but Bellcore requested expansion to four digits to accommodate an expected increase in FGD carriers.

To override a presubscribed inter-LATA carrier using a 3-digit CIC, the caller dials 10XXX, where XXX is a 3-digit CIC. To override a presubscribed inter-LATA carrier using a 4-digit CIC; the caller dials 101XXXX, where XXXX is a

4-digit CIC. A craftsperson can set a variable that allows the caller to use either the 3- or 4-digit format, or both.

This feature also allows "transitional" access dialing where selected FGB carriers can be accessed over FGD interswitch signaling facilities.

Interswitch signaling formats that use a CIC are modified to use a 4-digit CIC based on a per trunk group variable; this includes calls routed from an end-office to an inter-LATA carrier via an access tandem or calls that use international signaling.

3.8.1.2 Dialing Period Definitions

Once each switching office has been retrofitted with the 4-digit FGD CIC, the user dialing state is defined in terms of 1 of 3 values (pre-permissive, permissive, or post-permissive).

3.8.1.2.1 Pre-permissive Dialing Period

If the office is in the pre-permissive dialing period, a user may only dial a 5-digit carrier access code (CAC), 10+XXX. From the user's point of view, the pre-permissive dialing period has already begun, since a 5-digit CAC is the only length that is allowed prior to the 5E9(1) software release. From the service provider's point of view, the pre-permissive period starts when the office has been retrofitted to include the 4-digit CIC. This is because the pre-permissive period affords the service provider the ability to dial the new 101+XXXX CAC from test positions, and be routed to the proper carrier.

During this dialing period, a total of 970 FGD carrier identification codes are available for assignment.

3.8.1.2.2 Permissive Dialing Period

A user may dial the 10+XXX, 101+0XXX, 101+5XXX, or 101+6XXX access codes during the permissive dialing period. The permissive dialing period is introduced by setting a recent-changeable office parameter and should be started before the last 3-digit FGD CIC has been assigned.

During this dialing period, a total of 2,970 FGD carrier identification codes are available for assignment.

3.8.1.2.3 Post-permissive Dialing Period

A user may dial only the 101+XXXX carrier access code during the post-permissive dialing period. The post-permissive dialing period is introduced by setting a recent-changeable office parameter.

Industry consensus has not been reached on the length of the permissive dialing period, and the start of the post-permissive period is not known. The post-permissive dialing period should be started sometime before the 2,970 FGD carrier identification codes from the permissive dialing period have been assigned.

During this dialing period, a total of 10,000 FGD carrier identification codes are available for assignment.

3.8.1.3 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 99-5E-1319
- NSEP Number: Not available at date of publication.

3.8.1.4 Background

To avoid CIC exhaust, the Industry Carriers Compatibility Forum (ICCF) has led the industry to formulate a

two-phase plan for the expansion of these resources. Phase 1 eliminates the administrative linkage between Feature Group B (FGB) CICs and FGD CICs, and creates two separate pools of CICs. It also expands the FGB CICs from three to four digits. Phase 2 of the ICCF CIC expansion plan is FGD CIC expansion, in which the FGD CICs are expanded from three to four digits.

The current ICCF plan calls for deployment of the Phase 1 capabilities (FGB expansion) by 1H93; and Phase 2 (FGD expansion) by 2H95.

3.8.1.5 Availability

This feature is available in the 5E9(1) and subsequent software releases of the 5ESS[®] switch.

3.8.1.6 Feature Application

This feature is provided per 5ESS[®] switch.

3.8.2 User Perspective

This feature was primarily designed for telephone subscribers wishing to gain access to nonpresubscribed carriers which have been assigned 4-digit CICs.

3.8.3 User Operation

3.8.3.1 Activation

This feature is activated by the subscriber dialing a nonpresubscribed inter-LATA carrier CAC of either a 10XXX or 101XXXX depending on the particular inter-LATA carrier and whether the office is in the pre-permissive, permissive, or post-permissive dialing period. During the pre-permissive dialing period the subscriber dials 10XXX. During the permissive dialing period the subscriber dials either 10XXX or 101XXXX. After the permissive dialing period ends, only the 101XXXX carrier access code is permitted.

3.8.3.2 Deactivation

Not applicable.

3.8.3.3 Restriction Capability

Not applicable.

3.8.4 Compatibilities

This feature is compatible with all other features assignable to the 5ESS[®] switch.

3.8.5 Interactions

There are no adverse interactions between this feature and other features assignable to the 5ESS[®] switch.

3.8.6 Engineering

3.8.6.1 Special Planning Considerations

Not applicable.

3.8.6.2 Hardware

There is no unique hardware associated with this feature.

3.8.7 Assignment Dependencies and Limitations

3.8.7.1 Dependencies

There are no other features that must be operational in the 5ESS[®] switch before this feature can be implemented.

3.8.7.2 Limitations

The 5ESS[®] switch imposes no limits on the maximum number of assignable carriers. The maximum number of measurable carriers at any one time is a combined limit of 500 for FGB and FGD at an access tandem or an end office.

3.8.8 Feature Implementation Procedures

3.8.8.1 Office Data Administration (ODA) Implementation

Not applicable.

3.8.8.2 Recent Change Procedures

3.8.8.2.1 Scenario One - EAMF Trunk Group Conversion with Gradual Cutover

A new trunk group between the end office and the access tandem is engineered and provisioned to handle equal access traffic using EAMF signaling with 4-digit CICs. Trunks from the old EAMF trunk group are moved to the new trunk group, tested, and put in service as follows.

- The network elements involved are the end office and access tandem office, each with the CIC expansion feature.
- This scenario involves a trunk engineer, an SCC technician, and a trunk testing technician.
- The trunk engineer uses translation guide records.
- The SCC technician uses a remote recent change and verify terminal.
- The SCC technician or office technician uses the trunk and line work station to do trunk testing.
- Additional features are not needed.
- Service type can be plain old telephone service (POTS) or ISDN BRI lines.
- Other external OSs are not needed.

The trunk engineer specifies the additional switch translations by filling out the appropriate forms from the translation guide and then transmits these forms to the SCC.

The SCC technician enters the data from the forms into the EAEO and AT switches using recent change and verify as follows:

- Insert a new trunk group with 4-digit CIC signaling in the EAEO and AT (at this point, the new trunk group will have no members).

- For each old route in the EAEO that points to the old trunk group: insert a temporary new route that points to the old trunk group (using 3-digit CIC signaling) with an alternate route identical to the old route's alternate route.
- Update the old route(s) in the EAEO to point to the new trunk group (using 4-digit CIC signaling) and alternate route to the new route(s).
- For each member in the old trunk group in both the EAEO and the AT: remove the member from service, delete the member from the old trunk group, insert the member in the new trunk group, do a trunk test on the member, and put the member in service.
- When all members have been moved to the new trunk group, update the old route(s) to alternate route as it did originally.
- Delete the temporary new route(s).
- Delete the old trunk group in the EAEO and the AT.

As trunk members are moved to the new trunk group, carrier interconnect calls from lines in the EAEO are routed to the AT over the new trunk group and completed to the IC/INC.

3.8.8.2.2 Scenario Two - Pre-permissive to Permissive Dialing Conversion

The EAEO is retrofit to the software release with the FGD CIC expansion feature and is in the pre-permissive dialing period. The telephone company will test the new CAC from test lines, inform their subscribers of the new CAC format, and change the EAEO to the permissive period as follows:

- The network elements involved are the EAEO with the FGD CIC expansion feature and the SCC.
- This scenario involves an SCC technician.
- The SCC technician uses a remote recent change and verify terminal.
- Additional features are not needed.
- Service type can be POTS or ISDN BRI lines.
- Other external OSs are not needed.

The SCC technician verifies that the new CAC translations are valid by making test calls from a designated test line to several carriers. The SCC technician uses a recent change and verify terminal to change the switch's permissive state from "pre-permissive" to "permissive." Now the new CAC can be dialed from ordinary subscriber lines. The telephone company informs the subscribers served by the EAEO that the CAC has a new format (101+XXXX) that should now be used instead of the old format (10+XXX). Some subscribers now make calls with the new CAC format and others continue to make calls with the old CAC format.

3.8.8.2.3 Scenario Three - Permissive to Post-permissive Dialing Conversion

The EAEO is in the permissive period. The telephone company will inform their subscribers that the permissive dialing period is ending and change the EAEO to the post-permissive period as follows:

- The network elements involved are the EAEO with the FGD CIC expansion feature and the SCC.
- This scenario involves an SCC technician.
- The SCC technician uses a remote recent change and verify terminal.

- Additional features are not needed.
- Service type can be POTS or ISDN BRI lines.
- Other external OSs are not needed.

The telephone company has informed their subscribers that the permissive dialing period is ending on a specific date and that they will no longer be able to dial 10+XXX to reach carriers. On the advertised date, the SCC technician uses a recent change and verify terminal to change the switch's permissive state from "permissive" to "post-permissive." The new CAC (101+XXXX) can be dialed from ordinary subscriber lines, but the old CAC (10+XXX) is not valid. Calls dialed with the old CAC may get misrouted, route to an announcement, or time out waiting for additional digits. The treatment for these misdialed calls depends on the specific translations in the EAEO. Most subscribers dial calls with the new CAC format that are routed successfully. Other subscribers attempt to dial calls with the old CAC format that do not route as the subscriber intended.

3.8.8.3 Assignment Verification

The SCC technician verifies the FGD CIC expansion feature during the pre-permissive, permissive, and post-permissive by dialing calls with a 5-digit (10+XXX) and a 7-digit (101+XXXX) CAC from a designated test line and from lines with a normal subscriber class of service as follows:

- The network elements involved are the EAEO with the FGD CIC expansion feature, an access tandem, and the SCC.
- This scenario involves an SCC technician.
- The SCC technician uses a remote recent change and verify terminal and test lines.
- Additional features are not needed.
- Service type can be POTS or ISDN BRI lines.
- Other external OSs are not needed.

The EAEO is retrofit to the software release with FGD CIC expansion and is in the pre-permissive period. The SCC technician can test the office dialing plan by dialing inter-LATA test calls with a CAC. For example, access to the original single carrier is available (from the designated test lines) by dialing either 10+288+ or 101+0288+. Subscribers cannot yet reach the original single carrier by dialing 101+0288+ because the office is still in the pre-permissive period.

When the office is changed to the permissive period, the SCC technician can retest the office dialing plan by dialing inter-LATA test calls with a CAC. For example, access to the original single carrier is available (from the designated test lines) by dialing either 10+288+ or 101+0288+. Also, in the permissive period, access to the original single carrier is available from subscriber lines (and from the designated test lines) by dialing either 10+288+ or 101+0288+.

When the office is changed to the post-permissive period, the SCC technician can retest the office dialing plan by dialing inter-LATA test calls with a carrier access code. For example, in the post-permissive period, access to the original single carrier is available from subscriber lines (and from the designated test lines) by dialing 101+0288+, but not by dialing 10+288+. The office no longer accepts the old CAC (10+XXX) from subscriber lines or the designated test lines.

3.8.9 Feature Operation

This feature operates within the 5ESS[®] switch to allow a subscriber's Inter-LATA telephone call to be routed over a non-presubscribed carrier identified by the subscriber dialing 101XXXX, where XXXX is a 4-digit CIC.

3.8.10 Administration

3.8.10.1 Measurements

No new measurements are provided for this feature. Existing carrier interconnection measurements are used.

3.8.10.2 Billing

Not applicable.

3.9 INTRA-LATA PIC

3.9.1 Overview

3.9.1.1 Description

The *Intra-LATA Presubscribed Inter-LATA Carrier (PIC)* feature (number 99-5E-1291) allows the Inter-LATA Carriers (IC) to carry certain intra-LATA toll routes, on a presubscription basis, that were previously handled by the Local Exchange Carrier (LEC). These new routes are defined according to Numbering Plan Area (NPA) and/or office codes on a per digit interpreter table basis. Unless the caller specifies a carrier in the dialing sequence, the calls are carried by the user's Presubscribed intra-LATA Toll Carrier (PTC). Intra-LATA PIC allows a user to dial an intra-LATA toll Directory Number (DN) without specifying a carrier and have the call routed by a presubscribed toll carrier. Provisions have been made to allow 0+ or 0- calls be carried either by the LEC or the PTC.

The service provider's switch administrator designates the intra-LATA toll calls by populating the Office Dependent Data (ODD) with the appropriate information. Two new Carrier Interconnect (CI) call types have been added to the ODD data base.

Intra-LATA PIC is a secured feature (SFID=149) requiring that necessary arrangements be made between the service provider and Lucent Technologies. These arrangements include paying a Right-To-Use (RTU) fee before Lucent Technologies provides enabling information.

Intra-LATA PIC is a transparency feature that can operate on both the 5ESS[®] switch and the 1A ESS[™] switch.

3.9.1.2 Definitions

The following definitions should be helpful in understanding the Intra-LATA PIC feature:

- **Local Access and Transport Area (LATA)** - LATA is a defined non-overlapping geographical area where an Equal Access End Office (EAEO) and/or Access Tandem (AT) can provide a carrier access to the local exchange. A local switching entity and any associated remote switching units must receive regulatory approval to serve more than one LATA.
- **Carrier Access Code (CAC)** - The carrier access code is the 5-digit prefix 10XXX where XXX is the 3-digit Carrier Identification Code (CIC). (For example, if a carrier's CIC is 288, the CAC becomes 10288.) A new CIC expansion feature was introduced in the 5E9 software release that increased the CAC to a 7-digit prefix - 101XXXX. (So in the example above, the carrier's CAC becomes 1010288.)
- **Local Exchange Carrier (LEC)** - The LEC is the service provider owning the switch who provides the local loop and serves as the default carrier for intra-LATA calls.

- **Intra-LATA PIC/Intra-LATA Toll Calls** - Intra-LATA PIC or intra-LATA toll calls are any intra-LATA calls between two central offices in the same LATA where the call is not defined by the tariff as a local calling area call or as an Extended Area Service (EAS) call.
- **Intra-LATA Local Calls** - All intra-LATA calls not defined as Intra-LATA PIC/intra-LATA toll calls are intra-LATA local calls and by default are carried by the LEC.
- **Inter-LATA Carrier (IC)** - An inter-LATA carrier is a carrier that handles inter-LATA calls dialed between LATAs via the North American numbering plan. An IC handles intra-LATA local calls that are dialed with a 10XXX or 101XXXX prefix. Intra-LATA PIC allows ICs to handle intra-LATA toll calls.
- **Presubscribed Inter-LATA Carrier (PIC)** - A PIC is an inter-LATA carrier that has been presubscribed by the user. Inter-LATA calls not dialed with a 10XXX (or 101XXXX) prefix are handled by the PIC. A PIC can be associated with an individual line, an individualized dialing plan (IDP) group or with the entire 5ESS[®] switch.
- **Presubscribed Intra-LATA Toll Carrier (PTC)** - A PTC is an intra-LATA carrier presubscribed to a line for handling intra-LATA toll calls. Intra-LATA toll calls not dialed with a 10XXX (or 101XXXX) prefix are handled by the PTC. A PTC can be associated with an individual line, an individualized dialing plan (IDP) group or with the entire switch.
- **Intra-LATA** - Intra-LATA refers to both intra-LATA *local* and intra-LATA *toll* calls.
- **0+ call** - 0+ is an operator assisted call that requires additional digits be dialed (for instance, 0-630-555-1234).
- **0- call** - this means only a "0" is dialed to contact an operator; no other digits follow.

3.9.1.3 Background

Before implementation of the Intra-LATA PIC feature, inter-LATA carriers handled intra-LATA (toll and local) traffic only if a 10XXX carrier access code (CAC) prefix designating a carrier with intra-LATA regulatory approval was dialed. To more effectively compete with the LECs, the ICs expressed an interest in enhancements to the carrier interconnection so that intra-LATA toll calls did not require dialing of a 10XXX prefix to designate an inter-LATA approved carrier.

3.9.1.4 Availability

The Intra-LATA PIC feature is available as a software update for the 5E9(1) and 5E9(2) software releases and is targeted for deployment in the 5E10(1) software release.

3.9.1.5 Feature Environment

This feature is provided on a per individual line basis, a per (individualized dialing plan) group basis or on a per office (5ESS[®] switch) basis.

3.9.2 Feature Operation

In the following scenarios, the Local Exchange Carrier (LEC) or another carrier may be selected as the PTC.

- (1) *With a line PTC* - A line or a primary rate interface (PRI) trunk places an intra-LATA toll call without a CAC prefix. (See Figure 3-18.)
- (2) *With an IDP group PTC* - A line or trunk places an intra-LATA toll call without dialing a CAC prefix. (See Figure 3-18.)

- (3) *With an office PTC* - A line or trunk (PRI or private facility, only) places an intra-LATA toll call without dialing a CAC. (See Figure 3-18 .)
- (4) A line or trunk places an intra-LATA toll call without dialing a CAC and does not have a line PTC, an IDP group PTC nor an office PTC. The call will be handled by the LEC. (See Figure 3-18 .)
- (5) A line or trunk places an intra-LATA toll call and dials a 10XXX/101XXXX CAC. The call will be carried by the dialed carrier (XXX or XXXX) and not the PTC. The call may be handled by the LEC if it is a 0- or 0+ operator call depending on recent change options.

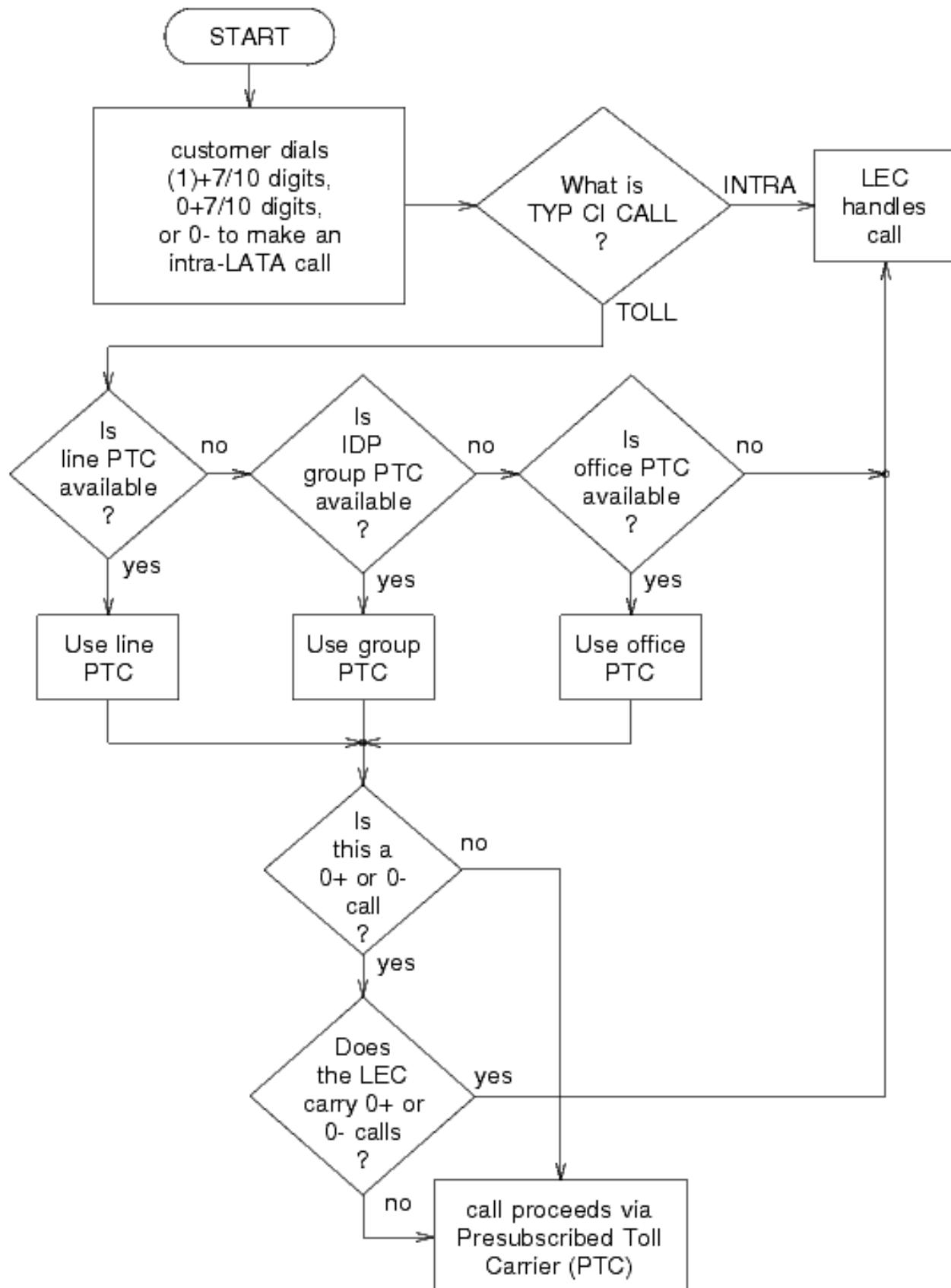


Figure 3-18 Intra-LATA PIC Direct, 0+, Or 0- Operator Call**3.9.3 User Operation****3.9.3.1 For Subscribers**

With the Intra-LATA PIC feature, the end-user is no longer required to dial either the 10XXX or 101XXXX prefix to identify the desired toll carrier. Instead, a PTC may be assigned to each line and it is only necessary to dial the area code and/or DN.

3.9.3.2 For Switch Personnel

Switch personnel will be able to perform the following operations:

- (1) Specify dial codes [(NPA)-office code], on a per digit interpreter table basis, that will be given Intra-LATA PIC treatment.
- (2) Assign or change the line PTC on an individual line basis. The PTC is also assignable to lines on a remote switching module (RSM) or an optically remote module (ORM). The multi-line hunt group (MLHG) is not restricted to one group PTC; however, each MLHG member may have its own PTC.
- (3) Assign or change a group PTC on an IDP group (or centrex) basis. The IDP group PTC will apply to lines, PRI trunks and private facility (PF) trunks (if the trunks belong to an IDP group).
- (4) Assign or change an office PTC on an office basis.
- (5) Specify whether Intra-LATA PIC 0+ operator assisted calls are to be handled by the PTC or LEC on a PTC basis.
- (6) Specify whether Intra-LATA PIC 0- operator assisted calls are to be handled by the PTC or LEC on a PTC basis.
- (7) Set the office 0- option for selective carrier denial (SCD) treatment given to Intra-LATA PIC 0- calls from a non-paying customer.
- (8) Identify all lines with any PTC or a specific PTC.
- (9) Use Global Recent Change to assign the PTC for a group of lines.
- (10) Assign or change the PTC on a PRI trunk.
- (11) Choose whether to apply *toll restriction* and *toll diversion* to Intra-LATA PIC calls on a per CoDe Index (CDI) basis. These existing features were not modified by the Intra-LATA PIC feature.

3.9.4 Engineering**3.9.4.1 Hardware Resources**

No hardware considerations are associated with this feature.

3.9.4.2 Software Resources

No software considerations are associated with this feature.

3.9.4.3 Transition Considerations

There are no transition considerations associated with this feature.

3.9.5 Interactions And Incompatibilities

3.9.5.1 Interactions

3.9.5.1.1 Intra-LATA Indicator

The intra-LATA indicator on RC/V view 10.3 will not apply for intra-LATA toll calls. It only applies to intra-LATA *local* calls. The INTRA LATA field indicates whether this carrier will handle intra-LATA calls when 10XXX or 101XXXX is dialed.

3.9.5.1.2 Call Blocking

Full 1+ blocking and 1+ split blocking will apply to Intra-LATA PIC calls handled by a presubscribed or dialed carrier other than the LEC but will not apply to Intra-LATA PIC calls carried by the LEC.

3.9.5.1.3 Selective Carrier Denial

Selective carrier denial (SCD) can selectively inhibit certain carrier handled calls from those lines designated as non-paying by the assigned carrier. SCD can also be used to deny access to multiple carriers.

0- Intra-LATA PIC calls routed to the LEC operator as a result of SCD screening will generate automatic number identification II (ANI II) digits that will inform the LEC operator of a non-paying caller.

3.9.5.1.4 Carrier Selection Information

The carrier selection information (CSI) parameter, part of the common channel signaling 7 (CCS7) ISDN user part (ISUP) message sent to a carrier, identifies if the inter-LATA caller has dialed a 10XXX/101XXXX prefix and if the dialed carrier matches the Presubscribed Inter-LATA Carrier (PIC). The CSI parameter also identifies if the user dialed carrier matches the PTC.

3.9.5.1.5 BRCS Automatic Call Distribution

The line PTC will apply to Intra-LATA PIC calls directly originated from BRCS Automatic Call Distribution lines.

3.9.5.1.6 Primary Rate Interface

The Intra-LATA PIC capability will apply to EDSL/PRI trunks. The PRI trunk can have a PTC assigned to it.

Two new fields, "PTC" and "DIR CON IC," have been added to the TRUNK GROUP view (5.1) to support the Intra-LATA PIC capability. Populating "Y" in the DIR CON IC field is only allowed when the Intra-LATA PIC feature is activated and means that the PRI trunk group is directly connected to an Inter-exchange Carrier's switch.

Setting the DIR CON IC field to "N" (default) indicates that the PRI trunk group is not directly connected to an Inter-exchange Carrier's switch.

For outgoing intra-LATA toll PRI calls, if the DIR CON IC field is set to "N", then for all outgoing intra-LATA toll PRI calls, the carrier ID obtained by the carrier selection procedure will be sent in the TNS/NSF IE of the PRI SETUP message.

If the DIR CON IC field is set to "N" and no carrier ID is determined by the carrier selection procedure, or if the DIR CON IC field is set to "Y," then the carrier ID information will not be sent in the TNS/NSF IE of the PRI SETUP message.

For incoming intra-LATA toll PRI calls, if a carrier ID is received in the TNS/NSF IE of the incoming SETUP message, then the existing procedures for carrier determination for inter-LATA calls are applied to the intra-LATA toll calls.

If the carrier ID is not received in the TNS/NSF IE of the incoming SETUP message, then carrier is assigned as follows:

- (1) The PTC carrier assigned to the incoming PRI trunk group is used for the call.
- (2) If the PRI trunk group PTC is not assigned, then the IDP group PTC is used.
- (3) If the IDP group PTC is not assigned, then the office PTC is used.
- (4) If the office PTC is not assigned, then LEC will be used as carrier for the call.

3.9.5.1.7 Local Area Signaling Services

3.9.5.1.7.1 Originating LASS Features

For an intra-LATA toll call, if the PTC or dialed carrier (10XXX/101XXXX) is the LEC, the call will be treated as intra-LATA local and be routed by the LEC. If the PTC or the dialed carrier is an IC, the call will be treated as inter-LATA and be routed by the IC.

If the Automatic Recall (AR) or Automatic Callback (AC) LASS feature works with intra-LATA *local* calls routed by the LEC then it will work with intra-LATA *toll* calls routed by the LEC.

If the AR or AC features are set up to work across LATAs then they will also work with intra-LATA toll calls carried by an IC. AR and AC features will handle inter-LATA calls (and intra-LATA toll calls carried by an IC) if properly installed and there is signaling system 7 (SS7) connectivity.

When an Automatic Callback (AC) or Automatic Recall (AR) attempt results in an intra-LATA toll call, the attempt *will not* be blocked by a value of "N" being in the INTER LATA AC AR field on RC/V 8.21 (LASS OFFICE PARAMETERS).

For intra-LATA local and toll calls, if 10XXX/101XXXX is dialed, Automatic Recall (AR) and Automatic Callback (AC) attempts will result in a call, regardless of the value of the INTER LATA AC/AR field, and regardless of whether the dialed carrier is the LEC or another carrier.

If a call is dialed with a Carrier Access Code (CAC), the Outgoing Line History Block (OLHB) will not be invalidated.

3.9.5.1.7.2 Screen List Editing Feature Interaction with Intra-LATA PIC

The ability to add an intra-LATA toll number to a screening list of a Screen List Editing (SLE) feature (such as Selective Call Rejection, Selective Call Forwarding, etc.) will not be affected by whether the INTER LATA SCREEN field on RC/V view 8.21 is set to Y or N. The ability to add an intra-LATA local or toll number to a screening list of an SLE feature will not be affected by whether calls made by the SLE feature subscriber are carried by the LEC or an IC.

3.9.5.1.7.3 Terminating LASS Features (Call to LASS User)

All LASS features will work properly with incoming Intra-LATA PIC calls if the calling number is delivered. However, if the LEC does not transmit the calling party number to the IC or the IC does not transmit the calling party number to the LEC, those LASS features depending on delivery of the number will not function properly.

Included are:

- Automatic callback
- Incoming call line identification
- Customer originated trace
- Bulk calling line identification
- Calling party number/billing number delivery

NOTE: The CPN SUBSC option on RC/V view 10.2 can be used to allow/disallow passing of the SS7 Calling Party Number parameter to an IC.

3.9.5.1.8 CIDIAL Line Attribute

The Carrier Interconnect DIALing privileges (CIDIAL) line attribute allows Carrier Interconnect dial around privilege (10XXX+ dialing) to a line. CIDIAL = "ALLOW" and "DENY" will apply to 10XXX+ intra-LATA toll calls. However, CIDIAL = "REQ" will not apply to intra-LATA toll calls.

"REQ" will be treated as if "ALLOW" had been specified. In other words, 10XXX dialing is allowed, but not required.

3.9.5.1.9 Automatic Route Selection

Intra-LATA PIC capability does not apply to calls routed using automatic route selection (ARS) routes. However, if a ARS call marked as an Intra-LATA PIC overflows to the public network and there is no route fail carrier, the call may be routed with the PTC.

3.9.5.2 Incompatibilities

911 code cannot be marked as Intra-LATA PIC. However, other types of N11 codes (411, 611, 811, etc.) can be marked as Intra-LATA PIC.

Intra-LATA PIC will not support the following optional capabilities:

- Customer changeable IDP group PTC through dial code
- Time of day (TOD) capability for changing IDP group PTC
- Advanced services platform/advanced intelligent network (ASP/AIN) inter-networking (except for autonomous case)
- 5ESS[®] switch operator services position system (OSPS) application support

3.9.6 Dependencies And Limitations

3.9.6.1 Dependencies

No other features need to be installed or activated in order for this feature to work.

3.9.6.2 Limitations

Currently, when an advanced services platform (ASP) call is made from a line, the PIC for inter-LATA calls is

transmitted from the switch to the service control point (SCP). The PTC will not be transmitted to the SCP. The SCP then returns routing number and carrier information indicating that an IC, LEC or autonomous (unknown) carrier will be used to complete the call. ASP will not be supported by Intra-LATA PIC except when the SCP returns an autonomous carrier. Intra-LATA PIC will not override carrier information returned by the SCP. In the above scenario, the call works the same as an intra-LATA call and the intra-LATA indicator applies.

3.9.6.3 Isolation Constraints

Not applicable.

3.9.7 Feature Implementation

3.9.7.1 Office Data Administration Provisioning

The ODA information in Table 3-10 is provided as a feature verification aid for the service provider.

Table 3-10 ODA Provisioning Information For Intra-LATA PIC

ODA FORM	ODA FORM	FIELD	ALLOWED VALUES	TG5 DIV	ASSOC RC/V VIEWS
LINE	5109-4	PTC	0000-9999	D3S1i	1.6
MLHLN	5111-1	PTC	0000-9999	D3S1k	N/A
DSL/BRCS ASSIGNMENT	5908-1	PTC	0000-9999	D5S1	23.2
OFCOPT	5509	TOLL CARRIER	0000-9999	D5S1i	8.1
OFCOPT	5509	ICLATA SCD IND	See "Note 1, "Section 3.9.7.1.1 .	D5S1i	8.1
TKGRP	5202	PTC	0000-9999	DS32a	5.1
TKGRP	5202	DIR CON IC	Y/N	DS32a	5.1
PDIT	53002	TYPE OF CI CALL	See "Note 2, "Section 3.9.7.1.2 .	D3S3b	9.2
LDIT	53003(5)	TYPE OF CI CALL	See "Note 3, "Section 3.9.7.1.3 .	D3S3c	9.3
LDIT	53003(5)	CI TYPE	See "Note 3, "Section 3.9.7.1.3 .	D3S3c	9.3
RDIT	53007(8)	TYPE OF CI CALL	See "Note 4, "Section 3.9.7.1.4 .	D3S3h	9.9
RDIT	53007(8)	CI TYPE	See "Note 7, "Section 3.9.7.1.7 .	D3S3h	9.9
IDPGP	56014	GROUP PTC	0000-9999	D4S22d	9.10
MLDIT	53003	TYPE OF CI CALL	See "Note 3, "Section 3.9.7.1.3 .	D3S3	9.15
ICF	5305-1/2	ICLATA OPT	See "Note 5, "Section 3.9.7.1.5 .	D4S22r	10.3
RAR	5301	NONE CONF	See "Note 6, "Section 3.9.7.1.6 .	D3Sf	10.10
RAR	5301	ZERO PLUS CONF	See "Note 6, "Section 3.9.7.1.6 .	D3Sf	10.10
RAR	5301	ONE PLUS CONF	See "Note 6, "Section 3.9.7.1.6 .	D3Sf	10.10

3.9.7.1.1 Note 1

This option, selective carrier denial (SCD), inhibits 0- Intra-LATA PIC calls from those lines whose customers have not paid their bills. Allowed values are [Y]ES to send calls to recorded announcement for SCD treatment and [N]O to allow the LEC to handle calls.

3.9.7.1.2 Note 2

Allowed values for PDIT, field "TYPE OF CI CALL" are [C]ICUT, [INTE]R, [INTR]A, [N]ONCI, [PSC]AR, [PSN]CI or [TO]LL. If [TO]LL is chosen, the PTC is the carrier.

3.9.7.1.3 Note 3

Allowed values for these fields are [COM]P, [CON]FL, [INTE]R, INTRA, INTRM, [N]ONCI, [PR]IV, [PSC]CI, [S]AC, [TC]ONF, [TO]LL or [W]Z1. If the value [TO]LL is chosen, the PTC is the carrier; if [TC]ONF or [CON]FL is chosen, a conflict results that is resolved through RC/V view 10.10.

3.9.7.1.4 Note 4

Allowed values for these fields are [COM]P, [CON]FL, [INTE]R, INTRA, INTRM, [N]ONCI, [PR]IV, [PSC]AR, [PSN]CI, [TC]ONF, [TO]LL or [W]Z1. If the value [TO]LL is chosen, the PTC is the carrier. If [TC]ONF or [CON]FL is chosen, a conflict results that is resolved through RC/V view 10.10.

3.9.7.1.5 Note 5

Allowed values are [Y]ES for LEC and [N]O for Intra-LATA PIC carrier to carry 0-/0+ Intra-LATA PIC calls.

3.9.7.1.6 Note 6

Allowed values are [I]NTER, [T]OLL or blank (no entry) (see the "ICLATA CONFLICT RESOLUTION" table). Information appears here only if the "TYP CI CALL" in RC/V 9.3 is [TC]ONF or CON[FL].

3.9.7.1.7 Note 7

Allowed values for these fields are [COM]P, [CON]FL, [INTE]R, INTRA, INTRM, [N]ONCI, [PR]IV, [PSC]CI, [PSN]CI, [TC]ONF, [TO]LL or [W]Z1. If the value [TO]LL is chosen, the PTC is the carrier; if [TC]ONF or CON[FL] is chosen, a conflict results that is resolved through RC/V view 10.10.

3.9.7.2 Recent Change Provisioning

Enable the Intra-LATA PIC feature using RC/V View 8.22. Previous arrangements must have been made between the service provider and Lucent Technologies for enabling information.

The Recent Changes necessary to activate Intra-LATA PIC are listed in Table 3-11 .

Table 3-11 RCV Provisioning Information For Intra-LATA PIC

RC/V VIEW	VIEW NAME	FIELD	ALLOWED VALUES
1.6	COMPOSITE LINE (LINE ASSIGNMENT)	PTC	0000-9999
1.8	ANALOG LINE/BRCS ASSIGNMENT	PTC	0000-9999
23.2	DIGITAL SUBSCRIBER LINE	PTC	0000-9999
23.8	DSL/BRCS ASSIGNMENT	PTC	0000-9999
5.1	TRUNK GROUP	PTC	0000-9999
5.1	TRUNK GROUP	DIR CON IC	Y/N
8.1	OFFICE PARAMETERS (MISCELLANEOUS)	PTC	0000-9999
8.1	OFFICE PARAMETERS (MISCELLANEOUS)	ICLATA SCD IND	See "Note 1," Section 3.9.7.2.1 .
9.2	PREFIX/FEATURE DIGIT (OFFICE DIALING)	TYP CI CALL	See "Note 2," Section 3.9.7.2.2 .
9.3	LOCAL DIGIT (OFFICE DIALING)	TYP CI CALL	See "Note 3," Section 3.9.7.2.3 .
9.3	LOCAL DIGIT (OFFICE DIALING)	CONFLICT TYP CI CALL	See "Note 3," Section 3.9.7.2.3 .
9.9	REMAINING DIGIT (OFFICE DIALING)	TYP CI CALL	See "Note 4," Section

			3.9.7.2.4 .
9.9	REMAINING DIGIT (OFFICE DIALING)	CONFLICT TYP CI CALL	See "Note 7," Section 3.9.7.2.7 .
9.10	IDP GROUP DEFINITION (INDIVIDUAL DIALING)	GROUP PTC	0000-9999
9.15	MULTIPLE LOCAL DIGIT (OFFICE DIALING)	TYP CI CALL	See "Note 3," Section 3.9.7.2.3 .
10.3	INTER-LATA CARRIER	ICLATA OPT	See "Note 5," Section 3.9.7.2.5 .
10.10	SCREENING (CHARGING)	NONE CONF	See "Note 6," Section 3.9.7.2.6 .
10.10	SCREENING (CHARGING)	ZERO PLUS CONF	See "Note 6," Section 3.9.7.2.6 .
10.10	SCREENING (CHARGING)	ONE PLUS CONF	See "Note 6," Section 3.9.7.2.6 .

3.9.7.2.1 Note 1

This option, selective carrier denial (SCD), inhibits 0- Intra-LATA PIC calls from those lines whose customers have not paid their bills. Allowed values are [Y]ES to send calls to recorded announcement for SCD treatment and [N]O to allow the LEC to handle calls.

3.9.7.2.2 Note 2

Allowed values for this field are [C]ICUT, [INTE]R, [INTR]A, [N]ONCI, [PSC]AR, [PSN]CI or [TO]LL. If [TO]LL is chosen, the PTC is the carrier.

3.9.7.2.3 Note 3

Allowed values for these fields are [COM]P, [CON]FL, [INTE]R, INTRA, INTRM, [N]ONCI, [PR]IV, [PSC]AR, [PSN]CI, [S]AC, [TC]ONF, [TO]LL or [W]Z1. If the value [TO]LL is chosen, the PTC is the carrier; if [TC]ONF or CON[FL] is chosen a conflict results that is resolved through RC/V view 10.10.

3.9.7.2.4 Note 4

Allowed values for these fields are [COM]P, [CON]FL, [INTE]R, INTRA, INTRM, [N]ONCI, [PR]IV, [PSC]AR, [PSN]CI, [TC]ONF, [TO]LL or [W]Z1. If the value [TO]LL is chosen, the PTC is the carrier; if [TC]ONF or CON[FL] is chosen a conflict results that is resolved through RC/V view 10.10.

3.9.7.2.5 Note 5

Allowed values are [Y]ES to allow the local carrier to handle 0-/0+ intra-LATA toll calls and [N]O to allow the feature group D carrier to handle 0-/0+ intra-LATA toll calls.

3.9.7.2.6 Note 6

The information in these fields pertains to resolving TYPE CI CALL conflicts. Allowed values are [T]OLL, [I]NTER, or blank. (Blank or no entry indicates INTRA.) Table 3-12 shows how the fields are populated.

3.9.7.2.7 Note 7

Allowed values for these fields are [COM]P, [CON]FL, [INTE]R, INTRA, INTRM, [N]ONCI, [PR]IV, [PSC]CI, [PSN]CI, [TC]ONF, [TO]LL or [W]Z1. If the value [TO]LL is chosen, the PTC is the carrier; if [TC]ONF or CON[FL] is chosen a conflict results that is resolved through RC/V view 10.10.

Table 3-12 Intra-LATA PIC Conflict Resolution

TYPE CI CALL (See "Conflict Resolution Note 1" Section 3.9.7.2.8 .)	ZERO PLUS CONF/ONE PLUS CONF (See "Conflict Resolution Note 2," Section 3.9.7.2.9 .)	RESOLUTION
CONFL	blank	INTRA or INTER (See "Note 3," Section 3.9.7.2.10 .)
CONFL	I	INTER
CONFL	T	TOLL
TCONF	blank	INTRA
TCONF	I	INTER
TCONF	T	TOLL

3.9.7.2.8 Conflict Resolution Note 1

Field TYPE CI CALL must reflect these values on RC/V views 9.2 (PREFIX/FEATURE DIGIT), 9.3 (LOCAL DIGIT), 9.9 (REMAINING DIGIT) and 9.15 (MULTIPLE LOCAL DIGIT).

3.9.7.2.9 Conflict Resolution Note 2

NONE CONF, ZERO PLUS CONF and ONE PLUS CONF are new fields on RC/V view 10.10 [SCREENING (CHARGING)].

3.9.7.2.10 Conflict Resolution Note 3

Conflict is resolved using previously defined (before Intra-LATA PIC) method.

3.9.7.3 Customer Premises Equipment

Not applicable.

3.9.8 Maintenance Considerations

Not applicable.

3.9.9 Administration

3.9.9.1 Measurements

Existing 30 minute traffic counts for an Inter-LATA Carrier will be pegged to include the counts for Intra-LATA PIC calls routed through an IC.

The existing IC measurements in the 24 hour plant measurements includes Intra-LATA PIC calls routed through an IC.

The existing inter-exchange carrier shared trunk group (IECSTG) and inter-exchange carrier start signal time-out (IECSST) 5-minute network management (NM) measurements for a carrier will include Intra-LATA PIC calls that are routed through an IC. Intra-LATA PIC calls will be treated by the NM measurements as existing inter-LATA calls.

Measurements for group PIC also apply to group PTC.

3.9.9.2 Billing

Existing inter-LATA carrier interconnect Automatic Message Accounting (CI-AMA) records are created for Intra-LATA PIC calls carried by an IC and existing LEC (non-CI AMA) records are created for Intra-LATA PIC calls carried by the LEC (if the user indicates the LEC as the PTC).

3.10 CARRIER ROUTING/CALL PROCESSING BY FACILITY PRESENCE

3.10.1 Description

The Carrier Routing/Call Processing by Facility Presence feature (99-5E-3970) provides a new Carrier Routing trigger for Access Tandem or Interexchange Carrier 5ESS[®] switches. This trigger launches an ASP R0.1 Information Collected query at the Toll Switch for designated carriers.

3.10.2 Availability

The Carrier Routing/Call Processing by Facility Presence feature (99-5E-3970) is available as a software update for the 5E11 software release and is included in the 5E12 and later releases.

3.10.3 Environment

This feature is provided on a per-office basis.

3.10.4 Cross References

The following cross references apply to this feature:

- Feature Number:
 - 99-5E-3970, Carrier Routing/Call Processing by Facility Presence
- This feature is in compliance with the following Bellcore Technical References (TRs):
 - TR-TSV-000905
 - TR-NWT-000690.

3.10.5 Background

Not applicable.

3.10.6 Feature Operation

In the toll switch, the Carrier Routing trigger can be detected under the following conditions:

- the incoming trunk group is provisioned to allow Carrier Triggers,
- a carrier ID is received in the trunk signaling or is provisioned on a trunk group,
- the signaled or derived carrier ID is provisioned with an ASP R0.1 trigger number.

Under these conditions, an ASP R0.1 Information Collected query is launched.

3.10.7 User Operation

3.10.7.1 For Subscribers

No subscriber actions are associated with this feature.

3.10.7.2 For Switch Personnel

On RC/V form 10.3, switch personnel assign a valid ASP 0.1 carrier trigger to each IXC using the feature. On RC/V view 5.1, CARRIER TRIG must be set to "yes" on the incoming group.

3.10.8 Engineering

3.10.8.1 Hardware Resources

No hardware considerations are associated with this feature.

3.10.8.2 Software Resources

No software considerations are associated with this feature.

3.10.8.3 Transition Considerations

This feature will only operate in networks that include an SCP with the complimentary WLD feature.

3.10.9 Interactions and Limitations

This feature and the ASP Trunk Trigger For Toll feature (99-5E-3156) cannot both be active.

3.10.10 Incompatibilities

No incompatibilities are associated with this feature.

3.10.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

3.10.12 Isolation Constraints

No isolation constraints are associated with this feature.

3.10.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the Carrier Routing/Call Processing by Facility Presence feature by populating the following fields in RC/V view 8.22, SECURED FEATURE UPGRADE:

FIELD	VALUES
FEATURE ID	243
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

Switch personnel assign a valid ASP 0.1 carrier trigger to those carriers using the Carrier Routing/Call Processing by Facility Presence feature. These triggers are assigned via RC/V view 10.3.

For a Feature group D carrier, RC/V view 10.3 field ASP TRIG NBR is set to a valid ASP R0.1 Trigger number, as defined on RC/V view 9.35.

If the carrier is signaled into the switch, then on RC/V view 5.1, the CARRIER TRIG field is set to Y to allow the carrier to detect the ASP trigger.

If the carrier is not signaled, then the carrier is derived from the data on the incoming trunk group, and the CARRIER

ID must be defined the same as the trunk group provisioned with the ASP trigger. FEAT GRP is set to D, and CARRIER TRIG is set to Y.

3.10.14 Customer Premises Equipment (CPE)

Not applicable.

3.10.15 Maintenance Considerations

Not applicable.

3.10.16 Administration

3.10.16.1 Measurements

This feature does not impact measurements.

3.10.16.2 Billing

This feature does not impact billing.

3.11 ALTERNATE LOCAL SERVICE PROVIDER ROUTING

3.11.1 Description

The Alternate Local Service Provider Routing feature (99-CP-4031) is a call routing feature that provides an Alternate Local Service Provider (Alt LSP) with the ability to handle directory assistance, operator assistance, and other non-operator handled Intra-LATA local calls on a line by line basis through presubscription.

This feature allows a Local Exchange Carrier (LEC) to assign a Presubscribed Local Carrier (PLC) to an Alternate Local Service Provider (Alt LSP) customer line and also allows the LEC to mark an Alt LSP customer line as an unbundled line. The carrier identified to handle these calls is designated as the PLC carrier.

This feature allows the LEC to support both bundled and unbundled service on the same switch. It also has the flexibility to allow the Alt LSP to select the types of calls that will be handled by the LEC and those that will be handled by the Alt LSP.

This is a secured feature (SFID 269) and a right-to-use (RTU) fee must be paid to Lucent Technologies before enabling information is provided.

3.11.2 Availability

The Alternate Local Service Provider Routing feature (99-CP-4031) is available for the 5E12 and later software releases.

3.11.3 Environment

This feature is implemented on a per-line basis. The Alt LSP feature is available on any subscriber line.

3.11.4 Cross References

The following cross references apply to this feature.

- Feature Number: 99-CP-4031

3.11.5 Background

Not applicable.

3.11.6 Feature Operation

This feature allows the LEC to route Operator and Directory Assisted calls [such as, 0-, 0+NANP DN without the NPA, 0+full NANP DN, 411, (NPA)-555-1212, 611 and 811] and non-operator assisted (None+/1+) 0+NANP DN (with or without the NPA) Intra-LATA local calls to an Alt LSP platform or an Access Tandem (AT) for routing to an Alt LSP. This allows a LEC to unbundle existing lines on a 5ESS switch and to process these calls through the Alt LSP's network. This is accomplished by identifying PLC carriers using a three-digit or four-digit Carrier Identification Code (CIC) and assigning this carrier to a subscriber line.

This feature allows the LEC to mark an Alt LSP customer line as unbundled. If the line is marked as unbundled, none+/1+ NANP DN (with or without the NPA) non-operator handled calls will be routed to the Alt LSP network.

This feature supports all originating line classes of service, as well as EDSL and EDSLHM (in other words, PRI) for trunk classes of service for 411, 611, 811, (NPA)-555-1212, 0-, 0+, and non-operator handled None+/1+ NANP DN (with or without the NPA) calls.

3.11.6.1 PLC Identification

A new field, PLC, has been added to the Line, Individualized Dialing Plan (IDP) (Centrex/Business) group, Primary Rate Interface (PRI) trunk, and ACD TN forms. The new PLC field is populated with a Carrier Identification Code (CIC), identifying that subscriber as being presubscribed to that CIC as its Alt LSP. If the PLC field is not populated, or if the PLC field is populated but the routing information for the PLC is not populated, the call defaults to the LEC.

3.11.6.2 Unbundled Line Identification

Another new field, UNBUNDLED, has also been added to the Line, IDP group, PRI trunk, and ACD TN forms for the purpose of identifying unbundled lines and routing the calls accordingly.

3.11.6.3 Intraswitch Indicator

Another new field, INTRASWITCH, has also been added to the carrier form. If INTRASWITCH=Y, none+/1+ NANP DN (with or without the NPA) non-operator intraswitch calls from an unbundled line will be routed through the PLC network as interswitch calls.

3.11.7 User Operation

3.11.7.1 For Subscribers

No subscriber actions are associated with this feature.

3.11.7.2 For Switch Personnel

Switch personnel install, enable, and activate this feature using recent change.

Switch personnel can perform the following operations:

- (1) specify the routing information for the PLC carrier,
- (2) assign the PLC to a line, PRI trunk group, IDP group, or ACD TN, or a combination of these,
- (3) mark a line, PRI trunk group, IDP group, or ACD TN, or a combination of these, as bundled or unbundled,

- (4) use global Recent Change to assign PLC and unbundled indication to a group of lines,
- (5) identify all lines with a range of PLCs or a single PLC through the use of Multiple Line Query and Presubscribed Carrier Report, and
- (6) identify all lines that have been marked as unbundled through the use of Multiple Line Query.

3.11.8 Engineering

3.11.8.1 Hardware Resources

No hardware considerations are associated with this feature.

3.11.8.2 Software Resources

No software considerations are associated with this feature.

3.11.8.3 Transition Considerations

No transition considerations are associated with this feature.

3.11.9 Interactions and Limitations

This feature affects the Intra-LATA PIC feature for 0- and 0+ Intra-LATA Toll calls. If the Presubscribed Toll Carrier (PTC) does not handle 0-/0+ Intra-LATA Toll calls, the call will be handled by the PLC (with a LEC handling option).

NOTE: This feature uses an Office Option Bit (set on Recent Change view 8.31) which impacts 0-/0+ ICLATA calls where the ZMINUS/ZPLUS options are Y.

If the PLC does not handle the call, it is handled by the LEC.

Intra-switch calls that are routed through a carrier are treated as inter-switch calls. All features [e.g., Multi-way, Call Waiting Originating/Dial Call Waiting (CWO/DCW), Terminal Group Station Restriction (TGSR), etc.] that work intra-switch only will not work (or work differently) if the intra-switch calls are routed through a carrier switch.

The switch only allows assignment of a PLC and unbundled indicator on a Multi Line Hunt Group (MLHG) member basis and does not allow PLC nor unbundled indicator assignment to an MLHG on a group basis.

3.11.10 Incompatibilities

Intra-LATA calls attempted for the PLC are blocked if the line does Selective Carrier Denial (SCD) screening for the PLC.

3.11.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

3.11.12 Isolation Constraints

No isolation constraints are associated with this feature.

3.11.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the Screening Enhancement to OCCA feature by populating the following fields in Recent Change and Verify (RC/V) view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	269
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

The service provider sets up a carrier to handle local calls and assigns this carrier to a line, trunk, and an IDP group by populating the following fields with the PLC carrier routing information on RC/V view 10.3 (Carrier Administration), using the CIC as the key:

FIELD	VALUES
CODE INDEX	See Note 1
ROUTE INDEX	See Note 1
SIGNAL	ST or STP
CODE CONVERSION DN	up to 15 digits
INTRASWITCH	Y/N (See Note 2)

NOTE 1: If Code Index and Route Index are left blank, the call will be handled by the LEC.

NOTE 2: Enter Y to route intraswitch calls from an unbundled line to a PLC carrier, or N to route intraswitch calls from an unbundled line to the LEC.

The service provider populates the UNBUNDLED field and assigns the PLC on the following forms:

RC/V VIEW	VIEW NAME	FIELD	ALLOWED VALUES
1.6	COMPOSITE LINE (LINE ASSIGNMENT)	UNBUNDLED	Y or N (See Note 1)
1.6	COMPOSITE LINE (LINE ASSIGNMENT)	PLC	0000-9999 (See Note 2)
1.8	ANALOG LINE/BRCS ASSIGNMENT	UNBUNDLED	See Note 1
1.8	ANALOG LINE/BRCS ASSIGNMENT	PLC	See Note 2
5.1	TRUNK GROUP	UNBUNDLED	See Note 1
5.1	TRUNK GROUP	PLC	See Note 2
6.10	ACD AND DAA TN ASSIGNMENT	UNBUNDLED	See Note 1
6.10	ACD AND DAA TN ASSIGNMENT	PLC	See Note 2
9.10	IDP GROUP DEFINITION (INDIVIDUAL DIALING)	UNBUNDLED	See Note 1
9.10	IDP GROUP DEFINITION (INDIVIDUAL DIALING)	PLC	See Note 2
23.2	DIGITAL SUBSCRIBER LINE	UNBUNDLED	See Note 1
23.2	DIGITAL SUBSCRIBER LINE	PLC	See Note 2
23.8	DSL/BRCS ASSIGNMENT	UNBUNDLED	See Note 1
23.8	DSL/BRCS ASSIGNMENT	PLC	See Note 2

NOTE 1: YES to route none+/1+ NANP DN (with or without the NPA) non-operator calls to the PLC carrier, or NO to route none+/1+ NANP DN (with or without the NPA) non-operator calls to the LEC.

NOTE 2: Input proper PLC Carrier Identification Code for Alt LSP, for this customer

The service provider may set up a carrier to handle local calls and assigns this carrier to a group of lines on a global basis through the Global Recent Change Views. These views can be used in conjunction with the A.2 view and 28.X view to update the unbundled and PLC fields on multiple lines as listed in the preceding table.

3.11.14 Customer Premises Equipment (CPE)

Not applicable.

3.11.15 Maintenance Considerations

Not applicable.

3.11.16 Administration

3.11.16.1 Measurements

The Alternate Local Service Provider Routing feature affects the TRFC30, PLNT 24, and the 5 minute NM measurements. For more information, see 235-070-100, Appendix 1 *5ESS® Switch Administration And Engineering Guidelines — Appendix 1, Traffic And Plant Measurements* for detailed information on measurements.

3.11.16.2 Billing

This feature generates a Feature Group D AMA record with a Call Code of 110 for local calls routed to the PLC carrier.

4. INTEROFFICE SIGNALING AND SUPERVISION (NON-CCS)

4.1 SIGNALING FEATURES

4.1.1 Compatibility With 1300- To 1500-Ohm Loops

4.1.1.1 Feature Description

A maximum conductor loop resistance of at least 1500 ohms (outside plant) is supported.

4.1.1.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.2 Nonintegrated Per-Line Range Extension

4.1.2.1 Feature Description

4.1.2.1.1 Feature Definition

The Nonintegrated Per-Line Range Extension feature provides a method to serve customers beyond the normal office resistance limit. Metallic lines served by the 5ESS[®] switch with greater than the 1500 ohms loop conductor resistance limit [1600 ohms for private branch exchange (PBX) trunks], not including station equipment, must be treated with individual range extenders external to the 5ESS[®] switch. This feature extends the office signaling and supervisory range for H88 loaded customer loops and provides the necessary voice-frequency (VF) gain to maintain proper transmission performance.

Range extenders for the 5ESS[®] switch are provided on a per-line basis. A range extender is connected to a line requiring range extension at the main distributing frame (MDF) via cabling. Cabling to and from the range extender frames connects to the MDF. Cross connections at the MDF are made to the cabling from the range extender frames to the line unit (LU) and to the lines requiring range extension.

The Nonintegrated Per-Line Range Extension feature consists of hardware units such as the 5A, 7A, or 8A range extenders with gain (REGs). Each of the REGs will be used on a per-line basis. The 7A REG is called a Mini-REG System. The REGs can be used on lines with the following types of service:

- (a) The 5A REG and 7A REG (loops from 1000 up to 2800 ohms), noncoin plain old telephone service (POTS), single-party, 2-party operator number identification (ONI), or automatic number identification (ANI) lines.
- (b) The 8A REG (coin loops from 1050 up to 2800 ohms) dial-tone-first (DTF) and coin-first (CF) coin lines.

4.1.2.1.2 Availability

The Nonintegrated Per-Line Range Extension feature, used in the per-line design application, is available with all software releases.

4.1.2.1.3 Applications

The Nonintegrated Per-Line Range Extension feature enables the 5ESS[®] switch to provide telephone service on H88 loaded customer loops with loop conductor resistance in excess of 1500 ohms (1600 ohms for private branch trunks) by using REGs. The maximum loop resistance, according to loop resistance rules, is 2800 ohms.

4.1.2.1.4 Limitations

Unigauge range extended lines are not allowed for the 5ESS® switch.

To comply with long route design rules, the conductor loop resistance is limited to a maximum of 2800 ohms.

All customer loops beyond 1500 ohms (1600 ohms for PBX trunks) require range extension with gain.

The 8A coin REG is not to be installed in a tandem arrangement with other range extenders or repeaters.

4.1.2.1.5 User Operation

The Nonintegrated Per-Line Range Extension feature will prove useful to both the subscriber and the operating telephone company (OTC). The subscriber (generally in suburban residential areas) benefits through improved VF transmission. The OTC realizes benefits through improved outside plant design and administrative operational advantages.

The Mini-REG System is mounted in a frame equipped with 7A REGs and a Mini-REG power, fuse, and alarm panel. Major and minor alarm functions are provided by the Mini-REG power, fuse, and alarm panel mounted in the line range extender frame. A major alarm is caused by the failure of both (-78 volt) power units, failure of both -78 volt buses, or failure of a -48 volt, or -78 volt shelf fuse. A minor alarm is caused by failure of one -78 volt power unit or one input bus. The major and minor alarm conditions are indicated by their respective red front panel lamps. An alarm cutoff switch is also provided, and a white status lamp indicates the state of the alarm cutoff switch. Both power units have red indicator lamps which illuminate to indicate power failures.

The 5A and 8A REGs are mounted in a frame equipped with a power, fuse, and alarm panel. Alarms from this panel are connected to the 5ESS® switch office audible and visual alarms.

4.1.2.1.6 System Operation

7A Mini-REG

The Mini-REG System is a per-line REG which consists of a VF range extension, shelves, and a power, fuse, and alarm panel mounted into a range extender frame. The frame provides shelves for the 7A REG circuit packs. The Mini-REG System can be used on loops between 1000 and 2800 ohms. All Mini-REG functions are provided by the 7A REG circuit packs with the exception of the power supply, fusing, and alarms. The 7A REG provides the necessary VF gain automatically depending on the conductor loop resistance.

Conductor loop resistance is the resistance between the MDF and the customer distribution terminal. The 7A REG measures total external circuit resistance that includes the customer drop and station set resistances. These resistances have been taken into account in the 7A internal circuit logic by assuming that they total 250 ohms.

The 7A REG is switched into the line circuit path when an off-hook condition occurs. Loop voltage and current detectors provide measured voltage and current control. These detectors provide measured loop voltage and current data to circuit logic to determine loop resistance. The result is compared with present resistance in the logic circuit. If the loop resistance is less than the present resistance threshold, the logic circuit sets the amplifier gain for 3 dB. If the loop resistance is greater than the present resistance threshold, the logic circuit sets the amplifier gain for 6 dB. A resistance less than 1000 ohms puts the REG in a bypass state. In the bypass state, a metallic bypass of the amplifier is provided.

A panel-mounted busy lamp indicates that a subscriber is off-hook and is receiving office current. The lamp indication is independent of whether the loop is long, requiring range extension, or is short, and the REG is in the bypass mode.

Power for all circuitry, except the amplifier in the 7A, is derived directly from the -48 Vdc office battery. The boosted-loop supply is generated by two dc-to-dc converters in each bay.

5A REG

The 5A REG supplies signaling range extension and transmission gain for telephone circuits. The 5A REG, when used to provide the Nonintegrated Per-Line Range Extension feature, is used on a per-line basis.

An automatic gain control circuit automatically switches the gain from 3 to 6 dB for loop resistance exceeding 2000 ohms. The 5A REG amplifier uses an impedance matching network to match the amplifier to the H88 loaded line impedance.

When the amplifier of the REG is switched into the circuit, the subscriber loop voltage is increased from -48 volts to -78 volts or -100 volts. The operating condition of a 5A REG is indicated by a light-emitting diode (LED) on the front panel called a busy lamp. The 5A REG is automatically set for 3 dB on loops with less than 2000 ohms of resistance. When the loop is greater than 2000 ohms, the 5A REG is automatically switched to 6 dB of gain.

8A Coin REG

The 8A Coin REG aids signaling and transmission range extension on H88 loaded coin loops. This REG can be used on CF or DTF coin loops with resistance ranging from 1050 to 2800 ohms.

Repeater gain is automatically set to 3 dB for loops shorter than 2000 ohms and 6 dB for loops longer than 2000 ohms. The 8A repeater incorporates a universal line build-out network that allows it to interface with H88 loaded cable. Boosted battery of -78 Vdc or -100 Vdc is received by the 8A Coin REG and is regulated to ensure line feed current of the proper magnitude and polarity to operate touch-tone dialing, totalizer, and station set transmitter out to 2800 ohms.

4.1.2.2 Resource Utilization

4.1.2.2.1 Hardware Requirements

Hardware requirements for the REGs can be found in the following sections:

- Section 332-210-100, *5A Range Extender With Gain (REG) Description*
- Section 332-210-101, *Mini-REG System and 7A Range Extender With Gain Description and Operation*
- Section 332-210-102, *8A Range Extender Coin REG Description, Operation, and Installation*

4.1.2.2.2 Software Requirements

The Nonintegrated Per-Line Range Extension feature does not require additional software. This feature is provided totally by hardware units in the range extender frame.

4.1.2.3 Implementation and Administration

4.1.2.3.1 Implementation

The hardware units required to provide this feature must be ordered to accommodate the number of lines requiring range extension. Range extension in the 5ESS[®] switch is provided on a per-line basis. The 7A REG has two range extension circuits per circuit pack which will range extend two lines. The 5A and 8A REGs each have one range extension circuit per circuit pack.

The 8A Coin REG is supplied with a coin test (CNT) plug which is inserted into one position of a 2-position socket module located in the lower-left quadrant of the 8A printed wiring board. Depending on the position of the CNT plug, the tip (CT relay) or ring (G relay) conductor is grounded to aid coin tests. Electronic switching system offices require

that the CNT plug be installed in the tip position.

4.1.2.3.2 Administration

4.1.2.3.2.1 Measurements

There are no traffic or plant measurements associated specifically with this feature. However, there exist traffic and plant measurements associated with lines served by a 5ESS[®] switch.

4.1.2.3.2.2 Charging

There is no charge for this feature.

4.1.2.4 Other Considerations

The following items should be considered when providing Nonintegrated Per-Line Range Extension:

- (a) The maximum conductor loop resistance according to long route design rules for a customer loop is 2800 ohms.
- (b) All customer loops beyond 1500 ohms require REG treatment.
- (c) All long route design loops must be loaded, using H88 loading.
- (d) No bridged taps between load coils and nonloaded bridged taps are allowed.

4.1.3 Compatibility With Dial Long Line Circuits

4.1.3.1 Feature Description

Dial long line circuits are circuits that are used to extend the range of customer loops. The range is extended by repeating supervision and dial pulses from the customer to the central office (CO) and by repeating ringing from the CO to the customer. A variety of dial long line circuits may be required dependent upon their capabilities to provide necessary service features and for meeting transmission and range requirements associated with these services.

4.1.3.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.4 Analog Line To Integrated SLC[®] Carrier At 5ESS[®] Switch Cut (ALIC5)

4.1.4.1 Overview

4.1.4.1.1 Background

Several technical challenges are involved in the cutover process from copper on an analog switch to integrated digital loop carrier (DLC) on a digital switch. First, there is a need for an Office-to-Office (OTO) test procedure to ensure that every line appearance on the existing switch is assigned an identical Directory Number (DN) on the newly installed digital switch. Furthermore, such OTO tests need to be conducted through an automated procedure to allow the switch to test a relatively large number of lines in the typically short window between the switch installation (turnover) and the switch cutover by the Local Exchange Carrier (LEC). Secondly, there is a need for a new capability that permits the DLC to be connected to the existing subscriber line on the analog switch without disrupting service to the subscriber on this line, while DLC installation and line testing are underway. To accomplish

this, the DLC needs to be equipped with the means to remove battery and ground on command from the digital switch, so that when the DLC is activated while connected to a working subscriber line, the service from the existing analog switch is not disrupted. Beyond that, the procedure allows the telephone company to automatically cut the newly installed DLC lines simultaneously with the digital switch cutover.

Substantial savings can be realized in outside plant rehabilitation programs if such work is carried out at the same time that the corresponding switch in the wire carrier is upgraded from analog to digital technology. The major handicap for implementing such programs has been the lack of a technically feasible solution for cutover of copper lines on an analog switch to integrated DLC lines on a digital switch. While procedures currently exist to convert copper lines to universal DLC on an analog switch, and similarly to convert copper lines to integrated DLC on the same digital switch, no procedure existed up to now to convert copper on an analog switch directly and in a single step to integrated DLC on a digital switch.

4.1.4.1.2 Definition

ALIC5 addresses the needs described in Section 4.1.4.1.1 with new hardware on the *SLC*[®] Series 5 Carrier System and a new secured feature for the *5ESS*[®] switch. On *SLC*[®] Series 5 Carrier System, the AUA179, ALIC5 POTS and *SPOTS*[®] channel units have been introduced to allow direct bridging of the DLC Remote Terminal (RT) to the working subscriber line on the analog switch, without any service disruption. To accomplish that, the AUA179 channel unit is equipped with a relay controlled by the *5ESS*[®] switch, which turns off the battery and ground generated by the RT and allows normal operation of the subscriber line in the "Pre-Cutover" mode on the existing switch.

4.1.4.1.3 Cross-References

The following cross-references are applicable to the ISDN Attendant ESP on the BRI feature:

- Feature number: 99-5E-1389
- NSEP/5SEP code: Not available.

4.1.4.1.4 Availability

ALIC5 is a secured feature and is available with a 5E8 software update and later software releases. Because this is a secured feature, it will not be enabled until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature enabling is provided upon ordering. Contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

4.1.4.1.5 Feature Application

This feature is provided on a per office (switch) basis.

4.1.4.2 User Perspective

4.1.4.2.1 User Profile

The current methods available for converting analog lines to integrated *SLC*[®] systems necessitate costly intermediate hardware installation and require extensive manual testing. Such prohibitive expense and labor prevent service providers from converting the embedded copper wire base despite annual maintenance savings per line.

The ALIC5 feature provides substantial installation savings per line in reduced conversion costs. In addition, it provides increased flexibility of office engineering by giving service providers the ability to cross-connect analog lines directly to the integrated system RT and perform automated testing of the cross-connects.

4.1.4.2.2 Customer Premises Equipment

ALIC5 is transparent to the end customer.

4.1.4.2.3 Activating the Feature

Because this is a secured feature, it will not be activated until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature activation is provided upon ordering. Contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

4.1.4.2.4 Deactivation

Because this is a secured feature, it will not be enabled until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature activation and deactivation is provided upon ordering. Contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

4.1.4.3 Planning Considerations

ALIC5 Office-to-Office functionality is contingent on a valid ALIC5 configuration as follows:

- ALIC5 feature functionality purchased and unlocked

Failure to purchase the feature will result in service disruption on an attempt to cross-connect lines to the existing office.

- Cutover program active (view 8.1 attribute *CUTTRANS* set to Y)

Attempt to cross-connect ALIC5 CUs prior to activating cutover program will result in service disruption. In addition, OTO testing will be denied if cutover program is not active.

- Equipage of modified ALIC5 CUs

Failure to equip modified ALIC5 CUs will result in service disruption on an attempt to cross-connect lines to the existing office.

- Appropriate service class assigned to CU lines

Assignment of incorrect service class to the line will prevent detection of signal state changes and result in inaccurate Office-to-Office test results.

- Mode I *SLC*® Series 5 RTs configured for Feature Package B

Modified CUs will not be available for other than Series 5 RTs. Attempts to cross-connect using *SLC*® 96 RT will result in service disruption. Mode II operation or incorrect feature package will prevent detection of signal state changes and result in inaccurate Office-to-Office test results.

- RT termination to DCLU or TR08 Integrated Digital Carrier Unit (IDCU).

Attempts to cross-connect using TR303 CUs will result in service disruption. In addition, OTO testing of TR303 IDCUs is currently blocked for all configurations.

4.1.4.4 Assignment Dependencies And Limitations

4.1.4.4.1 Dependencies

The ISLC and ALIC5 OTO are contingent on Feature Package B (FPB), as the carrier facility time slot stuffing pattern for any other feature prevents detection of state change signals.

4.1.4.4.2 Limitations

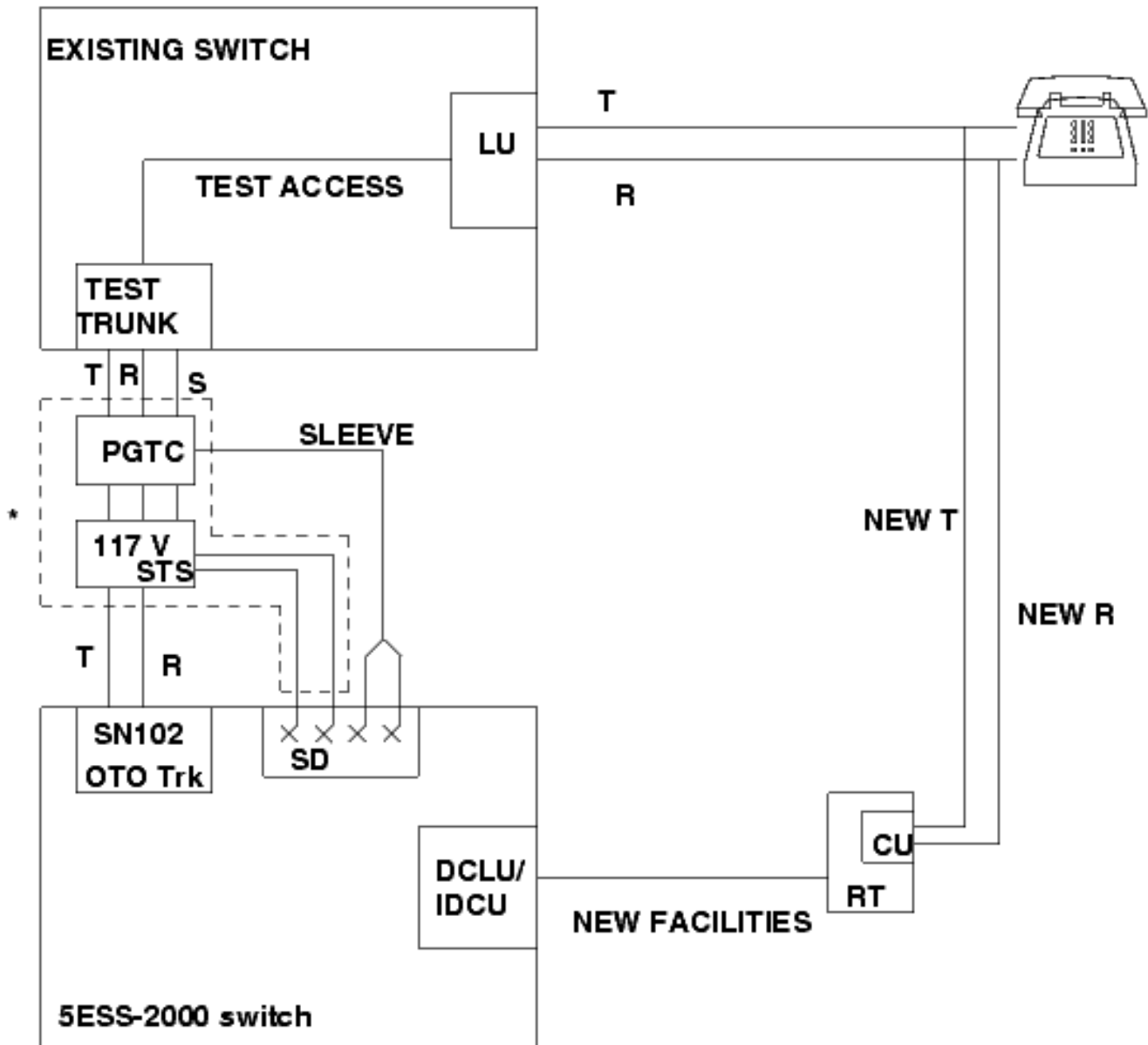
5ESS[®] switch integrated carrier systems support only FPB remote terminals. Feature packages A, C, and AC are not TR08 compliant and are not supported.

4.1.4.5 Feature Implementation

Refer to 235-105-200, 5ESS[®] *Switch Precutover and Cutover Procedures*.

4.1.4.6 Feature Operation

These events assume the interoffice trunk configuration shown in Figure 4-1. Text indicates if the actions are performed within the trunk terminal process (TK) or the line terminal process (LI).



*** PGTC and 117 V STS optional; required only if testing ISLC configured lines as well**

Figure 4-1 ALIC5 OTO Configuration

At the time that OTO testing is activated, the 5ESS[®] switch line appearances are inactive. The ALIC5 CU is configured with battery isolated from the Tip and Ring leads.

NOTE: All test exits, whether as a result of errors or upon successful test completion, will return the ALIC5 CU to the appropriate battery isolated state.

(TK)

The far-end office test trunk is seized by bridging Tip/Ring of the SN102 OTO trunk and applying high current to the

Sleeve lead. If the existing office is other than a Step-by-Step switch, the existing OTO TTF terminal process currently used by Analog OTO is created and a tone detector is allocated for subsequent busy detection. Dial Pulse (DP) or Multi Frequency (MF) digits corresponding to the existing line appearance DN are outpulsed from the SN102 to the far-end trunk. Busy detection is then performed. Step-by-Step far end offices indicate busy by reversing battery on Tip/Ring. All other far end office types indicate busy by presence of voice or tone on Tip/Ring, which is detected by the TTF tone detector allocated previously. If the line is determined to be busy after two successive test attempts, testing is terminated with result REPORT = BUSY-VOICE/TONE. The busy detection interval is 800 milli-second by default. This interval may be extended to a maximum of 13.4 seconds by specifying a value to the OT option of the EX:OTO input message. If no voice/tone is detected, the line is assumed to be idle and the line terminal process is created.

(LI)

TM code calls PC function LPsig() which calls modified PC function OPSig() to put the RT CU into the loop start idle state to restore battery to Tip and Ring. Note that this function call will have no impact if the configuration is ISLC OTO. A fail return from LPsig() (very low probability, resulting from a resource or data error) will terminate testing with result REPORT = SOFTWARE-BLOCKAGE. After a 100 milli-second delay to allow sufficient RT response time, a directed scan is made of the 5ESS[®] line appearance to determine the on-hook/off-hook state of the line. The expected condition is on-hook. An off-hook detected during two successive test attempts will result in termination of testing with result REPORT = BUSY-OFFHOOK. The most probable cause of an off-hook for both ALIC5 and ISLC configured lines is a failure to detect voice or tone during initial busy check, or subscriber off-hook condition (which cannot be detected during busy check). For ALIC5 configured lines, consistent off-hook results are indicative of a short condition.

Low sleeve current is applied to complete test connection to old office line appearance. The default wait interval of 2 seconds for this to complete may be increased to 8.3 seconds by specifying a value to the CT option of the EX:OTO input message.

Upon cut-through of the test connection, a directed scan is performed on the port. ALIC5 configured lines are expected to show off-hook at this point. This is due to the effect of the closed LC relay on the SN102 trunk, which, as a result of cut-through, is now present on the test path. Upon successful detection of off-hook, testing branches off to the ALIC5 polarity test, performed by (TK). Incorrect polarity of the line Tip/Ring will translate along the test path to cause incorrect polarity on the trunk Tip/Ring, given that the LC relay is still closed. Incorrect polarity will be detected via a determination of the trunk state. Testing will terminate with a report of ERROR = POLARITY. Note that this result was not previously used for ISLC OTO, but is an existing OTO error output used for testing of analog lines. If the polarity is correct, the test logic will rejoin the main ISLC code flow at the point where the test connection to the old office is idled.

Detection of on-hook in response to the directed scan following cut-through is the expected condition for ISLC configured lines. ALIC5 lines which show on-hook indicate an open condition on the RT loop Tip/Ring or a discontinuity in the carrier facility wiring. In this case, testing will continue along the main ISLC code flow, and the subsequent scan will again detect the on-hook and report the discontinuity.

Subsequent to the directed scan of the line, the main ISLC code flow applies 117 V on the Tip lead toward the existing office to activate the signaling sequence used to verify continuity of ISLC configured lines. ALIC5 configured lines will only reach this code if continuity testing fails. The 117 V STS will typically not be equipped or powered for testing of ALIC5 configured lines. If it is, however, application of 117 V will have no effect on the existing office LU line or ALIC5 CU to which it is bridged.

Upon application of 117 V across the trunk, a directed scan is performed on the port. All lines reaching this point should show off-hook. Previously detected ALIC5 discontinuities will fall through to this point and report. Failure to detect off-hook will result in termination of testing with result of ERROR = NO-CONTINUITY.

117 V is idled, the SN102 Tip/Ring bridge is removed, high current is applied on Sleeve, and the test path is released. Note that this is the point at which ALIC5 testing rejoins the code flow, assuming a successful polarity test.

A final directed scan is performed on the port. A result of off-hook indicates for both ALIC5 and ISLC, the customer going off-hook subsequent to the first directed scan. Offhook conditions, if detected during two successive test attempts, will terminate testing with a result of REPORT = BUSY-OFFHOOK. All successfully configured lines will show on-hook and terminate testing with REPORT = ATP.

4.1.4.7 Administration

4.1.4.7.1 Measurements

This feature has no impact in this area.

4.1.4.7.2 Billing

This feature has no impact in this area.

4.1.5 Integrated SLC[®] Series 5 Carrier System - Mode 96 Compatibility

4.1.5.1 Definition

This feature provides an integrated interface for a new version of the remote terminal. The integrated SLC[®] series 5 carrier system - mode 96 compatibility feature provides the new digital loop carrier remote terminal. This system uses state-of-the-art technology and is compatible with the SLC[®] 96 carrier system. This feature supports POTS and SPOTS[®] services.

4.1.5.2 Availability

This feature is available with the 5E6 and subsequent software releases.

4.1.6 Integrated SLC[®] 96 Carrier

4.1.6.1 Feature Description

4.1.6.1.1 Feature Definition

This feature provides the 5ESS[®] switch with the capability to terminate T1 lines from a Mode I or Mode II SLC[®] 96 carrier remote terminal (RT) directly into a digital carrier line unit (DCLU). An integrated SLC[®] 96 carrier can serve the following types of lines and trunks:

- Single-party lines using loop signaling
- Two-party ONI or ANI lines
- Four-party (semiselective or fully selective) lines
- Eight-party (semiselective or divided-code) lines
- Coin (CF or DTF) lines
- Special service lines (wide area telephone service lines and nondirect inward dialing PBX trunks).

NOTE: Each special service line or coin line displaces two single-party lines that could have potentially been served by the SLC[®] 96 carrier. Special services are limited to those services that can be switched within the 5ESS[®] switch office.

A *SLC*[®] 96 carrier operating in Mode I (carrier-only) provides no concentration at the RT and provides 96 T1 line channels (24 channels per T1 line) to the *5ESS*[®] switch office via 5 T1 lines (4 active and 1 standby). A *SLC*[®] 96 carrier operating in Mode II (carrier-concentrator) provides 2:1 digital concentration at the RT and provides 48 T1 line channels (24 channels per T1 line) to the *5ESS*[®] switch via 3 T1 lines (2 active and 1 standby). Additional concentration of lines served by an integrated *SLC*[®] 96 carrier is provided in the switching module (SM) at the *5ESS*[®] switch office. The amount of concentration is engineered according to the expected demand for service from customers served by the *SLC*[®] 96 carrier.

4.1.6.1.2 Availability

A *SLC*[®] 96 carrier operating in Mode I (carrier-only), or Mode II (carrier-concentrator) may be integrated into any *5ESS*[®] switch software release.

4.1.6.1.3 Applications

The *SLC*[®] 96 carrier is a system feature which provides capabilities to serve up to 96 customers through a *SLC*[®] 96 carrier RT connected by T1 digital lines to a *5ESS*[®] switch office. The channel bank in the RT may be equipped with a mixture of channel units (CUs), as desired, to provide service to different types of lines. The *SLC*[®] 96 carrier may operate in either Mode I or Mode II. Split modes of operation on one system are not recommended.

A *SLC*[®] 96 carrier can be equipped for a minimum configuration where the system serves less than its full capacity.

Each T1 digital line from a *SLC*[®] 96 carrier RT is terminated directly by a subscriber digital facility interface (SDFI) in the DCLU. Each DCLU and the SDFI in it are assigned via recent change (RC) procedures or the office data administration (ODA) procedures.

The integrated *SLC*[®] 96 carrier feature can be used for expanding the service capability of existing cable plants, or for new wire center deferral. The system can also be used to consolidate, defer, and avoid small community dial offices.

4.1.6.1.4 Limitations

Customers served by a *SLC*[®] 96 carrier remoted from a *5ESS*[®] switch over T1 lines must have only the host *5ESS*[®] switch telephone numbers.

Nonswitched special services and services requiring bridging at the *5ESS*[®] switch office can not be served by an integrated *SLC*[®] 96 carrier. Either metallic lines or nonintegrated pair gain systems are required for these services.

4.1.6.1.5 Interactions

There are no interactions between the integrated *SLC*[®] 96 carrier and any other feature in a *5ESS*[®] switch office.

4.1.6.1.6 Restriction Capability

There exists no allowable methods by which the customer may restrict the capability of the integrated *SLC*[®] 96 carrier feature. Telephone service provided through an integrated *SLC*[®] 96 carrier, from the customer's viewpoint, is the same as the customer served by a *5ESS*[®] switch whose line terminates directly on an LU in the *5ESS*[®] switch office.

4.1.6.1.7 User Operation

The integrated *SLC*[®] 96 carrier operates automatically with a *5ESS*[®] switch. The only time that operating company

personnel would intervene is when an alarm and status problem occurs. The *SLC*[®] 96 carrier alarm displays at both the RT and *5ESS*[®] switch indicate system status and the location of a system trouble. The *5ESS*[®] switch alarms report service affecting (major alarm) and nonservice affecting (minor alarm) troubles with the RT, transmission lines, or a *5ESS*[®] switch DCLU. Alarm information is reported to both the switching control center (SCC) and the maintenance management center over the automatic line insulation test channel.

4.1.6.1.8 System Operation

This part provides a functional description of the operation of an integrated *SLC*[®] 96 carrier. The hardware required for an integrated *SLC*[®] 96 carrier can be functionally divided into the following:

- A *SLC*[®] 96 carrier RT
- Transmission facilities
- *5ESS*[®] switch equipment.

***SLC*[®] 96 Carrier Remote Terminal**

The *SLC*[®] 96 carrier RT is that part of the digital subscriber system that is remote from the *5ESS*[®] switch office and is connected to it by T1 lines. An integrated *SLC*[®] 96 carrier may operate in one of two modes (Mode I or Mode II). Mode I is the carrier-only mode where up to 96 subscribers without concentration at the RT are provided with 96 channels to the *5ESS*[®] switch office. Mode II is the carrier-concentrator mode where up to 96 subscribers share access to 48 channels to the *5ESS*[®] switch office.

The RT basically performs the following functions:

- (a) Analog VF signals from lines connected to the RT are converted to digital signals. In the opposite direction, digital signals are converted to analog VF signals for transmission to subscriber lines.
- (b) Digital signals are synchronized into specific time slots and are time multiplexed along with other signals into a serial bit stream for transmission to the *5ESS*[®] switch office. In the opposite direction, the RT demultiplexes signals from the serial bit stream. The digital signals are connected to analog VF signals and transmitted over the appropriate lines.

The RT has a channel bank assembly. This unit is made up of four equipment shelves which consists of CUs and circuit packs which are called common equipment circuit packs. Common equipment circuit packs in the channel bank are as follows:

- Power control unit
- Line switch unit
- Transmit/receive unit (TRU)
- Line interface unit (LIU)
- Time assignment unit (Required in channel banks for Mode II)
- Alarm control unit
- Special service unit

- Channel test unit
- Data link unit.

Each shelf in the channel bank assembly contains 12 CUs. Each single or multiparty CU is capable of interfacing two subscriber lines. Different types of CUs exist for signaling and interface requirements for each different type of line served by the system. A coin CU will provide an interface for one coin line. The CU takes the VF signals from the line(s) with which it interfaces and produces pulse amplitude modulation samples. The pulse amplitude modulation samples are produced at an 8-kHz rate. The sampling of signals is performed in a fixed sequence so that a stream of pulse amplitude modulation samples are produced. In the opposite direction, pulse amplitude modulation samples from the TRU are converted to VF signals by the CUs. The VF signals are transmitted to the subscriber lines.

Pulse amplitude modulation samples from the CUs are sent to the TRU. The TRU encodes each pulse amplitude modulation sample into a pulse code modulation signal. The TRU also synchronizes each pulse code modulation signal into a specific time slot and multiplexes 24 digital signals into a serial digital stream. In the opposite direction, pulse code modulation signals are converted to pulse amplitude modulation samples.

The mode of operation for an integrated *SLC*[®] 96 carrier is determined by the choice of common plug-in circuit packs in the RT channel bank. A channel bank equipped with time assignment units operates in Mode II (carrier-concentrator mode). The time assignment units collect the serial data bit streams from the TRUs and perform a 2:1 concentration ratio. The time assignment unit performs digital concentration by selectively matching the digital signals for transmission with available time slots. In Mode II operation, 96 subscriber lines share access to 48 channels provided between the RT and the *5ESS*[®] switch office. Each T1 line between the RT *5ESS*[®] switch office provides 24 channels. For Mode II operation, two T1 lines can carry forty-eight 2-way telephone conversations while a spare standby line called the protection line is provided for use if faults should occur in either of the two active T1 lines. When faults are detected on one of the T1 lines, an automatic switch to the protection line is made.

If a *SLC*[®] 96 carrier operates in Mode I (carrier-only), the serial data bit streams from the TRU are sent to the LIU. The LIU performs the following functions:

- Data in the data stream is monitored by a line monitor in the LIU.
- The LIU requests a switch to the T1 protection line when the error-rate exceeds the error-rate threshold.
- A converter converts the unipolar data stream into a bipolar data stream for transmission over a T1 line. In the opposite direction, the bipolar data stream is converted by a converter to a unipolar data stream.
- The LIU derives a receive clock from the incoming T1 bit stream.
- The LIU provides regulated line current, fusing, and a fuse alarm display.
- A 6-MHz clock is generated by the LIU.
- The LIU provides access for maintenance functions on the T1 line.

Transmission Facilities

The LIU contains a selectable line monitor error-rate switch which can be set for one of three options. Each of the options specifies an error-rate threshold on which a switch to the protection line is to be made. If a threshold is exceeded, the LIU sends a signal to the line switch unit in the RT to switch from the faulty line to the protection line. The three error-rate switch options are as follows:

- X Option:** The X option sets the error-rate threshold to one error per 10,000 bits.

- (b) **Y Option:** The Y option sets the error-rate threshold to one error per 100,000 bits.
- (c) **Z Option:** The Z option sets the error-rate threshold to one error per 1,000,000 bits.

Transmission facilities required for an integrated *SLC*[®] 96 carrier are as follows:

- T1 digital carrier lines
- Voice-frequency facilities
- Digital cross-connect bay
- Office repeater bay (ORB).

T1 Digital Carrier Lines

Each *SLC*[®] 96 carrier operating in Mode I (carrier-only) requires five T1 lines (four active and one standby). Each *SLC*[®] 96 carrier operating in Mode II (carrier-concentrator) requires three T1 lines (two active and one standby). Each T1 line utilizes repeaters for digital signal regeneration. Refer to Section 363-202-100 for information on *SLC*[®] 96 carrier, carrier-line conditioning, and T1 line repeaters.

Data transmitted over the T1 digital line is a bipolar data stream sent at a 1.544 Mbit/second rate. One T1 frame consists of twenty-four 8-bit time slots plus one additional bit referred to as the frame bit. To communicate control information over a T1 line, every other frame bit is used to form a derived data link. The communications over the derived data link is synchronous and a complete set of derived data fields are sent every 9 milliseconds. Each field is used to control and/or monitor the operation of the RT. The four fields which may be carried over the derived data link are shown in Table 4-1 .

Table 4-1 *SLC*[®] 96 Carrier Derived Data Link Fields

DERIVED DATA LINK FIELD	PURPOSE
A	Alarm
C	Concentrator (Time Assignment Unit)
M	Maintenance
S	Line Switch

VF Facilities The VF facilities connect from the RT to the station set at the customer location. Refer to Section 915-710-110 for design information on VF facilities.

ORB and Digital Cross-Connect Bay

Each T1 carrier line from a *SLC*[®] 96 carrier RT is routed through a distributing frame and an ORB to a digital cross-connect bay. The T1 carrier line then connects directly to an SDFI in the DCLU. The SDFIs equipped in the DCLU are a different type of SDFI than that equipped in the digital line and trunk unit. Each type of interface has a unique circuit pack code. The ORB is a bay in the office, usually near the digital cross-connect bays that houses the digital repeater used to regenerate the pulse code modulation data for a T1 line. The ORB provides power for repeaters mounted in the bay and repeaters mounted along the T1 lines. The digital cross-connect bay to which T1 lines and SDFI circuit packs are wired permits cross-connection by patch cords and plugs.

5ESS[®] Switch Equipment

The 5ESS[®] switch equipment consists of hardware and software in the 5ESS[®] switch office specifically required to integrate a *SLC*[®] 96 carrier. Software needed to integrate a *SLC*[®] 96 carrier is provided. Functions normally provided by a *SLC*[®] 96 carrier central office terminal (COT) are "integrated" into the 5ESS[®] switch. The T1 digital

lines from the *SLC*[®] 96 carrier RT are terminated by an interface unit in a *5ESS*[®] switch SM called the DCLU.

The DCLU is equipped with SDFIs, data multiplexers, control multiplexers, equalizers, and power units. Each SDFI terminates one T1 line. The DCLU consists of two service groups. A maximum of six *SLC*[®] 96 carrier RTs may be terminated on a DCLU. Each service group interfaces up to three RTs. If one DCLU service group is removed from service, the other service group will handle data and control to and from the SDFIs in both service groups. Each DCLU service group connects to the time slot interchange unit over two peripheral interface data buses (PIDBs), and each DCLU service group connects to the interface module processor unit (IMPU) over two peripheral interface control buses (PICBs).

Each PIDB carries 32 time slots. Each DCLU service group can handle a maximum of 64 calls over two PIDBs. Control and communication between the DCLU and IMPU is over the PICBs. A PIDB consists of two sets of twisted-pair cables. Each cable contains four twisted pairs. One set of cable goes to side 0 of the time slot interchange unit and the other set goes to side 1. The signals transmitted over a PIDB are as follows:

- 4.096 Mbit/second data-in and data-out signals, 32 time slots (16 bits/time slot)
- 4.096-MHz clock
- 8-kHz sync pulse.

Each SDFI provides a direct digital interface for a T1 digital carrier line connected to a *SLC*[®] 96 carrier RT. The SDFI in the DCLU converts the T1 line data format to the internal data and control line formats used in the *5ESS*[®] switch. Conversely, the SDFI converts data from a PIDB and control information from a PICB into a T1 line data format for transmission over a digital line.

The SDFI equipped in the DCLU can be functionally divided into the following:

- (a) **Receiver:** The receiver converts the bipolar serial data bit stream from the T1 digital line to a unipolar data bit stream. Another function of the receiver is to receive transmit data that has been looped from the driver for maintenance purposes.
- (b) **Driver:** The driver converts a unipolar 24 time slot (8 bits/time slot) data stream to a bipolar data bit stream for transmission over a T1 digital line. Transmit data from the driver can be looped to the receiver for maintenance purposes.
- (c) **Framer:** In the receive direction, the framer determines the correct frame alignment and detects the facility trouble conditions and alarms. In both the transmit and receive directions, the framer performs frame-level and line-level conversions.
- (d) **Receive Synchronizer:** The receive synchronizer converts the data received over the T1 digital line from twenty-four 8-bit time slots (1 frame) format to (thirty-two 16-bit time slots format PIDB format). Additional functions include inhibiting the updating of signaling bits and detection and reporting of slip conditions.
- (e) **Transmit Formatter:** The transmit formatter changes the thirty-two 16-bit time slot data streams from the time slot interchanger and signaling device to a twenty-four 8-bit time slot format. The transmit formatter is connected to the maintenance buffer. Diagnostic reports and control information are sent between the transmit formatter and maintenance buffer.
- (f) **Universal Synchronous Receiver Transmitter:** The universal synchronous receiver transmitter is a device that acts as an interface between data on the parallel microcomputer bus and serial data on the synchronous frame data links (transmit and receive) which connects to the framer.
- (g) **Microcomputer Bus:** The microcomputer bus consists of an 8-bit bus and 4 control leads (read, write, data

select, address select). The microcomputer bus allows bidirectional flow of information between the microcomputer and any of the devices connected to the bus.

- (h) **Maintenance Buffer:** The maintenance buffer is responsible primarily for providing the interface between the microcomputer and the diagnostic report and control streams of the framer, receive synchronizer, and the transmit formatter. Additional functions include preprocessing of alarms received from the framer, controlling external devices, and monitoring and reporting external device status.
- (i) **Microcomputer:** The microcomputer in each SDFI detects framing errors and slips and provides an indication of the IMPU when a preset number of these are counted. The microcomputer interfaces with other circuits in the SDFI over the microcomputer bus.
- (j) **Control Communication Buffer:** This device provides temporary storage for control information sent between the IMPU and the SDFI microcomputer.
- (k) **Control Link Receiver-Transmitter:** The control link receiver-transmitter provides an interface between the control link protocol transmitted over the PICB and the control communications buffer. Control messages transmitted to the DCLU and sent from the control multiplexer are decoded by the control link receiver-transmitter. This device also sends reply messages along with data required in control messages.
- (l) **Power Converter:** Each SDFI has its own power converter which converts -48 volts to 5 volts. A start signal from the power start circuit pack is required for application of power.
- (m) **Time Slot Interchanger and Signaling:** The time slot interchanger and signaling device in the SDFI interchanges time slots transmitted and received by the SDFI. This device consists of two circuits: one for the receive and one the transmit pulse code modulation data directions. The time slot interchanger and signaling device provides the following functions:
 - (1) **Service Group Selection and Time Slot Interchanger:** This device allows pulse code modulation data to be transmitted to either DCLU service group. In the event of a data multiplexer failure in one of the two DCLU service groups, data from the SDFI can be sent to the data multiplexer in the other service group. In the opposite direction where data is sent from a data multiplexer to an SDFI, the service group selection has the capability to select, on a time slot basis, which data multiplexer in service group 0 or 1 to receive data. Also within the same service group, time slots received from the receive synchronizer may be interchanged to any time slot for transmission to the data multiplexer.
 - (2) **Call Origination (Off-Hook) Detection:** This functional unit detects whenever a transition from an on-hook to off-hook occurs. When this transition occurs, the time slot interchanger and signaling device reports the condition to the SDFI microcomputer. The microcomputer reports time slot activity to the IMPU. All time slot transitions are written to the control communications buffer, but only on-hook to off-hook transitions are flagged.
 - (3) **Idle Code Sending:** Idle or unused time slots sent to and from the RT are inserted with data or code. This code is called idle code. Idle code is inserted into an idle time slot by the time slot interchanger and signaling device.

Each SDFI maps the 24 time slots of a T1 digital line into 32 time slots with every fourth time slot stuffed (unused). Only 24 of the 32 time slots are used. This leaves one out of four time slots not used. For Mode I operation, time slots 0, 4, 8, 12, 16, 20, 24, and 28 in every SDFI are stuffed. However, for Mode II operation, the stuffed time slots are staggered from one SDFI to the next. Four different stuffing patterns are used. Every fourth time slot is stuffed using any of the stuffing patterns. However, the stuffing pattern determines exactly which group of fourth time slots are stuffed. The stuffing pattern is specified when the data assignments for the SDFI are made.

Once the 24-time-slot format is mapped to a 32-time-slot format with every fourth time slot stuffed, the 32-time-slot

data stream is sent to a large scale integration device in the SDFI. This device is called the time slot interchanger and signaling device which contains two 32 by 64 time slot interchangers. The receive time slot interchanger can switch any of the mapped 32 time slots from the T1 facility to any 1 of 64 time slots. Such switching is in response to commands from the IMPU which bases these commands on the status of the service groups. The output of the receive time slot interchanger is two serial 32-time-slot data streams. These two 32-time-slot data streams are sent over two PIDBs to the data multiplexers. One PIDB connects to the data multiplexer in service group 0, while the other PIDB connects to the data multiplexer in service group 1.

In the opposite direction, data from the two 32-time-slot PIDBs are multiplexed into a single 64-time-slot serial data stream by a multiplexer in the time slot interchanger and signaling unit. The transmit time slot interchange interchanges any of the 64 time slots to any of the 32 time slots.

One data multiplexer is equipped in each DCLU service group. The data multiplexer concentrates data from all SDFIs. In normal operation with no failures, the data multiplexer also distributes clock and sync pulses from the PIDBs to each SDFI. In the event of a data multiplexer failure, the other data multiplexer can take the additional load from the failed data multiplexer. However, during a data multiplexer failure, the connection ratio has doubled.

The data multiplexer selects incoming data from one duplicated side of the time slot interchange unit. According to a command sent from the control multiplexer, the data multiplexer selects the side from which to receive data.

Data on the PIDBs is checked by using a parity loopback technique. Each time slot can have either even or odd parity in it. For each time slot that is received, the corresponding time slot in the next frame transmitted to the data interface, is sent with the same parity as the received time slot. For example, if odd parity is received on time slot 12 by the data multiplexer from the data interface, the next frame transmitted to the data interface in time slot 12 is sent with odd parity. The data multiplexer determines the type of parity (odd or even) for each time slot and uses this information to generate parity on each of the time slots to be transmitted to the data interface. A time slot delay circuit is used to ensure that data parity on the incoming time slots can be sensed and the correct parity for the outgoing time slots can be generated.

Data received from the data interface in the time slot interchange unit is sent out to selected SDFIs by the data multiplexer. Control circuits select which SDFI receives the data during each time slot.

One control multiplexer is equipped in each DCLU service group. The control multiplexer connects to each of the SDFIs in both DCLU service groups over two PICBs. Each of the PICBs carry different types of information and provide the control multiplexer with the information necessary to perform its functions. One of the PICBs provide a communication path to the control interface in the 5ESS[®] switch IMPU. The other PICB provides the control multiplexer with information for the following functions:

- Controls the switching of pulse code modulation data through the concentrator network provided by the data multiplexer
- Selects an SDFI to be connected to a PICB
- Reports service requests from SDFIs to the IMPU
- Performs maintenance functions.

Once an SDFI is selected at the control multiplexer via a PICB, one or more orders can be made from the IMPU via a second PICB to the selected SDFIs.

Available software gives a 5ESS[®] switch office the capability to provide customer service through an integrated SLC[®] 96 carrier. Software in the 5ESS[®] switch handles the unique characteristics of lines terminated on a SLC[®] 96 carrier RT and T1 lines that connect to the 5ESS[®] switch. Call handling operations for SLC[®] 96 carrier customers are different from analog line terminations. Software in the 5ESS[®] switch recognizes that service is provided through

a *SLC*[®] 96 carrier and invokes the appropriate software routines to handle call processing.

The peripheral control software provides abstract resources of the switching machine to the feature control and terminal maintenance software in the *5ESS*[®] switch. The use of abstract terms allows the other software subsystems to be isolated as much as possible from hardware changes in the *5ESS*[®] switch office. Peripheral control routines that perform hardware functions are called drivers. A peripheral control driver provides control of the SDFI by the use of abstract names. One example of an abstract is a logical port. A logical port represents a physical connection to the *5ESS*[®] switch such as a T1 line connection. Each port is identified by a name to differentiate it from other port types. Associated with each port is a specific set of electrical characteristics.

In addition to representing the hardware in abstract terms, peripheral control provides a set of logical port primitives which are used by the feature control subsystem. A primitive is a program function or program operation performed by one software subsystem for another software subsystem. Peripheral control primitives perform *SLC*[®] carrier port activation and invoke other peripheral control routines.

Peripheral control routines and drivers use data structures to store information that represents the data paths through the DCLU. A data structure is a block of memory that is used to store data or control information that is used by peripheral control routines and drivers. The data structures used by peripheral control are as follows:

- (a) **Channel Data Block:** A channel data block exists for each of the 512 channels available on the peripheral side of the time slot interchanger within the SM.
- (b) **Channel Control Block:** The channel control block contains status information associated with a call and a communication area.
- (c) **Circuit Data Block:** One circuit data block exists for each of the 64 peripheral interface time slots with a DCLU service group.
- (d) **Path Data Structure:** The path data structure contains the name of the *SLC*[®] carrier port, a pointer to a channel control block, the PIDBs, the stuffing patterns, an SDFI, and a T1 time slot. This structure contains information associated with a path through the DCLU and only exists during port activation.

Logical port primitives, LPart, LPactsr, and LPactring perform port activation and invoke a *SLC*[®] 96 carrier path hunt routine. The logical port primitives obtain idle channel control blocks and invoke a *SLC*[®] carrier path hunt routine. The *SLC*[®] carrier path hunt routine links a channel data block and circuit data block and places a T1 time slot in the path data structure. Once the data structures are linked together to represent a path through the DCLU, hardware in one service group is activated to set up the path.

When the *SLC*[®] 96 carrier is operating in Mode II, customer lines are assigned and deassigned T1 time slots on a per-call basis. The time assignment units equipped in a *SLC*[®] 96 carrier channel bank provide a 2:1 digital concentration function. To support this operation, a peripheral control routine called the *SLC*[®] 96 carrier concentrator driver is provided. This driver performs time assignment and deassignment operations once a path has been established through the DCLU to the time slot interchange unit in the SM. The concentrator driver is not involved for Mode I where no concentration is performed, and a fixed association between the *SLC*[®] 96 carrier lines and the time slot exists. In Mode I operation, a maximum of 96 *SLC*[®] 96 carrier customers are provided with 96 T1 line channels to the *5ESS*[®] switch.

In addition to providing assignment and deassignment operations, the concentrator driver performs pulse code modulation loop testing. The concentrator driver sends two different pulse code modulation test patterns to the RT. The test pattern is looped back at the *5ESS*[®] switch. If the first test pattern is sent and returned within a specified interval, the second test pattern is sent.

4.1.6.2 Resource Utilization

4.1.6.2.1 Hardware Requirements

Hardware required to configure an integrated *SLC*[®] 96 carrier consists of *5ESS*[®] switch equipment including transmission equipment and a *SLC*[®] 96 carrier. Required *5ESS*[®] switch equipment consists of the DCLU which contains the following six codes of circuit packs.

- (a) **Equalizer (SN215, SN216, SN217, SN218, or SN219):** The equalizer is a circuit pack that ensures that the characteristics of signals between the DCLU and digital cross-connect bay remain essentially unchanged. The equalizer is equipped according to the distance that the DCLU is located from the digital cross-connect bay. One equalizer in the DCLU provides equalization for all the SDFIs equipped on one DCLU service group.
- (b) **Power Start (SN346):** The SN346 is a circuit pack required for operation of the power converters that are found on each SDFI. Each SDFI contains its own power converter.
- (c) **Power Converter Unit (494L1):** The 494L1 is a dc-to-dc power converter (-48 volts to 5 volts) for the control and data multiplexer circuit packs. Each of the SDFIs contains its own power converter.
- (d) **Control Multiplexer (UN120):** The UN120 is a circuit pack in each service group that controls the switching of the pulse code modulation data path through the concentrator network (data multiplexer circuit pack). The control multiplexer provides a communication path between the SDFIs and the control interface in the IMPU via PICB.
- (e) **Data Multiplexer (UN121):** The UN121 is a circuit pack which concentrates data from up to 30 SDFIs onto 2 PICBs which connect to the data interface in the time slot interchange unit.
- (f) **SDFIs (ANN4):** Each SDFI terminates one T1 line from a *SLC*[®] 96 carrier RT.

Required *SLC*[®] 96 carrier equipment consists of equipment required for the RT. The RT equipment consists of:

- (a) The RT enclosure is either a cabinet, frame, or hut which is provided with *SLC*[®] 96 carrier channel banks, plug-in circuit packs, power shelves, battery shelves, and battery packs.
- (b) Additional RT equipment and/or apparatus consists of a battery charger, ringing generator, reserve power battery shelves, and fuse and jack panel.

NOTE: For a description of *SLC*[®] 96 carrier equipment, refer to Section 363-202-100, *SLC*[®] 96 Carrier, General Description.

Transmission equipment required for an integrated *SLC*[®] 96 carrier consists of the following:

- (a) **Carrier Facilities:** The carrier lines may be either single or mixed-gauge, polyethylene-insulated conductor cable; or pulp (paper) insulated, copper or aluminum conductor cables with standard sheaths.
- (b) **Repeaters:** The T1 type repeaters are required to regenerate digital signals on the carrier lines. In a typical installation, repeaters are spaced at 6000-foot intervals; however, the type of carrier line selected must be considered on minimum and maximum distances between repeaters. Refer to Section 902-221-110 or Section 855-351-200 concerning digital line engineering. Repeater apparatus cases are required for the housing of the repeaters.
- (c) **ORB and Digital Cross-Connect Facility:** The T1 carrier lines from a *SLC*[®] 96 carrier RT enter the *5ESS*[®] switch office and connect to the distribution frame where protectors are provided. Connections from T1

carrier lines on the MDF run to an ORB and digital cross-connect facility. The ORB and digital cross-connect provide for maintenance and administration of the digital facilities, and in the integrated *SLC*[®] 96 carrier applications, provides power for the digital lines.

4.1.6.2.2 Software Requirements

All the necessary software to integrate a *SLC*[®] 96 carrier is provided in the 5E6 software release and all subsequent software releases.

An integrated *SLC*[®] 96 carrier requires approximately 1K-byte of SM per dynamic memory per RT. Approximately 100 bytes of SM static memory for data is required per DCLU. Approximately 25 K bytes of text memory is required to offer the integrated *SLC*[®] 96 carrier feature.

Integrated *SLC*[®] 96 carrier calls require the same amount of administrative module (AM) and SM real time as a call from a line served directly from a *5ESS*[®] switch LU.

4.1.6.3 Implementation and Administration

4.1.6.3.1 Implementation

The translations necessary to provide the integrated *SLC*[®] 96 carrier feature can be made via the initial ODA run or by RC messages. Translation arrangements for the ODA run and RC can be made via the video display terminal, *TELETYPE*[®] 4025BS teletypewriter terminal, *VT100*[™] D video terminal or equivalent, using an interactive process where the user is provided with a series of menus and views.

To access ODA, dial up the data link to Lucent Technologies, which supports this function, and follow the procedures provided in 235-118-2xx, *5ESS*[®] *Switch Recent Change Procedures*. Additional information on ODA may be found in 235-080-100, *5ESS*[®] *Switch Translations Guide (TG-5)*.

For Mode II operation, time slot stuffing patterns for the SDFI must be chosen so the stuffed time slots are staggered from one SDFI to the next.

4.1.6.3.2 Administration

4.1.6.3.2.1 Measurements

The 30-minute traffic measurements associated with the *SLC*[®] 96 carrier are sent only to an Engineering and Administrative Data Acquisition System unless otherwise requested via input messages. Maintenance personnel can, via input messages, request that the 30-minute traffic measurements associated with a *SLC*[®] 96 carrier and the DCLU also be received at the SCC and master control center (MCC). For more information on the input messages for traffic and plant measurements, refer to 235-070-100, *5ESS*[®] *Switch Administration And Engineering Guidelines*.

The 30-minute traffic measurements associated with a *SLC*[®] 96 carrier which may be requested are as follows:

- (a) ***DCLU Maintenance Usage:*** The maintenance usage count is a count of the number of time slots in a set of 64 DCLU time slots that are unavailable for customer usage.
- (b) ***RT Usage:*** The RT usage count indicates the number of time slots found in the busy state for a specified *SLC*[®] 96 carrier.
- (c) ***DCLU Terminating Attempts:*** This measurement is a peg count of the number of blocked attempts to

terminate a call on a *SLC*[®] 96 carrier (per set of 64 DCLU time slots).

- (d) **DCLU Total Usage:** The total usage count is a count of the total usage on a set of 64 DCLU time slots.

Once input message(s) have been entered to send the 30-minute traffic measurements to the MCC and SCC, the traffic measurements will continue to be printed at 30-minute intervals until disabled via another input message(s).

4.1.6.3.2.2 Charging

Billing information for calls originating on a *SLC*[®] 96 carrier connected to the *5ESS*[®] switch is collected by the billing software subsystem in the *5ESS*[®] switch. Routing and screening operations for calls are performed by the routing and terminal allocation (RTA) subsystem in the *5ESS*[®] switch. The RTA subsystem produces route and screen indexes which are used in routing the call to a destination and accessing charging information for the call.

The *5ESS*[®] switch provides a single-entry automatic message accounting record for a call that requires billing. Billing data is collected, formatted, and forwarded to a Revenue Accounting Office as a single-entry record.

Charging of calls for customers that are served through an integrated *SLC*[®] 96 carrier is the same as for calls made by customers whose lines terminate directly on an LU in the *5ESS*[®] switch office. Charging information for the different types of calls that can be made by a particular line is found in the *5ESS*[®] switch data base and is specified when data assignments for that line are made.

4.1.6.4 Other Considerations

The following questions should be considered when planning to implement an integrated *SLC*[®] 96 carrier.

- (a) Will the integrated *SLC*[®] 96 carrier be a more economic alternative than cable and structure additions for a particular application? Refer to *Loop Carrier Analysis Program and Long Feeder Route Analysis Program—LCAP2/LFRAP—General Input* (901-360-100).
- (b) Will Mode I or Mode II operation of the integrated *SLC*[®] 96 carrier provide all the services needed for a particular application? Mode II provides 2:1 concentration for lines that connect to the RT.
- (c) Is the *5ESS*[®] switch equipped with a software release that will support this feature? A *SLC*[®] 96 carrier may be integrated into a *5ESS*[®] switch with an appropriate software release.
- (d) Are line insulation testing capabilities important? Automatic and demand line insulation tests can be performed on lines served by an integrated *SLC*[®] 96 carrier. However, line insulation tests on lines served by a nonintegrated *SLC*[®] 96 carrier cannot be conducted.

4.1.7 Pair Gain Interface To Nonintegrated *SLC*[®] Carrier

4.1.7.1 Feature Description

4.1.7.1.1 Feature Definition

SLC[®] 96 Carrier

The nonintegrated *SLC*[®] 96 carrier is a digital subscriber loop carrier system which provides up to 96 subscriber channels (when fully equipped) between a COT and RT, using T1 digital lines (DS-1 rate) or other transmission

facilities such as fiber cable (DS-2). The terms "nonintegrated" and "universal" are used interchangeably to refer to *SLC*[®] 96 carriers which require a COT at the *5ESS*[®] switch. The nonintegrated *SLC*[®] 96 carrier can provide subscriber service, coin service, VF special services, and digital data port. The *SLC*[®] 96 carrier can provide a wide variety of designed special services using D4 plug-ins.

The nonintegrated *SLC*[®] 96 carrier can be equipped with different codes of *SLC*[®] 96 carrier CUs to provide the following types of services:

- (a) Single-party and 2-, 4-, or 8-multiparty service combined with 2-party ANI.
- (b) Coin telephone service with DTF and CF modes.
- (c) Special services: Many of the CUs developed for the D4 channel banks may be used. For example, VF special services include capabilities to serve PBX CO trunks.
- (d) Digital data ports with data speeds of 2.4, 4.8, 9.6, and 56 kb/s.

The system is fully compatible with both rotary dialing and touch-tone dialing (either automatic or manual).

***SLC*[®] 40 Carrier**

The *SLC*[®] 40 carrier system is a digital subscriber loop carrier providing 40 full-time speech channels (when fully equipped) between a COT and RT, using a T1-type digital line. The *SLC*[®] 40 carrier can be equipped with different codes of *SLC*[®] 40 carrier CUs to provide the following types of service:

- (a) Single-party, 2-party ANI, or multiparty ONI service capability.
- (b) Coin telephone service in the DTF or CF mode.

The system is fully compatible with both rotary dialing and touch-tone dialing (either automatic or manual).

KS-20988 Multichannel Subscriber Carrier System

The KS-20988 system is an analog carrier system which provides up to six 2-way voice grade channels (when fully equipped) on one pair of nonloaded subscriber grade cable. A typical system consists of a COT, line repeaters, subscriber terminals, and a line termination unit. The system can be used for noncoin 1-, 2-, or 4-party service with rotary or manual touch-tone dialing.

4.1.7.1.2 Availability

The KS-20988 system, the *SLC*[®] 40 carrier, and nonintegrated *SLC*[®] 96 carrier can be used with all of the software releases for the *5ESS*[®] switch.

4.1.7.1.3 Limitations

No automatic line insulation tests are run on the connections from the *5ESS*[®] switch LU to the *SLC*[®] 96 carrier COT, the *SLC*[®] 40 carrier COT, and the KS-20988 system COT. Tests made on these connections can only be performed from the line to the input of the pair gain system CU and not on the subscriber loop. For all nonintegrated pair gain lines, line insulation tests are prohibited. Prohibiting line insulation tests on nonintegrated pair gain lines is accomplished through the RC system of the *5ESS*[®] switch.

Automatic touch-tone service is not recommended for use with the system. Automatic touch-tone service refers to an automatic dialing arrangement where tones are sent automatically from the station set to the KS-20988 system.

The tones are usually sent to the KS-20988 system faster with automatic touch-tone service than with manual touch-tone service. System response for the KS-20988 system is relatively slow, and all tones automatically sent may not be detected.

4.1.7.1.4 User Operation

SLC[®] 96 Carrier

The SLC[®] 96 carrier alarms displays at both the COT and RT indicate system status and the location of a system trouble. Central office alarms indicate a service affecting problem (major alarm), a potential loss of service (minor alarm), loss of commercial power at the RT, or miscellaneous problem conditions at the RT (power/miscellaneous alarm). Alarm information can be transmitted to facilities such as a remote maintenance facility, the maintenance center, or a repair service bureau.

The COT equipment includes a fuse and alarm panel. This panel provides both audible and visual summary alarm indications to the 5ESS[®] switch and remote maintenance centers. An alarm unit equipped in the fuse and alarm panel monitors the system and initiates office alarms. Alarm arrangements are provided, including local visual alarms and connections to office alarm systems.

SLC[®] 40 Carrier

The SLC[®] 40 carrier alarms displays at both the COT and RT indicate system status and aid in corrective maintenance. Both service affecting (major) and a potential loss of service alarm (minor) in the CO indicate trouble conditions with the SLC[®] 40 carrier.

The COT equipment includes a fuse and alarm panel. This panel consists of fusing arrangements, alarm relays, power sharing resistors, and two alarm lamps.

KS-20988 Multichannel Carrier System

The KS-20988 system is complete and no adjustments are required. A visual alarm on the DC-to-DC converter is provided to indicate excessive current flow through the carrier line. The alarm will reset automatically when the trouble is cleared. The KS-20988 system COT provides for external connections at the back of the unit which includes connections for a CO alarm.

Repeatability of CO Building/Power and Miscellaneous Alarms

The *Central Office Building/Power and Miscellaneous Alarms* feature (99-5E-2779) allows a service provider to assign the building/power and miscellaneous alarms to be set to repeat every fifteen minutes until cleared. This provides reasonable assurance that an important alarm is not missed.

4.1.7.1.5 System Operation

Nonintegrated SLC[®] 96 Carrier

The nonintegrated SLC[®] 96 carrier and the 5ESS[®] switch configuration consist of a SLC[®] 96 carrier RT, a COT that connects to the RT over multiple T1 lines, and connections from the COT to the subscriber MDF and then to the inputs of the 5ESS[®] switch LU.

The nonintegrated SLC[®] 96 carrier can be configured in any of the following modes:

- (a) **Mode I-Carrier-Only Mode:** Mode I provides 96 carrier channels and dedicates one channel to each subscriber line.
- (b) **Mode II-Carrier-Concentrator Mode:** Mode II concentrates 48 lines onto 24 carrier channels per group.

- (c) **Mode III-Special Service Only:** Mode III provides 48 special service channels [coin, VF special service units or Digital Data System (DDS) data port].

The *SLC*[®] 96 carrier channel bank consists of four shelves (A, B, C, and D). The channel bank is made up of an upper shelf group (A and B) and a lower shelf group (C and D).

Customer lines served by a *SLC*[®] 96 carrier and *5ESS*[®] switch connect to a *SLC*[®] 96 carrier RT. The RT connects to the COT over multiple T1 lines. The number of T1 lines required depends on the mode of operation. For example, Modes II and III require three T1 lines (two service and one protection line), and Mode I requires five T1 lines (four service and one protection line). The COT connects to the *5ESS*[®] switch through the MDF to the *5ESS*[®] switch SM. The VF lines from the COT and MDF connect to the LU of the SM. Many types of facilities can be connected to an LU. These facilities include lines with loop-start, lines with ground-start, and trunks. The COT coin lines, single-party lines, and multiparty COT CUs connect through the MDF to the LU of the *5ESS*[®] switch. A maximum of 512 lines can run from the MDF to an LU. The digital signal level zero data port is used at the COT to provide a standard signal level to interface with other DDS equipment.

***SLC*[®] 40 Carrier**

The *SLC*[®] 40 carrier and the *5ESS*[®] switch configuration consist of a *SLC*[®] 40 carrier RT which serves up to 40 lines, a COT that connects to the RT over main and protection T1 lines, and connections from the COT to the MDF and then to the LU of the *5ESS*[®] switch SM.

The *SLC*[®] 40 carrier and the *5ESS*[®] switch can provide single- and 2-party ANI or multiparty and coin ONI service capabilities.

KS-20988 Multichannel Subscriber Carrier

The KS-20988 system consists of a COT, subscriber terminals, and line conditioning equipment. Six tip and ring pairs connect from the COT to the *5ESS*[®] switch through the MDF and then to the LUs of an SM.

4.1.7.2 Resource Utilization

4.1.7.2.1 Hardware Requirements

The *SLC*[®] 96 and *SLC*[®] 40 carriers and the KS-20988 system equipment are ordered by the outside plant engineer based on service needs.

The *5ESS*[®] switch equipment required for a *SLC*[®] consists of metallic service unit scan (TN 220 circuit pack) and distributor (TN221) points. For a *5ESS*[®] switch with a *SLC*[®] 96 carrier, a set of eight scan points are required on an office basis plus one scan point per *SLC*[®] 96 carrier.

The eight scan points are required to sense the following types of conditions:

- Major alarm
- Minor alarm
- Power minor alarm
- Fuse alarm
- Near-end trouble

- Far-end trouble
- Carrier line failure
- Remote terminal building trouble.

The additional scan point required per *SLC*[®] 96 carrier is used to identify which *SLC*[®] 96 carrier caused the alarm.

Normally, an *ESS*TM switch with a *SLC*[®] 96 carrier requires two distributor points for a channel bank loopback and a remote alarm cutoff feature. Initially, the use of distributor points for these features in a *5ESS*[®] switch will not be supported.

Scan points are required for a *SLC*[®] 40 carrier. The *SLC*[®] 40 carrier fuse and alarm panel provides provisions for sensing *SLC*[®] 40 carrier major and minor alarm conditions.

The KS-20988 system provides external alarm contacts for office alarms.

4.1.7.2.2 Software Requirements

Software required for operation of the nonintegrated subscriber loop carriers is provided with all the software releases of the *5ESS*[®] switch.

4.1.7.3 Implementation and Administration

4.1.7.3.1 Implementation

The translations necessary to provide connections (lines, trunks, coin services, etc.) to the *SLC*[®] 96 and *SLC*[®] 40 carriers, and the KS-20988 system can be made via the initial ODA run or by RC messages. The translation arrangements for both ODA and RC can be made via video display terminal, *TELETYPE*[®] 4025B teletypewriter terminal, *VT100*TM terminal, or equivalent, using the interactive process provided by the menus and views. With systems using program documentation standards (PDS) commands, use the following input message to access the RC menus and views:

```
RCV:MENU:APPRC;PRINT!
```

With the systems using the man-machine language (MML) commands (5E6 and later software releases), use RCV:MENU:DATA,APPRC, PRINT; to access the RC menus and views. Refer to 235-600-700, *5ESS*[®] Switch Input Message Manual.

The RC view transition procedures differ depending on the software release in the office. If you are not familiar with the procedures for going from one view to another, refer to 235-118-2xx, *5ESS*[®] Switch Recent Change Procedures for further details concerning the RC menus and views.

The following RC view is used to establish the translation data for lines.

LINE-COMPOSITE TELEPHONE NUMBER VIEW (RC_LINE 1): This view is used to make assignments for a line.

Assignments for lines, coin and noncoin, single- and 2-party lines connected to the pair gain systems are made the same as those for lines which do not connect to a pair gain system but are connected to a *5ESS*[®] switch. Each VF connection from the *SLC*[®] 96 and *SLC*[®] 40 carriers or the KS-20988 system COT through the MDF to a *5ESS*[®] switch LU has associated data in the data base that describes the characteristics of the connection. This data includes a line equipment number, a telephone number, and office equipment and features. Refer to *5ESS*[®] Switch Translation Guide (TG-5) for more information concerning translation data assignments.

Office records provide a listing of the actual inventories and assignments of the data base and serve as a means for administering the 5ESS[®] switch office. Office records which may be used for this feature as worksheets to aid administrative and maintenance personnel in translation data inputting and data entry into the ODA process are as follows:

- 5100-1 Telephone Number Record
- 5100-2 Supplementary Telephone Number Record
- 5171-1A/1AB Office Equipment Record
- 5171-2A/2B Office Equipment Record
- 5840 Scan Point Number Assignment Record
- 5841 Distribute Point Number Assignment Record.

Refer to Translation Guide, TG-5 for instructions for filling out the ESSTM switch forms. Copies of the reproducible ESSTM switch forms are provided in Section 10 of TG-5.

4.1.7.3.2 Measurements

Specific measurements are not made for the SLC[®] carriers; however, peg counts and usage counts associated with lines, trunks, etc., connected to the SLC[®] carriers and 5ESS[®] switch can be used. However, for an integrated SLC[®] 96 carrier; the 5ESS[®] switch measurement subsystem will provide maintenance measurements at regular intervals.

4.1.8 Loop-Start Line

4.1.8.1 Feature Description

In a loop-start line arrangement, the CO supplies battery between the ring and the tip conductors. The CO detects a loop closure from the customer station as a seizure, after which it provides dial tone on the tip and ring conductors as a start-dial signal.

4.1.8.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.9 Ground-Start Line

4.1.9.1 Feature Description

In a ground-start line arrangement, the CO provides battery through a ground detector to the ring conductor and leaves the tip conductor open. The customer station or PBX seizes the line by applying a ground to the ring conductor. The CO responds by returning ground on the tip conductor and dial tone across the tip and ring as start-dial signals. Upon detecting the tip ground from the CO, the customer station or PBX removes ground from the ring side and changes to loop closure for the off-hook state. Alerting the customer or PBX is done by connecting 20-Hz ringing to the ring conductor and ground to the tip conductor.

4.1.9.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.10 Line Sleeve Lead Control

4.1.10.1 Feature Description

4.1.10.1.1 Feature Definition

Line sleeve lead control is a feature that by means of a third wire permits operation of a device in an equipment unit external to the switching system but directly associated with the line (for example, operate a relay). The system identifies any line equipped with a sleeve lead and provides the functional operation of the sleeve lead in accordance with the application of the device associated with the line and/or detects a change of state of the sleeve lead.

The line sleeve lead control function is typically used to operate the following auxiliary circuits:

- Auxiliary line circuit
- Dial long lines circuits requiring a grounded sleeve lead to indicate seizure
- 800 Service timers
- Emergency line circuits for completion of calls to fire, police, ambulance, etc.
- No. 14-type electromechanical message registers for the Hotel/Motel Message Register feature.

NOTE: The 800 Service is not limited to the 800 NPA if the switch has implemented a toll-free treatment feature that allows additional toll-free service access codes (SAC) such as 877 or 888.

4.1.10.1.2 Availability

This feature is available with the 5E6 and subsequent software releases.

4.1.10.1.3 Limitations

The following limitations apply to the line sleeve lead control feature:

- A line in the 5ESS[®] switch is limited to one application of the sleeve lead function.
- All 2-party lines requiring a sleeve lead application must have both parties assigned to the same sleeve lead.

4.1.10.1.4 Interactions

The 4-party and 8-party line features are not allowed with line sleeve lead control.

All 2-party lines requiring a sleeve lead application must have both parties assigned to the same sleeve lead.

4.1.10.1.5 Restriction Capability

The line sleeve lead control capability is controlled only by the OTC using RC methods.

4.1.10.1.6 User Operation

The customer is unaware that a sleeve lead function is being performed when the line requiring the function is involved in a call. Depending on the type of circuit being operated (that is, message register), the feature may or may not involve customer interaction.

4.1.10.1.7 System Operation

If a sleeve lead is required for a line, it is effective on both origination and termination. In either case, the line translation indicates whether or not the line has a sleeve lead.

After the software has executed an order to operate or release the desired device in an external equipment unit, the normal call processing routines are resumed, and the call is processed the same as any other call.

4.1.10.2 Resource Utilization

4.1.10.2.1 Hardware Requirements

The line sleeve lead control function requires the use of the signal distributor points in the signal distributor plug-in circuit pack located in the metallic service unit and a ground-start dial long lines circuit SD 96371.

4.1.10.2.2 Software Requirements

The amount of program storage required by line sleeve lead control is included in the estimate of storage needed for the feature in which line sleeve lead control is used.

4.1.10.3 Implementation and Administration

4.1.10.3.1 Implementation

The *ESS*TM switch 5100-2, Supplementary Telephone Number Record and the *ESS*TM switch 5105-2, Supplementary Hunt Group Record are used to specify the line sleeve lead control feature. The RC methods can be used to add or delete this feature.

Distribute points must be wired to external equipment via the distribution frame.

4.1.10.3.2 Administration

4.1.10.3.2.1 Measurements

No measurements are required on the Line Sleeve Lead Control feature.

4.1.10.3.2.2 Charging

Any charging for the line sleeve lead control function is done in connection with the associated feature.

4.1.10.4 Other Considerations

No special planning is required for the line sleeve lead control feature.

4.1.11 Emergency Ringback

4.1.11.1 Feature Description

Emergency ringback is a feature associated with basic 911 emergency service that is used to recall a customer's station immediately following a disconnect from the caller and at the request of an emergency bureau. The request for emergency recall is transmitted from the emergency bureau as a unique signal to the CO. The recall signal applied to a customer line from the CO is either 20-Hz ringing, ROH tone, or steady high tone depending upon the supervisory state of the line.

Emergency ringback signaling to an on-hook individual or coin line is 20-Hz ringing. On-hook party lines are rung using an interleaved distinctive ringing code. Ringback signaling to an off-hook non-PBX or coin line is an ROH tone except when carrier facilities are used. In this case, high tone is returned.

4.1.11.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.12 Two-Digit Translation On Incoming Trunks

4.1.12.1 Feature Description

Two-digit translation on incoming trunks is a system-related feature that provides for address signaling from incoming trunks where one digit of a 3-digit address is suppressed by the originating office. An office arranged with this feature is capable of determining the valid 3-digit address from the digit(s) received and routing the call to its intended destination.

An example of this feature is a 411 (directory assistance) call where a step-by-step office would suppress the first digit and only send the second and third (11) digits of the intended address. The receiving office recognizes the received address as a valid 411 address and routes the call to a directory assistance operator.

4.1.12.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.13 Optional Number Of Digits On Incoming Trunks

4.1.13.1 Definition

This feature (99-5E-0204) makes the 5ESS[®] switch compatible with step-by-step offices and community dial offices that absorb a certain number of digits when they route the call to other offices.

It can be divided into two parts.

- (1) **No Digits (Direct Connect)** provide for calls to be routed to a predetermined number when a particular incoming trunk is seized. The 5ESS[®] switch then output pulses that number to another office or completes the call to a trunk (for example, 411 trunk).
- (2) **N (N > 0) Digits** is an option that allows an incoming trunk to receive a predetermined number of digits (for example, one digit, two digits, etc.) and route the call (after necessary translation to a desired number) to higher class offices or to another trunk (for example, 411, 911, 611 services) on the same 5ESS[®] switch.

4.1.13.2 Availability

This feature is available with the 5E6 and all subsequent software releases.

4.1.14 Special Information Tones

4.1.14.1 Feature Description

The special information tones (SITs) are machine-detectable tone sequences that precede announcements given to uncompleted calls. The SIT permits the automated analysis of call disposition.

4.1.14.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.15 Individual Line Ringing

4.1.15.1 Feature Description

Individual line ringing requires the application of an alternating current/direct current (ac/dc) ringing signal to activate a ringer bridged across the line within the telephone set. Under certain conditions, coded ringing signals can be used.

4.1.15.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.16 Two-Party Line Ringing

4.1.16.1 Feature Description

Two-party line ringing normally requires the application of an AC/DC ringing signal to activate a ringer from either the ring side of the line to ground within the telephone set for party 1 or the tip side of the line to ground for party 2. This method of ringing is referred to as 2-party fully selective ringing. Under certain conditions, coded ringing signals can be used.

4.1.16.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.17 Multiparty Ringing

4.1.17.1 Feature Description

Multiparty ringing is a system-related feature that provides each party of a 4- or 8-party line with a unique ringing alert signal or coded ringing. A CO requires either ac-dc and/or superimposed ringing capabilities for ringing party line stations.

The system provides ringing methods that include fully selective ringing, semiselective ringing, and coded ringing. Fully selective ringing provides for ringing each station without ringing any other station sharing the line. A common ringing code should be used for all parties. Semiselective ringing provides for the simultaneous ringing of no more than two stations with a unique ringing code for each of the two stations. Coded ringing provides for the simultaneous ringing of no more than four stations with a unique ringing code for each station.

Fully selective or semiselective ringing is required for 4-party lines. Semiselective ringing is required for 8-party lines. The 8-party coded ringing is not required for new switching systems.

4.1.17.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.18 Audible Ringing Tone

4.1.18.1 Feature Description

Audible ringing is a system-related feature that provides a ringing tone within one half second from the entry of the last valid digit to inform calling customers that the called destination is being alerted.

4.1.18.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.19 Reverting Call Service

4.1.19.1 Feature Description

Reverting call service is a service-related feature that permits a 2-, 4-, or 8-party line customer to complete a call to another party sharing the same line. A call between two customers sharing a party line is referred to as a reverting call.

4.1.19.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.20 Bridge Lifters

4.1.20.1 Feature Description

Bridge lifters are devices that electrically or physically isolate bridged telephone pairs at the CO to reduce the transmission losses. Saturable inductors, relays, and semiconductor devices are sometimes used as bridge lifters. A hypothetical example of a bridge lifter application might be a 2-party line bridged at the CO. If only one party is off-hook, the on-hook party is bridged through an inductor that isolates the on-hook loop at VFs but allows dc access. For this application, 20-Hz ringing signals should pass through the bridge lifter device. This example may not be applicable to all 2-party lines.

4.1.20.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.21 Prevention Of Service Requests By Induced Voltages

4.1.21.1 Feature Description

A system-related feature that prevents service request appearances caused by induced voltages on ground-start lines can be provided by means of an auxiliary line circuit. This type of circuit may be applied to loop-start lines or as a ground-start to loop-start converter. It is only required on a per-line basis where induced voltages would cause the system to misinterpret saturation of a current sensitive device by induced ac voltage as a (off-hook) seizure.

4.1.21.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.22 Class Of Service

4.1.22.1 Feature Description

Class of service is a feature that permits the system to identify service requirements for lines and intersystem facilities. Each line and intersystem facility terminating in a CO requires individual treatment based upon its electrical characteristics, privileges, restrictions, call processing features, charge treatment, routing, screening, etc. The

information used to define these attributes is referred to as class-of-service information.

4.1.22.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.23 Subscriber Loop Echo Return Control

4.1.23.1 Feature Description

This feature provides for limiting echo return from subscriber loops under software control.

4.1.23.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.24 Automatic Number Identification

4.1.24.1 Feature Description

4.1.24.1.1 Feature Definition

The Automatic Number Identification (ANI) is a feature which identifies an originating customer's billing number for calls routing to Traffic Service Position System (TSPS), Centralized Automatic Message Accounting (CAMA), or B911 offices. The local switching system outpulses the billing number to the operator facility after standard called number outpulsing has completed.

The ANI is performed only for line originators and is done for outgoing TSPS, CAMA, and B911 trunks.

4.1.24.1.2 Availability

The ANI feature is provided with the 5E6 and subsequent software releases.

4.1.24.1.3 Restrictions

Station identification is possible for single-party, coin, PBX, charge-a-call, hotel-motel, and 2-party lines if the office has chosen ANI for 2-party lines. The 4- or 8-party lines cannot be uniquely identified automatically.

4.1.24.1.4 Operation

After the called number has been received, the CAMA, TSPS, or B911 office sends an off-hook toward the 5ESS[®] switch. This off-hook is interpreted as the start signal for outpulsing the ANI information. Via the ANI capability, the local office will send an information digit and the NANP DN without the NPA of the billing number to the terminating/receiving office for billing or identifying the calling party. Once the trunk has gone off-hook, it will remain off-hook for the rest of the call.

For details on how ANI is outpulsed to inter-LATA carriers (ICs) with the carrier interconnect (CI) feature, see Section 3, Carrier Interconnection.

4.1.24.2 Resource Utilization

4.1.24.2.1 Hardware

No additional hardware is required for this feature.

4.1.24.2.2 Software

This feature will occupy about 2000 bytes in the SM.

4.1.24.2.3 Real-Time Impact

The ANI feature will be located in the SM. It is estimated that the call will use 10 percent more setup time than a POTS line-to-trunk call.

4.1.25 ANI6/ANI7 On A Trunk Group Or Simulated Facilities Group (SFG) (5E7)

4.1.25.1 Definition

The ANI6/ANI7 on a Trunk Group or SFG feature provides the capability of outpulsing an ANI I-digit of 6 or 7, or ANI II-digits of 06 or 07 when making an OUTWATS SFG call or a trunk origination when the class of service is PF, PFITT, or PFLASH.

The ANI digits are outpulsed before the billing DN is outpulsed, for call terminations to a CAMA, TSPS, LTOLLCON, or IEC trunk class of service. The ANI I-digit of 7 or ANI II-digits of 07 indicate to the operator system that the call requires special screening, and presumably the operator system uses the ANI information to query a data base to see how the call should be handled. The ANI I-digit of 6 or ANI II-digits of 06 indicate a call from a hotel/motel customer, and could be handled the same as the call with the ANI I-digit of 7 or ANI II-digits of 07.

4.1.25.2 Background

4.1.25.2.1 Simulated Facilities Groups

Simulated facilities are often associated with the Private Facilities Access (PFA) modular feature in Business and Residence Custom Services (BRCS). Private Facilities are various public and private trunk networks that can be accessed by an end user who is allowed dial access to these facilities. Traffic on some private facilities is limited solely by the number of physical trunks composing the private facility. In this case, if all of the physical trunks are busy, no further access to the private facility is possible until a trunk becomes idle (queuing may also be invoked). The SFGs, however, provide a method by using software to limit customer access to private facilities. The SFGs also enable certain customer services associated with private facility access to be sold on a limited access basis. As a result, the customer is dialing for access for simulated facilities.

Access to OUTWATS is provided through simulated facilities groups. The OUTWATS feature is only applicable when the OUTWATS serving switch is also the switch providing the switching for the customer. Volume control, which limits the number of calls that may be in process at any given time, is provided by using simulated facilities and/or the related trunking circuits.

4.1.25.2.2 ANI6/ANI7

The ANI7 feature provides the ability to outpulse an ANI I-digit of 7 (or ANI II-digits of 07) before the billing DN, for terminations to a CAMA, TSPS, local toll connect (LTOLLCON), or interexchange carrier (IEC) trunk class of service (that is, 0- or 0+ calls routed to operator systems). This indicates to the operator system that the call requires special screening, and assumes that the operator system uses the ANI information to perform a query to a data base to see how the call should be handled.

Before the 5E7 software release, the ANI7 feature allows provisioning of ANI7 to individual lines independent of their originating line class of service. This allows the telephone companies to monitor individual lines on 0- and 0+ calls. For customer-owned coin phones with ANI7 assigned, the current ANI7 feature provides the telephone companies the ability to keep AMA billing records on 1+ calls, by allowing a charge-a-call line class of service and the ability to transmit the digit 7 on 0- and 0+ calls. The 5ESS[®] switch, before the 5E7 software release, provides no mechanism

to provide ANI7 based on the originating trunk or simulated facilities group.

Before the 5E7 software release, ANI6 feature supports outpulsing of ANI6 based only on the originating line class of service.

4.1.25.3 Availability

This feature is available with the 5E7 and later software releases.

4.1.25.4 Feature Application

This feature is provided for any analog call using an OUTWATS SFG or any trunk origination where the trunk has a class of service of PF, PFITT, or PFLASH.

4.1.25.5 User Profile

The users of this feature are either a customer using private facilities access to the local end office [for example, a cellular mobile carrier (CMC)] or a Centrex subscriber using OUTWATS services.

4.1.25.6 User Operation

The operation of this feature is transparent to the end-user. Only the internal operation (signaling) of existing features is affected.

The operating company can assign this feature by using recent change. The ANI6/ANI7 fields are assigned to incoming or two-way PF, PFITT, or PFLASH class-of-service trunks by using Recent Change View 5.1; or to OUTWATS SFGs by using Recent Change View 10.4. The ODA forms are the TRKGRP form and the MCRTIDX form.

4.1.25.7 Restriction Capability

Not Applicable.

4.1.25.8 Compatibilities

This feature is backward compatible with the existing ANI7 capability on lines; it should not force changes to the line data to maintain the existing functionality.

4.1.25.9 Interactions

4.1.25.9.1 Simulated Facilities Group (SFG) Queuing

The SFG queuing does not affect its ANI6/ANI7 treatment. Once the OUTWATS SFG queuing call dequeues, it receives ANI treatment.

4.1.25.9.2 Call Forwarding

The ANI6/ANI7 information of call forwarding is based on the base DN.

4.1.25.9.3 CCS7 Network

The ANI6/ANI7 information is sent out over the CCS7 network interconnect.

4.1.25.9.4 Flexible ANI

For the Flexible ANI feature, ANI6 and ANI7 is considered as a hard coded class-of-service ANI pair in terms of the precedence of ANI II pairs. As a result, the Flexible ANI feature takes precedence over this feature.

4.1.25.9.5 Advanced Services Platform (ASP)

Access to ASP can be accomplished by using an OUTWATS SFG. It is not necessary to support ANI6/ANI7 for OUTWATS access to ASP, because for ASP, ANI6/ANI7 are not needed as input to the data base, and ASP can pick up new ANI information from the NCP data base as needed.

4.1.25.9.6 ISDN Switched Access to Interexchange Carrier (IEC) Services

For the ISDN Switched Access to IEC Services feature, access to the Primary Rate Interface (PRI) route to an IEC can be accomplished by using an OUTWATS SFG. The ANI6/ANI7 for OUTWATS access to the PRI is supported.

4.1.25.9.7 Modular Queuing

Calls receiving ANI6 or ANI7 treatment may be queued by the SFG Queuing feature. The fact that a call is queued should not affect the ANI digits to be signaled.

4.1.25.9.8 ANI Over Private Facilities

This feature is not required to work for calls using the ANI Over Private Facilities feature.

4.1.25.10 Engineering

4.1.25.10.1 Special Planning Considerations

Not Applicable.

4.1.25.10.2 Hardware

Not Applicable.

4.1.25.11 Assignment Dependencies and Limitations

4.1.25.11.1 Dependencies

4.1.25.11.1.1 Analog

Calls made using CAMA or TSPS trunk classes of service use traditional LAMA/CAMA signaling or operating system signaling. Calls made using LTOLLCON or IEC trunk classes of service use EA signaling.

4.1.25.11.1.2 CCS7

Calls made using the CCS7 ISUP network interconnect trunk class of service use CCS7 inter-LATA signaling.

4.1.25.11.2 Limitations

Not Applicable.

4.1.25.12 Feature Implementation Procedures

4.1.25.12.1 ODA Implementation

The ODA forms used to implement this feature are the TRKGRP form (comparable to Recent Change View 5.1) and the MCRTIDX form (comparable to Recent Change View 10.4). These forms are shown in 235-080-100, *5ESS® Switch Translations Guide (TG-5)*.

4.1.25.12.2 Recent Change Procedures

The operating company can assign this feature by using recent change. The ANI6/ANI7 fields are assigned to incoming or two-way PF, PFITT, or PFLASH class-of-service trunks by using Recent Change View 5.1 or to OUTWATS SFGs by using Recent Change View 10.4. For more information on RC/V views, see 235-118-2xx, *5ESS® Switch Recent Change Reference*.

Following are the definitions of the fields in Recent Change View 5.1 that have an impact on this feature.

- TRK CLASS — Trunk service class. For this feature the values are PF, PFITT, and PFLASH.
- DATARATE — (DATARATE) — Data rate of the trunk. Enter 56K, R64K, or 64K. (no default) (domain DATARATE).
- ANI6 — For incoming or two-way trunks with a service class of PF, PFLASH, or PFITT, acceptable values are Y (Yes) and N (No). A value of Y indicates that ANI digit "6" should be outpulsed. A value of N indicates that ANI digit "6" should not be outpulsed. ANI6 traditionally indicates that the call is from a hotel/motel customer. The default value is N.
- ANI7 — This attribute indicates to the operator system that calls may require special screening. For incoming or two-way trunks with a service class of PF, PFLASH, or PFITT, acceptable values are Y (Yes) and N (No). A value of Y indicates that ANI digit 7 should be outpulsed, a value of N indicates that ANI digit 7 should not be outpulsed. ANI7 traditionally indicates a call from a coin telephone. The default value is N.

Following are the definitions of the fields in Recent Change View 10.4 that have an impact on this feature.

- ANI IND — (ANIIND) — Automatic number identification indicator. Outpulse ANI, y or n. (default = N) (domain ACTIVE)
- ANI6 — For OUTWATS SFGs, acceptable values are Y (Yes) and N (No). A value of Y indicates that ANI digit "6" should be outpulsed. A value of N indicates that ANI digit "6" should not be outpulsed. ANI6 traditionally indicates that the call is from a hotel/motel customer. The default value is N.
- ANI7 — This attribute indicates to the operator system that calls may require special screening. For OUTWATS SFGs, acceptable values are Y (Yes) and N (No). A value of Y indicates that ANI digit 7 should be outpulsed, a value of N indicates that ANI digit 7 should not be outpulsed. ANI7 traditionally indicates a call from a coin telephone. The default value is N.
- ANI II DIGITS — (ANIINDIGITS) — Enter valid ANI II digits, 00-99, or blank for no data. (no default) (domain ANI II).

4.1.25.12.3 Assignment Verification

Not Applicable.

4.1.25.13 Feature Operation

There are three features and one type of trunk that use OUTWATS SFGs on the *5ESS®* switch. They are as follows:

- Advanced Services Platform (ASP) feature
- Automatic Route Selection (ARS) feature
- Private Facilities Access (PFA) feature
- Primary Rate Interface (PRI) trunk.

OUTWATS SFGs can be accessed by dialed code or through a route list such as those used by ARS.

The ASP may access an OUTWATS SFG type when the service control point returns an SFG routing index along with a directory number. All ASP calls use ANI II-digits to identify the call as ASP. Features (not class-of-service) using ANI II-digits always have precedence over ANI6/ANI7; therefore, ASP OUTWATS calls never have ANI6 or ANI7.

The ARS can access OUTWATS SFGs in an ARS route list allowing the call to receive ANI6 or ANI7 treatment. It is also possible to make ARS trunk originations on the PFITT, PFLASH, or PF incoming trunks that would allow ANI6 or ANI7 treatment.

The PRI trunks can access OUTWATS SFGs but do not support ANI6 or ANI7.

The PFA can access OUTWATS SFGs by using a dial code with a second dial tone or without a second dial tone allowing the call to receive ANI6 or ANI7 treatment. The PFA can also make trunk originations on the PF, PFITT, or PFLASH incoming trunks that would allow ANI6 or ANI7 treatment.

This feature is divided into two pieces, OUTWATS SFG calls and trunk origination calls. In all cases, the ANI6 and ANI7 fields are initialized to DBNO in FPBRCINIT().

4.1.25.13.1 Calls Using OUTWATS SFGs

To provide the ability to give ANI6/ANI7 on a per call basis when the caller uses an OUTWATS SFG, two new fields must be added to Recent Change View 10.4, ANI6 and ANI7. The ANI6 or ANI7 fields can be populated on Recent Change View 10.4 under the following conditions:

- When the SFG Type in Recent Change View 7.3 is OUTWATS.
- The Route Type in Recent Change View 10.4 is set to SFG.
- The ANI indicator in Recent Change View 10.4 is set to Yes.
- The ANI II digits in Recent Change View 10.4 is not set.

When an OUTWATS SFG call is made, the originating terminal process (OTP) performs precedence checks to determine which ANI to use. If the ANI II digits field is populated, then it is put into the route request message. All service features (for example, ASP) use the ANI II digits field to carry their ANI. Otherwise, the route fail message is checked to see if the ANI7 field is set to Yes. If the ANI7 field is set to No, the ANI6 field is checked. As the call progresses, checks are made to see if the ANI6 or ANI7 bits in the route request message are set to No. If the ANI6 or ANI7 bits are set to No, they are sent to the terminating terminal process (TTP).

Once in the TTP, checks are made to determine if ANI-I or ANI-II are being called if there are no ANI-II digits in the message that was sent to the TTP. The presence of ANI-II digits in the message means that the call is a service call (such as, ASP or SSP800). Service calls using ANI have the highest priority and no other indicators are considered. If necessary, checks are made to determine which ANI to use (Flexible ANI, ANI7, ANI6 or ANI associated with a class of service). In all cases, Flexible ANI is checked first and has the highest priority, then ANI7, ANI6, and finally

ANI can be assigned based on the class of service. The ANI digits are placed into the (DMDN) buffer and the call proceeds without any further impact by this feature.

4.1.25.13.2 Trunk Originations

To provide the ability to give ANI6/ANI7 treatment on trunk originations, the ANI6 and ANI7 fields must be added to Recent Change View 5.1. These bits can be populated on Recent Change View 5.1 under the following conditions:

- When the class of service is PF, PFITT, or PFLASH
- The trunk direction is set to INCOM (incoming) or TWOWAY (for two-way trunks)
- The DATARATE field is not set. (Even though PF trunks can be provisioned to carry 56kbps CSD calls, ANI6 or ANI7 cannot be set on incoming PF trunks when the DATARATE field is provisioned.)

If a two-way trunk with ANI6 or ANI7 assigned is used as an outgoing facility, ANI6/ANI7 treatment is not given.

In the OTP, ANI6 or ANI7 data for the trunk to be used is sent to the TTP. Once in the TTP, checks are made to determine if ANI-I or ANI-II are being called if there are no ANI-II digits in the message that was sent to the TTP. The presence of ANI-II digits in the message means that the call is a service call (such as, ASP or SSP800). Service calls using ANI have the highest priority and no other indicators are considered. If necessary, checks are made to determine which ANI to use (Flexible ANI, ANI7, ANI6 or ANI associated with a class of service). In all cases, Flexible ANI is checked first and has the highest priority, then ANI7, ANI6, and finally ANI can be assigned based on the class of service. The ANI digits are placed into the (DMDN) buffer and the call proceeds without any further impact by this feature.

4.1.25.14 Administration

4.1.25.14.1 Measurements

Not Applicable.

4.1.25.14.2 Billing

Not Applicable.

4.1.26 Software Controlled Connection Loss

4.1.26.1 Feature Description

To assure transmission stability in conference with the network transmission requirements, interoffice calls may require the insertion of one of several loss values (including zero loss) depending on the connection type and the interfacing facility (for example, toll connecting, direct interlocal, analog, digital). Usually these losses are fixed and traditionally provided on analog facilities external to the switching system. However, when a port can be used for two or more connection types requiring different losses (for example, toll connect and intertoll), the system is able to insert the appropriate loss.

This feature provides for the insertion, when required, of any of several possible loss levels at the loop port side or trunk port side of connections. The determination of each loss level is under software control and is a function of the transmission loss requirements for the connection.

4.1.26.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.27 Synchronization To Incoming DS1 Facilities

4.1.27.1 Feature Description

With the hierarchical synchronization plan used in the continental United States, a switching system derives its clock rate from an accurate frequency signal arriving from another office. With this feature, the switching system obtains the primary or backup reference signal for synchronization of its clock from the DS1 signals of designated digital facilities.

4.1.27.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.28 Inter-LATA-Carrier/International-Carrier Interconnection

4.1.28.1 Feature Description

This feature offers inter-LATA carriers equal access to intra-LATA carriers using a trunk type interface. With this feature, the 5ESS[®] switch can function as a local equal access end office (EAEO) or as an access tandem (AT) office. The interface allows uniform nationwide access codes, single dial tone operation, calling number identification, short dialing sequences, improved transmission and maintenance, and provides answer supervision to inter-LATA carriers. Provision is made for network management (including a selective incoming overload control capability) and traffic measurements on a per inter-LATA carrier basis, as well as other required Operations Support System interfaces. This feature is applicable to local and AT offices. For more information, refer to Section 3, Carrier Interconnection.

4.1.28.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.29 Feature Group A

4.1.29.1 Feature Description

Feature Group A provides interconnection to carriers as a line appearance on local switches (called Feature Group A Serving Offices). Feature Group A calls are those which terminate or originate at designated Feature Group A lines serving a carrier. The Feature Group A line is virtually indistinguishable from any other line served by the switch. The only substantial difference is that automatic message accounting (AMA) records are generated for all calls terminating or originating at the Feature Group A line. The address digits of the called line are sent directly to the carrier by the customer using dual-tone, multifrequency signaling. The Feature Group A Serving Office may or may not provide other forms of interconnection, independent of the provision of Feature Group A.

For more information, refer to Section 3, Carrier Interconnection.

4.1.29.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.30 Feature Group B

4.1.30.1 Feature Description

Feature Group B provides interconnection to carriers as a trunk appearance on certain local switches. Originating

calls are dialed as 950-WXXX, where the XXX identifies the carrier. (W may be any digit.) These originating calls may be routed directly from the serving switch to the carrier or via a tandem switch. In any case, an AMA record is generated on all carrier answered calls. The address digits of the called line are sent directly to the carrier by the customer, using dual-tone, multifrequency signaling. Terminating calls are also AMA recorded and may be routed directly to the switch serving the called line or via a tandem switch.

For more information, refer to Section 3, Carrier Interconnection.

4.1.30.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.31 Frequency Selective Ringing - 100 V

4.1.31.1 Feature Description

This feature provides the ability to deliver the required frequency selective ringing at 100 volts rms. Many independent telephone companies use frequency selective ringing for alerting individual customers on a multiparty line. Each station set is tuned to ring at the particular frequency assigned to that customer. Three series of five frequencies are used for frequency selective ringing. They are harmonic, decimonic, and synchrononic. These frequencies are selectable on a switch office basis. Because of the environment the 5ESS[®] switch is being placed in, the series will have to be selectable on an SM basis. This provides the ability for a remote switching module (RSM) to use a different frequency series than its host in those situations where the RSM replaces a rural office separate from the host office. Rather than replace station sets when a customer is moved from a multiparty line to a single party line, the existing station sets are retained, and the line is assigned the ringing frequency necessary to ring those station sets.

4.1.31.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.32 Frequency Selective Ringing For Integrated SLC[®] 96 Carrier

4.1.32.1 Feature Description

This feature provides the ability to deliver the required frequency selective ringing on the SLC[®] 96 carrier. Many telephone companies use frequency selective ringing as an alternative to 20-Hz ringing for alerting customers. Each station set is tuned to ring at a particular frequency. The frequencies are harmonic, decimonic, and synchrononic and are selectable on an office basis. Because the SLC[®] 96 carrier may be used in environments where frequency selective ringing is in use, this feature allows use of a frequency series different from the series used at the host office. Rather than replace station sets when a customer is moved from a multiparty line to a single party line, the existing station sets are retained, and the line is assigned the ringing frequency necessary to ring those station sets.

4.1.32.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.33 Basic Nail-Up

4.1.33.1 Feature Description

4.1.33.1.1 Feature Definition

This feature provides the ability to establish and tear down connections between any two nonswitched special

service ports on the 5ESS® switch. A nailed-up connection is a semipermanent transmission path from one digital signal level 0 (DS0) port to another DS0 port on the switch. Service requirements dictate that this transmission path be guaranteed and the signaling information not be subjected to normal call processing treatment.

4.1.33.1.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.33.2 Hardware

Hardware occupancy for a nail-up connection is similar to a POTS trunk-to-trunk call, except that it may remain stable for weeks, months, or years instead of the nominal few minutes. Resource usage consists of two SM ports on a TU or a digital trunk unit, and a TSI or TSI-TMS-TSI path through the switching fabric. Since no signaling or audible tones are needed for nail-up, no services are required of the local digital service unit (LDSU). During nail-up testing, the transmission test function (TTF) portion of the global digital service unit (GDSU) is required. The conference circuits on the GDSU are unused for nail-up.

4.1.33.3 Implementation and Administration

4.1.33.3.1 Implementation

Planning engineers, who are concerned with RSM-to-host T1 links, must account for the number of nail-up connections when deciding the number of T1 links needed by the RSM.

Planning engineers must respect the 25 percent nail-up limit for nonswitched special services unless they are prepared to accept performance degradation in switched services that coexist in the same SM. However, if no switched traffic is put on a particular SM, then all the time slots on that SM may be dedicated to nail-up. This allows a maximum of 480 nail-up ports, contained on two fully equipped digital trunk units.

4.1.33.3.2 Administration

Operating company personnel can use RC views to perform the following operations:

- Set up a nail-up connection
- Tear down a nail-up connection
- Update loss values of nail-up connections.

4.1.34 Nonsegregated T1 Special Services

4.1.34.1 Feature Description

This feature provides the ability to accept T-Carrier facilities, containing a mixture of special service and message channels, directly onto the switch and to perform the channel separation within the switch. The switch then routes the individual channel information to the appropriate transmission facilities. The feature is an alternative to performing these functions with channel banks or other similar equipment external to the switch.

4.1.34.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.1.35 Voice Frequency Data Enhancement

4.1.35.1 Description

The Voice Frequency Data Enhancement (VFDE) feature (99-5E-4413) is an enhancement to the platform-independent TR-303 capabilities. This feature establishes an extended Time-slot Management Channel (TMC) message set, providing enhancements beyond the implemented TR-303 standard.

For lines served by a TR-303 RDT, robbed bit signaling degrades the bit rate of a DS0 to 56Kbps. The VFDE feature provides an enhanced TMC message set that allows 64Kbps clear channel use of a DS0 once a call has been set up. The VFDE feature is interoperable with RDTs that do not support these new messages.

The VFDE feature applies to all analog calls to or from single party Plain Old Telephone Service (POTS) lines, Wide Area Telephone Service (WATS) lines, and Ground Start Private Branch eXchange (PBX) lines on VFDE-capable RDTs.

This is a secured feature (SFID 277) and a right-to-use (RTU) fee must be paid to Lucent Technologies before enabling information is provided.

4.1.35.2 Availability

The VFDE feature (99-5E-4413) is available as a software update to the 5E11 and 5E12 software releases and is included in the 5E13 and later software releases.

4.1.35.3 Environment

This feature is provided on a per-office basis.

4.1.35.4 Cross References

The following cross references apply to this feature:

- 99-5E-4413, Voice Frequency Data Enhancement

4.1.35.5 Background

Not applicable.

4.1.35.6 Feature Operation

When this feature is activated, the TR-303 uses VFDE signaling, unless the switch recognizes that the RTE is not using VFDE signalling. The switch then issues a Protocol Error Record (PER) and switches back to robbed-bit signaling. If the RTE begins using VFDE signaling again, the switch will also resume using VFDE protocols.

4.1.35.7 User Operation

4.1.35.7.1 For Subscribers

No subscriber actions are associated with this feature.

4.1.35.7.2 For Switch Personnel

No switch personnel action is associated with this feature.

4.1.35.8 Engineering

4.1.35.8.1 Hardware Resources

This feature works with the TR-303 interface.

4.1.35.8.2 Software Resources

The VFDE feature requires that the switch also have *SLCTM-2000* Access System Digital Loop Carrier (DLC) Subsystem Software release 4.6, which supports the enhanced message set. the enhanced message set is not supported in *SLCTM 96* or *SLCTM Series 5* DLC systems.

4.1.35.8.3 Transition Considerations

No transition considerations are associated with this feature.

4.1.35.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

4.1.35.10 Incompatibilities

No incompatibilities are associated with this feature.

4.1.35.11 Dependencies

In order for the VFDE feature to operate on an RDT, that RDT must support the VFDE enhanced TMC message set, which is supported in the *SLCTM-2000* Access System Digital Loop Carrier (DLC) Subsystem Software release 4.6.

4.1.35.12 Isolation Constraints

No isolation constraints are associated with this feature.

4.1.35.13 Recent Change Provisioning

See 235-118-2xx, *5ESS[®] Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the VFDE feature by populating the following fields in recent change and verify (RC/V) view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	277
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

Before the VFDE feature will become active for a particular RDT, the RDT must identify itself to the *5ESS[®]* switch as being VFDE-capable. The RDT does this by sending the switch a TMC "VFDE SUPPORT" information message, which the RDT does periodically or whenever a TMC link is restarted or switched.

4.1.35.14 Customer Premises Equipment (CPE)

Not applicable.

4.1.35.15 Maintenance Considerations

Not applicable.

4.1.35.16 Administration

4.1.35.16.1 Measurements

This feature does not impact measurements.

4.1.35.16.2 Billing

This feature does not impact billing.

4.2 INTEROFFICE FEATURES

4.2.1 Dial Pulsing

4.2.1.1 Feature Description

The Dial Pulsing (DP) feature provides the capability of transmitting and receiving DC address signals between offices.

Dial pulse address signals are sent as trains of on-hook pulses with the number of pulses in the trains corresponding to the digit of the address. The trains of digit pulses are separated by longer off-hook intervals called interdigital times. The time interval from the start of one on-hook pulse to the start of the next on-hook pulse in the same digit is the pulse period. The reciprocal of this period is the pulsing speed, and it is expressed as pulses per second. The on-hook pulse duration is called the break time, and the off-hook remainder of the period is called the make time. The break time, expressed as a percent of the period, is a characteristic or measure of the DP called percent break.

For reception of dial pulse addresses, the system recognizes dial pulse signals at the nominal rate of 10 pulses per second.

A dial pulse sending circuit outputs at the nominal rate of 10 pulses per second and 60 percent break. The interdigital time is at least 600 ms.

4.2.1.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.2 Multifrequency Pulsing

4.2.2.1 Feature Description

Multifrequency pulsing is a feature that provides the capability of transmitting AC address signals between offices. Each address digit is transmitted as a pulsed pair of frequencies (from a set of six). Pulses are transmitted at a rate of about 7 pulses per second.

4.2.2.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.3 Immediate Start

4.2.3.1 Feature Description

Immediate start (by-link) is a feature that provides intersystem address signaling between the *ESSTM* switch and a system that transmits and/or receives address signals without special address control signals. For the reception of digits from offices requiring immediate start, the system is prepared to recognize the first dial pulse promptly after the connect signal is received. For transmission of address information to an office requiring immediate start, the system delays outpulsing after sending the connect signal to assure that the distant office is ready.

It is desirable that the transmitting office verifies that battery and ground are of the proper polarity at the time of seizure. Failure to detect the proper condition results in a retry of the call and a failure recorded.

4.2.3.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.4 Wink Start

4.2.4.1 Feature Description

Wink start is a feature that provides control for address signaling between systems arranged with wink start as a special address control signal. The wink start signal is applicable to specified incoming, outgoing, and 2-way trunks and is used to inform the calling office that the called office is prepared to receive address signals.

A wink start signal consists of a brief off-hook. If the calling office receives an off-hook signal of more than the expected wink duration on a 2-way trunk, the signal is interpreted as a glare condition. (A glare condition is the result of nearly simultaneous seizures of a 2-way trunk at both ends.)

For wink start operation, the transmitting office tests for the detection of the brief off-hook as a signaling integrity check.

4.2.4.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.5 Delay Dial

4.2.5.1 Feature Description

Delay dial is a feature that provides control for address signaling between systems arranged with delay dial as a special address control signal. The delay dial signal is applicable to specified incoming, outgoing, and 2-way trunks and is used to inform the calling office that the called office is not prepared to receive address signals.

For delay dial operation, the originating system detects the on-hook to off-hook transition of the delay dial signal shortly after sending the connect signal. Receipt of the on-hook to off-hook and back to on-hook condition is an indication of signaling integrity.

4.2.5.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.6 Stop-Go

4.2.6.1 Feature Description

Stop-go is a feature that provides control of intersystem address signaling between a local switching system and an intertoll trunk that is arranged for stop-go signaling.

Stop-go operation is similar to delay dial except that the delay dial signal of the stop-go operation is sent during interdigital time after one or more digits have already been sent on an immediate start basis. The off-hook transition constitutes a stop pulsing signal, and the transition back to on-hook is the go signal. This operation is only required where a local switching system is establishing a call over a toll connecting trunk via an intertoll step-by-step system to a common control system that does not have immediate start capability or in certain tandem tie trunk networks. Dial pulsing is always used.

In the toll connecting application, the stop signal is generated first by the intertoll step-by-step system when it is about to seize a trunk to the called office. This stop signal is then extended by an overlapping delay dial signal from the called office until it is ready to receive dial pulses. The local switching system is capable of detecting the stop dial signal during interdigital time. After detecting the go signal, the local switching system resumes outpulsing of the address digits. The local switching system is not required to generate stop-go signals.

4.2.6.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.7 Loop Signaling Arrangements

4.2.7.1 Feature Description

Signaling arrangements where DC supervisory, address, and control signals are superimposed on the same conductors that are used for transmission are referred to as loop signaling arrangements. The following are supervisory states which are required for various loop signaling arrangements:

- Reverse battery (RB)
- High low
- E and M lead interfaces.

4.2.7.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.8 Reverse Battery

4.2.8.1 Feature Description

The trunk circuit at one end of a variety of loop signaling trunks applies battery and ground through suitable resistances to the tip and ring conductors. One polarity on the tip and ring leads is used for the on-hook state, and the reverse is used for the off-hook state. The trunk circuit at one end of a variety of loop signaling trunks provides supervisory signaling by means of loop signaling states. On a loop signaling trunk, the on-hook state is an open (infinite resistance) across tip and ring. The off-hook state is a relatively low resistance across tip and ring.

4.2.8.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.9 High Low

4.2.9.1 Feature Description

The trunk circuit at one end of a variety of loop signaling trunks provides supervisory signaling by changing the

impedance it applies across the tip and ring conductors. A high-low trunk indicates the on-hook state by a high resistance across tip and ring. The off-hook state is a relatively low resistance across the tip and ring.

4.2.9.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.10 E And M Lead Interfaces

4.2.10.1 Feature Description

The E and M lead trunks make use of separate leads for signaling. Either E and M leads or E, M, SG, and SB leads are used. Ground and open states are used for off-hook and on-hook, respectively, on the E lead for signaling from the trunk facility to a trunk circuit. Battery and ground or battery and open states are used for off-hook and on-hook, respectively, on the M lead for signaling from a trunk circuit to the trunk facility. The SG and SB leads may be used to supply the signaling ground and battery when a looped conductor arrangement is desired.

4.2.10.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.11 Intra-Office Connecting Arrangements

4.2.11.1 Feature Description

An intra-office connecting arrangement is required to establish a connection between two customers served by the same switching system.

4.2.11.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.12 Local RB Supervision, MF Or DP

4.2.12.1 Feature Description

A local incoming trunk with loop supervision is used to complete a call from a distant local office to a customer served by the home office. The home office uses RB supervision toward the distant office. Either DP or multifrequency (MF) signaling may be used.

4.2.12.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.13 Local E And M Lead Supervision, MF Or DP

4.2.13.1 Feature Description

A local incoming trunk with E and M lead supervision is used to complete a call from a distant local office to a customer served by the home office. Supervision is handled over the E and M leads. The DP is received on the E lead, and MF signaling is received over the transmission leads.

4.2.13.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.14 Tandem RB Supervision, MF Or DP

4.2.14.1 Feature Description

A tandem incoming trunk with loop supervision is used to complete a call from a distant local office to a customer served by the home office or to another distant office. The RB supervision is used toward the originating distant office.

4.2.14.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.15 Tandem E And M Supervision, MF Or DP

4.2.15.1 Feature Description

A tandem incoming trunk with E and M lead supervision is used to complete a call from a distant office to a customer served by the home office or to another distant office. Supervision is handled over the E and M leads. The DP is received on the E lead, and MF signaling is received over the transmission leads.

4.2.15.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.16 Immediate Start RB Supervision, DP

4.2.16.1 Feature Description

An immediate start incoming trunk with loop supervision is used to complete a call from a distant step-by-step office to a customer served by the home office or to another distant office. Immediate dial operation is used with the incoming DP being either loop or battery and ground pulsing. The RB supervision is used toward the originating distant office.

4.2.16.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.17 Immediate Start E And M Lead Supervision, DP

4.2.17.1 Feature Description

This immediate start incoming trunk is similar to the immediate start incoming trunk with loop supervision, except that E and M lead supervision is used. Incoming DP is on the E lead.

4.2.17.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.18 Tandem Completing Toll

4.2.18.1 Feature Description

Incoming toll completing trunks are used to complete calls from a toll office to a customer served by the home office. Supervision and address signaling are handled as described above for the loop and E and M lead local incoming trunks.

4.2.18.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.19 Toll Switching, Distant Building

4.2.19.1 Feature Description

A variety of trunks are used to complete toll calls from 3CL switchboards in distant buildings to customers served by the office. Supervision may be high-low, RB, or by E and M leads. Address signaling is by either DP or MF signaling. Coin control signals are handled by inband MF signals. Rering is controlled either by wink or inband MF signals.

4.2.19.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.20 Verification

4.2.20.1 Feature Description

Verification service is a feature which permits operators to establish a connection to a customer line to verify a busy condition. Operator access for verification is provided over dedicated facilities and special verification trunks which interconnect class 5 offices and operator systems. In the class 5 office, the verification access is obtained via incoming "no-test" trunks and associated facilities. The facilities may connect directly to a manual switchboard or to a switched verification network accessed by remote operator systems [for example, Traffic Service Position System (TSPS)]. The trunks may use RB loop or E&M lead supervision, with MF or DP signaling.

4.2.20.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.21 Local Test Desk Or Cabinet Access

4.2.21.1 Feature Description

Test trunks are used to establish test connections from a local test desk or cabinet to a customer line via the local switching system. These connections are required for testing, maintenance, and busy verification. Access to both busy (no test) and idle (regular test) lines is required.

4.2.21.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.22 Outgoing Interoffice Trunks

4.2.22.1 Feature Description

Outgoing interoffice trunks are used to handle calls between two local offices or from a local office to a toll office (tandem access toll trunks).

4.2.22.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.23 Loop Supervision, MF Or DP

4.2.23.1 Feature Description

Outgoing loop trunks use loop or high-low supervision toward the distant office. The RB supervision is returned from the distant office. Address signaling is by either DP or MF signaling.

4.2.23.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.24 E And M Lead Supervision, MF Or DP

4.2.24.1 Feature Description

Outgoing trunks may use E and M lead supervision. Address signaling may be by MF signaling over the transmission leads or DP on the M lead.

4.2.24.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.25 Directory Assistance

4.2.25.1 Feature Description

Directory assistance trunks are used to complete calls to operators when the customer has dialed the directory assistance number. These types of trunks may use RB loop supervision or E and M lead supervision, and may be used to or from centralized locations in distant buildings.

4.2.25.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.26 Switchboard

4.2.26.1 Feature Description

Trunks may be provided to a 3CL switchboard in the same or in a distant building when a customer dials a "0" call for operator assistance. A class-of-service tone to identify the customer's class of service may be used. Either RB, high-low, or E and M lead supervision may be used to a distant building. Only loop supervision is used within the same building.

4.2.26.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.27 Traffic Service Position System

4.2.27.1 Feature Description

Trunks to a traffic service position in a TSPS No. 1 System are provided for "0", "0+", and "1+" calls. Both coin and noncoin stations may be served. High-low-reverse battery, or E and M lead supervision is used. Address signaling is by MF signaling. Address signaling is followed by automatic number identification (ANI). Multiwink, expanded inband, and inband coin control and ringback signals are used. After address signaling, the connection can be released only after TSPS returns on-hook supervision.

4.2.27.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.28 Repair Service Bureau Access

4.2.28.1 Feature Description

This access provides a routing arrangement by which a customer dialing 611 or a designated NANP DN without the NPA is connected to a Repair Service Bureau for the purpose of reporting trouble. Repair service trunks to operator switchboards are no longer required.

4.2.28.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.29 Access To Local Test Desk

4.2.29.1 Feature Description

Outgoing test trunks are provided to complete calls to a local test desk or other test equipment for test and maintenance purposes. These are used by craftspersons at the customer's station.

4.2.29.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.30 Centralized Intercept

4.2.30.1 Feature Description

Intercept trunks are used to complete calls to an operator or an announcement machine when the called number has been disconnected, has been changed, or is out of order.

4.2.30.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.31 Interoffice (MF And DP)

4.2.31.1 Feature Description

Two-way trunks may be used to provide the combined functions of the incoming and outgoing trunks already described. E and M lead supervision is used.

4.2.31.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.32 Switchboard And Desk

4.2.32.1 Feature Description

Two-way trunks may be used to provide the combined functions of the one-way trunks already described. Both loop supervision and E and M lead supervision are used.

4.2.32.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.33 Outgoing Centralized Automatic Message Accounting Trunks

4.2.33.1 Feature Description

When message billing is provided via a distant centralized automatic message accounting (CAMA) office, dedicated CAMA trunks are used for the completion of direct distance dialing (DDD) calls through the CAMA office. On CAMA calls, the calling number is outpulsed via ANI or, when necessary (for example, multiparty calls), identified by an operator number identification (ONI). A TSPS No. 1 system may be used for the CAMA function, in which case TSPS trunks instead of CAMA trunks are used for completing DDD calls.

4.2.33.2 Availability

This feature is provided with all software releases.

4.2.34 Direct Ports To PCM Facilities

4.2.34.1 Feature Description

Direct ports to pulse code modulation (PCM) facilities provide for direct connection from a switching network to a PCM digital terminal. A digital switching system having this feature avoids the conversion from one digital signal to another.

4.2.34.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.35 Direct Ports To DS1 Facilities

4.2.35.1 Feature Description

Direct ports to DS1 facilities provide for a direct connection from a switching network to a DS1 digital terminal.

4.2.35.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.36 Voice Path Assurance Test

4.2.36.1 Feature Description

This feature provides the capability for making a voice path assurance (VPA) test for the CCS trunks. This test ensures the integrity of the voice path since the signaling path and voice path are separate on CCS trunks.

4.2.36.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

4.2.37 Toll Switching Same Building

4.2.37.1 Definition

The Toll Switching Same Building feature allows trunks which are used to complete toll calls to customers served by the central office to use trunks with up to five conductors when the 3CL switchboard is in the same building as the central office, in addition to those trunks used when the switchboard is in a distant building. The multiwire trunks use sleeve lead supervision. Coin control signals are sent over tip and ring leads and rering control signals are on the tip lead. Dial pulsing and MF signaling are used.

4.2.37.2 Availability

This feature is available with the 5E6 and subsequent software releases.

4.2.38 800-Post Dial Delay Multifrequency Signaling Response Reduction

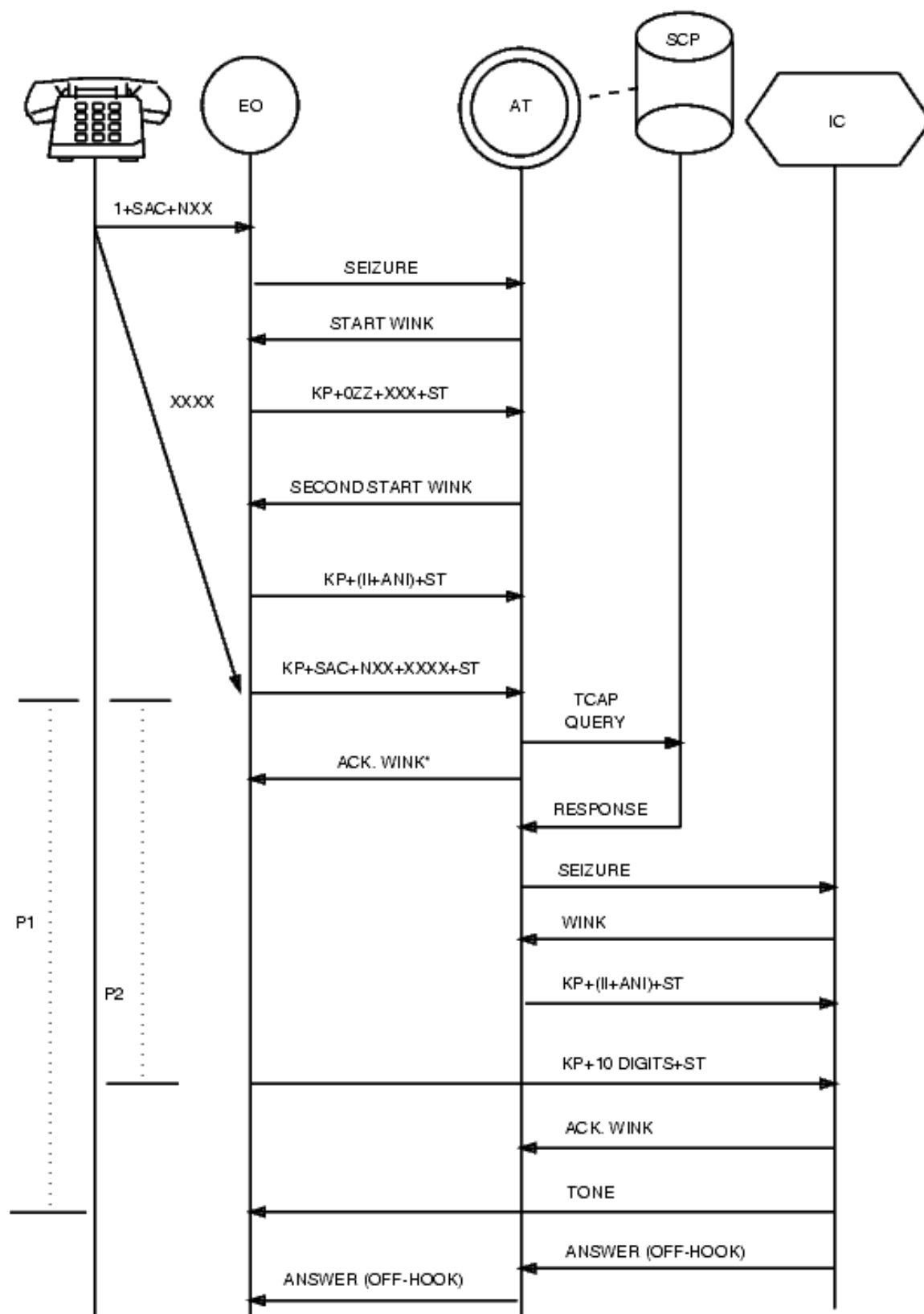
4.2.38.1 Definition

This feature is a special feature that reduces the post-dial delay (PDD) for SSP 800 calls by approximately 1.29 seconds when a 5ESS[®] switch acts as an access tandem (AT) switch and is receiving MF impulsing. This feature reduces the call setup time associated with SSP 800 calls by compressing the components that account for the processing and hand-off of data to the interexchange carrier (IC) office.

Part of this reduction is applicable when the connection between the end office (EO) and the AT is MF signaling. There is more reduction if the AT performs the 800 data base query. Refer to Table 4-2 for the MF Signaling Response Reduction components. Figure 4-2 shows the signaling flow between network elements. This figure should be referenced when considering the tables in this section.

Table 4-2 MF Signaling Response Reduction

AREA	FEATURE NOT ACTIVATED ^a	FEATURE ACTIVATED ^a	REDUCTION ^a
START WINK LENGTH	220	150	70
WAIT BEFORE SECOND START DIAL	800	200	600
SECOND START WINK LENGTH	220	150	70
WAIT BEFORE TCAP QUERY	550	0	550
SAVINGS			1290
Notes:			
a. The values presented in this table are in milliseconds.			



*THE FEATURE INTERCHANGES THE ORDER OF AT ACTIONS.

Figure 4-2 Equal Access MF Signaling Sequence (Feature Activated)

4.2.38.2 Cross-References

The following cross-references are applicable to the Multifrequency Signaling Response Reduction feature:

- Feature number is 99-5E-1325
- NSEP/5SEP number is not available.

4.2.38.3 Availability

This feature is available with a software update to the 5E6, 5E7, and 5E8 software releases and is generally available with 5E9(1) and later software releases.

Because this is a secured feature it will not be enabled until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature enabling is provided upon ordering. Contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

4.2.38.4 Background

The Federal Communications Commission (FCC) docket 86-10, released September 4, 1991, specifies that the following criteria be met prior to 800 service implementation by the Local Exchange Carriers (LECs):

- By March 1993, 97 percent of toll-free calls should have a post-dial delay of no more than 5 seconds.
- By March 1995, 100 percent of the calls should have a post-dial delay of no more than 5 seconds, with a mean delay of no more than 2.5 seconds.

This FCC guideline impacts LECs who have not deployed Signaling System 7 (SS7) widely in their network or have certain network architectures that cause them to not meet the hand-off time requirements. A longer post dial delay is apparent when inband (MF) signaling is used between the end office and the access tandem and/or between the access tandem and the Interexchange Carrier (IC). A longer PDD also occurs when the end office switch is directly connected to the IC switch and inband signaling is used between the two switches.

NOTE: The 800 Service is not limited to the 800 NPA if the switch has implemented a toll-free treatment feature that allows additional toll-free service access codes (SAC) such as 877 or 888.

4.2.38.5 Feature Application

This feature is provided on a per-office (switch) basis.

4.2.38.6 User Perspective

4.2.38.6.1 End-User Perspective

This feature is a network intersystem signaling feature. While the end-user has no direct control over this feature, the end-user may notice a reduction in the post-dial delay (that is, the 800 calls are set up faster when inband signaling is used in the network). Figure 4-2 shows the end-user's perceived post-dial delay for a tandem MF network. The delay which the end-user perceives is marked as "P1" and differs from the network view of post-dial delay "P2". While the network view of 800 post-dial delay is the time it takes the EO (after the end-user finishes dialing) to provide the IC all information necessary to establish a call, the end-user's view of post-dial delay is the

delay from when the end-user finishes dialing to when the end-user hears audible ringing.

4.2.38.6.2 Customer Premises Equipment

Private Branch Exchanges that connect to the switch using the MF signaling protocol will see the impact of this feature when initiating calls. This can include all the changes described in this document, but would usually be limited to a shortened start wink.

4.2.38.7 User Operation

Because this feature represents a network interswitch MF signaling functionality, the end-user has no control over the use of this feature. The end-user may notice a shorter post-dial delay for calls requiring inband signaling within the network.

4.2.38.7.1 Activating the Feature

Information on feature activation is provided upon ordering. Contact your Lucent Technologies Account Representative for ordering information and the Right-to-Use (RTU) fee associated with this feature.

4.2.38.7.2 Invoking the Feature

This feature is automatically invoked once the special secured feature has been activated.

4.2.38.7.3 Deactivation

This information will be supplied upon ordering.

4.2.38.8 Interactions

This feature does not change any functionality of switch-based features. However features which utilize MF signaling are subject to reductions made by this PDD feature.

4.2.38.8.1 Advanced Service Platform (ASP) Services

The ASP network makes extensive use of EA/MF signaling. If the response reduction feature is activated, the ASP interface is subject to any applicable reduced values.

4.2.38.8.2 Emergency (911) Services

The E911 service utilizes CAMA/MF signaling. If the response reduction feature is activated, the E911 interface is subject to any applicable reduced values.

The CST calls utilize EA/MF signaling. If the response reduction feature is activated, CST calls are subject to any applicable reduced values.

4.2.38.9 Assignment Dependencies And Limitations

4.2.38.9.1 Dependencies

No feature dependencies have been identified.

4.2.38.9.2 Limitations

While network integration of SS7 decreases the post-dial delay associated with toll-free number service calls, the optimum deployment of SS7 (with regard to toll-free number service calls) is top down. In other words, the network

architectures which utilize SS7 to connect the SSP ATs to the ICs show the fastest setup times. In networks where SS7 has been installed between the EO and the AT and MF has been left between the AT and the IC, this feature has no impact. MF outpulsing is then needed to complete the call to the IC. The MF outpulsing between EO and AT, and between AT and TO can be reduced by purchasing the 800 PDD Transmission feature (99-5E-1437).

4.2.38.10 Feature Operation

This feature impacts every MF connection to the AT, including CAMA, Traditional, and Equal Access (EA) signaling. Connections via traditional and CAMA signaling benefit from a shorter start wink. The EA and especially SSP 800 calls receive further reductions.

4.2.38.10.1 EA to AT Connection With Feature Not Activated

This feature addresses the reduction of PDD for SSP 800 calls that route from an EO to an AT. Figure 4-3 illustrates a typical network setup.

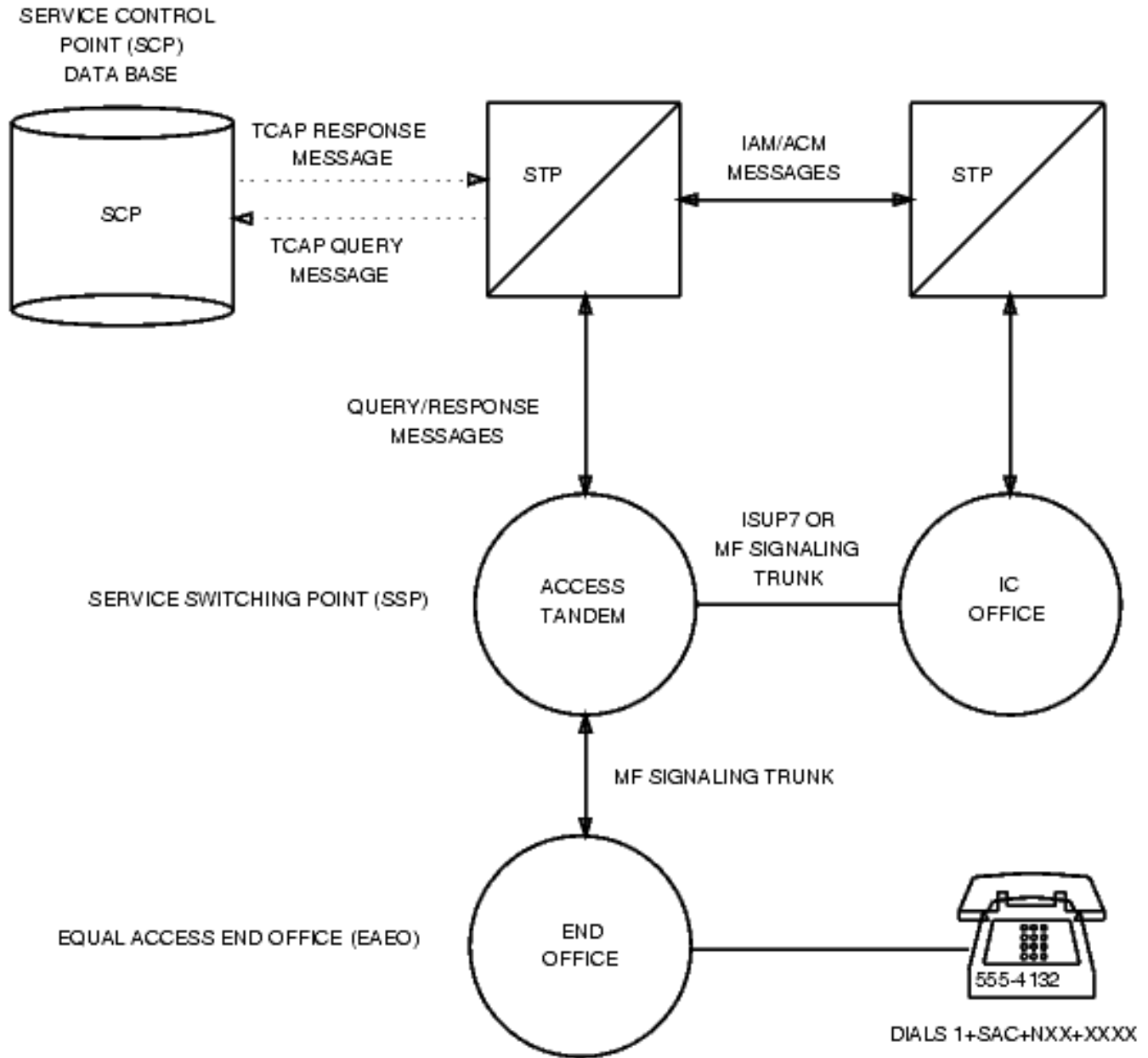


Figure 4-3 Typical Office Configuration

The customer proceeds to dial a toll-free number, 1+SAC+ a NANP DN without the NPA, and the EO routes the call to the AT. Post-dial delay begins once the dialing customer dials the last DTMF digit (presses the digit button). The call is routed over an MF trunk which requires interoffice, inband MF signaling. The AT represents the SSP office which allows translations for toll-free service.

Figures 4-2 and 4-4 show what occurs in MF signaling for SSP 800 calls and the particular portion of that signaling which this feature will address. The EO attempts to seize the MF trunk for signaling use. The trunk seizure is made upon receiving all but the last four digits (overlap outpulsing) and while still continuing to receive the remaining digits, the call setup proceeds.

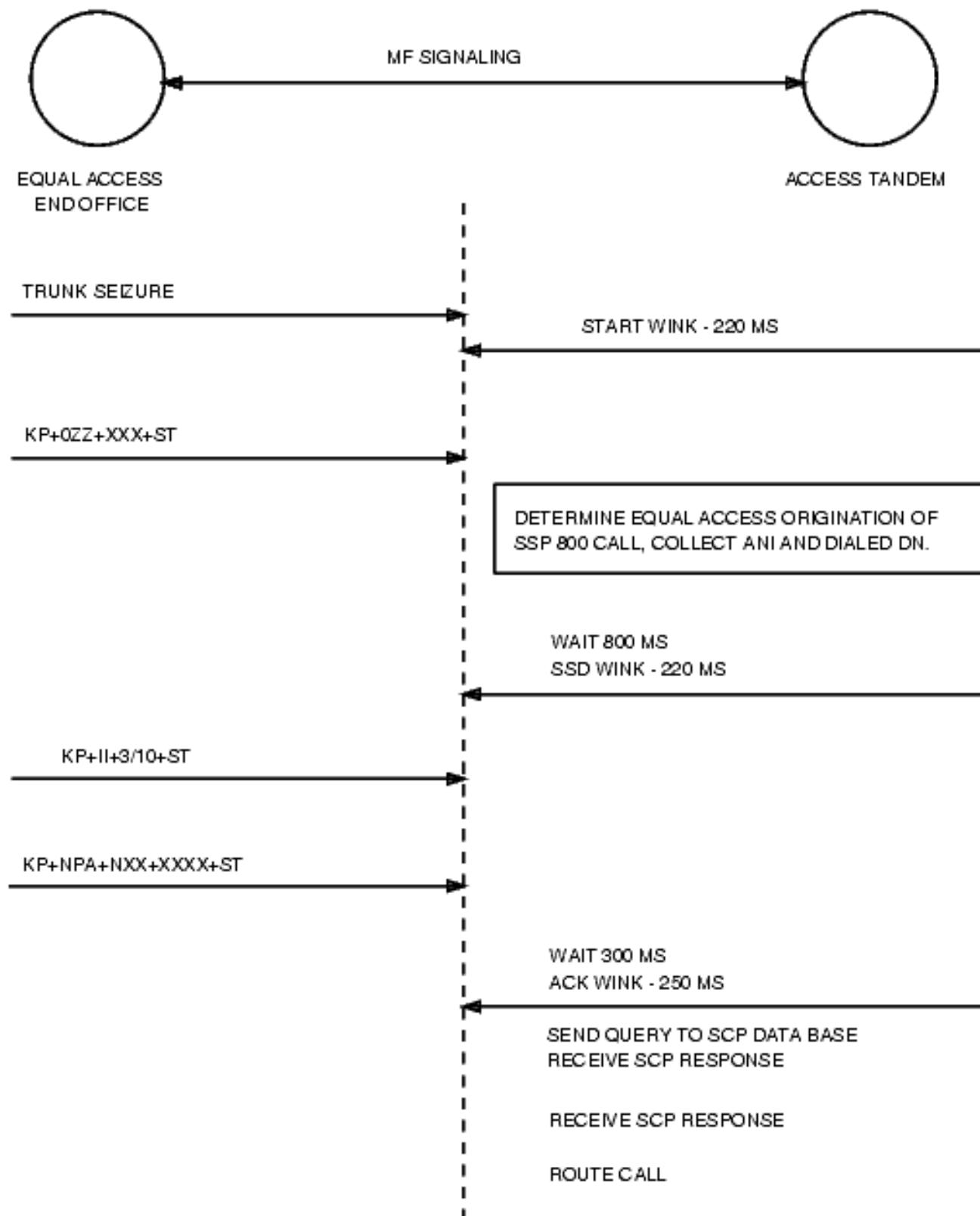


Figure 4-4 EA/SSP 800 MF Signaling With Feature Not Activated

The AT responds by sending a start wink in the form of an off-hook/on-hook sequence to the EO to inform the EO that the AT is ready to receive digits. The off-hook duration for the start wink is 220 ms. Once the EO receives the start wink, the EO sends the KP 0ZZ+XXX+ST digit sequence.

At this point in the call, the AT can do either of the following:

- It routes the call to an IC and cuts through the connection so that the EO and the carrier can complete the EA signaling. The start wink from the carrier is repeated by the AT to the EO to initiate further outpulsing.
- It collects the ANI and called digits from the EO in order to further process the call. This processing can be for either provide SSP 800 service or interworking the MF signaling with SS7 signaling to the IC office.

In order to further process the SSP 800 call, the AT sends a second start dial (SSD) wink back to inform the EO that the AT is ready to receive the ANI digit sequence, KP+II+3/10+ST, as well as the dialed digit sequence, KP+ a full NANP DN +ST. The ANI digits represent information about the calling party such as the class of service (II) and the calling DN (3/10). The AT waits 800 ms before sending the SSD wink. The SSD wink is also an off-hook/on-hook sequence that lasts 220 ms. After receiving the SSD wink, the EO sends the ANI and dialed digit sequences. After receiving the last MF digit, the AT waits 300 ms before sending an Acknowledgment (ACK) wink back to the EO indicating that the digits were successfully received. The duration of the ACK wink off-hook signal is 250 ms.

If the AT recognizes that the call applies to toll-free service, which requires a query to the SCP data base, the AT formats and sends a query message over the SS7 system. The call is then routed to either SS7 or MF trunks to the IC, according to the routing DN returned in the SCP response message. This may be over either an MF or CCS trunk to the IC.

The formal end of post-dial delay occurs when the IC receives the address information, either in the IAM message transmitted over the SS7 network or with the last MF digit for inband signaling.

4.2.38.10.2 EA Signaling to the AT with Feature Activated

This feature reduces the post-dial delay by approximately 1.29 seconds using timing reductions in three areas.

4.2.38.10.2.1 Standard Wink Length Reduction

The length of the off-hook in the off-hook/on-hook sequence of a wink signal is reduced by this feature. The start wink is reduced from 220 ms to 150 ms. Other types of signaling such as traditional and CAMA take advantage of the shortened start wink length. In most cases, the SSD wink, which starts the 2nd phase of outpulsing, has its length reduced from 220 ms to 150 ms. This applies to AT operation for SSP 800 calls, and interworking MF to SS7. The reduction of the off-hook length meets the off-hook period for a standard wink outlined in the LSSGR requirements of 140 ms to 290 ms. Refer to Bellcore LSSGR, Section 6.3.4.3.

The total reduction, including reduction of both the Start and SSD winks, is 140 ms.

4.2.38.10.2.2 Second Start Dial Wink Delay Reduction

The reason for providing this SSD delay pertains to allowing enough time for intermediate offices to set up their connections.

The delay before the AT sends the SSD wink to the EO is reduced from 800 ms down to 200 ms. This meets Bellcore requirements which specifies a wait of a minimum of 200 ms. The total post-dial delay reduction is 600 ms.

4.2.38.10.2.3 ACK Wink And SCP Query Interworking

The existing procedure of sending the ACK wink to the EO before sending a query to the SCP is modified by this

feature, so that they proceed in parallel. To do this, the query message is formatted and sent by the AT first. After the query is sent and while the SCP is processing the request, the AT sends the ACK wink back to the EO. Once the ACK wink finishes, the AT waits for a response message from the SCP data base.

The normal ACK wink process takes 550 ms. This consists of the 300 ms delay before sending the wink and the 250 ms wink length. The time used to send the query over the CCS network, to access the external data base, and to receive the response message back over the network varies and cannot be controlled by the 5ESS[®] switch. From Bellcore studies, this elapse time averages 600 ms. Refer to the Bellcore Special Report SR-NWT-002251 Section 2, "Background."

Another part of this query/response process involves message processing, transmission, and queuing within the switch, which varies depending upon switch load conditions. The additional switch time is minimally 100 ms, for a total of at least 700 ms for the whole query/response process.

When sending the query to the SCP first, the SCP can process the request while the switch generates the ACK wink, rather than doing the two operations in series. The currently anticipated reduction to the PDD is 550 ms, just from this reordering.

If the query/response process becomes faster than the current systems provide, the response message could wait upon the completion of the ACK wink. Processing of the response would continue once the ACK wink finishes. Since this improvement might occur from technical evolution of the external SCP system, the wait before the ACK wink is reduced from 300 ms to 200 ms.

The total reduction to the post-dial delay in all three areas for the AT amounts to 1.29 seconds. The changes to the AT can be seen in Figure 4-5 . A summary of the timing reductions provided by this feature can be found in Table 4-2 .

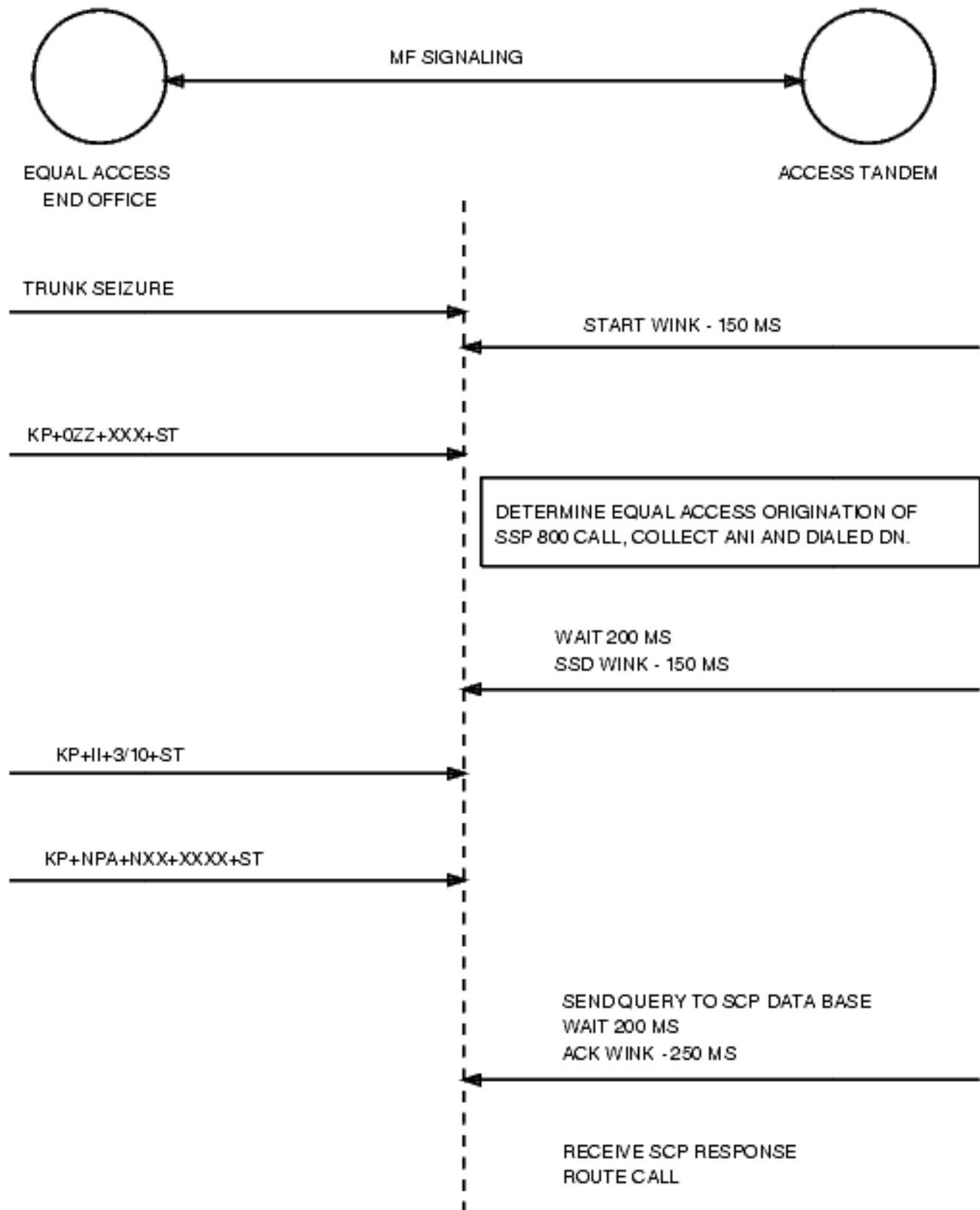


Figure 4-5 PDD Reduction

4.2.38.10.3 System Perspective

From a call processing perspective, the incoming MF trunk at the AT end handles the initiating of the winks that are sent back to the EO. The incoming trunk sends the Start and SSD winks each with 150 ms off-hook length.

The AT sends the SCP query message, which is sent out over the CCS network from the STP. The message is received and the SCP data base is accessed. During this time the AT sends the ACK wink to the EO while the SCP is generating a response to the query message.

4.2.38.11 Administration

4.2.38.11.1 Measurements

There are no new measurements pertaining to this feature. There is an existing count in Section 91 of the 30-minute traffic report that is pegged for ACK wink failures that occur before the query is sent to the SCP. The count heading is FAIL-2S-EA.

The existing count that is pegged, for ACK wink failures for ASP after the initial query, is called FAIL-CP-AIQ and is in Section 118 of the 30-minute traffic report.

The existing count that is pegged, for ACK wink failures on SSP 800 calls after the initial query, is called FAIL-CP-AIQ in Section 91 of the 30-minute traffic report. Refer to 235-070-100, Appendix 1, *5ESS® Switch Administration And Engineering Guidelines — Appendix 1, Traffic And Plant Measurements* for more information.

4.2.38.11.2 Billing

There is no impact in this area.

4.2.39 800-Post Dial Delay Multifrequency Signaling Transmission Reduction

4.2.39.1 Definition

The 800-Post Dial Delay MF Signaling Transmission Reduction feature is a special feature that reduces the call setup time when a 5ESS® switch employs MF and DTMF signaling.

This feature reduces the PDD time associated with SSP 800 calls. This feature compresses the components that account for the signaling from the end office (EO) to the access tandem (AT) and from the EO directly to the interexchange carrier (IC) office. This feature modifies the transmission to the Point of Presence (POP) by up to 3.3 seconds when used in both the EO and AT.

NOTE: This feature is being supplied for those network configurations that cannot satisfy the FCC order by implementing the 800-Post Dial Delay Multifrequency Signaling Response Reduction feature 99-5E-1325. (See "Background," Section 4.2.39.4 .) This feature allows signaling at a rate faster than thresholds supplied in the LSSGR. [See Bellcore document "LATA Switching Systems Generic Requirements (LSSGR)," TR-NWT-000506, Issue 3, September 1991.]

The amount of reduction of PDD for the MF transmission portion is a configurable option per switch/SM. Its impact depends on the Network Configuration.

This reduction is applicable on connections that employ MF signaling, including those from an EO to an AT, from an EO to a POP, and from an AT to a POP. Tables 4-3 and 4-4 show reductions based on network configuration.

Table 4-3 MF Signaling Transmission Reduction to AT

AREA	FEATURE NOT ACTIVE ^a	60 ms OPTION ^a	50 ms OPTION ^a

	LENGTH	MULTI-PLIER	LENGTH	REDUC- TION	LENGTH	REDUC- TION
MF DIGIT SIGNAL LENGTH	70	31 Digits	60	620	50	1240
KP DIGIT SIGNAL LENGTH	110	3 Sequences	90	60	90	60
WAIT BEFORE KP	150	3 Sequences	0	450	0	450
DELAY BEFORE KP	50	3 Sequences	50	0	0	150
SAVINGS				1130		1900
Notes:						
a. The values presented in this table are in milliseconds.						

Table 4-4 MF Signaling Transmission Reduction to IC

AREA	FEATURE NOT ACTIVE ^a		60 ms OPTION ^a		50 ms OPTION ^a	
	LENGTH	MULTI-PLIER	LENGTH	REDUC- TION	LENGTH	REDUC- TION
MF DIGIT SIGNAL LENGTH	70	24 Digits	60	480	50	960
KP DIGIT SIGNAL LENGTH	110	2 Sequences	90	40	90	40
WAIT BEFORE KP	150	2 Sequences	0	300	0	300
DELAY BEFORE KPP	50	3 Sequences	50	0	0	100
SAVINGS				920		1400
Notes:						
a. The values presented in this table are in milliseconds.						

4.2.39.2 Cross-References

The following cross-references are applicable to the 800 PDD features:

- Multifrequency Signaling Transmission Reduction LSSGR or feature number 99-5E-1437.
- NSEP/5SEP Number is not available.

4.2.39.3 Availability

This feature is available with a software update to the 5E6, 5E7, and 5E8 software releases and is generally available with 5E9(1) and later software releases.

This feature is installed as a secured special feature using the secured features recent change view. Because this is a secured feature it will not be enabled until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature enabling is provided upon ordering. Contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

4.2.39.4 Background

The Federal Communications Commission (FCC) docket 86-10, released September 4, 1991, specifies that the following criteria be met prior to 800 service implementation by the Local Exchange Carriers (LECs):

- By March 1993, 97 percent of 800 calls should have a PDD of no more than 5 seconds.

- By March 1995, 100 percent of the calls should have a PDD of no more than 5 seconds, with a mean delay of no more than 2.5 seconds.

This FCC guideline impacts certain LECs who have not deployed Signaling System 7 (SS7) widely in their network or have certain network architectures that cause them to not meet the hand-off time requirements. Longer PDD is apparent when inband signaling is used between the end office and the access tandem and/or between the access tandem and the Inter-exchange Carrier (IC). Longer PDD also occurs when the end office switch is directly connected to the IC switch and inband signaling is used between the two switches.

4.2.39.5 Feature Application

This feature is provided on either a per-SM or per-office (switch) basis.

4.2.39.6 User Perspective

4.2.39.6.1 End-User Perspective

This feature is a network intersystem signaling feature. While the end-user has no direct control over this feature, the end-user may notice a reduction in the PDD (that is, the 800 calls are set up faster when inband signaling is used in the network). Figure 4-6 shows the end-user's perceived PDD. The delay that the end-user perceives is marked as ``P1" and differs from the network view of post-dial delay ``P2". While the network view of 800 PDD is the time it takes the EO (after the end-user finishes dialing) to provide the IC all information necessary to establish a call, the end-user's view of PDD is the delay from when the end-user finishes dialing to when the end-user hears audible ringing.

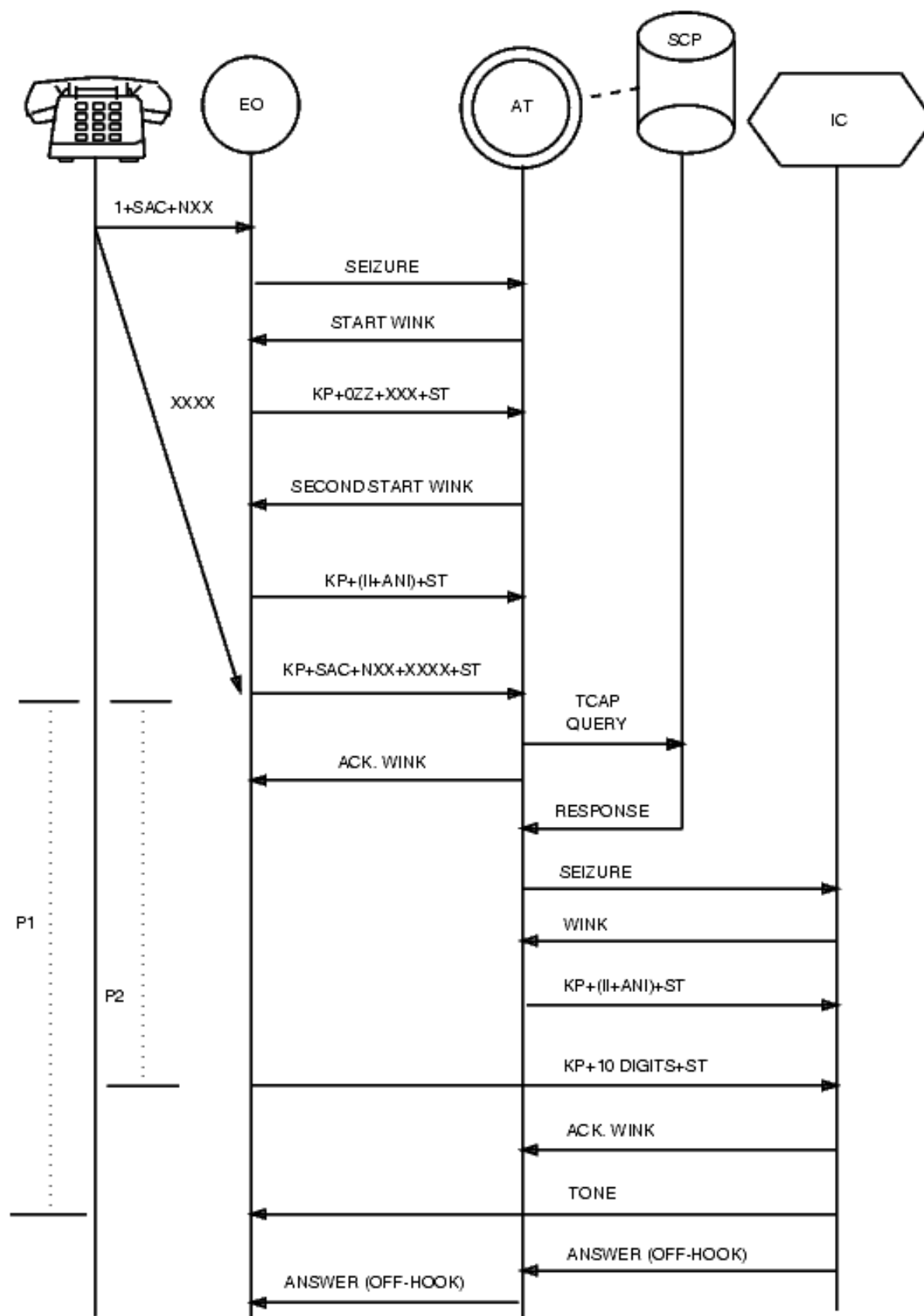


Figure 4-6 Equal Access MF Signaling Sequence for SSP 800**4.2.39.6.2 Customer Premises Equipment**

Private Branch Exchanges and other devices that receive MF and DTMF from the switch are impacted by this feature. Those devices must be able to detect the shorter digits sent by the switch.

4.2.39.7 User Operation

Because this feature represents a network interswitch MF signaling functionality, the end-user has no control over the use of this feature. The end-user may notice a shorter post-dial delay for calls requiring inband signaling within the network.

4.2.39.7.1 Activating the Feature

Information on feature activation is provided upon ordering. Contact your Lucent Technologies Account Representative for ordering information and the Right-to-Use (RTU) fee associated with this feature.

4.2.39.7.2 Invoking the Feature

This feature is automatically invoked on all calls that use MF and DTMF outpulsing, once the feature has been activated. Once activated, any one of three options are available (off, 60 and, 50).

Changing the speed option on switching modules equipped with local digital services units (LDSU) versions with pumpable digital service unit 2 (DSU2) devices requires initialization of the LDSU. This is also true of LSDUs having pumpable DSU1 with TN1637 circuit packs, but is not true for the firmware based non-pumpable DSU2s which are not changed with this feature. SMs equipped with DSU1 devices do not need to be initialized to implement the speed change.

The speed is controlled by how the option bits are set. The option bits are set in the Secured Feature Upgrade View for pre-5E9 feature use and in the Optioned Feature View for 5E9 feature use. The settings of the option bits and the outpulsing speeds are as follows:

Option ID 549	Option ID 556	Speed
N	N	70 ms
N	Y	70 ms
Y	N	60 ms
Y	Y	50 ms

The LDSU is initialized, in those cases where needed, by sequentially removing from service and then restoring to service each of the two service groups in the unit. Both operations are required, but diagnostics need not be performed.

With the initial introduction of this feature as a software update (SU), the feature may be activated and the speed options set prior to the installation of the SU. When this occurs, any necessary initialization of the LDSU will occur when that unit has the new software pumped.

The software update must be applied during low call traffic periods. The DSU1 may drop active trunk calls while applying or backing out the software update.

4.2.39.7.3 Deactivation

This information will be supplied upon ordering.

4.2.39.8 Interactions

This feature does not change any functionality of switch-based features. However features which utilize MF and DTMF signaling are subject to the options chosen for this PDD feature.

4.2.39.8.1 Advanced Service Platform (ASP) Services

The ASP network makes extensive use of EA/MF signaling and is subject to any applicable reduced values according to the option as selected for the transmission feature.

4.2.39.8.2 Emergency (911) Services

E911 service which utilizes CAMA/MF signaling is subject to any applicable reduced values according to the option as selected for the transmission feature.

CST calls which utilizes EA/MF signaling is subject to any applicable reduced values according to the option as selected for the transmission feature.

4.2.39.9 Engineering

4.2.39.9.1 Hardware

There are no new hardware requirements for this feature.

4.2.39.9.2 Software

Software which controls the pumpable DSU2 or a pumpable DSU1 with TN1637 is needed to allow for selection of the faster MF transmission rates. This firmware is pumped to the DSUs during the software update installation process.

As was previously mentioned, the faster timing options of 50 or 60 ms can be provided by pumpable DSU1 and DSU2 peripherals, as well as the DSU1 with UTG. Nonpumpable DSU2 peripherals will not have the firmware changes necessary to implement the reduced digit and interdigit timing.

4.2.39.10 Assignment Dependencies And Limitations

4.2.39.10.1 Dependencies

No feature dependencies have been identified.

4.2.39.10.2 Limitations

While network integration of SS7 decreases the PDD associated with toll-free number service calls, the optimum deployment of SS7 (with regard to toll-free number service calls) is top down. In other words, the network architectures which utilize SS7 to connect the SSP ATs to the ICs show the fastest setup times. In networks where SS7 has been installed between the EO and the AT and MF has been left between the AT and the IC, this feature only impacts the AT and IC connection. Refer to Table 4-4 .

4.2.39.11 Feature Operation

This feature impacts all MF and DTMF outpulsing by the switch.

4.2.39.11.1 EO to AT Connection with Feature Not Activated

This feature addresses the reduction of PDD for SSP 800 calls that route from an EO to an AT. Figure 4-3 illustrates a typical network setup.

The customer proceeds to dial an 800 number, 1+800+ a NANP DN without the NPA, and the EO routes the call to the AT. Post-dial delay begins once the dialing customer dials the last DTMF digit (presses the digit button). The call is routed over an MF trunk which requires inter-office, inband MF signaling. The AT represents the SSP office which allows translations for 800 service.

Figures 4-6 and 4-7 show what occurs in MF signaling for SSP 800 calls and the particular portion of that signaling which this feature will address. The EO attempts to seize the MF trunk for signaling use. The trunk seizure is made upon receiving all but the last four digits (overlap outpulsing) and while still continuing to receive the remaining digits, the call setup proceeds.

The AT responds by sending a Start wink in the form of an off-hook/on-hook sequence to the EO to inform the EO that the AT is ready to receive digits. Once the EO receives the Start wink, the EO prepares to send a KP signal, which denotes the start-of-address signal to unlock the AT digit receiver that lasts 110 ms. The EO, however, delays 200 ms before sending the KP signal for two-way trunks.

With MF pulsing, the signals are actually pulses of pairs of selected tones used to represent digits. A tone pair can be either on or off and, during outpulsing, the tone is on for a certain duration before being turned off. The KP tone is on for 110 ms before the 0ZZ+XXX+ST digit sequence is sent to the AT. Each digit, including the ST or Start (end-of-address and start call processing) signal, is on for 70 ms. This is the duration of the signal or the digit timing. After the 70 ms expires, the digit tone is turned off for another 70 ms before the next digit tone is to be turned on. The duration between digit tones is known as the interdigit timing.

At this point in the call, the AT can do either of the following:

- It routes the call to an IC and cuts through the connection so that the EO and the carrier can complete the EA signaling. The start wink from the carrier is repeated by the AT to the EO to initiate further outpulsing.
- It collects the ANI and called digits from the EO in order to further process the call. This processing can be for either SSP 800 service or interworking the MF signaling with SS7 signaling to the IC office.

In order to further process an SSP 800 call the AT sends a second start dial (SSD) wink back to inform the EO that the AT is ready to receive the ANI digit sequence, KP+II+3/10+ST, as well as the dialed digit sequence, KP+ a full NANP DN +ST. The ANI digits represent information about the calling party such as the class of service (II) and the calling DN (3/10). After receiving the SSD wink, the EO delays 200 ms on 2-way trunks before sending the KP signal for both the ANI and dialed digit sequences. The digit and interdigit timing for both digit sequences is again 70 ms.

If the AT recognizes that the call applies to 800 service, which requires a query to the SCP data base, the AT formats and sends a query message over the SS7 system. The call is then routed to either SS7 or MF trunks to the IC, according to the routing DN returned in the SCP response message.

In routing over an MF trunk to the IC, the protocol consists of two digit sequences of inband signaling: the ANI sequence and the routing DN sequence. These are transmitted in a manner similar to the sequences above. In cases where the SSP 800 call routes to a SS7 connection from the AT to the IC, and also when regular (non SSP 800) EA calls are signaled MF from the EO to the AT and then SS7 to the IC, the same information is included in an Initial Address Message (IAM).

The formal end of post-dial delay occurs when the IC receives the address information, either in the IAM message transmitted over the SS7 network or with the last MF digit for inband signaling.

Figure 4-7, with MF between the EO and AT, uses the same signaling as the preceding, and is also speeded up by this feature.

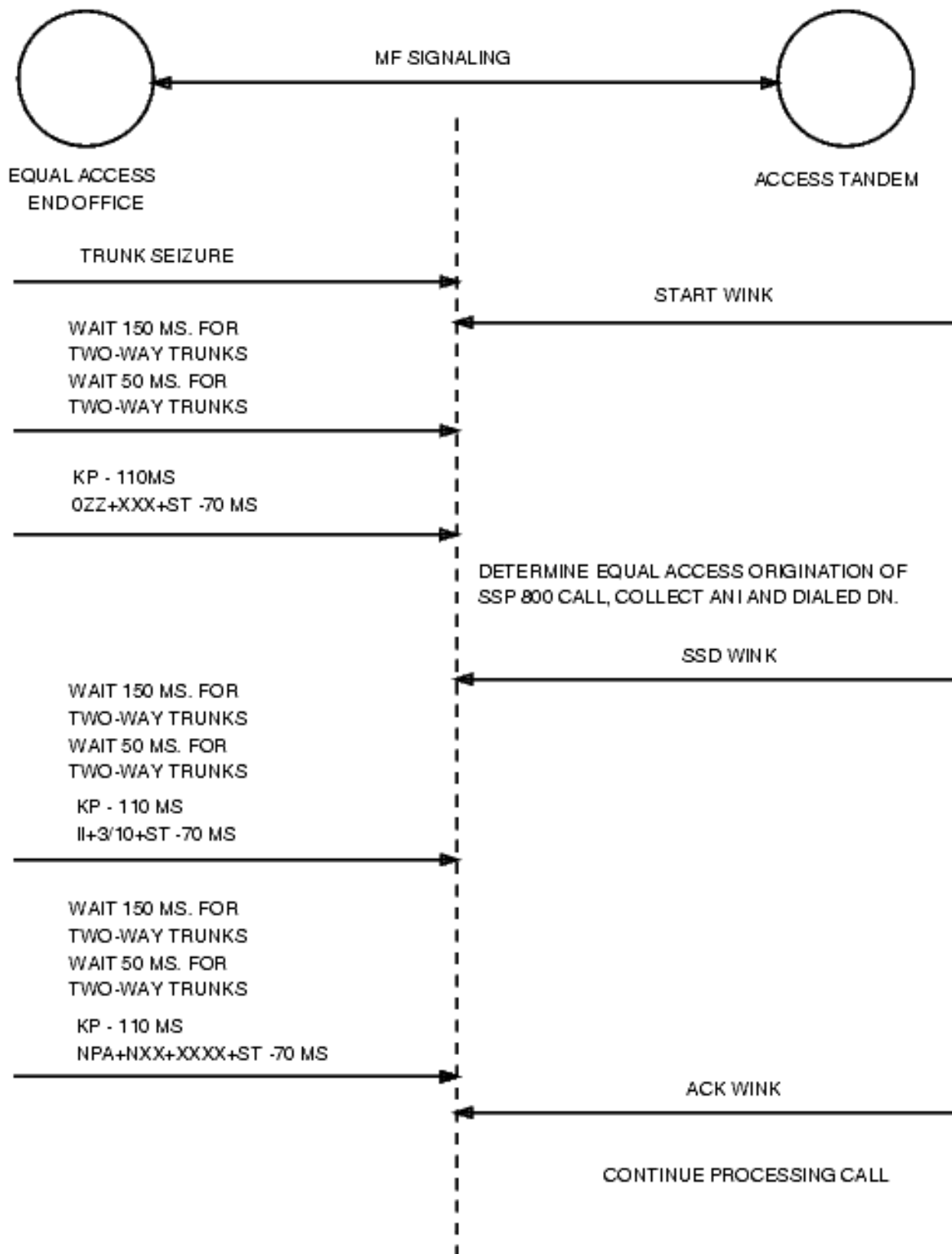


Figure 4-7 MF Signaling EO to AT with Feature Not Active

4.2.39.11.2 Post-Dial Delay Transmission Reductions

This feature accomplishes transmission reduction by modifying MF signaling protocol used by calls routing over MF trunks. The protocol changes are beneficial to all MF calls, but for this feature's concern, particularly for SSP 800 calls. Refer to Table 4-3 and Figure 4-8 for typical EO to AT connection reductions.

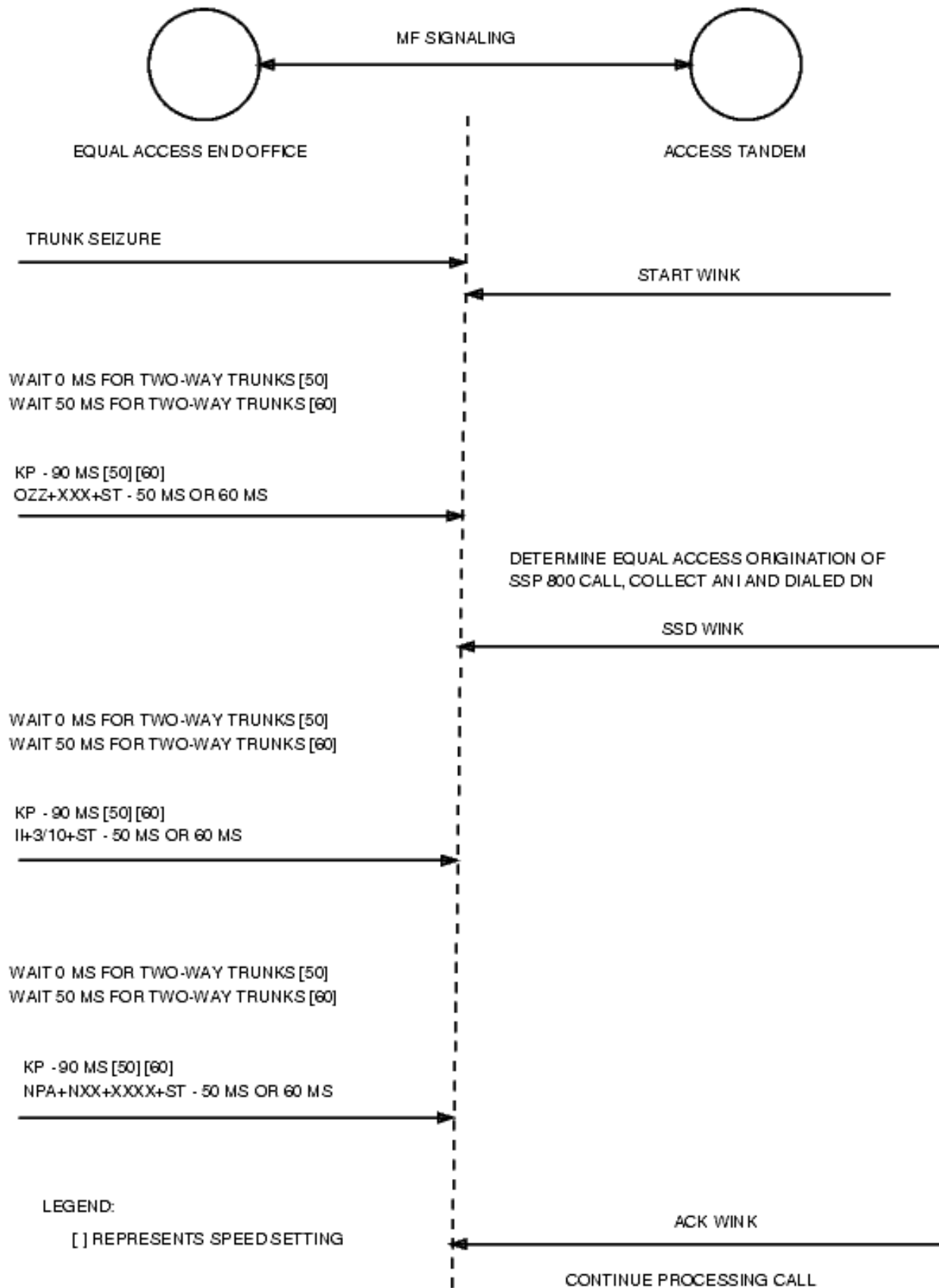


Figure 4-8 PDD Transmission for EO-AT Connection

4.2.39.11.3 Other Office Connections

This feature will impact more than the EO to AT connection in the above network configuration. Where an EO connects directly via MF to the IC, and where the AT collects the ANI and called DN for processing and then signals using MF to the IC, there are two digit sequences that are speeded up. Examples of these network configurations are shown in Figures 4-9 and 4-10. The flow diagram for the direct connections is shown in Figure 4-11.

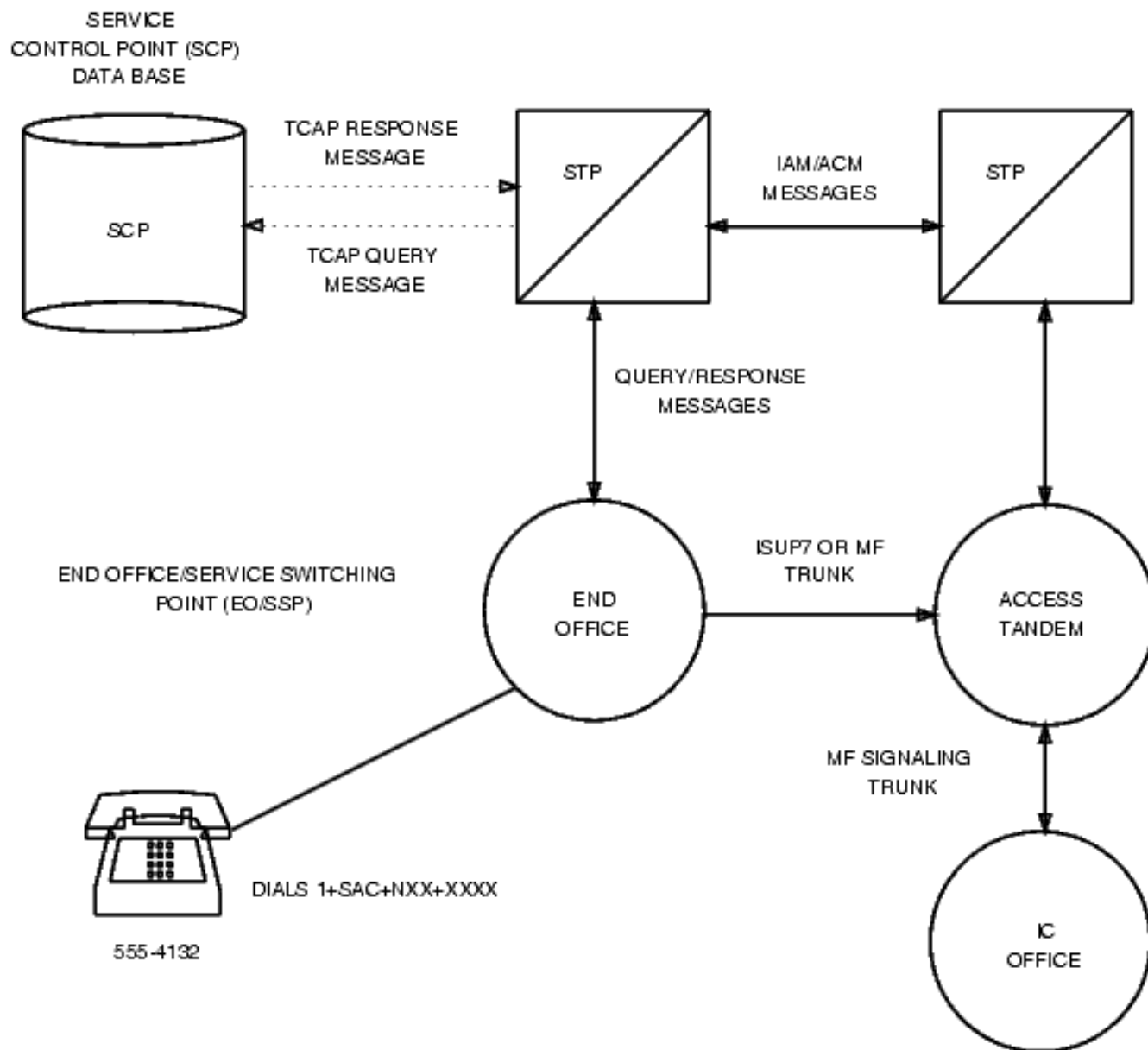


Figure 4-9 Other Office Configuration I

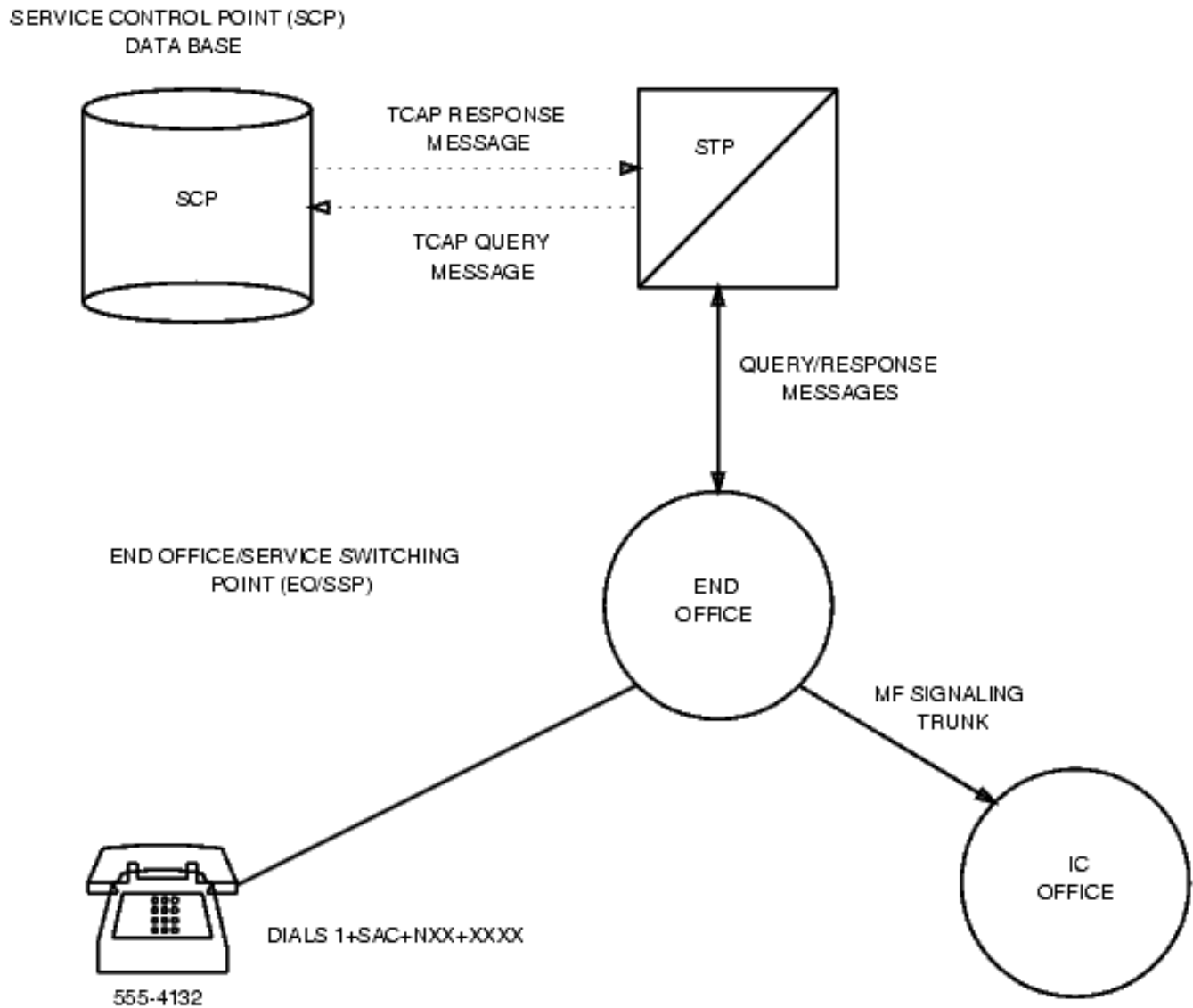


Figure 4-10 Other Office Configuration II

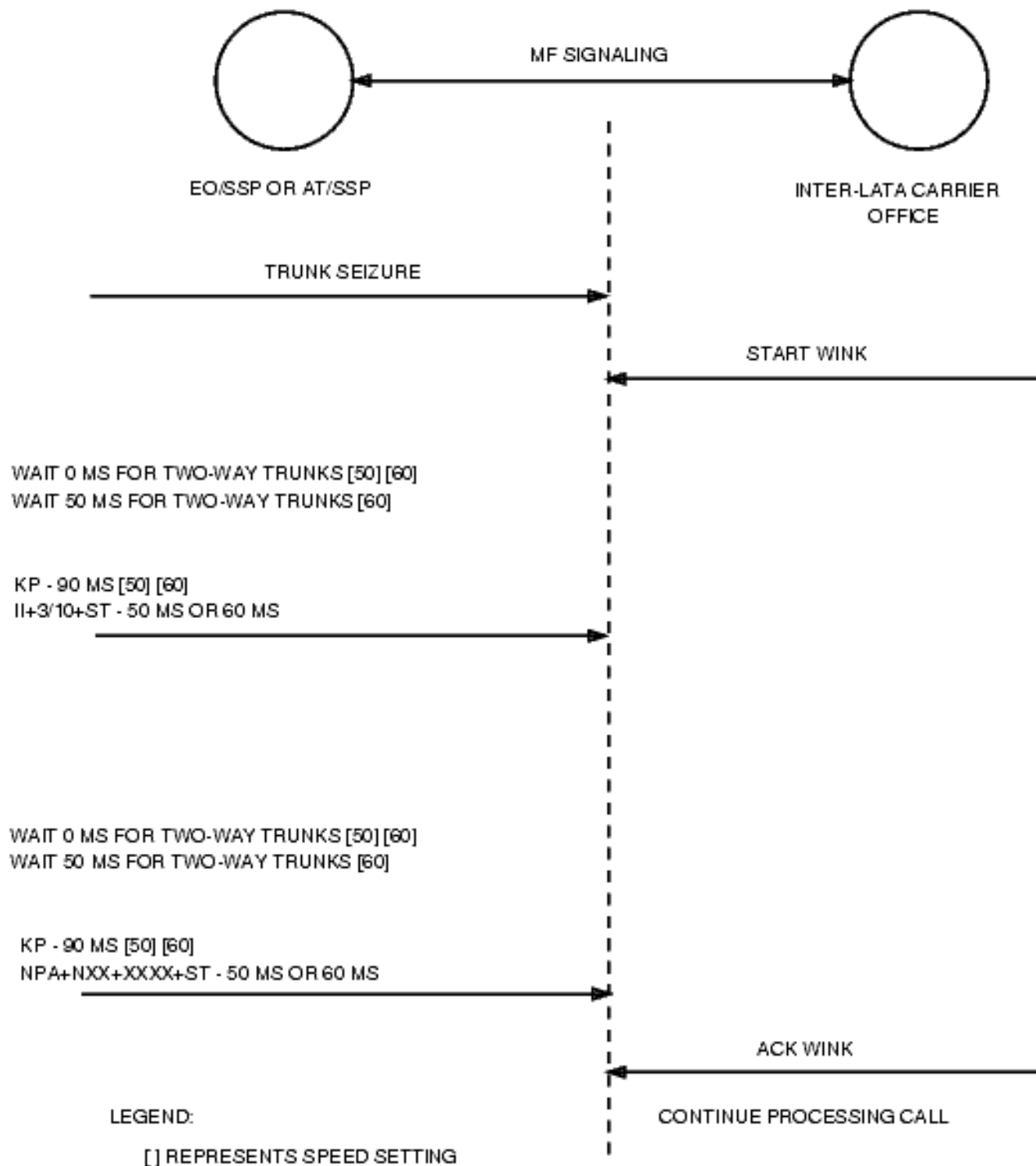


Figure 4-11 MF Signaling to IC with Feature Active

EA connections through an AT, other than for SSP 800 and interworking to SS7 from MF, reflect the outpulsing of the EO. If the EO is equipped with this feature, it will outpulse more quickly and the call setup times will benefit. Such MF connections are inherently faster than that for SSP 800 because the AT does not need to collect and then retransmit the ANI and called number stages.

In addition to EA and SSP 800 connections, The actual reductions depend on the number of digits transmitted and whether the trunk is two-way or not. Refer to Table 4-4 and Figure 4-12 for direct connection reductions.

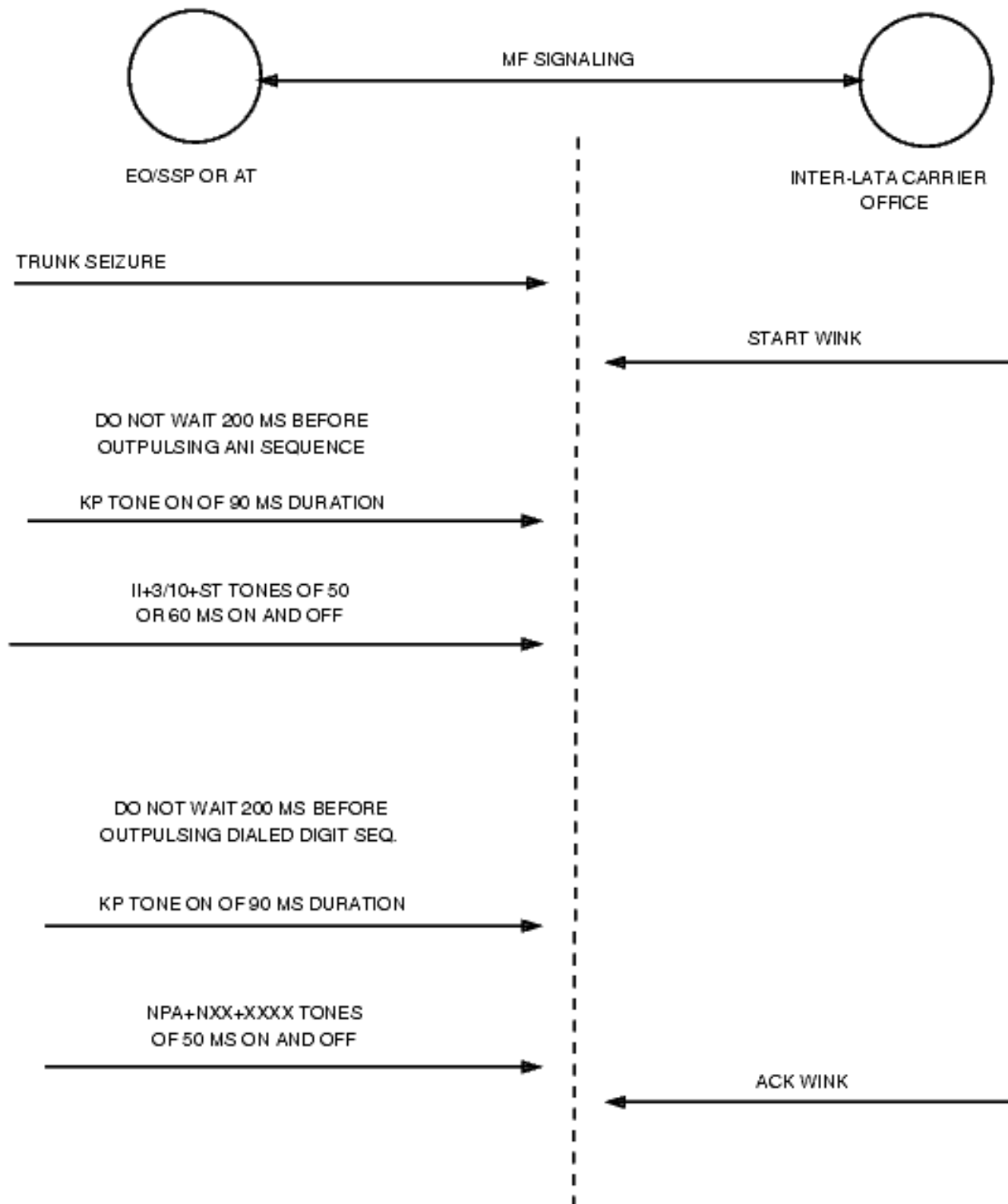


Figure 4-12 MF Signaling for Direct EA Connections with Feature Active

4.2.39.11.3.1 Wait and Delay Before KP Signal

Before each digit sequence is sent, the EO waits 150 ms before initiating the sending of the KP signal for two-way trunks. With the both the 50 ms and the 60 ms speed settings, this wait is removed.

There is an additional 50 ms wait before the KP for all MF trunks. When the speed is set to 50 ms, this wait is also removed for two-way trunks. One-way trunks retain the 50 ms wait with all option settings. See Table 4-5 .

Table 4-5 Delay Before KP for Speed Options

SPEED	2-WAY TRUNKS	1-WAY TRUNKS
70	200	50
60	50	50
50	0	50

4.2.39.11.3.2 Width of KP Signal

The length of the KP signal is reduced for both the 60 ms and the 50 ms options, down to 90 ms from 110 ms for the 70 ms setting and operation prior to this feature. This feature still meets LSSGR requirements, which define the KP to be within a 90-120 ms range.

4.2.39.11.3.3 Duration of Digits and Interdigit Timing

The duration of the MF and DTMF digits and the interdigit timing are reduced by this feature, as directly represented by the speed settings.

NOTE: The reduction in the digit and interdigit timing to 60 ms is still within the 58-75 ms range specified in LSSGR requirements. Refer to "LSSGR Requirements - Signaling, Sec. 6, Issue 2," July, 1987, TR-NWT-000506.

While the 50 ms setting is outside the allowed range caution should be exercised in using the 50 ms option, as some network elements, connections, or CPE might not be able to accept the signaling.

4.2.39.11.3.4 System Perspective

From a call processing perspective, the outpulsing procedures are handled by the outgoing MF trunk. As soon as the trunk seizure is recognized by the AT or IC and a Start wink is returned, the outgoing trunk sends the KP signal. The 150 ms delay before sending the KP signal which is done for MF outpulsing on two-way trunks is removed. If the 50 ms outpulsing is selected, then 50 ms delay for two-way trunks before outpulsing is similarly removed and the KP signal length is specified to be 90 ms rather than 110 ms. Similar 150 ms and 50 ms delays can be bypassed and the modified KP signal is also available outpulsed for the ANI and dialed digits sequences. The digit duration and silence periods for each digit sequence is outpulsed over the outgoing trunk at the speed selected by the option.

4.2.39.12 Billing

This feature has no impact on Billing.

4.2.40 DCLU & IDCU TR-008 Mode 1 Interface Support Of The SLC® 96-Compatible Dual Circuit FX Plugs

4.2.40.1 Overview

4.2.40.1.1 Definition

The Digital Carrier Line Unit (DCLU) & Integrated Digital Carrier Line Unit (IDCU) Bellcore's Technical Reference

TR-TSY-000008 (TR-008) Mode 1 Interface Support of *SLC*[®] 96-Compatible Dual Circuit Foreign eXchange (FX) Plug special feature allows the *5ESS*[®] switch to terminate, provision and maintain *SLC*[®]-96-compatible dual circuit (FX) plugs.

This feature offers two major benefits for systems that currently use dual circuit FX plugs:

- (1) It provides greater access capacity for TR-008 mode 1 remote terminals and facilities.
- (2) Universal TR-008 mode 1 systems that utilize dual circuit FX plugs will not have to be reconfigured to single circuit FX plugs when these systems are converted to integrated access on the *5ESS*[®] switch.

This is a secured feature (SFID=144) requiring that necessary arrangements be made between the service provider and Lucent Technologies. These arrangements include paying a right-to-use (RTU) fee before Lucent Technologies provides enabling information.

4.2.40.1.2 Cross-References

The following cross-references are applicable to the dual circuit FX plug interface feature:

- Feature number: 99-5E-2299
- NSEP/5SEP code: N/A

4.2.40.1.3 Availability

The DCLU & IDCU TR-008 mode 1 interface support of *SLC*[®]-96-compatible dual circuit FX plug feature is available as a software update to the 5E9(1) and later software releases.

4.2.40.1.4 Feature Application

This feature is provided on a per-subscriber basis.

4.2.40.2 User Perspective

4.2.40.2.1 User Profile

The subscriber is the end-user of this feature.

4.2.40.2.2 Customer Premises Equipment

This feature has no special customer premise equipment needs.

4.2.40.3 User Operation

The DCLU and IDCU TR-008 mode 1 dual circuit FX plug interface feature allows *SLC*[®]-96-compatible FX circuits to be terminated on the *even numbered* circuits (as well as the *odd numbered* circuits) associated with the TR-008 mode 1 DCLU and IDCU interfaces. Since all capabilities to originate and terminate calls will be maintained, this feature will be transparent to the end users of the FX circuits.

When this feature is implemented, the Recent Change administrator will be able to perform full engineering, provisioning, operations, measurements, maintenance and billing of either the odd, or the even or both circuits associated with the *SLC*[®]-96-compatible dual circuit FX plugs.

4.2.40.3.1 Activation

4.2.40.3.1.1 Activating the Feature

With enabling information provided by Lucent Technologies, the service provider activates this feature using RC/V view 8.22.

4.2.40.3.1.2 Invoking the Feature

This feature is automatically invoked on activation.

4.2.40.3.2 Deactivation

This feature is deactivated by removing the enabling provided in RC/V view 8.22.

4.2.40.3.3 Restriction Capability

This feature has no hardware, software or feature compatibility restrictions.

4.2.40.4 Compatibilities

This feature is supported with software release 5E9(1) and later. It will only work with TR-008 mode 1 and will not work with TR-008 mode 2.

4.2.40.5 Interactions

There are no feature interaction issues with this feature. The DCLU's and IDCU's TR-008 mode 1 dual circuit FX interface feature implemented for the odd, even or both circuits is transparent with current the DCLU or IDCU's odd-circuit-only TR-008 mode 1, FX interface.

4.2.40.6 Engineering

4.2.40.6.1 Special Planning Considerations

Minor changes are required in any training classes that include material on the DCLU TR-008 mode 1, FX interface to indicate that a secured special feature exists that will support the operation, administration, maintenance and provisioning (OAM&P) associated with odd, the even or both circuits associated with the dual circuit FX plug when terminated on the DCLU's and IDCU's TR-008 mode 1 interface.

4.2.40.6.2 Hardware

There are no changes to the DCLU or IDCU TR-008 mode 1, FX interface's *"Hardware Interfaces Requirements"* except that other intra-network interfaces must now support the odd, even or both circuits associated with the dual circuit FX plug when terminated on the DCLU's and IDCU's TR-008 mode 1 interface.

4.2.40.6.3 Software

There are no changes to the DCLU or IDCU TR-008 mode 1, FX interface's *"Software Transitions"* requirements except that the software transitions must now support the odd, even or both circuits associated with the dual circuit FX plug when terminated on the DCLU's and IDCU's TR-008 mode 1 interface.

4.2.40.7 Assignment Dependencies And Limitations

4.2.40.7.1 Dependencies

This feature is intended for use with *SLC*®-96-compatible dual circuit FX plugs terminating on the DCLU or IDCUs TR-008 mode 1 interface.

4.2.40.7.2 Limitations

This feature will only work with TR-008 mode 1, and will not work with TR-008 mode 2.

4.2.40.8 Feature Implementation

There are no changes to the DCLU or IDCUs TR-008 mode 1, FX interface's *"Feature Installation and Growth"* requirements, except that the feature installation and growth must now support the odd, even or both circuits associated with the dual circuit FX plug when terminated on the DCLU's and IDCUs TR-008 mode 1 interface.

4.2.40.8.1 Recent Change Procedures

The following Recent Changes are necessary to activate the dual circuit FX special feature for the **5E9(1)** software release:

- On Recent Change view 18.11 (*Remote Terminal Equipment for DCLU*), screen 2 of 2, set those fields, 16 through 63, corresponding to the customer channel units (CU) requiring feature activation to a value of **SF1**.
- On Recent Change view 18.15 (*Remote Terminal Equipment for IDCUs*), screen 3 of 6, set those fields, 38 through 85, corresponding to the customer CUs requiring feature activation to a value of **SF1**.

The following Recent Changes are necessary to activate the dual circuit FX special feature for the **5E9(2)** software release:

- On Recent Change view 18.11 (*Remote Terminal Equipment for DCLU*), screen 2 of 2, set those fields, 16 through 63, corresponding to the customer CUs requiring feature activation to a value of **DFXS**.
- On Recent Change view 18.15 (*Remote Terminal Equipment for IDCUs*), screen 3 of 6, set those fields, 38 through 85, corresponding to the customer CUs requiring feature activation to a value of **DFXS**.

4.2.40.8.2 Assignment Verification

The Secured Feature Recent Change view (8.22) will indicate if the feature has been turned on. Successful assignment of an even numbered circuit on the Remote Terminal Equipment Recent Change view (18.11) and the Remote Terminal Recent Change view (18.15) will confirm that the feature is operational.

4.2.40.8.3 Deleting Customer Service

Remove values (corresponding to the customer CU whose service is to be deleted) set in Recent Change views 18.11 and 18.15 as previously described under *"Recent Change Procedures"*.

4.2.40.9 Feature Operation

The DCLU and IDCUs TR-008 mode 1, dual circuit FX plug interface feature provides the capabilities to provision, operate, administer, and maintain, both the odd and even numbered circuits associated with the D4 compatible dual circuit FX plugs that are terminated on the DCLU's and IDCUs mode 1 TR-008 interface.

The DCLU and IDCUs TR-008 mode 1, dual circuit FX plug interface feature supports all the existing features and functionalities that are currently supported on the DCLU's single circuit mode 1 TR-008 interface. The only modification to the existing FX circuit termination on the mode 1 TR-008 DCLU and IDCUs are that the FX circuit

features are supported on either odd FX circuits, even FX circuits, or both odd and even FX circuits simultaneously.

4.2.40.10 Administration

4.2.40.10.1 Measurements

There are no changes to the DCLU TR-008 mode 1, FX interface's measurements, except that the measurements must now support the odd, even, or both circuits associated with the dual circuit FX plug when terminated on the DCLU's and IDCU's TR-008 mode 1 interface.

4.2.40.10.2 Billing

There are no changes to billing for the DCLU TR-008 mode 1, FX Interface's, except that the Billing must now support the odd, even, or both circuits associated with the dual circuit FX plug when terminated on the DCLU's and IDCU's TR-008 mode 1 interface.

4.2.41 4-Wire FX Lines Via DFI

4.2.41.1 Description

The 4-Wire foreign exchange (FX) Line via digital facility interface (DFI) feature (99-5E-2536) allows a service provider to provision FX service served via a digital port on the digital facility interface (DFI). Either ground start or loop start signaling can be used over this interface.

Without this feature, the switch provides FX service between the DFI and a remote terminal FXO type channel unit via a trunk group where the switch functions as a D4 channel bank FXS type plug.

4.2.41.2 Availability

The 4-Wire FX Line via DFI feature (99-5E-2536) is available as a software update for the 5E10 and 5E11 software releases, and is available for the 5E12 and later software releases.

4.2.41.3 Environment

This feature is provided on a per-office basis, and is used on a digital facility with a digital facility interface (DFI).

4.2.41.4 Cross References

The following cross references apply to this feature:

- Feature Number:

99-5E-2536, 4-Wire FX Line via DFI

4.2.41.5 Background

Not applicable.

4.2.41.6 Feature Operation

Users of FX service are those who desire line service from a central office that is foreign to the normal service area of the subscriber.

For incoming calls, the call is initially routed, via the long distance network, to the foreign exchange office. It is then sent to the subscriber's office and the subscriber is alerted.

For outgoing calls, the subscriber receives dial tone directly from the foreign exchange office.

The 5ESS[®] switch functions as the foreign exchange office (FXO) and sends the same signaling and supervision signals as an FXO. The switch allows a service class of 4WINDIV to support additional INSTRSIG values of loop (LOOP) and ground (GRND)

When a 4WINDIV line is provisioned with INSTRSIG values of LOOP or GRND, the switch provides A and B bit signaling from the DFI to remote terminal foreign exchange subscriber (FXS) type channel units.

4.2.41.7 User Operation

4.2.41.7.1 For Subscribers

No subscriber actions are associated with this feature.

4.2.41.7.2 For Switch Personnel

No switch personnel action is associated with this feature.

4.2.41.8 Engineering

4.2.41.8.1 Hardware Resources

No hardware considerations are associated with this feature.

4.2.41.8.2 Software Resources

No software considerations are associated with this feature.

4.2.41.8.3 Transition Considerations

No transition considerations are associated with this feature.

4.2.41.9 Interactions and Limitations

The SM must be a standard, fully-loaded, or SM-2000.

4.2.41.10 Incompatibilities

The following features cannot be used with the 4-Wire FX Line via DFI feature:

- Music on Hold
- Shared DN
- Selective Distinctive Alerting

The following features only work if the ICLID On 4-Wire Subscriber Line - DNU-S feature (99-5E-4980) is also used:

- ICLID Feature Calling Number Delivery (CND)
- ICLID Feature Calling Name Delivery (CNAM)

4.2.41.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

4.2.41.12 Isolation Constraints

No isolation constraints are associated with this feature.

4.2.41.13 Recent Change Provisioning

Provision the 4-Wire FX Line via DFI feature by populating the following fields in RC/V view 1.6 [COMPOSITE LINE (LINE ASSIGNMENT)]:

FIELD	VALUES
TN	subscriber telephone number
LCC	line class code (3 alpha-numeric characters)
PLIT	Y
RTNRNG	4W OFF or 4W24
PRITYRNG	4W OFF, 4W350, or 4W1650
INSTRSIG	LOOP or GRND
OE	D

Select the start signal type by populating the following field in RC/V view 8.5 [TIMING (MISCELLANEOUS)]:

FIELD	VALUES
START SIGNAL	LOOP or GRND

4.2.41.14 Customer Premises Equipment (CPE)

Not applicable.

4.2.41.15 Maintenance Considerations

Not applicable.

4.2.41.16 Administration

4.2.41.16.1 Measurements

This feature does not impact measurements.

4.2.41.16.2 Billing

This feature does not impact billing.

5. CALL PROCESSING FEATURES

5.1 AUTOMATIC INTERNAL OVERLOAD CONTROL

5.1.1 Feature Definition

The overload control feature detects different levels of overload without reacting to normal fluctuations in traffic patterns engineered for the system in accordance with system performance specifications. The feature identifies the level or severity of the overload and determines what actions should be taken to eliminate or minimize the effects of the condition.

During the overload period, overload control limits deferrable work to a given minimum rate and allows nondeferrable work at a predetermined maximum rate. Overload control prevents call processing from taking away all the real time by limiting the call processing input to the predetermined rate. During the normal office operation without overload, nondeferrable work is given real time without limit, and unused real time is allocated to deferrable work. The less call processing work that exists in the system, the more real time is allocated to deferrable work (for example, routine audit).

The objective of overload control is to maximize system performance during periods of overload. If the resource overload is caused by call processing or maintenance activity, the input rate of the corresponding activity is reduced. This results in speeding up recovery of overload resources without damaging call processing or maintenance activity already in process.

5.1.2 Availability

Overload control is a standard 5ESS[®] switch feature available with any software release.

5.1.3 Interactions

The following routine terminal maintenance work is inhibited during an administrative module (AM) real-time overload:

- All automatic line insulation testing (ALIT)
- All automatic progression testing (APT).

The following routine terminal maintenance is inhibited during a switching module (SM) real-time overload:

- ALIT in the overloaded SM
- All APT.

Since there is no routine terminal maintenance in the communication module processor (CMP), none is inhibited.

5.1.4 User Operation

5.1.4.1 Customer

During periods of overload, the customer may experience delays in dial tone or the call may be blocked. The overload control feature minimizes the effect of overload so that the telephone service is affected as little as possible.

5.1.4.2 Operating Telephone Company

The operating telephone company (OTC) personnel can make requests via the master control center (MCC) video display terminal for overload status information. Overload status information consists of overload monitors and controls in effect. Whenever the status of a processor changes, a message is printed at the receive-only printer (ROP) and the MCC pages are updated. The MCC Page 109 indicates the status of overload conditions, if they exist, in both the AM, SM and CMP and provides the capability to request specific SM and CMP overload status and either allow or inhibit Essential Service Protection (ESP).

In 5ESS[®] switch offices with the 5E6 and later software releases, input messages may be used to request overload status information and allow or inhibit ESP for the 5ESS[®] switch office.

5.1.5 System Operation

Overload control is a system feature which consists of software in the SM or remote switching module (RSM) and the AM and CMP. The following capabilities are provided by overload control:

- Monitors system resources
- Invokes controls to ensure high-call processing efficiency and stability
- Notifies telephone personnel at the MCC via Video Display Page 109 and the ROP of the overload state of the system.

5.1.6 Measurements

Network measurements related to this feature include peg counts and usage counts assigned to the 15-minute, 30-minute, and 24-hour traffic schedules.

5.2 ESSENTIAL SERVICE PROTECTION

5.2.1 Feature Definition

The ESP is a feature aimed at assuring that a number of lines designated by the OTC as "essential" receive priority originating service during periods of extreme overloads. Service to other lines must be equitably distributed when ESP is activated. The ESP feature is manually enabled and disabled. The ESP is automatically activated, if previously enabled, when the system detects that service has been significantly degraded.

5.2.2 Availability

The ESP feature is available with the 5E6 and subsequent software releases.

5.2.3 Restriction Capability

Telephone personnel have the ability to inhibit or allow ESP.

5.2.4 User Operation

The MCC Page 109 provides capabilities to allow or inhibit ESP. Input messages are also available to allow or inhibit ESP.

5.2.5 Other Considerations

The 5ESS[®] switch does not require a set pattern of essential switches per switch group.

There is no limit on the number of lines in the switch office which may be assigned ESP.

5.3 POWER CROSS TEST

5.3.1 Feature Definition

This test is made during a customer origination and termination to insure that no power crosses exist on the loop. It is also generally made before any connection of the outside cable to the gated diode crosspoints (GDX) network.

5.3.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.4 RINGING CONTINUITY TEST

5.4.1 Feature Definition

This test is performed during a customer termination to insure that no open circuit exists on a loop. If the call is unanswered, it is reported on the ROP.

5.4.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.5 NUMBERING PLAN

5.5.1 Feature Definition

The numbering plan is a feature that utilizes destination code numbering to provide a uniform method of identifying a main station in accordance with the North American Numbering Plan (Notes on the Network, Section 2). A destination code consists of a 3-digit numbering plan area (NPA) code, a 3-digit central office (CO) code, and a 4-digit station number. A destination code is also referred to as a national number. The full NANP DN or, more commonly, the NANP DN without the NPA of a destination code are referred to as a directory number or telephone number.

5.5.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.6 DIRECT DISTANCE DIALING

5.6.1 Feature Definition

The Direct Distance Dialing (DDD) feature permits eligible customers to place calls without operator assistance by dialing a set of digits in accordance with the numbering plan.

5.6.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.7 PERMANENT SIGNAL

5.7.1 Feature Definition

Permanent signal is a feature that tests for the reception of digits after dial tone has been returned to an originating line. If no digits are received within a limited time after the start of dial tone to the calling line, the line is considered to be in a permanent signal state (off-hook), and permanent signal treatment is applied.

Permanent signal treatment consists of a sequence of steps including an announcement followed by receiver-off-hook (ROH) tone to attempt to clear the condition.

5.7.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.8 DIGIT INTERPRETATION

5.8.1 Feature Definition

Digit interpretation is a feature that provides for the recognition of the end of customer dialing and the recognition of dialed digits as prefixes, CO codes, NPA codes, and other types of dialed information. The digit interpretation rules applicable to a local switching system are office dependent in accordance with the feature arrangements provided.

5.8.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.9 PARTIAL DIAL

5.9.1 Feature Definition

Partial dial timing is activated after each digit is received unless the system has determined that dialing is complete, critical interdigit timing is activated, or dialing is invalid. A time-out indicates that the customer has partially dialed the number of digits required to complete the call, and the call should be given partial dial treatment. Partial dial treatment consists of a series of steps including an announcement followed by ROH tone.

5.9.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.10 CRITICAL INTERDIGIT TIMING

5.10.1 Feature Definition

Critical interdigit timing is activated when the digits received provide sufficient information to complete a call, but the possibility of receiving additional valid digits exists. For example, after the seventh digit of a 10-digit station call has been received, the system might assume that no digit will follow. However, one option allows a short period of time for the customer to continue dialing the eighth digit of a 10-digit call. This period of time is a critical interdigit timing interval and is approximately 4 seconds in duration. A time-out after the critical interdigit timing interval is treated as a completed dialing condition.

5.10.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.11 END OF DIAL

5.11.1 Feature Definition

This feature allows the system to determine that dialing is complete and then process the call with a minimum of delay. It is desirable to avoid the use of timing whenever possible, as this delays call completion and is a potential source of wrong numbers (for example, if the customer pauses too long between the seventh and eighth digits of a 10-digit call). A customer alternative to timing is the use of the # key on the touch-tone (or equivalent) set to indicate the intended end of dialing. The system is capable of interpreting the # signal from a touch-tone (or equivalent) set to be the end of dial signal except for the valid use of the # symbol as a prefix digit.

5.11.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.12 SCREENING

5.12.1 Feature Definition

Screening is a feature that determines the eligibility of a customer to complete a call as dialed based upon class-of-service information associated with the line. Prior to routing a call as dialed, the system screens the call and denies completion of all calls that are found to be ineligible due to class-of-service restrictions.

5.12.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.13 ROUTING

5.13.1 Feature Definition

Routing is a feature that determines the terminating line or trunk group based upon an analysis of the digits received, call history, and screening of a line where required.

5.13.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.14 ALTERNATE ROUTING

5.14.1 Feature Definition

Alternate routing is a feature that provides for routing a call to an alternate trunk group if no trunks are available in the primary trunk group.

The system attempts to route a call to the trunk group assigned as the primary trunk group. If no trunk is available in that trunk group, the system attempts to route the call in a predetermined sequence over each alternate trunk group.

5.14.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.15 SUBSCRIBER DIRECTORY NUMBER DIALING FEATURES

5.15.1 Feature Definition

These features relate to the subscriber dialing practices for local and toll calls in a given NPA. In the definitions under this feature set, the symbol "X" denotes any dialed decimal digit (0 through 9), "N" denotes digits 2 through 8,

and "P" denotes digits 0 or 1.

The first 3 digits of a 7-digit address or digits 4 through 6 of a 10-digit address are the CO code. The first 3 digits of a 10-digit address are the NPA code.

The NPA codes are of the format NPX (excluding N11 codes). The CO codes are preferably of the format NNX (which are distinguishable from NPA codes). However, some NPAs have exhausted all NNX formats for CO codes and had to resort to using CO codes of the NPX format, thus giving rise to code ambiguities. Code ambiguities can be resolved by a prefix or a critical (4 seconds) interdigital time-out after the seventh digit, depending on the switching environment.

Subscriber dialing practices are usually uniform for a given NPA and are governed by the constraints or capabilities of the exchanges in the NPA (common control or noncommon control) and whether or not NPX formats are used for CO exchanges in the NPA.

5.15.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.16 PREFIX 1 FOR TOLL CALLS

5.16.1 Feature Definition

A prefix 1 is used for NANP DN without the NPA and full NANP DN toll calls. This feature is used in NPAs with SXS exchanges [which use the 1 prefix to route toll calls to a serving centralized automatic message accounting (CAMA) exchange to allow automated billing]. For the sake of dialing uniformity within the NPA, this practice is also used on common control offices (whatever their billing arrangements).

If an NPA with this dialing arrangement exhausts the NNX format and uses NPX formats for some CO codes, then a toll call with ambiguous NPX on its first three digits must use critical interdigital timing after the seventh digit to resolve the ambiguity and decide whether the dialed address is seven or ten digits long.

Valid call addresses for this feature are as follows:

- (1) NPA does not have ambiguous CO codes.
 - (a) Local: NNX-XXXX
 - (b) Toll call without NPA: 1+NNX-XXXX
 - (c) Toll call with NPA: 1+NPX-NANP DN without the NPA.
- (2) NPA has ambiguous CO codes.
 - (a) Local: NANP DN without the NPA
 - (b) Toll: first 3 digits after prefix unambiguous (1+NANP DN without the NPA or 1+NPX-NANP DN without the NPA).
 - (c) Toll: first 3-digits after prefix ambiguous:
 - 1+NPX-XXXX+(T>4sec.)
 - 1+NPX-NANP DN without the NPA (no critical time-out occurred after 7th digit).

5.16.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.17 PREFIX 1 FOR 10-DIGIT CALLS

5.17.1 Feature Definition

With this feature, a 1 prefix indicates that a full NANP DN follows (1 plus NANP DN without the NPA receives partial dial treatment). This feature is used in NPAs where all exchanges are common control and ambiguous NPX codes are in use (or planned to be used) for CO codes.

Codes allowed for this feature are as follows:

- (a) NANP DN without the NPA (local or toll)
- (b) 1+NPX-NANP DN without the NPA.

5.17.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.18 NO PREFIX REQUIRED FOR 7- OR 10-DIGIT CALLS

5.18.1 Feature Definition

This feature does not require a prefix for NANP DN without the NPA or full NANP DN customer-dialed calls. It is adopted in NPAs where all exchanges are common control and there are no ambiguous CO codes in the NPA.

The following features are variations of this feature:

- Prefix 1 allowed on full NANP DN calls only.
- Prefix 1 allowed on NANP DN without the NPA or full NANP DN calls.

5.18.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.19 PREFIX 1 ALLOWED ON 10-DIGIT CALLS ONLY

5.19.1 Feature Definition

The 1+NNX-XXXX calls are routed as dialing errors.

The 1+NPX-XXXX calls receive partial dial time-out after the seventh digit. Allowed codes are as follows:

- (a) NNX-XXXX
- (b) NPX-NANP DN without the NPA
- (c) 1+NPX-NANP DN without the NPA.

5.19.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.20 PREFIX 1 ALLOWED ON 7- OR 10-DIGIT CALLS

5.20.1 Feature Definition

With this feature, the prefix 1 is not required, but is permitted, on any NANP DN without the NPA or full NANP DN call (including NANP DN without the NPA calls within the same exchange). Allowed codes are:

- (a) NNX-XXXX
- (b) NPX-NANP DN without the NPA
- (c) 1+NNX-XXXX
- (d) 1+NPX-NANP DN without the NPA.

5.20.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.21 FOREIGN AREA TRANSLATION (6-DIGIT TRANSLATION)

5.21.1 Feature Definition

Foreign area translation is a feature that provides selective routing for full NANP DN calls based upon the requested foreign NPA code and office code. This translation is only required for foreign NPAs which can be accessed by more than one route.

5.21.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.22 OPERATOR ASSISTANCE - DIAL 0

5.22.1 Feature Definition

Operator assistance in response to dialing a single digit 0 is a feature that routes a call directly to an operator for assistance. The operator facility may be Traffic Service Position System (TSPS) or a cordboard, depending on feature arrangements of the CO.

5.22.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.23 SPECIAL TOLL CALLS - DIAL 0 PLUS SEVEN OR TEN DIGITS

5.23.1 Feature Definition

Special toll calls are characterized by operator handling of a 0 plus NANP DN without the NPA or a 0 plus full NANP DN toll call. Upon recognition of a special toll call and when dialing is determined to be complete with a valid destination code, the call is routed to a TSPS. The seven or ten digits received are outpulsed to the TSPS.

5.23.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.24 SERVICE CODES N11

5.24.1 Feature Definition

Service codes N11 is a feature that provides simplified dialing in order to complete calls to frequently called service facilities.

Service codes are of the form N11, where N is any decimal digit 2 through 9. When the system receives a valid service code, as specified by the Operating Company, dialing is complete and the call is routed to the trunk group associated with the service requested.

Although all service codes are not universally applied in all central offices, the normal application of service codes is as follows:

- (a) Local information - 411
- (b) Repair - 611
- (c) Business office - 811
- (d) Emergency - 911.

5.24.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.25 SERVICE CODES N11 (ENHANCED)

5.25.1 Feature Definition

This feature provides the same service as service codes N11 with enhancements.

5.25.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.26 DIRECTORY ASSISTANCE

5.26.1 Feature Definition

Directory assistance is a feature that routes calls to a local or foreign NPA directory assistance operator based upon the digits received. The option of charging for directory assistance calls is provided.

Directory assistance codes may vary in different areas. However, the system is capable of interpreting and routing any one, a subset of all, or all of the following codes to a directory assistance facility:

- 411
- 1-411

- 555-1212
- 1-555-1212
- NPA-555-1212 (NPA = 3-digit NPA code)
- 1-NPA-555-1212 (NPA = 3-digit NPA code).

5.26.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.27 CUSTOM CALLING SERVICE ACCESS CODES

5.27.1 Feature Definition

Custom calling service access codes is a feature that permits the system to provide custom calling services to the customer with a standardized set of 2-digit codes following a service access code prefix * or 11.

5.27.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.28 INTERSYSTEM ADDRESS OUTPULSING (MF AND DP)

5.28.1 Feature Definition

Intersystem outpulsing is a feature that provides the forwarding of multifrequency (MF) or dial pulsing (DP) address information from a local switching system to a distant office. Customer-dialed prefixes are not normally outpulsed.

5.28.2 Availability

This feature is provided with the 5E9(1) and later software releases.

5.29 OUTPULSE TWO THROUGH FIFTEEN DIGITS MF AND DP

5.29.1 Feature Definition

Outpulse dialed number received (from two to fifteen digits).

NOTE: Offices arranged for international direct distance dialing (IDDD) feature(s) may require up to 13-digit outpulsing (up to 15-digit outpulsing with 5E10 and later software releases). Other features such as CAMA and TSPS may require additional outpulsing such as automatic number identification (ANI) or operator number identification (ONI) digits.

5.29.2 Availability

This feature is provided with the 5E9(1) and later software releases.

5.30 DELETE DIGITS (UP TO SEVEN)

5.30.1 Feature Definition

Outpulse the dialed number with the first one to seven digits suppressed.

5.30.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.31 PREFIX DIGITS (UP TO THREE)

5.31.1 Feature Definition

Outpulse the dialed number received with one, two, or three digits prefixed.

5.31.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.32 OUTPULSE SEVEN DIGITS FOR VALID SERVICE CODES

5.32.1 Feature Definition

Outpulse a specified NANP DN without the NPA number based upon receipt of a valid service code.

5.32.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.33 RECEPTION OF OUTPULSING FROM OTHER SYSTEMS (MF AND DP)

5.33.1 Feature Definition

The reception of outpulsing from other systems is a feature that permits the accumulation of MF or DP address information in order to locally terminate a call. The number of digits required for each application is dependent upon the local office trunk group arrangements, the distant office outpulsing characteristics, and local office destination code assignments.

5.33.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.34 INTERCEPT ROUTING FOR CALLS TO BLANK, CHANGED, DISCONNECTED, OR UNASSIGNED DIRECTORY NUMBERS

5.34.1 Feature Definition

Intercept routing for calls to blank, changed, disconnected, or unassigned directory numbers is a feature that permits the system to alert the intercept system of the reason why a call cannot be completed as dialed.

One or more of the following intercept treatments is provided for this type of call:

- Announcement - local or remote
- Operator
- Remote intercept system.

5.34.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.35 ANNOUNCEMENT - LOCAL OR REMOTE

5.35.1 Feature Definition

Route the call to an announcement which may be provided locally or remotely.

5.35.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.36 OPERATOR

5.36.1 Feature Definition

Route the call to a local or remotely located operator.

5.36.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.37 REMOTE INTERCEPT SYSTEM

5.37.1 Feature Definition

Route the call to a remote intercept system such as Automatic Intercept System (AIS).

5.37.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.38 REMOTE SWITCHING UNITS

5.38.1 Feature Definition

This feature entails the capability of having a switching unit called an RSM located remotely from the basic system but connected to it by a control message and data link.

The distance allowed between RSMs and their hosts is increased by the Far Access Remote feature. For more information, see "Far Access Remote (FAR)," Section 5.40 .

5.38.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.39 HOSTING SINGLE-MODULE RSM UNITS

5.39.1 Feature Definition

The single-module RSM is a 5ESS[®] switch switching module remoted on digital transmission facilities from a host switching module. A host switching module is a local switching module that can host one to five RSMs (in addition to

lines and trunks) up to the capacity of the host switching module. In normal operation, customers served by the single-module RSM are offered any or all of the features available to the customers connected directly to the host. During RSM stand-alone operation, most custom calling features are available. Those requiring a host facility, such as a global digital services unit (for example, conferencing), will not be provided in stand-alone.

5.39.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.40 FAR ACCESS REMOTE (FAR)

5.40.1 Feature Definition

The Far Access Remote (FAR) feature (99-5E-1252) increases to 600 miles the distance at which Remote Switching Modules (RSMs) and Optically-Remoted Modules (ORMs) can be placed from the host. This has been accomplished by providing the ability to selectively control the loss added to calling paths on analog voice line-to-line calls which traverse umbilicals to these very distant units.

5.40.2 Feature Availability

The FAR secured feature is available in 5E9(2) and later software releases.

5.40.3 Feature Implementation

The FAR feature is activated via RC/V view 8.22 (SFID 184). The local or remote loss is programmed via RC/V view 8.27. For more information on RC/V views, see 235-118-2xx, *5ESS® Switch Recent Change Reference*.

5.41 TIMED RELEASE DISCONNECT

5.41.1 Feature Definition

An originating office causes a timed release disconnect (TRD) if the calling party fails to disconnect within 10 to 12 seconds after the called party has gone on-hook. The TRD timing is only applied after the minimum chargeable duration has elapsed. The TRD timing is not performed by the local office on calls routed to operator systems.

5.41.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.42 TANDEM CAPABILITY

5.42.1 Feature Definition

The tandem office feature provides the local switching system with the capability to serve as a tandem or local/tandem office. The tandem office is an intermediate switching center primarily used to switch trunks between local or tandem offices and other local or tandem offices.

Tandem switching is a means of making economical use of trunks and switching equipment; otherwise, many small separate groups of trunks would be required to interconnect different offices in the same general area.

5.42.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.43 LIMITED LOCAL TANDEM SWITCHING

5.43.1 Feature Definition

This feature provides only the capability for interconnecting an originating local office to a terminating local office.

5.43.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.44 LOCAL INTERTANDEM SWITCHING

5.44.1 Feature Definition

This feature provides, in addition to the capabilities of limited local tandem switching, the capability to interconnect local tandem offices and to connect the local office with another tandem office.

5.44.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.45 OPTICALLY REMOTED MODULE (ORM)

5.45.1 Feature Definition

The ORM feature provides the ability to remotely place a TRM (2-mile optical remote switching module) up to 2 miles from the host 5ESS[®] switch over an extended network control and timing (NCT) link bypassing the host SM. The ORM feature also allows an SM to be remoted up to 150 miles (120 miles with SLC[®]) from the host office over a standard transmission facility bypassing the host SM.

The EXM-2000 distance limitation for host to remote is the same for the RSM/ORM.

Refer to 235-900-1xx, *5ESS[®] Switch Product Specifications*, for additional information on transmission distance limitations for the RSM, ORM, and EXM-2000.

The distance allowed between ORMs and their hosts is increased by the Far Access Remote feature. For more information, see "Far Access Remote (FAR)," Section 5.40.

5.45.2 Availability

This feature is provided with the 5E6 and subsequent software releases.

5.45.3 Restrictions

There are no restrictions associated with this feature. The ORM is available for both CM1 and CM2.

5.45.4 Hardware

A new more sensitive paddleboard is used to achieve the 2-mile operating range. The new paddleboard is required at the TMS and at the TRM. An ORM requires transmission rate converter unit (TRCU) hardware to interface the NCT link to the standard transmission facility. The TRCU hardware is located at the host office and at the ORM.

5.46 0XX AND 1XX ROUTING

5.46.1 Feature Definition

This feature allows the assignment of office codes of the format 0XX and 1XX to lines. These are provided for special uses to save normal directory numbers and are typically used for assignment of pseudo-directory numbers beginning with a 0 or 1 to INWATS and OUTWATS lines. Since 0XX and 1XX are being excluded from the Local Digit Interpreter Table, lines that are assigned a telephone number with a 0XX or 1XX office code can only be reached via an incoming trunk. However, no additional restrictions are imposed by the 0XX or 1XX assignment.

5.46.2 Availability

This feature is available with the 5E6 and subsequent software releases.

5.46.3 Applications

The purposes of this feature are to ease the shortage of central office codes in large metropolitan areas and to offer protection against undesired access of these lines by the local network.

5.47 TIMING DELAY ON LOCAL CALLS

5.47.1 Overview

5.47.1.1 Definition

The Timing Delay on Local Calls (TDLC) feature provides the ability to specify on a per-dial code basis, when a dialed prefix (rather than timing) can be used to resolve digit analysis dial code conflicts. The TDLC provides the ability to eliminate unnecessary post dialing delays on domestic local calls when the dialed codes for these calls conflict with other office or NPA codes.

5.47.1.2 Economic Worth

This feature provides the ability to eliminate post dialing delay on local calls. For offices whose dialing plans allow such improvements, the universal tone decoder (UTD) is released sooner. Those offices able to make use of the TDLC improvements gain in UTD resource availability.

5.47.1.3 Availability

The TDLC feature is generally available for the software release 5E6.

This feature is not an option for an office. When the software update of this feature is issued for a given software release, all offices with that software release must apply the software update (assuming that office wishes to apply subsequent software updates).

5.47.1.4 Feature Provision Basis

This feature is provided on a per-office basis.

5.47.2 User Perspective

5.47.2.1 User Profile

The subscriber experiences performance improvement in those offices that can use TDLC to eliminate unnecessary post dialing delay on certain NANP DN without the NPA calls.

Operating company procedures remain unchanged.

5.47.2.2 User Operation

Not applicable.

5.47.2.3 Interactions

Not applicable.

5.47.3 Engineering

Not applicable.

5.47.4 System Resources

Not applicable.

5.47.5 Assignment Guidelines

Not applicable.

5.47.6 System Operation

Code conflicts occur when the destination of a call, normally identified by the first three impulsed digits, depend upon the remaining number of impulsed digits, but not upon their value. For Local/Toll offices, the situation arises in the cases where the first three digits may be followed by:

- (1) Three digits (NPA + Operator Code)
- (2) Four digits (NANP DN without the NPA)
- (3) Five digits (NPA + Leave Word Operator Code)
- (4) Six digits (NPA + Toll Tandem Codes + Operator Codes)
- (5) Seven digits (full NANP DN).

The 5ESS® switch can use a "1+ or 0+" prefix (PREFIX field on RC View 9.3) to immediately route a (1/0)+NANP DN without the NPA call when this code conflicts with a full NANP DN number. Without the TDLC feature, the 5ESS® switch uses time to determine if NANP DN without the NPA or 1 plus a full NANP DN is being dialed (even if NONE is specified as the prefix in the RC View 9.3). With the TDLC feature, call processing routes a dialed "NONE+NANP DN without the NPA" call without unnecessary post dialing delay (assuming NONE has been specified as the prefix on RC View 9.3)

5.47.7 Administration

Not applicable.

5.48 OPTIONAL 7-DIGIT OUTPULSING

5.48.1 Overview

5.48.1.1 Definition

The Optional 7-Digit Outpulsing feature provides the ability to control the outpulsing in inter-LATA calls that route

from an equal access end office (EAEO) to an access tandem (AT) using feature group D (FGD) equal access (EA) signaling. Prior to this feature, the 5ESS® switch only outpulses full NANP DN called numbers. When a NANP DN without the NPA call is dialed, the office NPA is prepended to the called number to form a full NANP DN for outpulsing. This feature allows the service provider to decide if prepending is to be done, on a per-route basis. With this feature, both NANP DN without the NPA and full NANP DNs could be sent to an AT from a 5ESS® switch acting as an EAEO using the same route index.

5.48.1.2 Availability

This feature is available with 5E6 and later software releases.

NOTE: Consult your Lucent Technologies Account Executive for availability.

5.48.1.3 Feature Provision Basis

This secured feature is not enabled until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature enabling is provided upon ordering. Please contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

When this feature is purchased, it is activated on a per-route basis.

5.48.2 User Perspective

5.48.2.1 User Profile

This feature is used by customers at an EAEO to outpulse a NANP DN without the NPA call to an AT. The feature does not impose new or changed end-user requirements. The intent of this feature is to provide access to an AT's Software Defined Network (SDN) routing mechanism. Upon receipt of a NANP DN without the NPA directory number (DN), the Tandem performs the SDN function; upon receipt of a full NANP DN, the Tandem provides normal routing.

5.48.2.2 User Operation

This feature may be assigned to an end-user via Centrex access (PFA or ARS) or by dedicated means (normal assignment is via Centrex access). In such a case, the end-user dials the ARS or PFA access code followed by the NANP DN without the NPA inter-LATA DN. The Centrex feature is set up to route the call over a specially prepared route index. Preparing the Centrex feature includes assigning a Centrex carrier to handle the call.

In the case of dedicated access, the user simply dials a NANP DN without the NPA inter-LATA DN. In this case, a carrier is also required to be assigned to the line. This causes every inter-LATA call made by the line to be routed to the specially prepared route access.

In both cases, the NANP DN without the NPA number is outpulsed as dialed.

Intra-LATA simulated facilities OUTWATS calls may be optionally routed to the inter-LATA carrier found in the SFG OUTWATS data. With this option activated, all intra-LATA and inter-LATA simulated facilities OUTWATS calls are routed by the specified OUTWATS inter-LATA carrier. This option is supported in software release 5E6 by software update 90-0027.

No special activity is required to handle intra-LATA calls dialed via dedicated access.

5.48.2.3 Operational Limitations

This feature applies only for NANP DN without the NPA calls that are being routed from the 5ESS® switch (EAEO) over a shared trunk group to an AT, where Feature Group D signaling is used between the EAEO and AT.

This feature applies only for trunk connections utilizing Equal Access Multifrequency (EAMF) signaling between the 5ESS[®] switch (EAE0) and an AT.

The prefixing of the NPA to the originating NANP DN without the NPA inter-LATA call is independent of the interexchange carrier handling the call.

This feature operates on a per-route index basis, independent of the originating class of service.

Feature Group B signaling is not supported for this feature.

5.48.2.4 Interactions

Not applicable.

5.48.3 Engineering

Not applicable.

5.48.4 Assignment Guidelines

5.48.4.1 Forms and Views

5.48.4.1.1 Translation Guide Forms

Not applicable.

5.48.4.1.2 Recent Change Views

There are no new recent change (RC) views.

A route index is assigned this feature on RC View 10.2 (ROUTE INDEX). The route index is provisioned for this feature by assigning prefix digits of 2xx where 0xx is normally assigned. The "2" is translated to a "0" before outpulsing takes place.

5.48.4.2 Assigning to Customer

Obtain assistance from the Lucent Technologies Secured Feature Administrator (SFA) to enable this secured feature. In a new start office, the Lucent Technologies SFA enables the feature through ODA. In an existing office, the Lucent Technologies SFA provides instructions, including the necessary password, for using RC View 8.22 for 5E6 and later software releases.

When this feature is enabled, use RC View 10.2 to include the following information for each route index assigned to this feature:

- Enter **STG** in the RT DES TYP field.
- Enter **2xx** in the PREF DIG field.

NOTE: Valid values for xx are 00 to 99.

- Enter **EA** in the SIG PRO field.

Use the following procedure to optionally route all intra-LATA and inter-LATA simulated facilities OUTWATS calls to the inter-LATA carrier found in the SFG OUTWATS data.

- (1) Select RC View 8.22 in 5E6 and later software releases.
- (2) Enter **u** for the update mode.
- (3) In the FEATURE ID field, enter **509**.
- (4) In the MODULE field, enter **OFC** (office).
- (5) The PASSWD field must be blank.
- (6) In the ACTIVE field, enter **Y** (yes).
- (7) Leave all remaining fields blank.
- (8) Enter **u** to update the data.

The following procedure verifies this optional feature in one SM:

- (1) Select RC View 8.22 in 5E6 and later software releases.
- (2) Enter **r** for review mode.
- (3) In the FEATURE ID field, enter **509**.
- (4) In the MODULE field, enter the SM number (1 to 192).

NOTE: Do not use **OFC** in the MODULE field for the verify procedure.

- (5) If the ACTIVE field is **Y**, the feature is enabled in the SM specified. If the ACTIVE field is **N**, the feature is disabled in the SM.

NOTE: Repeat this procedure for each SM to be verified.

5.48.4.3 Deleting Customer Service

Obtain assistance from the Lucent Technologies Secured Feature Administrator (SFA) to delete this secured feature. The Lucent Technologies SFA provides instructions, including the necessary password, for using RC View 8.22 for 5E6 and later software releases.

NOTE: Changing the PREF DIG field (RC View 10.2) from **2xx** to **0xx** effectively turns off the feature for that route index.

Use the following procedure to remove the optional feature which routes all intra-LATA and inter-LATA simulated facilities OUTWATS calls to the inter-LATA carrier found in the SFG OUTWATS data.

- (1) Select RC View 8.22 in 5E6 and later software releases.
- (2) Enter **u** for the update mode.
- (3) In the FEATURE ID field, enter **509**.
- (4) In the MODULE field, enter **OFC** (office).
- (5) The PASSWD field must be blank.

- (6) In the ACTIVE field, enter **N** (no).
- (7) Leave all remaining fields blank.
- (8) Enter **u** to update the data.

5.48.4.4 Assignment Limitations

It is assumed that the prefix values 200 to 299 will not be used for other reasons.

5.48.5 System Operation

System operation for this feature is shown in Figure 5-1 .

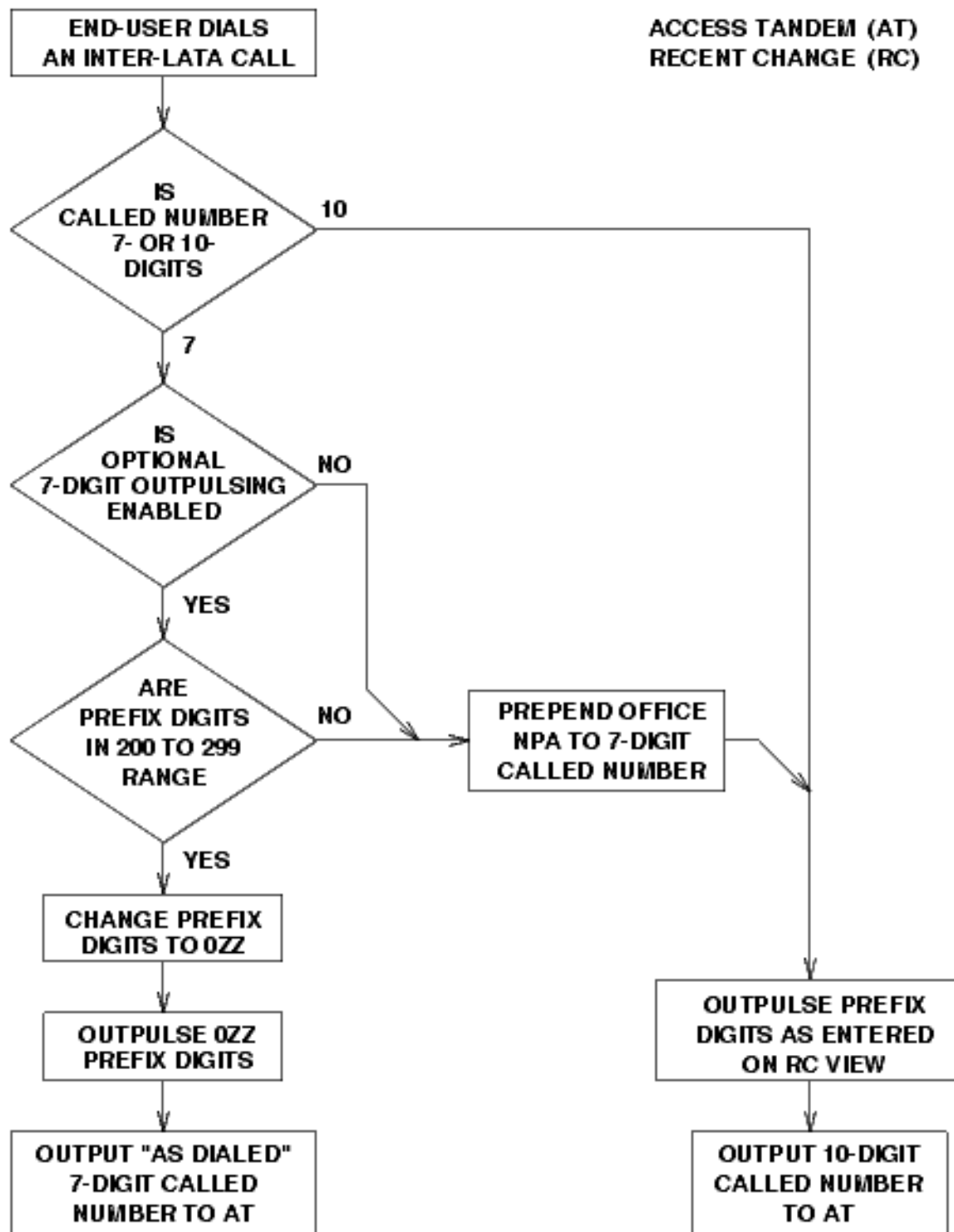


Figure 5-1 Optional 7-Digit Outpulsing Feature Flow Diagram

5.48.6 Administration

Not applicable.

5.49 IN-PROGRESS CALL TRACE

5.49.1 Overview

5.49.1.1 Definition

The In-Progress Call Trace (IPCT) feature is a public safety feature that allows telephone company personnel to identify the far-end party active on a call (usually the originator of the call) in an emergency or demand situation.

5.49.1.2 Availability

The IPCT feature is available with the 5E6 and subsequent software releases.

Major enhancements to IPCT were done in the 5E6(1) and 5E8(1) software releases.

5.49.1.3 Feature Assignment

The IPCT is done on a per-call basis.

5.49.2 User Perspective

5.49.2.1 User Profile

This feature and its output is for use by telephone company personnel and other authorized agencies.

5.49.2.2 Feature Operation

In order to perform an IPCT, one end of the network path must be known. The known terminal can be identified by DN if it is a line, by group and member number if it is a trunk or multiline hunt group (MLHG) member, or by process identification (PID) number if it is a circuit-switched call. To request identification of a call in progress, the appropriate input message must be typed on the keyboard of the video display terminal. An output message identifies the called and calling parties, date, and time. Every effort is made to provide enough information to uniquely identify the parties on the call.

For Line Time Slot Bridging (LTSB) calls with barging, the trace always begins from the controlling port.

IPCT differs from Nuisance Call Trace (NCT) in that IPCTs are manually requested after a call is set up, while NCTs are automatically generated every time a DN marked for NCT is dialed.

IPCTs should be initiated using the *primary* DN (or MLHG group and member number) of the terminal to trace, even if it is not the DN active on the call. This insures that the correct translation from DN to port is made. For ISDN lines, both B-channels associated with the selected port are traced.

As of software release 5E12, IPCT will display whatever is available for the DN and/or PDN in the output at the time of the call. This means that either a full NANP DN or a NANP DN without the NPA may be displayed on the ROP for the calling or called party number regardless of whether switch personnel have input a full NANP DN or a NANP DN without the NPA. If switch personnel desire that all numbers be displayed in a full NANP DN format, then the field ROP DISP DN 10 can be set to Y on RC/V view 8.1. However, if the switch has any office code that is defined in more than one NPA on that switch, then all DNs will be output as full NANP DNs regardless of the ROP DISP DN 10 setting.

Beginning with the 5E6(1) software release, for Inter-Module Trunking (IMT) calls IPCT traces through to the far-end party unless requested to stop at the IMT. This option is useful for determining which trunk group and member a particular IMT call is using.

Beginning with the 5E6(1) software release, the option of tracing analog calls on hard hold is also provided.

Beginning with the 5E8(1) software release, when any member of a conference call is traced, all of the connections are shown.

5.49.2.3 Interactions

No interactions.

5.49.2.4 Limitations

IPCT does not support the tracing of logical test ports.

IPCT is available for analog and circuit-switched ISDN calls only.

5.49.3 System Operation

When an IPCT request is made, a message is sent to the Call Trace system process in the administrative module (AM) to indicate that an IPCT is desired. When this message is received, an IPCT terminal process is created and the trace request message is forwarded to it. This message contains the identifier for the known end of the call, either a DN, a group and member number, or a PID. If this identifier is not a PID, then it is converted to a global port name using terminal maintenance (TM) translation functions. A message is then sent to the appropriate SM requesting a trace on the identified port or PID.

The Call Trace system process in the SM receives the message and uses information from the traced port's process control block link area (PCBLA) and any associated data blocks to determine the number of connections to the port. The SM reports the number of connections to the IPCT process in the AM so that the AM knows how many messages to expect for this trace. The SM then continues the trace by sending a message to the SM(s) associated with each far connection of the call.

When these continue trace messages are received, the port associated with the far connection is identified and the port name and other information is sent back to the IPCT process in the AM.

The IPCT process in the AM receives the message, performs any necessary translations, formats the data and sends the information to the HM (human machine) interface for printing. It then checks its connections counter to see if more messages are expected. If so it waits, if not the process terminates.

If an IPCT is unable to complete, an error message is sent to the HM interface. See the TRC IPCT CALL TRACE Output Message Manual page for a complete list of error messages. Be aware that the most common source of error is an incorrect specification in the input message itself.

A flow diagram for In-Progress Call Trace is provided in Figure 5-2 .

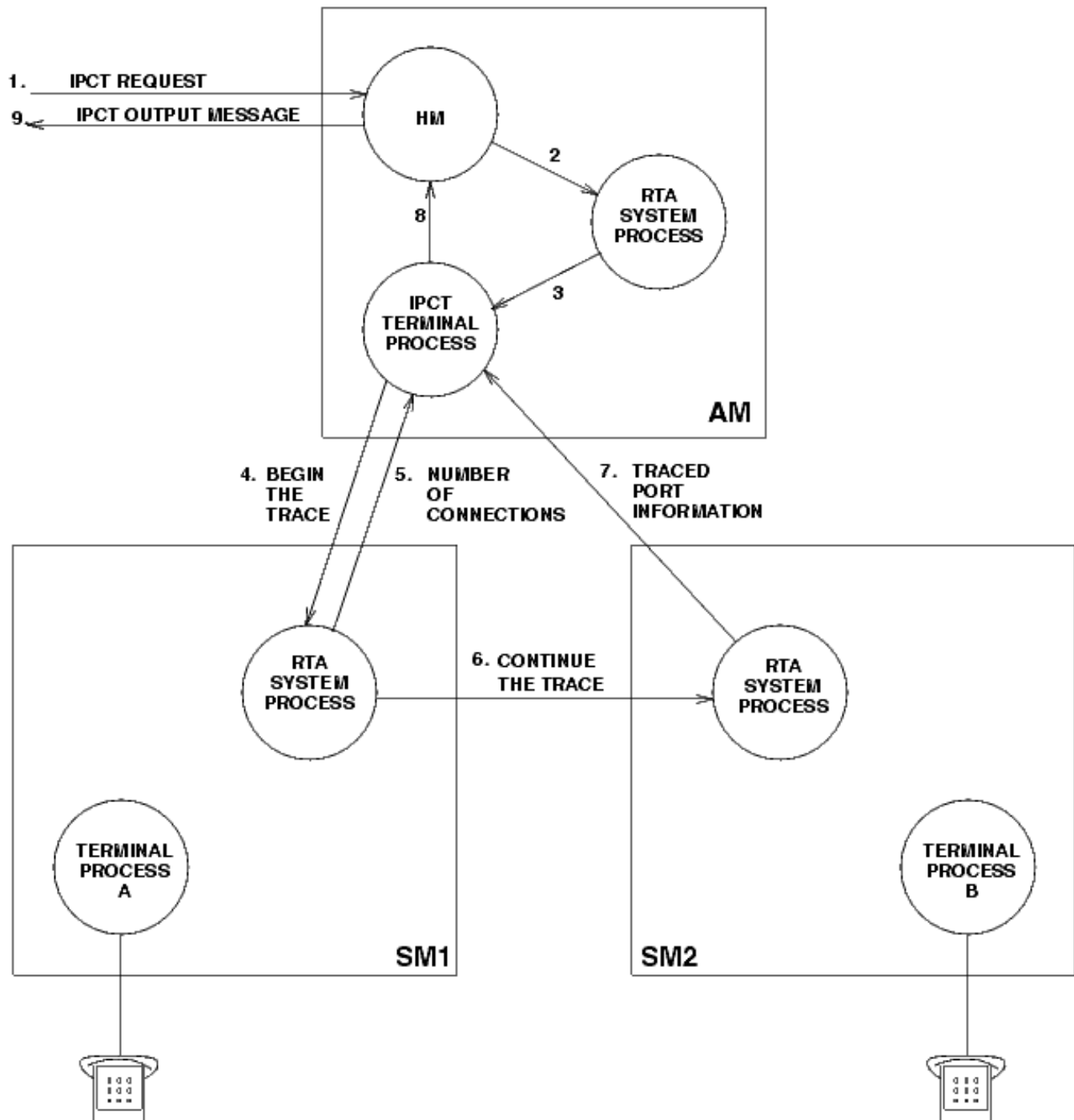


Figure 5-2 Flow Diagram for In-Progress Call Trace

5.49.4 Engineering

5.49.4.1 Hardware

No special hardware.

5.49.4.2 Software

No special memory engineering is required for IPCT.

5.49.5 Implementation

The IPCT is implemented via a TRC:IPCT input command. System response is a trace request acknowledgement followed by one or more TRC IPCT output messages. For more information on these messages, see 235-600-700, *5ESS® Switch Input Messages Manual* and 235-600-750, *5ESS® Switch Output Messages Manual*.

5.49.6 Administration

5.49.6.1 Measurements

No measurements.

5.49.6.2 Billing

No billing.

5.50 NUISANCE CALL TRACE

5.50.1 Overview

5.50.1.1 Definition

Nuisance Call Trace is a public safety feature that allows a telephone company to identify the unknown originator of a telephone call. When a DN is marked for Nuisance Call Trace, an output message automatically prints whenever that DN is called. This printout lists the time and date of the call and information on the called and calling parties. Every effort is made to provide enough information to uniquely identify the parties on the call. Please refer to the TRC IPCT output message in 235-600-750, *5ESS® Switch Output Messages Manual* for the exact message contents for the software release being used.

Nuisance Call Trace includes the following trace types:

- Terminating Call Trace
- Tandem Call Trace
- Interoffice Call Trace
- End-to-End Call Trace.

5.50.1.2 Availability

Terminating Call Trace, Tandem Call Trace and Interoffice Call Trace are available with the 5E6 and subsequent software releases. End-to-End Call Trace is available beginning with the 5E6(1) software release.

Major enhancements to Nuisance Call Trace were done in the 5E6(1) software release.

5.50.1.3 Feature Assignment

Nuisance Call Trace is provided on a per-DN basis.

5.50.2 User Perspective

5.50.2.1 User Profile

This feature and its output is for use by telephone company personnel and other authorized agencies.

5.50.2.2 Feature Operation

5.50.2.2.1 Terminating Call Trace

Terminating Call Trace is used to determine the immediate source of a nuisance call (that is, the line or trunk which originated the call within the office). When a customer requests that incoming calls to a DN be traced, that DN is marked for tracing using the appropriate recent change view. All attempts to terminate to a traced DN result in Nuisance Call Trace output messages until recent change is used to deactivate the feature on that line. If a trunk group and member number is identified as having originated the nuisance call, the trace must be continued at the far-end office. Depending on the type of far-end office either Tandem Call Trace or Interoffice Call Trace should be used.

If the terminator of the call is an MLHG, Nuisance Call Trace triggers an In-Progress Call Trace to pinpoint which member of the MLHG answered the call. The two output messages have the same event number so that they can be easily correlated.

If the terminator of the call is a shared DN, Nuisance Call Trace triggers an In-Progress Call Trace to pinpoint which terminal of those sharing the DN answered the call. The two output messages have the same event number so that they can be easily correlated.

Starting with the 5E6(1) software release, if the terminator of the call is an MLHG or shared DN and the call came in over an IMT, Nuisance Call Trace triggers two In-Progress Call Traces. One shows the originator's connection to the far-end IMT and the other shows the terminator's connection to the near-end IMT. This is necessary in order to pinpoint which terminal answered the call. All three output messages have the same event number so that they can be easily correlated.

5.50.2.2.2 Tandem Call Trace

If Terminating Call Trace has determined that nuisance calls are coming through a tandem office, the DN to be traced is put on the calling line identification (CLID) list (also known as the nonresident call trace list) in the tandem office. When a call to the traced DN routes through the office, the incoming tandem trunk is identified in the Nuisance Call Trace output message. This procedure is continued through each tandem office until a local office is determined to be originating the nuisance calls. At this point Interoffice Call Trace can be used in the local office to determine the actual originator of the calls.

5.50.2.2.3 Interoffice Call Trace

When nuisance calls are found to be coming from one particular office, the DN to be traced is put on the CLID list in that office. When a call is made to the traced DN, a Nuisance Call Trace output message is generated identifying the line which originated the call.

5.50.2.2.4 End-to-End Call Trace

End-to-End Call Trace is an enhancement to Terminating Call Trace available in the 5E6(1) and later software releases. It provides for the inclusion of originating DNs contained in trunk setup messages in Nuisance Call Traces triggered on a terminating line. That is, if an interoffice call is made over a trunk or trunks which deliver the calling party number (for example, CCS7 or PRI), and if this interoffice call terminates to a traced DN, then if the originator's DN is available, it is displayed in the Nuisance Call Trace output message along with the incoming trunk group and member number used. If the calling DN is present in the trunk setup message, it is displayed in the Nuisance Call Trace output messages regardless of whether Directory Number Privacy was invoked.

In addition to the originator's DN, a uniqueness field is provided which tells the craft whether the DN given uniquely maps to a port in the originating office. If the DN is unique, then the source of the nuisance call has been pinpointed. If the DN is not unique, then there is more than one port in the far-end office which could have originated a call using this DN. Interoffice Call Trace can be used in the far-end office to pinpoint the source of the call.

If the uniqueness of the DN was not provided by the trunk signaling mechanism, it is displayed as unknown. Check with the far-end office to see if the uniqueness of the DN can be determined and perform an Interoffice Call Trace if necessary.

Except for the inclusion of the originating DN and uniqueness, the operation of End-to-End Call Trace is identical to Terminating Call Trace.

5.50.2.3 Interactions

Nuisance call trace will print information to the ROP as soon as the switch attempts to route to the port. At this point, call processing continues, and the call could be denied termination due to some restriction (TGSR, ATH for AMA, MDR RSTRCT or ACCT, etc.). If the user enters a valid ACCT or ATH code to override the respective restriction when prompted, and the call is allowed to proceed to the DN, a second set of nuisance call information would appear on the ROP for this call.

5.50.2.4 Limitations

When an incoming trunk call is traced, Nuisance Call Trace provides the trunk group and member number. Unless End-to-End Call Trace is available, the calling line cannot be identified.

Due to real time constraints, the maximum number of DNs that can be on the CLID list at one time is 36. These DNs can be up to 15 digits long.

DNs on the CLID list must take the same form they will have during routing, that is, prefixing, deleting and special dialing plans must be taken into account when deciding which digits to put on the list. Partial matching is done for calls involving overlapped outpulsing. Carrier access codes (for example, 10XXX) are not used for the CLID list check.

Calls tandeming through an access tandem (AT) office using equal access signaling cannot be matched against the CLID list. This is because the AT is never aware of the called DN.

Nuisance Call Trace does not support the tracing of logical test ports.

Nuisance Call Trace is available for analog and circuit-switched ISDN calls only.

Nuisance Call Trace should be employed sparingly, since every call to a traced number generates an output message. When a high rate of traced calls occurs for a sustained interval of time, the load of output messages might be too great for the processing capacity of the switch, resulting in lost trace printouts. To avoid this situation, assignment of call trace should consider the number of calls normally placed to the telephone number and the existing level of trace printouts from other numbers. If the existing peak rate of trace printouts in the office is between 200 and 250 per hour, then tracing calls to a telephone number with high usage is inadvisable.

5.50.3 System Operation

5.50.3.1 Terminating Call Trace/End-to-End Call Trace

A yes/no attribute in a data relation states whether the DN is to be traced. During routing of the call this attribute is checked and, if it is set to yes, a trace entry point function is called. This function collects the necessary information from the routing data and sends it to a trace system process in the AM. This process performs the necessary checks and conversions, formats the TRC IPCT output message and sends it to the HM interface for printing.

Flow diagrams for Terminating Call Trace and End-to-End Call Trace are provided in Figure 5-3 and Figure 5-4 .

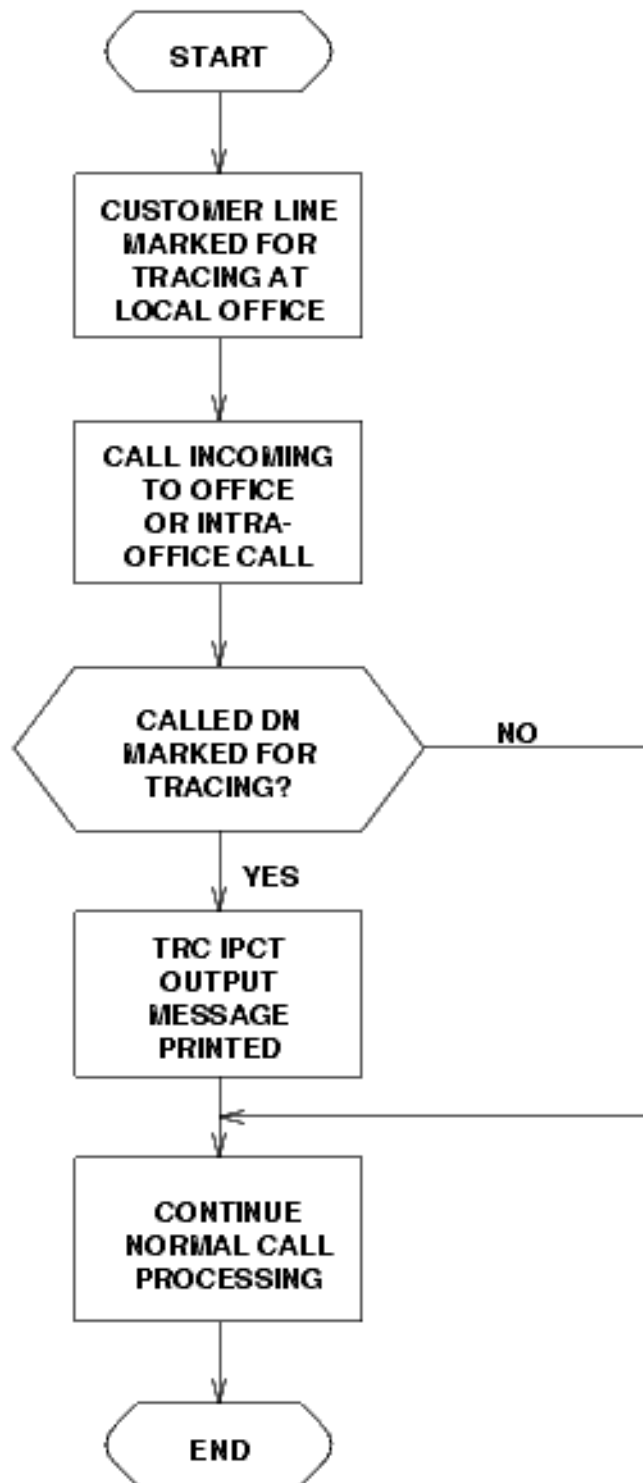


Figure 5-3 Flow Diagram for Terminating Call Tracing

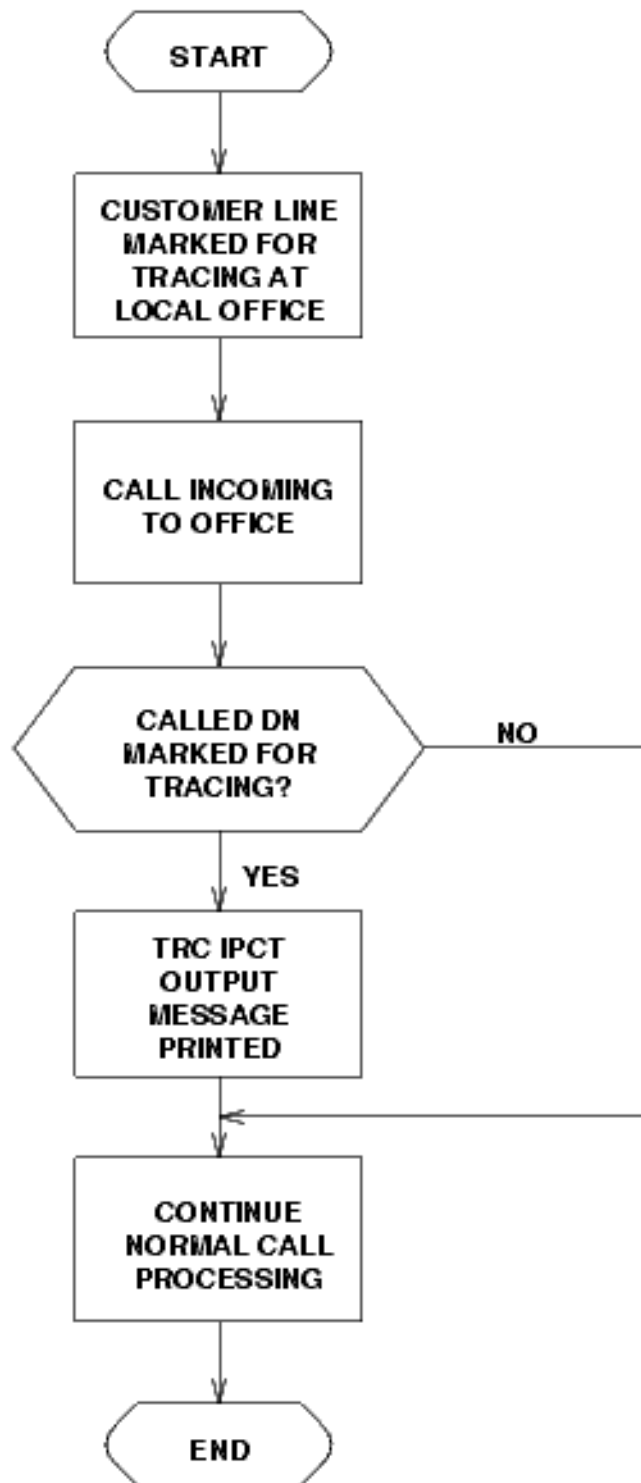


Figure 5-4 Flow Diagram for End-to-End Call Trace

5.50.3.2 Interoffice Call Trace/Tandem Call Trace

A list is maintained in global memory of the DNs outside of the office which should be traced. When a call is routing to an outgoing trunk, the routing DN is checked for a match against this list. If a match is found, a trace entry point

function is called. This function collects the necessary information from the routing data and sends it to a trace system process in the AM. This process performs the necessary checks and conversions, formats the TRC IPCT output message and sends it to the HM interface for printing.

Flow diagrams for Interoffice Call Trace and Tandem Call Trace are provided in Figure 5-5 and Figure 5-6 .

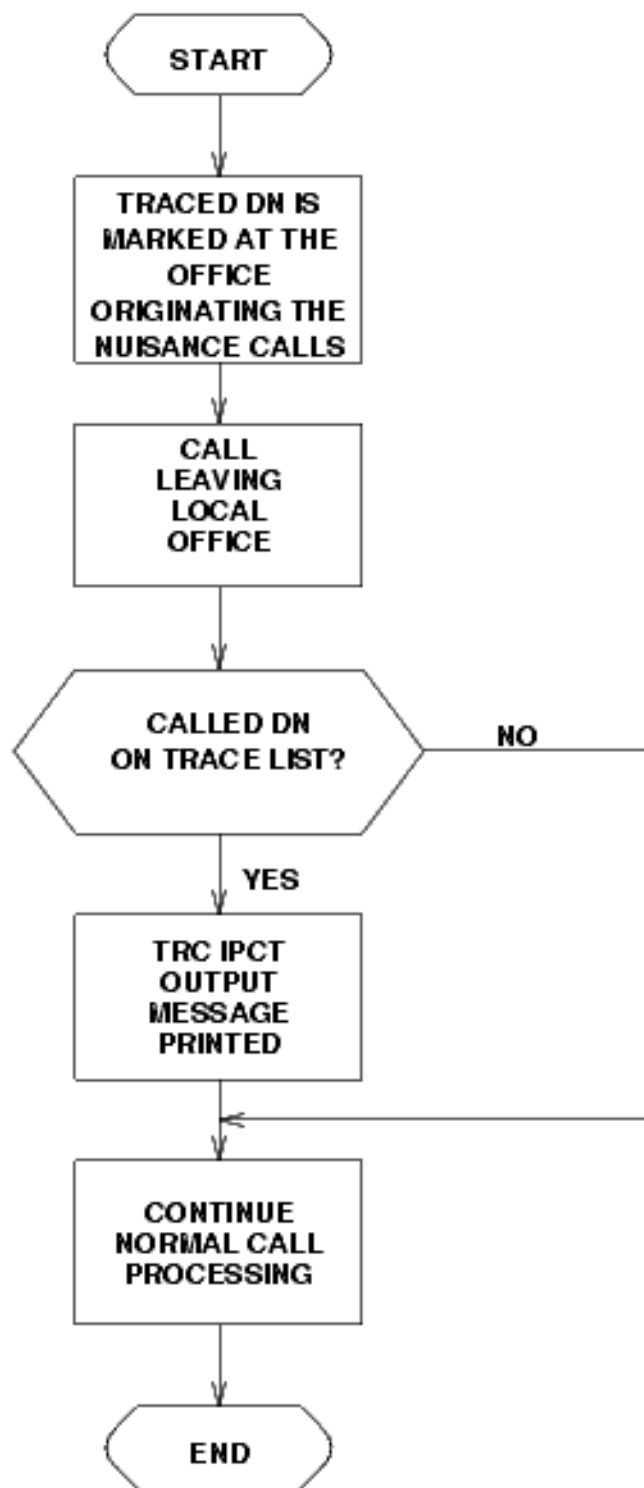


Figure 5-5 Flow Diagram for Interoffice Call Tracing

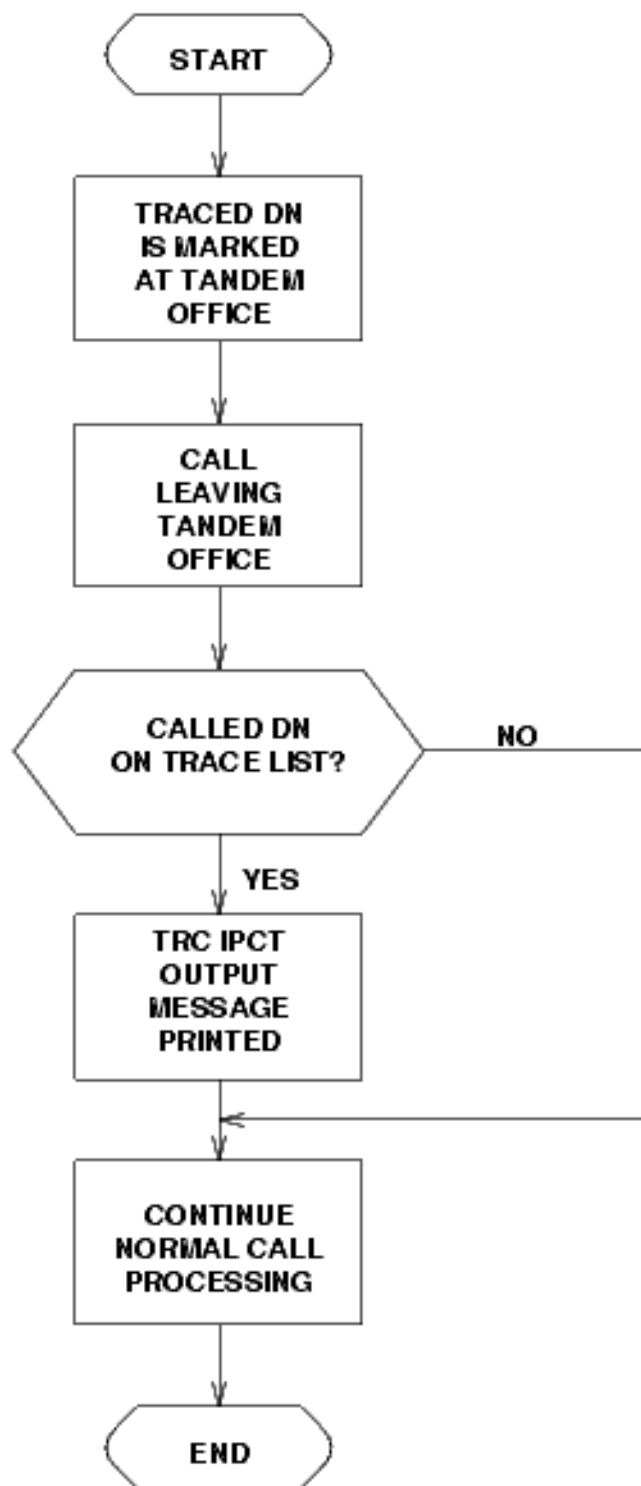


Figure 5-6 Flow Diagram for Tandem Call Tracing

5.50.4 Engineering

5.50.4.1 Hardware

No special hardware.

5.50.4.2 Software

No special memory engineering is required for NCT.

5.50.5 Implementation

5.50.5.1 Terminating Call Trace/End-to-End Call Trace

These trace types are implemented by setting a field to 'Y' using recent change. This can be done for the individual DN of an MLHG member, for an MLHG group (UCD, MUPH or ISAT only), or for a regular line's DN. Typical recent change fields and views are as follows:

- Analog line - RC View 1.1, TRC field
- Analog MLHG member - RC View 3.2, TRC field
- Analog MLHG - RC View 3.5, GROUP TRC field
- ISDN line or MLHG member - RC View 23.2, TRC field.

To deactivate the trace, set the TRC field to 'N'.

To trace PBX DID lines, perform the following steps:

- (1) Update RC/V View 4.14 to assign a circuit routing mod to the hundreds group. Do this by entering C in field 3. RMTYPE, then explicitly or implicitly specify an SM number.
- (2) If an LCC with TERM TREATMENT = RI does not exist, insert one in RC/V View 4.1.
- (3) Delete RC/V View 1.5 for line to be traced.
- (4) Insert RC/V View 1.5 for line to be traced. Apply LCC defined in step 2. Use RTI from RC/V View 4.14 and set TRC = Y. This will assign the one DN to its own RTI, while the rest of the hundreds group continues to be routed by the HRI.

To deactivate the trace, set the TRC field to 'N' on RC/V View 1.5.

Refer to 235-105-220, *5ESS[®] Switch Corrective Maintenance*, for more information on implementing Nuisance Call Trace.

5.50.5.2 Interoffice Call Trace/Tandem Call Trace

These trace types are implemented by adding the DN to be traced to the CLID list. They are deactivated by removing the DN from the list. Both operations are performed via input command **TRC:CLID**.

To check which DNs are currently on the CLID list type in **OP:CLID**.

5.50.6 Administration

5.50.6.1 Measurements

No measurements.

5.50.6.2 Billing

No billing.

5.51 UTILITY CALL TRACE

5.51.1 Overview

5.51.1.1 Definition

The Utility Call Trace (UCT) feature displays the hardware path of a call through the switch on the TTY screen and prints a summary message containing hardware information on the receive only printer (ROP). Utility Call Trace also takes a snapshot of the data structures associated with the call and saves them in a global data area for printing upon demand.

5.51.1.2 Availability

The UCT feature is available with the 5E6 and subsequent software releases.

Major enhancements to UCT were done in the 5E8(1) software release.

5.51.1.3 Feature Assignment

The UCT is done on a per-call basis.

5.51.2 User Perspective

5.51.2.1 User Profile

UCT is for use by telephone company maintenance personnel.

5.51.2.2 Feature Operation

UCTs are triggered off of a known piece of data identifying a port, process, time slot number or circuit to be traced. Traces can be triggered off of a directory number, a line equipment number, a group and member number (for trunks or multiline hunt groups), etc. UCTs can be requested via input command, utility breakpoints, source code function calls or, TTY input pokes. System response is an acknowledgement message, a graphic representation of the hardware used by the call, and a summary message containing hardware and other information. By default, the summary message is in external (diagnostic) format. Internal format is available upon request. As part of the UCT, selected data structures are collected for each traced party. A separate request can be made to dump this information to the ROP.

Circuit-switched ISDN Utility Call Trace and packet-switched ISDN Utility Call Trace are available in the 5E6 software release. For circuit-switched ISDN call traces, a channel (D, B1 or B2) or subaddress/call ID number may be required in order to uniquely identify the entity to trace. If this information is not provided, the default action is to trace the D-channel signaling path. If a subaddress/call ID of "ALL" is specified, a special status page is populated showing information on all subaddresses/call IDs associated with the traced entity. Circuit-switched call traces are the default; packet switched call traces are available by specifying the "pkt" option.

For Line Time Slot Bridging (LTSB) calls with barging, the trace always begins from the controlling port. For shared DN calls with bridging, the controlling port is always traced providing the subaddress/call ID option is used in the input request.

OSPS Utility Call Trace was also introduced in the 5E4(2) software release. This allows a trace to be performed on a

specific Basic Services Terminal or a Video Display Terminal operator position.

As of software release 5E12, UCT will display whatever is available for the DN and/or PDN in the output at the time of the call. This means that a NANP DN without the NPA may be displayed on the UCT MCC page or pages and on the ROP for either the calling or called party number, regardless of whether switch personnel have input a full NANP DN or a NANP DN without the NPA. If switch personnel desire that all numbers be displayed on the UCT MCC page or pages and on the ROP as a full NANP DN, then the field ROP DISP DN 10 can be set to Y on RC/V view 8.1. However, if the switch has any office code that is defined in more than one NPA on that switch, then all DNs will be output as full NANP DNs regardless of the ROP DISP DN 10 setting.

Beginning with the 5E8(1) software release, when any member of a conference call is traced, all of the connections are shown. If one of the members of the conference call controls another conference call, then only the first conference call encountered is traced and the trace data will indicate the presence of other conference call(s) that are part of the one traced (that is multiple conference calls are not traced).

Also beginning with the 5E8(1) software release, hairpin and dual-path DDS connections were introduced. Dual-path DDS is a special case of hairpin and is a type of service in which one path is used for data while the other path contains error correction information. Either path may be specified in the input command as the path to trace.

5.51.2.3 Interactions

No interactions.

5.51.2.4 Limitations

Only one UCT is allowed at a time. Subsequent UCTs overwrite the information stored in the global data area.

The UCT cannot reliably identify the DN used by a multiparty origination. Such DNs are flagged with a "+".

For traces that specify a PID, the PID must be for circuit-switched call.

UCT does not support the tracing of logical test ports.

5.51.3 System Operation

5.51.3.1 Circuit-Switched Utility Call Trace

When a trace request is made, a message is sent to the Call Trace system process in the AM to indicate that a UCT is desired. This message contains the identifier for the entity (port, process, circuit or time slot) to be traced. Various checks and conversions are made and, if the trace request is valid, a message is sent to the appropriate SM to begin the trace.

An SM RTA process receives the message and uses the information contained in it to retrieve the PCBLA for the entity being traced. The PCBLA and associated data blocks are used to determine the number of connections to be traced. The SM reports the number of connections to the RTA process in the AM so that the AM will know how many sets of data to expect back. The SM then sends a message to the SM associated with each far connection of the call to trigger a trace for that connection.

After sending these "continue trace" messages, or after receiving a continue trace message, the SM process begins data collection. When all of the expected structures are collected, they are formatted into messages and sent to the AM process for storage. If an error is encountered during data collection, an error flag is set. Depending on the severity of the error, the trace of that connection may be terminated. If the trace of a connection is terminated, an appropriate error message is printed on the ROP.

As the AM receives the data messages from the SMs, they are stored in a global trace area. The AM keeps track of

which messages have been received for each connection. When all of the expected messages for a connection have been received, the AM formats and prints the summary output message and displays the hardware path on the TTY screen for that connection. An error in tracing one connection of the call does not necessarily affect the output for other connections of the call. Nonfatal errors in data collection are signaled in the header of the output messages.

If additional data concerning the call is desired, the data structures stored in the global trace area can be dumped to the ROP. The data structures for a particular connection can be dumped by specifying the process ID (available from the summary output message) for that connection. Specific sets of data structures for the connection can also be requested. The default is to dump all data for all connections.

A diagram of the Circuit-Switched UCT call flow is provided in Figure 5-7 .

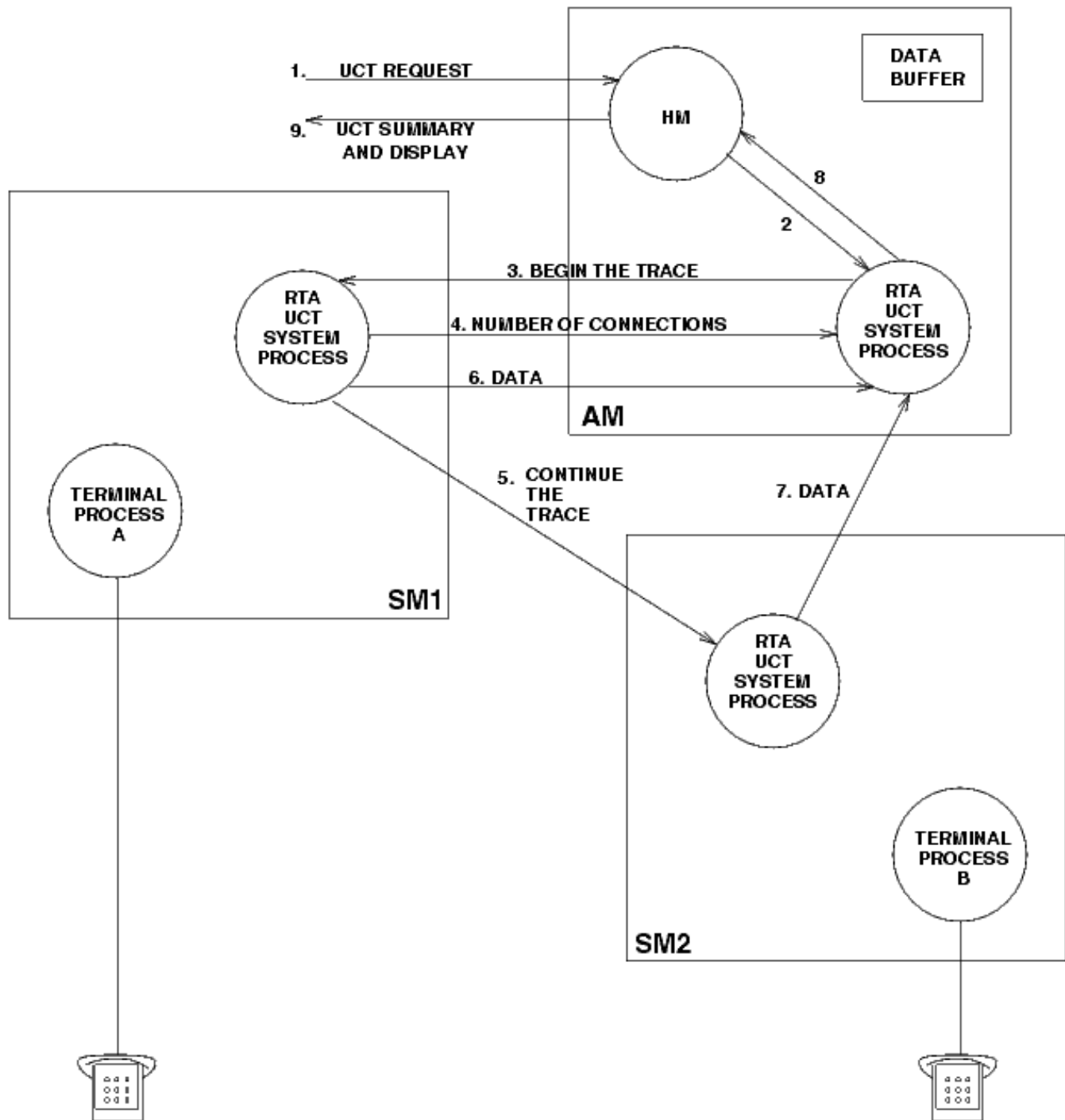


Figure 5-7 Flow Diagram for Circuit-Switched Utility Call Trace

5.51.3.2 Packet-Switched Utility Call Trace

When a trace request is made, a message is sent to the Call Trace system process in the AM to indicate that a UCT is desired. This message contains the identifier for the port to be traced. Various checks and conversions are made and, if the trace request is valid, a message is sent to the appropriate SM to begin the trace.

The Call Trace system process in the SM receives the message and uses the information contained in it to retrieve

the D- or B-channel data to be collected for the physical view information. This data is sent up to the AM for storage. The SM RTA process then generates a new message to the packet handler (PH) that identifies the channel to be traced.

The PH TM process receives the message and uses the information to collect the D channel control block (DCCB), logical link control block (LLCB), access link control block (ALCB) and logical channel control block (LCCB) data for that channel. If there are no LLCBs, LCCBs or ALCBs for that channel, there are no active packet calls and an end-of-data message is sent to the SM. If there are LCCBs, LLCBs and ALCBs then the level 2 (DCCB and LLCB) and level 3 (ALCB and LCCBs) data structures are sent to the packet interface (PI). The last message sent is an information message indicating all the data has been sent.

The PI receives the PH data message and stores all level 3 messages. Level 2 messages are passed on through to the SM. When the information message has been received, a series of messages are sent to the SM containing the level 3 structure. Also the information message is passed on to the SM.

The Call Trace system process in the SM receives each message from the PI and hands it off to the AM.

The Call Trace system process in the SM receives each of the messages containing the block data of the data structures and stores it. When the last message from the SM is received, the MCC 139 summary page is populated with the first 16 LCNs and the MCC 140 page is updated with the call trace hardware data. An error in tracing the packet call does not necessarily affect the output for the other LCNs. NonFatal errors in data collection are signaled in the header of the output messages.

If additional data concerning the call is desired, the data structures stored in global data can be dumped to the ROP. The data structures for a particular packet call can be dumped by specifying the DN (available from the summary output message) for that call. Specific sets of data structures can also be requested. The default is to dump all collected data.

A diagram of the Packet UCT call flow is provided in Figure 5-8 .

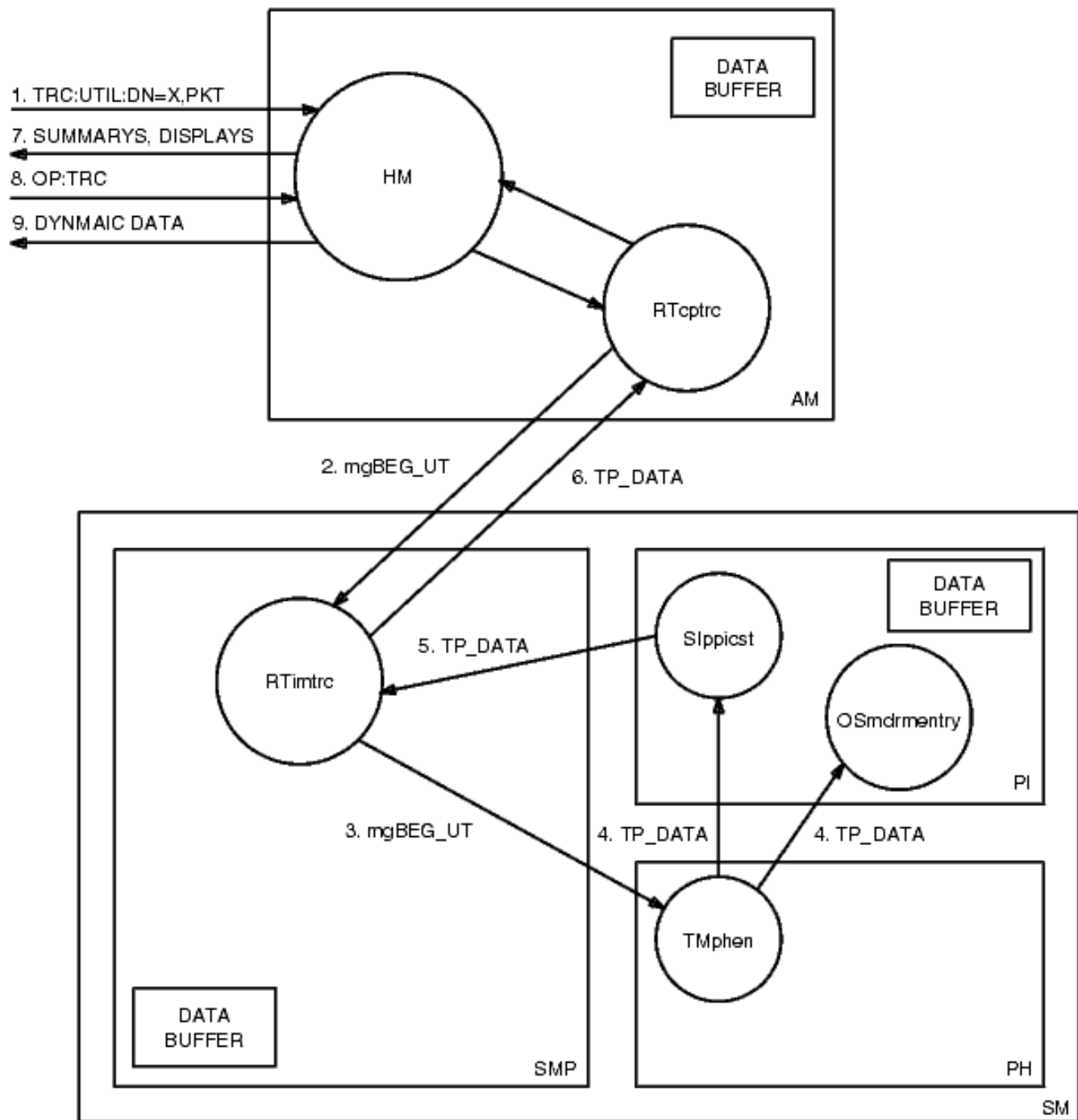


Figure 5-8 Flow Diagram for Packet-Switched Utility Call Trace

5.51.4 Engineering

5.51.4.1 Hardware

No hardware requirements.

5.51.4.2 Software

No special memory engineering is required for UCT.

5.51.5 Implementation

The UCTs can be requested via input command or software release utility breakpoints. Refer to the TRC UTIL Input Message Manual page for information on the input command. Please seek technical assistance for UCTs triggered from breakpoints as misuse of this feature can seriously degrade switch operation. Data dumps can be requested via the OP TRC input command. Refer to the Input Message Manual for details.

Traces and data dumps can also be requested via TTY pokes. The poke menu resides on MCC Page 131. The menu page also contains directory information for other UCT pages.

For additional information on the use of UCT, please refer to the appropriate maintenance procedures document.

5.51.6 Administration

5.51.6.1 Measurements

No measurements.

5.51.6.2 Billing

No billing.

5.52 GROUP ALERTING SERVICE

5.52.1 Feature Definition

The Group Alerting Service permits the controller (or alerting party) upon dialing a code to signal a preselected number of telephones simultaneously. One-way communication is then established from the controller to all members of the group that have responded to the signal. There may be a maximum of three different control telephones associated with the customer group alerting service, only one of which may be used at one time.

5.52.2 Availability

The Group Alerting Service feature is provided in all software releases of the 5ESS[®] switch.

5.52.3 Application

The Group Alerting Service feature provides a means, independent of the switching network, of alerting a group or several groups of subscribers for the purpose of disseminating an alert message.

5.52.4 Limitations

Each group alerting circuit can alert a maximum of 25 customers.

5.52.5 Interactions

Each line that is to be a member of a Group Alerting System should be able to have the make-busy key and sleeve lead function assigned to it. Lines serving *Dataphone*[®] data sets should be excluded from the Group Alerting System.

5.52.6 Restriction Capability

The Group Alerting Service is a manual hardware feature, and there are no provisions to partially restrict the capabilities of the feature.

5.52.7 User Operation

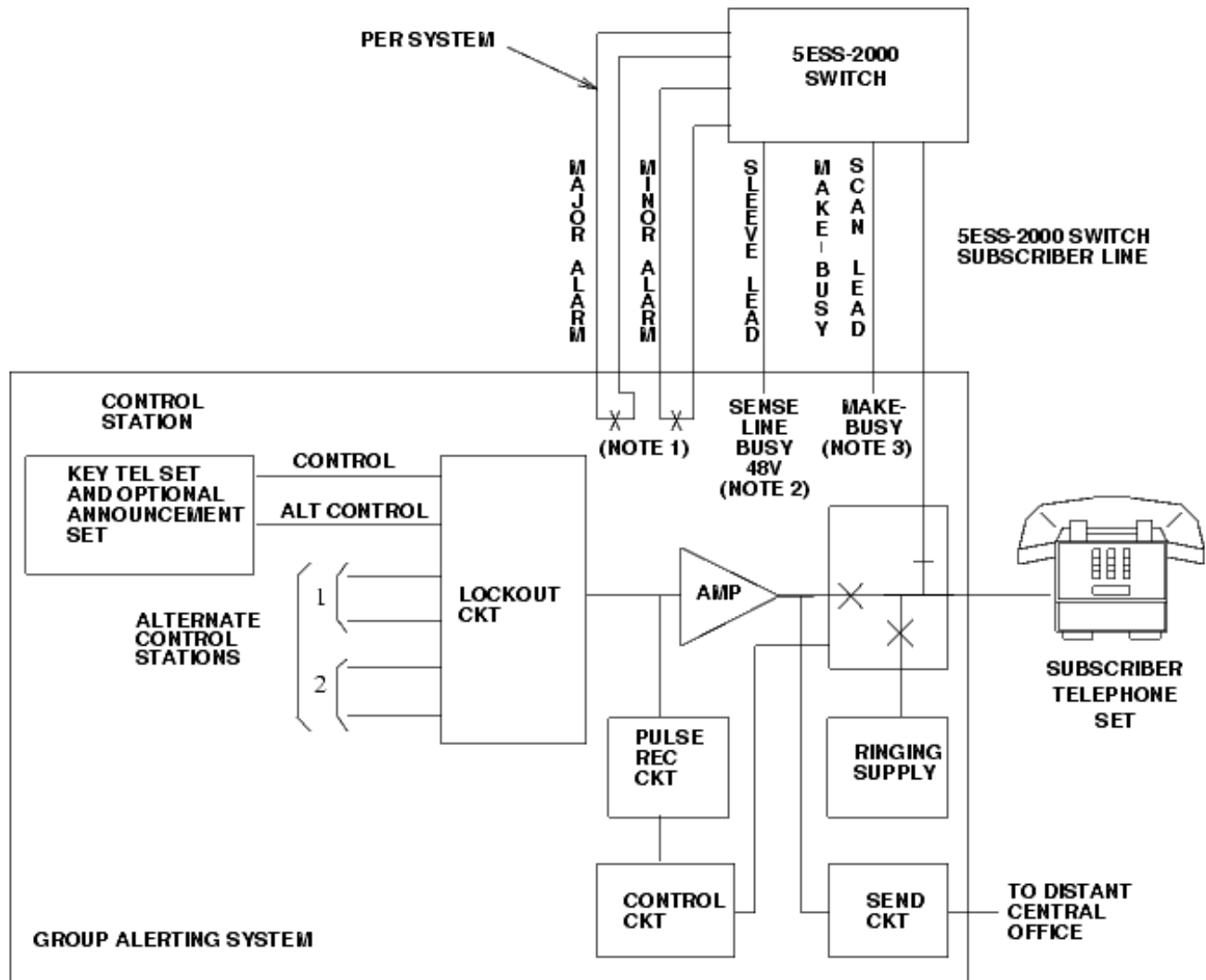
The Group Alerting Service is used by volunteer fire departments, civil defense groups, or others requiring quick and simultaneous dispatch of oral or recorded messages. During nonalert periods, subscriber telephones are connected to normal service lines at the 5ESS[®] switch office.

The Group alerting circuit can be activated from any of the three control stations. A control station may consist of only a modified telephone set connected to the control circuits at the 5ESS[®] switch office. No other service is connected to this set. Announcements are repeated orally during the alert period.

Using an expanded alert system, an oral announcement is made initially from a telephone at the control station, and then the announcement is automatically repeated from an announcement set during the alert period.

5.52.8 System Operation

During nonalert periods, subscriber telephones are connected to normal service lines at the 5ESS[®] switch central office. During alert periods, 1-way voice transmission is provided from a control station or alternate control station to a selected group of telephone subscribers mutually connected to the group alerting system through one or more central offices. A local office sending circuit is provided when some groups to be alerted are located in a distant office. See Figure 5-9 and Figure 5-10 .



Notes:

1. A failure within the GA system can be communicated to the 5ESS-2000 switch by providing a loop closure to one of two scan leads to indicate a Group Alert System major or minor alarm.
2. Senses a sleeve lead associated with the alerted line. If current is flowing in that line, the 5ESS-2000 switch is connected to the line, and the Group Alerting System may optionally apply a superimposed tone.
3. If no current is flowing or when it stops flowing, the Group Alerting System provides a loop closure to the make-busy scan lead associated with the line, to make the line busy to terminating calls. Relays are operated to terminate the subscriber line in 47K Ω and connect the alerted party's telephone to ringing or the controller of the alert.

Figure 5-9 Group Alerting Service Block Diagram

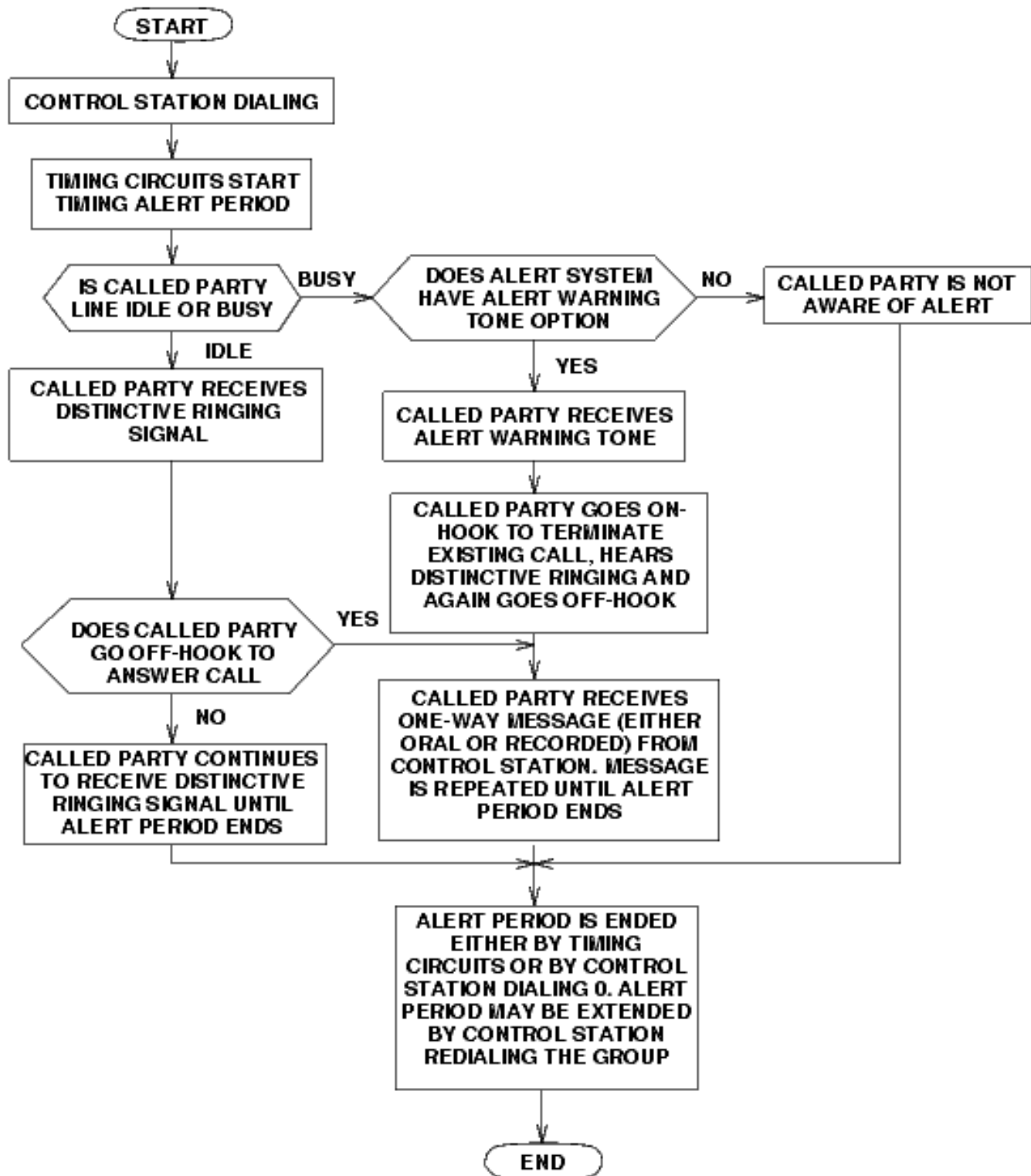


Figure 5-10 Group Alerting Service Feature Flow Diagram

A maximum of three control stations can be provided to permit activation of the group alerting circuit from up to three remote control points. An alert may be initiated at a control station by dialing a single digit from the control telephone. Group alerting hardware at the switch central office will select, connect, and ring the proper group of

subscribers. Additional groups may be alerted by dialing additional digits corresponding to the selected groups. One digit may be reserved for an all-groups alert.

Using the basic alert system, oral announcements are made during the alert period from a telephone at the control station. Using an expanded alert system, an oral announcement is made initially from a telephone at the control station and then by operation of controls at the telephone set; the announcement is automatically repeated from an announcement set during the alert period. An alternate control line may be provided to ensure service if the regular line fails. All control stations must be served by the same central office. A test and monitor line from the central office to each control station may be provided.

Subscriber telephones receive a distinctive ringing signal which informs the subscriber that an alert condition exists. An alert warning tone may be provided optionally, which informs the subscriber on a busy line that an alert condition exists. If the subscriber terminates the existing call, distinctive ringing is heard; and upon answer, the subscriber receives the alert message.

Alert announcements and connections are automatically terminated by timing circuits in 3, 5, or 8 minutes, as determined by wiring options, unless otherwise terminated or extended from a control station. An alert may be terminated before being automatically timed out by dialing the digit 0 from a control telephone. An alert may be extended by redialing the previously dialed digit(s) from a control telephone before the alert is automatically timed out.

When an alert condition is initiated from one control telephone, any additional control telephones are locked out at the lockout circuit and receive a busy tone to indicate the lockout conditions.

The Group Alerting Service is provided entirely by a separate dedicated system which is cross-connected to telephones served by the Group Alerting System. However, in order to inform the Group Alerting System that a group member line is off-hook, a sleeve lead (a separate wire or pair of wires) is associated with each group member line. At all times when the group member line is off-hook, the local switching system grounds the sleeve lead. In addition, a scan lead is associated with each group member line in order to provide a make-busy function. When the group alerting system seizes the idle line during an alert, the group alerting system grounds the scan lead to indicate to the 5ESS[®] switch that the line should be made busy to any terminating calls.

In addition to the one scan and one sleeve lead per group alert member line, there are two scan leads provided per Group Alerting System. On one of these scan leads, the Group Alerting System provides a loop closure that the switch senses as a minor alarm and takes appropriate minor actions. The second scan lead is used to indicate a major alarm from the Group Alerting System to the switch.

5.52.9 Resource Utilization

5.52.9.1 Hardware

All of the equipment shown in Table 5-1 is required for the Group Alerting Service at the central office and may be mounted on the 5ESS[®] switch miscellaneous frame or on a standard relay rack.

Table 5-1 shows hardware ordering information for the Group Alerting Service feature.

Table 5-1 Ordering Information For The Group Alerting System Hardware

DESCRIPTION	ORDER CODE	SD NUMBER	J-SPEC NUMBER	NO. OF 2-INCH MTG. PLT SPACESPER UNIT
Group Alerting Service-Control Circuit	NA	95883	J95421	1
Group Alerting Service-Aux or Monitor And Test Line Circuit	NA	95884	J95421	1

5.52.9.2 Software Requirements

Software requirements are not applicable to the Group Alerting Service feature.

5.52.10 Implementation and Administration

5.52.10.1 Data Assignments and Records

The translations necessary to define the Group Alerting Service feature may be made via the ODA or by RC messages. The translation arrangements for both ODA and RC can be made via video display terminal, *TELETYPE*[®] 4025BS teletypewriter terminal, *VT100*[™] terminal, or equivalent, using the interactive process provided by the menus and views.

With systems using PDS commands, use the following input message to access the RC menus and views:

RCV:MENU:APPRC;[PRINT][DETAIL][SUMMARY]!

With systems using the MML commands (5E6 and later software releases), use **RCV:MENU:APPRC[PRINT][SUMMARY][DETAIL];** to access the RC menus and views. Refer to 235-600-700, *5ESS*[®] *Switch Input Messages Manual*, for further details.

The RC view transition procedures differ depending on the software release in the office. If you are not familiar with the procedures for going from one view to another, refer to 235-118-2xx, *5ESS*[®] *Switch Recent Change Procedures* for further details concerning the RC menus and views.

The Lines-Non-Multiline Hunt Telephone Number View (View 1) is required to assign the Group Alerting Service feature. From this view, the required sleeve leads are assigned. The *ESS*[™] Switch 5100-1 Record, Telephone Number Record, which is used to define the features for each telephone number in a *5ESS*[®] switch office, is the office record associated with the Group Alerting Service feature.

5.52.10.2 Measurements

Measurements are not applicable to the Group Alerting Service feature.

5.52.10.3 Charging

Charging is not applicable to the Group Alerting Service feature.

5.53 CALLING LINE SIDE SUPERVISION

5.53.1 Overview

5.53.1.1 Definition

The Calling Line Side Supervision (CLSS) feature allows the *5ESS*[®] switch to provide battery reversal to the intelligent customer premises equipment (CPE) indicating that the called party answered. The battery is left in the reverse state until on-hook is detected. When a called party on-hook is detected, the switch reverses the battery again (returning the battery to normal) to the CPE indicating that the called party has disconnected from the call. This battery reversal assumes that the calling party remains off-hook.

This feature is an analog, per-line feature, for lines with an "FC_INDVDL", "FC_PBX", or "PBXHOTMOT" class of service that do not subscribe to any BRCS or originating features.

5.53.1.2 Economic Worth

Typical users are intelligent public telephones (IPTs), PBXs, and mass callers. This feature is used for more accurate charging. A mass caller application would be to tear down the call upon indication of the first disconnect of the called party so a call could be initiated to the next stored number.

5.53.1.3 Availability

This feature is available with 5E7 and later software releases.

NOTE: Consult your Lucent Technologies Account Executive for availability.

5.53.1.4 Feature Provision Basis

This secured feature is an analog, per-line feature and is not enabled until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature enabling is provided upon ordering. Please contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

5.53.2 User Perspective

5.53.2.1 User Profile

This feature is used by customers, with intelligent CPE, to monitor called party status during a call.

5.53.2.2 Customer Premises Equipment

This feature assumes that the subscriber has intelligent CPE which can recognize and utilize the battery reversals that are applied by the switch upon called party answer and called party disconnect. The intelligent CPE is required to have polarity guard firmware.

5.53.2.3 User Operation

The end-user perception of this feature is dependent upon the internal algorithms used by the intelligent CPE. For example, once the talk path is established on a 5ESS[®] switch, the called party may go on-hook and then back off-hook, within delay disconnect timing (DDT), any number of times. Since battery reversals are given to the CPE as soon as the originating switch receives an answer or disconnect message, the internal algorithm of the CPE may tear down the call on the first indication of disconnect.

When a user places a call from an intelligent CPE (for example, public telephone or PBX), charging for the call can begin once the called party answers. The central office switch indicates answer supervision to the intelligent CPE by applying battery reversal to the analog line. Charging can be terminated when the central office indicates called party disconnect by reversing the current polarity of the line (returning the battery to normal).

A mass caller places calls to stored numbers. When battery reversal is detected for called party answer, the caller message is started. The message continues to play until battery reversal is detected. When the battery is returned to normal, the message could be stopped and a call initiated to the next stored number.

5.53.2.4 Operational Limitations

This feature is for analog lines (non-ISDN) only.

This feature does not apply where answer supervision and disconnect are not returned to the switch. In these situations, the switch does not reverse the battery of the line connected to the intelligent CPE.

A race condition may occur when the originator goes on-hook while the switch is attempting to apply reverse battery.

The battery at the originating port is not reversed by the switch if the originator is off-hook.

This feature only applies to calls originated by a CLSS subscriber.

If the switch is unable to supply battery reversal, the intelligent CPE uses its existing algorithm to determine called party status.

This feature applies to loop start, ground start, universal *SLC*[®] series 5 carrier system, universal *SLC*[®] 96 carrier system, integrated *SLC*[®] series 5 carrier system, and *SLC*[®] 96 carrier system lines.

NOTE: For an integrated configuration, the series 5 remote terminal (RT) must be set to the TR8 mode. From the DCLU, the TR8 mode looks like a series 96 terminal.

This feature is supported on analog lines served by an RT that is connected to the Integrated Digital Carrier Unit (IDCU) developed for the 5E8 software release.

The battery reversal is applied only if the originator and terminator have a stable talking path. If the call is terminated before the terminator goes off-hook, the CLSS feature is not applicable.

5.53.2.5 Interactions

No features, having interactions with the stable call path, are allowed on a line subscribing to the CLSS feature.

5.53.3 Engineering

Not applicable.

5.53.4 Assignment Guidelines

5.53.4.1 Forms and Views

5.53.4.1.1 Translation Guide Forms

Office Record 5109-4 is modified to add the new field **CLSS**.

5.53.4.1.2 Recent Change Views

The recent change (RC) View 1.6 is modified to add the new field **CLSS**. The new RC CLSS field is defaulted to "no." When the line is subscribed to the CLSS feature, this field is populated with "yes."

The mapping code for the following RC views is modified to permit assignment of CLSS:

- View 1.6, Composite Line (Line Assignment)
- View 1.8, BRCS Assignment - TN View
- View 1.11, BRCS Feature Assignment (Line Assignment)
- View 23.20, Primary or Secondary Only Key System

5.53.4.2 Assigning to Customer

Obtain assistance from the Lucent Technologies Secured Feature Administrator (SFA) to enable this secured feature. In a new start office, the SFA enables the feature through ODA. In an existing office, the SFA provides instructions, including the necessary password, for using RC View 8.22 (Secured Feature Upgrade).

5.53.4.3 Deleting Customer Service

Obtain assistance from the SFA to delete this secured feature. The SFA provides instructions, including the necessary password, for using RC View 8.22.

5.53.4.4 Assignment Limitations

The intelligent CPE is required to have polarity guard firmware.

The following are the only features which can be assigned to a line subscribing to CLSS:

- Series Completion
- Multiline Hunting
- Multiple DNs Per Line with Distinctive Ringing
- Selective Carrier Denial
- Advanced Services Platform
- Multifrequency Ringing
- Automatic Number Identification (ANI) 7.

The following must **not** be assigned to a line with the CLSS feature:

- Shared DN capability (SHARED) line feature
- Busy Monitor Status (BUSY MON) line feature
- Line Time-Slot Bridging (LTSB) line feature
- Local Area Signaling Services (LASS) features.

5.53.5 System Operation

If the call completes to an announcement or some destination that returns answer supervision, the switch reverses the battery of the line connected to the intelligent CPE. If another party picks up the call while the call is in the talking state (for example, the caller may be placed on a queue), the battery remains reversed. This appears to the originating CPE as a continuous connection with the terminator.

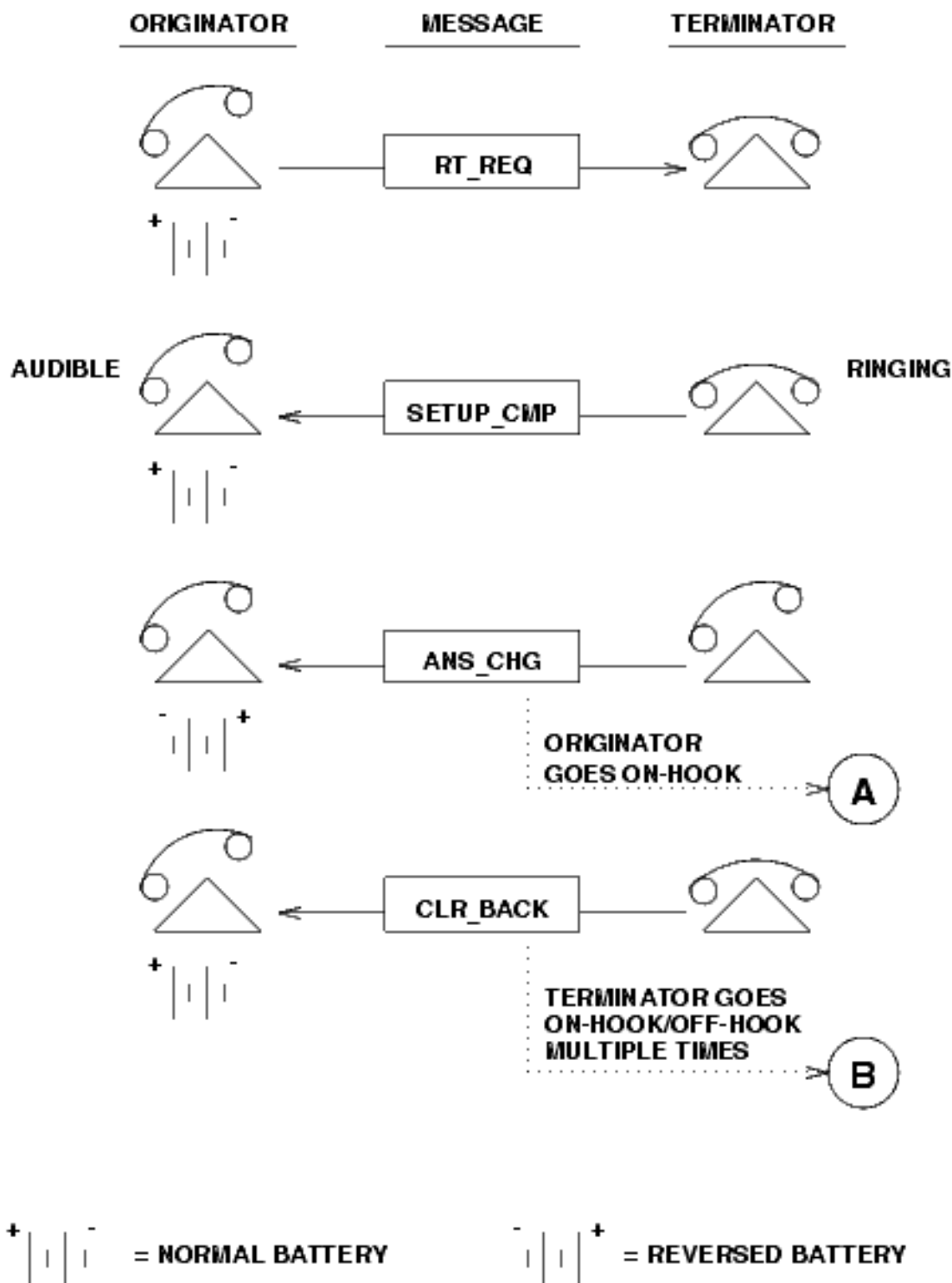
Figures 5-11 , 5-12 , and 5-13 depict some call scenarios to describe the CLSS feature. It is assumed the originator subscribes to CLSS for all scenarios.

In Figure 5-11 , the originator is off-hook (battery on originating port is normal) and sends an RT_REQ message. When an ANS_CHG or ANS_NOCHG message (terminator off-hook) is received from the terminating terminal process (TTP), the originating terminal process (OTP) reverses the battery. When the CLR_BACK message is received from the TTP, the battery is returned to normal.

If the originator goes on-hook before the terminating side, the battery is returned to normal.

If the originator remains off-hook and the terminator goes off-hook again before DDT has expired, OTP receives the REANS message. The OTP reverses the battery on the originating port. If the terminator goes on-hook again, the

battery is again returned to normal. This can be repeated an unlimited number of times after valid answer timing (VAT) has expired. If it happens before the VAT expires, the short supervisory transition (SST) counter is pegged and after a maximum number of SSTs (currently 2), the call is idled.



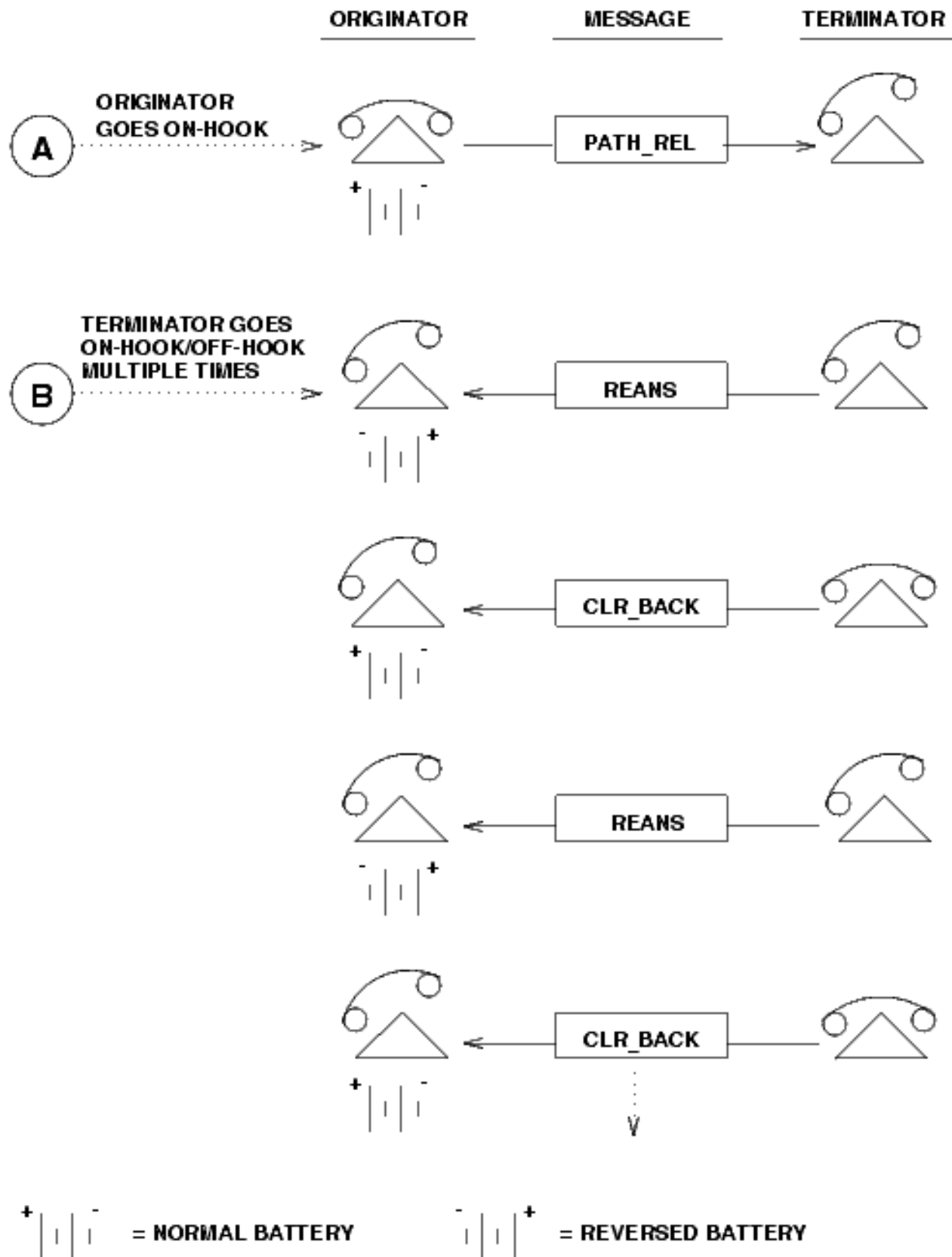


Figure 5-11 Call Setup With Calling Line Side Supervision

In Figure 5-12, the terminating side has the Call Pickup feature. The OTP sends the RT_REQ message and messages are passed between terminators 1 and 2. The TTP 2 sends a RECALL message to the OTP. The OTP sends a PATH_REL message to TTP 1 and a RT_REQ message to TTP 2. The battery is reversed on the originating port when the OTP receives the ANSPU message from TTP 2.

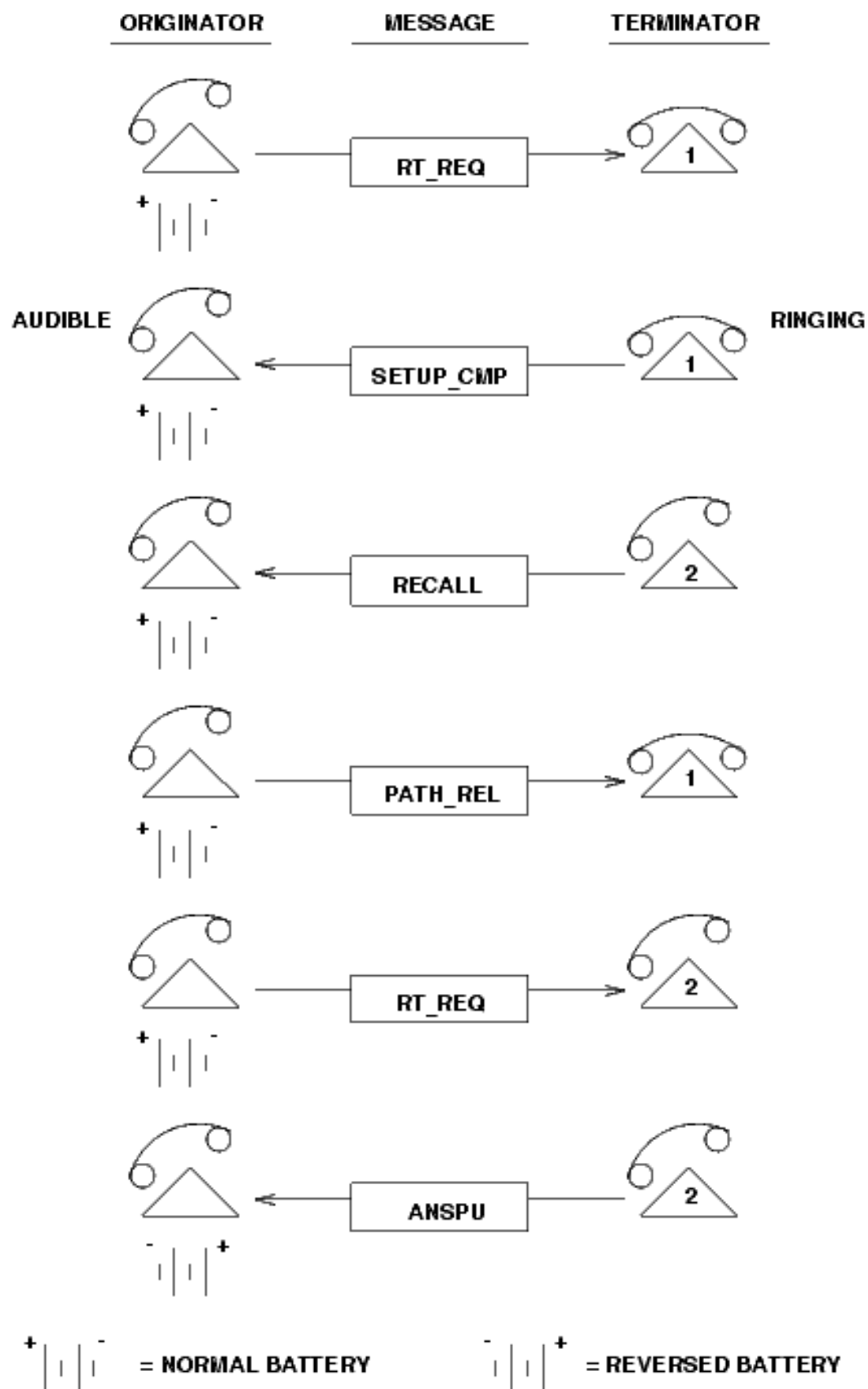


Figure 5-12 Call to a Terminating Line with Call Pickup Feature from an Originator with CLSS

In Figure 5-13, a call is made to a 911 line from a line subscribing to CLSS. Battery is reversed on the originating port when the 911 TTP returns ANS_NOCHG. If the CLSS originator goes on-hook before the 911 line, the battery remains reversed and **on-hook** ringback capabilities are allowed. When both the CLSS originator and 911 line remain off-hook, the battery remains reversed and **off-hook** ringback capabilities are allowed.

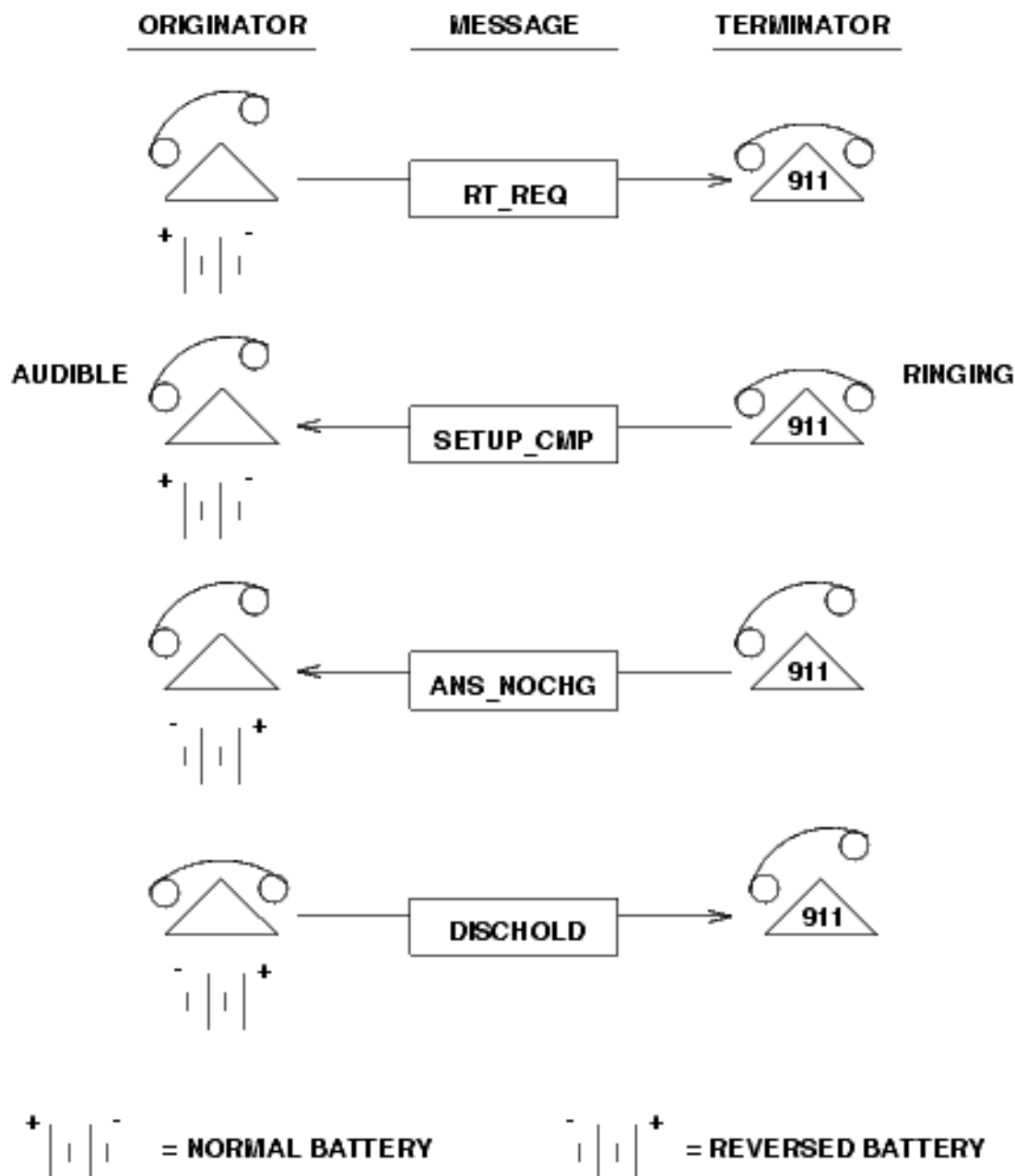


Figure 5-13 Call to a 911 Line from an Originator with CLSS

5.53.6 Administration

Not applicable.

5.54 CALLING PARTY DISCONNECT INDICATION

5.54.1 Overview

5.54.1.1 Definition

The Calling Party Disconnect Indication (CPDI) feature provides an indication to the called party as soon as the system recognizes calling party disconnect. The indication is a short open interval (that is, removal of central office battery) between 800 and 1000 ms as soon as the calling party on-hook is detected. This CPDI open interval is in addition to the regular 800ms open interval provided after the 10- to 12-second disconnect timing interval.

5.54.1.2 Economic Worth

The open interval provided by the CPDI feature allows automatic answering equipment to react earlier to disconnect, eliminating the 10 to 12 seconds of silence in recorded messages and making the equipment available sooner for the next call.

5.54.1.3 Availability

This feature is available with 5E7 and later software releases. The feature is also available for the 5E6 software release via software update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

5.54.1.4 Feature Provision Basis

This feature is optional on a per-office basis and is not active until it has been enabled via the Transparency Feature Optioning System. The enabling is done locally, and does not require assistance from Lucent Technologies. The option number for this feature is 515.

5.54.2 User Perspective

5.54.2.1 User Profile

The typical user for this feature is the owner of a telephone who wants to use automatic equipment to handle incoming calls.

5.54.2.2 User Operation

The user without an attached answering machine is unaware of any change in system operation when the CPDI feature is activated.

When this feature is activated with automatic equipment connected, the user may hear a click indicating the open was provided. This kind of automatic equipment, programmed to react to an open interval, may also cause an on-hook (from the called party) to be sent to the switch immediately thereby freeing the line to receive more incoming calls.

5.54.2.3 Operational Limitations

The switch provides a CPDI only when the calling party disconnects first.

The CPDI feature affects calls to all line classes of service, excluding any ISDN classes of service.

The CPDI given to the called party is a single open interval between 800 and 1000 ms.

The CPDI feature does not work on a line time slot bridging (LTSB) revertive call.

5.54.2.4 Interactions

A CPDI open interval is not given when a calling party disconnects if the called party remains on an active call due to a multiway, call pickup with barge-in, or call waiting feature.

The calling party disconnect indication is also given to a key system providing hold for a called party when a calling party disconnects.

5.54.3 Engineering

5.54.3.1 Special Planning Considerations

Operation on remote switching modules is the same as on local switching modules. This includes operation in normal and stand-alone modes.

The CPDI feature applies to calls using connections to customer lines. This includes loop-start as well as ground-start lines.

NOTE: Ground start receives immediate disconnect treatment instead of a 2-second timer when waiting for the called party to go on-hook.

The CPDI is provided for intra-office and interoffice calls.

Operating company personnel enable/disable this feature via recent change (RC).

For multiparty lines, the CPDI signal indication is given to all of the lines belonging to the terminal port.

5.54.3.2 System Resources

Not applicable.

5.54.4 Assignment Guidelines

5.54.4.1 Recent Change Views

This feature is enabled/disabled via RC View 8.22 (SECURE FEATURE UPGRADE).

5.54.4.2 Assigning to Customer

The procedure to enable this optional feature for an office is as follows:

- (1) Select RC View 8.22 for 5E6 and later software releases.
- (2) Enter **u** for the update mode.
- (3) In the FEATURE ID field, enter **515**.
- (4) In the MODULE field, enter **OFC** (office).
- (5) The PASSWD field must be blank.
- (6) In the ACTIVE field, enter **Y** (yes).
- (7) Leave all remaining fields blank.

- (8) Enter **u** to update the data.

5.54.4.3 Deleting Customer Service

The procedure to disable this optional feature for an office is as follows:

- (1) Enter **u** for the update mode.
- (2) In the FEATURE ID field, enter **515**.
- (3) In the MODULE field, enter **OFC** (office).
- (4) The PASSWD field must be blank.
- (5) In the ACTIVE field, enter **N** (no).
- (6) Leave all remaining fields blank.
- (7) Enter **u** to update the data.

5.54.4.4 Verify Option Feature

The procedure to verify this optional feature for one SM is as follows:

- (1) Select RC View 8.22 for 5E6 and later software releases.
- (2) Enter **r** for review mode.
- (3) In the FEATURE ID field, enter **515**.
- (4) In the MODULE field, enter an SM number (1 to 192).

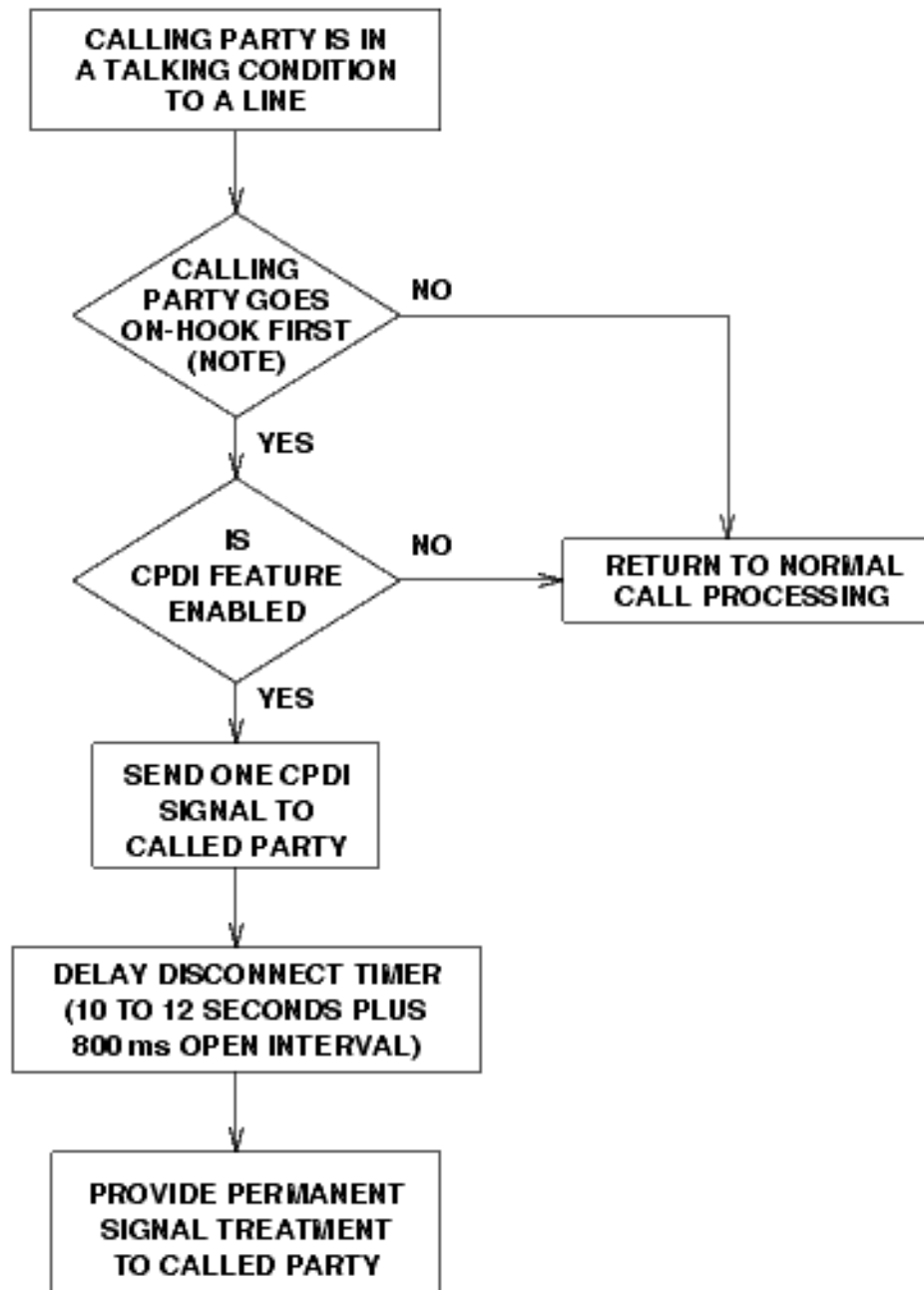
NOTE: Do not use **OFC** in the MODULE field for the verify procedure.

- (5) If the ACTIVE field is **Y**, the feature is enabled for the SM specified. If the ACTIVE field is **N**, the feature is disabled for the SM.

NOTE: Repeat this procedure for each SM to be verified.

5.54.5 System Operation

The call flow is illustrated in Figure 5-14. On a call in a talking condition to a line, if the calling party disconnects first, the called party's switch sends a CPDI to the called party when calling party on-hook is detected. The CPDI signal given is a short open interval (that is, removal of central office battery); the CPDI is followed by 10- to 12-second disconnect timing (plus an 800 ms open interval) and permanent signal treatment.



NOTE: CALLED PARTY REMAINS OFF-HOOK.

Figure 5-14 Calling Party Disconnect Indication Flow Diagram

5.54.6 Administration

Not applicable.

5.55 FULL 1+ BLOCKING/1+ SPLIT BLOCKING

5.55.1 Overview

5.55.1.1 Definition

The Full 1+ Blocking/1+ Split Blocking feature provides lines a capability to allow credit card, collect, or third-party billing of Inter-LATA Carrier (IC) and International Carrier (INC) calls using alternate carriers from lines presubscribed to a particular carrier while blocking nonoperator calls. The feature provides an option to either block all nonoperator IC/INC calls or only those calls requesting an alternate carrier. Blocked calls are routed to a tone or 13A announcement.

This feature primarily affects inter-LATA nonoperator calls; however, Inter-Exchange Carrier (IEC) calls dialed with a carrier access code (10XXX) are also blocked by this feature. Intra-LATA Local Exchange Carrier (LEC) calls are not affected by this feature.

5.55.1.2 Availability

This feature is available with 5E7 and later software releases. The feature is also available for the 5E6 software release via software update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

5.55.1.3 Feature Provision Basis

This feature is assignable on a per-line basis.

5.55.2 User Perspective

5.55.2.1 User Profile

This feature allows subscribers to place operator calls to an alternate carrier.

5.55.2.2 Customer Premises Equipment

This feature works with any existing Customer Owned Coin Operated Terminals (COCOT) and any CPE used in aggregators arrangements such as hotels, motels, and hospitals.

5.55.2.3 User Operation

This feature does not affect the call flow scenario from the user's perspective. Users may dial calls using carriers other than the presubscribed carrier, by dialing the 10XXX 0 full NANP DN sequence to place their calls.

5.55.2.4 Operational Limitations

Users with split blocking must dial 1 full NANP DN to use their presubscribed carrier. The split blocked user that dials 10XXX 1 full NANP DN receives error treatment.

The fully blocked user receives error treatment when nonoperator calls are dialed with or without 10XXX.

Calls dialed with the 950 access code are not blocked by this feature.

Cut-through to carrier calls dialed with the 10XXX access code followed by the pound (#) sign are not blocked by this feature.

Toll-free Service Access Code (SAC) calls (such as 800, 877, or 888 calls) are not blocked by this feature.

The 900 calls are blocked if full 1+ Blocking is assigned, they are allowed if split 1+ Blocking is assigned.

Calls to the emergency bureau are not blocked by this feature.

Calls to N11 numbers are not blocked by this feature.

A line may simultaneously subscribe to both 1+ Blocking and Advanced Services Platform (ASP). 1+ Blocking will be applied to the Service Control Point (SCP) returned route for ASP calls that originated from the Service Switching Point (SSP) via a subscribed trigger. 1+ Blocking will not be applied to the Dialed Number Triggers that may be dialed from lines subscribing to 1+ Blocking. 1+ Blocking cannot be applied to ASP subscribers on a Network Access Point (NAP) since the call is routed to its final destination from the SSP and the SSP is not aware of the originator's subscribed features. 1+ Blocking will not apply to an ASP call that originated from a line that subscribes to 1+ Blocking if the ASP call results in serial triggering.

Electronic Tandem Network private network calls are not blocked by this feature.

The 1+ Blocking feature does not support Operator Number Identification (ONI).

Private Facility Access (PFA) calls are not blocked by this feature.

INWATS calls are not blocked by the 1+ Blocking feature.

5.55.2.5 Interactions

The 1+ Blocking feature applies to directory assistance (555-xxxx) calls when a carrier is used.

Automatic Callback (AC) Modular feature calls that are blocked receive AC Long Term Denial announcement.

Automatic Recall (AR) Modular feature calls that are blocked receive AR Long Term Denial announcement on subsequent AR activations.

This feature does not restrict privately dialed/routed calls. ARS calls which fail in ARS screening and have a filter error treatment of escape to pots can be blocked. The same is true for any type of ARS call which overflows to DDD.

Interactions between this feature and Call Forwarding may occur as follows:

- If the forwarded-to number (CFDN) is entered by the user, the switch validates the CFDN. If the 1+ Blocking feature is assigned to the Call Forwarding user, blocking applies at the time of validation of the CFDN. If a call origination to the CFDN is to be blocked, the CFDN is not accepted by the switch. Call Forwarding (CF) error treatment is provided to the CF user.
- If the forwarded-to number (CFDN) is entered via recent change, the switch does not validate the CFDN. If the 1+ Blocking feature is assigned to the Call Forwarding user, an interaction with the 1+ Blocking feature occurs at the time the call is forwarded. Forwarding is blocked by the 1+ Blocking feature if call origination to the CFDN is to be blocked. However, release treatment to the calling party should not be the same as for the blocked call origination. Call Forwarding error treatment applies.

For the Selective Call Acceptance (SCA)/Computer Access Restriction (CAR) modular feature, blocking applies on the DN to which the caller is forwarded as described for the Call Forwarding feature (SCA error treatment is returned to the user). Screen List Editing (SLE) entry of numbers on the screening list are not blocked by the 1+ Blocking feature.

For the Selective Call Forwarding (SCF) modular feature, the CFDN is validated and blocked if the 1+ Blocking feature applies as described in the CF feature. SCF error treatment is returned to the user. SLE entry of numbers on the screening list are not blocked by the 1+ Blocking feature.

For the Selective Call Rejection (SCR) modular feature, the SLE entry of numbers on the screening list are not

blocked by the 1+ Blocking feature.

For the Selective Distinctive Alert (SDA) modular feature, the SLE entry of numbers on the screening list are not blocked by the 1+ Blocking feature.

The CI-DIAL feature takes precedence over 1+ Blocking.

When a HOT LINE call is routed, blocking is applicable.

Blocking applies to digits analyzed in the Individualized Dialing Plan (IDP) which results in nonoperator carrier calls in the Office Dialing Plan (ODP).

Adding a new call leg through a multiway feature follows the same blocking treatment as a new call origination from the controller's line. The multiway features subject to this blocking are as follows:

- Three-way Calling
- Six-way Conference Calling
- Call Transfer Individual-Incoming Only (CTIIO)
- Call Transfer Individual-All Call (CTIAC)
- Call Transfer Outside (CTO)
- Attendant Call Transfer.

The 1+ Blocking feature has no effect on the current operation of the Call Trace feature. However, as with any routed call to an announcement or reorder, a blocked call can be traced when the call is set up to the blocking error treatment.

If a Privilege Code call is routed when no carrier is dialed (that is, no 10XXX), the call is treated as intra-LATA and 1+ Blocking is not applied. If a Privilege Code call with a LEC carrier is dialed, it is treated as intra-LATA and 1+ Blocking is not applied. Other Privilege Code calls are subject to 1+ Blocking.

When a speed call origination is made, blocking rules apply as if the call was attempted by dialing the number stored in the Speed Calling list.

On-net CCSA calls are not affected by this feature. Off-net IC/INC calls from CCSA stations are subject to blocking by this feature.

On-net EPSCS calls are not affected by this feature. Off-net IC/INC calls from EPSCS stations are subject to blocking by this feature.

Selective Carrier Denial (SCD) takes precedence over the 1+ Blocking feature if SCD is purchased and active.

If 1+ Blocking is assigned to line time slot bridging (LTSB) lines (1DN only), blocking treatment is as follows:

- For LTSB lines on one terminating number (TN), both LTSB ports receive the same blocking treatment.
- For LTSB lines on two different TNs, the LTSB ports receive different blocking treatment depending on the blocking feature (if any) assigned to each port.

Nonoperator Corridor Code calls are subject to blocking by this feature.

5.55.3 Hardware

There is no new hardware for 1+ Blocking; however, when an announcement is used for error treatment, an existing interface with a 13A announcement is used for blocking error treatment.

NOTE: The fixed route index being used is N010xx.

5.55.4 Assignment Guidelines

5.55.4.1 Forms and Views

5.55.4.1.1 Translation Guide Forms

The translation guide forms used to assign this feature are as follows:

- 5109 - 1/2/3/4, Telephone Number
- 5111 - 1/2/3, Multiline Hunt Group Terminal
- 5908 - 1 through 10, Digital Subscriber Line User.

These Office Data Administration forms are modified to add the new field, BLK 1PLUS. For the 5E6 software release, the valid entries for this field are:

- **F** (block all nonoperator carrier calls)
- **S** (block all 10xxx nonoperator dialed calls if any 10xxx dialing is done)
- **N** or blank (no blocking on this line).

For the 5E7 and later software releases, the valid entries for this field are as follows:

- **FULL** (block all nonoperator carrier calls)
- **SPLIT** (block all 10xxx nonoperator dialed calls if any 10xxx dialing is done)
- **NONE** or blank (no blocking on this line).

5.55.4.1.2 Recent Change Views

The Recent Change (RC) views used to install this feature for 5E7 and later software releases are as follows:

- RC View 1.6, Composite Line (Line Assignment)

NOTE: Recent chance Views 1.1, 1.2, 1.6, 2.1, 2.2, and 3.2 used in the 5E6 software release are consolidated into RC View 1.6 for 5E7 and later software releases.

- RC View 23.2, Digital Subscriber Line
- RC View 10.1, Fixed Route (Routing).

The line assignment views are modified to add a new required field, BLK 1PLUS. For the 5E6 software release, this field is one character. For the 5E7 and later software releases, this field is five characters in length.

5.55.4.2 Assigning to Customer

This feature is assignable on a per-line basis to the following classes of service:

- Individual
- 4-wire individual
- PBX
- Hotel/Motel
- PBX Hotel/Motel
- Coin
- Attendant
- ISDN
- ISDN attendant
- LTSB 1-DN
- Stand-alone test line.

The service provider switch personnel assign blocking feature to lines for which blocking is required. The switch personnel determine on a per-line basis whether full or split blocking is required.

To assign this feature to a line, use either the analog or digital line views to insert the appropriate value into the BLK 1+PLUS field. In the 5E6 software release, the valid entries for this field are:

- **F** (block all nonoperator carrier calls)
- **S** (block all 10xxx nonoperator dialed calls if any 10xxx dialing is done)
- **N** or blank (no blocking on this line) (default).

For the 5E7 and later software releases, the valid entries for this field are:

- **FULL** (block all nonoperator carrier calls)
- **SPLIT** (block all 10xxx nonoperator dialed calls if any 10xxx dialing is done)
- **NONE** or blank (no blocking on this line) (default).

The interface to the error announcement is set by assigning a route index to a 13A announcement on RC View 10.1 with a fixed route index of NO10XX.

5.55.4.3 Feature Verification

When the Verify Office capability is available, proper blocking treatment may be verified. Information has been added to the output message to indicate when carrier access is denied by this blocking feature. The added error message is:

"Routing to tone or announcement, Carrier access denied by BLK 1PLUS"

- Call will route to DEST_TYP NO10XX error treatment because the user is not allowed to access a carrier as dialed. The user is assigned either SPLIT or FULL BLOCKING with the BLK 1PLUS feature.

The "SF22 tuple not found" error message may also be received if the data is garbled.

5.55.4.4 Deleting Customer Service

To delete this feature for a line, use either the analog or digital line views to insert the appropriate value into the BLK 1+PLUS field as follows:

- (a) In the 5E6 software release, insert **N** or blank (no blocking for 1+ on this line).
- (b) In 5E7 and later software releases, insert **NONE** or blank (no blocking for 1+ on this line).

5.55.4.5 Assignment Limitations

This feature is assignable to Centrex lines on a line basis and not on a Centrex *group* basis. Also, this feature is assignable to multiline hunt lines on a line basis and not on a multiline hunt *group* (MLHG) basis.

This feature is not assignable to the following classes of service:

- 911
- CHGACALL
- Operator Number Identification (ONI)
- Two-Party
- Two-Party ANI/ONI
- Multiparty
- Trunk and Line Work Station callback phone.

This feature is not assignable to trunks with any trunk class of service (including PBX trunks with a Central Office trunk appearance).

5.55.5 System Operation

When full 1+ Blocking is assigned, all nonoperator IC/INC call originations are blocked. When split 1+ Blocking is assigned, IC/INC nonoperator calls requesting an alternate carrier are blocked while calls to the IC/INC presubscribed carrier are not blocked. Blocked calls are routed to N010xx (fixed route index).

5.55.6 Administration

Not applicable

5.56 TRANSFER TO AUTOMATIC CALL DISTRIBUTION FROM AUTOMATIC RESPONSE UNIT

5.56.1 Overview

5.56.1.1 Definition

The Transfer to Automatic Call Distributor (ACD) from Automatic Response Unit (ARU) feature provides the ability for the ARU to redirect a call to an ACD agent without the use of loop-around trunks.

5.56.1.2 Background

An ARU is a (front-end) processor that screens calls incoming to the 5ESS® switch Automatic Call Distributor/Management Information System (ACD/MIS) before connecting to an ACD agent. It does this by prompting the caller to enter digits that may affect where the call gets routed. If the ARU determines that an ACD agent is needed, it can then transfer the call to the ACD. The Operator Service Position System (OSPS) software program relies on the originator of an ACD call being a trunk. In order to effect this transfer without the Transfer to ACD from ARU feature, the call must be routed over a loop-around trunk.

5.56.1.3 Availability

This feature is available with the 5E8 software release. The feature is also available for 5E6 and 5E7 software releases via software update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

5.56.1.4 Feature Provision Basis

The basic Transfer to ACD from ARU feature provides the ability for the ARU to redirect a call to an ACD agent without the use of loop-around trunks for calls that enter the switch on non-CCS trunks with a class of service of IEC or LTOLL_CONN. The basic portion of the feature is optional on a per-office basis and is not active until it has been enabled. The enabling is done locally, and does not require assistance from Lucent Technologies. The option number for this feature is 540.

In 5E7 and later software releases, after the basic feature has been enabled, the secured Common Channel Signaling (CCS) interface portion of this feature may be activated. This portion provides the same feature functionality for calls that enter the switch on CCS7 trunks with a class of service of IEC or LTOLL_CONN. The secured CCS interface portion of the feature, which is provided on a per-office basis, is not activated until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature activation is provided upon ordering. Please contact your Lucent Technologies Account Representative for ordering information and the Right-to-Use (RTU) fee associated with the CCS portion of the feature. The Common Channel Signaling interface for this feature is not available with the 5E6 software release.

5.56.2 User Perspective

5.56.2.1 User Profile

This feature provides for the routing of calls to ACD agents without using loop-around trunks.

5.56.2.2 User Operation

When this feature is active, the ACD agent notices no change in the way ACD calls are received or distributed.

5.56.2.3 Operational Limitations

If the access code associated with this feature is dialed or is included in the forward-to-DN and the office is not configured as an ACD provider, reorder treatment is given.

If the access code associated with this feature is dialed or is in a forward-to-DN, and the signaling type of the call's

incoming trunk is CCS7 but the secured portion of the feature is not active, the call is transferred to the ACD DN via loop-around trunks.

If the access code associated with this feature is dialed or is in a forward-to-DN, and the class of service of the incoming trunk is not IEC or LTOLL_CONN, the call is transferred to the ACD DN via loop-around trunks.

The CCS interface portion of this feature supports only ISDN User Part (ISUP) signaling, and only for 5E7 and later software releases.

5.56.3 Engineering

5.56.3.1 Special Planning Considerations

Commercial ACD must be available in the office before the Transfer to ACD from ARU feature can be used. This is indicated by the GI_cacd office parameter being YES.

Loop-around trunks are required for calls destined for an ACD agent that terminate to the switch on lines, or on incoming trunks with a class of service other than LTOLL_CONN or IEC.

The ARU must be reprogrammed to dial the access code associated with this feature, then the ACD DN, then a "#". If the access code is ambiguous, it and the ACD DN must be separated by a "#" for conflict resolution.

NOTE: There is no second dial tone after the access code is dialed.

If the ARU is forwarded to an ACD, the forward-to-DN must be changed to include this feature access code. There must not be a "#" at the end of the digit string. If the access code is ambiguous, it and the ACD DN must be separated by a "#".

5.56.3.2 System Resources

Not applicable.

5.56.4 Assignment Guidelines

5.56.4.1 Forms and Views

5.56.4.1.1 Translation Guide Forms

The translation guide forms used in implementing this feature are as follows:

- Form 5300-2, Prefix/Feature Digit Interpreter
(the corresponding RC View is 9.2)
- Form 5601-1,2, Individualized Dialing Plan Dialed Code Assignment
(the corresponding RC View is 9.13)
- Form 5713, Secured Feature System Assignment
(the corresponding RC View is 8.22).

5.56.4.1.2 Recent Change Views

The RC views used in implementing this feature are as follows:

- RC View 8.22, Secured Feature Upgrade
(to enable/disable the optional basic Transfer to ACD from ARU feature and to activate/deactivate the secured

CCS interface portion of this feature)

- RC View 9.2, Prefix/Feature Digit (Office Dialing)
(to define the feature access code and ACTION field)
- RC View 9.13, IDP Dialed Code Assignment (Individual Dialing)
(to define the feature access code and ACTION field).

5.56.4.2 Assigning to Customer

The procedure to enable the basic optional feature for an office is as follows:

- (1) Select RC View 8.22 for 5E6 and later software releases.
- (2) Enter **u** for the update mode.
- (3) In the FEATURE ID field, enter **540**.
- (4) In the MODULE field, enter **OFC** (office).
- (5) The PASSWD field must be blank.
- (6) In the ACTIVE field, enter **Y** (yes).
- (7) Leave all remaining fields blank.
- (8) Enter **u** to update the data.

To activate the secured CCS interface portion of this feature, contact the Lucent Technologies Secured Feature Administrator (SFA) for assistance. In a new start office, the SFA activates the portion of the feature through ODA. In an existing office, the SFA provides instructions, including the necessary password, for using RC View 8.22 for 5E7 and later software releases.

For an office dialing plan, select RC View 9.2 to define the access code for this feature. The access code is switch owner defined in the DIGITS TO INTERPRET field. Also **ACDXFER** is specified in the ACTION field.

For an Individual dialing plan, select RC View 9.13 to define the access code for this feature. The access code is switch owner defined in the INC DIGITS field. Also **ACDXFER** is specified in the ACTION field.

NOTE: The maximum number of digits allowed in the ACD DN digit string is 15 (that is, access code + # + ACD DN) must be 15 or fewer digits). The same access code can be used by all of the ARUs on the same switch.

5.56.4.3 Deleting Customer Service

The procedure to disable the basic optional feature for an office is as follows:

- (1) Select RC View 8.22 for 5E6 and later software releases.
- (2) Enter **u** for the update mode.
- (3) In the FEATURE ID field, enter **540**.
- (4) In the MODULE field, enter **OFC** (office).

- (5) The PASSWD field must be blank.
- (6) In the ACTIVE field, enter **N** (no).
- (7) Leave all remaining fields blank.
- (8) Enter **u** to update the data.

To deactivate the secured CCS interface portion of this feature, contact the SFA for assistance. The SFA provides instructions, including the necessary password, for using RC View 8.22 for 5E7 and later software releases.

5.56.4.4 Verify Option Feature

The procedure to verify the basic optional feature for one SM is as follows:

- (1) Select RC View 8.22 for 5E6 and later software releases.
- (2) Enter **r** for review mode.
- (3) In the FEATURE ID field, enter **540**.
- (4) In the MODULE field, enter an SM number (1 to 192).

NOTE: Do not use **OFC** in the MODULE field for the verify procedure.

- (5) If the ACTIVE field is **Y**, the basic feature is enabled for the SM specified. If the ACTIVE field is **N**, the basic feature is disabled for that SM.

NOTE: Repeat this procedure for each SM to be verified.

5.56.4.5 Assignment Limitations

The line to the ARU must be an analog line with an individual line class of service.

The ARU line must not have the Call Forwarding Over Private Facilities feature active.

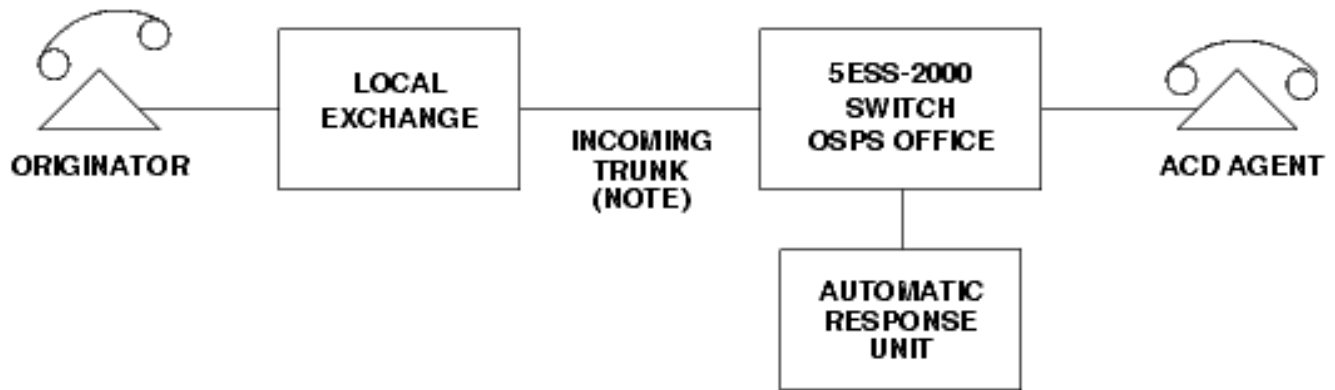
The CCS interface portion of this feature does not support CCS6 signaling. Also it may not be activated for software releases prior to 5E7.

The access code must be associated with the null feature (/*) as opposed to a Business and Residence Custom Services feature.

The ARUs forward-to-DN must be assigned with RC/V. It cannot be customer originated recent changed (CORCed).

5.56.5 System Operation

This feature is used when calls to be screened by the ARU enter a 5ESS® switch office on a trunk with the COS marked LTOLL_CONN or IEC. The call is routed to an ARU using existing digit analysis and call processing. The ARU determines when the call should be routed to an ACD. Figure 5-15 shows the network view of the call.



NOTE: INCOMING TRUNK CLASS OF SERVICE IS LTOLL_CONN OR IEC.

AUTOMATIC CALL DISTRIBUTION (ACD)
CARRIER TRUNK (IEC)
LOCAL END OF TOLL CONNECT TRUNK (LTOLL_CONN)
OPERATOR SERVICES POSITION SYSTEM (OSPS)

Figure 5-15 Transfer to ACD from ARU Network Overview

Once the ARU has determined that assistance of an ACD agent is required, it flashes to put the call from the incoming trunk on hold. The ARU dials the ACD XFER access code and the ACD directory number (DN), followed by a #.

NOTE: If the access code is ambiguous, the ARU would have dialed a # after the access code and before the ACD DN.

The ACD DN is sent to the incoming trunk's terminal process where the digits are analyzed. The call then terminates to an ACD agent.

The ARU line may have the Call Forwarding Busy Line, Call Forward Don't Answer, or Call Forwarding Variable feature active. The call to the ARU can then be forwarded to the ACD using this feature. The forward-to-DN should contain the access code and the ACD DN.

NOTE: If the access code is ambiguous, a # must separate the access code from the ACD DN. If the access code is not ambiguous, the # after the access code is optional in the forward-to DN digit string. There should not be a # at the end of the forward-to-DN string.

5.56.6 Administration

5.56.6.1 Measurements

No new measurements are required for failed calls associated with the new access code dialed by the ARU. The following existing measurements are affected when the Transfer to ACD from ARU feature is used:

- The trunk call attempt measurement is pegged twice due to the redirection of the call.
- The CFBL and CFV measurements are pegged for attempted usage when applicable.

NOTE: No billing record will be associated with these counts.

- The CFDA measurement is not pegged.

5.56.6.2 Billing

When this feature is active and the access code is dialed, billing records are eliminated for the following ARU to ACD legs of the call when LTOLL_CONN or IEC trunks are used:

- Call Forwarded legs
- "Transfer" leg (ARU to ACD).

If the original call to the ARU is marked INWATS, the INWATS indicator is maintained so that the end-user is billed for the call.

5.57 ROUTING OF INTRA-LATA/INTERSTATE CALLS

5.57.1 Overview

5.57.1.1 Definition

The Routing of Intra-LATA/Interstate Calls feature provides an expanded means by which an operating company can re-use dialing tables for several classes of customers, even if certain sequences (for example, NPA) must be handled as intra-LATA calls when dialed from some customers, but as inter-LATA calls when dialed from other customers. (Such a digit sequence is called a CONFLICT dial code). With this feature enabled, the conflict resolution algorithm is the same for calls dialed without a prefix (NONE +) and for calls dialed with a 1+ prefix as the algorithm for calls dialed with a 0+ prefix. The 0+ algorithm provides the ability for the operating company to define distinct intra-LATA routing for each of several classes of customers while still maintaining inter-LATA routing for other classes of customers. This feature applies to analog and Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) lines.

5.57.1.2 Availability

This feature is available with 5E7 and later software releases. The feature is also available for 5E6 software releases via software update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

5.57.1.3 Feature Provision Basis

This feature is optional on a per-office basis and is not active until it has been enabled. The enabling is done locally, and does not require assistance from Lucent Technologies. The option number for this feature is 523.

5.57.2 User Perspective

5.57.2.1 User Profile

The service provider use standard recent change (RC) procedures to control enabling/disabling of the Routing of Intra-LATA/Interstate feature option.

5.57.2.2 User Operation

The service provider are able to control whether intra-LATA interstate calls should be routed through the Local Exchange Carrier (LEC) or an Interexchange Carrier (IEC) by setting the feature option on or off, and populating the data for the routes.

5.57.2.3 Interactions

Not applicable.

5.57.3 Engineering

Not applicable.

5.57.4 Assignment Guidelines

5.57.4.1 Forms and Views

5.57.4.1.1 Translation Guide Forms

The translation guide forms used in implementing this feature are as follows:

- Form 5300-3,5, Local Digit Interpreter Table
(the corresponding RC View is 9.3)
- Form 5301, Rate and Route
(the corresponding RC View is 10.10)
- Form 5303, Route Index
(the corresponding RC View is 10.2)
- Form 5713, Secured Feature System Assignment
(the corresponding RC View is 8.22 for 5E6 and later software releases).

5.57.4.1.2 Recent Change Views

The RC views used in implementing this feature are as follows:

- RC View 8.22, Secured Feature Upgrade
(to enable/disable this optional feature)
- RC View 9.3, Local Digit (Office Dialing)
(to define an intra-LATA/interstate office code)
- RC View 10.2, Route Index (Routing)
(to define an intra-LATA/interstate route index)
- RC View 10.10, Screening (Charging)
(to define intra-LATA/interstate routing for Code Index/Screening Index combinations).

5.57.4.2 Assigning to Customer

The procedure to enable this optional feature for an office is as follows:

- (1) Select RC View 8.22.
- (2) Enter **u** for the update mode.
- (3) In the FEATURE ID field, enter **523**.

- (4) In the MODULE field, enter **OFC** (office).
- (5) The PASSWD field must be blank.
- (6) In the ACTIVE field, enter **Y** (yes).
- (7) Leave all remaining fields blank.
- (8) Enter **u** to update the data.

5.57.4.3 Deleting Customer Service

The procedure to disable this optional feature for an office is as follows:

- (1) Select RC View 8.22.
- (2) Enter **u** for the update mode.
- (3) In the FEATURE ID field, enter **523**.
- (4) In the MODULE field, enter **OFC** (office).
- (5) The PASSWD field must be blank.
- (6) In the ACTIVE field, enter **N** (no).
- (7) Leave all remaining fields blank.
- (8) Enter **u** to update the data.

5.57.4.4 Verify Option Feature

The procedure to verify this optional feature for one SM is as follows:

- (1) Select RC View 8.22.
- (2) Enter **r** for review mode.
- (3) In the FEATURE ID field, enter **523**.
- (4) In the MODULE field, enter an SM number (1 to 192).

NOTE: Do not use **OFC** in the MODULE field for the verify procedure.

- (5) If the ACTIVE field is **Y**, the feature is enabled for the SM specified. If the ACTIVE field is **N**, the feature is disabled for the SM.

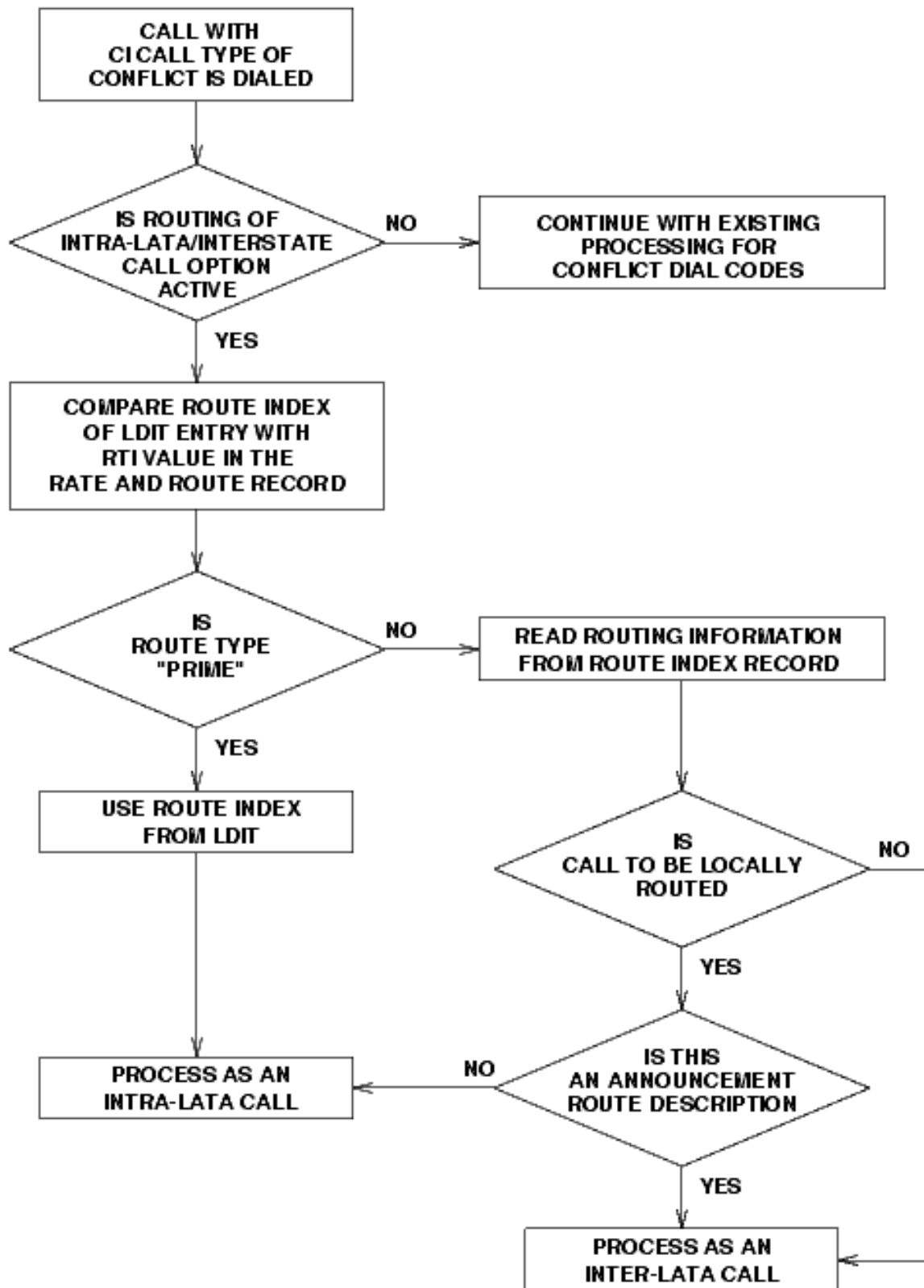
NOTE: Repeat this procedure for each SM to be verified.

Populate the data for intra-LATA/interstate call routes, using RC Views 9.3, 10.2, and 10.10.

5.57.5 System Operation

The existing processing for 1+ and NONE+ CONFLICT dial codes allows only a single intra-LATA route for all classes of customers using the same dialing table.

When the CI call type is CONFLICT and the Intra-LATA/Interstate Calls feature is active, all calls with 1+ or NONE+ use the 0+ process for determining if the call is to be routed as intra-LATA or inter-LATA. The flow diagram for this feature is shown in Figure 5-16 .



CARRIER INTERCONNECT (CI)
LOCAL DIGIT INTERPRETER TABLE (LDIT)
ROUTE INDEX (RTI)

Figure 5-16 Flow Diagram for Routing of Intra-LATA/Interstate Calls**5.57.6 Administration**

Not applicable.

5.58 INTERCHANGEABLE NPA CODES**5.58.1 Definition**

With the current supply of NPA codes approaching exhaustion, Bellcore has established a plan to change the format of NPA codes from N0/1X to office code; where N = any value 2 - 9, and X = any value 0 - 9.

With the new format, NPA codes and CO codes can be identical and, thus, "interchangeable." Interchangeable NPAs require that all service providers upgrade every switch to ensure that the callers served by those switches are able to complete calls to and from the new area codes.

Bellcore has recommended that the format of the NPA codes be changed from N0/1X to office code in order to increase the supply of the NPA codes.

The INPA Codes feature needs to be implemented virtually simultaneously throughout the area served by the North American Numbering Plan (NANP). To avoid a breakdown in the NANP, before the first NPA code in the new format can be assigned, every switch including OSPS should be updated to the appropriate software release to accept the additional 640 NPA codes.

The introduction of INPAs has the most effect in areas that currently have not introduced interchangeable Central Office (CO) codes, and where dialing procedures require a 1+ prefix for NANP DN without the NPA intra-NPA toll calls.

In some areas, state commissions currently require that a prefix be dialed for intra-LATA-intra-NPA toll calls (that is, 1+7D). The reason for the use of the 1+ prefix on 7D toll calls is based on customer perception. The idea is that if a caller must dial a 1+ prefix before a string of digits (7D/10D), the caller is more aware that the call is a toll call that will require an additional charge. In these cases, the second digit of the dialed string (not including the prefix "1") provides a distinction, indicating whether the call is a 10D or 7D call, since the format of their CO codes do not currently overlap with that of the NPA codes. However, with the introduction of INPAs, this distinction is no longer guaranteed and these areas now have to adjust to conflicts between NPA/office codes that never existed before.

5.58.2 Cross-References

The following cross-references are applicable to the Interchangeable NPA Codes feature:

- Feature number: 99-5E-1023
- NSEP/5SEP number is not available.

5.58.3 Background

The telephone numbers in World Zone 1, which encompasses the United States, Canada, Bermuda, and many Caribbean countries, are in a format prescribed by the NANP, which is administered by the Bell Communications Research (Bellcore). Each telephone in the area served by the NANP has a specific geographic address or destination code assigned to it. The address is a full NANP DN that consists of the following two basic parts: an NPA code, commonly called the area code, and an NANP DN without the NPA directory number (DN). NPA codes are currently in the format N0/1X, where N indicates any digit 2 - 9, 0/1 indicates either 0 or 1, and X indicates any digit 0 - 9. This format gives a maximum of 160 codes. Some of the codes in the N0/1X format have been reserved for

special purposes such as:

- N11 codes are reserved for special local services like 411 (local information) or 911 (emergency).
- N00 codes are *implicitly* reserved for nationwide services like 800 and 900 service and are not generally used for NPAs. However, N00 codes are not yet *explicitly* restricted from being utilized as NPA Codes.

Excluding these special codes (16), 144 codes can be used as NPA codes. Most of these NPA codes are already in use, and the ones that are remaining have been tentatively assigned to areas that require number relief prior to January 1, 1995. To ensure the future availability of NPA codes, Bellcore has recommended that the format of the NPA codes be changed to office code. This planned method of relief of the NPA code exhaustion is referred to as Interchangeable NPA codes (INPA).

In 1984, Bellcore, the administrator of the North American Numbering Plan (NANP), notified the telecommunications industry that the supply of Numbering Plan area (NPA) codes, also known as area codes, was exhausting. At that time, Bellcore announced that by 1995 all telecommunications service providers must have completed preparations for the introduction of interchangeable NPA codes.

NOTE: The 800 Service is not limited to the 800 NPA if the switch has implemented a toll-free treatment feature that allows additional toll-free service access codes (SAC) such as 877 or 888.

5.58.4 Availability

The INPA feature is available with a 5E8 software update and later software releases.

5.58.5 User Operation

When INPAs are first introduced in those offices for which the ODP will change to accommodate the INPA, the majority of offices should put "permissive" dialing periods into effect, that is, the end customers will experience a "grace" period during which dialing input from both the "old" Dialing Plan and the "new" Dialing Plan are accepted. At the termination of the permissive Dialing period all misdialed calls that use the "old" dialing plan must be considered misdialed via originating office screening. These calls could receive vacant code treatment, such as routing to reorder tone or a specialized announcement via a Fixed Route Index.

For customers that dial NANP DN without the NPA (per their old Dialing Plan) yet their new Dialing Plan requires/expects full NANP DN digits for a call, partial dial error treatment is returned.

For customers that dial full NANP DN digits, yet their new Dialing Plan requires/expects NANP DN without the NPA digits for a call, the call will attempt to route on NANP DN without the NPA digits, which may route the call to an unintended location or error treatment.

5.58.6 Feature Activation

Before the first NPA is introduced in the NANP, *all Network* personnel (including Central Office and PBX personnel) must verify that all CPE, including other switching systems such as voice messaging systems, inward wide area telecommunications systems (INWATS), etc., which utilize the NPA can handle the new NPA format.

5.58.7 Interactions

5.58.7.1 LASS Automatic Callback (AC) Modular Feature (CSV)

The LASS AC Incoming Line History Block (ILHB) contains the full NANP DN of the last incoming calling caller. The AC call processing must determine how the AC user would dial that party directly, that is, whether the dialing plan of

the user is built so that the user dials one of the following:

- NANP DN without the NPA
- 1 + NANP DN without the NPA
- full NANP DN
- 1+full NANP DN
- An extension.

LASS call processing attempts pseudo routing through the above list options until a successful route is found. When the successful route is found, the call-back call is actually routed to the original calling party via the digit string input that would have been required to dial the original calling party directly.

As a result, the LASS AC feature should remain unaffected by the INPA feature as long as the service provider sets up the Local Digit Interpreter Tables (LDIT) correctly, assuming the service provider determines a new Office Dialing Plan (ODP) is needed to accommodate INPAs (assuming it has not already done so since it had no previous need to accommodate interchangeable office codes).

5.58.7.2 LASS Automatic Recall (AR) Modular Feature (CSV and CSD)

The LASS Outgoing Line History Block (OLHB) contains the last called DN and is stored exactly as it was originally dialed. If the user dials an NANP DN without the NPA interswitch DN, the switch must be able to derive the NPA from the LDIT forms implied NPA fields (RC View 9.3) or from the Default NPA on RC View 8.1.

The switch then attempts to route AR calls based on the digit string contained in the OLHB (stored as it was originally dialed).

As a result, the LASS AR feature should remain unaffected by the INPA feature as long as the service provider sets up the LDIT correctly, assuming the service provider decides a new Office Dialing Plan (ODP) is needed to accommodate INPAs (assuming it has not already done so since it had no previous need to accommodate interchangeable office codes).

5.58.7.3 Automatic Route Selection (ARS) Modular Feature (CSV and CSD)

All additional subfeatures not listed here have been evaluated as having no feature interaction with INPA, and should be considered "Not Applicable."

5.58.7.4 Uniform Numbering

Once INPAs are introduced, additional entries may be required to be entered in the conflict resolution tables on the 5ESS[®] Switch (Recent Change View 9.21, Field #15) to resolve potential new conflicts between private network codes (for example, RNXs) and INPAs.

5.58.7.5 Line Identification Modular Feature (CSV and CSD)

All additional subfeatures not listed here have been evaluated as having no feature interaction with INPA, and should be considered "Not Applicable."

5.58.7.6 Private Facility Access (PFA) Modular Feature (CSV and CSD)

All additional subfeatures not listed here have been evaluated as having no feature interaction with INPA, and should be considered "Not Applicable."

5.58.7.7 800-Services (aka INWATS)

From a Bellcore perspective, N00 codes are *implicitly* reserved for nationwide services such as 800 service and are not generally used for NPAs. However, N00 codes are not yet *explicitly* restricted from being utilized as NPA Codes.

From the 5ESS® switch perspective, software checks currently exist that explicitly prohibit 700, 800, 888, 887, and 900 Special Access Codes (SACs) from being stored or used as an NPA code.

5.58.7.8 XY Digit Collection

The XY PFA Digit Collection value is used when two possible quantities of digits may be collected dependent on the value of a particular digit collected in a defined digit position. The types of digit collection supported are defined on Recent Change View 7.1 "Private Facility Group." The affected fields on this view with their potential entries for NPA/office code dialing are listed in Table 5-2.

Table 5-2 RC View 7.1 Affected Fields

FIELD NO.	FIELD	VALUE
*1	PFA GROUP	
#5	DIG COLL	XY
#6	RTIDX	
18	X DIGS	7
19	Y DIGS	10
20	NTH POS	2
21	NTH DIG1	0
22	NTH DIG2	1

(1+/0+) full NANP DN is supported in the dialing plan for this private dialing plan.

This RC setup implies that if the second digit (NTH POS) is a 0 (NTH DIG1) or a 1 (NTH DIG2) then 10 digits (Y DIGS) will be collected. However, if the second digit (NTH POS) is not a 0 (NTH DIG1) or a 1 (NTH DIG2) then 7 digits (X DIGS) will be collected.

This view works for NPA/office code conflict resolution while the NPA range only supports a 0 or a 1 for the second digit of the NPA, and the office does not support the concept of interchangeable office code codes. If the customer desires all NPAs as defined in the NANP to be dialable through the private network, then this setup will not work as outlined above when INPAs are introduced.

One possible solution that will still prevent timing for CCSA NANP DN without the NPA calls is a "prefix analysis" method that would require an RC setup as outlined in Table 5-3.

Table 5-3 RC Setup Using Prefix Analysis

FIELD NO.	FIELD	VALUE
*1	PFA GROUP	
#5	DIG COLL	XY
#6	RTIDX	
18	X DIGS	7
19	Y DIGS	11
20	NTH POS	1
21	NTH DIG1	0
22	NTH DIG2	1

This XY Digit Collection scheme implies that if the first digit (NTH POS) is a "0" (NTH DIG1) or a "1" (NTH DIG2), then 11 digits (Y DIGS) will be collected (including the prefix). However, if the first digit is not a "0" or a "1", then 7 digits are collected.

5.58.7.9 Queuing Modular Feature (CSV and CSD)

All additional subfeatures not listed as follows have been evaluated as having no feature interaction with INPA, and should be considered "Not Applicable."

5.58.7.10 Ringback Queuing for Trunks

When a call encounters a busy trunk group and confirmation tone is returned to indicate that the call is being queued, the caller may then go on-hook and wait for ring-back. When a facility becomes available, the queued caller is rung back, and the call is then completed via the awaited facility.

The INPA feature will have *no impact* on ring-back queuing, since the queuing feature stores the original dialed DN just as it is stored right out of a "Route Request" message from Digit Analysis. As long as the service provider has populated its Digit Analysis tables correctly, the queuing feature will operate transparently when INPAs are introduced.

5.58.7.11 Selective Call Acceptance (SCA)/Computer Access Restriction (CAR) Modular Feature (CSV)

All additional subfeatures not listed as follows have been evaluated as having no feature interaction with INPA, and should be considered "Not Applicable."

5.58.7.12 Screen List Editing (SLE)

Screen List Editing list entries can be NANP DN without the NPA or full NANP DN DN (with or without a prefix) or 1 to 7 digit extension numbers for users with extension dialing. In addition, the DN of the last calling party, which is stored in the Incoming Line History Block (ILHB), can be transferred to the screening list. All of these DNs are stored by SLE as full NANP DNs, after the SLE entries are validated.

After an SLE entry is successfully entered, it can be translated to its associated full NANP DN and used for any SLE "client" feature, for example, Selective Call Acceptance. As a result, if the service provider chooses a new Office Dialing Plan in order to accommodate INPA, SLE entries that have already been successfully entered will be unaffected by the new Dialing Plan, and there will be no need for the service providers to update their screening lists.

However, for all NEW SLE entries, the user must enter all digit strings into the list in accordance with the new Office Dialing Plan OR by the rules listed in Table 5-4 .

Table 5-4 New SLE Entry Rules

DIALING PLAN	ENTERED FORM			
	7 DIGITS	1+7 DIGITS	10 DIGITS	1+10 DIGITS
7 DIGITS ALLOWED	Yes	Yes	Yes	Yes
1+7 DIGITS ALLOWED	Yes	Yes	Yes	Yes
10 DIGITS REQUIRED	No	No	Yes	Yes
1+10 DIGITS REQUIRED	No	No	Yes	Yes

This table reveals the effect that changes to the Office Dialing Plan will have for new SLE entries. For example, all service providers that choose to evolve from NANP DN without the NPA (no prefix) dialing to 1+a full NANP DN with Home NPA (HNPA) dialing for intra-LATA, intra-NPA toll calls (Option 2) when INPA is introduced will then be required to enter at least full NANP DN (either with or without the prefix) in order to update the screening list with a intra-LATA, intra-NPA toll entry.

If routing on the stored full NANP DN is required, the same pseudo routing procedure outlined for LASS Automatic Call-back is utilized to determine the assumed input digit string with which to route.

As a result, the LASS SLE feature should remain unaffected by the INPA feature as long as the service provider sets up the LDIT correctly, assuming the service provider decides a new Office Dialing Plan (ODP) is needed to accommodate INPAs.

5.58.7.13 Selective Call Forwarding (SCF) Modular Feature (CSV)

All additional subfeatures not listed as follows have been evaluated as having no feature interaction with INPA, and should be considered "Not Applicable."

5.58.7.14 Screen List Editing (SLE)

After an SLE entry is successfully entered, it can be translated to its associated full NANP DN and used for any SLE "client" feature, including Selective Call Forwarding. As a result, if the service provider chooses a new Office Dialing Plan in order to accommodate INPA, it should have no effect on the operation of SCF.

5.58.7.15 Selective Call Rejection (SCR) Modular Feature (CSV)

All additional subfeatures not listed as follows have been evaluated as having no feature interaction with INPA, and should be considered "Not Applicable."

5.58.7.16 Screen List Editing (SLE)

After an SLE entry is successfully entered, it can be translated to its associated full NANP DN and used for any SLE "client" feature, including Selective Call Rejection. As a result, if the service provider chooses a new Office Dialing Plan in order to accommodate INPA, (assuming it has not already done so since it had no previous need to accommodate interchangeable office codes), it should have no effect on the operation of SCR.

5.58.7.17 Selective Distinctive Alert (SDA) Modular Feature (CSV)

All additional subfeatures not listed as follows have been evaluated as having no feature interaction with INPA, and should be considered "Not Applicable."

5.58.7.18 Screen List Editing (SLE)

After an SLE entry is successfully entered, it can be translated to its associated full NANP DN and used for any SLE "client" feature, including Selective Distinctive Alert. As a result, if the service provider chooses a new Office Dialing Plan in order to accommodate INPA, it should have no effect on the operation of SDA.

5.58.7.19 Terminal Group and Station Restriction (TGSR) Modular Feature (CSV and CSD)

All additional subfeatures not listed as follows have been evaluated as having no feature interaction with INPA, and should be considered "Not Applicable."

5.58.7.20 Route To Tone or DN

If the customer chooses to route calls that violate TGSR restrictions to a DN, that DN may be an full NANP DN (especially in main-satellite arrangements) which includes the NPA. The DN the service provider enters must be run through Digit Analysis, in accordance with the ODP or IDP. As a result, since some service providers may choose to alter their ODPs for INPA, the DNs which are currently specified may need to be reentered to comply with the new dialing plan, for example, NANP DN without the NPA DNs may need to be reentered as 1+a full NANP DN with an HNPA for intra-LATA, intra-NPA toll calls.

5.58.7.21 Attendant Features (CSV)

All additional subfeatures not listed as follows have been evaluated as having no feature interaction with INPA, and should be considered "Not Applicable."

5.58.7.22 Attendant Call Through Test

If the service provider chooses to use PFA XY Digit Collection to distinguish whether 7 or 10 digits should be collected and outpulsed over the PFA trunk being tested, then the INPA feature will have an effect with this feature. Any customer currently using XY Digit Collection to analyze the second NPA digit position will have to modify the XY Digit Collection scheme before the introduction of the first INPA, assuming the customer desires all NPAs in the NANP to be dialable through the private network.

5.58.7.23 Networking Features

All additional subfeatures not listed as follows have been evaluated as having no feature interaction with INPA, and should be considered "Not Applicable."

5.58.7.23.1 Flexible ANI (CSV)

This feature itself does not perform analysis on the DN that is sent over the outgoing trunk. If a service provider revises its office dialing plan to accommodate INPAs, then screening and routing translations determine whether digits are prefixed or deleted before being sent over the trunk.

5.58.7.23.2 Interswitch Voice Messaging

When the 5ESS[®] Switch, as an originating or terminating switch, attempts validation of a dialed full NANP DN or incoming full NANP DN, respectively, it must not check for a "0/1" in the second digit position of the NPA as a criterion for validation. A digit value of 0-9 must be considered valid.

5.58.7.24 Advanced Service Platform (ASP) Services

ASP is a feature which launches data base queries and new full NANP DN routing DNs are returned via a Service Control Point (SCP) data base. With this new DN, ASP then calls digit analysis with this new routing DN. Currently, in order to route on this number, ASP must determine if the first three digits of the returned full NANP DN routing DN match the "Home" or "Implied" NPA and, if so, they are deleted. This is performed so that calls which will complete within the NPA are routed on an NANP DN without the NPA basis. If there is no match, the full full NANP DN is presented to digit analysis.

With the conversion to INPA, some offices may convert to Dialing Plans 2, 4, or 6 which will allow NANP DN without the NPA dialing only for calls within the local calling area, while all other calls, including intra-LATA, intra-NPA toll calls must be dialed on a 1+full NANP DN basis (or NONE + full NANP DN basis). Since these full NANP DN-dialed calls may be within the NPA, and since ASP deletes the NPA of the returned number when it matches the switch NPA, all non-local intra-LATA, intra-NPA calls could be incorrectly routed.

5.58.7.25 Enhanced 911 (E911)

E911 is a feature which launches data base queries and new full NANP DN routing DNs are returned via a Service Control Point (SCP) data base. With this new DN, E911 then calls digit analysis with this new routing DN. Currently, in order to route on this number, E911 must determine if the NPA of the returned full NANP DN routing DN match the "Home" or "Implied" NPA and, if so, they are deleted. This is performed so that calls which will complete within the NPA are routed on an NANP DN without the NPA basis. If there is no match, the full full NANP DN is presented to digit analysis.

With the conversion to INPA, some offices may convert to Dialing Plans 2, 4, or 6 which will allow NANP DN without the NPA dialing only for calls within the local calling area, while all other calls, including intra-LATA, intra-NPA toll calls must be dialed on a 1+full NANP DN basis (or NONE + full NANP DN basis). Since these full NANP DN-dialed calls may be within the NPA, and since E911 may delete the NPA of the returned number when it matches the switch NPA, all non-local intra-LATA, intra-NPA calls could be incorrectly routed.

5.58.7.26 Miscellaneous Features

5.58.7.26.1 Call Tracing

All full NANP DNs with INPAs must be printable for Call Tracing. A customer must be able to enter any full NANP DN on the call trace list, including DNs with INPAs.

5.58.7.26.2 Toll Restriction

The Toll/Code Restriction feature blocks call completions to customer-specified codes, such as NPAs or office codes. A customer may specify 3-digit codes (NPA or NPA-office codes) to be restricted, and all calls to these codes are blocked, as required. Toll restricted stations cannot make toll calls. Code restricted stations are allowed certain toll calls only to specified NPAs.

With the inception of INPAs, it is possible that NPA and office codes that are specified for restriction will not be unique. Whether or not an office code or an NPA is intended for restriction must be specified in screening.

The service provider must be permitted to apply Toll Restriction or Code Restriction to any new NPA that becomes available through the INPA feature.

5.58.7.26.3 900 Services

N00 codes are *implicitly* reserved for nationwide services such as 900 service and are not generally used for NPAs. However, N00 codes are not *explicitly* restricted from being utilized as INPA Codes.

5.58.7.26.4 5E8 Local Area Signaling Services (LASS) NPA Split Resolution

There is no restriction on the format of the NPAs (that is, there are no checks that require a "0/1" in the NPA second digit position) that can be entered on the LASS NPA Split Table.

5.58.7.26.5 Access to 411, 611, 811

The N11 codes are reserved for special local services and should not be used as NPAs. As a result, these codes will remain unaffected by the INPA feature.

5.58.7.26.6 0+ and 1+ Dialing

All existing dialing plan possibilities will continue to be supported on the 5ESS[®] switch, yet neither the "No Prefix Required for 7- or 10-Digit Calls" nor the "Prefix `1' Allowed on 7- or 10-Digit Calls" calls option will likely be utilized by any service provider once INPAs are introduced.

5.58.7.26.7 Service Switching Point (SSP) 800 Service

SSP 800 is a feature which launches data base queries and new full NANP DN routing DNs are returned via a Service Control Point (SCP) data base. With this new routing DN, SSP 800 then calls digit analysis. Currently, in order to route on this number, the switch must determine if the NPA of the returned full NANP DN routing DN match the "Home" or "Implied" NPA, and if so, they are deleted. This is performed so that calls which will complete within the NPA are routed on an NANP DN without the NPA basis. If there is no match, the full full NANP DN is presented to digit analysis.

With the conversion to INPA, some offices may convert to Dialing Plans 2, 4, or 6 which will allow NANP DN without the NPA dialing only for calls within the local calling area, while all other calls, including intra-LATA, intra-NPA toll calls must be dialed on a 1+full NANP DN basis (or NONE + full NANP DN basis). Since these full NANP DN-dialed calls may be within the NPA, and since SSP 800 deletes the NPA of the returned number when it matches the

switch NPA, all non-local intra-LATA, intra-NPA calls could be incorrectly routed.

5.58.7.26.8 Timing Delay on Local Calls (TDLC)/Timing Delay on All Calls (TDAC)

The 5ESS[®] Switch Timing Delay for Local Calls/Timing Delay on All Calls (TDLC/TDAC) feature was designed to resolve a 1A ESSTM switch transparency issue and to allow the 5ESS[®] switch to use the presence or absence of a dialed prefix to resolve conflicts and by-pass critical interdigit timing. It specifically allows conflict resolution for office code/NPAs for both local and Carrier Interconnect (CI) calls.

In order to prevent timing for conflict resolution when INPAs are introduced, the TDLC/TDAC feature must be employed.

The basic purpose for TDAC is that timing must only be performed when necessary. Digit Analysis, after the switch is given a sequence of dialed digits (or while the digits are coming in via overlap outpulsing), determines whether the sequence can be distinguished from any other possible sequence and, if so, routes the call based on the number of digits expected (which is defined on the "NDE" field of Recent Change View 9.3). In other words, if an office is exclusive in its dialing plan about the presence or absence of a prefix as related to the number of digits in the dialed string following the prefix, (for example, uses the "1+" prefix exclusively for full NANP DN calls), then the office can use this fact, as defined in View 9.3, to activate the TDAC feature to resolve conflicts and avoid 4-second critical interdigital timing after NANP DN without the NPA.

Specifically, with TDAC, a digit string can be declared to be NANP DN without the NPA or full NANP DN based on the absence or presence of a prefix, respectively, instead of timing between the seventh and eighth digits. As a result, if a "1" prefix is dialed, full NANP DN is assumed and, if no "1" is dialed, the call is routed on NANP DN without the NPA.

When the Stored Prefix is either NONE, 1+ or 0+, and matches the Dialed Prefix for a given conflict, the Digits column determines how to resolve the code conflict. When the stored prefix equals "NULL" (that is, the service provider enters nothing in that RCV View 9.3 field), the switch uses the value in Digits to determine the number of digits expected when routing with no prefix. The value in Digits' determines the number of digits expected when routing with a 1+ prefix.

The TDAC is not applicable for an office that allows NONE+full NANP DN (between nonadjacent NPAs) AND 1+full NANP DN or NONE+NANP DN without the NPA AND 1+NANP DN without the NPA (as in Dialing Plan Option 3) that must enter conflict resolution.

5.58.7.26.9 Circuit-Switched Trunking (CST)

The CST feature uses NANP DN without the NPA/full NANP DN Special Access Codes (SACs), for example, 810-XXXX and 910-XXXX, which are actually public dial codes defined as SACs. A conflict may arise when the first digits of the NANP DN without the NPA/full NANP DN SAC codes are the same as an NPA. With the inception of INPA, the potential for such conflicts may be significantly increased as new INPAs are assigned with the same digits as the first digits of existing or future NANP DN without the NPA/full NANP DN SAC codes. With introduction of INPA, seven/ten-digit "SACing" feature functionality must be preserved.

5.58.8 Assignment Dependencies and Limitations

5.58.8.1 Dependencies

In order to prevent timing for conflict resolution when INPAs are introduced, the TDLC/TDAC feature must be activated.

5.58.8.2 Dialing Plans

With the introduction of INPAs, all Switching Systems and the 5ESS[®] Switch, must at least support the Dialing Plans listed in Table 5-5 as advocated by Bellcore in order to accommodate INPAs.

Table 5-5 Bellcore Established Dialing Plans

OPTION	TRAFFIC	NO. OF DIGITS	PREFIX
1	inter-LATA-inter-NPA	10D	1+
	inter-LATA-intra-NPA	7D	none
	inter-LATA-intra-NPA	10D	0+
	intra-LATA-inter-NPA	10D	1+
	intra-LATA-intra-NPA	7D(local/toll)	none
	intra-LATA-intra-NPA	10D	0+
2	inter-LATA-inter-NPA	10D	1+
	inter-LATA-intra-NPA	10D	1+
	intra-LATA-inter-NPA	10D	1+
	intra-LATA-intra-NPA	7D(local)	none
	intra-LATA-intra-NPA	10D(toll)	1+
	intra-LATA-intra-NPA	10D(toll)	1+
3	inter-LATA-inter-NPA	10D	1+
	inter-LATA-intra-NPA	7D	1+
	intra-LATA-inter-NPA	10D	1+
	intra-LATA-intra-NPA; 7D(local)	none	
	intra-LATA-intra-NPA	7D(toll)	1+
	intra-LATA-intra-NPA	7D(toll)	1+
4*	inter-LATA-inter-NPA	10D	1+
	inter-LATA-intra-NPA	10D	1+
	intra-LATA-inter-NPA	10D	1+
	OR		
	intra-LATA-inter-NPA	10D	none
	intra-LATA-intra-NPA	7D(local)	none
5	inter-LATA-inter-NPA	10D	1+
	inter-LATA-intra-NPA	7D	none
	inter-LATA-intra-NPA	10D	0+
	intra-LATA-inter-NPA	10D	1+
	intra-LATA-intra-NPA	7D(local/toll)	none
	OR		
6	inter-LATA-inter-NPA	10D	1+
	inter-LATA-intra-NPA	10D	1+
	intra-LATA-inter-NPA	10D	1+
	intra-LATA-intra-NPA	7D(local)	none
	intra-LATA-intra-NPA	10D(local)	0+
	intra-LATA-intra-NPA	10D(toll)	1+

NOTE: The 5ESS[®] switch can currently support all of these Dialing Plans and their Digit Analysis Tables are flexible enough to support dialing plans not listed above but currently utilized by several RBOCs. The 5ESS[®] Switch also supports all the conflict code resolution methods listed in the "Conflict Resolution Methods" section in their Digit Analysis Tables for all digit strings dialed by the subscriber.

In locations where Feature Group D (FGD) has been implemented, if the caller is not presubscribed to an interexchange carrier, inter-LATA calls require use of a Carrier Access Code (CAC), currently in the format 10XXX, preceding the dialing format shown in the preceding tables.

The essential distinctions between the Dialing Plans are the following:

- *Option 1:* User must dial NANP DN without the NPA on intra-NPA calls only, including intra-LATA, intra-NPA toll calls
- *Option 2:* User must dial 1 + a full NANP DN with HNPA for intra-LATA, intra-NPA toll calls
- *Option 3:* User must dial 1 + NANP DN without the NPA for Intra-LATA, Intra-NPA toll calls; the Home NPA is not required.

- *Option 4:* User must dial 1 + Home NPA for intra-LATA, intra-NPA toll calls; User may dial either 1 + full NANP DN OR NONE + full NANP DN for intra-LATA, interNPA calls. This dialing plan is an aggregate of Dialing Plan Option 2

NOTE: This plan is possible when the customer subscribes to the Premium "Expanded Metro Service Scope" service (service name variable based on service provider) which allows local non-prefix full NANP DN dialing between neighboring NPAs. This dialing plan is simply a variation on Dialing Plan 2 with this specific addition.

- *Option 5:* User may also dial, as an option, 1 + Home NPA for Intra-LATA, Intra-NPA local/toll calls (with no distinction on local/toll). This dialing plan is an aggregate of Dialing Plan Option 1.
- *Option 6:* User may also dial 0 + a full NANP DN with HNPA for Local Operator assisted calls for intra-LATA-intra-NPA local calls. This dialing plan is an aggregate of Dialing Plan Option 2.

5.58.8.3 Conflict Resolution Methods

To distinguish between a NANP DN without the NPA and a full NANP DN number when interchangeable NPA codes are introduced, one of the following three methods for conflict resolution can be used:

(1) Prefix Method

This method requires that all full NANP DN numbers be prefixed with a "1" or a "0" to indicate that full NANP DN will follow. All NANP DN without the NPA numbers are dialed without a "1" prefix.

(2) Timing Method

This method requires the switching system to wait a fixed period of time (that is, approximately 4 seconds) after the NANP DN without the NPA has been received (excluding the prefix "1" or "0") to see if additional digits are dialed. If no additional digits are dialed within the required period, the switching system will time out and process the call on a NANP DN without the NPA basis. Interdigital timing can be canceled from a Dual Tone Multifrequency (DTMF) telephone by dialing a "#" after the last dialed digit.

(3) Hybrid Method

This method is a combination of the prefix and the timing method. It requires timing only in those cases where a toll call is dialed on a 1+NANP DN without the NPA basis and the dialed office code is assigned as both a central office code within the Home NPA (HNPA) and an NPA code elsewhere in the NANP area. The successful application of the hybrid method depends on a switching system capable of examining the first 3 digits received after a leading "1" to determine whether the digits are an NPA code only, an office code only, or an ambiguous code that is in use as both. Only in the latter case will timing need to be applied after the 7th digit (excluding the 1+) to determine whether an NANP DN without the NPA or full NANP DN number is being dialed.

For Option 3, the length of digits dialed is identified by either the timing method or the hybrid method. Option 1 is the preferred alternative in more densely populated areas. Option 3 is the least preferred. With Option 1, a toll warning tone may be provided to alert the caller that the call is a toll call. Provision of this toll warning tone is considered a separate feature, and is currently not available. Bellcore recommends Option 1 as the standard dialing procedure;

however, the choice is that of the particular operating company.

These conflict resolution methods can be mapped to the Dialing Plan Options as follows:

- (1) Prefix method -----> Dialing Plan 1, 2, 4, 5 or 6 (see Note)
- (2) Timing method -----> Dialing Plan 2 or 3
- (3) Hybrid method -----> Dialing Plan 2 or 3

NOTE: Dialing Plan 4 uses 6-digit screening that screens for terminating NPAs that may be affected by the "Expanded Metro Service Scope" feature via a designated digit analysis table entry. If the NPA + office code are affected (that is, the NPA-office code are in the "Expanded Metro Service Scope"), the call must route on full NANP DN, and no prefix is required. If the NPA-office code are not in the Service Scope, the call must be routed to announcement or intercept.

5.58.9 Typical End-User Scenarios

End-user dialing is a function of the dialing method implemented by the serving office. If the service provider chooses Dialing Plan Option 1, the end-user who is currently dialing HNPA calls on a 1+7D basis will now have to dial only 7D without the prefix. If the office decides to continue with 1+7D dialing for toll calls within the HNPA by choosing ling Plan Option 3 the user will dial 1+7D. On 0+ calls, the user will either dial 0+7D or 0+10D depending on what is required by the serving office.

5.58.10 Service Provider Personnel Perspective

This feature must be allowed on all 5ESS[®] switch offices since it impacts the entire NANP area. service providers need to examine their current dialing plans to find all cases where the 1+ and 0+ prefix is required. This information is needed:

- (1) To determine which proposed option will be used in their offices
- (2) To determine if the chosen option will be in conflict with existing dialing plans.

If a service provider must adopt a new Office Dialing Plan (ODP) for an office to accommodate INPAs (assuming it has not already done so since it had no previous need to accommodate interchangeable office codes), the service provider will need to realign all its existing Screening, Digit Analysis, Routing, and Charging Translations tables to support the new ODP.

5.59 SPECIAL ACCESS CODES (SAC) CALL TYPES FOR CODES IN CONFLICT

5.59.1 General

5.59.1.1 Definition

This feature allows assignment of a Special Access Code (SAC) call type and SAC OWNER to each of two or more conflicting dial codes defined in the office. This allows use of certain currently assigned office codes as SAC calls when those codes are allocated as Numbering Plan Areas (NPAs).

When an NPA code matches a local office code, digit analysis cannot determine from the first three digits whether it's an NPA and full NANP DN will be dialed or it's an office code and NANP DN without the NPA will be dialed. Normally, this is resolved by defining the three digit code as CALL TYPE of CONFLICT in the LDIT (RC/V view 9.3), enabling Timing Delay on All Calls (TDAC), and by requiring a prefix to determine the digit string length and doesn't

have to do critical interdigit timing between the seventh and eighth digits. If TDAC is not activated, the switch does critical interdigit timing after each set of collected digits which constitutes a possible valid number (for example, between digits 7 and 8) until an unambiguous number is received.

This resolves most "normal" conflict situations; however, the Circuit Switched Trunk (CST) feature requires that a SAC be assigned to some codes in conflict. Once a code is defined as a CONFLICT, RC/V does not allow an entry in the TYP CI CALL field on screen one of view 9.3. Instead, the data needed to resolve the conflict must be defined on screen two (Conflict Resolution Entries Table). Starting with the 5E8 software release, the SAC Call Types for Codes in Conflict special feature allows 5ESS[®] switch translations that defines a code with a Call Type of CONFLICT on RC/V 9.3 to resolve the conflict on screen two with a TYP CI CALL value of "SAC" and a SAC OWNER. The new SAC OWNER field will hold the Carrier Identification Code (CIC) used to route to the target switch.

5.59.1.2 Cross-References

The following cross-references are applicable to this feature:

- Feature number: 99-5E-1376
- NSEP/5SEP code: Not available.

5.59.1.3 Availability

This feature is available with the 5E8 software update and later software releases.

5.59.1.4 Feature Application

This feature is provided on a per-office (switch) basis.

5.59.2 User Perspective

5.59.2.1 User Profile

This feature was primarily designed for telephone company maintenance personnel.

5.59.2.2 Customer Premises Equipment

No special customer premises equipment (CPE) is required for this feature.

5.59.3 User Operation

5.59.3.1 Activation

The activation sequence that follows (Figures 5-17 and 5-18) indicates how to provision a carrier interconnect of SAC in digit analysis when NANP DN without the NPA and full NANP DN numbers must be resolved in conflict because of a common NPA and office code. Both examples demonstrate the use of TDAC in resolving the NANP DN without the NPA/full NANP DN conflict. If TDAC is not being used, the NBR OF DIGITS field should not be populated and the conflict will be resolved by timing. The first provisioning sequence demonstrates how a new conflicting NPA/office code should be entered on the Recent Change view 9.3 when the full NANP DN number must have a carrier interconnect type of SAC. The second sequence indicates how an update should be performed when an existing SAC code is altered to be used as an NPA.

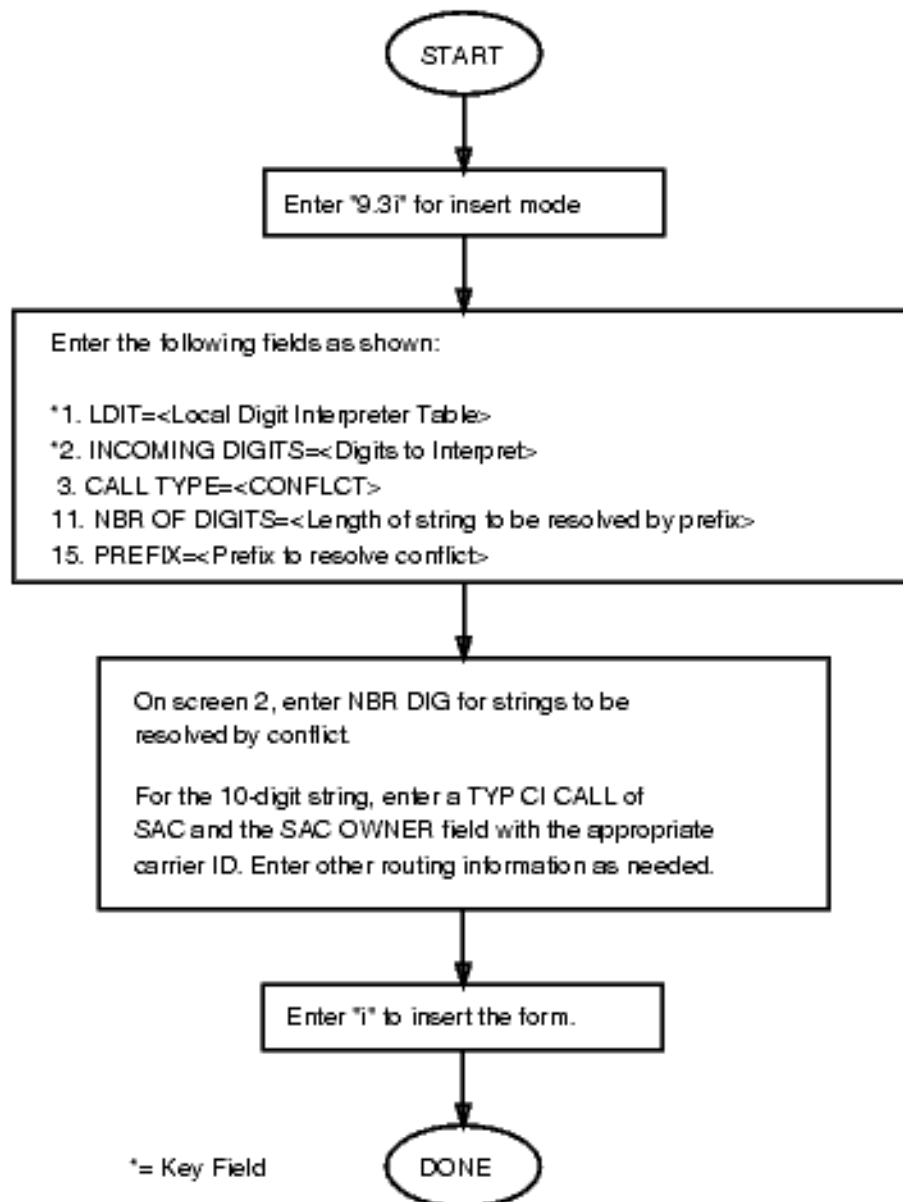


Figure 5-17 Provisioning sequence <SAC in Conflict - Insert>.

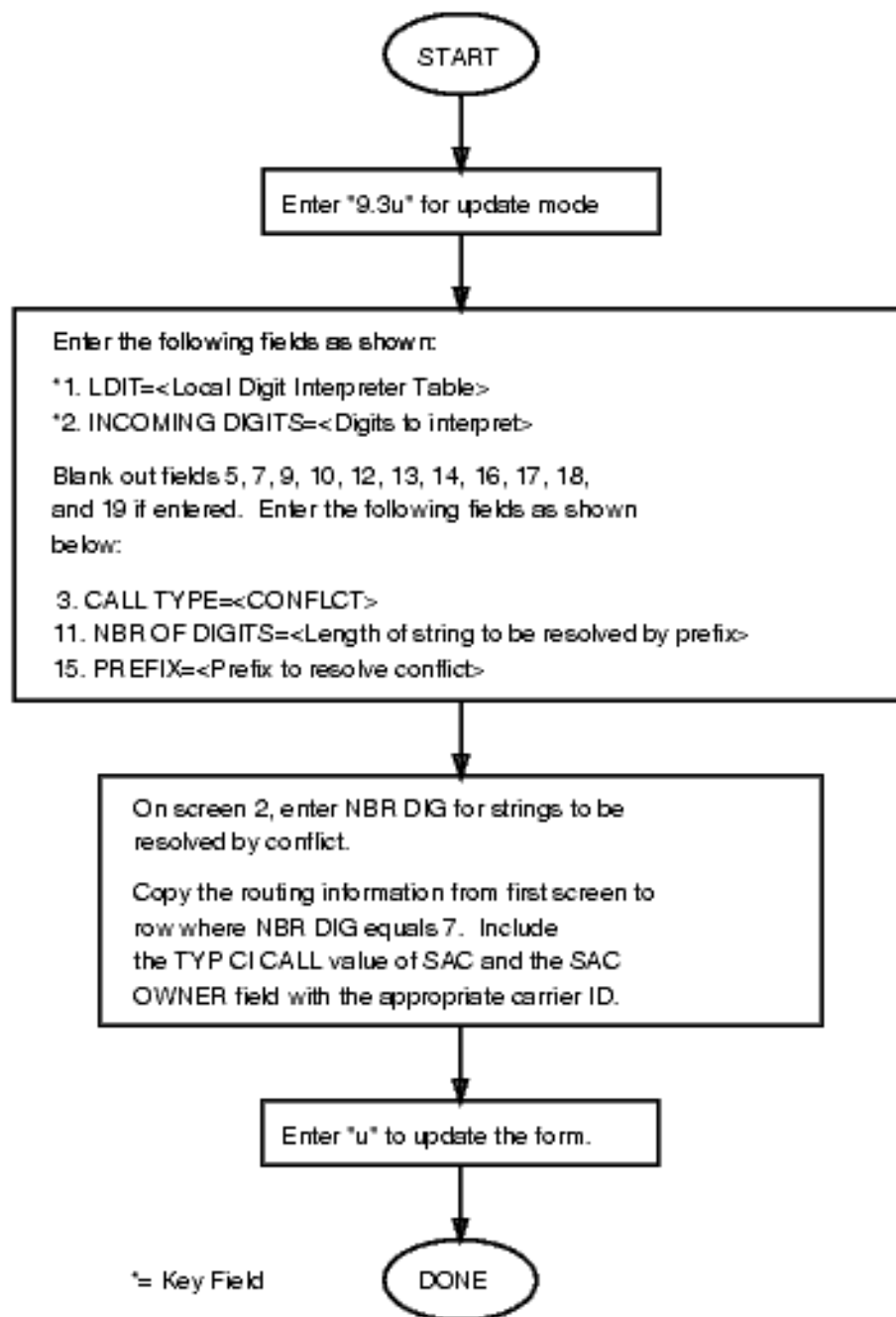


Figure 5-18 Provisioning sequence <SAC in Conflict - Update>.

5.59.3.2 Deactivation

To deactivate this feature, remove the appropriate digit translation tuples that were used to assign SAC data to a code in conflict.

5.59.4 Assignment Dependencies And Limitations

5.59.4.1 Dependencies

This feature builds on the functionality provided by the SSP800 feature. The SSP800 feature must be activated for offices designated as a circuit switched trunk (CST) Tandem.

The Seven Digit Outpulsing (VPATH) feature must be activated in the 5ESS[®] switches serving as Equal Access End Offices.

5.59.4.2 Limitations

Carrier Identification Code of 377 is used. The capability to identify CST calls based on a customer changeable CIC is not available.

The customer is not restricted to use a particular office code or NPA-office code for the CST service. Furthermore, multiple office code or NPA-office code can be used. However, care must be exercised in designating office code/NPA-office code to CST service. It is recommended to limit the number of office code dedicated to seven-digit CST codes. It is further recommended to limit the NPA used in the ten-digit access codes to only one possible NPA (for example, **900**) and to limit the number of office code used in the ten-digit code.

The CST Tandem switch will be required to perform full seven or ten-digit translations in order to route CST calls to Enhanced Service providers. The 5ESS[®] switch is not designed to perform exhaustive seven or ten-digit translations, therefore, it is resource consuming to do so. The more distinct office code/NPA-office code combination will be designated to CST service, the more resource consuming it will be to perform translations and the more difficult it will be to administer these translations. Thus, even though the customer is not restricted to use a particular office code or a particular NPA-office code combination for the CST service, it is strongly recommended that the number of office code or NPA-office code combinations be limited. In order to alleviate the resource concerns, the customers are advised to follow these guidelines:

- For ten-digit CST access codes (DNs), use only one NPA (that is, 900).
- For ten-digit CST access codes (DNs), use as few office code as possible and allow distinction in the least significant digit only (that is, allow office code between 880 and 889; disallow office code=880 and 850 and 580!).
- For seven-digit CST access codes (DNs), use as few office codes as possible and allow distinction in the least significant digit only (that is, allow office codes between 920 and 929; disallow office code=920 and 950 and 590!).

For 5E9(1) and later software releases, CST service does not support CCS7 signaling between the 5ESS[®] switch serving as a CST Tandem and the equal access end office (EAEO).

For software release earlier than 5E8, CST SAC codes cannot be specified on the LDIT view, Recent Change View 9.3, for dialed codes that are in conflict. Recent Change returns an error message when assigning a TYPE CI CALL of "SAC" on one or more conflict resolution entries. The 5E8 SAC Codes in Conflict feature will lift this restriction.

In the 5E8 software release, the SAC Codes in Conflict feature is limited to Office Dialing Plans (ODPs). This feature has no effect on Conflict Resolution for Private Network Dialing Plans (PNDPs) since PNDPs do not employ the TYPE CI CALL attribute nor SAC CI Call Types.

For 5E9(1) and later software releases, the CST service is not applicable beyond ODPs.

The SAC Codes in Conflict feature is not supported for translations in Remaining Digit Interpreter Tables (RDITs) that are available in the 5E8 software release. As a result, a new "SAC OWNER" field is not supported in the RDIT for conflict resolution entries in Recent Change View 9.9. In addition, when the TYPE CI CALL field on RCV 9.3, page 2 is set to a value of "SAC", the RDIT field must be left blank.

5.59.5 Administration

5.59.5.1 Measurements

Not applicable for this feature.

5.59.5.2 Billing

Not applicable for this feature.

5.60 DID ANSWER SUPERVISION

5.60.1 Overview

5.60.1.1 Description

The **Direct Inward Dialing (DID) Answer Supervision** feature (number 99-5E-1610) allows a 5ESS[®] switch configured as a private branch exchange/customer premise equipment (PBX/CPE) to return answer supervision over incoming DID trunks for these calls:

- DID calls routed to an announcement on the PBX. This includes calls routed to number invalid, not in service or not assigned recordings.
- DID calls routed to an outgoing trunk. This includes all calls routed back to the public switched telephone network (PSTN) or other PBXs. Answer supervision is provided after a fixed 15 second delay from the time the DID call was routed to another trunk unless real answer has already been received and relayed. Answer supervision is provided even when the call ultimately terminates to a ringing, announcement or busy/reorder tone.
- DID calls receiving a dial prompt and expecting additional in-band signaling from the caller. (Software release 5E10 only.)
- DID calls routed to a line that is marked as a free termination.

See Figure 5-19 for a call flow diagram.

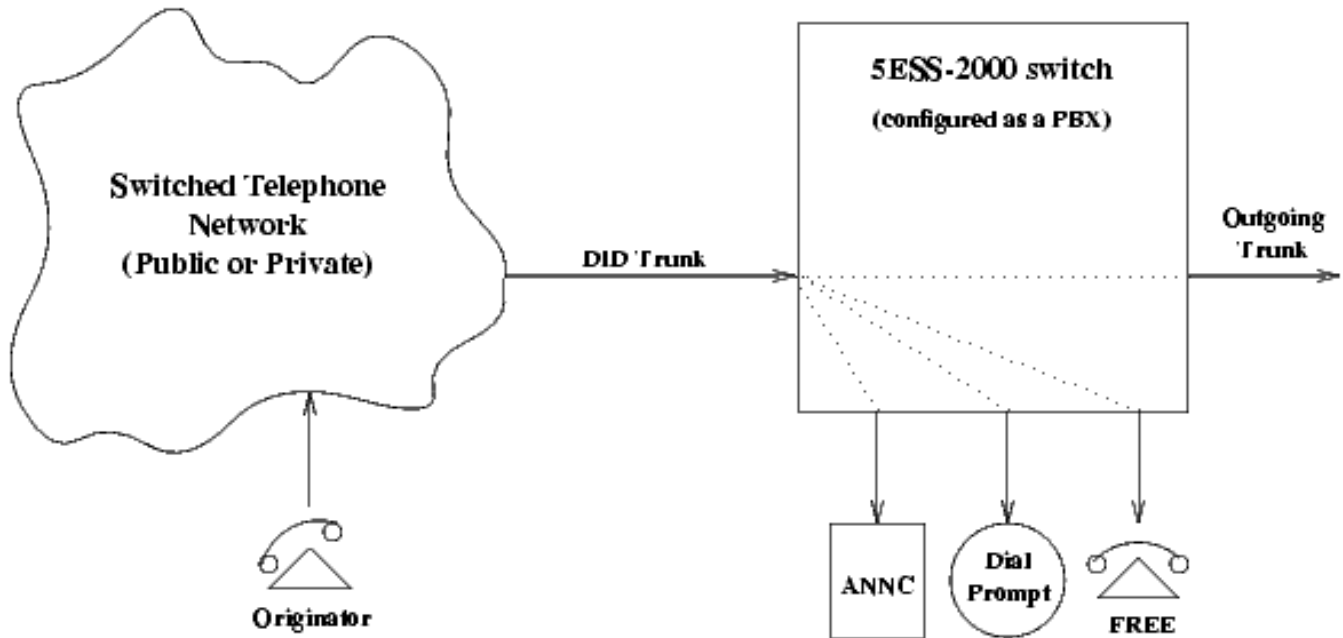


Figure 5-19 DID Answer Supervision Call Flow

5.60.1.2 Background

The 5ESS[®] switch is sold as customer premise equipment to large companies, universities and military bases and must be registered with the FCC under Part 68 Rules and Regulations. A FCC rule requires that answer supervision be returned on DID calls into customer premises equipment (CPE) and also when calls are routed back to the public switched telephone network (PSTN).

This feature brings the switch into compliance with the rule and only applies to 5ESS[®] switches used as PBX/CPE.

5.60.1.3 Availability

The feature is provided as a software update (SU) to the 5E8(1) and 5E9(1) software releases and as part of the 5E9(2) and 5E10 software releases.

A portion of this feature, addressing POTS trunk originations that do not involve feature interactions such as private facility access (PFA) and automatic route selection (ARS), is provided as a (SU) to 5E8(1) and later releases. The balance of the feature, addressing primary rate interface (PRI), feature execution and feature interactions will be provided as part of the 5E10 software release. This feature is not a secured feature.

5.60.1.4 Feature Environment

This feature is intended for 5ESS[®] switches being used as PBX/CPE.

5.60.2 Feature Operation

Typical scenarios involving the DID Answer Supervision feature include:

A user dials a DN that terminates on a 5ESS[®] PBX over a DID trunk. The 5ESS[®] PBX routes the call to an announcement on the PBX. The 5ESS[®] PBX relays answer supervision to the calling party's office. When the calling party hangs up or the announcement system hangs up, the call is disconnected. As a result of the answer supervision returned, the calling party's office will generate an AMA record for the duration of the call.

A user dials a DN that terminates on a 5ESS® PBX over a DID trunk. The 5ESS® PBX routes the call to a trunk facility. The 5ESS® PBX waits for 15 seconds and then relays answer supervision to the calling party's office if real answer was not already returned. When the calling party or the called party/system hangs up, the call is disconnected.

A user dials a DN that terminates on a 5ESS® PBX over a DID trunk. The 5ESS® PBX analyzes the digits and determines that a dial prompt should be returned to the caller as an indication that further digits are to be dialed by the caller. The 5ESS® PBX switch then relays answer supervision to the calling party's office.

A user dials a DN that terminates on a 5ESS® PBX over a DID trunk. The 5ESS® PBX will always return answer supervision if the PBX station is marked as a free termination.

For all four scenarios, the calling party may be billed from the time answer supervision is returned until the call is disconnected.

5.60.3 User Operation

5.60.3.1 For Subscribers

The end users are callers whose calls are destined for a 5ESS® switch PBX over a DID trunk. As a result of answer supervision, a calling party may be charged for:

- (1) Calls routed to an announcement on the PBX.
- (2) Calls routed to a trunk out of the PBX.
- (3) Calls that are given a dial prompt.
- (4) Calls to a station that is marked as a free termination.

5.60.3.2 For Switch Personnel

The 5ESS® PBX owner will have no administrative control on this feature. They will not be able to turn the feature off.

5.60.4 Engineering

5.60.4.1 Hardware Resources

No hardware considerations are associated with this feature.

5.60.4.2 Software Resources

No software considerations are associated with this feature.

5.60.4.3 Transition Considerations

No transition considerations are associated with this feature.

5.60.5 Interactions And Incompatibilities

5.60.5.1 Interactions

This feature will apply to DID calls when dial prompt is returned to the caller by

- Automatic route selection (ARS)
- Individualized dialing plan (IDP)
- Private facility access (PFA)
- Authorization codes
- Account codes
- Advanced services platform (ASP) triggers

5.60.5.2 Incompatibilities

FTS2000 switches and operator services position systems (OSPS) switches are not supported by this feature because they are not configured as PBXs.

5.60.6 Dependencies And Limitations

5.60.6.1 Dependencies

No new requirements.

5.60.6.2 Limitations

This feature will apply to DID calls arriving over analog, T1 and PRI DID trunk facilities but will not apply to common channel signaling (CCS) trunks.

5.60.6.3 Isolation Constraints

Not applicable.

5.60.7 Feature Implementation

5.60.7.1 Office Data Administration Provisioning

There is no ODA provisioning associated with this feature.

5.60.7.2 Recent Change Provisioning

No new requirements; the feature will be automatically activated when the service provider installs the 5ESS[®] switch as PBX/CPE using the GI_cpe global variable. (CPE parameter on Recent Change view 8.1.)

5.60.7.3 Customer Premises Equipment

No additional requirements.

5.60.8 Administration

5.60.8.1 Measurements

This feature does not introduce any new measurements.

5.60.8.2 Billing

As a result of answer supervision returned, a calling party may be charged for DID calls and local area signaling services (LASS) non-billable announcements will become billable.

5.61 NUMBER PORTABILITY (NP) - BASIC LOCAL ROUTING NUMBER (LRN)

A full description of the Number Portability - Local Routing Number feature can be found in 235-190-127, *5ESS® Switch Number Portability User's Guide*.

The NP - LRN feature (99-CP-3169.A) gives the end user the ability to change their location or telephone service while keeping their original Directory Number (DN). There are three types of Number Portability:

- (1) *Service Portability* allows end users to retain their DNs after changing services, such as from POTS to Integrated Services Digital Network (ISDN).
- (2) *Service Provider Portability* allows end users to retain their DNs after changing service providers.
- (3) *Location Portability* allows end users to retain their DNs after changing physical locations, regardless of whether they are also changing their service provider or not. For instance, a user may move to a location where they are served by a different switch, or by a different rate center on the same switch, and still keep their original DN.

NOTE: For the 5E11 software release, Location Portability is limited to portability within a Local Access Transport Area (LATA).

This feature also includes the NP - Basic LRN Automatic Message Accounting (AMA) feature (99-CP-3667) and the Non-Conditional 10-Digit Trigger for LRN feature (99-CP-3888).

This feature introduces a new Advanced Services Platform (ASP) Release 0.1B trigger that is capable of supporting all three types of Number Portability.

When an NPA-office code is defined as portable, the Service Control Point's (SCP's) service logic is defined to return the Local Routing Number (LRN) of the ported DNs' serving switch, and the switch uses the LRN to route the call. The LRN is stored in the Initial Address Message's (IAM's) Called Party Number (CdPN) parameter, and the actual dialed digits are stored in the Generic Address Parameter (GAP). To prevent more than one Local Number Portability (LNP) query from being launched on a call, the Forward Call Indicator (FCI) parameter in the Integrated Services digital network User Part (ISUP) IAM is used to indicate whether an LNP query has been performed.

The following scenario, which is illustrated in Figure 5-20, shows the basic call flow required to get calls to ported numbers. In this scenario, the calls are handled by a Local Service Provider and intra-LATA SS7 signaling is used.

Figure 5-20 indicates the steps of the scenario with circled numbers.

- (1) Line A (630-224-1111) dials Line B (630-713-2222).
- (2) The originating exchange performs digit analysis on the dialed digits to determine how to route the call, and determines that B is in a portable NPA-office code.
- (3) Based on the dialed digits, the switch sends a query to the Local Number Portability Service Control Point (LNP-SCP).
- (4) The LNP-SCP sends an "Analyze_Route" response containing the LRN of the serving switch.

- (5) The originating switch receives the LNP-SCP response and analyses the data. The LRN is translated in a Post_Query Digit Analysis Selector (DAS) associated with the trigger and an ISUP route out of the switch is determined.
- (6) The call is routed to the serving switch based on the LRN.
- (7) The serving switch receives and processes the contents of the IAM message, replaces the CdPN parameter's contents with the dialed digits stored in the GAP parameter, performs digit analysis on the dialed digits from the GAP, and finds the subscriber on the switch.
- (8) The serving exchange completes the call to the subscriber.
- (9) An appropriate AMA record is generated for the call by the originating office, with an appended LNP Module containing the LRN returned from the LNP-SCP data base and an indication that the module applies to the terminating party, as well as a query status indication of "no query failure."

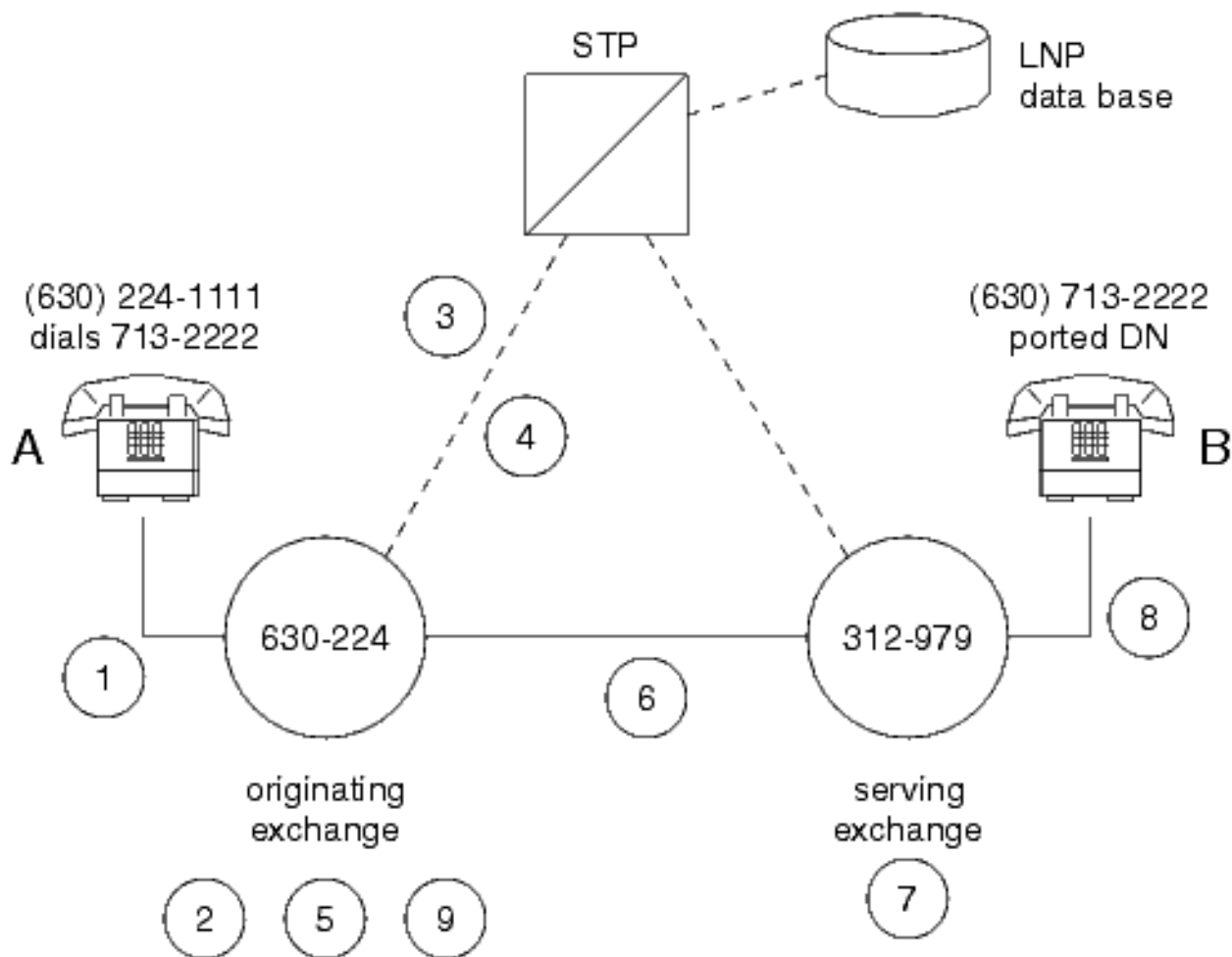


Figure 5-20 Number Portability - Local Routing Number Call Scenario

For more information on the Number Portability - Local Routing Number feature, see 235-190-126, *5ESS® Switch Advanced Services Platform, Release 0.1B*.

5.62 COIN PHONE FUNCTIONALITY ON AIU

5.62.1 Description

The Coin Phone Functionality On AIU feature (99-5E-2758) provides an interface for analog coin phones through an analog interface unit (AIU). A new coin application circuit pack that supports up to 16 coin lines and provides an interface to the 5ESS[®] switch is installed in the AIU.

This feature is not secured.

5.62.2 Cross References

- Feature number: 99-5E-2758, 97-5E-3116
- Bellcore specifications: TR-NWT-000506, TR-TSY-000961

5.62.3 Background

Not applicable.

5.62.4 Availability

The Coin Phone Functionality On AIU feature is available as a software update to the 5E11 software release and will be part of the 5E12 software release.

5.62.5 Feature Environment

This feature is supported on the 5ESS[®] switch, the 5ESS[®] switch VCDX and the 5ESS[®] switch CDX, and is assigned on a per-line basis.

5.62.6 Feature Operation

The switch sees "Coin Phone Functionality on AIU" as a new hardware feature.

5.62.7 User Operation

5.62.7.1 For Subscribers

No subscriber action is associated with this feature.

5.62.7.2 For Switch Personnel

The service provider must install the coin phone application pack in the AIU and then provision the feature as later described in this document.

5.62.8 Engineering

5.62.8.1 Hardware Resources

This feature requires the coin phone application pack to be installed in the AIU. Each coin phone application pack supports up to 16 circuits.

5.62.8.2 Software Resources

This feature requires no new software resources.

5.62.8.3 Transition Considerations

There are no transition considerations associated with this feature.

5.62.9 Interactions and Limitations

This feature has no interactions or limitations.

5.62.10 Incompatibilities

This feature has no incompatibilities.

5.62.11 Dependencies

A new analog interface unit (AIU) (97-5E-3116) must be installed and provisioned before the Coin Phone Functionality On AIU feature will work. This AIU is available for 5ESS[®] switches equipped with the 5E11 software update and 5E12 and later software releases.

5.62.12 Isolation Constraints

This feature has no isolation constraints.

5.62.13 Feature Implementation

5.62.13.1 Office Data Administration (ODA) Provisioning

The following table provides a cross-reference between ODA forms and the associated Recent Change views. The ODA forms must reflect the same information shown in "Recent Change (RC) Provisioning," Section 5.62.13.2 .

ODA FORM	OFFICE	ASSOC
line	5109	1.6
eqaiup	5746	20.16

NOTE: Refer to 235-080-100, 5ESS[®] Switch Translations Guide (TG-5) for details on translations forms.

5.62.13.2 Recent Change (RC) Provisioning

5.62.13.2.1 Activating the Feature

Activate the Coin Phone Functionality On AIU feature using Recent Change view 20.16 (AIU PACK FORM) (*new* for 5E11) and set field **TYPE** to a value of **CLP**.

5.62.13.2.2 Assigning the Feature to Lines

For this feature to be assigned to a line, RC view 1.6 [COMPOSITE LINE (LINE ASSIGNMENT)], field **COIN** must be set to a value of **CF** for coin first, **DTF** for dial tone first or **SPP** for semi-post pay. Up to 20 lines can be assigned to each coin application pack.

See 235-118-252, 5ESS[®] Switch Recent Change Reference manual for detailed information on allowed values.

5.62.13.3 Customer Premises Equipment (CPE)

A standard coin telephone (per Bellcore specification TR-TSY-000961) is required for this feature.

5.62.14 Maintenance Considerations

MCC page 1320 has been modified to show the equipage of the coin application pack.

For MCC displays, refer to 235-105-110, *5ESS® Switch System Maintenance Requirements and Tools*.

5.62.15 Administration

5.62.15.1 Measurements

This feature requires no new measurements.

5.62.15.2 Billing

This feature does not affect billing.

5.63 ROUTE INTERNATIONAL CALLS BY COUNTRY CODE

5.63.1 Description

The Route International Calls by Country Code feature (99-5E-3968) performs special call processing when an *A-I-Net®* signal control point (SCP) returns both a route and a carrier ID code (CIC) value to the *5ESS®* switch for routing. With this feature active, the switch attempts to complete the call to the route specified by the SCP, and will use the CIC returned by the SCP in signaling to the next switch, if appropriate. The CIC returned by the SCP is not used to determine an alternate route.

This is a secured feature (SFID 213) and a right-to-use (RTU) fee must be paid to Lucent Technologies before enabling information is provided.

5.63.2 Availability

The Route International Calls by Country Code feature (99-5E-3968) is available as a software update for the 5E10 and 5E11 software releases, and is included in the 5E12 and later releases.

5.63.3 Environment

This feature works as part of *A-I-Net®* and is provided on a per-office basis.

5.63.4 Cross References

The following cross references apply to this feature:

- Feature Number:
 - 99-5E-3968, Route International Calls by Country Code

5.63.5 Background

Not applicable.

5.63.6 Feature Operation

The Route International Calls by Country Code feature is invoked for international calls if the *A-I-Net®* SCP returns

both primary trunk group and primary carrier. If the SCP also returns one or a combination of the following codes, the switch disregards the alternates:

- Alternate trunk group
- Alternate trunk group and second alternate trunk group in the analyze route response
- Alternate carrier—Although the switch chooses the route based on the primary trunk value, the called party digits and the primary carrier returned in the analyze route response must result in a valid call type in the post-query digit analysis selector (DAS).
- Alternate carrier and second alternate carrier

The feature operates as follows:

- (1) An international call enters the switch on a TTOLL trunk group. After initial digit analysis, the switch queries the SCP, consistent with the Trunk Trigger for Toll feature (99-5E-3156, SFID 159).
- (2) After SCP processing (which may include directives to the switch to play announcements and/or collect digits), the SCP responds with both primary trunk group and primary carrier values.
- (3) The switch chooses the outgoing route based on the primary trunk group value. The CIC returned from the SCP as the primary carrier is used for signaling to the next inter-exchange carrier switch (if used), but is not used for routing purposes.
- (4) The switch routes the call as an international call. The switch uses the value received from the SCP in the Primary carrier as the CIC value in the outgoing signaling.

If the switch is unable to complete the call over the trunk group indicated by the Primary trunk group value, the switch applies normal call failure treatment.

5.63.7 User Operation

5.63.7.1 For Subscribers

No subscriber actions are associated with this feature.

5.63.7.2 For Switch Personnel

The service provider enables this feature using recent change and verify (RC/V).

5.63.8 Engineering

5.63.8.1 Hardware Resources

No hardware considerations are associated with this feature.

5.63.8.2 Software Resources

No software considerations are associated with this feature.

5.63.8.3 Transition Considerations

No transition considerations are associated with this feature.

5.63.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

5.63.10 Incompatibilities

No incompatibilities are associated with this feature.

5.63.11 Dependencies

This feature should have the Toll Connecting Routing and Billing Enhancement feature (99-5E-2851, SFID 154) active.

5.63.12 Isolation Constraints

No isolation constraints are associated with this feature.

5.63.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the Route International Calls by Country Code feature by populating the following fields in RC/V view 8.22, (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	213
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

5.63.14 Customer Premises Equipment (CPE)

Not applicable.

5.63.15 Maintenance Considerations

Not applicable.

5.63.16 Administration

5.63.16.1 Measurements

This feature does not impact measurements.

5.63.16.2 Billing

This feature does not impact billing.

5.64 CALL FORWARDING ON TRUNKS

5.64.1 Description

The Call Forwarding On Trunks feature (99-5E-4029) provides the capability to forward calls if all trunks in the trunk group are busy or out of service, instead of giving the caller a busy signal. Using the Next Route Index, the service provider can reroute the call to an alternate trunk group or to another Directory Number (DN).

5.64.2 Availability

The Call Forwarding On Trunks feature (99-5E-4029) is available as a software update for the 5E11 and 5E12 software releases and is included in later software releases.

5.64.3 Environment

This feature is provided on a per-office basis.

5.64.4 Cross References

The following cross references apply to this feature:

- Feature Number:
 - 99-5E-4029, Call Forwarding On Trunks

5.64.5 Background

Not applicable.

5.64.6 Feature Operation

Customers connected to the switch by dedicated trunk groups, such as a business with a Private Branch eXchange (PBX), subscribe to the Call Forwarding On Trunks feature to improve service for their callers.

When a call cannot be terminated to the trunk group, because all of the trunks in the trunk group are busy or out of service, the Call Forwarding On Trunks feature forwards the call to a DN chosen by the feature subscriber. This feature works with all trunk types, and the route-to DN can be any DN on the same switch as the trunk group. However, if a Call Forwarding feature is assigned to the route-to DN, the redirected calls can be forwarded to any DN in the network.

NOTE: To assign a Call Forwarding feature to a DN, the DN must be assigned a physical port.

The forwarded leg of the call is treated as a new call origination from the busy trunk group. Existing call forwarding capability is used to forward the call.

5.64.7 User Operation

5.64.7.1 For Subscribers

End users connected to the switch via dedicated trunk groups, such as a customer who owns a PBX, subscribe to the Call Forwarding On Trunks feature.

5.64.7.2 For Switch Personnel

No switch personnel action is associated with this feature.

5.64.8 Engineering

5.64.8.1 Hardware Resources

No hardware considerations are associated with this feature.

5.64.8.2 Software Resources

No software considerations are associated with this feature.

5.64.8.3 Transition Considerations

No transition considerations are associated with this feature.

5.64.9 Interactions and Limitations

To extend the capabilities of the Call Forwarding On Trunks feature to accommodate termination of calls to alternate locations, the Remote Call Forwarding feature or the Call Forwarding Variable feature may be assigned to the route-to DN.

The following points need to be kept in mind when using the Call Forwarding On Trunks feature in association with Voice Messaging Systems (VMSs):

- Existing VMS interactions and interfaces still apply.
- The route-to DN assigned should not be Multi-Line Hunt Group (MLHG) member 1 of a VMS, because the VMS will treat a call to that DN as an attempt to *retrieve* messages. The route-to DN for VMS applications should be an intermediate DN that forwards the call to the VMS via a Call Forwarding feature, so that the VMS will correctly interpret the call as an attempt to *leave* a message for a VMS subscriber.
- While the Call Forwarding On Trunks feature has the capability to forward to the DN serving a VMS, this does not guarantee full VMS functionality. Calls directed to a VMS via the Call Forwarding On Trunks feature may receive default-mode treatment from the VMS. For example, the Channel History (CH) information transmitted to the VMS may be missing or incomplete, in which case the VMS will go into stand-alone (default) mode and prompt the caller for the called DN.

5.64.10 Incompatibilities

The Call Forwarding On Trunks feature does not support announcement trunks.

5.64.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

5.64.12 Isolation Constraints

No isolation constraints are associated with this feature.

5.64.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the Call Forwarding On Trunks feature by populating the following fields in RC/V view 8.22, SECURED FEATURE UPGRADE:

FIELD	VALUES
FEATURE ID	273
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

Activate the Call Forwarding On Trunks feature by doing the following.

First, the alternate Route Index (RTI) is inserted by using RC/V view 10.2, ROUTE INDEX (ROUTING):

RC/V	VIEW NAME	FIELD	ALLOWED
10.2	ROUTE INDEX (ROUTING)	RTI	(enter RTI to be used as alternate RTI)
10.2	ROUTE INDEX (ROUTING)	ETYP	DNTRAN
10.2	ROUTE INDEX (ROUTING)	NEXT RTI	(enter NOC of the route-to DN)
10.2	ROUTE INDEX (ROUTING)	PREF DIG	(enter last four digits of the route-to DN)
10.2	ROUTE INDEX (ROUTING)	RT DES TYP	NMFAIL (5E11, 5E12)
			CALLFORWARD (5E13 and later)

Then the RTI for the trunk group is updated to specify the RTI defined above as the NEXT RTI for the trunk group.

RC/V	VIEW NAME	FIELD	ALLOWED
10.2	ROUTE INDEX (ROUTING)	RTI	(enter trunk group RTI)
10.2	ROUTE INDEX (ROUTING)	ETYP	HUNT
10.2	ROUTE INDEX (ROUTING)	TGN	(enter trunk group number)
10.2	ROUTE INDEX (ROUTING)	PREF DIG	
10.2	ROUTE INDEX (ROUTING)	NEXT RTI	(enter RTI to be used as alternate RTI)

Once this is done, call forwarding for the route-to DN can be set up using the Remote Call Forwarding feature (01-02-1402) or Call Forwarding Variable feature (01-02-1401 or 01-02-1401A). Therefore, when the call is routed to the route-to DN, the call will be automatically forwarded to the specified forward-to-DN.

For more information on the Remote Call Forwarding feature (01-02-1402) and the Call Forwarding Variable feature (01-02-1401 or 01-02-1401A) and the RC/V provisioning of these features, see 235-190-103, *5ESS® Switch Business And Residence Feature Descriptions*.

NOTE 1: The route-to-DN must be on the same switch to which the trunk is connected. However, the forward-to-DN can be located anywhere.

NOTE 2: The route-to-DN should have the correct billing DN assigned to it so that the final forwarded leg of the call will be billed properly.

NOTE 3: Correct PIC and PTC carriers for toll calls need to be assigned to the route-to-DN so that calls routed to the forward-to-DN are handled by the appropriate carriers.

5.64.14 Customer Premises Equipment (CPE)

Not applicable.

5.64.15 Maintenance Considerations

Not applicable.

5.64.16 Administration

5.64.16.1 Measurements

This feature does not impact measurements.

5.64.16.2 Billing

This feature does not impact billing.

5.65 GOVERNMENT EMERGENCY TELECOMMUNICATIONS SERVICE (GETS) HIGH PROBABILITY OF CALL COMPLETION (HPC)

5.65.1 Description

In the event of a national emergency, the Government Emergency Telecommunications Service (GETS) High Probability of Call Completion (HPC) feature provides enhanced call completion capabilities to authorized GETS users during times of network stress or congestion. During severe network congestion, a call may not be completed because demand exceeds the number of circuits or due to network management controls implemented by the service provider. This feature allows a GETS user dialing an HPC-defined number to bypass certain network management controls, to queue and wait for a trunk circuit to become available, and to have their call marked as higher priority, increasing the probability of their call completing.

5.65.2 Availability

The GETS HPC feature (99-5E-3945) is available with the 5E13 and later software releases.

The use of HPC Network Capabilities is restricted in the United States and U.S. Territories to National Security/Emergency Preparedness (NS/EP) users authorized by the Office of the Manager, National Communications Systems (OMNCS). Service provider deployment of these HPC Network Capabilities must be co-ordinated with the OMNCS at the following address:

Office of the Manager
National Communication System
Attn: GETS Program Office
701 South Courthouse Road
Arlington, VA, 22204-2198
email: gets@ncs.gov

5.65.3 Environment

This feature is provided on a per-office basis.

5.65.4 Cross References

The following cross references apply to this feature:

- 99-5E-3945, Government Emergency Telecommunications Service (GETS) High Probability of Call Completion (HPC)
- This feature is based on the following Bellcore Generic Requirements:
 - GR-317-CORE
 - GR-394-CORE
 - GR-2931-CORE

5.65.5 Background

The Office of the Manager, National Communications System (OMNCS) has been charged by the White House with providing a survivable and enduring telecommunications capability for the purposes of NS/EP. Therefore, a set of switch-based and Advanced Intelligent Network features have been developed to provide a High Probability of Call

Completion (HPC) for critical users of the Public Switch Telephone Network (PSTN) in the event of a national security emergency (a natural disaster, military attack, technological emergency, or other situation which degrades or threatens the security of the United States).

5.65.6 Feature Operation

The GETS HPC feature allows HPC calls to be queued for public network trunks where non-HPC calls are not allowed to queue.

The GETS HPC feature exempts calls identified as HPC from certain normal traffic management controls, both pre-hunt controls and post-hunt controls, which allow HPC calls to continue routing attempts rather than being redirected or blocked. Pre-hunt controls are applied after a trunk group has been chosen and before the hunt for an idle member starts. Post-hunt controls are applied after the trunk group hunt failed to locate an idle member and before alternate route treatment is applied.

HPC calls are exempted from the following Network Traffic Management controls:

- Pre-hunt Protective Trunk Group Controls:
 - manual CANCEL-To(CANT) controls
 - manual SKIP actions set to less than 100% (checked on both the initial and second routing chain scan)
 - Automatic Congestion Control (ACC) cancel-to action
 - Automatic Congestion Control SKIP actions set to less than 100%
 - Trunk Reservation(TR) cancel-to control action
 - Trunk Reservation(TR) SKIP control action set to less than 100%
- Post-hunt Protective Trunk Group Controls:
 - cancel-from control actions when the level is set to less than 100%

NOTE: The cancel-from control cancels calls that overflow a trunk group, exceeding a threshold. When percentage of calls subject to control is set to 100%, calls are sent to a specified announcement and the call is canceled.

- Post-hunt Expansive Trunk Group Controls:
 - Cancel In-Chain Return (CICR) option of ReRoute (RR)

If a call makes it through the entire RR chain without routing, it is returned to the current routing chain at the spot where the RR was called, and the call is not routed to final handling. For an HPC call, Immediate ReRoute (IRR) is not supported.

HPC calls are subject to the following Network Traffic Management controls:

- Pre-hunt Protective Trunk Group Controls:
 - manual SKIP actions set to 100% (checked on both the initial and second routing chain scan)

- Automatic Congestion Control SKIP actions set to 100%
- Trunk Reservation (TR) SKIP control action set to 100%
- Post-hunt Protective Trunk Group Controls:
 - cancel-from control actions when the level is set to 100%
- Post-hunt Expansive Trunk Group Controls:
 - control actions by reroute controls

HPC calls are subject to control actions by reroute controls. Reroute Trunk Groups are not subject to HPC trunk queuing. Normal prehunt, hunt, post hunt processing occurs on trunk groups used for RR route expansion.

5.65.6.1 Detection of HPC Calls

The GETS HPC feature allows selected digit strings to be defined as HPC numbers in switch translations. When these HPC numbers are dialed, the call is recognized as an HPC call, whether dialed from an analog line, an ISDN line, a private facility trunk, an ISDN PRI, or if received over incoming public trunks using intra-LATA signaling.

The GETS HPC feature allows the switch to recognize an HPC call when the incoming Initial Address Message (IAM) Calling Party's Category (CPC) value is NS/EP.

5.65.6.2 ISUP Trunk And Signaling Measurements

The GETS HPC feature allows the switch to recognize an HPC call when the incoming Initial Address Message (IAM) Calling Party's Category (CPC) value is set to NS/EP. This feature also allows the switch to set the IAM CPC to NS/EP for outgoing calls.

The GETS HPC feature allows the switch to set the IAM CPC to NS/EP for outgoing calls, via a new Office Option to control the IAM Priority value for outgoing IAMs. The GETS HPC feature also provides a set of HPC-specific traffic measurements.

5.65.6.3 Exemption From Network Traffic management Controls

5.65.6.4 HPC Trunk Queuing

5.65.7 User Operation

5.65.7.1 For Subscribers

A government-authorized GETS user dials 1-710-NCS-GETS (1-710-627-4387), and, when prompted, enters their PIN. Once the PIN has been accepted, the subscriber is prompted for the destination number for their call.

If the call cannot be immediately connected, the call will be placed in the HPC Trunk Queuing (TQ) queue.

5.65.7.2 For Switch Personnel

Switch personnel assign aspects of the GETS HPC feature via Recent Change. See 235-118-2xx, *5ESS® Switch*

Recent Change Reference for detailed information on RC/V views.

5.65.7.2.1 Defining HPC Numbers

Service provider personnel assign HPC status to directory numbers that need to be able to receive HPC calls. This can be assigned to specific Directory Numbers (DNs), to all the numbers under an office code, or to entire NPAs. Switch Personnel only need to go to the appropriate Recent Change view and change the HPC field to "YES."

HPC assignments are made via Local Digit Interpreter Tables (LDITs) or Remaining Digit Interpreter Tables (RDITs).

To assign HPC at the NPA level (LDIT), switch personnel need to do the following.

- (1) For all Digit Analysis Selectors (DASs) that could reach the GETS number, determine the LDITs used by the DASes.
- (2) Update the 9.3 translations for these LDITs, only changing the GETS HPC field to "YES" (assuming that the number is already marked interLATA etc). Below is an example that assumes an LDIT for a line that originates a GETS call:
 - 1. LDIT - Enter 1.
 - 2. INCOMING DIGITS - Enter 710.
 - 3. CALL TYPE - Enter NORMAL.
 - 4. TYP CI CALL - Enter INTER.
 - 7. RTI - Enter the route to the Access Tandem (AT).
 - 9. OFFCOD - Leave blank.
 - 11. NBR OF DIGITS - Enter 10.
 - 13. CODE INDEX - (Determined by office.)
 - XX. HPC - Enter YES.

5.65.7.2.2 Assigning HPC Queues

It is likely that a DNT will also be defined against the GETS number using the TRIG NBR field and a corresponding 9.35 entry, and that Default Routing will be assigned using the DFLT RT field.

The same method is used to assign HPC at the 7-, 8-, 9-, or 10-digit level by using the appropriate RDIT views. Similarly, assigning HPC for dialing plans associated with incoming trunks can be done on appropriate INDIT views.

If the feature is to be used without customization, then switch personnel can assign the feature immediately using RC/V view 5.1, Trunk Group View. If the HPC feature is to be customized, the parameters are first defined on Recent Change View 12.40, Modular Queuing (Feature Definition) using the following fields.

- FEATURE - Enter HPCTQC15 or HPCTQC30.
- GROUP TYPE - Enter TRK for trunk group.
- QUEUE TYPE - Enter HPCOHQ. This allows call originators to remain off-hook while the call is queued. In

addition to voice calls, circuit switched data calls may be queued.

- QMODULE - Enter the number of the Switching Module (SM) on which the queue will reside.
- DELAY ANNOUNCEMENTS - Assign up to four delay announcements, which are assigned for each queue and which can be shared by several queues. Each row in this field defines the announcement trunk to be used. The quantity of announcements specified will be displayed.
- TYPE - Enter the queue announcement type. The default is NBARGE, which allows the customer to hear the announcement from the beginning.
- CYCLES - Enter the queue announcement cycle which is the number of times the delay announcement is to be given.
- ANNPORT - Enter the trunk equipment number.
- SPC DELAY TREAT? - Enter Y or N to allow or inhibit Special Delay Treatment. If Y is entered, announcements may be associated with the queue. In addition, Recent Change view 7.12 must be used to customize the announcements, or audible ringing will be applied when the call is queued.

If this field is set to N, no treatment will be given to the originator (in other words, silence).

- ROUTINE SIZE - Enter the number of queue slots made available to queue routine calls simultaneously for the queued trunk group.
- ROU Q TIMEOUT - Enter the maximum time that a routine call can remain in the queue.

HPC queuing is assigned on Recent Change view 5.1 "Trunk Group View" using the following fields:

- TGN - Enter the number of the trunk group being defined.
- TRK CLASS - Enter the originating class of service for the trunk.
- QUEUE ALLOWED - Enter Y to allow modular queuing.
- Q FEATURE - enter /HPCTQ15 or /HPCTQ30.

5.65.7.2.3 Controlling Outgoing IAM/CPG Priority

All GETS traffic is assigned a priority of 1. Therefore, switch personnel can effectively raise the priority of GETS HPC traffic by lowering the priority of all other traffic. This is accomplished by setting the IAM_CRM PRIORITY field on RC/V view 8.15 (CCS OFFICE PARAMETERS) to 0.

5.65.8 Engineering

5.65.8.1 Hardware Resources

No hardware considerations are associated with this feature.

5.65.8.2 Software Resources

No software considerations are associated with this feature.

5.65.8.3 Transition Considerations

No transition considerations are associated with this feature.

5.65.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

5.65.10 Incompatibilities

No incompatibilities are associated with this feature.

5.65.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

5.65.12 Isolation Constraints

No isolation constraints are associated with this feature.

5.65.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on RC/V views.

5.65.13.1 Enabling The GETS HPC Feature

The service provider enables the GETS HPC feature by populating the following fields in recent change and verify (RC/V) view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	279
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

5.65.13.2 Defining HPC Numbers On Digit Analysis Views

HPC numbers can be assigned in the Local Digit Interpreter Table (LDIT), Remaining Digit Interpreter Table (RDIT), INcoming Digits Interpreter Table (INDIT), or the Conflict Resolution Table.

HPC can be assigned to all addresses within an NPA, to all addresses within a specific office code in an NPA, or to a specific Directory Number (DN). Calls to the specified address or addresses will receive HPC treatment if the HPC field is set to YES on:

- RC/V view 9.3 [LOCAL DIGIT (OFFICE DIALING)],
- RC/V view 9.9 [REMAINING DIGIT (OFFICE DIALING)],
- RC/V view 9.5 [INCOMING TRUNK DIGITS (OFFICE DIALING)], or
- RC/V view 9.15 [MULTIPLE LOCAL DIGIT (OFFICE DIALING)].

Service provider personnel may also want to provision an Advanced Services Platform (ASP) Dialed Number Trigger (DNT) at the same time if the GETS service is being provided. (For more information on ASP, see 235-190-126, *5ESS® Switch Advanced Services Platform, Release 0.1B*.)

5.65.13.3 Assigning HPC Queues

Switch personnel provision the GETS HPC Trunk Queuing (TQ) capability by assigning the HPCTQ feature defined on RC/V view 12.40 (BRCS FEATURE ASSIGNABILITY & USAGE COUNTS). This feature is then assigned to a trunk group via RC/V view 5.1 (TRUNK GROUP).

Switch administrators should set the length of the queue timer or timers at the Access Tandem (AT) for GETS trunk queuing so that the Equal Access End Office (EAEO) timer "T-iam" does not time out, which will ensure that calls will complete when trunk queuing is encountered.

5.65.13.4 HPC Route Provisioning

The Switch Administrator needs to be aware that GETS second scan processing and, therefore, queueing, occurs only when the routing chain is properly set up.

The Switch Administrator must provision the route chain so that when all trunk groups in the route chain have been exhausted during the first scan, a secondary route index, attached to the last route index in the route chain, points to REORDER. If the secondary route index points to an announcement trunk group, the call will not receive busy treatment but will be considered complete, and no second scan processing will occur.

GETS HPC trunk queueing and post-hunt network management controls will be applied only during second scan processing.

5.65.13.5 SS7 ISUP IAM/CRM Message Priority

Switch personnel need to set the IAM_CRM PRIORITY field on RC/V view 8.15 (CCS OFFICE PARAMETERS) to 0, which assigns a priority of 0 to all normal traffic. Therefore, HPC traffic, having an automatically assigned priority of 1 will always take priority.

5.65.14 Customer Premises Equipment (CPE)

Not applicable.

5.65.15 Maintenance Considerations

Not applicable.

5.65.16 Administration

5.65.16.1 Measurements

The GETS HPC feature uses the following measurements.

For more information on measurements see 235-070-100, Appendix 1, *5ESS® Switch Administration And Engineering Guidelines — Appendix 1, Traffic and Plant Measurements*.

5.65.16.1.1 GETS Measurements (30-Minute Traffic Report)

Per Office Measurements (new section) Originating HPC Call Attempts Incoming HPC Calls Terminating HPC Calls Outgoing HPC Calls Outgoing HPC Calls to IXCs Outgoing HPC Calls to No Circuit Outgoing HPC IXC Calls to No Circuit HPC Calls Exempted from Network Management Controls

HPC Trunk Group Queue Attempts
HPC Trunk Group Queue Overflow
HPC Trunk Group Queue Abandon
HPC Trunk Group Queue Time-Out
ACG Exempted HPC Call Attempts
ACG Blocked HPC Call Attempts
Trunk Queuing Office Special Study Measurements
Section 55: Queuing For Trunk Group Measures
Section 56: Trunk Group Queuing Announcement Measures
Plant Measurements
Count IAM's from IXCs with Priority other than 00/01

5.65.16.1.2 Network Management Measurements (5-Minute Report)

Per Office Measurements (new fixed length package)
Originating HPC Call Attempts
Incoming HPC Calls
Terminating HPC Calls
Outgoing HPC Calls
Outgoing HPC Calls to No Circuit
ACG Exempted HPC Call Attempts
ACG Blocked HPC Call Attempts
MCG Exempted HPC Call Attempts
HPC calls exempted from manual cancel-to controls
Number of HPC calls exempted from ACC control action
Number of HPC calls exempted from TR control actions
Number of HPC calls exempted from cancel-from control actions
Number of HPC calls exempted from skip control actions
Trunk Group Basis Measurements (new trunk group package)
HPC Call Attempts
HPC Call Overflows
HPC Trunk Group Queue Time-outs
HPC Trunk Group Queue Overflows

5.65.16.2 Billing

No special billing treatment is provided for HPC calls. Normal AMA recording based on the results of digit analysis and the characteristics of the originating or incoming facility are provided.

5.65.16.3 Discretes

As part of the 30-second alerting indicators sent to the network traffic managers, the switch sets discrete indications whenever one or more HPC calls are given no circuit final handling treatment or whenever one or more HPC calls have been exempted from Network Traffic Management Controls or *A-I-Net*® Advanced Intelligent Network Automatic Congestion Control (ACG).

5.66 NUMBER PORTABILITY- NPA-NXX GROWTH

5.66.1 Description

The Number Portability - NPA-NXX Growth feature (99-5E-3730) allows up to 8,190 office codes (also referred to as NXXs), populated with Directory Numbers (DNs), to be supported on each *5ESS*® switch and allows DN's with the same office code but in different Numbering Plan Areas (NPAs) to be served by the same switch.

This feature is provided to accommodate two situations in which DN's served by the same switch might be in different NPAs but have the same office code. The first of these situations is an NPA split where a switch serves DN's that were previously in the same NPA but are now in two or more NPAs. The second is where a subscriber served by one switch takes advantage of number portability and has their DN moved to another switch, requiring the second switch to grow a new office code and possibly a new NPA as well.

The Feature Interaction With Ten Digit Office Dialing feature (99-5E-4510) provides some of the capabilities of the Number Portability - NPA-NXX Growth feature at lower cost. It allows certain features to operate properly in a dial

plan where ten digits are required to reach all Directory Numbers (DNs) including DN on the same switch in the same Numbering Plan Area (NPA) as the calling party's DN.

5.66.2 Availability

The Number Portability - NPA-NXX Growth feature (99-5E-3730) is available with the 5E12 and later software releases.

The Feature Interaction With Ten Digit Office Dialing feature (99-5E-4510) is available with the 5E12 and later software releases and is available as a software update, with reduced functionality, for the 5E10 and 5E11 software releases.

5.66.3 Environment

These features are provided on a per-office basis.

5.66.4 Cross References

The following cross references apply to these features:

- Feature Number: 99-5E-3730
- Feature Number: 99-5E-4510

5.66.5 Background

Previously, the 5ESS[®] switch could only support DN from 250 office codes, and each of these office codes had to be unique within the switch—DNs with the same office code but in different NPAs could not be supported by the same switch. With the increasing frequency of NPA changes and the implementation of number portability, it has become necessary for switches to be able to serve DN from multiple NPAs and to serve office codes that appear in more than one NPAs. Therefore, seven digits are no longer sufficient to uniquely identify a DN within a switch.

5.66.6 Feature Operation

Beginning with the 5E12 software release, many changes have been implemented to accommodate ten-digit DN identification within the switch. Some of these changes apply when the Number Portability - NPA-NXX Growth feature or the Feature Interaction With Ten Digit Office Dialing feature is active, others apply whether these features are active or not.

5.66.6.1 Changes To Recent Change Views

All Recent Change and Verify (RC/V) views containing DN have been changed to accommodate ten-digit DN. For specific information on RC/V views, see 235-118-2xx, *Recent Change Reference*.

The following changes apply to RC/V views whether the Number Portability - NPA-NXX Growth feature is active or not:

- Either seven-digit or ten-digit DN can be entered in non-key fields.
- DN displayed in non-key fields show the full ten-digit DN.
- Either seven-digit or ten-digit DN can be entered in a key field, and the key field will display the DN as entered.
- In the following Class A views, in which a range of DN are entered, ten-digit DN are required:

- A.2 MULTIPLE LINE QUERY
- A.9 PRESUBSCRIBED INTER-LATA CARRIER REPORT
- A.12 SELECTIVE CARRIER DENIAL (SCD) CARRIER REPORT
- A.13 LINE PARAMETER QUERY

If fewer than ten digits are entered for either end of the range, an error message will be returned, even if both ends of the range are unique DNs.

When the Number Portability - NPA-NXX Growth feature has not been activated, seven-digit DNs will be accepted by RC/V views requiring DNs.

When the Number Portability - NPA-NXX Growth feature has been activated, ten-digit DNs will usually be required by RC/V views containing DNs. The only time seven-digit DNs will be accepted is when the DN has an office code that appears in only one NPA on the switch. If a seven-digit DN is entered that has an office code that appears in more than one NPA on the switch, the RC/V request will fail.

A new field, ROP DISP DN 10, has been added to RC/V view 8.1 [OFFICE PARAMETERS (MISCELLANEOUS)]. When this field is set to "Y," the switch uses ten-digit DNs in output messages and asserts.

5.66.6.2 Changes To Input Messages

For specific information on input messages, see 235-600-700, *Input Messages Manual*.

When the Number Portability - NPA-NXX Growth feature has not been activated, input messages that require DNs will permit seven-digit DNs to be entered.

When the Number Portability - NPA-NXX Growth feature has been activated, input messages that require DNs will usually require ten-digit DNs. The only time seven-digit DNs will be accepted is when the DN has an office code that appears in only one NPA on the switch. If a seven-digit DN is entered that has an office code that appears in more than one NPA on the switch, the input message request will fail. One exception is that the ALW:AMATRC input message always requires ten-digit DNs.

The following conditions apply whether the Number Portability - NPA-NXX Growth feature of the is active or not:

- The VFY:OFC input message has a parameter, "DIG," that specifies the DN being called and needs to agree with the dialing plan used by the DN specified as the originator.
- The OP:OFR input message only allows seven-digit DN ranging. However, the OP:OFR input message now includes a separate NPA parameter. If seven-digit DNs are entered, the results will include all DNs that match the specified DNs, regardless of their NPAs.
- The TST:GRC and GRC:TEST input messages will accept either seven-digit or ten-digit DNs or DN ranges. If a single seven-digit DN is entered, the results will include all DNs that match the specified DNs, regardless of their NPAs. If a range of DNs is entered, the DNs must be ten-digit.
- The VFY:CPU input message will only accept ten-digit DNs.

5.66.6.3 Changes To Output Messages

For specific information on output messages, see 235-600-750, *Output Messages Manual*.

A new field, ROP DISP DN 10, has been added to RC/V view 8.1 [OFFICE PARAMETERS (MISCELLANEOUS)]. When this field is set to "Y," the switch uses ten-digit DNs in output messages. If this field is set to "N" (the default), the switch uses seven-digit DNs in output messages. The following exceptions apply whether the Number Portability - NPA-NXX Growth feature is active or not:

- The VFY MLHG output message will always provide DNs in ten-digit format.
- The VFY OFC output message will provide DNs in seven-digit or ten-digit format, depending on the following:
 - If the VFY:OFC input message was entered with a ten-digit DN, then the corresponding VFY OFC output message will contain a ten-digit DN.
 - If the VFY:OFC input message was entered with a seven-digit DN, and the ROP DISP DN 10 field on RC/V view 8.1 [OFFICE PARAMETERS (MISCELLANEOUS)] is set to Y, or if there is at least one office code that appears in more than one NPA on the switch, then the corresponding VFY OFC output message will contain a ten-digit DN.
 - If the VFY:OFC input message was entered with a seven-digit DN, and neither the ROP DISP DN 10 field on RC/V view 8.1 [OFFICE PARAMETERS (MISCELLANEOUS)] is set to Y, nor are there any office codes that appear in more than one NPA on the switch, then the corresponding VFY OFC output message will contain a seven-digit DN.
- The OP ACSR output message always includes DNs in ten-digit format.
- The DUMP ACSR always includes DNs in ten-digit format.

5.66.7 User Operation

5.66.7.1 For Subscribers

No subscriber actions are associated with this feature.

5.66.7.2 For Switch Personnel

Service providers need to review their internal procedures and determine where ten-digit DNs will need to be specified in communications within the switch and with Operational Support (OS) systems.

Service providers need to plan the procedures needed to accommodate these changes.

Service providers need to discuss with their OS providers the changes needed in their OSs and the time by which these changes are needed. Specifically, OS providers will need to change their internal data bases that store DNs to store ten-digit DNs, and they may also have to make changes to their communications with the switch, which will require ten-digit DNs in order to specify unique DNs.

CAUTION: Even service providers that do not activate the Number Portability - NPA-NXX Growth feature will be impacted by it, due to changes to RC/V views, input messages, output messages, and, on switches that support the *Pinnacle*® Automatic Call Distribution (ACD) feature, changes to the Application Interface Unit (AIU) and Management Information Systems (MIS) interfaces.

5.66.8 Engineering

5.66.8.1 Hardware Resources

If the Remote Access to Call Forwarding (RACF) feature (01-02-1409) or the Remote Access to ASI-Proxy (RASl)

feature (99-5E-1501) is active, a circuit pack upgrade is required to support a new announcement. Refer to NDRJ5D003EA-1, *5ESS® Switching Equipment Specification for Digital Service Unit Model 2* to identify the RAF/SAS announcement firmware (microcode) required for this feature. This will impact circuit packs in the RAF/SAS frame.

5.66.8.2 Software Resources

No software considerations are associated with this feature.

5.66.8.3 Transition Considerations

Subscribers need to be notified, before the change takes place, that they will have to dial ten digits to reach some DNs that they were previously able to reach with only seven digits.

5.66.9 Interactions and Limitations

Both the Number Portability - NPA-NXX Growth feature and the Feature Interaction With Ten Digit Office Dialing feature may be active in a switch at the same time.

The Number Portability - NPA-NXX Growth feature and the Feature Interaction With Ten Digit Office Dialing feature create several categories of interactions.

5.66.9.1 External Equipment Interactions

CAUTION: The ways in which an NPA split impacts external equipment interfaces and switch OA&M must be carefully considered. Prior to the 5E12 software release, both the external connections to the switch and the switch's OA&M were, for the most part, unaffected by an NPA split, since the NPA of a DN was rarely significant in these interactions. This is no longer true when non-unique office codes are introduced in a switch. Careful consideration must be given to each interface to determine what is needed to successfully support the NPA split, how OSs and CPE must be changed to support the new NPA, and when OSs and CPE must be changed to support the new NPA.

There are several 5ESS® switch features and interfaces that exchange DNs with Customer Premises Equipment (CPE) or with other equipment in the switching center. If the switch supports DNs with the same office codes but in different NPAs, the CPE or other switching center equipment may need to be configured or upgraded to support ten-digit DNs. The 5ESS® switch features and interfaces affected are:

- **COT** - The Local Area Signaling Services (LASS) Customer Originated Trace (COT) feature currently prints the called number (COT originator's DN) as a seven-digit number. Under control of the ROP DISP DN 10 field on RC/V view 8.1 [OFFICE PARAMETERS (MISCELLANEOUS)], the called party number can be printed as either a seven-digit or ten-digit DN. The default is seven-digit, but this can be changed, whether the Number Portability - NPA-NXX Growth feature is active or not. However, on a switch that supports the same office code in more than one NPA, when the Number Portability - NPA-NXX Growth feature is active, the COT output message always prints ten-digits for the COT originator's DN.
- **BCLID** - The switch normally sends a seven-digit called party number to the CPE through the Bulk Calling Line Identification (BCLID) interface. If this is sufficient for the subscriber to uniquely define the DN, then they do not need to receive ten-digit called party numbers, even if the office code of a number appears in more than one NPA served by the switch office. If a business customer is subsequently assigned two or more DNs with the same office code, but the DNs are associated with different NPAs, then the switch can be provisioned to send ten-digit called party numbers to the BCLID interface. The business customer would then need to configure or upgrade their CPE to accept ten-digit called party numbers.

The BCLID DN 10 field on RC/V view 4.62 (BULK CALLING LINE IDENTIFICATION GROUP PARAMETERS)

controls whether seven-digit or ten-digit DNs are sent on the BCLID interface, whether the Number Portability - NPA-NXX Growth feature is active or not.

Ten-digit *calling* party DNs are already sent on the BCLID interface.

- **MSS** - Existing Message Service Systems (MSSs) that exchange seven-digit DN information with the switch may continue to do so. While the office codes within the switch are still unique, the switch remembers the NPA associated with each office code. If the switch begins serving DNs with office codes that are not unique to an NPA and the switch is still provisioned to send seven-digit DNs to an MSS, the switch examines received office codes, prefixes the remembered NPA, and sends seven-digit DNs to the MSS. In this way, an MSS system can continue to use seven-digit DNs, as long as all the seven-digit DNs used by the MSS system are unique within the MSS.

If the MSS provider wants to support DNs whose office codes are not unique to one NPA within the switch, then the MSS is required to use ten-digit DNs, and both the MSS CPE and the switch must be provisioned to support the exchange of ten-digit DNs. The switch only remembers the NPA that was associated with an office code when it was unique and may prefix a received seven-digit DN with the wrong NPA.

If an MSS provider wants to extend their service to any DNs in office codes that appear on the switch in more than one NPA, then both the MSS CPE and the switch will need to be provisioned to exchange ten-digit DNs.

The MSS interface can be provisioned to exchange ten-digit DNs whether the Number Portability - NPA-NXX Growth feature has been activated or not.

The ALW DUP NXX field on RC/V view 24.7 (DSL AP COMMUNICATIONS DATA) controls whether the switch uses seven-digit or ten-digit DNs on the MSS interface. (Default is seven-digit.)

- **ACD-MIS** - The *Pinnacle*® ACD capability exchanges DNs with CPE via two interfaces: the *Pinnacle*® Call Event Messages data link and a standard RC/V OS interface, both which have been upgraded, as of the 5E12 software release, to support ten-digit DNs.

All switches that support *Pinnacle*® ACD need to notify the AIU and MIS administrators of the date when the 5E12 retrofit will occur, and enough notice should be given for the AIU and MIS administrators to order the required software and plan the transition with switch personnel. The MIS administrators will need to execute a conversion utility to update seven-digit DNs to ten-digits DNs. This is required whether or not the Number Portability - NPA-NXX Growth feature is activated.

- **LTOLLCON** - There are some applications where service providers may be delivering automatic Number Identification (ANI) information from originating switches directly to third party providers, possibly pay-per-view vendors, via Local Toll Connecting (LTOLLCON) trunks. Service providers need to work with the third party providers to assure that the pay-per-view vendors can support the additional office codes and NPAs that may be employed through the use of this feature. This is an unusual non-traditional interface to have with a third party vendor, so service providers need to take extra care to determine if this situation is occurring in their company. Since ANI is delivered as a seven-digit number, a trunk group per NPA will be required, just as it is today for switches supporting multiple NPAs.
- **PRI** - If a Primary Rate Interface (PRI) is used to initiate calls to the switch, and both the PRI is connected to a Private Branch eXchange (PBX) or other device supporting multiple NPAs, and the PRI is provisioned to support Calling Party number screening, then the Calling Party Number Information Element (IE) should be sent to the switch as a ten-digit number.
- **ASI-Proxy** - When the Subscriber ID for a line has not been provisioned, the Advanced Services Interface (ASI)-Proxy feature defaults to sending the DN of the line to the Intelligent Peripheral (IP). Currently a seven-digit DN is sent, but if the seven-digit DN is ambiguous, the switch can be provisioned to send a full ten-digit DN, and, in this case, the IP must be provisioned to accept a ten-digit DN.

The ASISID10 field on RC/V view 8.1 [OFFICE PARAMETERS (MISCELLANEOUS)] controls this capability and can only be set to send ten-digit DNs if the Number Portability - NPA-NXX Growth feature is active.

- **EDS** - Any Electronic Directory Service (EDS) Application Processor (AP) CPE supporting DNs assigned to NPAs other than the default NPA must send ten-digit DNs to the switch in EDS messages and must be able to accept ten-digit DNs from the switch. If the EDS office codes are part of an NPA split, the DNs that have been moved to a new NPA will no longer be associated with the default office code, and so will require a ten-digit interface.
- **FM-TOD** - Prior to the 5E12 software release, Code List Names for Facilities Management (FM) Time-of-Day (TOD) (also known as TOD Group Names) consisted of names with up to eight characters. When provisioning a name, switch personnel could use any combination of up to eight alphanumeric characters, as long as the name did not start with the letter "T." Default Code List Names for a DN, generated automatically by the switch, used the letter "T" followed by the seven-digit DN.

With the 5E12 software release, Code List Names for TOD can be up to eleven characters long, whether the Number Portability - NPA-NXX Growth feature is active or not. With 5E12, default Code List Names use the letter "T" followed by the ten-digit DN. At 5E12 retrofit, default eight-character Code List Names (beginning with the letter "T") are converted to default eleven-character Code List Names, but Code List Names provisioned by switch personnel remain unchanged (as long as they don't begin with "T").

Although a switch, running on 5E12 or a later software release, supports eleven-character names, an existing FM-TOD CPE system may continue to exchange eight-character default Code List Names with the switch, as long as the eight-character default Code List Names are still unique on the CPE system. The switch remembers the NPA associated with each office code while the office codes are still unique. If the office codes become non-unique, but the switch is still provisioned to support eight-character default Code List Names for the FM-TOD CPE, then the switch examines received office codes and prefixes them with the remembered NPA but sends messages to the FM-TOD CPE in eight-character default Code List Name format.

If an FM-TOD CPE service provider wants to support lines in a non-default office code that appears in more than one NPA on the switch, then the FM-TOD CPE must exchange Code List Names with the switch in eleven-character format.

The "ALW DUP NXX" field on RC/V view 24.7 (DSL AP COMMUNICATIONS DATA) controls whether the switch supports an eight-character or eleven-character default Code List Name FM-TOD CPE interface. An eight-character interface is the default.

5.66.9.2 Ten-Digit Dialing

The Number Portability - NPA-NXX Growth feature and the Feature Interaction With Ten Digit Office Dialing feature allow certain other features to operate properly in a dial plan that requires ten digits to reach any DN, even DNs on the same switch and in the same NPA as the calling party's DN. Use of any of the following features in an office that has mandatory ten-digit dialing requires the purchase of either the Number Portability - NPA-NXX Growth feature or the Feature Interaction With Ten Digit Office Dialing feature:

- ISDN Intercom
- ISDN Attendant Direct Station Select
- Series Completion to a Multi-Line Hunt Group
- Directed Call Pickup of a Pre-Stored DN
- Terminal Group Attendant

- ACD/BRCS
 - Queue Dialing
 - Agent Intercom
 - Service Observe
 - Third Party Call Control
- Remote Access to Call Forwarding (RACF)
- Remote Access to ASI-Proxy (RASI)
- Automatic Customer Station Rearrangement

NOTE 1: The Remote Access capability changes an announcement in the RAF and SAS frames which requires that the circuit pack supporting the announcement be upgraded.

NOTE 2: The Feature Interaction With Ten Digit Office Dialing feature only supports the RACF, RASI, and ACSR features in the 5E12 and later software releases.

NOTE 3: When both the Number Portability - NPA-NXX Growth feature and the Feature Interaction With Ten Digit Office Dialing feature are inactive, the above features will not work in an office with mandatory ten-digit intra-switch dialing. If the office allows seven-digit or ten-digit intra-switch dialing, the features will work correctly.

NOTE 4: When either or both the Number Portability - NPA-NXX Growth feature or the Feature Interaction With Ten Digit Office Dialing feature are active, the above features work correctly in an office that requires or allows ten-digit intra-switch dialing.

5.66.9.3 ISDN Interactions

The possibility of encountering the same office code in different NPAs on the same switch means that service providers need to examine the method used to generate Service Profile Identifiers (SPIDs), and, more specifically, the provisioned portion of the SPID, the User Service Order Profile Identifier (USPID). Each USPID *must be unique* on the switch.

A USPID is chosen by the service provider for each User Service Order Profile (USOP) when the USOP is assigned to the ISDN line. The USPID is provisioned in class 23 RC/V views and is programmed into the CPE's SPID.

For Custom ISDN, the SPID is the same as the USPID and can be up to ten digits long.

For National ISDN, the SPID includes the USPID, which is up to eighteen digits long, plus a two digit Terminal Identifier (TID), for a potential total of twenty digits. However, the National ISDN Council recommends that SPIDs be limited to fourteen digits, which provides for a ten-digit DN plus a TID.

Service providers frequently assign ten-digit USPIDs that include the seven-digit DN (without the NPA, especially for Custom ISDN. Depending on the information encoded in the additional three digits, seven-digit DNs may not produce unique USPIDs when the Number Portability - NPA-NXX Growth feature is active. Therefore, the service provider must adopt a different method for creating USPIDs but still take into consideration the ten-digit limitation for Custom ISDN USPIDs. It is also important to note that changing USPIDs already programmed in CPEs' SPIDs requires that the CPE be reprogrammed.

5.66.9.4 Routing Interactions

Routing Information is the set of digits, associated with a specific trunk circuit, that a switch sends to route a call to the next switch. The digits may be sent in the voice band on a Multi-Frequency (MF) trunk or in a Signaling System 7 (SS7) Initial Address Message (IAM) on an SS7 trunk.

The Number Portability - NPA-NXX Growth feature does not alter the principles or rules employed to set up a routing plan, but if a previously-unique office code is opened up in a second NPA on the same switch, then the routing plan must take into account that the NPA is no longer unique. The routing digits must uniquely define the destination DN, and this may require that more digits be sent than previously.

5.66.10 Incompatibilities

No incompatibilities are associated with this feature.

5.66.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

5.66.12 Isolation Constraints

No isolation constraints are associated with this feature.

5.66.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the Number Portability - NPA-NXX Growth feature by populating the following fields in RC/V view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	198
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

The service provider enables the Feature Interaction With Ten Digit Office Dialing feature by populating the following fields in recent change and verify (RC/V) view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	275
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

5.66.14 Customer Premises Equipment (CPE)

Not applicable.

5.66.15 Maintenance Considerations

As of the 5E12 software release, the Integrated Mechanized Loop Test (IMLT) and the IMLT/ISDN are affected as follows.

When the Number Portability - NPA-NXX Growth feature is not active, the IMLT and the IMLT/ISDN continue to use seven-digit DNs to communicate with the switch, but will also accept ten-digit DNs.

When the Number Portability - NPA-NXX Growth feature is active, the IMLT and IMLT/ISDN require ten digits to test

a DN with an office code that appears in more than one NPA on the switch, but will accept either a seven-digit or a ten-digit DN to test a DN with an office code that appears in only one NPA on the switch.

OS systems providing IMLT support must be compatible with these changes.

5.66.16 Administration

5.66.16.1 Measurements

There are changes to some sections of the TRFC30 report.

Sections 128 and 199 have been used to provide traffic data on directory numbers, and have listed the DNs as seven digit numbers. Sections 235 and 236, corresponding respectively to sections 128 and 199, will specify the DNs in ten digit format.

- If the Number Portability - NPA-NXX Growth feature is not active, sections 128 and 199, which list seven-digit DNs, will continue to be used.
- If the Number Portability - NPA-NXX Growth feature is active, new sections 235 and 236, which list ten-digit DNs, are used.

RC/V views 13.7, 13.8, and the new view 13.10 are used with the new sections 235 and 236.

OS systems monitoring the traffic channels must be compatible with these changes.

5.66.16.2 Billing

This feature does not impact billing.

5.67 IMMEDIATE START ANNOUNCEMENT INTERFACE FOR *PINNACLE*® ACD

5.67.1 Description

The Immediate Start Announcement Interface For *PINNACLE*® ACD feature (99-5E-4256) eliminates the delay, encountered with the 13A, 14A, 15A, and 16A announcement units, in playing an announcement to *PINNACLE*® Automatic Call Distribution (ACD) system callers. Many callers who experienced this delay became confused or annoyed and hung up before they could be served by an agent. In the call center business, this is the least desirable outcome for a customer call. By eliminating this delay, the Immediate Start Announcement Interface For *PINNACLE*® ACD feature ensures that callers are connected to the appropriate announcement quickly, instead of having to wait in confusion and frustration.

The Immediate Start Announcement Interface For *PINNACLE*® ACD feature provides an interface to the 17A Announcement Unit, which supports up to 165 different announcements and can handle up to twenty-four callers at one time. Each caller can be played different announcements, the same announcement, or any combination. This interface to the 17A Announcement Unit provides an immediate start announcement capability for the Automatic Call Distributor/Business and Residence Custom Services (ACD/BRCS) Interworking feature (99-5E-2776) that is transparent to existing call vectoring announce and prompt steps provisioning. The Immediate Start Announcement Interface For *PINNACLE*® ACD feature also supports the Enhanced Prompting for Incoming Digits (EPIC) function, allowing collected digits to be displayed on agents' telephone sets.

5.67.2 Availability

The Immediate Start Announcement Interface For *PINNACLE*® ACD feature (99-5E-4256) is available as a software

update for the 5E12 and 5E13 software releases and is included in the 5E14 and later releases.

5.67.3 Environment

This feature is provided on a per-trunk group basis for ACD/BRCS customers.

5.67.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-4256

5.67.5 Background

Not applicable.

5.67.6 Feature Operation

The older announcement unit interfaces (13A, 14A, 15A, and 16A) had a delay because they waited for the announcement cycle to start before completing the announcement connection to the caller. The Immediate Start Announcement Interface For *PINNACLE*® ACD feature's interface to a 17A Announcement System eliminates this announcement delay.

This interface is transparent to the existing provisioning for the call vectoring announce and prompt steps and supports the existing Enhanced Prompting for Incoming Calls (EPIC) Enhancement feature, allowing the collected digits to be displayed on the agent's telephone set.

5.67.7 User Operation

5.67.7.1 For Subscribers

No subscriber actions are associated with this feature.

5.67.7.2 For Switch Personnel

Switch personnel need to analyze their call load, and then determine the number of 17A announcement units needed to handle the load and make sure that the Switching Module (SM) used to connect to the 17A announcement units has a sufficient number of Universal Tone Detectors (UTDs) to accommodate the call load.

Switch personnel first need to define a Route Index (RTI) on the appropriate RC/V 5.1 (TRUNK GROUP) views or 5.5 (TRUNK MEMBER) views, then on view 10.2 [ROUTE INDEX (ROUTING)] to access each 17A announcement unit.

Switch personnel then need to indicate which announcement is to be used by entering the announcement number (001-165) in the CARG2 field of the appropriate 6.7 (ACD CALL VECTORS) view for the vector commands Announce, Prompt, and Disc.

For each trunk group that is to have the Immediate Start Announcement Interface For *PINNACLE*® ACD feature assigned to it (and is associated with the specified RTI), switch personnel need to set the following values on the appropriate 5.1 (TRUNK GROUP) view (including the new IMM START ANN field):

RC/V view 5.1 field	value
IMM START ANN	Y
TRK DIR	OUTGO
TRK CLASS	LTOLLCON

HUNT TYPE	FIFO
OUTPLS	MF
INPLS	NOSIGNAL
CASCADING	N
MAX CALLS	<blank>
ANNC CYCL	0
FC AUD	Y

5.67.8 Engineering

5.67.8.1 Hardware Resources

Agent positions must be Lucent Technologies Type B or Type D terminals or equivalent. The 5ESS® switch must be equipped with a 17A announcement unit.

5.67.8.2 Software Resources

No software considerations are associated with this feature.

5.67.8.3 Transition Considerations

No transition considerations are associated with this feature.

5.67.9 Interactions and Limitations

Unlike the 14A, 15A, and 16A announcement units, the 17A Immediate Start Announcement unit requires signaling from the 5ESS® switch, in the form of a three-digit announcement index ranging from 001 to 165, to specify which announcement to play for the call.

Unlike the 14A, 15A, and 16A announcement units, the 17A unit cannot be used in broadcast mode. Since the unit provides an immediate start of the specified announcement, there can only be one caller per 17A unit port.

Unlike the 14A, 15A, and 16A announcement units, the 17A unit will automatically disconnect from the switch at the end of the announcement. The 14A, 15A, and 16A announcement units do not automatically disconnect, having to be disconnected from the switch side.

5.67.10 Incompatibilities

No incompatibilities are associated with this feature.

5.67.11 Dependencies

The Immediate Start Announcement Interface For *PINNACLE*® ACD feature requires that ACD/BRCS and the Vector Prompt Enhancement feature (99-5E-2285) be active.

5.67.12 Isolation Constraints

No isolation constraints are associated with this feature.

5.67.13 Recent Change Provisioning

The Immediate Start Announcement Interface For *PINNACLE*® ACD feature is not secured, so no switch personnel action is required to enable the feature.

Switch personnel need to define a Route Index (RTI) on RC/V view 10.2 [ROUTE INDEX (ROUTING)], and on the associated 5.1 (Trunk Group) view and 5.5 (Trunk Member) view, to access each 17A announcement unit. See

235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

5.67.14 Customer Premises Equipment (CPE)

Not applicable.

5.67.15 Maintenance Considerations

Not applicable.

5.67.16 Administration

5.67.16.1 Measurements

This feature does not impact measurements.

5.67.16.2 Billing

This feature does not impact billing.

5.68 ICLID ON 4-WIRE SUBSCRIBER LINE - DNU-S

5.68.1 Description

The ICLID On 4-Wire Subscriber Line - DNU-S feature (99-5E-4980) allows Incoming Calling Line Identification (ICLID) features Calling Number Delivery (CND) (99-5E-0269) and Calling Name Delivery (CNAM) (99-5E-0834.A) to be assigned to the Digital Network Unit - Synchronous Optical Network (DNU-S). This feature also provides the same capability for the Digital Line and Trunk Unit (DLTU).

5.68.2 Availability

The ICLID On 4-Wire Subscriber Line - DNU-S feature (99-5E-4980) is available as a software update for the 5E12 and 5E13 software release and is included in the 5E14 and later releases.

5.68.3 Environment

This feature is provided on a per-office basis.

5.68.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-4980

5.68.5 Background

Previously, Incoming Calling Line Identification (ICLID) features could not be assigned to a 4-wire subscriber line.

5.68.6 Feature Operation

The ICLID On 4-Wire Subscriber Line - DNU-S feature unblocks the assignment of features using CND or CNAM to 4WINDIV type lines.

5.68.7 User Operation

5.68.7.1 For Subscribers

No subscriber actions are associated with this feature.

5.68.7.2 For Switch Personnel

Switch personnel can assign CND and CNAM to 4-wire lines as they can to any other type of line.

5.68.8 Engineering

5.68.8.1 Hardware Resources

No hardware considerations are associated with this feature.

5.68.8.2 Software Resources

No software considerations are associated with this feature.

5.68.8.3 Transition Considerations

No transition considerations are associated with this feature.

5.68.9 Interactions and Limitations

LP4W24 is the only ringing pattern supported by the ICLID On 4-Wire Subscriber Line - DNU-S feature.

5.68.10 Incompatibilities

No incompatibilities are associated with this feature.

5.68.11 Dependencies

Either the Support 4 Wire Subscriber Feature on DNU-S feature (99-5E-3611) or the 4-wire FXO Line via DFI feature (99-5E-2536) must be provisioned for the ICLID On 4-Wire Subscriber Line - DNU-S feature to be provisioned on a 4-wire line.

5.68.12 Isolation Constraints

No isolation constraints are associated with this feature.

5.68.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The ICLID On 4-Wire Subscriber Line - DNU-S feature is not a secured feature, so no Secured Feature Identification SFID is required.

Switch personnel can assign CND or CNAM to DNU-S or DLTU lines by populating the following fields in RC/V view 1.8, ANALOG LINE/BRCS ASSIGNMENT:

RC/V VIEW	VIEW NAME	FIELD	ALLOWED VALUES
1.8	ANALOG LINE/BRCS ASSIGNMENT	FEATURE LIST (FL)	/LICNDP or /LIRCMA

or by populating the following fields in RC/V view 1.11, BRCS FEATURE ASSIGNMENT (LINE):

RC/V VIEW	VIEW NAME	FIELD	ALLOWED VALUES
1.11	BRCS FEATURE ASSIGNMENT (LINE)	FEATURE LIST (FEATLIST)	/LICNDP or /LIRCNMA

5.68.14 Customer Premises Equipment (CPE)

Not applicable.

5.68.15 Maintenance Considerations

Not applicable.

5.68.16 Administration

5.68.16.1 Measurements

This feature does not impact measurements.

5.68.16.2 Billing

This feature does not impact billing.

5.69 DISTINCTIVE REMOTE MODULE

5.69.1 Feature Definition

The 5ESS[®] Switch Distinctive Remote Module (DRM) is a remote architecture based on the SM-2000 architecture with no back-hauled voice or data traffic. Each DRM consists of a single SM-2000, an Administrative Workstation (*Netra*[™] t 1120), and a commercially remoted *Ethernet*[®] connection to the host 5ESS[®] switch. The host provides a common set of maintenance terminals and data links off of the Administrative Services Module (ASM), which can support a 5ESS[®] switch (3B21D, CM2, and SMs/SM-2000s) and up to 15 DRMs.

For more information, refer to 235-200-150, *5ESS[®] Switch Distinctive Remote Module (DRM) User's Guide*.

5.69.2 Availability

This feature is provided with the 5E14 and subsequent software releases.

6. ADMINISTRATION

6.1 ADMINISTRATIVE FEATURES OVERVIEW

Administration is a number of related functions with the objective of ensuring the overall provision of service by the 5ESS[®] switch. Administration includes the assignment of lines and trunks to the system, memory management, collection of traffic and plant data, provisions for additions and modifications to the switch, service evaluation, and capabilities to control and manage the 5ESS[®] switch.

The primary objective of administration is to assure that the 5ESS[®] switch delivers a high level of quality service to the subscribing customers. This is accomplished by monitoring and evaluating system performance. Potential problems that could cause service deterioration are identified.

The administrative features provide network administration personnel with capabilities to administer the switching system activities. Included in administrative features are interface features which allow external administration systems access to the 5ESS[®] switch to provide administrative functions. Among these external systems are Network Management and Network Administration Systems.

6.2 BUSINESS AND RESIDENCE CUSTOM SERVICES ADMINISTRATION

Refer to 235-190-103, *5ESS[®] Switch Business And Residence Feature Descriptions* for information on administrative functions performed by the customer (end-user) and for information on the following features:

- Customer Station Rearrangements (CSR) Via Remote Memory Administration System (RMAS)
- Selective Customer Control of Facilities
- Wide Area Telephone Service (WATS) Administration Data.

6.3 FLEXIBLE IOP UTILIZATION

6.3.1 Feature Definition

Current administration of the input/output processor (IOP) requires that each peripheral device is assigned to a unique IOP slot on a software release basis. If an office does not need a given device, its slot is wasted in that office. Flexible IOP Utilization provides flexibility in equipment configuration data (ECD) administration that allows IOP slots to be used as they are needed in a given office. This feature eliminates the need for adding a growth IOP when there is room for the peripheral device in an existing IOP.

6.3.2 Feature Operation

6.3.2.1 User Perspective

The primary function of the flexible IOP function is to conserve IOP resources. This feature allows full utilization of the basic IOPs (IOP 0 or 1) and minimizes the need for growth IOPs (IOP 2 and 3). To achieve this goal, flexibility in engineering the IOP is required.

Flexibility in circuit pack code equipment location -- IOP slots must be flexible with the peripheral controller circuit pack code assigned to them. This flexibility allows empty slots to be used as they are needed without undue restrictions.

Flexibility in channel functions -- Operational Support System (OSS) links must be movable to any PC channel of the same type making efficient use of the equipped circuit packs and eliminating unnecessary hardware.

Flexibility in the number of channels -- Ideally, the implementation of flexible IOP would include the ability to provide multiple channels for a given function. This would provide the customer with the ability to engineer the number of peripheral devices used for a given function.

Presently each office installed is provided with a fully equipped base ECD with a default hardware and software configuration. Optional hardware is marked unequipped in the ECD. The ECD is customized to the office's specific configuration using a recent change/verify (RC/V) customization script. If optional hardware is ordered, it is marked equipped in the ECD during customization. This customization script is generated by ECD Configuration System (ECS).

Flexible IOP modifies ECS in order to support adding IOP devices in variable slots. Initially an office must start with a stripped down base ECD. This configuration should be considered a starting point to build upon. Adding IOP devices to the ECD is the primary function of ECS. This base or minimum configuration contains the minimum equipment necessary to boot the system. The minimum configuration consists of:

- IOP 0, COMMUNITY 0, SLOT 0 - Maintenance teletypewriter (MTTY) controller (mttyc0) - circuit pack code TN983.
- IOP 0, COMMUNITY 0, SLOT 1 - Scanner and signal distributor (SC/SD) controller (scsdc2) - SCSD controller UN33B is used to monitor the building power to the 5ESS[®] switch.
- IOP 0, COMMUNITY 0, SLOT 2 - SCSD controller (scsdc0). The SCSD controller (UN33B) provides the scan and signal distribute interface for all 3B processor alarms including up to 3MHDs and the office alarm SD points for major, minor, and critical alarm indicators.
- IOP 0, COMMUNITY 0, SLOT 3 - Tape Controller (mtc0). The tape controller circuit pack code requires options based on the fast tape back-up feature. Circuit pack UN52 is used for non-fast tape back-up applications, or a UN145 for fast tape back-up applications.
- IOP 0, COMMUNITY 3, SLOT 3 - Permanently unassigned in the base ECD.
- IOP 1, COMMUNITY 0, SLOT 0 - MTTY controller (mttyc1) - circuit pack code TN983.
- IOP 1, COMMUNITY 0, SLOT 1 - SCSD controller (scsdc3). The SCSD controller (UN33B) is used to monitor the building power to the 5ESS[®] switch.
- IOP 1, COMMUNITY 0, SLOT 2 - SCSD controller (scsdc1). The SCSD controller (UN33B) provides the scan and signal distribute interface for all 3B processor alarms.
- IOP 1, COMMUNITY 3, SLOT 3 - Permanently unassigned in the base ECD.

The previous minimum configuration may be populated to a full application using a customization script. This script is a high level RC/V script, used to add all the necessary low levels forms to populate a full ECD. However, only installing offices will use ECS to customize their ECD.

In existing offices, IOP configurations can be reconfigured by an office to individually customize their IOP devices. High level forms are used to reconfigure an IOP. High level forms are invoked by entering RC/V. Entering the 199 menu option on a control display terminal enters RC. After entering RC, enter a toggle to access the high level forms. Entering a "?" at this point lists all of the high level forms available to the user. After the user enters the name of the desired high level form, the user is prompted for the required field values. When all the prompts have been entered, the high level forms updates the appropriate low level forms. If a problem occurs during the update, the high level form prompts the user to resolve the problem and allows the user to enter the change mode. After exiting the form, the user can enter another high level form, toggle back to the low level forms, or exit the recent change verify session.

This feature does not change the existing RC/V system. Users have the advantage of using high level forms to modify the ECD plus use of the low level forms continue to be possible as they were in the past. High level forms require the user to supply only a minimal amount of information to add, change, or delete an IOP device. This provides greater efficiency in utilizing the IOP resources. The IOP configurations can now be reconfigured by an office to individually customize their IOP devices.

6.3.2.2 System Perspective

The Administrative Module (AM) IOP provides the interface between the computer and various peripheral devices; for example, data sets, line printers, TTYs, etc. In the 5ESS[®] switch application of the AM, the periphery consists of the switch's OSSs and the SCSD interface for 5ESS[®] switch equipment alarms and craft interface.

Currently peripheral controllers (PCs) are populated in the IOP and dedicated to a particular function on a 5ESS[®] switch software release basis. Each IOP slot is assigned on a peripheral controller circuit pack code and function, with each version of the 5ESS[®] switch base ECD. Modifying the standard layout is currently possible but the level of interaction required to accomplish this modification is complex. Each application of the 5ESS[®] switch; toll, PBX, military, etc., tends to have its own subset of required IOP functions.

Considering the number of features requiring IOP resources, the various office configurations, and the finite number of IOP slots available, flexible IOP provides many advantages.

The slot assignment feature of flexible IOP accomplished through high levels forms provide greater efficiency in utilizing IOP resources. The Form Assembly Translator (FAST) code, the mask files and a common set of high level default files make up the high level forms. FAST is a form manipulation language used to query and or update the ECD data base. FAST uses ODIN managed form interface mask files to create various views of the high level forms that a user would see at their terminal.

A mask file is made up of a domain specification and form specification file. The domain file defines the underlying attributes of a form and contains any help messages, conversion and error messages used by the form. The specification file defines the layout of the fields on the form and the display characteristics for these files. Both of these files (domain and form specification) creates the form definition files. The form definition file is formatted into the mask with the mask editor. The mask editor is an interactive tool that creates the mask editor script which makes possible the automatic construction of forms.

A default data file that exists for each low level form is used by FAST to set those low level forms values that are not set interactively by the user.

In order to add an IOP device to the IOP, a controller of the same type must be present. One controller can handle up to two devices and can support a combined baud rate of 9600. An additional controller is necessary if the baud rate for both units is higher than 9600 baud. Adding a device to the IOP requires the user to know the following data:

- IOP slot number for the controller
- Controller name for the added device
- Channel (0 or 1) where the device is to be located. (A controller can handle up to two devices and is capable of supporting a total of 9600 baud.)
- Baud rate of the device to be assigned (if applicable).

6.3.3 Feature Assignment

In addition to the base configuration described previously, there are several assignment rules which should be established for engineering an IOP layout.

Tape controllers affect the IOP layout. If a second tape controller is required in a 5ESS® switch, it must be located in IOP 1, community 0, slot 3 as expected by the UNIX® RTR Operating System.

Flexible IOP does not change any assignments in IOP 0 or 1 communities 0 or 1 with the exception of the tape controller previously mentioned. Fixed IOP slots assignments are briefly mentioned as follows.

Additional SCSD controllers can be equipped only in PC community 0 or 1 of IOP 0 and 1. These are the only slots equipped with terminal field wiring required for cabling to the UN33B.

- If an office is equipped with a time multiplexed switch (TMS) and message switch (MS) as separate entities, a SCSD controller is required in IOP 0 and IOP 1, community 1 slot 0 (scsdc4 and 5) for alarms and control of CM1 hardware.
- If an office is equipped with CM2, additional SCSD controllers are required in IOP 0 and 1, community 1 slots 2 and 3 without equipping the packs for CM1 (as previously described).

These SCSDs are fixed in the base ECD and option CM1 or CM2 is picked at the time of ECS. If CM1 is selected, then both controllers are assigned to allow conversion to CM2 at a later date. If CM2 is selected, only the controller for CM2 is assigned. In CM2 equipped offices, SCSD controllers in IOP 0 and 1, community 1, slot 0 are optional for CM2 growth.

Offices equipped with common network interface (CNI) cabinets or Network clock 2 options, require an SCSD controller in IOP 0 and 1 in community 1, slot 2.

An SCSD controller is offered to the customer as an orderable option for providing customized SCSD interfaces. When equipped, these optional packs are equipped in IOP 0 or 1 or both, in community 1, slot 1.

The IOP 0 and 1, community 1, slots 0 - 3 are equipped with UB33B circuit packs as required by the office configuration. When equipping IOP 0 and 1, SCSD circuit packs should be assigned first. Any slot not equipped with a UN33B circuit pack can be used as required.

Attention must be paid to data rates of the OSS links as they are assigned. The total baud rate through TN75C or TN74B is 9600 baud. If one channel on the circuit pack is operating at this rate, the second channel on the pack is unusable.

Both IOP 0 and 1 community 15 slot 3 can not be assigned because of hardware restrictions.

6.3.4 Availability

The Flexible IOP feature is available with the 5E6 software release, and later software releases.

6.4 INTERFACE TO THE MULTIFUNCTION OPERATIONS SYSTEM

6.4.1 Feature Definition

A Multifunction Operations System (MFOS) provides telecommunications networks with centralized and integrated operations and maintenance support. The MFOS gathers and processes key network data from widely distributed network elements. The MFOS has multiple functional applications assigned to several processes. These functional applications are implemented as an integrated set, so that MFOS appears as one system.

6.4.2 Feature Operation

The MFOS interface with the 5ESS® switch does not require a new separate data link. This interface terminates existing physical data links from the 5ESS® switch Administrative Module (AM) IOP for the OSS, RMAS, EDAS,

SCCS. The 5ESS[®] switch emulates all these various operational support systems. As far as the 5ESS[®] switch is concerned, these data links interface directly with their respective operational support systems.

The MFOS provides:

- Switch Maintenance
- Data base Administration
- Billing and traffic reports.

The switch maintenance function for MFOS is referred to as the network element maintenance. This function provides real-time surveillance and control of various network elements. Maintenance messages are collected and examined as they are produced by 5ESS[®] switch network elements. As messages are logged, alarm conditions are detected and alarm maintenance messages are generated. The interface for switch maintenance in the 5ESS[®] switch is similar to the SCCS interface for the 5ESS[®] switch.

The data base administration function of MFOS is referred to as the network element data base function. This function allows users to update the data bases of 5ESS[®] switches that are network elements. Users can add, change, or delete subscriber line information as service is modified. The network administration function interface is similar to the 5ESS[®] switch interface with RMAS. The data base function provides:

- Data base update and verification
- Active files for all messages that have not been released to the network or satisfactorily processed
- History files for all messages accepted by the network
- Display and print update and verification messages
- Administrative reports are available on demand
- Interface to service order administration system.

Traffic reports are collected via the MFOS traffic data collection reporting function. This function collects and processes traffic data from the network elements and provides users with information for network surveillance, centralized service analysis, and network administration. The interface for the traffic data collection and reporting function is similar to the 5ESS[®] switch EADAS interface. Traffic data collection and reporting function consists of:

- Traffic data collection and storage
- Traffic report generation including exception and summary reports
- User files that let users create schedules for summary report generation
- User-defined reports allow users to generate customized traffic reports
- Data examination and manipulation.

The billing data collection function of MFOS centralizes collection of AMA data from network elements (5ESS[®] switches). The billing data collection and reporting function collects billing data from 5ESS[®] switch network elements daily. The MFOS also writes to standard AMA data 9-track magnetic tape allowing downstream processing. The magnetic tapes can be forwarded to an AMA TPS for detailed processing and preparation of customer bills.

6.4.3 Availability

The Interface with the MFOS feature is available with 5E6 and later software releases.

6.5 DATA BASE MANAGEMENT MEMORY ALTERATION

Data base management memory alteration features are described in the following sections.

6.5.1 Assignments

6.5.1.1 Overview

This feature (45-01-0100) provides a means of updating the data contained in the 5ESS[®] switch memory. Assignment is the association of logical identifiers (in the areas of line/telephone numbers, trunks, and hardware) to physical units of equipment (circuits and ports) and the provision of feature permissions.

6.5.1.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.5.2 Recent Change and Verify

6.5.2.1 Overview

This feature (45-01-0200) provides a means to change and verify the contents of the data base. The 5ESS[®] switch RC/V feature provides a menu-driven format.

6.5.2.2 Availability

The RC/V feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.5.2.3 Feature Operation

6.5.2.3.1 Stand-Alone RC/V

The RC/V capability provides the user with the ability to add, delete, update, or verify the 5ESS[®] switch data using a menu-select/mask format or a text program documentation standards (PDS) or man-machine language (MML) format. The text interface may be used for nonvideo type terminals.

The RC/V interface provides a 2-level menu. The two levels consist of a category level and a view level. The user is guided by a cursor and help messages in completing the views data items. In the case of an input error, an error message is displayed. Default values are provided when inserting data into the data base.

When the view input is complete, the data items within the view are checked for validity, and the view is evaluated for consistency with the existing data base. All errors are flagged with detailed error messages. A more complete description of the RC/V capabilities of the 5ESS[®] switch can be found in 235-118-2xx, *5ESS[®] Switch Recent Change Procedures*.

6.5.2.3.2 Remote Memory Administration System

The RC/V functions in the 5ESS[®] switch may be performed by an RMAS. The RMAS is a network of microcomputers used to assist in the administration of messages or views (RC/V, trunk make-busy, trunk make-idle messages) for the local 5ESS[®] switch. The RMAS user interface to the 5ESS[®] switch data base uses video display

masks. A mask is a formatted video terminal display that provides the principle input medium for administrative and system tables as well as RC/V messages. The masks allow the user the flexibility to input RC information that is specifically tailored to a customer order.

6.5.3 Initialization and Growth

6.5.3.1 Overview

This feature (45-01-0300) allows initialization of the data base. Growth allows for the addition of equipment to an office to meet the need for increased telephone service.

Initialization is a mechanism to recover from errors, faults, and failures by performing a deterministic sequence of software and hardware actions that bring the system to a known, sane state. From this known state, call processing can be restarted with a fault-free system.

Growth is the systematic modification of central office equipment to provide increased call-handling capacity and improved service. Growth is required to make a 5ESS[®] switch evolve economically over a wide range of services and traffic needs.

The office data administration (ODA) process is a data generation process providing initialization of the data base. The initial office dependent data (ODD) (assignments for lines, trunks, equipment, etc., that are office specific) of a 5ESS[®] switch is provided through a series of interactions between the operating telephone company (OTC) and Lucent Technologies.

An on-line ODA process can be used by the telephone company and Lucent Technologies to build and manipulate a forms data base prior to its compilation in the 5ESS[®] switch. The input data is verified for errors both during and after the data entry process. Office records of the assignments made are produced during and after the data entry process.

The person entering data uses a terminal and printer at their location to call the ODA computer and establish a data link.

The data base is compiled at Lucent Technologies and shipped to the office on magnetic tape. A tape drive is used to load the data into the switch and onto disk packs where it can be used by the software release.

6.5.3.2 Availability

The initialization and growth feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.5.4 Growth

There are two types of growth: switch growth and terminal growth. Switch growth is the addition of hardware that is part of the 5ESS[®] switch. Terminal growth is the addition of lines and trunks that are attached to the ports of the 5ESS[®] switch.

The term "growth," relative to switch hardware, refers to the addition of equipment units to the office and/or the expansion of equipment units already present. Terminal growth refers to the assignment of users (for example, lines and trunks) to the physical hardware. The term "degrowth" refers to the removal of equipment units and the removal of packs of circuits from an equipment unit. All the equipment which may be grown may also be degrown.

Since growth takes place in an operational office, the growth procedures maintain the reliability and availability of the office. Reliability considerations dictate that growth does not interfere with normal office maintenance programs. The integrity of growth units must be ensured before these units are made available to the operational office.

The RC/V views are used to update the data base during the growth process.

6.5.5 Office Records Verification

6.5.5.1 Overview

This feature (45-01-0400) provides a means to:

- Obtain office records of the data base
- Perform ad hoc request for data in the data base.

Office records for the 5ESS[®] switch are tabular listings of the actual inventories and assignments of the data base and serve as a means for administering the 5ESS[®] switch office. These records are documented in the Translation Guide for the 5ESS[®] switch (TG-5). An explanation of the form entries is included in the TG-5. The office records for the 5ESS[®] switch have been divided into a number of categories:

- 5100 - Line Data
- 5200 - Trunk Data
- 5300 - Digit Analysis, Routing, and Charging Data
- 5400 - Future Data
- 5500 - Miscellaneous Data
- 5700 - Equipment Data
- 5800 - Engineering Assignments Data.

6.5.5.2 Applications

Copies or variations of the office record forms may be used as worksheets to aid administrative and maintenance personnel in translation inputting and data entry into the ODA process. Office records are available both on the on-line 5ESS[®] switch and the ODA process.

This feature provides a means to audit a data base external to the central office with the data base contained in the central office.

6.5.5.3 Availability

This feature is available with the 5E6 software release for the 5ESS[®] switch.

6.5.5.4 Feature Operation

Office records may be obtained through the office record capability of the switch or via RMAS or ODA.

6.5.6 Memory Backup and Recovery

6.5.6.1 Overview

This feature (45-01-0500) provides a means to restore a damaged data base to a consistent state from a second

source.

This feature provides for backup of the data base manually or automatically and recovering the data base in the event of an on-line data base error. The data base on each processor is backed up onto the disk at the user request (manual) or on a scheduled (automatic) basis. In between backups, the data base updates are logged on a disk file to be reapplied during recovery, in case of data base mutilation or system initialization.

6.5.6.2 Availability

The memory backup and recovery feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.5.7 Program Alteration

6.5.7.1 Overview

An efficient means of altering the contents of memory (programs, parameters, and office data) is available (45-01-0600). The system program includes all executable programs including: main memory resident as well as any paged, overlaid, and swapped programs; any microprocessor programs stored in writable memory; and any special purpose data that is not recent changeable.

6.5.7.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.5.8 Interface to Centralized Data Base Management Centers

6.5.8.1 Overview

This feature (45-01-0700) allows the implementation of data base management functions from centralized operations support facilities external to the switching system (that is, RMAS).

6.5.8.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.5.9 RMAS Interface

6.5.9.1 Overview

The RMAS acts as a focal point between the operation facilities and the 5ESS[®] switch entities that they serve, providing interface to the switching system and also mechanized aids to support 5ESS[®] switch data base management activities. Functionally, RMAS transmits data base update information to the switching system and queries the switching system for current data base information (45-01-0701). The switching system responds to RMAS messages, indicating whether they are accepted or rejected and also provides any data base information appropriate for a query message. The RMAS administers its internal files and controls the interface dialogue based on its interpretation of 5ESS[®] switch responses.

6.5.9.2 Availability

The RMAS interface feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.5.10 Direct Terminal Interface For Data Change and Verify

6.5.10.1 Overview

This feature (45-01-0800) provides the capability to efficiently perform data change and verify functions locally without assistance from external operations support systems.

6.5.10.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.5.11 Call Forward and Speed Call Data Update Capability

6.5.11.1 Feature Definition

The Call Forward/Speed Call (CF/SC) Data Update Capability feature provides an automated process for updating CF/SC data during switch conversions. It is primarily aimed at 1A ESSTM switch to 5ESS[®] switch conversions. The CF/SC data update is performed in several phases. New 5ESS[®] switch software is provided for only one of these phases. This phase requires as input an ASCII file containing feature data compatible with the 5ESS[®] switch. An input message from the craft is used to initiate the conversion process. The new 5ESS[®] switch software converts the ASCII input file into the corresponding binary input file needed for the next phase. Binary input files generated are compatible with the existing retrofit customer-originated recent change (CORC) log file format. The 5ESS[®] switch identifies which SM the line resides on and includes the CF/SC data in the binary file for the SM. This feature supports CF/SC updates for plain subscriber lines, centrex lines, and multiline hunt group lines. Internal 5ESS[®] switch software identifies MLHG lines in order to format an MLHG entry.

6.5.11.2 Feature Operation

Customer-changeable call forward and speed calling are features that require CORCs. These CORCs are applied to the 5ESS[®] switch translations immediately following cutover in order for feature data to be consistent across switches.

The CF/SC update process consists of the following steps:

- 1/1A ESSTM switch CF/SC data dump
- CF/SC feature name/data conversion and ASCII formatting
- CF/SC binary input formatting for the 5ESS[®] switch
- CF/SC translation updates for the 5ESS[®] switch.

6.5.11.2.1 Subscriber Perspective

Although a subscriber does not interact directly with the CF/SC data update process, the subscriber's service is affected by it. During the entire CF/SC data conversion process, the operating company prevents the subscriber from changing any of the CF/SC data.

The new CF/SC data update process provides better service to the subscriber by making it practical for the operating company to preserve both CF and SC data during the switch cutover. In the past, a slower process was used to update call forwarding data. Furthermore, the subscriber was usually required to reenter speed calling data after the cutover.

From the subscriber's perspective, the quality of the update process is measured by the length of time during which subscriber changes to the CF/SC data are locked out, and the completeness and accuracy of the updated CF/SC

data on the new switch.

6.5.11.2.2 Operating Company Perspective

In the first phase of the update process, the OTC personnel dump the CF/SC data on the 1A ESSTM switch using the VF:DNSVY message.

In the second phase, they edit the 1A ESSTM switch data to convert 1A ESSTM switch feature names to 5ESS[®] switch feature names and to convert any other data to 5ESS[®] switch format.

In the third phase, an ASCII data file containing the converted data is transferred to the 5ESS[®] switch. The process of formatting the binary CORC log files is initiated by the OTC personnel using a new input message.

After the CORC files have been generated, the operating telephone personnel start the fourth and final phase by issuing the CNVT:CORCLOG,LOAD message. During this phase, data consistency checks are performed as the data is updated. A high quality update process from the operating company personnel perspective demands rapid processing of the data during the conversion and accurate updating of the information on the new switch. The processing is not halted by data inconsistencies for an entry, but continues processing other entries, giving specific details of the inconsistencies so that they can be corrected manually.

6.5.11.3 Availability

This feature is provided with the 5E6 and subsequent software releases.

6.5.12 Data Base Query Select - Trunk Reports

6.5.12.1 Feature Definition

The Data Base Query Select-Trunk Reports feature provides nonkey query for trunk data that is accessible by a local/remote terminal.

The 5ESS[®] switch provides a nonkey query system that allows a user to retrieve information from office data base by matching a set of attributes given in a query request. For example, it is possible to request a list of all trunk groups in a route which have the far-end exchange as the glare controlling end.

The request is RC form driven only and is initiated as an administrative task.

6.5.12.2 Feature Operation

6.5.12.2.1 User Perspective

The Data Base Query Select-Trunk Reports feature is a nonkey system that allows craft to retrieve specific information from the 5ESS[®] switch data base. Input to the system is via menu recent change and the output report is routed to the office records printer. The output is displayed in tabular form similar to an office record. The query is supported from each of the following RC forms:

- **5202-1 Trunk Group Record**— By specifying the contents of the CLCITM code group identification (CLCIGRPID) field, or by specifying the trunk group number, the trunk group record (5202-1) can be retrieved. This record lists all the trunk group numbers associated with the CLCIGPID.

A list trunk group numbers with a specific set of attributes can be retrieved by specifying the given set of attributes.

- **5204 Trunk Features and Assignment Record**— A list of trunk group numbers along with their member

numbers and the contents of the corresponding CLCIGRPID can be retrieved by specifying a given set of attributes.

- **5303 Route Index Expansion Record**— A trunk report of the corresponding route indexes (RTIs) and all the attributes associated with each RTIs can be gathered by specifying a particular TGN or the contents of CLCIGRPID.
- **5300-3 Local Digit Interpretation Record**— A trunk report of all the associated codes of DESEP (traffic separations destination separations class) can be retrieved by specifying a DESEP. This report includes all the attributes associated with each local digit interpreter table.

This feature also adds enhancements to forms 5204 and 5303 (addition of cicgrid field) and form 5303 (return RTI, given trunk group member and code).

Trunk reports are designed to look like a standard recent change operation. A trunk is initiated by entering the message (for example, rcv:menu:aprc) on a standard recent change terminal or trunk line work station. When the master menu screen is displayed, enter A to change to the administrative menu. From this menu, any administrative report including trunk reports can be executed. The individual trunk report screens contain all the attributes that are valid as search parameters for each trunk request.

Trunk reports are written so that craftspersons are not required to fill every field on the screen. Any field that is not filled is treated as a don't care. If the craftsperson did not enter any search data for that field, the system assumes that any information stored in the data base in this field is acceptable.

If a error occurs that affects the printing of a trunk report, the craftsperson will be notified via the trunk report screen or the office printer. An error detected while using the terminal to request a report, is routed to the input screen. An error that is detected after the craftsperson has left the trunk reports screen is routed to the office records printer. If an error occurs before and during the printing of a trunk report, the error message(s) are printed on the output printer (office records printer).

6.5.12.2.2 System Perspective

Each of the trunk reports that a craftsperson can query can be translated into a unique view of the data base. When a request for a trunk report is issued, the process that results is given a telephone company administrative support capability (TASC) process ID. The TASC is a method of querying the 5ESS[®] switch ODD to obtain report data. When the search parameters for a specific trunk report have been entered successfully, the data is passed to On Line Data Integrity System (ODIN) for system checks. The ODIN passes the buffer containing the screen data to a RC change high level function. If an abort request is entered, this function sends a message to office records to abort. Other messages are handled by a switch statement that assigns the correct message size and type to a message sent to the office records control process.

After a message is sent to office records, the control process expects a response. If a response does not arrive in two seconds, an alarm times out, and an error message is generated informing the craftsperson of a failure. When the error message has been displayed, trunk report releases the terminal.

Office records system processes receive and act upon messages requesting office records output. When a message is received, an appropriate case statement corresponding to the message is searched for and when found, the code in the case is executed. Each case relates directly to a specific trunk report. Each trunk report case allows the mapping code to process the report, and sets a bit in one of the alpha fields informing the mapping code that this is the first time it has been called. This is a loop in each case so that processing continues until the mapping code indicates that it has either encountered an error or has finished processing. Since trunk reports is implemented by a nonkey access method, the mapping code for various reports use logic specifically written for each trunk report view to determine the search criteria entered by craft. If a craftsperson requested a trunk report that requires an RC view on a screen, a view tuple is constructed by the mapping code. If the view tuple does not

match the search criteria entered by the craft personnel, the mapping code constructs the next view tuple until a match is found. If no matching tuple is found, an end of report indication is sent to trunk reports and is sent to the craftsperson implying no data base match is found.

6.5.12.3 Interactions

The Data Base Query Select-Trunk Reports feature interfaces with the TASC, office records, and menu recent change. The trunk reports system is considered part of the recent change subsystem. New views on the recent change administrative menu allow craftspersons to query the trunk, trunk group, route index, and local digit translator data resident on the 5ESS[®] switch. The office records and TASC processes provide a means for the trunk reports output to be written to the office records printer. Since TSAC and trunk reports uses the office records printer as an output device, these systems must schedule their printing activities via the office records scheduling table.

6.5.12.4 Availability

The Data Base Query Select-Trunk Reports feature is available with the 5E6 and subsequent software releases.

6.6 DATA BASE INTEGRITY AND SECURITY

6.6.1 Data Base Integrity

6.6.1.1 Overview

Three levels of consistency checking are provided by recent change to protect integrity of the data base when inserts, modifications and deletions are performed. The first level of error checking provides range checking for each attribute. The second level provides intraform error checks of attributes on the form. The third level checks the form for consistency with the data in the data base.

6.6.1.2 Availability

The data base integrity feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.6.2 Data Base Security

6.6.2.1 Overview

A set of protection measures is provided to prevent unauthorized access to the data base to protect against disclosure, alteration, or obliteration of its contents.

6.6.2.2 Availability

The data base security feature is provided with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.6.3 Delayed Activation Of Recent Change (Batch RC)

6.6.3.1 Feature Description

This feature (45-03-0000) provides a capability for storing and checking (for validity) RC messages in a latent state for later activation. The delayed messages can be activated or canceled by another RC message. Delayed RC messages are automatically checked for validity when activated.

This feature allows RCs to be input specifying the date and time the RC should be performed or allows RCs to be input as a demand batch file. Large numbers of RCs can be released quickly in a batch mode. The RCs can be input at any time, stored until they are needed, and then released. Also, once the RCs are stored, the dates and

times for release can be changed by the user. Once released, RCs are kept as history records until the system performs batch file processing which removes them. Reporting is included to display the contents and status of all RCs entered in the batch mode and aid in file activities.

6.6.3.2 Availability

The delayed activation of the RC (batch RC) feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.6.3.3 Feature Operation

6.6.3.3.1 Batch Recent Change Entry

There are two basic modes of RC entry: immediate and delayed release (or time release). The first mode (immediate) consists of interactively entering RC information and immediately passing this information onto the 5ESS[®] switch. This mode is the default mode. When the delayed release mode is set, it remains throughout the entire session until the user specifies a different mode. To return to immediate mode, the user enters a command for a view number. The user selects which RC entry mode to enter when prompted for a view number.

Upon entering the batch input (BI) mode, a screen comes up requesting whether the input is demand or time release. If it is demand, the user is prompted for the file name, indicating where the RC requests are stored on disk. If time release input is indicated, the user is prompted for a clerk identifier (ID), which is the name of the file where the RC requests are stored. After indicating the clerk identifier, a mask is automatically brought up prompting the user for service order information. This information includes:

- An order number
- An item number
- A message number
- The date and time of the release of that RC.

The order number indicates the service order. The item number is a sequential number representing an individual request within a service order. The message number is used when there are several dependent RCs within an item. If one RC depends upon the previous one having succeeded, it uses the same item number with a higher message number. The date and time indicates when the RC should be processed in the 5ESS[®] switch data base. Time is expressed with the hour (military time) and minutes. The date includes the month, day, and year.

Each time that a new RC request is input, the corresponding order information fields are updated. If the user chooses not to return to the service order between RC requests, the corresponding fields are automatically incremented. If the message number of the previously input item is 0, then for each RC, the item number is incremented by one, and the service order, clerk ID, message number, date and time fields remain the same. If the message number of the previous message was greater than 0, the message number is incremented by one, and all other fields remain the same. In the case that the clerk is adding a new service order, or wishes to number the items and messages in a way different from the automatic numbering scheme, the service order must be updated before each RC request, to reflect the new values.

During batch input, first- and second-level error checking is done. These error checks make sure that the input is semantically correct and self-consistent. Third-level error checking, which checks the input data against the data base for consistency, is not performed until the RC is processed to the 5ESS[®] switch data base. Error messages are output to the release file.

6.6.3.3.2 Editing Assigned Date and Time

Batch edit consists of the ability to change the date and time of pending RCs. It also allows for the deletion of pending RC requests. Batch edit is performed in the same manner as any other view form. The user enters the key values (service order number, item number, and message number), and the data is read and output to the screen. If a delete operation is indicated, the entry is deleted from the batch file. Actually, the tuple is deleted from relation BTCHREL, and the entry is marked complete in the batch file. During a batch edit, the date and time fields are changed on the pending RC stored on disk.

6.6.3.3.3 Releasing Stored Recent Changes

Two methods of releasing RCs are supported:

- (1) **Time Release:** The release of stored RCs according to a date and time that is defined by the user.
- (2) **Demand Release:** The release of all RCs stored in a particular batch file.

The first method is automatically scheduled according to the global parameters set for release time. The second method is invoked by entering a message or by entering the batch release mode of RC.

6.6.3.3.4 Controlling the Release of Recent Changes

Time release requests are processed as determined by the batch office parameters. One parameter indicates how often RCs are released (by hours), and another parameter tells the minutes past the hour the actual process is started.

Only one release request is started at a time. A second request is blocked. Automatic requests always have priority over manual demand requests. Therefore, an automatic request cannot be blocked by an incoming manual request.

6.6.3.3.5 Release Demand or Delayed Release (Automatic) Recent Changes

When the RCs in the batch input file are released, information is stored on the status of the RCs. This information indicates how many of the RCs are successful, how many are in error, and whether the entire file is processed or prematurely aborted.

In the case of delayed release RCs, a batch review may be performed. A search for past due requests is made and sorted by time, filename, service order, item number, and message number. When all requests have been processed, status information is stored, and the corresponding file is marked with the appropriate status. The status is marked completed for each RC that was successfully applied to the ODD. The status is marked error for each RC that was not successfully applied to the ODD.

6.6.3.3.6 Reporting the Contents of Files

The request for generating a batch content report can originate from a special batch display, or from a craft input message. All requests from RC/V will display the data on the RC/V terminal. Craft input requests will print the data on the read-only printer (ROP) or another specified printer.

There are two kinds of reports the user can select. The activity report provides the summary of all RCs by status (pending, completed, error) of all clerks. The report by individual clerk is requested with selection criteria, and formatting options, to allow only the required information to be generated. Through the status selection options, only RCs that match a desired status are selected. Through the time selection option, only RCs with a release time that falls within a range of times are output. By using the status and time selection options together, finer selection is obtained.

For requests originated by craft message, an option is the printer device where the report is to be printed. Through this

reporting, the user can easily detail any records and can more easily administer the entry and release of RCs.

6.6.3.3.7 File Management - Accounting and Reclamation of Disk Space

When the user chooses the batch input mode, a file is created using the clerk ID as the name. If the file already exists, the input is appended to this file. The files are monitored to make sure that they do not get too large. Released RCs are deleted automatically from the batch input file. The clerk can also have the RCs removed on demand through an input message. The automatic removal of released RCs will remove, for all clerks, all records with status of completed or error that have been released for a specified number of days.

6.6.4 Teletypewriter Input/Output

6.6.4.1 Feature Description

The teletypewriter (TTY) input/output (I/O) (45-05-0000) is generally provided by a TTY or by a CRT keyboard terminal optionally complemented by a hard copy device such as a printer. The TTY I/O in the 5ESS[®] switch is provided by the CRT keyboard terminal and ROP at the master control center (MCC) and supplementary trunk and line work stations (STLWSs).

For local maintenance access, there are two separate physical channels which can interface to the I/O device(s). A single set of I/O devices (for example, one CRT keyboard terminal and one ROP) can be switched to the separate physical channels. If errors are detected within the current access path, the system automatically changes over to the second path. A direct manual override for the switching hardware is also provided.

At least one of the local maintenance accesses is capable of providing local access for other functions including traffic, service orders, and trunk testing.

For remote maintenance access, there are two separate physical channels to allow duplex access or simplex access with backup.

6.6.4.2 Interfaces

The CRT keyboard terminal and ROP at the MCC are interfaced to the 5ESS[®] switch via circuit packs equipped in the input/output processor (IOP). The peripheral controller cables connect the peripherals to the IOP by way of Electronics Industry Association (EIA) connectors on the patch panel at the rear of the cabinets. The IOP basic unit has its own microprocessor to transfer, receive, and buffer data between complementary peripheral devices and the central processing unit (CPU). The IOP is equipped with peripheral controllers. Peripheral controllers are specialized microprocessor-based controllers that serve as an intelligent interface between the selectable microprocessor interface and a slow-to-medium speed peripheral device. Peripheral devices consist of printers, terminals, magnetic tape drive units, data sets, and other units in the 5ESS[®] switch. Some of the peripheral controllers equipped in the IOP are described in the following paragraphs.

The BX.25 data link controller can provide one RS232C data interface at 9600 baud or one running at 56K baud. An on-board microprocessor directs internal procedures, and a programmable read-only memory contains bootstrap programs.

The asynchronous line controller is a flexible 2-channel controller that has the capability to control up to four peripheral devices such as TTYs, line printers, or data sets. These devices must adhere to the RS232 signal interface.

The asynchronous data link controller is an 8-channel controller that provides a wide variety of serial communication links via RS232C interface. These communication channels may be connected to asynchronous terminals or computers locally or remotely via modems.

The maintenance teletypewriter peripheral controller provides interfaces with central control, emergency action

interface, operator terminal, console printer, and to a switching control center system. It provides for manual intervention and control of the computer and peripherals.

6.6.4.3 Availability

The TTY I/O feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.7 AUTOMATIC TRAFFIC AND SERVICE MEASUREMENTS

Automatic traffic measurement features (45-06-0000) and service measurement features (45-07-0000) are described in 235-070-100, Appendix 1, *5ESS[®] Switch Administration Guidelines — Appendix 1, Traffic And Plant Measurements*. Refer to this document for information on these features.

6.8 TRAFFIC MEASUREMENT OUTPUT

Traffic measurement output (45-09-0000) features are described in the following sections.

6.8.1 Engineering and Administrative Data Acquisition System Interface

6.8.1.1 Feature Description

The system provides an interface (45-09-0100) to the Engineering and Administrative Data Acquisition System (EADAS). Data transmitted over the data link interface is collected and summarized by the data processor system. Network management controls can be transmitted to the local system.

The 5ESS[®] switch-EADAS interface, a dedicated binary link, has a 2400 b/s transmission rate. The interface provides an efficient high-capacity means of transmitting the desired data from the 5ESS[®] switch to EADAS. The EADAS controls the traffic output data flow by requesting information from the 5ESS[®] switch. The EADAS receives the 30-minute traffic report and the hourly and 24-hour separation (division of revenue) reports.

6.8.1.2 Availability

This interface feature is provided with the 5E6 and all software releases for the 5ESS[®] switch.

6.9 NETWORK ADMINISTRATION WORK GROUP I/O CHANNEL

The Network Administration Work Group I/O channel features (45-10-0000) are described in the following sections.

6.9.1 Network Administration Work Group Verification Of Translation Data

6.9.1.1 Feature Description

This feature (45-10-0100) enables the Network Administration Work Group to verify the system translation area of the data base via a direct access I/O channel. Access to this channel may be obtained via:

- A Switching Control Center System (SCCS) work station terminal.
- A dedicated I/O terminal at the network administration work group. The system limits queries on this channel to translation functions relevant to the network administration work group.

6.9.1.2 Availability

This feature is provided with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.9.2 System Status Information Retrieval

6.9.2.1 Feature Description

This feature (45-10-0200) enables the network administration work group to use the I/O channel to:

- (a) Query the system for office performance (for example, processor overload) and control status information
- (b) Receive the previous information automatically on occurrence of status changes
- (c) Change the control status for Essential Service Protection (ESP).

6.9.2.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

6.9.3 Traffic Data Query Capability

6.9.3.1 Feature Description

This feature (45-10-0300) enables the Network Administration Work Group to query the switching system for selected traffic data measurements, as a backup to normal data collection and critical network management (NM) controls.

6.9.3.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

6.9.4 Verification Of Traffic Schedules

6.9.4.1 Feature Description

The system will, upon request, produce an output of the traffic report (45-11-0000) from the previous collection interval.

6.9.4.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

6.10 SERVICE EVALUATION INTERFACE

The service evaluation interface (45-13-0000) features are described in the following sections.

6.10.1 Service Evaluation System

6.10.1.1 Feature Description

The system provides the capability to meet dial line service observing objectives. The basic objective for measuring dial line service observing is to obtain data that may be used as an aid in administering a central office and as a guide for the fullest utilization of equipment in satisfying service demands. This data is obtained from service evaluation (45-13-0100) of customer-dialed calls. These measurements will reflect the following criteria.

- (a) How effectively the various types of local and toll dial switching systems function in the completion of the calls

dialed by customers. This performance is measured principally in terms of percentage of call failures due to equipment blockages and failures, speed of call advancement measured in terms of average seconds, and call disposition.

- (b) The effective use of the equipment by the customer which is measured in terms of customer irregularities.

6.10.1.2 Availability

The service evaluation feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.10.2 No. 2 Service Evaluation System Interface

6.10.2.1 Feature Description

An interface to the mechanized No. 2 Service Evaluation System (SES) (45-13-0200) is provided. The No. 2 SES does the following:

- (a) Mechanizes the selection and evaluation of calls used to support the network services evaluation process.
- (b) Provides the capability to identify and analyze long-holding-time calls for which answer supervision is not returned to the billing point.
- (c) Provides timely referrals of service-evaluated faults to Network Service Facility support systems to assist the network maintenance process.
- (d) Provides call disposition details on evaluated calls to support corporate call completion improvement activities.

6.10.2.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.10.3 Black-Box Fraud Protection

6.10.3.1 Feature Description

This feature (45-15-0000) is provided to detect:

- (a) The absence of supervisory conditions at the called party, once ringing is tripped to avoid charging the calling party.
- (b) The called party giving two off-hook signals, both of which are less than the minimum chargeable duration interval. The switch then interrupts the talk path.

6.10.3.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.10.4 Signaling Irregularities (Blue-Box Fraud Detection)

6.10.4.1 Feature Description

This feature (45-16-0000) is provided to detect changes in supervision on an established connection to an outgoing trunk and the presence of multifrequency digits on the talk path. Should four or more multifrequency digits be detected or supervision continues to change for more than 5 minutes, the call is terminated.

The signaling irregularities feature allows the 5ESS® switch to prevent blue-box fraud on toll calls. A call is suspected of being blue-box fraudulent, when a short supervisory transition signal is detected on its outgoing toll connecting trunk during the answer or talk state. If the call is identified as fraudulent, it is terminated immediately. This feature is integrated into the terminating trunk terminal process to minimize the impact on existing call processing software and the tone decoder utilization.

6.10.4.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

6.10.5 Blocked Call Indication Report

6.10.5.1 Overview

The Blocked Call Indication (BCI) Report feature provides a means for obtaining output messages on the ROP indicating LENs which are experiencing A- or B-link blockages in the line unit concentrators. The switch administrator can use the information in the output messages as an aid to improve load balancing.

6.10.5.2 Feature Operation

The BCI Report feature can be turned on with separate input messages to identify blockages of originating or terminating calls. Once turned on, blockages are reported via output messages to the ROP. The BCI Report is invoked by the following command in MML:

```
ALW:BCIRPT,{O|T},SM=a[&&b][,MAX=c];
```

You must select either originating or terminating call blockage reporting. Both types of reporting can be active at the same time, but each must be allowed with a separate input message.

You must choose the SM(s) to study by using the SM keyword. One SM or a range of SMs may be specified. In order to avoid a drain on system resources which could occur if many calls are blocked in a short period of time, it is recommended that the feature not be run on wide ranges of SMs.

You may specify the maximum number (between 1 and 1024) of blockage messages that are reported prior to the feature turning itself off in a given SM. A separate MAX value may be specified for originating or terminating blocked calls. If you do not enter a value, a default value of 64 is used.

The BCI reporting can be stopped by entering the following command:

```
INH:BCIRPT,{O|T};
```

NOTE: Originating and terminating blocked call reporting can be stopped independently of each other.

The current activation status of BCI reporting can be obtained by entering the following:

```
OP:BCIRPT;
```

The ON/OFF status for originating and terminating BCI reporting is displayed along with the SM range chosen with the input message and the value of MAX being used. In addition, each SM which is still activated for reporting is displayed.

6.10.5.3 Availability

This feature is available with the 5E6 and subsequent software releases.

6.11 NETWORK MANAGEMENT

6.11.1 Feature Definition

The NM (45-18-0000) is a set of real-time procedures aimed at optimizing network performance when the network is under stress due to adverse conditions. The NM provides and operates control and surveillance features that aid in maintaining the network integrity and security during overloads and failures.

Unlike internal switching system overload controls, which modify the internal call processing functions under overload to maximize the efficiency of the switching system, network management controls are aimed at modifying and optimizing the flow of traffic in the entire network.

The NM features are described in the following sections.

6.11.2 Manual Network Management Controls

Manual network management controls (45-18-0200) supplement and augment automatic network management controls. Manual controls also provide more flexibility in coping with situations that require human judgment. Manual controls, such as reroutes, can be expansive in nature. Alternatively, they are protective by canceling or blocking traffic that cannot be completed. Manual controls can be activated and deactivated at network management work groups through the OSS which supports the operation of the network management work group or through an on-site NM capability.

The manual NM control features consist of:

- Code Controls (45-18-0201)
- Trunk Group Controls (Enhanced) (45-18-0202A).

6.11.3 Code Controls

6.11.3.1 Feature Description

6.11.3.1.1 Overview

Code controls (45-18-0201) block traffic to destination codes that are hard or impossible to reach. This conserves network resources for other traffic. Code controls are most effective for controlling focused overload, a condition characterized by a surge of traffic from many parts of the network to a single office or destination code.

Call gapping is a control which regulates the maximum rate at which calls are released towards a destination code. The ability to block all traffic to a destination code is also provided.

6.11.3.1.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.11.3.1.3 Applications

The code control feature is a system feature that limits traffic to particular destination codes that 5ESS[®] switch and NM personnel have determined are hard to reach.

6.11.3.1.4 Limitations and Restrictions

Code controls have the following limitations and restrictions:

- A maximum of 64 code controls may be set.
- There are 16 gap intervals.
- There may be up to 15 digits in a code control, not including the prefix.
- Code controls take place before any other NM manual control.
- Each code control must specify a unique digit string; no duplicate code controls are allowed.
- One code control digit string may be a leftmost subset of another code control digit string. For instance, there may be a code control on 312 and another code control on 312979. A per-call destination code is only controlled by the most specific, that is, longest, of all matching code controls. For instance, 3129793395 would only be controlled by the 312979 code control and not the 312 code control.

6.11.3.1.5 Feature Operation

Code controls are activated by either Engineering and Administrative Data Acquisition System/Network Management (EADAS/NM) or by 5ESS[®] switch personnel. If EADAS/NM personnel decide to set a code control, an input message (called a set message) is entered and sent via EADAS over an external data link communication package virtual channel to the administrative module (AM) in the 5ESS[®] switch. When personnel specify that a particular code should be controlled, they also specify a gap interval.

The set message is used by EADAS/NM personnel to turn on and off a code control or change a parameter (for example, gap interval) of a code control without having to remove the code control and reinsert it. Included in the set message are the gapping interval, code control identifier (which control), digits to be controlled, and the carrier prefix.

A verification message is returned to show what actions have been taken. The verification message will contain all the information in the set message plus a return code field to indicate the success or failure of the set message. The return codes indicate the different reasons for failure.

Software in the AM installs, removes, or modifies the control in the list of code controls. If this message causes the first code control to be set up, or causes the last code control to be removed, a flag is set or reset to indicate whether there are any code controls on in the switch. Also a flag in the switching module (SM) is set. The flags are used to save extra work that is done for code controls. When there are code controls in effect as indicated by these flags, the necessary work (reconstructing the full destination code for the call and checking to see if this code matches any of the existing code controls) is performed. When the flags indicate that no code controls are set up, this extra work is bypassed, thus saving time and resources. If a match occurs, the matched control gapping interval is checked. The gap interval tells the maximum rate at which calls may be released towards the problem destination code. When a match occurs between the destination code and a code control, and if the amount of time since the last match to the controlled code is less than the corresponding gap interval, the call is canceled. If the call is canceled, it is routed to the no circuit announcement, emergency announcement 1, or emergency announcement 2.

With code controls, the leftmost digits of a digit string are the most significant digits. The term full destination code refers to a digit string whose leftmost digits are the most significant. No digits can be inserted in front of a full destination code without changing its meaning. For example 3129793395 is a full destination code, but 9793395 is not since its leftmost digits are not as significant as possible. The full destination code is not always the same as the digits received by the 5ESS[®] switch for a call.

The matching rule used for code control is that if the digits in a code control digit string are the same as the leftmost subset of the digits of the per-call full destination code, there is a match. The per-call full destination code must be at least as long as the code control in order to make a match.

Requests for code control report information is also available. Measurements relating to code controls are maintained in the 5ESS[®] switch. These measurements include:

- The number of calls that match a code control
- The number of calls that match a code control which are allowed to continue
- The number of calls canceled due to all code controls.

Software in the 5ESS[®] switch handles requests for code control information, formats this information, and sends the response back to the requester.

6.11.3.2 Resource Utilization

The real-time impact on a per-call basis when no code controls exist is negligible. If code controls do exist, the checking time (checking destination code against code controls) is kept to a minimum.

For a maximum of 64 code controls, approximately 5000 bytes of dynamic memory space is needed in the AM.

Approximately 100 bytes are needed in the AM for gap interval information and other miscellaneous static data.

New ODD is required for code controls. A new SM relation requires approximately 12 bytes per tuple.

6.11.4 Trunk Group Controls

6.11.4.1 Feature Description

Manual trunk group controls (45-18-0202) are of two types: protective and expansive. Protective controls can be used to inhibit the spread of congestion in the network by restricting normal trunk group access and overflow. Protective trunk group controls include trunk group cancel and SKIP controls.

Expansive controls are used to exploit routing beyond the normal in-chain routes, when in-chain routes are busy or have failed, and there exists idle capacity in out-of-chain routes. The control which accomplishes this is called a reroute control.

6.11.4.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.11.4.3 Feature Operation

Trunk group controls can be divided into two classes:

- Prehunt - These controls are applied after the trunk group has been chosen and before the hunt for an idle member starts.
- Post-hunt - These controls are applied after the trunk group hunt failed to locate an idle member and before alternate route treatment is applied.

The controls take effect when a threshold is reached. The threshold for prehunt control is the percentage of all calls attempting to select a member in a trunk group. The threshold for post-hunt controls is the percentage of all calls failing to select a member in a trunk group. For all prehunt and post-hunt controls, the thresholds are given in terms of:

- Direct route traffic
- Alternate route traffic.

Direct route refers to the first choice trunk group in the normal routing chain, and alternate routing refers to the subsequent choice trunk group(s) in the normal routing chain. The percentage threshold values are defined from 0 to 100 in increments of 12.5 percent.

The following protective trunk group controls are available with the 5ESS[®] switch:

- Cancel-to (CANT) — This prehunt control cancels traffic destined for a specified trunk group.
- SKIP — This prehunt control causes a given trunk group to be skipped and alternate routing to another trunk group in the routing chain occurs.
- Cancel-From (CANF) — This post-hunt control is applied to traffic overflowing or skipping a given trunk group.

One expansive control [reroutes (RR)] is provided in the current implementation. This post-hunt control modifies the normal in-chain route advance pattern by substituting an out-of-chain trunk group for the next in-chain trunk group.

6.11.4.3.1 Cancel-To

The CANT is a prehunt control triggered when (1) the percentage of direct route traffic offered to a trunk group exceeds a threshold, or (2) the percentage of alternate route traffic offered to a trunk group exceeds a threshold. If CANT takes effect, the call is canceled with one of the following dispositions:

- (1) Connect to no circuit available (NCA) announcement
- (2) Connect to emergency announcement 1 (EA1)
- (3) Connect to emergency announcement 2 (EA2).

If the threshold is not exceeded, then member selection in the trunk group is allowed.

6.11.4.3.2 SKIP

The SKIP is a prehunt control triggered when (1) the percentage of direct route traffic offered to a trunk group exceeds a threshold, or (2) when the percentage of alternate route traffic offered to a trunk group exceeds a threshold. If SKIP takes effect, the trunk group is skipped and, if no post-hunt controls apply, alternate routing (to the next in-chain trunk group) occurs. If no alternate routing is available (that is, no more in-chain trunk groups), the call gets the treatment defined for that case.

If the threshold is not exceeded, then member selection in the trunk group is allowed.

6.11.4.3.3 Reroute

The RR is a post-hunt control triggered when (1) the percentage of direct route traffic failing to select a member in a trunk group exceeds a threshold, or (2) the percentage of alternate route traffic failing to select a member in a trunk group exceeds a threshold. If RR takes effect, then a substitute RR routing chain (via trunk groups) is traversed. When the RR routing chain is exhausted, routing continues in the normal routing chain unless the cancel in-chain return (CICR) option is specified. With the CICR option, the call is canceled and connected to NCA announcement. Prehunt controls and the post-hunt control CANF on trunk groups encountered while traversing an RR routing chain apply. However, RR control does not apply in this case.

If the threshold is not exceeded, then alternate routing (to the next in-chain trunk group) occurs.

6.11.4.3.4 Cancel-From

The CANF is a post-hunt control triggered when (1) the percentage of direct route traffic failing to select a member in a trunk group exceeds a threshold, or (2) the percentage of alternate route traffic failing to select a member in a trunk group exceeds a threshold. If CANF takes effect, the call is canceled with one of the following dispositions as specified by EADAS/NM:

- (1) Connect to NCA announcement
- (2) Connect to EA1
- (3) Connect to EA2.

If the threshold is not exceeded, then alternate routing (to the next in-chain trunk group) occurs.

6.11.4.3.5 Application of Controls

A trunk group can have the following trunk group controls active at any given time:

- CANT
- CANF
- CRO
- DOC
- RR
- SILC.

A maximum of 256 DOC controls and 128 manual trunk group controls may exist in an office at any given time; however, on 384 different trunk groups. Of the 128 manual trunk group controls, a maximum of 16 RR controls can be present, of which a maximum of 7 can be via routes and the remaining can be regular routes. There can be a maximum of 128 SILC controls active in an office. All of the network management trunk group controls, manual or automatic, can be active on 384 different trunk groups only.

When multiple controls are active on the same trunk group, the order of application is as follows:

- (1) Manual prehunt controls
 - CANT
 - SKIP.
- (2) Manual post-hunt controls
 - RR
 - CANF.

The network management software installs and deletes individual controls in response to requests received from EADAS/NM or on-site. In addition, control parameters such as threshold percentages can be modified on request from EADAS/NM or on-site without removing the initial control. The EADAS/NM or on-site personnel can also request that all controls of a particular type (for example, SKIP) be removed.

6.11.5 Trunk Group Controls (Enhanced)

6.11.5.1 Feature Description

This feature provides all the capabilities of the Trunk Group Controls feature, 45-18-0202, plus additional capabilities.

The enhancements and expansion (45-18-0202A) to the trunk group controls feature consist of new measurement information to be used by the EADAS/NM. This data consists of the following measurement data that is recorded by measurement counters.

- (1) The number of calls to which the SKIP trunk group control was applied.
- (2) The number of calls to which either the cancel-to or cancel-from trunk group control was applied.
- (3) The number of calls per trunk group control identifier to which the reroute trunk group control was applied.
- (4) The total number of calls to which the reroute trunk group control was applied, but for which no idle via route was found.

6.11.5.2 Availability

The trunk group control (enhanced) feature is available with the 5E6 and subsequent software releases for the 5ESS[®] switch.

6.11.6 Network Management Surveillance Data

6.11.6.1 Feature Description

To support the functions of a network management work group, network management surveillance data (45-18-0300) is sent from switching systems to EADAS and on to EADAS/NM. This data is collected on a regularly scheduled basis. These counts are received by EADAS, summarized for connected switches, and forwarded to EADAS/NM where they are used to evaluate the network and possibly require controls to be placed in switches.

Every 30 seconds a discrete request message is sent to the local switching system by EADAS, which responds with a set of discrete (on/off) indicators that show the current state of switching problems and network management controls. Every 5 minutes a data request message is sent to the local switching system, which responds with register readings and on/off flags that describe switching and trunk group performance, switching problems, and the results of network management actions during the most recent 5-minute interval.

6.11.6.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.11.7 Centralized Network Management

Centralized network management features (45-18-0400) are described in the following sections.

6.11.7.1 NM Audits and Alerts (Basic)

6.11.7.1.1 Feature Description

The EADAS/NM audits (45-18-0401) and alerts feature communicates to the network management work group OSS (EADAS/NM), via an intermediate data collection system (No. 1A EADAS), information that is not needed on a regularly scheduled basis.

The switching system maintains lists of trunk group reference and trunk group control status data that the network management work group must be able to audit.

Upon receipt of an audit request message, the local switching system sends complete contents of the requested list, either manual trunk group controls or reference data.

6.11.7.1.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

6.11.7.2 NM Audits and Alerts (Enhanced)

6.11.7.2.1 Feature Description

This feature enhances the capabilities provided by feature 45-18-0401. It handles command messages from the on-site capability of the network management work group and has the necessary changes to handle manual code controls, automatic controls, and carrier interconnect reference data.

Audits may be requested by personnel in the network management work group. The EADAS/NM may issue an audit request for certain information about a switching system to update its own data base. Finally, the EADAS/NM will issue a specific audit request whenever it has received a message-alerting discrete from the switching system.

Message alerting discrettes are on/off flags that are received on a regular basis (every 30 seconds or 5 minutes). These alerts indicate that some change (for example, trunk group changes, code control changes, routing changes) has occurred at the switching system.

Most audit information may be obtained in one of two forms. One form asks for the full set of information (demand audit), and the other form asks only for the changes since the last request for change information (change audit). The only change audit provided includes translation guide reference data changes.

6.11.7.2.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

6.11.7.3 Message Administration (Basic)

6.11.7.3.1 Feature Description

The message administration feature (45-18-0402) comprises the functional interactions which take place between the local switching system and the network management work group.

The interactions with the network management work group OSS (EADAS/NM) can take place via an intermediate traffic data collection system (No. 1A EADAS).

The messages to be communicated by the switching system include responses to audit requests and control command messages.

6.11.7.3.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.11.7.4 Message Administration (Enhanced)

6.11.7.4.1 Feature Description

The inclusion of automatic and manual NM control features enhance the message administration function (45-18-0402A).

The message administration feature processes the messages used to communicate between the switching system and the EADAS/NM (via EADAS) or the on-site capability. The switching system never transmits messages to EADAS/NM until a request for a message has been received. However, the switching system anticipates some requests (see surveillance data feature, 45-18-0202A) by buffering information for regularly scheduled 5-minute and 30-second requests sufficiently in advance so as to be available when the request is received. Other requests include audit requests and command activation/deactivation requests that are received by the switching system on an as-needed basis.

All requests received by the switching system result in a response which includes data if the request was an audit, and/or indication as to success or failure of the switching system's ability to comply with the request. The messages that pass between the switching system and EADAS/NM are distinguished on the basis of timing and priority. The priorities from highest to lowest are: discrettes (every 30 seconds), control messages (as needed), 5-minute data and flags (every 5 minutes), and audit messages (as needed).

6.11.7.4.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.11.7.5 Engineering and Administrative Data Acquisition System/Network Management Interface

6.11.7.5.1 Feature Description

The NM features provide the EADAS/NM interface (45-18-0403) via the EADAS traffic data collection system. The functions of the network management work group are supported by a computer-based system called EADAS/NM. The system collects data in near real time from toll and local offices in a large geographical area, such as a state or metropolitan area. From one EADAS/NM-supported network management work group, network managers can monitor and control many switching offices simultaneously. Local switching systems interface with the EADAS/NM system through an intermediate computer-based traffic data collection system such as EADAS.

6.11.7.5.2 Availability

The EADAS/NM interface feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.11.7.6 On-Site Network Management Capabilities

6.11.7.6.1 Feature Description

6.11.7.6.1.1 Overview

For backup (45-18-0500) in the event of a loss of contact with the OSS which supports the network management work group, the local switching office provides the capability to accept critical NM messages on I/O channels not connected to the network management work group OSS. These backup channels include maintenance and/or administrative channels which are usually accessible from the SCCS and/or the network administration work group.

The local switching system will respond to network management control messages and audit requests on the backup channel. Personnel at the network management work group will communicate by voice with personnel in work groups or facilities which have access to backup channels. Additionally, the 5ESS[®] switch provides a set of backup NM capabilities known as on-site network management which provides the ability to: retrieve 5-minute NM surveillance data, display some of the 30-second NM discrete information, and handle miscellaneous NM related messages. This feature provides the primary access to all the NM features for applications where EADAS/NM is not available. More specifically, the on-site NM capability permits a network manager to:

- Install or remove all types of manual controls
- Install or remove automatic control
- Retrieve NM data (5-minute and 30-second)
- Administer the NM capabilities through audits.

6.11.7.6.1.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.11.7.6.1.3 Applications

Network management control operations are performed remotely via a data line at an EADAS/NM facility. When the EADAS/NM link is inoperative, this feature allows on-site NM capabilities.

In independent telephone companies where no EADAS/NM facility is centrally located or in a non-EADAS/NM environment, the on-site NM capabilities are used to control network operations.

6.11.7.6.1.4 On-Site Network Management Capabilities

With the on-site NM capability, a human-to-machine interface is provided for accessing the NM capabilities. The NM work facility may be collocated with the 5ESS[®] switch or located remotely. The on-site NM capability is accessed either by the authorized 5ESS[®] switch office personnel (non-EADAS/NM applications) or remotely by a network manager. When the request is initiated locally at the switching office premises, the maintenance TTY is to be used.

6.11.7.6.2 Resource Utilization

6.11.7.6.2.1 Processor Real Time

The on-site NM capability uses no per-call real time. This capability only runs when an input message is entered or when the NM exception page display needs refreshing. Processor occupancy is kept to a minimum.

6.11.7.6.2.2 Dynamic Memory Space Requirements

The on-site NM capability requires 2500 bytes of AM dynamic data (TTY inhibits [8 bytes], 30-second discrete copy [14 bytes], and NM scratch area [2478 bytes]). The on-site NM capability does not require global dynamic data.

The on-site NM feature requires an AM private dynamic data area to hold the TTY inhibits for each type of control [trunk group control (TGC), call gapping code control, and selective incoming overload control (SILC)]. In some cases, the on-site NM feature must assemble data from two locations for output or copy data to prevent overwriting while it is being printed. An AM private dynamic data area is required as a temporary holding space until the data can be printed. A copy of the current 30-second discrettes is sent to the on-site NM feature every 30 to 90 seconds. A comparison of the current 30-second discrettes and the last discrettes sent is made. To hold the last 30-second

discretes sent, an AM private dynamic data area is required.

6.11.7.7 Trunks Out-of-Service for Data Changes

6.11.7.7.1 Feature Description

This feature (45-19-0000) requires that trunks be removed from service before trunk data changes are made to avoid possible adverse effects on calls.

6.11.7.7.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.11.8 Trunk Group List Audit (99-5E-0827)

This feature provides a listing of all trunk groups (TGs) by their trunk group numbers (TGNs) and associated *CLLI*[™] codes, as used in the 5ESS[®] switch's data base at any given instant. The 5ESS[®] switch issues a 30-second discrete to indicate that the TGN/*CLLI*[™] code assignments have changed in the switch data base due to TG additions, deletions or modifications. This listing enables the user to specify the type of listing of all TGs currently assigned in the switch data base or only those TGs that have been changed, added or deleted since the last audit. Note that the Network Traffic Management Operations System (NTM OS) user is able to request this audit manually or set up the NTM OS to request this audit listing automatically in response to the switch discrete mentioned earlier.

The Trunk Group List Audit feature encompasses the TG List Demand Audit and TG List Change Audit. TG List Demand Audit provides a list of all the TGs and associated far-end *CLLI*[™] codes currently assigned in the 5ESS[®] switch's data base. The TG List Change Audit provides a list of only those TGs and associated far-end *CLLI*[™] codes that have been changed, added, or deleted from the 5ESS[®] switch's data base since the last audit.

Differences. This is a new message to/from the network traffic management operation system.

This feature impacts the NTM OS, such as NetMinder and RNMS. If a trunk group has been changed, added, or deleted from the 5ESS[®] switch's data base, the Network Management Operations Systems are used to request the Trunk Group List Audit. A Network Traffic Manager can manually request a list of all the TGs and associated far-end *CLLI*[™] codes in the office, usually after a Software Release Retrofit, via the Network Management Operations Systems.

This feature is used by a Network Traffic Manager to keep the Operations Systems data base synchronized with the 5ESS[®] switch's data base. The Network Traffic Manager is able to use the Trunk Group List Audit capability to obtain a list of all TGs and associated far-end *CLLI*[™] code currently assigned in the 5ESS[®] switch's data base.

The Data Collection-Traffic and Network Management Operations Systems does not request a large amount of information through the Data Collection-Traffic Operations Systems often because this can cause problems during traffic or five-minute data collection. Therefore, the Trunk Group List Demand Audit is not triggered more than once during a 15-minute interval.

The Data Collection-Traffic Operations Systems are impacted.

This feature is used by a Network Traffic Manager to keep the Operations Systems data base synchronized with the 5ESS[®] switch's data base. The Network Traffic Manager is able to use the Trunk Group List Audit capability to obtain a list of all TGs and associated far-end *CLLI*[™] code currently assigned in the 5ESS[®] switch's data base.

The Data Collection-Traffic and Network Management Operations Systems does not request a large amount of information through the Data Collection-Traffic Operations Systems often because this can cause problems during traffic or five-minute data collection. Therefore, the Trunk Group List Demand Audit is not triggered more than once

during a 15-minute interval.

The Data Collection-Traffic Operations Systems are impacted.

6.12 NETWORK MANAGEMENT/DOMAIN SELECTIVITY

6.12.1 Definition

The Network Management Domain Selectivity capability provides the 5ESS[®] switch with the ability to support network management requests on a domain value basis. Network management controls are call processing controls designed to provide maximum use and efficiency of resources at all times. These controls are not always introduced in the office they are protecting. With the growing number of private networks being introduced, overlapping numbering plans are becoming more prevalent. Overlapping numbering plans allow the same digit string to identify different termination points depending on the domain of the originator. For NM, a call's switching domain is the only way to distinguish one call from another when overlapping number plans are routed on the same switch.

This capability refines manual NM controls to apply only to specific switching domains. The controls that are affected by this capability are code controls, expansive trunk group controls (reroute), and protective trunk group controls (cancel-to, cancel-from, and skip). Each control is restricted to affect only those calls whose domain matches the domain(s) associated with the control. The switching domains that are associated with each control are specified by the network manager at the time each control is installed or modified. This capability primarily involves modifying existing functions and messages that administer and apply manual NM controls to make them domain selective.

6.12.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.12.3 User Operation

The users for this feature include both on-site craft and the network managers at a remote network management center. This feature does not require software release update when the operating company personnel add a new domain and selectively activate a control with that domain. The include and exclude options allow the operating company personnel to specify an inclusion or exclusion list in a manual trunk control command as dictated by the situation. If the controls must apply to many domains (more than five), the exclude option is exercised. On the other hand if controls must apply to a small set of domains (five or less), then the include option is exercised.

The user uses the following modified input commands to implement this feature:

- `clr:cgap`
- `set:cgap`
- `clr:tgc`
- `set:tgc`
- `set:rr`

6.12.4 Feature Operation

The domain value associated with a call is initially determined by the domain assigned to the originating port. This value, referred to as the digit analysis selector (DAS) value, has a primary function of determining the translation structures to be used during digit analysis, and prior to this capability was discarded after determining translation structures. The association of a domain value with a call throughout the entire call processing phase permits domain

selective manual controls to be implemented in an office. To be able to effectively perform network management, the DAS value is carried beyond the digit analysis phase and made available when network management controls are executed. Network management needs the domain value for both code control and trunk group control application.

Prior to the implementation of this capability, the reroute trunk group control, RR, was restricted to apply to calls with directory numbers in the North American Numbering Plan (NANP). This meant that the prefix/delete algorithm which is applied to the outpulsed digits of all rerouted calls could be and was designed only for codes which were part of NANP. As this capability is implemented, the reroute control will be able to apply to calls in all domains. This means that the reroute prefix/delete algorithm will be applied to all rerouted calls, and hence will process outpulsed directory numbers which may be in any numbering plan. Since the prefix/delete algorithm was designed only for NANP directory numbers, it adversely affects the digit strings of calls in certain numbering plans. Each numbering plan must now be considered in light of the algorithm. If, for certain numbering plans, the prefix/delete algorithm incorrectly prefixes or deletes digits, the algorithm must be changed to ignore those calls. The following are the different cases that have been considered.

- Action point number (APN) numbering plan - These APN directory numbers are always of the form SSS-NANP DN without the NPA. However, the SSS code will never overlap with any NPA. This means that the algorithm will never incorrectly prefix or delete digits.
- International calls - These calls will be outpulsed with directory numbers of various lengths where the first 3 digits may overlap with some NPA. This means that digits could be erroneously deleted or prefixed by the prefix/delete algorithm. However, all of these calls will have a domain of 81 or CCIDDDTC. Hence, the prefix/delete algorithm has been changed to ignore all calls in domain CCIDDDTC.

Code controls are protective controls used to block calls to a specific destination as close to the point of origin as possible when focused overloads are detected. The dialed digits are matched to a digit string specified when the control was implemented to determine whether or not a call is a candidate for a code control.

Trunk group controls consist of protective and expansive controls. The outgoing trunk group number is matched to the trunk group number specified when the control was requested to determine whether a call is a candidate for a trunk group control. The protective trunk group controls are involved in the cancellation of calls per the following:

- Cancel-To cancels calls on a percentage basis before hunting through a trunk group for an idle trunk
- Cancel-From cancels overflow calls from a trunk group on a percentage basis
- Skip marks a trunk group as unavailable and the next trunk group in the alternate routing chain is hunted instead.

The expansive trunk group control, reroute, is concerned with increasing the number of paths a call can take to completion. The reroute control inserts an alternate route trunk group(s) into the normal routing chain. This is a post-hunt reroute in that the reroute trunk group(s) is searched after the controlled trunk group.

Without domain selectivity, trunk group controls would be applied to all calls in the network regardless of domain. If all calls in the network are controlled regardless of domain, it would be possible for protective trunk group controls to cancel calls that should not normally be canceled (that is, calls in a domain that are not contributing to the overload situation in the office). Domain selective protective trunk group controls provide the granularity of control needed to protect the network without unwanted side effects.

Expansive trunk group controls without domain selectivity would suffer the same type of consequences as protective trunk group controls if the controls applied to all domains. When all calls receive expansive controls without consideration to domain, it is possible to reroute a call and inadvertently lose the associated domain. This results in not just a lost call but possibly a call completed to an incorrect termination point. Associating a domain with a call

throughout the call processing phase along with specification of a domain on the trunk group control alleviates these problems.

6.12.5 Interactions

No interactions with other features have been identified.

6.12.6 Limitations and Restrictions

The following limitations and restrictions apply to this feature:

- The response time limit of 5 seconds to install, change, or delete a control from the craft shell or remote NM center will be met.
- The maximum number of code controls is limited to 64.
- The maximum number of trunk group controls is limited to 128.
- The maximum number of extended reroutes is limited to 16.
- Only one domain will be associated with any one code control, and a maximum of five domains may be associated with any one trunk group control.

6.12.7 System Resources

6.12.7.1 Hardware

This feature has no effect on system hardware resources.

6.12.7.2 Software

It is estimated that this feature uses 5930 bytes of disk memory for text and data.

6.12.8 Implementation

This feature is implemented by on-site craft or network managers at a remote network management center entering the appropriate network management input messages.

6.12.9 Measurements

With this capability, any manual NM control is applicable only to a call whose domain matches one of the control domains. It does not affect how measurements are being taken, but affects the meaning of some of the measurements.

Prior to this capability, trunk group control measurements indicated all calls that were affected by the control independent of the call's domain. The new measurement is the total of all calls whose domain matches one of the domains in the control. This total is not broken down into separate counts for each domain.

6.13 THE 8-HOUR PASSED MDR

6.13.1 Definition

The 8-Hour Passed Message Detail Recording (MDR) feature scans call record fields to identify which calls have been in progress for at least 8 hours. Such calls have an MDR record written only for calls that are normally marked

for MDR recording. The 8-hour passed MDR records are generated at fixed times during the day spaced 8 hours apart. These generation timers are called 8-hour scan times. At the 8-hour scan time, if a call has been in progress for 8 hours or more, an 8-hour passed MDR record is generated.

6.13.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.13.3 User Operation

For the Enhanced Private Switched Communication Service (EPSCS) application, the Customer Service Administration Control Center (CSACC) uses the 8-Hour Passed MDR feature to identify long duration calls. Once an 8-hour passed MDR is received by the CSACC, the display indicator is lighted and proper action is taken by the CSACC staff. The subscriber receives 8-hour passed MDR records from the CSACC.

The assignment of the 8-hour passed MDR parameter in the MDR group is the responsibility of the operating company personnel. The operating company personnel are also responsible for the specification of the start time and whether the scan should take place.

For the EPSCS application, the 8-hour passed MDR parameter is only specified for MDR groups associated with trunks.

6.13.4 Feature Operation

The 8-Hour Passed MDR provides intermediate MDR records every 8 hours for calls that have been in progress for at least 8 hours. In addition, an 8-hour passed MDR indicator is set in the call event code of the MDR record to distinguish such MDR record from the regular MDR record for the call.

The following is a high-level view of the 8-Hour Passed MDR scenario:

- (1) At 8-hour scan times, the 8-Hour Passed MDR records are generated for the calls which have been in progress for at least 8 hours and for which regular MDR records would be generated upon termination of calls.
- (2) The API communications package is used to send the 8-Hour Passed MDR from the 5ESS[®] switch via the appropriate ISDN-SMs hosting the EPSCS OS data links.
- (3) For the EPSCS application, the EPSCS OS collects the 8-Hour Passed MDR records and converts those 5ESS[®] switch MDR records into the internal CSACC MDR format.
- (4) For the EPSCS application, the EPSCS OS passes the 8-Hour Passed MDR records to the CSACC system. This data is used to drive CSACC network displays and provide detailed records of long duration calls.

When the start time is changed, the next pending 8-hour scan should still take place and the new start time takes effect at the closest 8-hour interval to the new start time after that scan. If a scan is in progress, the scan completes and the new start time takes effect as described previously.

6.13.5 Interactions

The MDR to Customer Location (CL) feature is used to generate MDR records and as a basis to build the 8-Hour Passed MDR capability upon.

An 8-Hour Passed MDR record can be generated if and only if a regular MDR record can be generated.

6.13.6 Limitations and Restrictions

It is impossible to generate all 8-Hour Passed MDR records at the exact time the 8-hour scan period starts. The transmission of these MDR records occurs over several real-time breaks so as to not adversely affect real-time consumption.

6.13.7 System Resources

6.13.7.1 Hardware

No additional hardware is required to provide this feature.

6.13.7.2 Software

Approximately 13400 bytes of text and data memory are required to provide this feature.

6.13.7.3 Real Time

Real-time requirements to provide this feature are negligible.

6.13.8 Implementation

The assignment of the 8-hour passed MDR parameter in the MDR group and the specification of the start time is the responsibility of the operating company personnel. The start time for the 8-Hour Passed MDR capability can be specified through Recent Change. If not specified, the start time defaults to 1:00 a.m. This is fixed on an office basis, not on a customer basis.

6.13.9 Measurements

This capability does not require any new MDR counts. When any 8-Hour Passed MDR is generated, the existing Generated Record Count is pegged. When any 8-Hour Passed MDR record is lost because of all data links failure, the existing lost Record Count is pegged.

6.14 SELECTIVE CARRIER DENIAL

6.14.1 Definition

The Selective Carrier Denial (SCD) feature provides the ability to selectively inhibit certain carrier handled calls from those lines which have been designated as non-paying subscribers by a particular carrier. Call to be blocked could be either inter-LATA or intra-LATA, if the specified carrier handles intra-LATA traffic. Calls that are blocked route to a tone or announcement, as specified by the local operating company.

6.14.2 Availability

This capability is deployed in the 5E6 (1) software release as a special feature.

NOTE: Consult your Lucent Technologies Account Executive for availability.

This feature is provided on a per-business customer basis.

This SCD feature is assignable to any line that has a unique port. This includes POTS and BRCS lines, remote switching module (RSM) lines, optical remote module (ORM) lines, SLC[®] carrier lines, MLHG member lines, and hotel/motel lines. The SCD screening also applies to trunks using line type translations, such as private branch exchange (PBX) and foreign exchange (FX) lines. This includes the INDIV, PBX, HOTMOTL, and HOTPBX classes

of service.

6.14.3 User Perspective

6.14.3.1 User Profile

The SCD feature allows telephone personnel to maintain the base relations required by the SCD capability.

6.14.3.2 User Operation

Call processing checks calls to determine if they are to be blocked by SCD screening and apply the appropriate treatment on the calls. Calls which can be blocked are as follows:

- Non-operator assisted calls:
 - (1)+NANP DN without the NPA or (1)+full NANP DN (PIC [primary carrier] call)
 - 10XXX+(1)+NANP DN without the NPA or 10XXX+(1)+full NANP DN (non-PIC call)
- Operator assisted calls:
 - 0+NANP DN without the NPA or 0+full NANP DN (PIC call)
 - 10XXX+0+NANP DN without the NPA or 10XXX+0+full NANP DN (non-PIC call)
- Operator calls:
 - 00- (PIC operator)
 - 10XXX+0 (#) or 10XXX = 00 (non-PIC operator)
- Cut-through calls:
 - 10XXX+ #
- Information calls:
 - 1+NPA-555-1212 (where: NPA = numbering plan area)
- Service Access Codes (blocked only if selected by the service provider):
 - (1)+XXX+NANP DN without the NPA
- International calls:
 - 10XXX)+011+CC+NN (non-operator assisted call)
 - (10XXX)+01+CC) (operator assisted call)
 - where: CC=country code, NN=national telephone number

6.14.3.3 Activation

Activation of this feature is administered by telephone personnel, as directed by the customer.

6.14.3.4 Operational Limitations

The SCD can be provided for up to 31 carriers. For a centrex group, SCD screening is done on an individual line basis, not a group basis; for example, MLHGs could not be screened, but individual lines within the MLHG could.

The feature available with the 5E6 (1) software release does not provide SCD screening for ISDN lines. This will be provided at a later date if the feature penetration in these lines is determined to warrant development.

The "sending of ANI digits to the operator on 0- calls" requirement will not be included in the 5E6 (1) software release. Modifications needed to support this requirement will be issued through a software update at a later date.

6.14.3.5 Deactivation

Deactivation of this feature is administered by telephone personnel, as directed by the customer.

6.14.3.6 Interactions

In general, any originating feature that is handled by a carrier must be screened for SCD. This can be intra-LATA calls as well as inter-LATA calls.

6.14.3.6.1 Multiway Calling

When a subscriber places a call on hold and attempts to dial another party for a 3-way call, a call transfer, or a 6-way conference call, SCD screening applies to the party being added on.

6.14.3.6.2 Call Forwarding Variable

The SCD screening is performed when the Call Forwarding Variable feature is activated by the customer and the remote DN is one which is handled by a carrier.

The SCD screening is also performed each time a call is forwarded to a carrier-handled remote DN. If the call should be blocked due to SCD screening, the forwarding does not occur. The call in this special case is routed to reorder or recorded announcement (not the normal SCD treatment).

6.14.3.6.3 Remote Activation of Call Forwarding

The SCD screening is performed when call forwarding is activated remotely via the Remote Activation of Call Forwarding feature.

6.14.3.6.4 Speed Calling

Calls that are originated using speed calling are screened for SCD. Speed call screening occurs when the speed call entry is used to place a call, not when the entry is placed on a list.

6.14.3.6.5 Automatic Route Selection

Automatic route selection calls are screened based on the originating line when they use carrier facilities. Such screening applies to carrier-provided OUTWATS calls and calls that overflow to the DDD network.

6.14.3.7 Restriction Capability

The SCD feature is made available as a Special Purchase Feature upon general availability of the 5E6 (1) software release. A security system prohibits its use by any office that has not purchased SCD. The Special Feature Software Security System restricts non-authorized feature assignment (RC) and/or use call processing.

6.14.4 Engineering - Special Planning Considerations

The SCD feature is provided for the STANDARD switching module (SM), but not for the Basic SM, due to the memory impact of this feature.

6.14.5 System Resources

Not applicable.

6.14.6 Assignment Guidelines

6.14.6.1 Forms and Views

6.14.6.1.1 Translation Guide Forms

Three new office data administration (ODA) forms added to support this feature are:

- 5551 (Selective Carrier Denial Record, by TN)
- 5551B (Selective Carrier Denial Record, by MLHG and TERM)
- 5552 (SCD Screened Service Access Codes Record).

The following ODA forms are modified to include a screening indicator:

- 5109-3 (Telephone Number Supplement)
- 5111-3 (Multi-Line Hunt Group Lines Supplement)
- 5305-2 (Carrier Interconnect Feature Record).

6.14.6.1.2 Recent Change Views

Four new views added to support the SCD feature are:

- View A.12 [Selective Carrier Denial (SCD) Carrier Report]
- View 1.60 (Carrier Line Screening)
- View 1.61 (Advanced Service Interface Line Parameters)
- View 9.8 (SCD Screened Service Access Codes).

The following views are modified to add a "SCD SCRNING" (SCD screening) indicator:

- Multiple Line Query View A.2
- Line assignment Views 1.1 through 1.6 and 2.1 through 2.4

- Multi-line Hunt Group assignment View 3.5
- Carrier Administration View 10.3.

6.14.6.2 Assigning to Customer

The code supporting SCD is in every office that purchases the 5E6 (1) software release. The ability to perform Recent Changes on the new SCD views is protected by the Special Feature Locking mechanism. Only those offices purchasing the SCD feature are permitted to use the new SCD views. When purchased, telephone personnel administrate the SCD feature as directed by the customer. Using the new SCD views, the craft is able to:

- Assign and remove SCD on a line for a specific carrier
- Select which service access codes (SAC) are to be screened by SCD
- Select treatment applied to blocked calls
- Obtain a list of subscribers that have SCD assigned and the denied carriers
- Obtain a list of subscribers denied to a specific carrier.

The telephone company personnel have the ability to assign and remove SCD screening on a line via recent change.

6.14.6.2.1 Activation of SCD for Carriers

The recent change and verify (RC/V) View 10.3 (CARRIER ADMINISTRATION) field 31 (SCD SCRNING) is used to specify which carriers can have lines screened with SCD. The field is to be set to "Y" and updated for each carrier over which lines will have SCD screening applied.

6.14.6.2.2 Applying SCD Screening to Lines

To screen lines for selected carriers, RC/V View 1.60 is used. The line is to be entered by TN, OE, or MLHG member, then a carrier ID for a carrier which will be scanning the line is entered. The verification of which carriers are screening a selected line is available through RC/V View 1.61.

6.14.6.2.3 Routing Calls Blocked by SCD

The RC/V View 10.1 (FIXED ROUTING) is used to assign the desired fixed route for calls blocked by SCD.

6.14.6.2.4 Programming Service Access Codes

The RC/V View 9.8 is used to select service access codes (SACs) which are blocked by SCD. A call to a SAC is only blocked if the originator is screened with SCD by the carrier associated with the called SAC.

6.14.6.2.5 Multiple Line Query

Field 106 (SCD SCRNING) is added to RC/V View A.2 (MULTIPLE LINE QUERY) providing the ability to list all lines with (or without) SCD screening applied to them for at least one carrier.

6.14.6.2.6 SCD Carrier Report

Administrative RC/V View A.12 has been added for SCD carrier reports. This view allows a report sorted first by

carrier and then by screened subscribers. The view allows the user to limit the report to a single or range of TNs, a single or range of MLHG members, and a single or range of carriers.

6.14.7 System Operation

The call processing software recognizes calls that should be screened for SCD. Calls to be screened include those dialed with a carrier access code (10XXX), calls using the PIC and calls using the office default carrier. If the line has SCD assigned for the carrier handling the call, the call is screened. Blocked calls are routed to tone or announcement as defined by the local telephone company.

6.14.8 Measurements

Measurements, for the SCD feature, are added to an existing part of the daily plant report. Following are the two new fields, which are included in Part 6 of the OP:PLNT24 report.

- SCDCNT (The number of lines screened by Selective Carrier Denial.)
- SCDBLK (The number of calls blocked by Selective Carrier Denial.)

6.15 SUBSCRIBER LINE BUSY COUNTS (5E6-5E8 SOFTWARE RELEASES)

6.15.1 Overview

6.15.1.1 Definition

The SLB Counts feature provides two separate counts; an SLB count to show the number of times a specific line is found busy on terminating calls, and an Attempt count to determine the total number of terminating attempts to the line.

6.15.1.2 Economic Worth

This feature is used to identify customers who are missing incoming calls because their lines are busy. The data gathered with this feature is valuable in determining how many calls a subscriber is missing, giving a more accurate picture of the subscriber's need for additional lines. The SLB Counts feature benefits the end customers by allowing them to choose more efficient phone service for their call volume and by avoiding lost business due to insufficient line capacity.

6.15.1.3 Availability

This feature is available with 5E6 and later software releases.

NOTE: Consult your Lucent Technologies Account Executive for availability.

6.15.1.4 Feature Provision Basis

This feature is provided on a per-system basis.

NOTE: Subscriber Line Busy Counts - Phase 2 is provided with the 5E6 software release as a new section number (number 128, name SLB) of the 30-minute traffic report (TRFC30). This new version completely replaces the SLB Counts - Phase 1 feature, provided in previous software releases, which was not part of TRFC30. For 5E6 and later software releases, the Phase 1 input and output messages are no longer valid. Standard TRFC30 messages are now used.

6.15.2 User Perspective

6.15.2.1 User Profile

Switch administrators use the data from this feature as an additional tool for load balancing. The switch maintenance personnel use the SLB count as an additional tool to verify routing and office dependent data. The marketing and sales personnel use the data from this feature to determine a subscribers need for additional lines.

6.15.2.2 User Operation

This feature provides the craft control of the new section of the TRFC30 report. The new craft actions are:

- Allow and inhibit requests for generation of the SLB counts.
- Allow and inhibit requests for output to the ROP or TRFCH.
- Output requests for demand printing.
- Requests for status of the activation condition.

6.15.2.3 Activation

The input messages (IMs) controlling activation of this feature are as follows:

- **ALW:TRFC30,CLCT,SLB=DN1,...,DN6**
This IM identifies the DNs allowed for collection. Up to six DN identifiers may be entered in one command. The identifier is a NANP DN without the NPA.
- **ALW:TRFC30,CLCT,SLB=PREV**
This IM reactivates the previously allowed list of studied DNs if it is the first allow-for collection message after an **INH:TRFC30,CLCT,SLB=ALL** or **INH:TRFC30,CLCT,ALL** request.
- **ALW:TRFC30,ROP,SLB**
This IM requests that the SLB section be allowed for printing on the ROP automatically every 30 minutes. The SLB section prints on the ROP the data collected. The DNs having no activity are not printed.
- **ALW:TRFC30,TRFCH,SLB**
This IM requests that the SLB section be allowed for printing on the traffic channel automatically every 30 minutes (when equipped). The SLB data collected prints regardless if the DN being studied has activity or not.
- **ALW:TRFC30,CLCT,ALL**
This IM requests that all sections of the TRFC30 report be allowed for collection. The SLB section, which requires identifiers for collection, are not allowed by this command.
- **OP:TRFC30,SLB**
This IM requests an immediate output of the SLB section. All collected SLB with non-zero peg count is reported.
- **OP:STATUS,TRFC30**
This IM requests an immediate output of the status of all sections of the TRFC30 report.
- **OP:MEASTST,CLCT**
This IM requests an immediate output of the collection status of all sections of the TRFC30 report.
- **OP:MEASTST,PRNT**
This IM requests an immediate output of the print status of all sections of the TRFC30 report.

The output messages (OMs) received in response to input requests are as follows:

- **ALW MEASTAT TRFC30**
This OM is a trailer message following the **OP MEASTAT CLCT** output message. This trailer message reports the status for those sections requiring identifiers. For SLB, this OM reports all the DNs currently being studied.
- **OP MEASTAT CLCT**
This OM reports the section number, the section name, the section size, and the collection status of each section of the TRFC30 report.
- **OP MEASTAT PRNT**
This OM reports the print status to the ROP and the TRFCH of the 15-minute traffic, TRFC30, the division of revenue hourly, and the hourly plant reports.
- **OP STATUS TRFC30**
This OM reports the section number, section name, section size and the print status to the ROP and the TRCH of each section of the TRFC30 report.
- **OP TRFC30 SLB**
This OM reports the SLB data, including the DN, SM, terminating count, and busy count. This output is in response to a request for either an immediate or scheduled output of the SLB section.

6.15.2.4 Operational Limitations

Counts are generated only for DNs specifically requested, up to a total of 32 DNs per SM and not to exceed 128 DNs per office. Up to six DNs may be entered with a single ALW or INH input message.

6.15.2.5 Deactivation

The input messages (IMs) controlling deactivation of this feature are as follows:

- **INH:TRFC30,CLCT,SLB=DN1,...,DN6**
This IM identifies the DNs inhibited for collection. Up to 6 DN identifiers may be entered in one command. The identifier is a NANP DN without the NPA.
- **INH:TRFC30,CLCT,SLB=ALL**
This IM inhibits all currently-studied DNs from the SLB study list. The list is saved, and can be reactivated by the **ALW:TRFC30,CLCT,SLB=PREV** input message if that is the first allow-for-collection request after the list is inhibited.
- **INH:TRFC30,ROP,SLB**
This IM requests that the SLB section not be printed on the ROP.
- **INH:TRFC30,TRFCH,SLB**
This IM requests that the SLB section not be printed on the traffic channel.
- **INH:TRFC30,CLCT,ALL**
This IM requests that all sections of the TRFC30 report be inhibited for collection. The SLB section is inhibited by this command if the section is allowed for collection.

6.15.2.6 Interactions

The following items describe the interactions of the SLB Counts feature with several custom calling features:

- For POTS lines, or lines with their assigned custom calling features deactivated, the Attempt count is pegged for each termination. If the line is in use when a termination is attempted, the SLB count is pegged.
- For lines in a Series Completion list, SLB assigns only the last line of the hunt series.
- For lines having the Call Forwarding feature active, both counts are pegged for the CFBL feature, but neither of the counts is pegged for the CFV or CFDA features.
- For lines with the Call Waiting feature active, the Attempt count is pegged at each terminating on the line and the SLB count is only pegged when the busy tone is returned to the originator (SLB count is not pegged for the calls waited).
- For an Automatic Callback call, the Attempt count is pegged.

6.15.3 Engineering

Not applicable.

6.15.4 Assignment Guidelines - Limitations

Counts are generated only for DNs specifically requested by the craft up to a total of 32 DNs per SM and not to exceed 128 DNs per office. The SLB counts are only made on individual analog lines and the input DNs must be NANP DNs without the NPAs. Up to six DNs may be entered with a single ALW or INH input message. An analog line DN that is shared with ISDN terminals cannot be allowed for collection of SLB counts.

6.15.5 System Operation

This feature reports two new counts on a half-hour interval when they are requested. The new counts are reported as part of the existing TRFC30 report. The counts appear on a new section of the TRFC30 report, and contain measurements for a maximum of 128 DNs. The TRFC30 report comprising all sections or just a subset of all sections, may be output for any or all of four separate scenarios:

- (1) "Automatically" to the EADAS channel in response to an EADAS poll request.
- (2) "Automatically" scheduled output to the ROP at the 30-minute mark.
- (3) "Automatically" scheduled output to a Traffic Channel at the 30-minute mark.
- (4) Manual craft request at the master control center (MCC).

6.15.6 Measurements

The SLB Count feature adds a new section to the TRFC30 report. This feature differs from existing measurements collecting and reporting mechanism because the feature is inhibited as a default and counts are collected only on a subset of the total lines in an office and only those lines with a non-zero count value are printed. This feature is the first TRFC30 section to provide measurements on a per-DN basis.

This feature generates, collects, and reports two traffic measurements for identified lines. The lines these new counts are provided for must be identified by their NANP DNs without the NPA. The two new counts are pegged at the terminating SM as follows:

- (1) SLB count (peg count for terminating attempts returning busy tone to originator).

- (2) Attempt count (peg count for total terminating attempts).

6.16 VERIFY OFFICE ROUTING PHASE II

6.16.1 Overview

6.16.1.1 Definition

The verify office routing feature provides the office craft with the capability of obtaining consolidated routing translations information used by call processing programs on request. Phase II of this feature extends the functionality to process calls which use the individualized dialing plan (IDP), uniform numbering plan (UNP), or automatic route selection (ARS).

6.16.1.2 Availability

This feature is available with 5E6 and later software releases. This feature is also available for software release 5E6 via a Software Update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

6.16.1.3 Feature Provision Basis

This feature is provided on a per-office basis.

6.16.2 User Perspective

6.16.2.1 User Profile

The Verify Office Routing Phase II feature is used by the telephone company Plant Maintenance (craft) and Administration (office dependent data administration) personnel.

6.16.2.2 User Operation

The user enters an input message to identify routing errors in calls which use the IDP, UNP, or ARS. An output message identifies one of the following situations:

- (1) A tuple in a relation was missing. The relation name and keys are identified.
- (2) The call terminates to reorder or announcement.
- (3) The line or trunk being analyzed is assigned a feature which is not supported by the Verify Office feature.
- (4) The call terminated to a normalized office code (NOC); route index (RI) and trunk; MCRI and trunk; RI, trunk, and SFG_GRP (simulated facility group); or a DIALCODE.
- (5) During digit analysis, some type of processing error was encountered.

If an error is detected during the processing of a call, a descriptive error message is printed and the processing is halted. From this information, the craft takes the necessary steps to correct the problem encountered.

6.16.2.3 Activation

The craft initiates requests for verification of office routing translations, used in call processing, from the originating

line or trunk to the terminating line or trunk. The format of these input messages is as follows:

MML

VFY:OFC,{DN=a | TG=b[-c] | MLHG=d-e |PORT=f-g},{DIG=h};

PDS

VFY:OFC,{DN a | TG(b[,c]) | MLHG(d,e) |PORT(f,g)},DIG h!

Where:

a = directory number (DN)
 b = Trunk group number
 c = Optional member number of a trunk group number
 d = Multi-Line hunt group number
 e = Multi-Line hunt group member number
 f = Port name
 g = Module number of port
 h = Optional address digits (must be specified unless the call is from a manual or direct connect line or trunk).

The systems response is a printed output message. The output options reflect different originating ports and different results possible for the verification. Errors detected in the static data are identified with text stating a description of the problem, the area of call processing which found the error, and the relation (and its keys) in question, if any. The output message format is as follows:

Output Message: **VFY OFCa DIG=b EVENT c**

PORT=d-e PARTY=f DAS=g SCR=h COS=i
DIGITS USED=j PREFIX=k DEST IDX=[l]
DEST_TYP=[m] ACTN=[n] CHG_IDX=[o] CARRIER=[p] [q]
FRL=[r] [s] [t] [u]

Where:

a = The originator for which the call is being verified:

- **DN=x** (directory number of a line)
- **MLHG=x-y** (mlhg group number x and member number y)
- **PORT_ENTERED** (when a specific port is entered)
- **TG=x-y** (trunk group number x and member number y).

b = Verified dialed digits
 c = Request event number
 d = Originators SM number
 e = Originators port member number
 f = Specific party associated with the originating DN
 g = Originator digit analysis selector
 h = Originators screening index, ARS index, or SFG screening index
 i = Originators class of service or servclass
 j = Dialed digits after deletion, and prefix by digit analysis, but prior to any deletion and prefixing resulting from routing to a trunk to leave the office
 k = Prefix dialed:

- **NONE** (No prefix dialed)

- **0** (Zero prefix dialed)
- **1** (One prefix dialed)

l = Destination index, code index, or ARS index found in the office data for this call

m = Destination type found in the office for this call

n = Specific action defined in the office data for the dialed feature code

o = Charge index

p = Carrier used for the call

q = Termination of this call with respect to this office:

- **RI=x TRUNK=y** (Route index x and trunk group y, for a call leaving the office)
- **NOC=z** (Normalized office code z, for a local line)
- **DIALCODE** (Customer feature dial code entered)
- **MCRI=x TRUNK=y** (Route index x for MFC routing and trunk group y, for a call leaving the office)
- "blank" (call termination is not determined)

r = Group facility restriction level

s = **SFG_GRP=s** (SFG number)

t = "Error message"

u = Relation name and key fields.

6.16.2.4 Operational Limitations

Only one craft-initiated Verify Office request may be active at a time. Each request requires between 5 and 35 seconds to complete.

The following types of originations and calling services are not supported by this feature:

- Line time slot bridging (LTSB)
- Integrated services digital network (ISDN) features
- Private virtual network (PVN)
- Remote access service (RAS) for call forwarding
- Account codes and authorization codes
- Autovon calls to an operator
- Intercom call restriction (ICR)
- Local area signaling (LASS)
- Electronic tandem switching (ETS) on primary rate interface (PRI)

- Number 800 service calls
- Packet switching and modem pooling line, trunks, and calls
- Inter-toll trunks and local/toll operator services
- Special routing (hundreds group routing to a route index associated with a DN, such as for Direct Inward Dialing)
- Alternate routing patterns
- Operator Services Position System function
- Common Channel Signaling trunks
- Cutover routing
- Local test desk and board-to-board calls and network access
- Equal Access Signaling multiple digit sequence protocol (that is, other than the case of traditional signaling for an originating trunk)
- Centralized Automatic Message Accounting (CAMA) services
- Fully coded addressing (FCA) for international calls
- Hardware hunting or status checks.

NOTE: The 800 Service is not limited to the 800 NPA if the switch has implemented a toll-free treatment feature that allows additional toll-free service access codes (SAC) such as 877 or 888.

6.16.2.5 Interactions

This feature uses the static office dependent data (ODD) relations used in call processing. Any changes to these base relations will impact the functionality of the Verify Office code.

6.16.3 Engineering

Not applicable.

6.16.4 Assignment Guidelines

Not applicable.

6.16.5 System Operation

When the VFY_OFC input message is entered, it is interpreted and the message structure mgVFY_OFC is populated. This message structure is sent to the utility call trace (UCT) system process in routing and terminal allocation subsystem (RTA). This system process creates a terminal process and stores information to be output. The process then sends acknowledgement to the user.

The terminal process calls the function receiving the message and sends it to the system process in the SM. This system process creates an SM terminal process, sends the output message structure, and returns. When the SM terminal process is complete, the results are sent back to the AM UCT system process. The AM system process sends the output message to the AM terminal process which is in a wait state. In the AM terminal process, final

processing is performed to format and print the output message.

6.16.6 Administration

Not applicable.

6.17 VERIFY ROUTING AND CODE DATA

6.17.1 Overview

6.17.1.1 Definition

The Verify Routing and Code Data feature gives the service provider the ability to obtain consolidated routing information on request. The routing information includes the destination index and route index provided in a *UNIX*® file.

6.17.1.2 Availability

This feature is available with the 5E6 software release.

NOTE: Consult your Lucent Technologies Account Executive for availability.

6.17.1.3 Feature Provision Basis

This feature is provided on a per-system basis.

6.17.2 User Perspective

6.17.2.1 User Profile

This feature is used by the service provider to initiate the verification of routing information.

6.17.2.2 User Operation

6.17.2.3 Activation

A new input command is provided to produce the routing information. The new command is:

MML

OP:DIGTRC,SM=a,DAS=b,START=c,END=d;

Where:

a = switching module (SM) number (1 to 192)
 b = digit analysis selector (DAS) number (1 to 90)
 c = Starting range of digit strings (0 to 999999999) (see note)
 d = Ending range of digit strings (0 to 999999999) (see note).

NOTE: A string of three or more digits is required.

Response:

PF = Printout follows. Information in output file.
 NG = No good. The request was not accepted for one of the following reasons:

- An illegal SM number was specified
- An illegal DAS number was specified

- An illegal START number was specified
- An illegal END number was specified.

6.17.2.4 Operational Limitations

The output file is limited to a 1000 line entry.

6.17.2.5 Interactions

Not applicable.

6.17.3 Engineering

Not applicable.

6.17.4 System Operation

A list of translated digit patterns along with routing information is placed into a *UNIX*® file on the administrative module (AM) under the /updtmp directory. The routing information is written to a file called "xxxxxx.results" (xxxxxx is a unique number for every execution of the message). Any failures encountered while processing are output on the receive only printer (ROP) and an error file (xxxxxx.err) is also created under /updtmp.

6.17.5 Administration

Not applicable.

6.18 MULTIPLE LOCAL DIGIT TRANSLATION 3- TO 6-DIGIT EXPANSION

6.18.1 Overview

6.18.1.1 Definition

The Multiple Local Digit Translation 3- to 6-Digit feature provides service provider the ability to expand 3-digit routing sequences to 6-digit routing sequences, while continuing to route traffic on the 3-digit sequence.

6.18.1.2 Availability

This feature is available with the 5E6(1) software update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

6.18.1.3 Feature Provision Basis

This feature is provided on a per-system basis.

6.18.2 User Perspective

6.18.2.1 User Profile

This feature is used by service provider to translate 3-digit routing sequences to 6-digit routing sequences.

6.18.2.2 User Operation

Expansion Procedure

The expansion procedure is performed using RC View 9.15 (MLDIT).

(a) Change/Insert 6-digit translation(s):

- (1) Enter RC View 9.15 in review mode.
- (2) Enter 3-digit translation (to be expanded).
- (3) Select the Change /Insert operation.
- (4) Change the INCOMING DIGITS field (field 2) to one (or a range of) 6-digit value(s).
- (5) Insert the new 6-digit translation(s).

NOTE: Continue inserting until all 6-digit translation(s) are input.

(b) Update and verify 6-digit data:

- (1) At this point, the 6-digit translations can be updated or deleted without service impact.
- (2) Verify 6-digit translations for accuracy.

(c) Complete all verification of 6-digit data before proceeding.

(d) Switch routing from 3-digit to 6-digit translations:

- (1) Enter RC View 9.15 in Update mode.
- (2) Enter 3-digit translation that has been expanded.
- (3) Select the Change operation.
- (4) Change the **CONVERSION COMPLETE** field (field 34) to **Y**.

NOTE: If it is necessary to abort the expansion of a particular 3-digit translation, go to the **Backout** procedure now. The **Backout** procedure must be completed to allow subsequent expansions.

- (5) Complete the update operation.

Backout Procedure

The backout procedure requires the use of the office data base editor (ODBE).

(a) Delete all 6-digit translations entered in the **Expansion** procedure.

(b) Update the Global Parameter data:

- (1) Enter ODBE.
- (2) Enter processor number - **0**

- (3) Enter relation name - **PARAMETER**
- (4) Enter parameter name - **GLCP10DUMMY**
- (5) Enter operation - **U**
- (6) Enter value of - **0**
- (7) Complete the update and exit ODBE.

Error Messages

The following error messages could be received during an expansion.

- **THERE IS NO 6-DIGIT CONVERSION IN PROGRESS.**

This indicates that an invalid code has been entered in **Step d-2** of the **Expansion** procedure. The 3-digit translation currently being expanded must be entered.

- **INCOMING DIGITS DIFFER FROM ORIGINAL CONVERSION DIGITS.**

This indicates that a new expansion has been attempted while another expansion is in progress. The 3- to 6-digit expansion procedure is allowed on only one 3-digit code at a time. The expansion must be completed (**Expansion** procedure, **Steps d-1** to **d-5**) or must be backed out.

- **CONVERSION COMPLETE IS DONE ONLY ON 3-DIGIT STRING.**

This indicates that an invalid code has been entered in **Step d-2** of the **Expansion** procedure. The 3-digit translation currently being expanded must be entered.

6.18.2.3 Operational Limitations

The expansion is allowed on only one 3-digit string at a time.

6.18.2.4 Interactions

Not applicable.

6.18.3 Engineering

Not applicable.

6.18.4 Assignment Guidelines - Recent Change Views

A new field is added to RC View 9.15 (MLDIT). The new field, **CONVERSION COMPLETE**, is used to switch routing from 3-digit to 6-digit translations. This field has valid values of **Y** (yes) and **N** (no) with a default value of **N**.

6.18.5 System Operation

Service is maintained during expansion from 3- to 6-digit translations. While the user is inserting and verifying 6-digit translations, the system continues to route on the existing 3-digit translations. After the 6-digit translations are verified, the user decides when to switch routing from 3-digit to 6-digit translations. During the digit expansion, verification and switch-over, there is no service interruption.

6.18.6 Administration

Not applicable.

6.19 INTERMODULE TRUNKING

6.19.1 Definition

The Intermodule Trunking feature provides trunking between modules (MMRSMs, ORMs, and SMs) connected to the same base 5ESS[®] switch. An important application of this is the ability to provide emergency routing when a module connected to an intermodule trunk is isolated from the switch. Calls to and from the isolated module can be rerouted over the intermodule trunks to complete at their dialed destinations. Alternately, the intermodule trunks can be used as a primary route between two modules with overflow optionally rerouted to the links to the host. Additional alternate routes can be specified with the capability to tandem switch calls between the MMRSMs and/or ORMs.

When existing offices are replaced by MMRSMs or ORMs hosted from the same 5ESS[®] switch, then the existing trunks between the offices could still be used to carry traffic by providing the intermodule trunking feature.

In general, intermodule trunks operate as trunks connecting two independent switches.

6.19.2 Economic Worth

Inter-module trunks provide a more economical way to connect remotes being used as community dial office (CDO) replacements when trunks already exist between them.

6.19.3 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

6.19.4 Feature Assignment

The Intermodule Trunking feature is provided per SM.

6.19.5 User Perspective

6.19.5.1 User Profile

This feature was primarily designed for telephone company personnel as a means of increasing reliability by providing an alternate link for routing calls to and from remote switching modules, to carry traffic over existing trunks when CDOs are replaced by MMRSMs, or less commonly IMTs may be used to avoid crossing a LATA boundary.

6.19.5.2 Feature Operation

Inter-module trunking provides additional flexibility in routing various calling patterns within the switch. Customer subscribers, in general, are not aware of calls routed over NCT links versus calls routed over intermodule trunks. An exception to this is that BRCS features which do not work between switches do not work over intermodule trunks. All inter-switch BRCS features, LASS features and POTS features work over intermodule trunks. Also, if the IMTs are CCS7 trunks, they do not work during stand-alone operation.

Office administration personnel need to set up the ODD for the intermodule trunks based on the desired routing pattern. If the IMTs are to be used as a primary route, the appropriate local digit interpreter table (LDIT) needs to be defined for each SM containing an IMT so the appropriate DN ranges can be routed to the IMTs. If the IMTs are to be used only as an alternate route during stand-alone operation, the emergency routing tables in the module ODD need to be populated with the appropriate DN ranges to be routed.

In setting up intermodule trunks, office administration personnel should be aware of the constraints regarding the operation of features as described in the interactions paragraph. Features work across an intermodule trunk in the same way that they work across a trunk connecting two independent switches. Inter-module trunks support interoffice features such as LASS if the trunks are CCS7.

Inter-module trunks should be set up as a local trunk group connecting two modules (for example, ORM to ORM, MMRS to MMRS, ORM to MMRS, etc.). A local trunk group has all of its members terminating on the same SM. The ability to have local groups on any module is being provided by the ORM stand-alone capability. The advantage to defining a group to be a local is that calls to the group are hunted by the module that contains the group. This provides the benefit of removing the hunting operations for the intermodule trunks from the AM, thus improving performance and overall system capacity.

One of the restrictions, however, currently placed on all local groups is that network management controls are not available. Network managers must be aware of this consideration when setting up an intermodule trunk group, particularly in the case where it is used as a tandeming device. Another restriction is that CCS trunk groups may not be designated as local groups (that is, they must be global, owned by the AM).

Inter-module trunks may also be used as a global group (that is, members spread across several modules). A typical example is an intermodule trunk connecting an MMRS at one physical site to two ORMs at another physical site. The intermodule trunk would be connected to a single RSM in the MMRS cluster and would be considered local to the MMRS. The other end of the intermodule trunk group would be spread across the two ORMs, and would therefore be a global group. There are, therefore, no restrictions in the use of intermodule trunks as either local or global groups (other than those previously mentioned for local groups).

6.19.5.3 Interactions

The use of intermodule trunks during stand-alone operation assumes the installation of the stand-alone call processing option. This option is being provided in software release 5E6 for non-RSM modules by the ORM stand-alone capability.

An intermodule trunk group can be set up as a local group (that is, all members terminate on the same module). The ORM stand-alone capability for software release 5E6 is extending the concept of local groups (including local IMTs) to all module types. A restriction on the use of these local trunk groups is that they must not be used for CCS trunks. Any CCS intermodule trunk must be owned by the AM even if all the members of the group physically terminate on a single module.

The LASS features work consistently only if the switch has CCS7 capabilities and all of the intermodule trunks are CCS7 trunks.

6.19.6 Engineering

6.19.6.1 Special Planning Considerations

Office engineering guidelines should take into consideration the number of time slots that are tied up with each IMT. Each trunk ties up 24 peripheral time slots. Each digital facilities interface (DFI) can have up to 10 digital trunks. Analog trunks must be in groups of 64, with 64 time slots for each group. If there are less than three trunks, the unused time slots can be used by ISDN components. If a unit does not have ISDN, these slots are wasted.

If the intermodule trunk groups include both CCS7 and non-CCS7 trunks, LASS works inconsistently because LASS requires CCS7 trunks. Calls to or from a LASS user operate correctly when routed over CCS7 IMTs or over the umbilicals and incorrectly when routed over non-CCS7 IMTs. This condition must be balanced against the fact that CCS7 trunks do not work when a module on which the trunk terminates is isolated from the switch.

It is recommended to the telephone company, that the intermodule trunks provide a zero db loss connection (that is,

no loss imposed by the 5ESS[®] switch) to ensure an equivalent transmission grade of service whether the call is routed via the intermodule trunks or via the umbilicals.

6.19.6.2 Hardware

No special interfacing hardware is required for this feature. Each call completing across an intermodule trunk group utilizes a member of that trunk group for the duration of the call.

6.19.6.3 Software

This feature has no appreciable impact on switch memory capacity.

6.19.7 Implementation

This feature is implemented if the ODA is set right. The following translation forms are applicable to this feature:

- 5108
- 5116
- 5202
- 5210
- 5303
- 5304
- 5700
- 5722.

See the Translation Guide TG-5 DIV. 2, SEC. 1n for information and specifications relating to assignments for this feature.

6.19.8 System Operation

The three intermodule trunking options can be divided into two categories as follows:

- (1) IMTs used as the primary route between modules with the following options:
 - (a) Overflow or alternate routing not allowed over the communications links (option 1)
 - (b) Overflow or alternate routing over the communications links (option 2)
- (2) IMTs used only during stand-alone (option 3).

6.19.8.1 IMTs As The Primary Route

When using IMTs as the primary route, the telephone company has two options. Option 1) Designate the intermodule trunks as the primary route and disallow overflow or alternate routing over the communication links to the host. Option 2) Designate the intermodule trunks as the primary route with overflow or alternate routing going over the communication links to the host. Routing of calls originating and/or terminating on modules connected to

IMTs may include the intermodule trunks, depending on office engineering. Calls that require interprocessor messages, except CCS7 cannot go over IMTs; therefore, most intraoffice BRCS and ISDN features do not work over intermodule trunks.

In stand-alone, incoming and outgoing calls that have been engineered and populated to use the IMTs continue to use them. The isolation does not affect their routing. In Figure 6-1, if the primary route between B and C was the IMT, then the blockage on MMRSM-1's umbilical, does not affect the routing or completion of the call. Calls tandemed over IMTs behave as calls sent over interoffice trunks; therefore, these calls cannot have features that do not normally work for intraoffice calls.

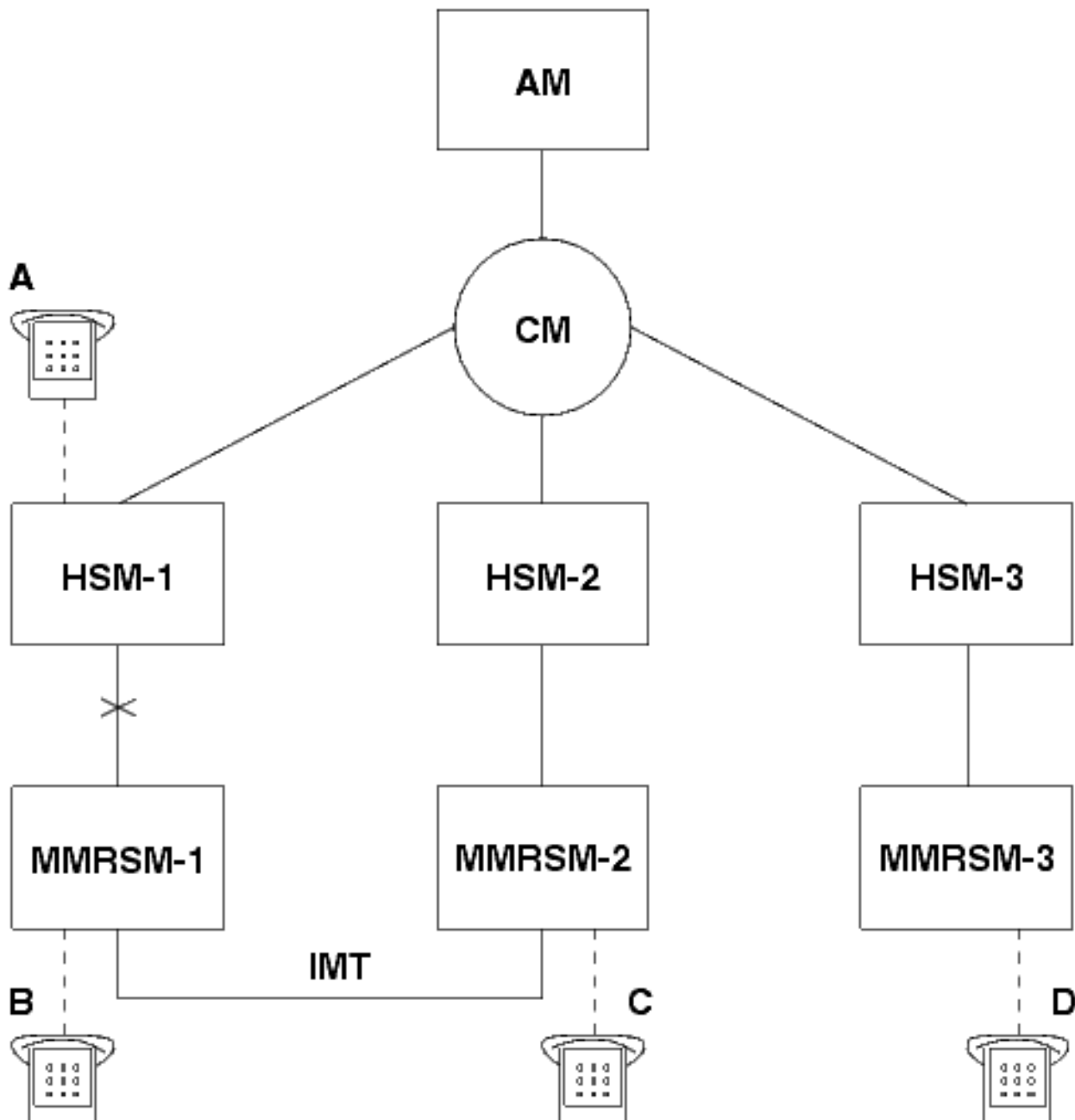


Figure 6-1 Intermodule Trunks Used During Stand-Alone

Examples of uses of IMTs as a primary route include the following:

(1) Community Dial Office Replacement

When two existing CDOs are replaced by MMRSMs hosted by the same 5ESS® switch, the connecting trunks can continue to be used as intermodule trunks. This is very useful for CDOs in a rural setting, with a community of interest between them replaced by MMRSMs connected to a host office in an urban setting. Calls can continue to route directly between the two MMRSMs over the probably numerous existing trunks, instead of routing through the umbilicals to the host and back. During overflow of the IMTs, the calls can be alternately routed to the umbilicals.

(2) Inter-LATA Applications

When the MMRSMs are in different LATAs than the host office, routing of calls via the host-to-remote links could be a violation of legal restrictions. Messages may go over LATA boundaries, but calls may not. Inter-module trunks connecting MMRSMs in the same LATA can carry calls between them, while the messages and control can remain with the host office in a different LATA. Overflow or alternate routing over the umbilicals to the host would be disallowed.

6.19.8.2 IMTs Used Only During Stand-alone

Prior to the application of the intermodule trunking feature, all call routing between modules on the same 5ESS® switch had to go over the links to the host SM or to the CM. If these links were not operational, the module could only complete calls that originated and terminated to a line or trunk on that module or MMRSM cluster. Inter-module trunking extends the MMRSM and ORM stand-alone capability to allow stand-alone modules to complete calls originating or terminating outside the module or cluster.

During normal operation, all traffic to or from the modules connected to IMTs is routed through the links to the host. There are two scenarios for stand-alone. In the first scenario, a module connected to an IMT is cut off from the host switch and the module on the other side of the IMT is still connected to the switch. See Figure 6-1 . Calls that originate and complete on the stand-alone module are handled normally. All calls originating on MMRSM-1 and do not terminate on the isolated module (MMRSM-1) are sent over the IMT to be routed to their final destination. In Figure 6-1 , MMRSM-2 handles subsequent routing with the help of appropriate routing SMs.

In the second scenario, the two modules on either side of an intermodule trunk are both in stand-alone (isolated from the host), and have the stand-alone option installed. These modules can complete calls originating and terminating on one of the modules. This includes line-to-line, line-to-trunk or trunk-to-line calls originating on one of the MMRSMs and complete on trunks or lines on one of the MMRSMs connected to the IMT. In Figure 6-1 , if both MMRSM-1 and MMRSM-2 are isolated from their hosts, calls between them (for example B and C) can still be completed. Of course any calls that require any equipment on the far side of the cut link cannot be completed. Calls must not be allowed to loop or be repeatedly routed over the same IMT.

An example of IMTs used as a stand-alone alternate route includes collocated ORMs. The IMTs can be used to connect collocated ORMs. Examples include remote communities of interest too large to be served by a single ORM and as 1A capping vehicles. The intermodule trunk provides additional reliability during stand-alone by providing call processing capabilities between the ORMs. It is expected that the added reliability will make ORMs a more desirable product.

An external timing source is required for an ORM (whereby, the ORM timing will be derived from the external source and not from the umbilicals), if features for example, intermodule trunking, ISDN features, and other features which need a high accuracy of timing have to be supported during stand-alone operation.

6.19.8.3 Alternate Routing of Blocked Calls Terminating on a Module with an IMT

When a module with an IMT loses its communication links with the host, calls from other modules attempting to

terminate over the blocked link fail at their first routing attempt. Routing then switches to the AM which uses emergency routing to alternate route the call to the module on the other end of the IMT. Using Figure 6-1, a call from A to B might be engineered to have the umbilical as its primary route. This route fails. Routing then goes to the AM which specifies an alternate route using the IMTs. The call is then rerouted through the CM to HSM-2 to MMRS-2 and over the IMT to MMRS-1.

6.19.9 Measurements

Existing traffic and plant measurements do not change for intermodule trunks. An intermodule trunk is treated as both an incoming and an outgoing trunk on the same switch. A call that traverses an intermodule trunk may be pegged on one end as an outgoing call and on the other end as an incoming call. Also trunk MDII errors may be pegged and reported at both ends of an IMT. No effort has been made to reduce or throttle this output.

6.20 TRANSMISSION RATE CONVERTER UNIT DIRECT FIBER INTERFACE

6.20.1 Definition

This feature (99-5E-0508) provides a transmission interface between the 5ESS[®] switch and an optical remote switching module (ORM) which achieves significant savings over the standard DS3 interface. The feature provides a point-to-point connection of ORMs to the communication module (CM) of the 5ESS[®] switch using the transmission rate converter unit (TRCU) configured to drive optical fiber. Configured this way, the TRCU converts the 32 Mb/s network control and timing (NCT) rate to a 45 Mb/s DS3 rate and then multiplexes the two DS3 channels (odd and even time slots from one physical CM) onto a single 90 Mb/s channel. The output of this channel drives a single-mode fiber link (without repeaters) in excess of 30 miles, depending on the characteristics of the fiber and the specific driver pack used.

6.20.2 Economic Worth

The ORM 90 Mb/s direct fiber-optic transmission is used to eliminate the need for the standard transmission equipment (DS3 transmission facilities) to provide a lower cost of the ORM.

6.20.3 Availability

This feature is available with the 5E6 and subsequent software releases of the 5ESS[®] switch.

6.20.4 Feature Assignment

This feature is provided on an ORM basis.

6.20.5 User Perspective

6.20.5.1 User Profile

This feature was primarily designed for the telephone company as a means of achieving significant savings over the standard DS3 interface.

6.20.5.2 Feature Operation

This feature is an ORM hardware design which minimizes software impact and is essentially transparent to the user. Various MCC page enhancements (Pages 1190, 1200, 1620, and 1900) have been provided to display the TRCU2 associated with the NCT link and ORM as well as provide ORM status to the craft.

6.20.5.3 Interactions

Hardware items that cannot coexist when this feature is provided are discussed in the following paragraphs.

The host TRCU2 consists of a shelf containing a maximum of eight TN1345 circuit packs, four 494RA power supplies, and four 16E, 16F, or 16G circuit packs. The redesigned NCT to DS3 Rate Converter (NDRC) circuit pack (TN1345) is required to handle the interface between time multiplexed switch (TMS) or dual link interface (DLI) to the existing optical line interface (OLI) circuit packs (16E, 16F, or 16G), which are used for direct fiber-optic transmission (TRCU2-O) or DS3 transmission (TRCU2-E) when AKM3 circuit packs are used.

The use of the 16E, 16F, or 16G depends on the distance between the host office and remote office.

At the remote office, another shelf is required. This shelf uses the same packs as the host office. This shelf is located above the MCTU, in the switching module cabinet (SMC).

Only four TN1345, two 494RA power supplies and two OLI (16E, 16F, or 16G) circuit packs are required for one remote connection in the host office. At the host office, the TRCU2-O shelf (J drawing number J5D003ED-2) is mounted in the miscellaneous frame. The NCT links from a TMS connect to the backplane of this shelf. The transmission portion of the 16E, 16F, or 16G circuit packs have a single mode fiber pigtail for connecting to the transmitting single mode or multimode fiber. The receiving portion of the circuit packs have a multimode fiber pigtail for connecting to the light-wave in the receiving direction.

Two pairs of fiber (2 transmitters and 2 receivers) are required to connect both the 0 and 1 circuits of the TRCU2-O in the host to the remote site.

The 2 pairs of fiber from the host office are connected to the fiber pigtails of the 16E, 16F, or 16G circuit packs. The four TN1345 circuit packs are connected to two TN1077B circuit packs of the DLI via shielded twisted pair cables. Control of the power supply circuit packs in the ORM is from TN1077B circuit packs in the DLI.

The 16E circuit packs using single mode fiber optic cable have the capability of transmitting and receiving for a distance of 18 miles. The 16F provides transmission over 29.3 miles and the 16G can provide transmission for 36.3 miles.

Multimode fiber can be used, but it causes a reduction in the remote distance for each type of 16 circuit packs.

This TRCU2 hardware can also work with DS3 type transmission equipment by removing the 16E, 16F, or 16G circuit packs and replacing them with AKM3 circuit packs. The output connects to a DSX-3 transmission equipment using type 728B coaxial cable. The AKM3 circuit pack has a snap lock coax connector mounted on the circuit packs. The cables to and from the DSX-3 are terminated in right-angled male BNC connectors mounted on the AKM3 packs.

Each DS3 channel carries the information of one NCT link. Since four NCT links are required to support an ORM, four DS3 channels are used to support one remote site. The four NCT links require eight coaxial cables to connect the TRCU2 hardware to the DS3 cross-connect frame. The TRCU2 hardware satisfies the following conditions:

- (1) Provides the bit rate and format conversion necessary to connect an NCT link to a DS3 link.
- (2) Provides the ability to transmit and receive electrical signals that conform to the DSX-3 cross-connect template.
- (3) Provides the ability to transmit and receive optical signals directly to and from single mode or multimode fiber optic cable.
- (4) Provides a loop around to give the diagnostic isolation capabilities.
- (5) Provides an LED that lights when all but one of the time slots on the incoming NCT link have idle code.

6.20.6 Engineering

6.20.6.1 Hardware

6.20.6.1.1 TMS to TRCU2 Interface

Four NCT links provide the connection between the TMS and the TRCU2. These NCT links are implemented with optical transmitters and receivers, and fiber optic cable just like the standard TMS to switching module (SM) NCT links. The NDRC circuit pack has circuitry to detect the presence of the following three data patterns:

- (1) Idle code on all but one of the time slots. This pattern is used to light an LED that indicates the link is idle.
- (2) A string of at least 33 ones followed by a string of at least 65 zeros on the G bit. This pattern is used to put the NDRC circuit pack into the loop mode.
- (3) A string of at least 65 ones on the G bit. This pattern is used to reset the loop mode. In addition, the loop mode is automatically reset two seconds after it is set.

The TMS, under diagnostic control, sends this special G bit pattern to put the NDRC into the loop mode so it can be diagnosed.

No power control and display function is provided for the power converters in the TRCU at the host end. The links are monitored for errors by the TMS and a loss of power produces errors which start the recovery process.

6.20.6.1.2 DLI to TRCU2 Interface

The four NCT links between the TRCU and the DLIs are implemented with shielded twisted pair because the distance is very short (less than 4 feet). The loop mode control mentioned previously is the same at this interface.

The NDRC circuit pack produces an 8 kHz reference signal by dividing down the incoming 45 MHz clock. This signal is sent to the DLI to be used as a reference for its phase locked loop. Each of the four NDRC circuit packs provides an 8 kHz reference signal with only one being selected by the two DLIs. In the NDRC circuit pack, those references not selected are synchronized to the reference that is selected.

Two leads from its associated DLI provide an indication to an NDRC circuit pack whether its reference has been selected as the phase locked loop input. One of these leads indicates whether a particular DLI is master or slave, and the other indicates whether the A or B link is being used as a reference.

The NDRC circuit pack also produces an out-of-frame output. This output indicates whether the NDRC circuit pack can frame up on the incoming 45 Mb/s signal. This signal is sent to the DLI where it is used to force the phase locked loop to free run when the NDRC circuit pack can not frame up on the incoming 45 Mb/s signal.

The power control and display function for the power converters in the TRCU2 is provided by the power control and display circuitry in the DLIs.

6.20.6.1.3 TRCU2-E to DS3 Cross-Connect Interface

The interconnection between the TRCU2-E and the transmission equipment is done at the DS3 rate via the DSX-3 cross-connect. The DSX-3 connections are implemented with coaxial cable with one cable required for receive and one cable required for transmit for each DS3 channel. Each DS3 channel carries one NCT link worth of information. Since four NCT links are required to support an ORM, four DS3 channels are used to support one ORM. These four links require 8 coaxial cables to connect from the TRCU2-E to the DS3 cross-connect.

6.20.6.1.4 TRCU2-O to Fiber Optic Cross-Connect

The interconnection between the TRCU2-O and the facility fiber optic cables is done at the 90 Mb/s rate via the fiber optic cross-connect. The fiber optic cross-connect allows the 90 Mb/s bit stream from the TRCU2-O to be distributed as desired over the facility fiber optic cables. Each 90 Mb/s bit stream carries two NCT links of information. Since four NCT links are required to support one ORM, two 90 Mb/s bit streams are used to support each ORM. Four individual fibers are required to support these two links.

6.20.6.2 Software

Simultaneous support of accurate trouble location for the TRCU2-E and TRCU2-O requires approximately 300 additional bytes of static data in the SM and 300 bytes of static data in the AM.

6.20.7 Implementation

The RC/V system provides the user interface that allows the craft to insert, update and delete data from the existing base relations required for this capability. The RC/V system supports the new change level indicators (CLIs) for TRCU-O in existing RC/V views. The RC/V system also supports the new unit type SMTRCU2.

The following four existing RC views have been changed:

- (1) TMS LINK (CM MODULE) - RC/V View 17.1
- (2) COMMUNICATION MODULE 2 - TMS LINK - RC/V View 17.12
- (3) TRANSMISSION RATE CONVERTER UNIT SHELF - RC/V Views 17.5 and 17.18

View 17.1 is used for CM1. This view allows the new CLI values and TRCU on the two-mile RSM (TRM) identifying the unit type of the new TRCU.

View 17.12 is used for CM2. This view allows the new CLI values.

View 17.5 is used for CM1 and View 17.18 for CM2. This function has been changed to populate RC_LOCEQ with the new unit type SMTRCU2 when applicable. A new field, TRCU TYPE, has been added to RC/V Views 17.5 and 17.18.

- When TRCU TYPE is equal to TRCU, SMTRCU is populated in RC_LOCEQ.
- When TRCU TYPE is equal to TRCU2, SMTRCU2 is populated in RC_LOCEQ.

The number of ORMs is still limited to 192 by the SM capacity of the 5ESS[®] switch.

6.20.8 Basic System Operation

This capability is an ORM hardware design which intends to minimize software impact. No design unit was assigned for this capability; however, the following subsystems required minor modifications:

- The DG subsystem provides diagnostic support for the trouble locating procedure (TLP) changes required with the new unit added for this capability.
- The maintenance request administrator (MRA) of the switch maintenance interface module (SMIM) subsystem provides general switch maintenance craft interface and configuration control.
- The RC/V subsystem provides support for the new CLI and the new unit type SMTRCU2.
- The DN and DNCP subsystems provide the testing of the circuit pack level of the TRCU2 hardware. The new

pack codes are printed in the TLP list when either DLI or TMS diagnostics fail.

- The conversion procedures from TRCU2-E to TRCU2-O for CM1 and CM2 versions of the TMS and the ORM have been provided.

The TRCU2-O hardware provides the redesigned NDRC and existing OLI circuit packs to directly connect the host and ORM. This design is known as the Transmission Rate Converter Unit - Direct Fiber-optic Transmission Interface (TRCU2-O).

The following sections define the hardware operation provided by this capability.

6.20.9 Description and Theory of Operation - TRCU2

A block diagram of the TRCU2-E is shown in Figure 6-2 for the DS3 connect option and a block diagram of TRCU2-O is shown in Figure 6-3 for the fiber connect option.

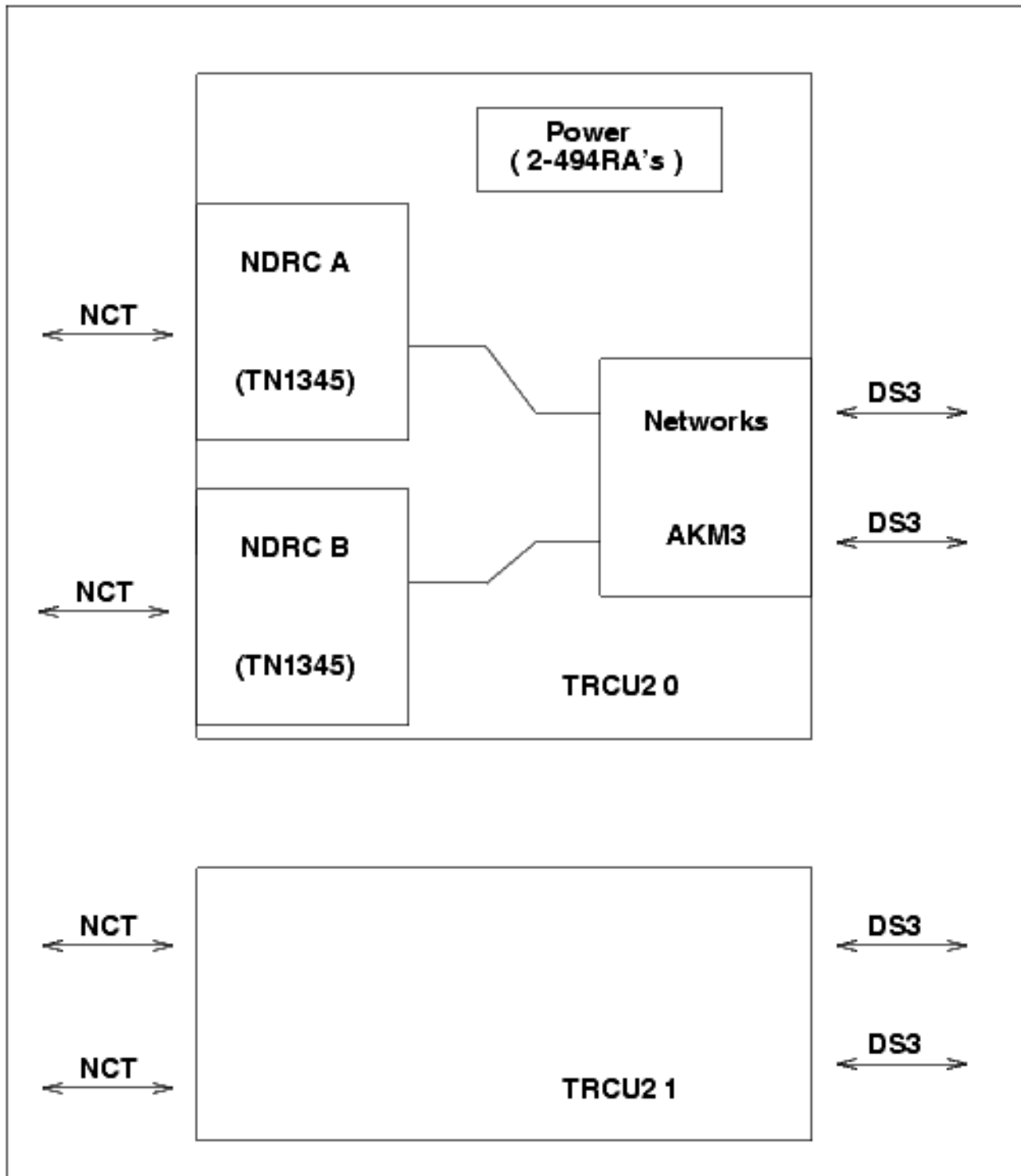


Figure 6-2 Transmission Rate Converter Unit 2 (DS3 Connect Option)

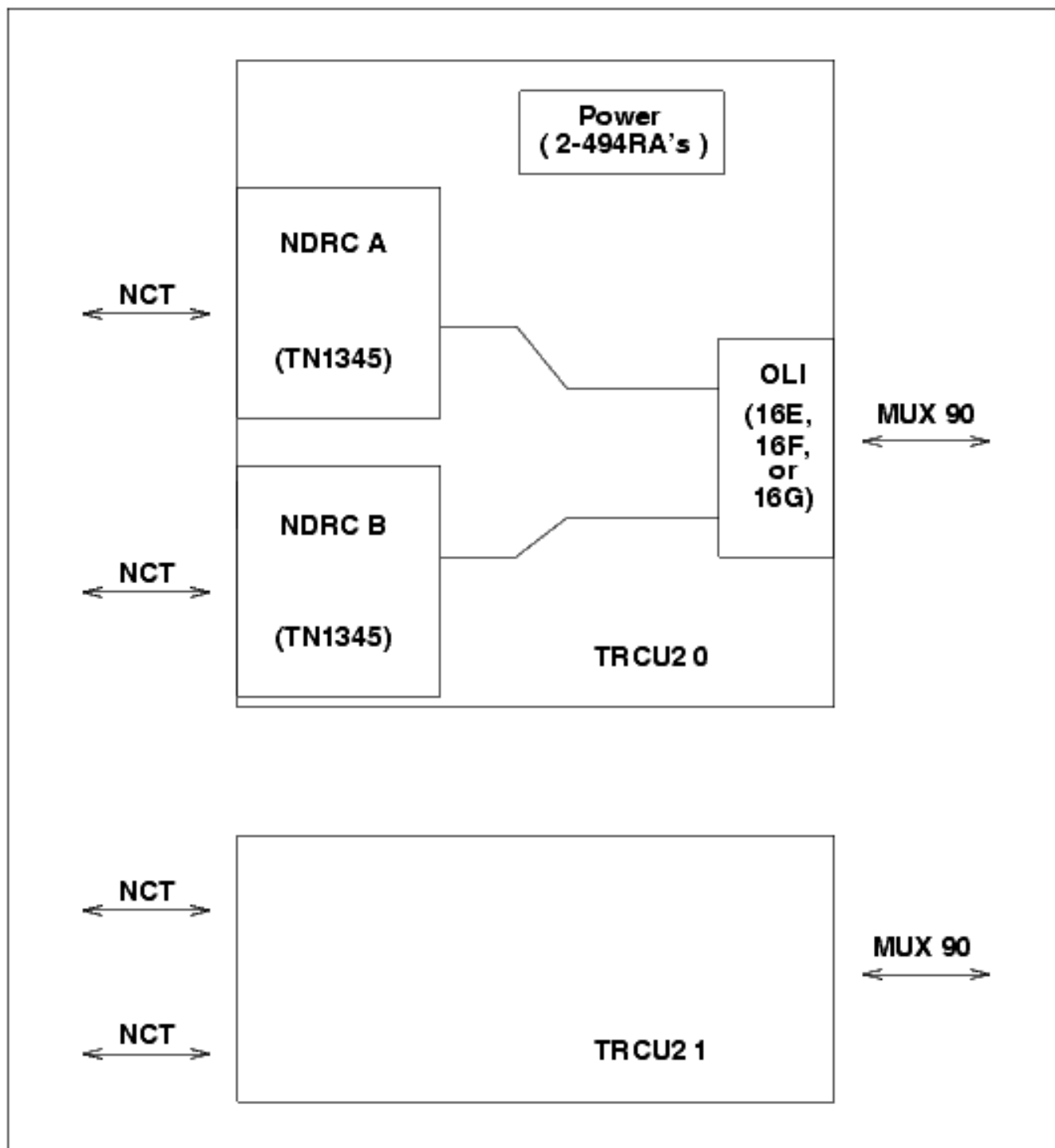


Figure 6-3 Transmission Rate Converter Unit 2 (Fiber Connect Option)

6.20.9.1 Power

Two power converters (494RA) are provided for each half of the TRCU2. One of these converters supplies +5 volts, and the other supplies -5 volts. At the host end, the power converters have no associated control and display function. To turn a converter off, its latch must be released. At the remote end, the control and display function of the

associated DLI also services the power converters in the TRCU2. Both the NDRC circuit pack and the networks circuit pack can be removed with the power on.

6.20.9.2 Networks (DS3 Connect Option)

This circuit pack (AKM3) is used when it is desired to connect to a DSX-3. The distance in the office between the location of the TRCU2-E and the DS3 cross-connect can vary from 0 to 450 feet. To accommodate this varying distance, equalization and attenuation is provided in the TRCU2-E by the networks circuit pack (AKM3). Equalization is provided on the receive portion of the circuit pack and a manually switchable pad is inserted on the transmit portion of the circuit pack for a distance less than 225 feet. A block diagram of the networks circuit pack is shown in Figure 6-4 .

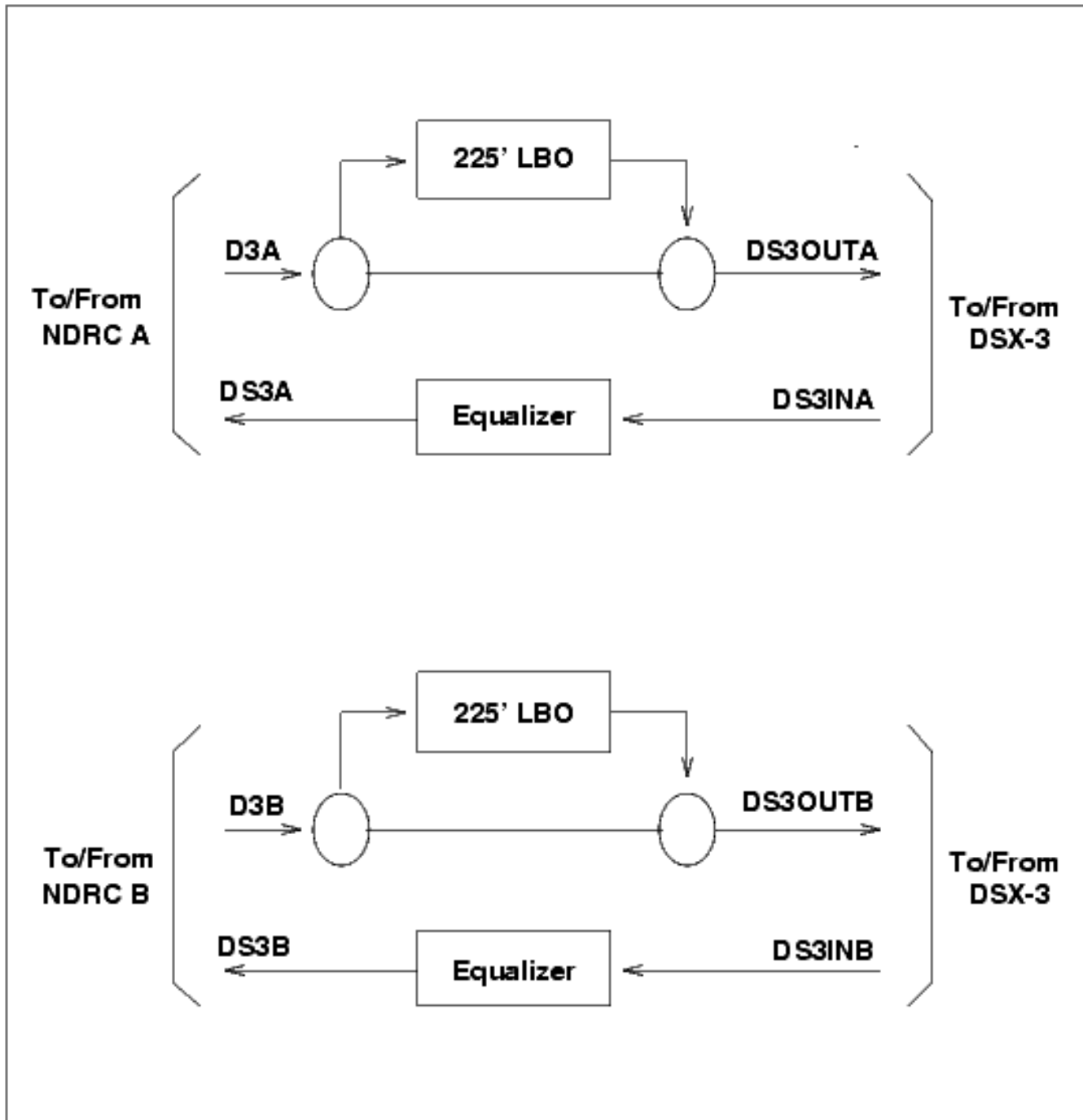


Figure 6-4 Networks (DS3 Connect Option)

6.20.9.3 Optical Line Interface (Fiber Connect Option)

A block diagram of the OLI circuit pack is shown in Figure 6-5. This pack is used when it is desired to connect directly to the facility fiber optic cables. In the light-wave transmitting direction, an 89.472 MHz signal is received from each of the associated NDRC packs. One of these signals is selected to be used by the OLI pack as the clock source. This 89.472 MHz signal is divided by two and the resulting 44.736 MHz signal is sent to the NDRC packs. The 44.736 MHz signal is used by the NDRC packs to return synchronous data to the OLI. The OLI receives

unipolar scrambled non-returned zero (NRZ) data and 44.736 MHz signal from each NDRC pack. These synchronized DS3 signals are combined to form the 89.472 MHz NRZ data signal. The DS3 signal from NDRC B link is marked to allow the separator at the far-end of the system to identify NDRC B's signal. The laser transmitter converts this electrical signal into pulses of light. These pulses of light are coupled into a single mode fiber pigtail for connection to the transmitting single mode or multimode fiber. In the light-wave receiving direction, the receiving single mode or multimode fiber is connected to a multimode fiber pigtail. The pin type diode (PIN) based light-wave receiver converts the pulses of light into electrical pulses.

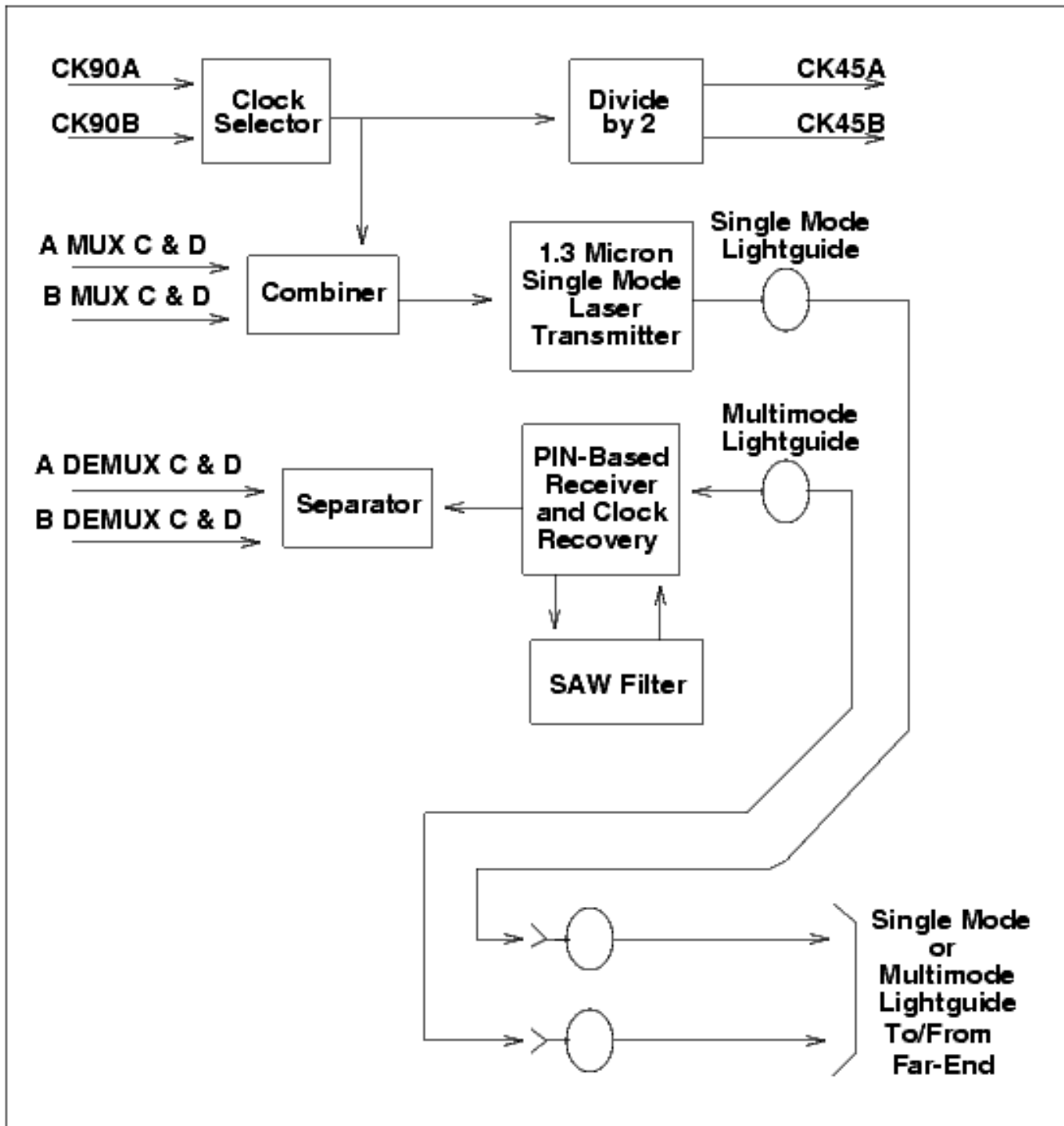


Figure 6-5 Optical Line Interface (Fiber Connect Option)

The clock is received from this 89.472 MHz unipolar NRZ data stream using a surface acoustic (SAW) filter. The signal is separated into two unipolar scrambled NRZ data and 44.736 MHz signal streams that are then sent to the appropriate NDRC packs.

The OLI pack was designed for the DDM-1000 Multiplexer. This pack comes in three different versions (16E, 16F, 16G) that result in span lengths from 18 to 36.3 miles without any transmission loss depending on the OLI version and type of cable. An option switch is provided on the OLI pack to adjust the output of the laser. This switch is set based on the light-wave signal loss (light-wave facility loss) from the transmit plug (host TRCU2-O) to the receive plug (remote TRCU2-O).

6.20.9.4 NCT to DS3 Rate Converter

A block diagram of the NDRC circuit pack (TN1345) is shown in Figure 6-6 .

B682 are used to carry the NCT 16 bit time slots with every fourth byte being stuffed with arbitrary data. Bits C1 through C21 are used to pass the frame number of the next M-frame in the superframe. Bytes 683 through 691 are stuffed with arbitrary data.

6.20.9.4.2 NCT Receive

The DLI link chip developed for time slot interchange unit model 3 (TSIU3) is used to frame-up on the incoming NCT bit-stream. The incoming bits are converted to nibbles with a shift register and then sent to the link chip and the first-in, first-out (FIFO). The sync input to the link chip is produced from the write 8 kHz output using a shift register. This sync forces the internal buffer in the link chip to be one time slot in length. The nibble and 8 kHz sync outputs of the link chip are sent to the loop-around control and the idle code detector.

6.20.9.4.3 First-In, First-Out

Because the nibbles received from the input shift register are asynchronous to the nibbles presented to the multiplexer modem (mul-dem) chip, a 64x5 FIFO is used to provide a variable length buffer with reads independent of writes. This FIFO is written at an 8 MHz rate using the same clock that drives the link chip. This FIFO is read using an 11 MHz clock from the mul-dem chip. The read FIFO generator eliminates enough clock cycles from the 11 MHz clock to produce an effective clock of 8 MHz. In every microsecond frame, a pattern of 6 clock pulses and 2 missing clock pulses is repeated 170 times followed by 4 clock pulses. Thus in a full frame, 1024 writes to the FIFO are performed and 1024 reads from the FIFO are performed.

6.20.9.4.4 C-Bit Generator

The C-bits in the DS3 format are used to pass the M-frame number over the link. A 10-bit counter that counts from zero to 698 is used to supply the M-frame number. The MSYNC lead designation output from the mul-dem chip is used to increment the counter once per M-frame. The contents of the counter is loaded into a shift register using lead designation MSYNC and mul-dem output lead designation MCBCLK shifts the value into mul-dem input lead designation MCBDB. Once per superframe, the 8 kHz sync from the FIFO is used to synchronize the C-bit counter and the internal mul-dem circuitry to the FIFO output.

6.20.9.4.5 90 MHz Clock Generator

A phase locked loop is used to produce an 89.472 MHz clock from the 32.768 MHz receive NCT clock. The 32.768 MHz clock is divided by 512 to produce a 64 kHz signal, and the 89.472 MHz output of the voltage controlled oscillator is divided by 1398 to produce a 64 kHz signal. These two 64 kHz signals are the inputs to the phase locked loop phase detector. The 89.472 MHz clock is divided by two and sent to the DS3 transmitter if the DSX-3 connect option is selected. The 89.472 MHz clock is sent to the OLI pack if the fiber connect option is selected.

6.20.9.4.6 Starting Byte Table and Write Clock Generator

A 699 location look-up table is used to convert from the 106.402 microsecond M-frame to the 125 microsecond NCT frame. Each location contains the starting NCT frame byte number for its associated M-frame. Once per M-frame, under control of the lead designation dsync output of the mul-dem chip, the write counter and clock generator are written with the table entry addressed at that time. The table address is produced from the C-bits received from the mul-dem chip over output lead designation AUXD.

6.20.9.4.7 Elastic Store

An elastic store is provided to allow for differences of phase in the four different links. The elastic store is two frames in length to allow independent reading and writing regardless of phase. The frame slip buffer length adjustment moves the read address by one frame any time the write and read addresses get too close to the same address. This allows a slip without forcing the DLI out of frame. The read counter gets its clock and phase from the incoming NCT bit-stream, while the write counter gets its clock and phase from the incoming DS3 bit-stream via the mul-dem

chip. A nibble from the mul-dem chip is converted to a byte and written to the elastic store. A byte is read from the elastic store and written in an 8-bit shift register from which it is shifted out over the NCT link.

6.20.9.4.8 8 kHz Reference Generator

The incoming DS3 recovered clock of 44.736 MHz is divided by 5592 to produce an 8 kHz reference square wave. This signal is sent to the associated link in the associated DLI where it is used as a reference to the DLI phase locked loop when that link is selected. The out-of-frame indication is also sent to the DLI. If the DS3 input goes out-of-frame, the DLI phase locked loop is forced to free run if it is locking to this link.

In the group of four links associated with a remote, only one link is being used as a reference for the DLI phase locked loop. The 8 kHz generator associated with the reference link is allowed to free run while the generators associated with the other three links are synchronized to the 8 kHz sync derived from the incoming NCT bit-stream. This forces all 8 kHz reference signals to be in phase so that a reference switch by the DLI does not introduce a large phase change. The lead designations MSTR, SELREF, and SELSENSE inputs are used to defeat the synchronizing of the 8 kHz generator when a particular link is being used as the reference.

6.20.9.4.9 Loop-Around Control

The loop-around control monitors the G-bit of the incoming NCT bit stream looking for the set loop-around and reset loop-around data patterns. The set loop-around data pattern is a string of at least 33 ones followed by a string of at least 65 zeroes. The reset loop-around data pattern is a string of at least 65 ones. A time-out reset occurs two seconds after loop-around is set.

6.20.9.4.10 Idle Code Detector

The idle code detector looks for idle code on all but one of the time slots on an incoming NCT link and turns on the proper LED if this condition exists. When a link is taken out of service the TMS or time slot interchange (TSI) sources idle code to all time slots except the message time slot on that link. The NDRC detects this condition and alerts the craft that it is all right to physically remove the pack.

6.20.9.4.11 DS3 Transmit and Receive

The DS3 bit-stream coming from the networks circuit pack is a bipolar signal. A clock is recovered from this signal and it is converted to two unipolar signals before sending it to the mul-dem chip. The DS3 mul-dem chip output consists of two unipolar data signals (M45N and M45P) and a clock (M45COUT). These signals are used to produce a bipolar data signal that is sent to the networks pack.

In the transmit direction, the mul-dem chip takes the nibbles from the FIFO, the C-bits and lead designation MSYNCIN from the C-bit generator, and the clock from the clock generator and adds the appropriate bits to produce the DS3 format output. In the receive direction, the mul-dem chip takes the two unipolar data signals and the clock and produces the nibble output along with clock, the C-bit output along with clock, the dsync output, and the out-of-frame indicator.

The DS3 bit-stream coming from the OLI circuit pack is sent to mul-dem inputs D45P and D45N. The DS3 mul-dem chip output consists of two NRZ data signals (M45N and M45P) and a clock (M45COUT). One of these data signals along with the clock is passed on to the OLI pack. This selection is made with the scramble or unscramble lead.

In the transmit direction, the mul-dem chip takes the nibbles from the FIFO, the C-bits and lead designation MSYNCIN from the C-bit generator, and the 44.736 MHz transmit clock from the OLI pack and adds the appropriate bits to produce the DS3 format output. This output appears on M45P as a scrambled NRZ signal and on M45N as an unscrambled NRZ signal.

In the receive direction, the mul-dem chip takes the scrambled NRZ data signal on D45P or the unscrambled NRZ data signal on D45N and the 44.736 MHz receive clock from the OLI pack and produces the nibble output along with

clock, the C-bit output along with clock, the lead designation dsync output, and the out-of-frame indicator.

Three LED indicators are provided in the faceplate of the TN1345 circuit pack. These LEDs are used to indicate the following:

- (1) The mul-dem chip cannot frame up on the incoming DS3 bit-stream.
- (2) The link chip cannot frame up on the incoming NCT bit-stream.
- (3) All but one of the time slots on the incoming NCT bit-stream contain idle code.

6.20.10 Measurements

There are no traffic or plant measurements unique to this feature. The interface information page (MCC Page 1200) is available to the craft to allow verification that the DLI side of the ORM is able to communicate with the TMS side of the ORM. It is assumed that the interfaces such as outside plant fiber optic cables are working properly.

6.21 STAND-ALONE FEATURE FOR SWITCHING MODULES

6.21.1 Definition

The main purpose of the Stand-Alone feature is to provide SMs the capability to continue processing calls even when they are isolated from the rest of the 5ESS[®] switch. If the SM has the stand-alone capability, then all ports on that SM are able to reach all other ports on the SM. The definition of SM here includes any switching module capable of call processing, whose NCT links terminate directly on the CM, that is, the SM has direct access between the 512 time slots in the SM and the corresponding CM NCT ports, independent of intervening transmission media. Included in this definition are host SMs, local SMs, and ORMs. The SMs which have ISDN capabilities are also included; however, specialized SMs, such as the OSPS Position Switching Module are not included.

The Stand-alone feature consists of the following capabilities:

- Stand-alone Emergency Number Access - Provision for routing emergency numbers to local directory numbers or route indices. The local directory numbers are associated with local POTS/ISDN lines or multiline hunt groups with members local to that SM. Route indices are associated with trunk groups with members located on that SM.
- Stand-alone Call Processing - Provision of the basic capability, automatic transitions into and out of stand-alone mode, and call routing capabilities for calls terminating to specific lines or trunks, including all hunted ports. Also, provision for maintaining all stable intramodule, intermodule and interswitch calls during transitions.
- Stand-alone Billing Memory - Provision for engineerable storage of billing data. This engineerable storage would be random access memory and its upper bound is determined by the addressable memory of the SM processor.
- Stand-alone Announcement - Provision for a stand-alone announcement capability either on line or trunk side.

All the capabilities listed previously are customer selectable options. The stand-alone billing memory and announcement capabilities are not allowed without the stand-alone call processing option.

In general, most call processing features offered on the SM during linked mode continue to be available in the stand-alone mode, provided the stand-alone call processing option is purchased. Those features that require shared resources from other SMs and or AM intervention do not operate in stand-alone mode. If the stand-alone option is not purchased, isolated SMs only complete a limited number of alternate emergency number routes provided the alternate route is associated with a local POTS/ISDN line (no multiline hunt groups or route indices). All other

originating calls are routed to reorder.

6.21.2 Availability

This feature is available with the 5E6 and subsequent software releases for non-RSMs, MMRSMs, and for a single module RSM.

6.21.3 Feature Assignment

This feature is provided on an SM basis for host office SMs, and on a site basis for remote SMs (ORMs, TRMs, and RSMs).

6.21.4 User Perspective

6.21.4.1 User Profile

The end-user for which this feature was primarily designed are the subscribers being served by the SM.

6.21.4.2 Feature Operation

6.21.4.2.1 Subscriber

There are two subscriber perspectives of stand-alone operation:

- (1) Calling from a module that is isolated.
- (2) Calling to a module that is isolated from the rest of the 5ESS[®] switch.

The subscriber who is calling within a module with the stand-alone option does not perceive a loss of basic functionality. The level of service provided depends on the type of call or feature requested. Termination service to trunks and lines on the same module are unaffected. The following are examples of features which work the same as in linked operation:

- Speed Calling
- Call Waiting
- Call Forwarding - Don't Answer
- Call Hold.

Other features that require shared resources such as a global digital service unit (GDSU) or access to routing data stored in the AM are not supported during stand-alone. These include the following:

- Three-Way Calling
- Conference Calling - Six-Way
- Directed Call Pickup with Barge-in
- OUTWATS
- Simulated Facility Groups

- Call Transfer (if controller disconnects before third party answers).

Certain types of calls may terminate to different destinations while in stand-alone operation. Examples include calls to emergency numbers that may be alternately routed to other destinations, or calls to MLHG pilot DN's located outside the module that may be routed to another part of the same MLHG local to the isolated module.

The subscriber perspective for calls terminating to isolated modules is really independent of whether that module has the stand-alone option installed. The same type of alternate routing or call treatment applies in either case. Calls may be alternately routed in the AM to terminations on other SM's. If another route is not available, the call may be routed to either reorder tone or an announcement at the option of the operating company.

6.21.4.2.2 Operating Company Personnel

When a remote module enters the stand-alone state and has a remote alarm panel installed, a critical alarm sounds at the remote site. When the module leaves the stand-alone state, the indicator clears.

At the host site, any module that becomes isolated from the host switch and has the stand-alone option installed displays the phrase "STANDALONE" on the MCC display for that module. If the module does not have the stand-alone option, it displays "ISOLATED." Any SM equipped with stand-alone prints a message on the ROP following exit from stand-alone indicating the duration of stand-alone operation. In addition, the measurement counts previously kept for RSM stand-alone duration, incoming blocked calls, and outgoing blocked calls have been extended to include all modules with the stand-alone option.

6.21.4.3 Interactions

There are no interactions between the stand-alone feature and other features of the 5ESS[®] switch; however, during stand-alone operation, features that require shared resources such as a GDSU or access to routing data stored in the AM are not supported during stand-alone. These include the following:

- Three-Way Calling
- Conference Calling - Six-Way
- Directed Call Pickup with Barge-in
- OUTWATS
- Simulated Facility Groups
- Call Transfer (if controller disconnects before third party answers).

6.21.5 Engineering

6.21.5.1 Hardware

6.21.5.1.1 Stand-Alone Announcement Circuit

Typically a 13A announcement machine is used. However, the operating company can choose to install and use a comparable machine. This type of announcement machine is connected to trunk port(s). A line side announcement machine (such as a 14A) can also be used by connecting it to a UCD multiline hunt group. Certain relations need to be populated if any of the modules within the office are equipped with a stand-alone announcement. If a module with the stand-alone call processing option has been engineered for the stand-alone announcement, calls which cannot be completed as dialed and which have no alternate route, receive the fixed route type of RT_RSMSA. This route

type can be directed to an announcement or reorder.

6.21.5.1.2 Remote Alarm Status Panel

For the ORM and TRM alarm panel applications, the alarm status circuit (ASC) can be used. The TN874 module processor pack and additional associated circuitry provide craft intervention keys and the display of module sanity and stand-alone status on the ORM and TRM. The ASC also provides control of all alarm and status lamps, and closures for an office alarm grid for building and power alarms. The ASC provides status indicators, system sanity, visual, audible, and auxiliary alarms.

6.21.5.2 Software

The Stand-alone feature has no impact on text memory. Non-RSM modules require additional ODD data to support stand-alone call processing. The size of this additional ODD is dependent on office configuration and features supported by the SM.

6.21.6 Implementation

6.21.6.1 Scenarios and Events

The stand-alone conversion capability is a special feature available on a per-SM basis and allows an existing SM to be configured with the stand-alone option. Furthermore, the conversion is expected to be done only once on an SM and only applies to non-RSM module types. Hence, unlike the regular view level recent change interface, the interface for conversion consists of various input/output messages. The conversion process is triggered by an input message containing the SM number. Once the input message is entered, the actual data transfer for conversion process begins. If no errors are encountered during the conversion process, an output message is issued to indicate the end of the conversion routine. If there are errors, appropriate error messages are issued to indicate the occurrence of the error(s). An "undo" option is available in the event that errors are encountered during conversion.

6.21.6.2 Data Changes During the Conversion Process

The data changes performed during the conversion process can be divided into the following three phases:

- Copy redundant relations from the AM ODD, where all relations redundant between AM and stand-alone SM are copied from the AM to the target SM. These include RL_RTMCRD, RLRT_POLY, RLRT_SFG, and RLRTGRPDN.
- Update SM ODD to contain routing information from the routing SM, where for each line terminating on the SM, the routing SMs are identified and relevant data pertaining to the SM is copied from the routing SM to the target SM. Various relations involved here are RLRT_DNTRAN, RLRT_SPECRI, RLRTDN_MHG, and RLRT_DNMPG.
- Update Glsacp and Glsabill ODD parameters - This marks the end of the conversion process and effectively the SM is capable of stand-alone operation from this point on.

6.21.6.3 Data Consistency and Concurrency Control

It is assumed that all of the previous data transfer is taking place in a single transaction. This ensures that the conversion process is done in its entirety. Since the actual amount of data moved is office dependent and can vary to a great extent, the transaction is not logged to insure against shortage of recent change log space, a fatal error condition during the conversion process. This in turn demands that an incremental backup be performed at the end of the conversion process.

6.21.7 System Operation

From the viewpoint of the SM, call analysis, routing, and termination is performed the same during linked and stand-alone operation. The same set of SM source code is used to route, hunt, and complete calls for all call and feature types.

Call processing operations which are handled differently during stand-alone operation include the following:

- (1) Time Slot Allocation - SMs hunt and allocate their own intra-SM NCT link time slots during stand-alone operation, rather than relying on the AM.
- (2) Trunk and Multiline Hunt Groups - SMs build their own dynamic hunt group status for global groups with local members.

NOTE: Hunting order may not be preserved during stand-alone.

- (3) Emergency Alternate Routes - Calls which cannot be completed as dialed may be routed to an alternate local destination.

Therefore, SM stand-alone operations are driven primarily by the configuration of the SM ODD using the same set of source code as used by linked call processing.

6.21.8 Measurements

No new traffic or plant measurement counts are required for this capability; however, changes have been made to the definitions and to the scope of certain counts in existing sections and parts on the 30-minute traffic (TRFC30), the 24-hour (PLNT24), and the monthly (PLNTMO) reports.

6.22 ORM/TRM SHARED RESOURCES

6.22.1 Overview

6.22.1.1 Definition

The Optically Remote Module/Two-Mile ORM (ORM/TRM) Shared Resources feature allows consolidation of the metallic resources and remote alarms for a collocated ORM site. A single directly connected test unit (DCTU) and modular metallic service unit (MMSU) is used for metallic testing of the collocated ORMs. Visual and audible alarms for the collocated ORM site are provided using a single alarm status unit (ASC). This feature allows sharing of resources similar to that of the multimodule remote switch module (MMRSM) and host 5ESS[®] switch office.

6.22.1.2 Economic Worth

This feature reduces hardware, administrative, and maintenance costs for collocated ORMs.

6.22.1.3 Availability

This feature is implemented in the 5E6 (1) software release as software update 89-0047. The feature is generally available in the 5E6 software release.

NOTE: Consult your Lucent Technologies Account Executive for availability.

6.22.1.4 Feature Provision Basis

This feature is provided on a ORM/TRM basis.

6.22.2 User Perspective

6.22.2.1 User Profile

This feature has no impact on the subscriber.

Operating telephone company personnel affected are:

- (1) Administration has:
 - New fields on existing ODA forms
 - Different procedures for populating existing forms.
- (2) Plant Maintenance has new procedures for:
 - Ordering and installation
 - Troubleshooting
 - Monitoring of site alarm output information.

6.22.2.2 Customer Premises Equipment

No new customer premises equipment is required for this feature.

6.22.2.3 User Operation

Operation of remote alarms in a collocated ORM site sharing resources is as follows:

- (1) ORM Status Lamps:
 - The **SYSTEM CYCLE** lamp reflects the sanity of the master module only. This lamp and the **MODULE CYCLE** lamp on the stand-alone monitor (SAM) in the master ORM reflect the same status. If a slave ORM is not cycling, the **MODULE CYCLE** lamp on the slave SAM changes from green to red.
 - The **SYSTEM STAND-ALONE** lamp reflects the stand-alone condition of the master ORM only. This lamp and the **MODULE STAND-ALONE** lamp on the SAM in the master ORM reflect the same status. If a slave ORM enters stand-alone, the **MODULE STAND-ALONE** lamp on the slave SAM is lighted.
 - This feature does not change the operation of the **SM TROUBLE** lamp. All circuit off-normal conditions for all ORM/TRMs at the site are reflected on the SM trouble lamp.
- (2) ORM Alarm Lamps and Controls:
 - This feature does not change the operation of the **CRITICAL**, **MAJOR**, or **MINOR** alarm lamps. All alarms from any ORM/TRM at the site are displayed on the ASC and audibles.
 - When the **ALARM TEST PROGRAM** button is pushed, the ASC and SAM are tested in the master ORM only. The SAM can be diagnosed by requesting demand phase 8 of the MCTSI diagnostic. This diagnostic can be requested on any ORM (master or slave) in an ORM site.

Operation of the alarm section of the ASC for ORM/TRMs is the same as for RSMs.

6.22.2.4 Operational Limitations

When the metallic network is shared among collocated ORMs, only one MMSU and one DCTU is used. Alarm sharing is limited to 12 ORMs.

The ASC may be inaccurate whenever the master or slave ORM is isolated in stand-alone or any abnormal state which prevents normal communication with the rest of the system.

6.22.2.5 Interactions

This feature has no interaction with other features.

6.22.2.6 Restriction Capability

Subscribers and telephone company personnel cannot restrict or change the operation of this feature.

6.22.3 Engineering

6.22.3.1 Special Planning Considerations

The digital ordering and planning system (DOPS) and video interactive regional generation of specifications (VIRGOS) supply the necessary ordering and specification information for this feature.

The master ORM must contain the MMSU. If the DCTU and ASC are purchased, they must also be located in the master ORM.

Each slave ORM at a collocated ORM must contain an SAM if remote alarms are being shared.

For existing sites having collocated ORMs, each with a DCTU and MMSU, this feature is made available through the conversion procedures and associated software update. It is not mandatory to convert collocated ORMs to the shared configuration.

Reference for Conversion Processing:

235-105-231, *5ESS[®] Switch Hardware Change Procedures — Growth*, Procedures 3.143 and 3.144

235-105-331, *5ESS[®] Switch Hardware Change Procedures — Degrowth* Procedure 3.84.

6.22.3.2 Hardware

When this feature is purchased, the following hardware considerations apply:

- Only one MMSU and one DCTU are used for the metallic network. Additional MMSUs can be used for the Scan/Dist function.
- Collocated ORMs must use the same power plant and ground window.
- ORMs cannot be more than one floor from the ground window.
- Collocated ORMs must have the same host *5ESS[®]* switch.
- ORMs must meet connectivity requirements stated in schematic drawing (SD)-5D007-01 and SD-5D014-02.

- DCTU and analog trunk units must meet connectivity requirements in SD-5D007-1.
- ORMs sharing remote alarms must have the ASC and SAMs driven from the same power supply.
- Only the master ORM has an ASC.
- The master and each slave ORM must have a SAM.

Collocated sites engineered before the availability of this feature may need to have hardware degrown. Items to be degrown include hardware in the ASC, DCTU, and MMSU which are no longer necessary with the new feature.

6.22.3.3 System Resources

Not applicable.

6.22.4 Assignment Guidelines

6.22.4.1 Forms and Views

6.22.4.1.1 TG-5 Forms

The Office Record 5722 (Remote Site Options Record) is modified to add an ALARM OUTPUT SITE column.

6.22.4.1.2 Recent Change Views

On existing RC View 8.12 (REMOTE ALARM OPTIONS PER SITE ID), attribute **ALARM OUTPUT SITE** (field 5) is added. This provides a mechanism for slave ORMs to set up remote alarm routing information to the master ORM.

6.22.4.2 Initial Implementation

Initial implementation of this feature is accomplished in the 5E6 software release as software update 89-0047.

For existing sites each with an MMSU and DCTU per ORM, existing procedures for DCTU, MMSU, TU test trunks, ASC growth and degrowth are used to convert an ORM site to the shared resources configuration. To implement this feature:

(1) For Metallic Network Conversion:

- When metallic test bus (MTB) access assignments are moved to the master module, the test equipment in the slave modules can be degrown. The SN107 circuit pack from the trunk unit (TU) in the slave modules may be degrown if any test trunk assignments in the master module exist. Also the TU in the slave modules may be degrown if it is no longer needed. Existing RC interfaces to MTBs are used for reassignment.
- The DCTU route index in the slave modules must be set to the same value as the DCTU route index of the master module, and the ALIT route index and MAJ route index in the slave modules must be set to "0" (zero).

(2) For Remote Alarm Sharing:

- In order for slave modules to share remote alarms from the master module at a collocated site, use the new attribute **ALARM OUTPUT SITE** on RC View 8.12. Enter the ORM SITE ID for the master module in this new field. The ORM SITE ID value may be obtained by reviewing MCC Page 1615 or field "33" on RC View 18.1.

- If at some point remote alarm sharing is no longer desirable, the slave module can be dissociated from the master module by updating the ALARM OUTPUT SITE field on RC View 8.12 to "0" (zero). After a slave ORM has been dissociated, the SAM may be physically removed if desired.

6.22.5 System Operation

The ORM/TRM Shared Resources feature introduces two independent features as follows:

(1) Metallic Network Sharing:

- Software assigns and sets up MTBs across the ORMs. The MTBs are used to connect SM peripheral units to the MMSU. This connection provides a metallic test path from the DCTU or other external test devices to a line or trunk.

(2) Remote Alarm Sharing:

- When an alarm occurs at an ORM site, information is routed to the ORM containing the ASC. Both visual and audible indicators inform maintenance personnel of an existing problem at the site and the severity of the problem.

6.22.6 Administration

Not applicable.

6.23 MESSAGE DETAIL RECORDING ON EA/CCS7/CCS7 NI/CAMA/ISDN FACILITIES

6.23.1 Overview

6.23.1.1 Definition

This feature (99-5E-0561) enhances the 5ESS[®] switch message detail recording (MDR) capabilities to meet the needs of leased networks. These new capabilities include the following:

- (1) The capability to provide MDR records for calls processed by a leased network ACP. In particular, the authorization code, FRL, call event code fields, etc., are determined in part or entirely from information in common channel signaling 7 (CCS7) messages.
- (2) The MDR records are supplied for calls that are originated on trunk/line facilities with the following forms of signaling.
 - (a) ISDN basic rate interface (BRI)
 - (b) ISDN primary rate interface (PRI)
 - (c) Equal access multifrequency (MF)
 - (d) Centralized automatic message accounting (CAMA)
 - (e) Common channel signaling 7 (CCS7)
 - (f) Signaling network interconnect.

As a consequence of new out-of-band trunk signaling, the values of certain fields, such as answer time, are modified.

- (3) A new call event code value is provided for the purpose of fraud detection on calls where there are repeated attempts to collect a valid authorization code and the caller abandons before one is collected.
- (4) New call event codes are provided to support the crankback capability to be provided by the leased network interoffice signaling feature.

This feature does not include any new fields to support the new ISDN and data networking capabilities.

6.23.1.2 Availability

This feature is provided with the 5E6 and subsequent software releases of the 5ESS[®] switch.

6.23.1.3 Feature Provision Basis

This feature is provided per line/trunk.

6.23.2 User Perspective

6.23.2.1 User Profile

This feature was primarily designed for users of leased networks.

6.23.2.2 User Operations

6.23.2.2.1 Subscriber

The customers get MDR records generated for calls originated on their leased network facilities. There are three types of MDR records - originating private record (OPR), incoming private record (IPR), and public record (PubR). In addition, the customers also receive MDR counts record, which is non-call related, and is generated once a day per MDR customer. The MDR records are sent from ISDN-SMs to the leased network Operations System.

6.23.2.2.2 Operating Company Personnel

The operating company personnel must first construct an MDR constructed feature(s) and an MDR group(s) for the business customer. Then the MDR constructed feature(s) and MDR group(s) are assigned to the customer lines/trunks.

6.23.2.3 Interactions

No interactions with this feature have been identified.

6.23.3 Engineering - Hardware

No new hardware or modification of existing hardware is required for this capability.

6.23.4 Assignment Guidelines

This feature does not require assignment to subscribers as it is available to users of the leased network upon subscription to the 5E6 software release of a 5ESS[®] switch.

6.23.5 System Operation

An MDR record is generated from information stored in the call record. At the end of each call, before the record is released, a check of the MDR Required Indicator field in the call record is made. An MDR record is generated if the indicator bit is set to DBYES.

6.23.6 Measurements

There are no new measurements associated with this feature.

6.24 CUSTOMER TRAFFIC DATA ON EA/CCS7/CCS7 NI/CAMA/ISDN FACILITIES

6.24.1 Overview

6.24.1.1 Definition

This feature (99-5E-0562) allows the following customer traffic (CTRF) data to be collected on all switched private trunk groups by leased network 5ESS[®] switches and sent to the leased network Operations System via the ISDN applications processor interface (API):

- (1) Peg counts
- (2) Usage counts
- (3) Overflow counts
- (4) Non-used trunks/locked-up trunks (NUTS/LUTS) scans
- (5) Short holding time/long holding time (SHT/LHT) reports.

Peg, usage, and overflow counts are also collected for BRI multi-line hunt groups (MLHGs) as is currently done for analog MLHGs.

This data is provided in a way consistent with current switch capabilities as specified in 235-900-303, *5ESS[®] Switch ISDN Application Processor Interface Specification* and supports trunk facilities with the following forms of signaling:

- ISDN BRI MLHG
- ISDN PRI
- Equal access MF
- CAMA
- CCS7
- Signaling network interconnect.

6.24.1.2 Availability

This feature is provided with the 5E6 and subsequent software releases of the 5ESS[®] switch.

6.24.1.3 Feature Provision Basis

This feature is provided per trunk/local MLHG.

6.24.2 User Perspective

6.24.2.1 User Profile

This feature was primarily designed for users of leased networks.

6.24.2.2 User Operations

The Traffic Data to Customer feature allows customers to specify which private facilities they wish to receive measurements on, what type of measurements they want (cumulative, peak, or time coincident), and how often they wish to receive the measurement reports. At the times specified by the customer, reports containing the measurements requested by the customer will be printed at the customer's location.

The Customer Polled Traffic Data feature provides the same measurements to the customer as the Traffic Data to Customer feature. However, the customer interactively chooses the measurements to be reported and the times the reports are to be printed.

The Automatic Circuit Assurance feature allows the customer to specify trunks to be scanned for usage. The customer can then receive reports listing trunks that are never traffic busy when they are scanned, and among those, the ones that are high-and-wet every time they are scanned. The feature also allows the customer to specify trunk groups whose members should have their holding times monitored.

6.24.2.3 Interactions

There are no restrictive interactions with this feature.

6.24.3 Engineering - Hardware

No new hardware or modification of existing hardware is required for this feature.

6.24.4 Assigning to Customer Guidelines

The customer has this feature assigned when subscribing to the 5E6 software release of the 5ESS[®] switch.

6.24.5 System Operation

Customer Traffic Data measurements are reported to the leased network customer. These measurements were made available by the existing capability implemented in the 5E3 software release. The measurements are collected on the 5ESS[®] switch and sent via dedicated BX.25 data links to an AP. The AP processes and reports these measurements to the customer.

6.24.6 Measurements

No new measurements are required by this feature.

6.25 100-SECOND SCANS ON EA/CCS7/CCS7 NI/CAMA/ISDN FACILITIES

6.25.1 Overview

6.25.1.1 Definition

This feature (99-5E-0563) allows 100-second scans (HSS) data to be collected on all switched private trunk groups

and local BRI multi-line hunt groups (MLHGs) by leased network 5ESS[®] switches and sent to the leased network-OS via the API. The HSS data is provided in a way consistent with current switch capabilities and did not require development to support trunk facilities with the following forms of signaling:

- ISDN PRI
- Equal Access MF
- CAMA
- CCS7
- Signaling Network Interconnect

Development was required to support HSS for local MLHGs. The HSS information is not collected and sent on leased network packet data by leased network switches. Also, HSS information does not make a distinction between circuit switched voice and data.

6.25.1.2 Availability

This feature is provided with the 5E6 and subsequent software releases of the 5ESS[®] switch.

6.25.1.3 Feature Provision Basis

This feature is provided per trunk group and local MLHG.

6.25.2 User Perspective

6.25.2.1 User Profile

This feature was primarily designed for users of leased networks.

6.25.2.2 User Operations

The interfaces used for HSS are the same as those in traffic data. The customer has the ability to request the usage count for local MLHGs. The MLHG usage means the number of BRI lines busy within the MLHG.

6.25.2.3 Interactions

There are no restrictive interactions with this feature.

6.25.3 Hardware

No new hardware or modification of existing hardware is required for this feature.

6.25.4 Assignment Guidelines

This feature does not require assignment to subscribers as it is available to users of the leased network upon subscription to the 5E6 software release of a 5ESS[®] switch.

6.25.5 System Operation

Prior to the 5E6 software release, the HSS capability collected usage data on switching modules which had leased network trunk groups only. This capability expands the scope to allow usage data to be collected on MLHGs. As is

done with trunk groups, the data collected every one-hundred seconds is sent to the leased network OS.

Prior to the 5E6 software release, craft interface provided the means of assigning the HSS feature on a customer basis and activating the feature on a trunk group basis only. This capability provides HSS usage information for MLHGs also. The MLHG usage means the number of BRI lines busy within the MLHG.

The interfaces used for HSS are the same as those in traffic data. The customer has the ability to request the usage count for MLHGs.

6.25.6 Measurements

No new measurements are necessary.

6.26 TRUNK RESERVATION WITH AUTOMATIC RESERVATION ADJUSTMENT

6.26.1 Overview

6.26.1.1 Definition

Trunk Reservation with Automatic Reservation Adjustment (99-5E-0565) is an enhancement to network management capabilities for the 5ESS[®] switch.

Trunk Reservation is an automatic prehunt trunk group control that selectively limits per-call access to trunks in a two-way or one-way outgoing trunk group when the trunk group is nearly full. Initially, it is able to limit traffic depending on whether it is using the trunk group as a direct or alternate. The control relies on two reservation levels known as RL1 and RL2, with RL1 being greater than RL2. Each reservation level has a control level, obtained from the response table associated with it. A control level is triggered when the number of idle trunks in the trunk group falls to or below the respective threshold. Since RL1 is greater than RL2, the first level response is less severe than the second. When a control level is triggered, the call is either canceled or the trunk group skipped depending on the option specified in the input command. With the Automatic Reservation Adjustment option, reservation levels are adjusted on a per-call basis according to traffic load on the trunk group.

6.26.1.2 Availability

This feature is provided with the 5E6 and subsequent software releases of the 5ESS[®] switch.

6.26.1.3 Feature Provision Basis

This feature is provided per 5ESS[®] switch.

6.26.2 User Perspective

6.26.2.1 User Profile

This feature was primarily designed for telephone company network management personnel.

6.26.2.2 User Operations

6.26.2.2.1 Subscriber

When blocked by Trunk Reservation, the subscriber receives No Circuit Announcement; but, overall the performance of the network should improve.

6.26.2.2.2 Operating Company Personnel

The operating company personnel, from either an on-site terminal or from the Remote Network Management Center, may assign, delete, modify, audit, or allow Trunk Reservation controls. Additionally, they may collect measurement data on the controls to determine their effectiveness.

6.26.2.3 Interactions

There are no interactions with other features.

6.26.3 Hardware

There is no new hardware required to support this feature.

6.26.4 Assignment Guidelines

This feature does not require assignment to subscribers as it is available to users of the 5ESS[®] switch upon subscription to the 5E6 software release of the 5ESS[®] switch.

6.26.5 System Operation

The Trunk Reservation control provides the network with a finer level of control for trunk groups. By providing the ability to reserve a specified number of trunks within a group, trunks in a two-way group may be reserved for incoming traffic or trunks may be reserved for direct routed traffic that has a higher probability of completing. If the Automatic Reservation Adjustment option is used, it prevents too many or too few trunks from being reserved, minimizing the risk of blocking calls while leaving trunks idle.

6.26.6 Measurements

The collecting and reporting of the new counts associated with Trunk Reservation have been added to two existing reports. These new counts provide the ability to determine if calls on a particular trunk group are being controlled due to Trunk Reservation, and how many calls are skipped or canceled due to Trunk Reservation for the office.

6.27 CALL GAP ENHANCEMENTS

6.27.1 Overview

6.27.1.1 Definition

This feature (99-5E-0564) increases the call gap table from the present 16 to 35. This feature allows the network manager, either through an on-site message or via the Remote Network Management Center, to specify more granular call gap intervals than possible before. The call gap interval refers to the time interval used to compute rate of release of calls for a given destination when the call gap control is in effect in the 5ESS[®] switch.

The Call Gap Enhancement feature provides more granularity at the high end and more at the low end by increasing the number of gap indices from 16 to 35, which identify the interval. Three indices are reserved for off, zero interval, and infinite interval. The remaining 32 correspond to the seconds between calls.

6.27.1.2 Availability

This feature is provided with the 5E6 and subsequent software releases of the 5ESS[®] switch.

6.27.1.3 Feature Provision Basis

This feature is provided per 5ESS[®] switch.

6.27.2 User Perspective

6.27.2.1 User Profile

This feature was primarily designed for telephone company network management personnel.

6.27.2.2 User Operations

The On-site or Remote Network Management Center network management personnel set the manual code control by specifying the maximum rate, known as the gap interval, using the modified TTY input message.

6.27.2.3 Interactions

There are no interactions between this feature and other features of the 5ESS[®] switch.

6.27.3 Hardware

No new hardware or modification of existing hardware is required for this feature.

6.27.4 Assignment Guidelines

This feature does not require assignment to subscribers as it is available to users of the 5ESS[®] switch upon subscription to the 5E6 software release of the 5ESS[®] switch.

6.27.5 System Operation

There is no change in the basic system operation of applying code controls.

6.27.6 Measurements

There are no new measurements supplied with this feature.

6.28 LINE UNIT CONCENTRATOR AND INDIVIDUAL LINE UTILIZATION MEASUREMENTS ENHANCEMENTS

6.28.1 Overview

6.28.1.1 Definition

This feature enhances the Line Unit Concentrator Utilization Measurements (LUCUM) appearing in Section 90 of the TRFC30 (thirty-minute traffic report) by increasing the maximum number of assignable concentrators from 8 to 20 and introducing the ability to assign up to 128 individual lines for measurement.

6.28.1.2 Economic Worth

This feature expands the number of assignable half grids for line unit (LU) concentrator measurements from 8 to 20. The additional assignable half grids allow the study of an entire LU at one time with up to a 10:1 concentration ratio.

6.28.1.3 Availability

This feature is available with 5E6 and later software releases.

NOTE: Consult your Lucent Technologies Account Executive for availability.

6.28.1.4 Feature Provision Basis

This feature is provided on a per-office basis.

6.28.2 User Perspective

6.28.2.1 User Profile

This feature is used by service provider Administration personnel.

6.28.2.2 User Operation

The service provider administration personnel use this feature to enhance collecting and sampling measurements, trends, and controlling system measurements required by traffic and maintenance engineering.

6.28.2.3 Activation

A. USING INPUT MESSAGE:

- (1) For concentrator study:

ALW:TRFC30,{CLCT|TRFCH|ROP}:LINE wwwxyy

NOTE: Up to eight concentrators may be entered with a single input message.

Where:

CLCT = Allow collection of specific section. Collection must be allowed for later printing.

TRFCH = Allow output of specific section to traffic channel. Sections must be allowed for collection prior to being allowed for traffic channel.

ROP = Allow printing of specific section to read only printer. Sections must be allowed for collection prior to being allowed for ROP.

LINE = Section to be enabled. The option **LINE** is used to specify concentrator for this input message.

www = SM number

x = line unit number

yy = concentrator number

- (2) For individual line assignment study:

ALW:TRFC30,{CLCT|TRFCH|ROP}:ILA wwwxyyzz

NOTE: Up to six ILAs may be entered with a single input message.

Where:

CLCT = Allow collection of specific section. Collection must be allowed for later printing.

TRFCH = Allow output of specific section to traffic channel. Sections must be allowed for collection prior to being allowed for traffic channel.

ROP = Allow printing of specific section to Read Only Printer. Sections must be allowed for collection prior to being allowed for ROP.

ILA = Section to be enabled (individual line assignment).

www = SM number

x = line unit number

yy = concentrator number

zz = line number

B. USING RECENT CHANGE VIEWS:

(1) For concentrator study (View 13.4, 5E6 and later software releases):

- Enter the office code in field 1.
- Enter an SM number, LU number, and concentrator number in the LIST OF CONCENTRATORS field. Up to 20 concentrators may be entered.

(2) For individual line assignment study (View 13.5, 5E6 and later software releases):

- Enter the office code in field 1.
- Enter an SM number, LU number, concentrator number, and line number in the LIST OF INDIVIDUAL LINE ASSIGNMENTS field. Up to 128 individual lines may be entered.

6.28.2.4 Operational Limitations

This feature limits the number of concentrators to be studied at one time to 20, and the number of individual line assignments (ILAs) to 128.

The number of concentrators per input message is limited to 8.

The number of ILAs per input message is limited to 6.

LU numbers entered must be analog.

It is not recommended to spread a study over more than 3 or 4 SMs.

It is recommended that Section 90 (TRFC30) be inhibited for collection when an office is retrofitted to a later software release.

6.28.2.5 Deactivation

A. USING INPUT MESSAGE:

(1) For concentrator study:

INH:TRFC30,{CLCT|TRFCH|ROP}:[LINE wwwxyy|ALL]!

Where:

- CLCT** = Inhibit collection of specific section(s). Inhibiting collection of sections automatically causes those sections to be inhibited for printing.
- TRFCH** = Inhibit output of specific section(s) to traffic channel.
- ROP** = Inhibit output of specific section(s) to receive-only printer.
- LINE** = Section to be inhibited (The option **LINE** is used to specify concentrator for this input message.)
- www** = SM number
- x** = line unit number
- yy** = concentrator number
- ALL** = Inhibit all sections, with or without identifiers (default).

NOTE: When the **LINE** option is specified, up to eight concentrators may be inhibited with a single input message.

(2) For individual line assignment study:

INH:TRFC30,{CLCT|TRFCH|ROP}:[ILA wwwxyyzz|ALL]!

Where:

- CLCT** = Inhibit collection of specific section(s). Inhibiting collection of sections automatically causes those sections to be inhibited for printing.
- TRFCH** = Inhibit output of specific section(s) to traffic channel.
- ROP** = Inhibit output of specific section(s) to receive-only printer.
- ILA** = Section to be inhibited (individual line assignment).
- www** = SM number
- x** = line unit number
- yy** = concentrator number
- zz** = line number
- ALL** = Inhibit all sections, with or without identifiers (default).

NOTE: When the ILA option is used, up to six ILAs may be inhibited with a single input message.

B. USING RECENT CHANGE VIEWS:

(1) For concentrator study (View 13.4, 5E6 and later software releases):

- Delete the office code in field 1
- Delete the SM number(s), LU number(s), and concentrator number(s) in the LIST OF CONCENTRATORS field.

(2) For individual line assignment study (View 13.5, 5E6 and later software releases):

- Delete the office code in field 1
- Delete an SM number(s), LU number(s), concentrator number(s), and line number(s) in the LIST OF INDIVIDUAL LINE ASSIGNMENTS field.

6.28.2.6 Interactions

Call processing is impacted by this feature. When Section 90 (LINE or ILA) of the TRFC30 report is in use, call processing uses macros to search tables and peg counters each time a call is made. This feature alone does not degrade service; however, real-time is used and must be considered when other features are added that also affect call processing.

The use of ROP and Engineering and Administration Data Acquisition System (EADAS) by this feature is large enough to become a significant factor if this feature is enabled simultaneously with other features using large amounts of these resources.

6.28.3 Engineering

Not applicable.

6.28.4 Assignment Guidelines - Recent Change Views

Two recent change (RC) views are added with this feature. These new views are:

- (1) View 13.4, Analog LU Concentrator Utilization Measurements (shown in Exhibit 6-1).
- (2) View 13.5, Analog LU Individual Line Utilization Measurements (shown in Exhibit 6-2).

5ESS (R) SWITCH

RECENT CHANGE 13.4

ANALOG LU CONCENTRATOR UTILIZATION MEASUREMENTS

*1. KEY ____

4. LIST OF CONCENTRATORS

SM LU CONC	SM LU CONC	SM LU CONC	SM LU CONC
1. ____ _	6. ____ _	11. ____ _	16. ____ _
2. ____ _	7. ____ _	12. ____ _	17. ____ _
3. ____ _	8. ____ _	13. ____ _	18. ____ _
4. ____ _	9. ____ _	14. ____ _	19. ____ _
5. ____ _	10. ____ _	15. ____ _	20. ____ _

Exhibit 6-1 View 13.4, Analog LU Concentrator Utilization Measurements

5ESS (R) SWITCH

SCREEN 1 OF 4

RECENT CHANGE 13.5

ANALOG LU INDIVIDUAL LINE UTILIZATION MEASUREMENTS

*1. KEY ____

4. LIST OF INDIVIDUAL LINE ASSIGNMENTS (1 - 32)

SM LU CONC LN	SM LU CONC LN	SM LU CONC LN	SM LU CONC LN
1. ____ _	9. ____ _	17. ____ _	25. ____ _
2. ____ _	10. ____ _	18. ____ _	26. ____ _

3. ____ _	11. ____ _	19. ____ _	27. ____ _
4. ____ _	12. ____ _	20. ____ _	28. ____ _
5. ____ _	13. ____ _	21. ____ _	29. ____ _
6. ____ _	14. ____ _	22. ____ _	30. ____ _
7. ____ _	15. ____ _	23. ____ _	31. ____ _
8. ____ _	16. ____ _	24. ____ _	32. ____ _

5ESS (R) SWITCH

SCREEN 2 OF 4

RECENT CHANGE 13.5

ANALOG LU INDIVIDUAL LINE UTILIZATION MEASUREMENTS

*1. KEY ____

4. LIST OF INDIVIDUAL LINE ASSIGNMENTS (33 - 64)

SM	LU	CONC	LN	SM	LU	CONC	LN	SM	LU	CONC	LN	SM	LU	CONC	LN
33.	____	_	____	41.	____	_	____	47.	____	_	____	57.	____	_	____
34.	____	_	____	42.	____	_	____	50.	____	_	____	58.	____	_	____
35.	____	_	____	43.	____	_	____	51.	____	_	____	59.	____	_	____
36.	____	_	____	44.	____	_	____	52.	____	_	____	60.	____	_	____
37.	____	_	____	45.	____	_	____	53.	____	_	____	61.	____	_	____
38.	____	_	____	46.	____	_	____	54.	____	_	____	62.	____	_	____
39.	____	_	____	47.	____	_	____	55.	____	_	____	63.	____	_	____
40.	____	_	____	48.	____	_	____	56.	____	_	____	64.	____	_	____

5ESS (R) SWITCH

SCREEN 3 OF 4

RECENT CHANGE 13.5

ANALOG LU INDIVIDUAL LINE UTILIZATION MEASUREMENTS

*1. KEY ____

4. LIST OF INDIVIDUAL LINE ASSIGNMENTS (65 - 96)

SM	LU	CONC	LN	SM	LU	CONC	LN	SM	LU	CONC	LN	SM	LU	CONC	LN
65.	___	-	___	73.	___	-	___	81.	___	-	___	89.	___	-	___
66.	___	-	___	74.	___	-	___	82.	___	-	___	90.	___	-	___
67.	___	-	___	75.	___	-	___	83.	___	-	___	91.	___	-	___
68.	___	-	___	76.	___	-	___	84.	___	-	___	92.	___	-	___
69.	___	-	___	77.	___	-	___	85.	___	-	___	93.	___	-	___
70.	___	-	___	78.	___	-	___	86.	___	-	___	94.	___	-	___
71.	___	-	___	79.	___	-	___	87.	___	-	___	95.	___	-	___
72.	___	-	___	80.	___	-	___	88.	___	-	___	96.	___	-	___

5ESS(R) SWITCH

SCREEN 4 OF 4

RECENT CHANGE 13.5

ANALOG LU INDIVIDUAL LINE UTILIZATION MEASUREMENTS

*1. KEY ____

4. LIST OF INDIVIDUAL LINE ASSIGNMENTS (97 - 128)

SM	LU	CONC	LN	SM	LU	CONC	LN	SM	LU	CONC	LN	SM	LU	CONC	LN
97.	___	-	___	105.	___	-	___	113.	___	-	___	121.	___	-	___
98.	___	-	___	106.	___	-	___	114.	___	-	___	122.	___	-	___
99.	___	-	___	107.	___	-	___	115.	___	-	___	123.	___	-	___
100.	___	-	___	108.	___	-	___	116.	___	-	___	124.	___	-	___
101.	___	-	___	109.	___	-	___	117.	___	-	___	125.	___	-	___
102.	___	-	___	110.	___	-	___	118.	___	-	___	126.	___	-	___
103.	___	-	___	111.	___	-	___	119.	___	-	___	127.	___	-	___
104.	___	-	___	112.	___	-	___	120.	___	-	___	128.	___	-	___

Exhibit 6-2 View 13.5, Analog LU Individual Line Utilization Measurements**6.28.5 System Operation**

Each time the user requests to allow or inhibit lines for study with an input message, an AM-to-SM message is sent to each SM having an ILA or concentrator included in the input message.

The system determines from the input allow message or RC views what collection(s) are to be made. The specific concentrator or individual line assignment information is used to collect data for later output.

Once data is collected (every 30 minutes), the data is sent from the SM(s) to the AM. If the TRFC30 report is enabled, the collected data is printed on the ROP.

6.28.6 Measurements

The measurements collected with this feature appear in Section 90 (LUCUM) of the TRFC30 report. The measurements are reported every thirty minutes or upon manual request. This data is available to be output to EADAS, the traffic channel, and the ROP. The report timing window for these measurements is incorporated into the TRFC30 data collection scheme.

6.29 LOCAL INCOMING TRUNK SERVICE EVALUATION (ITSE)**6.29.1 Overview****6.29.1.1 Definition**

The Local Incoming Trunk Service Evaluation (ITSE) feature provides an addition to the existing Dial Line Service Evaluation (DLSE) capabilities. When requested by the No. 2 Service Evaluation System (SES), ITSE evaluations are performed on incoming inter-LATA Carrier (IC) trunk originations. A Local ITSE call evaluation request from the No. 2 SES has two aspects. When an originating call matches a call request, it is evaluated and a Call Details message is returned to the No. 2 SES. The second aspect of Local ITSE call evaluation is bridging the No. 2 SES onto the evaluated call to monitor call tones and signaling.

6.29.1.2 Economic Worth

This feature is used to collect data to evaluate the completion performance of the incoming carrier toll traffic that terminates in the office's subtending networks. The data collected are used for the quality assessment of network service and for directing quality control activities.

6.29.1.3 Availability

This feature is available with 5E7 and later software releases. The feature is available with the 5E6 software release via a software update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

6.29.1.4 Feature Provision Basis

This feature is provided as an extension of the Operating Support System (OSS) Service Evaluation System (SES).

This secured feature is not enabled until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature enabling is provided upon ordering. Please contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

6.29.2 User Perspective

6.29.2.1 User Profile

The ITSE feature is transparent to the subscriber end-user; it does not affect the way an end-user places or receives a call.

Service provider personnel are provided an automated means of assessing the quality of network service and a means of identifying problems in the network.

6.29.2.2 User Operation

Not applicable.

6.29.2.3 Activation

This feature is executed when the No. 2 SES makes an ITSE call evaluation request to the 5ESS[®] switch over a data link connection between the No. 2 SES and the 5ESS[®] switch.

6.29.2.4 Operational Limitations

The ITSE component of the 5E6 software release provides call evaluation at the network junction where the call is entering the local exchange network from the toll network. Thus, the local ITSE feature is restricted to 5ESS[®] switches used as access tandems (ATs) or as equal access end offices (EAEOs).

The ITSE feature does not allow bridging onto a data call. Only circuit-switched voice calls are service evaluated by the ITSE feature.

Calls arriving over trunks connected to an IC are eligible for service evaluation. This includes trunks using per-trunk multifrequency signaling as well as common channel signaling, but excludes operator, CAMA, and test calls.

Service evaluation requests, occurring when no history of past traffic counts is available (for example, processor initialization), result in the request being terminated. Also, receiving an ITSE service evaluation request when the feature is not active results in the request being terminated.

At this time, the ITSE feature does not extend DLSE to include evaluation of originating ISDN lines.

6.29.2.5 Interactions

This feature builds on the DLSE feature software and interfaces with it.

Modules to be selected for initiating call evaluations now include both call originating SMs and RSMs. The administrative module (AM) and the communication module processor (CMP) are no longer selected for initiating call evaluation. The SES traffic collection messages to and from the CMP are no longer needed. Each call originating SM and RSM reports its SES traffic.

Only one evaluation will be initiated on a call. Multiple reroutes or originations during a call do not initiate additional evaluations. An evaluation in progress on a call that becomes a multiway call is terminated. No evaluations are allowed to be initiated on secondary legs of a multiway call.

6.29.3 Engineering

6.29.3.1 Special Planning Considerations

The No. 2 SES must be purchased in order to utilize the ITSE feature.

6.29.3.2 Hardware

For the ITSE feature, the interface between the 5ESS[®] switch and the No. 2 SES is one data link and from one to four voice links.

6.29.4 Assignment Guidelines

6.29.4.1 Assigning to Customer

Obtain assistance from the Lucent Technologies Secured Feature Administrator (SFA) to enable this secured feature. In a new start office, the SFA enables the feature through ODA. In an existing office, the SFA provides instructions, including the necessary password, for using RC View 8.22 for 5E6 and later software releases.

6.29.4.2 Deleting Customer Service

Obtain assistance from the SFA to delete this secured feature. The SFA provides instructions, including the necessary password, for using RC View 8.22 for 5E6 and later software releases.

6.29.5 System Operation

Figure 6-7 shows the local network for Local Incoming Trunk Service Evaluation (ITSE) and Dial Line Service Evaluation (DLSE). A flow diagram describing the reporting of SES ITSE traffic data to the No. 2 SES is shown in Figure 6-8. Figure 6-9 is a flow diagram showing the logical flow of processing for ITSE evaluation.

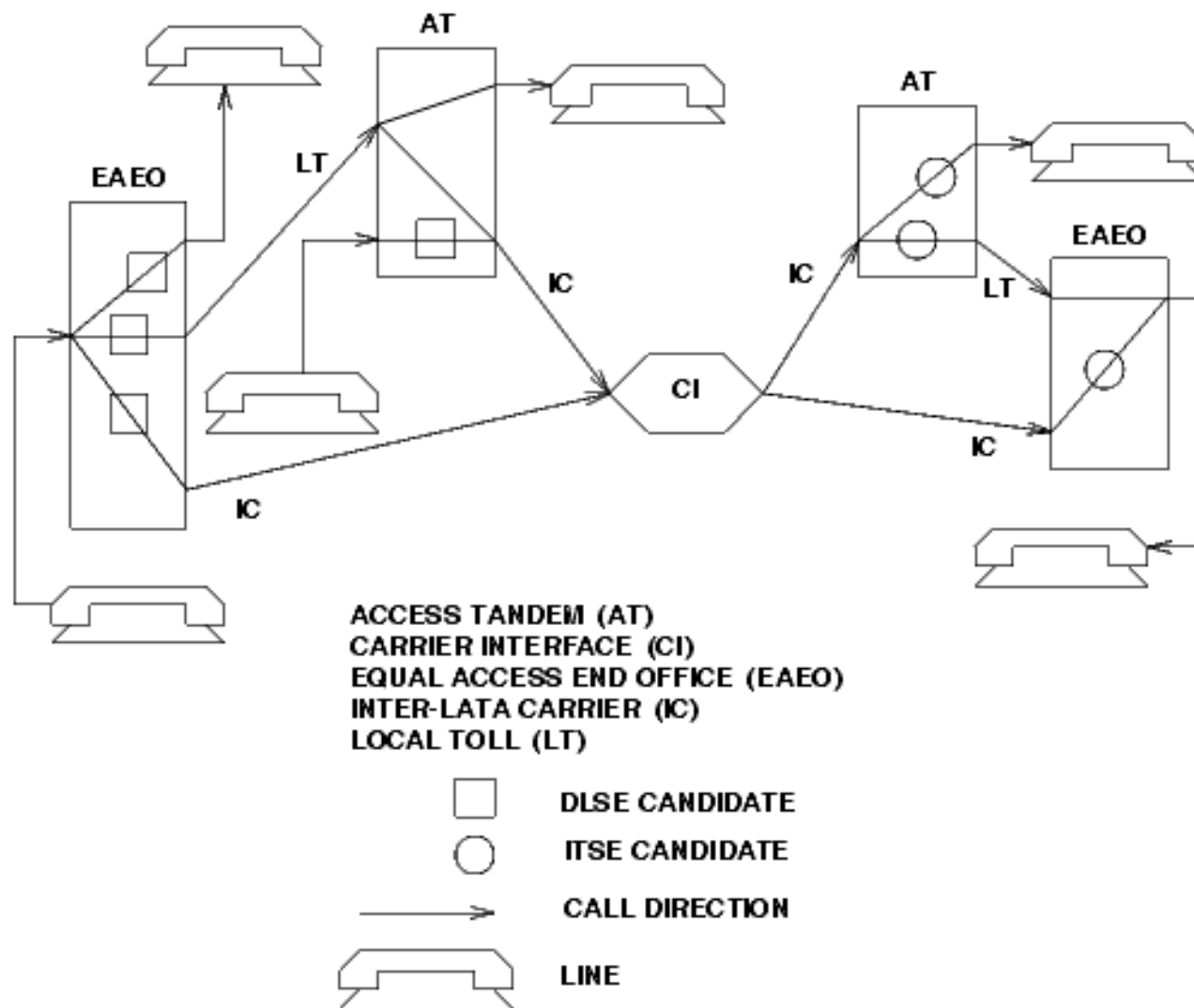
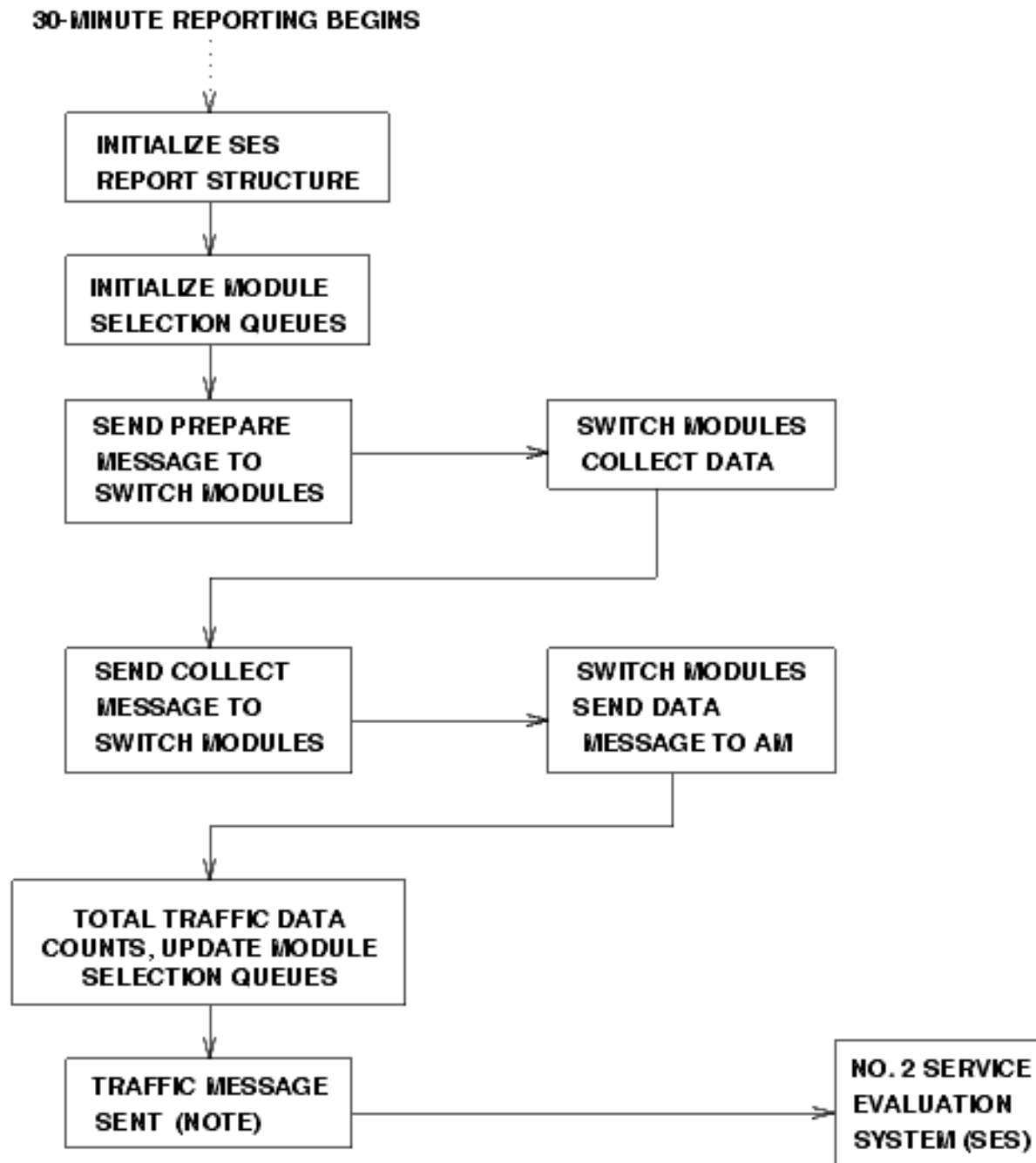
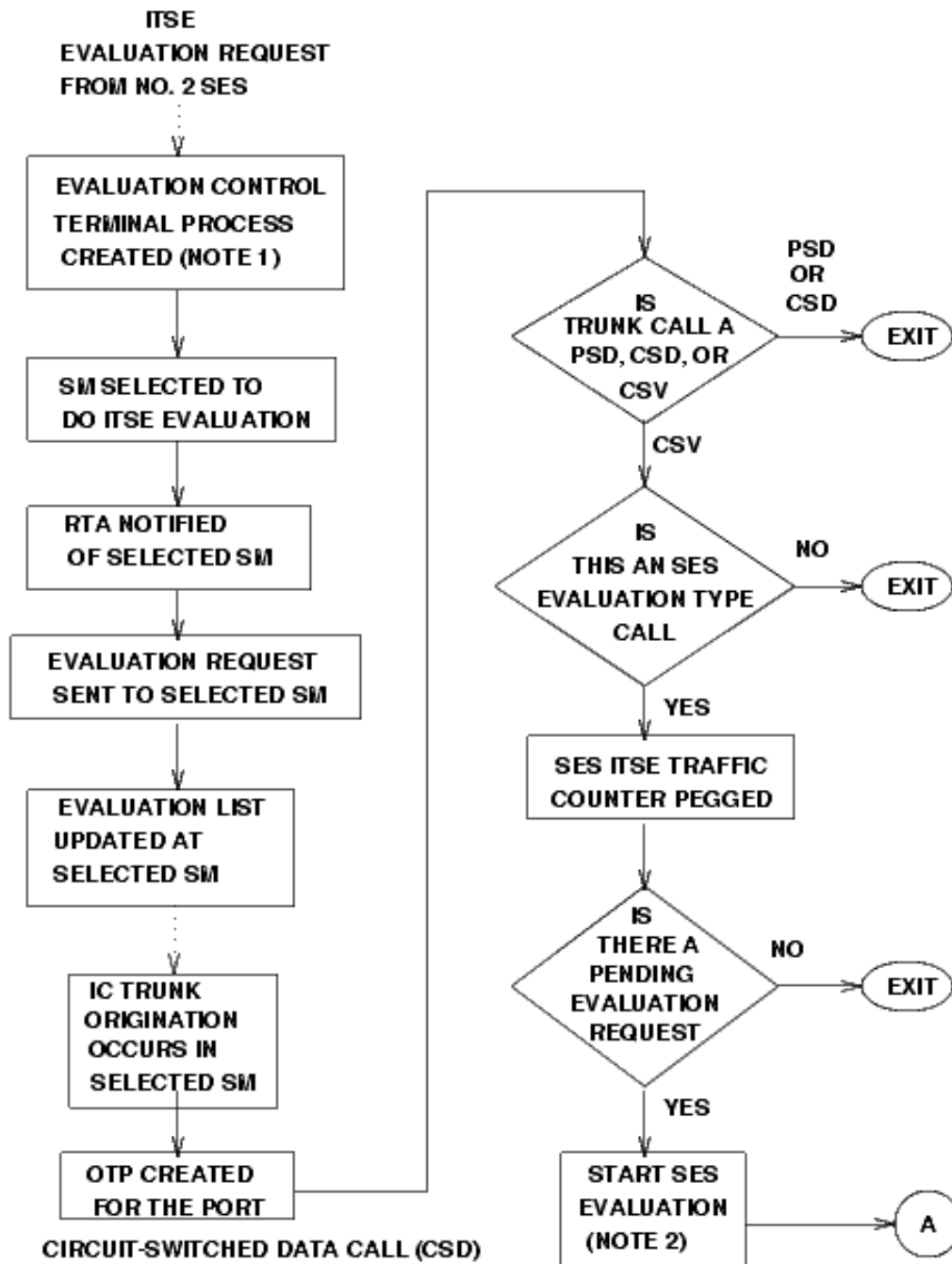


Figure 6-7 Local Network for ITSE and DLSE



NOTE: TRAFFIC DATA IS REPORTED TO THE NO. 2 SES EVERY 30 MINUTES.

Figure 6-8 Processing Flow Diagram for ITSE Traffic Data Reporting



CIRCUIT-SWITCHED DATA CALL (CSD)
CIRCUIT-SWITCHED VOICE CALL (CSV)
INTER-LATA CARRIER (IC)
ORIGINATING TERMINAL PROCESS (OTP)
PACKET-SWITCHED DATA CALL (PSD)
ROUTING AND TERMINAL ALLOCATION (RTA)
SERVICE EVALUATION SYSTEM (SES)

NOTE 1: EACH EVALUATION REQUEST CREATES A SEPARATE
EVALUATION CONTROL TERMINAL PROCESS, ONE PER VOICE LINK
MAXIMUM EQUAL TO THE MAXIMUM NUMBER OF VOICE LINKS.

NOTE 2: THERE MAY BE UP TO FOUR ACTIVE CONCURRENT EVALUATIONS
GIVEN THERE ARE FOUR VOICE LINKS.

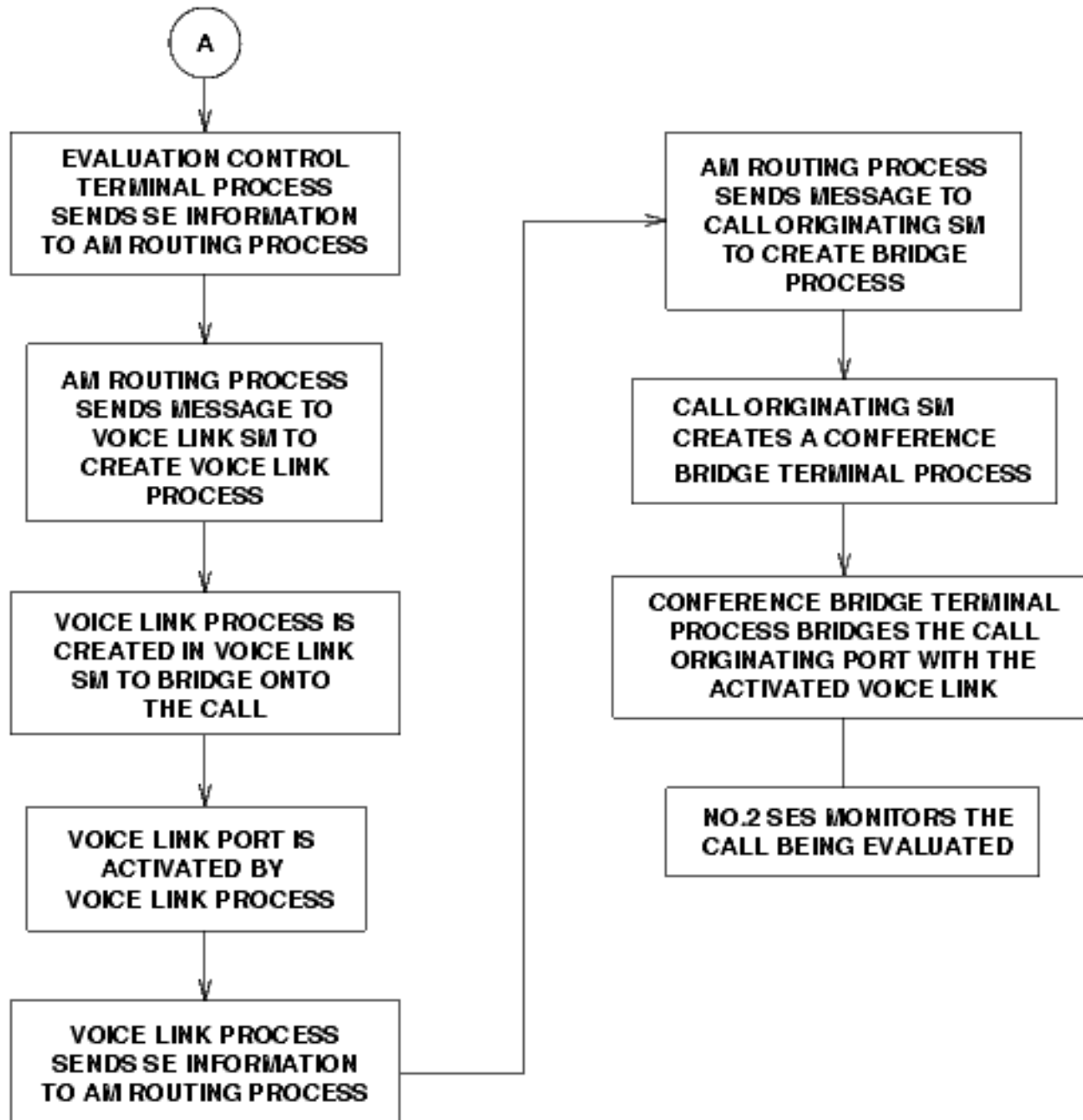


Figure 6-9 Processing Flow Diagram for ITSE Call Evaluation

6.29.6 Administration

6.29.6.1 Measurements

The measurements for the SES are not reported on the 5ESS® switch, but they are sent to the SES every 30 minutes for reporting on the No. 2 SES operating system.

The following new measurements are recorded to provide the ITSE data:

- MSITSECLS - This macro pegs the counter for the total number of IEC incoming trunk calls which can be

evaluated. This count is pegged in the SM.

- MSEITSECLS - This macro pegs the counter for the total number of IEC incoming trunk evaluations. This count is pegged in the AM.
- MStorigcnt - This is the total number of trunk originations in the switch, as taken from Section 5 of the 30-minute Traffic Report.

This measurement is used for normalization purposes.

6.29.6.2 Call Details Message Format and Field Values

As a part of a call evaluation, the Call Details message is returned to the 2 ESSTM switch (the second part of an evaluation is the bridging onto and monitoring of the call by the 2 ESSTM automated equipment).

The format of the Call Details message and the valuing of its fields do not completely agree with the (LSSGR) specifications. The differences are documented following the Call Details message description. An example of the Call Details Message format follows.

CALL DETAILS MESSAGE FORMAT				
15		8	7	0
0	Voice Link ID		Msg ID	
2	Orig. Class		Call Type	
4	Time Tag for Time of Seizure			
6				
8				
10	Time Tag for Switch Disposition			
12	Outgoing Trunk Identifier			
14				
16	Call Disp		Path Type	
18	fill		fill	
20	Incoming Trunk Identifier			
22				
24	D4	D3	D2	D1
26	D8	D7	D6	D5
28	D12	D11	D10	D9
30	IC4	IC3	IC2	IC1
32	sstind		Treatment	

Field Descriptions:

FIELD **VALUE** (octal)

Message ID 46

Voice Link ID 01-04

Call Type Type of call requested.
ITSE Call 10

Orig. Class This field indicates the class of the originating trunk.
IEC_MF 01
IEC_CCS 02

Time of Seizure The time that the observed call first came into the 5ESS[®] switch. Relative time format, 4 bytes.

Time of Disposition The time at which the routing of the observed call is completed, meaning that the outpulse has been successfully completed (or audible ring is applied if terminating to a line), or the call has been routed to a treatment or announcement. This action should be reflected in the Call Disposition field.

Outgoing Trunk ID The trunk group and member of the trunk over which the call leaves the office.

Path Type The following values are those used by DLSE and ITSE:

Initial value	0
Add-On Leg of Three-Way	1
Forward Leg of Call	2
Absentee Subscriber	3
Do Not Disturb	4
Centrex Attendant	5
Hotel/Motel	6
Prepay Coin	7
INWATS	18
Postpay Coin	9
<i>Dataphone</i> ® system	10
Hotel/Motel With Tax	11
Chargeable Quotation	12
Hotel/Motel Message Reg.	13
Remote Call Forwarding	14
Usage Sens. Three-Way Call	15
IC Change By Customer	16
IC Change By service provider	17
Feature Verification	18

NOTE: For values 1, 2, 3, 4, 5, 14, and 15, a twenty is added to the integer value. All values greater than 20 in this field are discarded by the SES for evaluation. Thus, values 1 through 5 and 14 and 15 end up not being evaluated.

Call Disposition The following values are those used by DLSE and ITSE:

60 IPM - busy tone 01
 120 IPM - fast busy 02
 Audible Ringing 03
 Outpulsing Complete 04
 BOC no circuit announcement 05
 Vacant code announcement 06
 BOC reorder announcement 07
 No ringing 10
 Intercept announcement 11
 Delivered to IC 12
 IC no circuit announcement 13
 IC reorder announcement 14
 Other 377

Incoming Trunk ID The trunk group and member number of the trunk over which the call arrives at the office.

D1 - D12 The called DN, in BCD. No prefix included.

IC Code	The carrier identification code of the inter-LATA carrier from which the call came.
sstind	This is the short supervisory transition (SST) indicator. This field is set to yes if such SST counts have been indicated in the Call Record; otherwise, it is set to no.
Treatment	A detailed indication of the treatment of this call. One byte character. This field is copied from the TREAT domain, as documented in the 5ESS® Switch Translations Guide.

The value of **01** in the originating class field implies that a multifrequency (MF) trunk call is being evaluated. A value of **02** indicates that a common channel signaling (CCS) trunk call is being evaluated.

The incoming field is now valued with the trunk group and member number. This is also true for the outgoing field in the case that the outgoing termination is to a trunk. However, the hexadecimal value **0xffff** is populated for the outgoing field if the termination to the trunk is a failure. The outgoing field is populated with a hexadecimal **0x0** for a termination to a line or if the type of termination can not be determined.

The path type field is actually used as a flash indicator to the No. 2 SES to indicate when a Centrex type call could be in progress; for example, a multiway conference call. The No. 2 SES discards the evaluation when this field indicates to do so. The range of values possible for this field and their implication is shown in the field description.

There are now two unused "filler" bytes after the call disposition field, for future use (for example, Feature Group B and Feature Group D distinction for the carrier may make use of these bytes.).

The format for the carrier ID field is from left to right, the thousand's unit, the hundred's unit, the ten's unit, and the one's unit. The first byte of the carrier ID has the first 4 bits being the ten's unit and the second 4 bits being the one's unit. The second byte has the first 4 bits being the thousand's unit and the second 4 bits being the hundred's unit.

The treatment field replaces the supplementary information field. This field designates failure treatment and is a refinement of the values supplied for the call disposition field when the call disposition is a failure. This field provides a more complete description of the call failure.

The short supervisory transition indicator (sstind) field is not used, and is populated to off (value **0**).

6.30 VERIFY COMPLETE ROUTING PATTERN OF ROUTE INDEX

6.30.1 Overview

6.30.1.1 Definition

The Verify Complete Routing Pattern of Route Index (RTITRC) feature is used to verify the routing pattern of a route index (RTI). The output data consists of a routing index, its associated trunk group (TG), and the next RTI (NRTI). The NRTI is used to output the next routing sequence. Up to 10 RTI/TG/NRTI sequences are output for each RTI translated.

6.30.1.2 Economic Worth

This feature allows office personnel to print out the route index routing pattern of a trunk. The printout is used to check for route looping and other inconsistencies.

6.30.1.3 Availability

This feature is available with 5E6 and later software releases. The feature is also available for the 5E6(1) software

release via software update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

6.30.1.4 Feature Provision Basis

This feature is provided on a per-office basis.

6.30.2 User Perspective

6.30.2.1 User Profile

The RTITRC feature is primarily used by the service provider and/or end-users for analyzing the routing pattern of toll trunks.

6.30.2.2 User Operation

The user inputs commands to produce the verify data and to access output and error files.

6.30.2.3 Activation

This feature is activated by the input command **OP:RTITRC**. Several input options are allowed to begin the RTI translation sequence. These options are as follows:

- (1) An RTI.
- (2) An SM number, trunk number, and a range of codes representing the incoming digits received on a member of the TG.
- (3) An SM number, trunk number, member number (TKGMN), and range of codes representing the incoming digits received on the trunk.
- (4) An SM number, digit analysis selector (DAS), and a range of codes representing the incoming digits received on a trunk which uses the indicated DAS.

Some examples of the input command are as follows:

- **OP:RTITRC,RTI=1;**
- **OP:RTITRC,SM=1,TG=380,START=312,END=313;**
- **OP:RTITRC,SM=9,TKGMN=260-1,START=8005, END=8006;**
- **OP:RTITRC,SM=4,DAS=5, START=0700,END=0800;**

Since this command allows a range of dialed codes to be entered for translation, it is possible that a large volume of output may be produced. All output data is directed to a *UNIX*® System file on the Administrative Module (AM). Upon completion of the translation, a message is printed on the receive only printer (ROP) indicating the status of the job and the name of the file containing the translated data. Examples of this message are as follows:

REPT OP RTITRC COMPLETE - SEE FILE /updtmp/RTITRC.589932

REPT OP RTITRC ABNORMAL END - SEE FILE /updtmp/RTITRC.5963857

If an error occurs during the translation, it is indicated on the completion message at the ROP. An error log file is created and named in the completion message and/or in the data output file. An example of an error message is as follows:

REPT OP RTITRC FAILED - SEE FILE /updtmp/RTIERR.3211370

The output and error file are accessed in one of two ways as follows:

- (1) Login to the AM.

Enter **cd /updtmp; cat <file name>**

Example: **AM:**
 cd /updtmp; cat RTITRC.598456

- (2) Use the DUMP command to print the file contents on the input teletypewriter and ROP.

Enter **DUMP:FILE,ALL,FN="/updtmp/<file name>"**

Example: **TTY:**
 DUMP:FILE,ALL,FN="/updtmp/RTIERR.672901"

6.30.2.4 Operational Limitations

The file produced by RTITRC is limited to 1000 lines of detail information (plus additional lines for headings).

If the output file is large, printing on the ROP should be done during a low traffic period.

NOTE: Remove unneeded output files from the /updtmp command to make room for other applications and future RTITRC runs. To remove these files, use the *UNIX*® System **rm(1)** command.

6.30.2.5 Interactions

The OP:RTITRC translations run under an independent, low priority *UNIX*® System process. It has limited interaction with other features.

6.30.3 Software

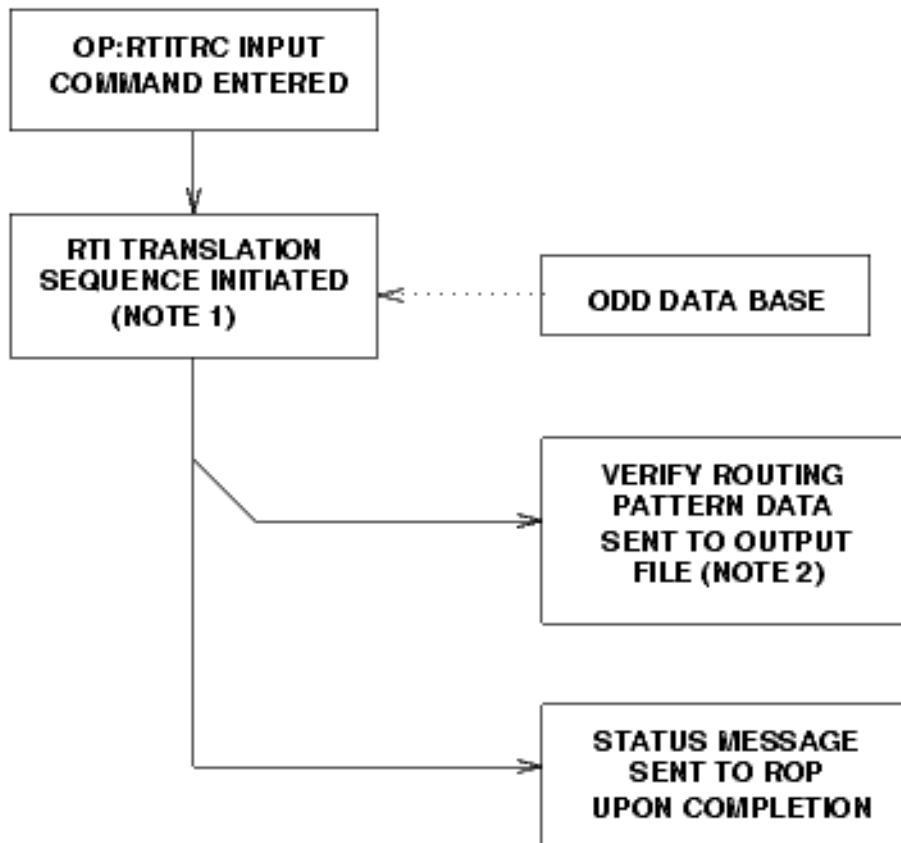
The low priority of the *UNIX*® System process, under which OP:RTITRC runs, guarantees that it is only actively processing when the system has adequate time.

6.30.4 Assignment Guidelines

Not applicable.

6.30.5 System Operation

The flow diagram for this feature is shown in Figure 6-10 .



NOTE 1 - DIGTRC UNIX(R) SYSTEM PROCESS

NOTE 2 - OUTPUT FILE UNDER /updtmp

Figure 6-10 Verify Complete Routing Pattern of Route Index Flow Diagram

6.30.6 Administration

Not applicable.

6.31 MODIFIED CALLING LINE DISCONNECT PROCEDURE FOR FRAUD PROTECTION

6.31.1 Overview

6.31.1.1 Definition

The Modified Calling Line Disconnect Procedure for Fraud Protection (MCLD) feature provides permanent signal (permsig) treatment rather than dial tone to an analog originator that remains off-hook and the delay disconnect timer (DDT) has expired after the terminator has gone on-hook. This forces the originator to go on-hook before placing a new call.

NOTE: Loop and ground-start lines receive the same treatment.

6.31.1.2 Economic Worth

The purpose of this feature is to prevent fraudulent calls from being made resulting from the use of certain customer

premises equipments (CPEs); such as, call diverters and customer-owned coin operated telephones (COCOTs).

6.31.1.3 Availability

This feature is available with 5E7 and later software releases. The feature is also available for 5E6 software releases via software update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

6.31.1.4 Feature Provision Basis

This feature is optional on a per-office basis and is not active until it has been enabled. The enabling is done locally, and does not require assistance from Lucent Technologies. The option number for this feature is 517.

This feature is not provided on "regular" coin lines.

NOTE: Coin lines which have a class of service of COIN are considered as "regular" coin lines.

6.31.2 User Perspective

6.31.2.1 User Profile

The end-users affected by this feature are those with CPEs; such as, call diverters and COCOTs (that is, equipment with a class of service other than COIN).

6.31.2.2 User Operation

Most users will be unaware of a change in operation since very few originating parties remain off-hook long enough to get dial tone following completion of a call. Users deliberately remaining off-hook following a call will quickly become aware of the change.

6.31.2.3 Activation

The following procedure enables this optional feature for all SMs:

- (1) Select RC View 8.22 for 5E6 and later software releases.
- (2) Enter **u** for the update mode.
- (3) In the FEATURE ID field, enter **517**.
- (4) In the MODULE field, enter **OFC** (office).
- (5) The PASSWD field must be blank.
- (6) In the ACTIVE field, enter **Y** (yes).
- (7) Leave all remaining fields blank.
- (8) Enter **u** to update the data.

NOTE: This feature also applies to originating lines in a remote switching module (RSM) and optically integrated remote switching module (ORM) when in the stand-alone mode.

6.31.2.4 Verify Option Feature

The following procedure verifies this optional feature for one SM:

- (1) Select RC View 8.22 for 5E6 and later software releases.
- (2) Enter **r** for review mode.
- (3) In the FEATURE ID field, enter **517**.
- (4) In the MODULE field, enter an SM number (1 to 192).

NOTE: Do not use **OFC** in the MODULE field for the verify procedure.

- (5) If the ACTIVE field is **Y**, the feature is enabled for the SM specified. If the ACTIVE field is **N**, the feature is disabled for the SM.

NOTE: Repeat this procedure for each SM to be verified.

6.31.2.5 Operational Limitations

This feature does not provide permsig treatment for lines with the following classes of service:

- ISDN
- ISATND
- COIN
- CHGACALL.

If the switch can not provide the permsig treatment because all announcement ports are busy, the originator receives reorder and is put on the high and wet list.

If an SM is in stand alone and the announcement ports are not available, the originator receives either reorder or stand-alone announcement.

This feature does not provide permsig treatment for the following:

- The controller of a hard hold scenario remains off-hook and the active party goes on-hook followed by the hard hold party (the controller hears nothing).
- A flash by the controller is ignored and the controller remains in silence.

The MCLD feature does not change the treatment given to direct connect/manual lines. Direct connect and manual lines do not receive dial tone when going off-hook. When the direct connect/manual call is idled and the originator is off-hook after the DDT, the subscriber is given permsig treatment.

This feature does not modify the following treatment:

- Types of toll trunks that do not perform DDT.
- Permsig treatment during an overload situation (that is, putting the line on a high and wet list without providing the permsig announcement).
- AUTOVON lines (hot lines) which reoriginate in the idling sequence.

Shared analog lines which stay off-hook after the called party goes on-hook do not receive permsig treatment, but reoriginate to dial tone during the idling sequence.

When a party with prohibit delay disconnect timing (PDDT) disconnects after being in a stable talking state, the switch provides a 10-second silent delay (different than DDT treatment) before connecting the originating party to permsig treatment.

This feature has no impact on the following:

- Call scenarios having error legs resulting in tearing down the call and idling the line.
- Call scenarios having error legs during initializations that never go through an idling sequence, but instead remove the port [these include, local area signaling services (LASS) automatic callback (AC), automatic recall (AR), line time slot bridging (LTSB), and shared directory number (SHDN)].

6.31.2.6 Deactivation

The following procedure disables this optional feature for all SMSs:

- (1) Select RC View 8.22 for 5E6 and later software releases.
- (2) Enter **u** for the update mode.
- (3) In the FEATURE ID field, enter **517**.
- (4) In the MODULE field, enter **OFC** (office).
- (5) The PASSWD field must be blank.
- (6) In the ACTIVE field, enter **N** (no).
- (7) Leave all remaining fields blank.
- (8) Enter **u** to update the data.

6.31.2.7 Interactions

Not applicable.

6.31.3 Engineering

6.31.3.1 Special Planning Considerations

The MCLD feature applies for calls to 911 in order to be transparent with the 1A ESSTM switch operation. Because permsig treatment may be optioned as receiver off-hook (ROH) tone only (that is, no announcement), some ambiguities can exist between this type of permsig and 911 off-hook ringback. Therefore, it is strongly recommended that permsig treatment be defined as something other than a single ROH tone.

The initial part of the permsig treatment should not be the ROH tone. If the ROH tone is the first part of the permsig treatment, this may result in the ROH tone being given to MLHG and PBX subscribers using headsets.

NOTE: Typically, permsig treatment begins with an announcement followed by the ROH tone.

6.31.3.2 Hardware

This feature should not affect CPE since an 800ms open is given by the 5ESS® switch to indicate called party disconnect.

6.31.4 Assignment Guidelines

6.31.4.1 Forms and Views

6.31.4.1.1 Translation Guide Forms

Office data administration (ODA) office records 5109 (telephone number) and 5111 (MLHG terminal) are modified to include a new field, **MCLD DEACT** (Modified Calling Line Disconnect Override). The valid values of this field are "no" (do not override the MCLD feature for this line), or "yes" (override the MCLD feature for this line).

6.31.4.1.2 Recent Change Views

A new field, **MCLD DEACT** (Modified Calling Line Disconnect Deactivation) is added to selected recent change (RC) line views. The default value of this field is "no." When the MCLD feature is active for the office, it is active for *all* lines using the same restore routine, if they are off-hook upon completion of delay disconnect timing. The MCLD feature can be overridden on a *per-line* basis by changing the MCLD DEACT field on the appropriate RC view to "yes."

(1) For the 5E6 software release, the following views are modified:

- RC View 1.1 (Individual Line)
- RC View 1.2 (Multiline Hunt Group Member)
- RC View 1.3 (Party Line)
- RC View 1.6 (Composite Line)
- RC View 2.1 (Individual Line)
- RC View 2.2 (Multiline Hunt Group Member)
- RC View 2.3 (Party Line)
- RC View 3.2 (Multiline Hunt Group Member)
- RC View A.2 (Multiple Line Query).

(2) For software release 5E7, the following views are modified:

- RC View 1.6 (Composite Line)

NOTE: Views 1.1, 1.2, 1.3, 2.1, 2.2, 2.3, and 3.2 are consolidated to View 1.6 in the 5E7 software release.

- RC View A.2 (Multiple line Query).

6.31.4.2 Changing a Subscriber Service

The feature override is provided in case CPE exists that listens for dial tone.

NOTE: When this feature is assigned to a multiparty line, each party is able to set the override option independent of the other parties.

To override the active MCLD feature on a **per-line** basis, enter **Y** (yes) in the MCLD DEACT field on the appropriate RC view.

(1) For software release 5E6, use the following views, as appropriate:

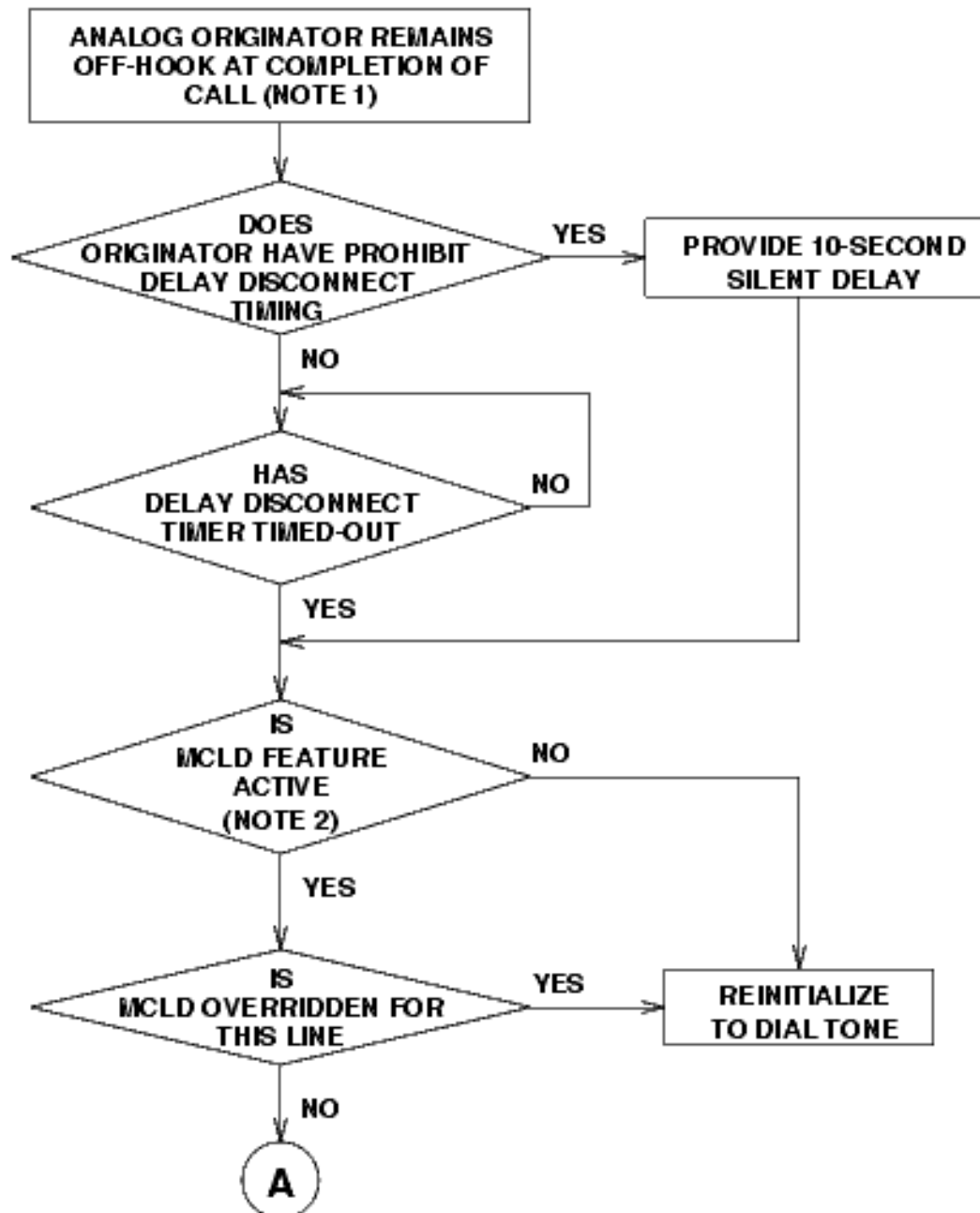
- RC View 1.1 (Individual Line)
- RC View 1.2 (Multiline Hunt Group Member)
- RC View 1.3 (Party Line)
- RC View 1.6 (Composite Line)
- RC View 2.1 (Individual Line)
- RC View 2.2 (Multiline Hunt Group Member)
- RC View 2.3 (Party Line)
- RC View 3.2 (Multiline Hunt Group Member).

(2) For software release 5E7, use RC View 1.6 (Composite Line).

NOTE: Views 1.1, 1.2, 1.3, 2.1, 2.2, 2.3, and 3.2 are consolidated to View 1.6 in the 5E7 software release.

6.31.5 System Operation

A flow diagram for this feature is shown in Figure 6-11 .



NOTE 1: ASSUME ORIGINATOR IS CPE SUCH AS CALL DIVERTER OR COIN OPERATED CUSTOMER OWNED TELEPHONE.

NOTE 2: CALL PROCESSING CODE IN ISDN, SHARED ANALOG, COIN, DIRECT CONNECT, AND MANUAL LINES IGNORE THE MCLD VALUE. NO CHECKS ARE IMPLEMENTED THROUGH RC/V.

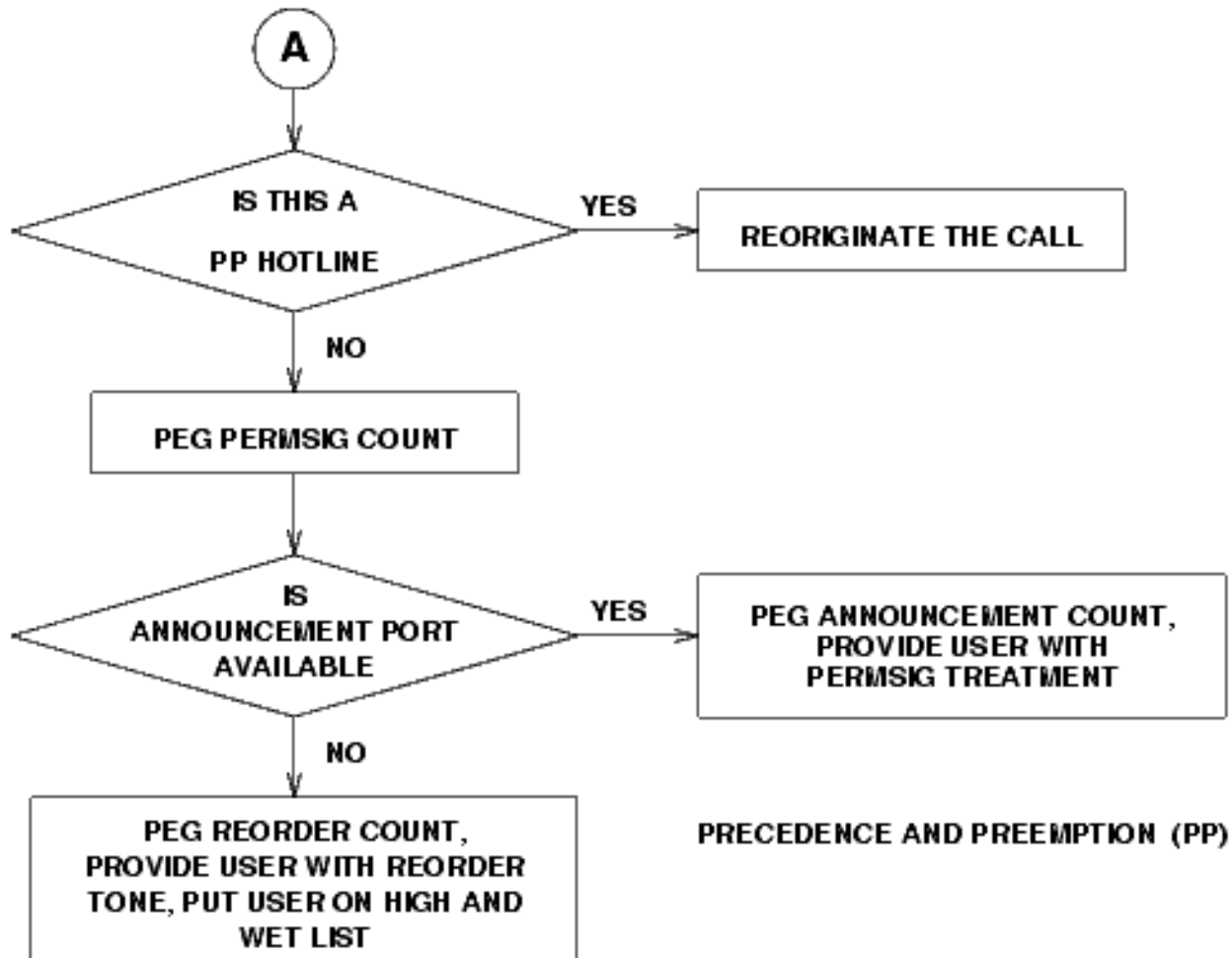


Figure 6-11 MCLD Feature Flow Diagram

6.31.6 Administration

6.31.6.1 Measurements

Prior to this feature, a count is pegged in Section 6 of the 30-minute traffic report when permanent signal treatment is given. When the MCLD feature is activated, this count is pegged for scenarios in which the originator remains off-hook after the called party goes on-hook.

Without the MCLD feature, originators are returned to dial tone, and then if the originator does not dial any digits, but goes on-hook during the dial tone, a false start measurement is pegged. Because the MCLD feature does not allow the originator to return to dial tone, the number of false start peg counts for the office are reduced.

In addition, existing reorder and announcement counts are also pegged when permanent signal treatment is given.

6.31.6.2 Billing

Not applicable.

6.32 GLOBAL RECENT CHANGE FOR LINES (5E7)

6.32.1 Overview

6.32.1.1 Definition

The Global Recent Change (GRC) for Lines feature allows the telephone company personnel to query the data base for all lines that match a specified query criterion and then update a single attribute, or group of attributes, for a selected set of lines. The feature accomplishes the GRC with as few as one or two user actions. Prior to the availability of this feature, the craftsperson had to perform each data base update individually, one line at a time. This feature significantly reduces the telephone company administrative costs for a specific set of service orders.

The changeable attributes are a limited subset of nonkey attributes found on the following views:

- 1.6 Composite Line
- 1.8 BRCS Assignment
- 23.2 Digital Subscriber Line
- 23.8 DSL/BRCS Assignment.

This list of views may expand in the future, as customer experience and recommendations are returned to the Systems Engineering and Development organizations.

6.32.1.2 Background

A telephone company regularly needs to change the value of data base attributes as a part of network operations. Additionally, these data base alterations may be for a large set of similar lines. The two methods available prior to the availability of this feature to perform repetitive line updates for attributes that cannot be changed through BRCS Feature Group (BFG) or cluster updates are as follows:

- The single RC operation for each line that needs to be changed. This alternative is clearly labor intensive.
- The Office Data Base Editor (ODBE) - The ODBE may be used to batch review, edit and batch-insert a relation. This procedure must be performed, in turn, on each switching module (SM) in the office. There are no data integrity checks for the ODBE changed data; consequently, the chance of propagating a data base error is increased.

Customer interest in operations, administration and maintenance (OA&M) with GRC capability is motivated by the fact that some specific line attributes, such as BRCS Clusters and BRCS Feature Group, can be changed on a global basis prior to the availability of this feature. In contrast, the following are examples of attributes that the telephone companies have indicated a desire to search and/or change:

- Carrier ID (PIC)
- Billing Telephone Number
- Carrier Interconnect Dialing (CIDIAL)
- Incoming Traffic Separation Class (INSEP)
- Destination Traffic Separation Class (DESEP)
- Screening Index
- Line Screening.

The Global Recent Change for Lines feature provides the strongly desired OA&M capabilities, as expressed by the customers at the telephone company Switching Feature Forum. This feature also meets 1A ESSTM switch transparency goals set by Product Management.

6.32.1.3 Availability

This feature is available with the 5E7 and subsequent software releases.

6.32.1.4 Feature Application

This feature is provided per 5ESS[®] switch.

6.32.2 User Profile

The GRC feature is used in the telephone company OA&M environment by craftspersons responsible for RC update of the 5ESS[®] switch data base. The tool is likely to be used only once or twice a month for large data base changes, but it is of importance because it reduces the amount of labor required to perform the data base updates. Fewer repetitious manual entries are required by the craftsperson thus reducing the volume of direct craft personnel involvement and the cost of labor.

The craftsperson is able to begin and control a Global RC session from the Switching Control Center (SCC), Recent Change Memory Administration Center (RCMAC), RC terminal, or central office.

6.32.3 User Operation

6.32.3.1 Change an LCC

Telephone companies often develop an undesired, inconsistent set of LCCs that vary over geographic regions and individual switches. In such cases, the telephone companies will devote resources to create consistency in their LCC coding. From an RC standpoint, correcting the inconsistencies simply require changing the existing LCC to another similar LCC.

The craftsperson queries for lines with LCC=XYZ using Multiple Line Query View A.2. The line keys for all lines matching the search criteria are stored in the query file. The number of line matches is printed at the class device for review by the craftsperson. The magnitude of the GRC can be judged by the craftsperson based on the displayed number of matching lines. An LCC different from the query LCC (for example LCC=ABC) is selected via GRC Views 28.2 through 28.5, for application to the queried lines. The GRC Schedule View 28.1 is used to specify the GRC job name, the GRC View 28.2, 28.3, 28.4, or 28.5, and the release date and time for the GRC update process to begin.

A GRC completion message is printed at the class device, and errors encountered during the GRC process are logged in the error file (grcerr).

6.32.3.2 CIDIAL Line Attribute Change

This scenario illustrates the GRC feature update capability to provide an attribute change for a large group of line users desiring carrier interconnect codes (CIDIAL = ALLOW).

The craftsperson enters the RC menu mode and accesses the Multiple Line Query View A.2 to select the attribute value, or range, that defines the group of lines for which the attribute CIDIAL should be changed. The query output generates a file of key identifiers for the lines that match the criterion. When the list is complete, the craftsperson may review the message output at the class device, indicating the total quantity of lines selected. This is essentially the same process followed previously.

The craftsperson identifies the new value for CIDIAL via GRC Views 28.2 through 28.5, for application to the queried lines. The GRC Schedule View 28.1 is used to specify the GRC job name, the GRC View 28.2, 28.3, 28.4, or 28.5, and the release date and time for the GRC update process to begin. A completion message is printed at the class device when the update has terminated. The craftsperson reviews the list of lines not updated because of errors in the error file. The error file contains detailed messages identifying the lines not updated and the specific reason for the failure.

NOTE: The craftsperson is able to change more than one attribute for a given set of lines in a single transaction as long as the attributes are found on the same RC view.

6.32.3.3 Removal of a Feature

The following is a typical case of removing a feature from a set of lines. In this case, call waiting, terminating is removed from the set of lines.

The craftsperson enters the RC menu mode and accesses the Multiple Line Query View A.2 to select the attribute value, or range, that defines the group of lines for which the Call Waiting, Terminating feature should be deleted. The query output generates a file of key identifiers for the lines that match the criterion. When the list is complete, the craftsperson can view the total quantity of lines that were selected. This is essentially the same process followed in previous scenarios.

The craftsperson identifies the feature to be removed on the RC view, DELFEAT=/CWT, and requests the feature deletion be applied to the selected lines using the GRC view. The GRC Schedule View 28.1 is used to specify the GRC job name, the GRC View 28.3, or 28.5, and the release date and time for the GRC update process to begin. A completion message is printed at the class device when the update has terminated. The craftsperson reviews the list of lines not updated because of errors in the error file. The error file contains detailed messages identifying the lines that were not updated and the specific reason for the failure.

NOTE: The craftsperson is able to delete three features for a given set of lines in a single transaction.

6.32.3.4 Data Input Errors and Input Error Recovery

The 5ESS[®] switch is able to assure that data input by telephone company personnel passes systematic and logical checks. Data is checked as if it were a single line update. Specifically, the domain (level 1), intraform (level 2), and interform (level 3) error checking is accomplished, but the switch cannot assure that the data is correct for the specific application. A craftsperson who discovers an input data error that is an incorrectly populated RC view field is able to stop the GRC process at any time. Either of the following recovery scenarios may be used, depending on the service effect of the error:

- Use GRC to reverse the change; that is, back-out a Global update.
- Use per line RC if the error was detected early in the Global update and few lines were altered.
- Reload backup copy of office dependent data (ODD).

6.32.3.5 Resource Failure

If the GRC process encounters an unrecoverable resource failure and is unable to continue (for example, the engineered file space for input, error or backout files is exceeded) then the process halts, prints an error message, and sends a minor alarm to the SCC.

In the case of file space problems, the craftsperson may review the list of temporary files from previous GRC activity in the rclog directory and remove, or save elsewhere, old temporary files to provide room for continuance (that is, restart of the GRC process). Refer to 235-118-2xx, *5ESS[®] Switch Recent Change Procedures*, for more information

on restarting the GRC process.

6.32.3.6 GRC Update Schedule

The customer is about to schedule a multiline update using the GRC and, in order to anticipate future RC activity and establish priorities for the update, needs to review how other batch and GRC activity is scheduled. The customer types **GRC:REPORT** to list the previously scheduled and pending update activity. This is a new capability for the 5ESS[®] switch. Refer to 235-600-700, *5ESS[®] Switch Input Messages Manual*, for an explanation of the input message variables.

6.32.3.7 Activation

All offices implementing the 5E7 software release have the GRC for Lines feature activated.

6.32.3.8 Deactivation

Not applicable.

6.32.3.9 Restriction Capability

Not applicable.

6.32.4 Compatibilities

Not applicable.

6.32.5 Interactions

There are no significant interactions between the GRC for Lines feature and other features available on the 5ESS[®] switch.

6.32.6 Engineering

6.32.6.1 Special Planning Considerations

The GRC for Lines feature impacts operations methods, procedures, and work flows in telephone company offices. Work load changes as the result of reducing the manual activity for RC updates result in the redistribution of craftsperson resources. This redistribution of resources may impact established work schedules. Offices not regularly using Batch RC will experience significant method and procedure changes if they fully exercise the GRC for Lines capability. Additionally, office management has to consider the optimal scheduling time of GRC for Lines to minimize impact on other OA&M processes.

6.32.6.2 Hardware

No hardware changes are required to support the GRC for Lines feature.

6.32.7 Assignment Dependencies and Limitations

6.32.7.1 Dependencies

Not applicable.

6.32.7.2 Limitations

The GRC for Lines feature provides the ability for the craft personnel to determine, via an input message, the amount of /log space remaining. If the space remaining is less than 20 percent (that is, the /log space is more than 80 percent full) the feature outputs an error message and does not continue. Telephone company personnel must intervene to provide more log space in the case of the /log being more than 80 percent full. The space remaining message allows the craftsperson to judge the volume of memory space remaining, the likelihood of the GRC exceeding the remaining space, and the need for an ODD backup prior to beginning the update. The craftsperson should monitor the size of the RC log files while the GRC update is in progress and back up the ODD when the RC log files reach 80 percent of capacity.

The GRC process comes to a graceful stop as the 80 percent capacity level is reached. An ODD backup should be anticipated after the process has come to the graceful stop. At this point, lines should be sampled and tested prior to the ODD backup to assure that the Global update has proceeded normally. This is important since some ability to restore the data base to a pre-Global update state is lost as a result of the backup.

Only one GRC process can be active at a time, though more than one GRC timed release request may be ordered by a craftsperson. Each GRC request is queued by the system as a timed release file. This queue is periodically checked and the first GRC file that is past due is automatically released. Other past-due files await their turn for release on a first-come, first-served basis. For example, if three GRC jobs have been queued and the first Global process halts, the second or third process may not run until the first has been canceled or restarted and run until completion.

Up to three features may be deleted at a time by a single GRC request. Any number of attribute changes for lines may be scheduled at one time as long as the attributes all appear on the same RC view. High risk attributes are blocked. The following GRC attributes are not supported from Views 28.2 and 28.3:

ASSOC OE	CHNG PTY	RNDMKB
BAL NTWK	CHNG TN	SAUTO
BAUTO	COMP LOSS	SCD SCRNING
BCK LNK	DEPENDDN	SERHLN
BRCS	HRI	SHARED
CHNG MEMB	LEAD PORT	SLLC
CHNG MLHG	MULTIDN	SPEC TRN
CHNG OE	RMB	STH

The following GRC attributes are not supported from Views 28.4 and 28.5:

ACSR GRP	CKT MLHG	DPKT MLHG
ACSR INH	CKT TERM	DPKT TERM
B1 SERV	CKT TN	DSL CLS
B2 SERV	CUT DGTS	EL
BAND	D ISCN	ISCN
BAUTO	D SERV	MDPKT
BCK LNK	DFLT SRV	MMB SUBGP
BRCS	DPIDB	MTERM
MULTIDN	PPB2 DPIDB	RNDMKB
NT1 TYPE	PPB2 ISCN	RSTR MP
ODB ISCN	PPB2 MLHG	SAUTO
OE	PPB2 TERM	SERHLN
PM GRP	PPB2 TS	SHARED
PPB1 DPIDB	QTR TS	STH
PPB1 ISCN	RBV TGN	TAUTO
PPB1 MLHG	RMB	TKS
PPB1 TERM	RND SUBGP	TS
PPB1 TS		

Blocked attributes for DPKT, ODB, PPB1, and PPB2 are as follows:

MODEM ACCESS TN1	CUGHX
MODEM ACCESS TN2	LCP
MODEM ACCESS MLHG1	TN
MODEM ACCESS MLHG2	

High risk attributes are those attributes that could result in serious service impact if altered by error.

The GRC for Lines feature is not available via the Remote Memory Administration System.

6.32.8 Feature Implementation Procedures

6.32.8.1 ODA Implementation

Not applicable.

6.32.8.2 Recent Change Procedures

Not applicable.

6.32.8.3 Assignment Verification

Not applicable.

6.32.9 Feature Operation

6.32.9.1 Functional Overview

The Global Recent Change architecture was incrementally built on the existing Recent Change architecture. This feature required functional extensions to the existing architecture, but did not radically change it.

Global Recent Change can be viewed as a 3-step operation:

- **Step 1** - Perform a query to find all the lines in the office matching a certain criteria (for example, find all the lines that have LCC=XYZ).
- **Step 2** - Change the attributes on View 28.2/28.3/28.4/28.5 (which correspond to View 1.6/1.8/23.2/23.8, respectively) and use the GRC view to schedule a Recent Change job at a user-specified time and date. For example, the user may want to change the Carrier Interconnect Code (**CIDIAL**) and apply this change to all the lines queried in Step 1 matching a certain criteria. The GRC view schedules the update job at the specified time and date.
- **Step 3** - The actual data base update.

In this step, the recent changes for all the lines are committed in the data base.

6.32.9.2 Architectural Overview

This section outlines the software architectural aspects of various components of GRC architecture.

6.32.9.2.1 Query Step (Step 1)

The existing multiple query view (A.2) is used to query attributes on analog and ISDN circuit lines. Changes to this view were required to support line query for packet fields on 23.2 and 23.8 attributes.

The query process was enhanced to support the following functionality:

- Allow the craftsperson to specify a user-defined job name for the entire GRC update that will be performed. (This will cause a directory with this same job name to be created under /rclog/GRC on the 5ESS[®] switch. All files created by this particular GRC update job will be stored in this directory. This GRC job name will be a required key to all of the "Class 28" GRC views.)

- Generate the query output file for GRC in a format suitable for use as GRC input.
- Be able to query analog or ISDN circuit lines on A.2 separately for GRC operation to allow separate updates for 28.2/28.3 and 28.4/28.5 views.

The purpose of the query output file is to provide the 'key(s)' information to the GRC process. The GRC process reads the keys from this file and calls the appropriate RC view for update for all the entries in the file.

A query requested using View A.2 results in sending a message from the RC process (aprc) to the Office Records control process which creates a query process (RCtsrpt) to perform a query of the data base by calling the appropriate mapping code functions.

6.32.9.2.2 Selecting Change Attributes/Scheduling GRC Request (Step 2)

A new class of views has been introduced to support the GRC feature. This class (Class 28) contains the following 5 views:

- (1) 28.1 - Global RC Schedule View
- (2) 28.2 - Global RC Update View for 1.6
- (3) 28.3 - Global RC Update View for 1.8
- (4) 28.4 - Global RC Update View for 23.2
- (5) 28.5 - Global RC Update View for 23.8.

View 28.1 allows the craftsperson to schedule a GRC job, and the four remaining views allow the craftsperson to indicate which attribute(s) is/are to be globally updated.

Presently, updates to attributes found on Views 1.6, 1.8, 23.2, and 23.8 are the only updates supported by the GRC feature. Refer to 2235-118-2xx, *5ESS® Switch Recent Change Procedures*, for more information on the recent change Views.

In this step, the RC process interacts with the GRC control process to schedule a recent change job. The RC process sends a message to the GRC control process to insert a request in the GRC queue. The GRC control process inserts a job in the queue.

6.32.9.2.3 Data Base Update (Step 3)

This step involves actual data base updates. The GRC control process (RCgrccp) monitors the GRC queue file which contains the requests for the GRC. When it is time to run a GRC request, the control process creates a child process, called GRC update process (RCgrcupd), to execute the recent changes for each entry in the query output file (keys.) This process (RCgrcupd) interacts with the DBrc terminal process in the Communication Module Processor (via a data base communication package) to perform the data base updates. The error file (grcerr) and the back-out file (backout) are created by the GRC update process. The update information file (update), which contains the changed field information, is used by the GRC update process to update the specified view. The control process handles the craftsperson's commands.

6.32.10 Administration

6.32.10.1 Measurements

Measurements are not applicable to the GRC for lines feature.

6.32.10.2 Billing

Billing is not applicable to the GRC for lines feature.

6.33 INTEGRATED SERVICES LINE UNIT/LINE UNIT LOAD ADMINISTRATION MEASUREMENTS (5E7)

6.33.1 Overview

6.33.1.1 Definition

The Integrated Services Line Unit (ISLU)/Line Unit (LU) Load Administration Measurements feature adds two new TRFC30 sections, one for LUs and another for ISLUs. The LU section contains usage statistics on each operational switch group (SG) within the selected LUs. The ISLU section contains usage statistics on each operational Line Group Controller (LGC) within the selected ISLUs. The ISLU studies can also include Remote Integrated Services Line Units (RISLUs). In both instances, up to 32 lines per load unit can be accommodated.

A network administrator may not want to collect data on all LUs in the entire office. Instead, the administrator may choose to focus only on overloaded and underloaded LUs. Therefore, network administrators have to select the LUs and ISLUs on which data will be collected before the TRFC30 sections are activated. Each of the two TRFC30 sections can be activated individually, independent of each other.

One usage count is computed for the entire operational SG based on a 100-second scan of lines in the SG. This count is produced for all types of LUs. The SG is also known as a half-grid. An SG has up to 32 lines spread across eight switches (0-7) with four lines per switch.

The number of counts within an LU varies depending upon the number of concentrators (or the concentration ratio) in the LU. For instance, there are 20 counts for an LU with 10:1 concentration, and 8 counts for an LU with 4:1 concentration.

Traffic usage is computed for concentrator busy A-links. For each SG, the traffic count reflects usage due to the following:

- Circuit-switched calls (voice and/or data)
- Terminal maintenance
- Network fabric exercise.

Certain activities like test calls, terminal maintenance activities, and fabric exercise will reflect usage because these conditions request a concentrator path. However, some off-hook conditions (showering, high and dry, and high and wet) will not reflect usage.

This procedure is consistent with the way traffic and maintenance usage are measured and reported in other TRFC30 sections. Because there is a 2:1 concentration in the SG, the theoretical maximum value per SG is $16 \times 18 = 288$ hundred call seconds (CCS) per half hour. Of course, the minimum value is 0.

NOTE: The LUs or SGs with no traffic usage and LUs or SGs that are operational but out of service all report 0 (zero) traffic usage.

Usage data is reported via a new TRFC30 section for the selected LUs. The network administrator selects specific LUs (**NOT** SGs) for study through the Recent Change/Verify screens or ODA forms.

One usage count is computed for each LGC based on a 100-second scan of time slot usage in the LGC. An LGC

has up to 32 U, T, and/or Z line cards. Unlike the maximum value of traffic counts on usage in an SG, the maximum value for an LGC cannot be easily stated. The number of nailed-up time slots (B's and D's) could easily vary from one LGC to another based on how it is engineered (variety of U, T, and Z cards) and it affects the maximum value of the traffic count on usage. In other words, the number of time slots available for circuit-switched data calls can vary from one LGC to another and this is reflected in the usage counts.

For each LGC with U and/or T cards, the traffic count reflects usage due to the following:

- Circuit-switched calls (voice or data)
- On-demand B channel (packet-switched) calls
- Dedicated or nailed-up B channels
- Terminal maintenance.

On-demand B channel usage is included in the usage because it competes with circuit-switched calls (voice and data) for time slots.

The traffic count does **NOT** include the following:

- Diagnostic maintenance usage
- D channel usage
- Control time slot usage.

For each LGC with Z cards, the traffic count includes the following usage:

- Voice
- Voice graded data service
- Terminal maintenance.

The traffic count does **NOT** include diagnostic maintenance usage.

The usage data is reported via the TRFC30 section for the selected ISLUs. The network administrator specifies the selected ISLUs (**NOT** LGCs) through the Recent Change/Verify screens.

NOTE: Neither the 5ESS[®] switch nor Engineering and Administration Data Acquisition System (EADAS) calculates weekly statistics on the usage measurement. The weekly statistics are computed in a downstream system.

6.33.1.2 Background

To provide and maintain a specified grade of service, network administrators need to constantly monitor the traffic load on switch resources. Using statistics on some TRFC30 measurements, network administrators can identify resources with excessive high usage or low usage and take appropriate administrative actions. When new lines are being added, for instance, the highly loaded LUs can be skipped and the lightly loaded LUs can be used. In some instances, highly loaded units may even be unloaded.

In line assignment, the objective is to maximize the number of lines (users) on a unit without exceeding its usage capacity, expressed in CCS. For instance, under certain conditions, the recommended traffic capacity of an LU (with 8:1 concentration) which is engineered for 1.5 percent blocking in the 5ESS[®] switch is 1700 CCS. If the average

usage on a line is 5 CCS, then only 340 (1700/5) terminations out of 512 are possible. However, if the average usage on each line is 2 CCS, the total usage is only 1024 CCS (512 x 2) out of 1700. Yet, no more than 512 lines can be accommodated in an LU with 8:1 concentration. The task of the network administrator is to assign as many lines to a line unit as possible without exceeding its engineered capacity.

The network administrator can optimize the number of lines through proper load administration procedures. Through load balancing, a mix of high and low CCS load lines can be assigned to different LUs to achieve the most efficient line administration scheme. If not properly administered, excessive blocking might occur in LUs causing degradation in service.

To properly administer LUs, measurements on usage are needed. The LSSGR Section 8 (TR-TSY-000541) states that traffic measurements should be available for each load unit. The smallest loading component in an LU is the SG and the smallest loading component within an ISLU is the LGC. For this reason, two new traffic counts have been added, one each to two new TRFC30 sections. One section provides statistics on usage per SG and the other provides statistics per LGC.

Decisions on administration of LUs and ISLUs cannot be made on single data points on traffic measurements. Meaningful analyses can be made only on data accumulated over a period of time. In 1 *ESS*TM and 1A *ESS*TM switches, weekly statistics (total or average) on usage are used for efficient administration of LUs. Similarly, the two new traffic counts are used in computing weekly statistics for administering LUs in the 5*ESS*[®] switch. These measurements are **NOT** automatically provided. They have to be obtained through special studies.

6.33.1.3 Availability

This feature is available with the 5E7 and subsequent software releases.

6.33.1.4 Feature Application

This feature is provided per 5*ESS*[®] switch.

6.33.2 User Profile

This feature is designed for the operating telephone companies to assist them in efficient administration procedures. Any working office with LUs/ISLUs could use load statistics for administration of line units. Load administration (or load assignment), just like the computation of load statistics, is accomplished in downstream systems. The line assignment system assists network administrators in selecting lightly loaded SGs and/or LGCs when new lines are being added.

6.33.3 User Operation

6.33.3.1 Activation

The two new TRFC30 sections (Section 144 reports usage on a per-SG basis and Section 145 reports usage on a per-LGC basis) are activated for collection and reporting by standard TRFC30 type messages. They can be activated individually and independently. A new Recent Change/Verify View 13.6 has been added to specify the LUs or ISLUs on which measurements are to be collected.

NOTE: Though usage data is provided per SG or LGC, the selection is done at the LU and ISLU levels. If the selected LUs and ISLUs are operational and are accepted for data collection by the 5*ESS*[®] switch, traffic measurements are provided for each operational SG and LGC in the existing units.

To enable the TRFC30 section for collection, the following input message is used for the LU section:

ALW:TRFC30,CLCT:SG=study_grp# (up to 5 study groups)

When the craft enters this command, data is generated and collected for all SGs on the LUs which are members of the study group specified.

To enable the TRFC30 section for collection, the following input message is used for the ISLU section:

ALW:TRFC30,CLCT:LGC=study_grp# (up to 5 study groups)

When the craft enters this command, data is generated and collected for all LGCs on the ISLUs which are members of the study group specified.

At system initialization, by default, sections are inhibited for ROP output. Due to the sheer volume of data, the entire data will not be allowed to be printed on the ROP. However, the craftsperson is allowed to select up to six records for output to the ROP. Thus, the craftsperson is able to look at the six highest, six lowest, or three highest and three lowest usage values (that is, records of six SGs or six LGCs).

To output six records with the highest count values to the ROP, during the next scheduled output, the following message is used:

ALW/INH:TRFC30,ROP,SG/LGC,HIGH=1

To output six records with the lowest count values to the ROP, during the next scheduled output, the following message is used:

ALW/INH:TRFC30,ROP,SG/LGC,LOW=1

To output three records with the highest count values and three records with the lowest count values to ROP, during the next scheduled output, the following message is used:

ALW/INH:TRFC30,ROP,SG/LGC,HILO=1

To output six specific records to the ROP, during the next scheduled output, the following message is used:

ALW/INH:TRFC30,ROP,SG/LGC,UNIT=sm#-lu#-concentrator#-sg(lgc)#

Note that the concentrator number needs to be specified only in the case of switch groups.

The following output message indicates the collection status of all sections of TRFC30 including the names of the two new sections:

OP:MEASTAT CLCT

The following trailer message following the foregoing output message indicates which study groups (rather than the SM/lu identifiers) are allowed for collection:

ALW: MEASTAT:TRFC30

The following output message is used (in response to the craftsperson's request for the print status) to indicate the print status of the sections:

OP:STATUS:TRFC30

In addition to the print status of all TRFC30 sections, the two new section names are included.

The following trailer message following the foregoing output message indicates which records of a section are allowed for outputting to the ROP:

ALW:STATUS:TRFC30

The following message is printed when the specified data requested by the craft is not in the EADAS buffer and when the craft has allowed the sections for ROP output:

OP:TRFC30-ND

When the craft allows the new sections for the ROP or CLCT, the following message responds with the valid and invalid identifiers that are entered:

ALW:TRFC30

Refer to 235-600-700, *5ESS[®] Switch Input Messages Manual*, for an explanation of the input message variables.
Refer to 235-600-750, *5ESS[®] Switch Output Messages Manual*, for an explanation of the output message variables.

6.33.3.2 Deactivation

The traffic count is deactivated (that is, inhibited from data generation and collection) by input messages for TRFC30 section, by removing an LU or ISLU on an activated study group, or by deleting the study.

To inhibit the two sections, the following messages are used:

INH:TRFC30,CLCT:SG=study_grp# (up to 5 study groups)

INH:TRFC30,CLCT:LGC=study_grp# (up to 5 study groups)

Refer to 235-600-700, *5ESS[®] Switch Input Messages Manual*, for an explanation of the input message variables.

6.33.3.3 Restriction Capability

Not applicable.

6.33.4 Compatibilities

This feature is compatible with all other features assignable to a *5ESS[®]* switch.

6.33.5 Interactions

There are no interactions between this feature and other features assignable to the *5ESS[®]* switch.

6.33.6 Engineering**6.33.6.1 Special Planning Considerations**

Not applicable.

6.33.6.2 Hardware

There are no specific hardware items unique to this feature.

6.33.7 Assignment Dependencies and Limitations**6.33.7.1 Dependencies**

No other features or services must be operational in the *5ESS[®]* switch before this feature can be implemented.

6.33.7.2 Limitations

6.33.7.2.1 EADAS

The EADAS TRFC30 buffer size of 75000 bytes may limit the amount of data an office can collect in one 30-minute period. One TRFC30 section has a maximum size of 32,000 bytes of data. In the worst case, if both of the new TRFC30 sections are activated simultaneously, then 64,000 bytes may be used leaving only 11,000 bytes for other TRFC30 sections. In this case, the network administrators may choose to activate only one of the two TRFC30 sections or activate only one study per section.

6.33.7.2.2 Line Unit (LU)

A maximum of 500 (4:1 concentration) LUs can be simultaneously studied. Data is provided for all SGs within these LUs. This amounts to studying 128,000 lines in groups of 32. The maximum number of SGs that can be studied simultaneously is 4,000.

6.33.7.2.3 Integrated Services Line Unit (ISLU)

The maximum number of ISLUs that can be studied is 250 each with 16 LGCs. The maximum number of LGCs that can be studied simultaneously is 4000. This amounts to studying 128,000 lines in groups of 32.

6.33.8 Feature Implementation Procedures

6.33.8.1 Office Data Assembler (ODA) Implementation

For office starts, Office Data Assembler (ODA) forms allow the operating telephone companies to specify study groups by populating RLMS_SGEQ, RLMS_LUSDY, and RLMS_SGSDY.

6.33.8.2 Recent Change Procedures

A new RC View, 13.6, has been added to specify the LUs and ISLUs on which data is collected. The same view is used for LUs and ISLUs; however, LUs and ISLUs are not mixed on a given view.

To generate traffic measurements, the craftsperson must do the following two things:

- (1) Set up a study group.
- (2) Enter an input message.

Through the new RC View 13.6, the craftsperson sets up a study group. For each line unit type, up to five study groups (each study group containing not more than 100 line units) can be defined by the craftsperson. To do this, the craftsperson enters the study group number, line unit type, and switching module (SM)/LU ids (up to 100).

The RC System checks whether the SM and the LU are operational. An error message is returned if these checks fail. An error is also returned by RC if the craftsperson makes a duplicated entry. However, duplicate SM/LU entries are permitted across study groups. Each study group can be activated and deactivated independently.

NOTE: The study groups and the units specified within the study groups by the craftsperson are saved following a generic retrofit.

As stated earlier, measurements generation and collection do not begin until the appropriate input messages are entered by the craftsperson.

When a line unit is added to the new RC View 13.6, and if the study group is already allowed for collection, counts

will be generated on the newly added LU. However, if the EADAS limits of 32K or 75K bytes of data would be exceeded because of the additional SGs or LGCs, RC returns an error message. If, before the update is completed, the telephone company allows another study group for collection or another TRFC30 section is allowed for collection, it is possible for the combination of this update and the newly allowed records to exceed the EADAS budget. In this case, an assert prints and the update fails.

If the status of an LU or ISLU is changed from operational to nonoperational or deleted from operational and the LU or ISLU is a member of a study group, the LU or ISLU is deleted from the new RC view. No indication that this has occurred is given to the telephone company. (A RISLU cannot go operational to delete).

6.33.8.3 Assignment Verification

Not applicable.

6.33.9 Feature Operation

6.33.9.1 Enabling Generation and Collection

6.33.9.1.1 Overview

Counts are only generated for operational SGs on the LUs specified by the craftsperson. Triggering the generation of SG measurements is a 2-step process. First the craftsperson, through the new RC View 13.6 or ODA forms, sets up a study group. A study group number (valid numbers are 1 through 5), unique line unit type (ISLU or LU), and unique members of the study group [SMs (1-192) and LUs (0-7)] numbers must be entered. The craftsperson must enter a message to begin actual generation of the counts. The input command, **ALW:TRFC30,CLCT:SG=<study group numbers>**, specifies the study groups which are allowed for generation and collection. Count generation for each operational SG in the specified LUs in the allowed study groups then begins.

6.33.9.1.2 Creating a Study Group

After the craftsperson enters the study group number, line unit type, and SM/LU ids (up to 100), RC checks if the SM and LU exist and are operational. An error is returned if these checks fail for any single pair of ids. An error is also returned if the craftsperson enters duplicate SM/LU ids within a study group; however, duplicate ids are allowed across study groups. The RC System numerically sorts the SM and LU ids within each study group in ascending order, first by SM then by LU.

6.33.9.1.3 Allowing Generation and Collection

When the craftsperson enters the allow input message, the switch verifies that there are LUs in the study group. If not, the study group is listed as an invalid element in the ALW TRFC30 output message. If the craftsperson allows a study group already allowed for collection, and if additional SGs have been made operational since the last allow, those SGs are also allowed for generation and collection if the EADAS 32K or 75K bytes of data limit would not be exceeded. If the EADAS memory budget is exceeded, the newly operational SGs (LGCs) are not allowed for collection and a message, **ALLOWED FOR CLCT-STUDY UNCHANGED** is printed on the **ALW TRFC30** output message.

6.33.9.1.4 Inhibiting Generation and Collection

If the craftsperson inhibits collection (**INH:TRFC30:CLCT:SG=<study group numbers>**), generation of the usage counts stops, and the counters are zeroed for all line units which are members of that study group. (This will not be done if the line unit is a member of another study group still allowed for collection.) Only line units which are members of an active study are reported.

6.33.9.1.5 Adding Additional LUs to a Study Group

If additional LUs are entered on View 13.6 to an existing study group which is allowed for collection, count generation begins for the newly populated LUs on the next 100-second scan entry unless the EADAS limit of 32K or 75K bytes of data is exceeded.

6.33.9.1.6 Deleting LUs From a Study Group

If the craftsperson deletes some of the LUs from a given study group and the study is allowed for collection, counts for those LUs will not be reported at the next half hour unless the LUs are members of another study group allowed for collection.

6.33.9.1.7 Deleting a Study Group

If the craftsperson deletes a study group, counts for all the LUs (ISLUs) on the study will not be reported at the next half hour unless the LU (ISLU) is a member of another study allowed for collection.

6.33.9.1.8 Changing Status of Grids/LGCs to Operational

When the status of grids or LGCs are changed from a nonoperational state (GROWTH or UNEQUIPPED) to operational, and if the grid or LGC is on an LU or ISLU that is a member of a study group that is allowed for collection, the newly operational SGs or LGCs do not become part of the study until the craftsperson allows (or reallows) the study for collection.

6.33.9.1.9 Changing Status of Grids/LGCs From Operational

When the status of grids or LGCs are deleted from operation or changed from an operational state to a nonoperational state, the counts for these grids and LGCs will not be reported at the next half hour.

6.33.9.1.10 Changing Status of LUs/ISLUs From Operational or Deleting LUs/ISLUs

If the craftsperson deletes an LU (ISLU) from operational or changes the status of the LU (ISLU) from operational to nonoperational [View 19.1 (LU), 22.5 (ISLU), 22.9 (RISLU)], the LU (ISLU) will be removed from View 13.6. (A RISLU cannot go operational to deleted.)

6.33.9.2 Report Generation

The TRFC30 report can be outputted to the receive only printer (ROP) via the automatic scheduled generation (every 30 minutes) or by a craftsperson's request at the Master Control Center for immediate output. The craftsperson can specify up to six SGs (and six LGCs) to be printed at the ROP. Alternately, the craftsperson can request that the six highest usage counts (for each TRFC30 section) or six lowest usage counts, or three highest and three lowest counts be printed.

All data for these two new sections is sent to EADAS and, if equipped, the traffic channel if a study is allowed for collection.

6.33.9.3 Craftsperson Request to Print Office Records

The craftsperson inputs the standard OP message at the Master Control Center to either print the office records, send them to a file for further use, or send them to the Switching Control Center for printing. All study groups for LUs and all study groups for ISLUs, inhibited or allowed, are outputted. There is one study group per page. Output consists of line unit type, study group number, and each SM/LU entry in the study group.

6.33.10 Administration

6.33.10.1 Measurements

The ISLU/LU Load Administration Measurements feature is a measurement feature and the measurements associated with it are discussed under the heading titled **Feature Operation**, Section 6.33.9 .

6.33.10.2 Billing

Billing is not applicable to this feature.

6.34 RECENT CHANGE DELAYED MESSAGE (RCDM)

6.34.1 Overview

6.34.1.1 Definition

The Recent Change Delayed Message (RCDM) feature provides the capability to queue recent change (RC) requests prior to the cable throw. When a delayed message is entered into the switch, normal input processing occurs including validity checks that take into account the message contents in the system. When the cable splicers need the line to be defined in the 5ESS[®] switch data base, they dial an order number on a telephone set arranged with a class of service of "activate service order," or they can activate the service order at the central office (CO), RCMAC, or switching control center (SCC) from an RC, master control console (MCC), or trunk line work station (TLWS) terminal. This initiates execution of the delayed recent change associated with that line and alleviates the need of holding the RCMAC on the line while a cable throw is being worked.

6.34.1.2 Economic Worth

The RCDM feature reduces the amount of coordination between cable spliced and RCMAC personnel during cable throws.

This feature allows the RCMAC to check the input of all line changes associated with the cable throw in advance. Also, the input information is logged to a file and is not input to the translations until the delayed service order is activated.

6.34.1.3 Availability

This feature is available with 5E7 and later software releases.

NOTE: Consult your Lucent Technologies Account Executive for availability.

6.34.1.4 Feature Provision Basis

This feature is provided on a per-switch basis.

6.34.2 User Perspective

6.34.2.1 Profile

This feature is used by the service provider during cable throws.

NOTE: A cable throw is the service provider activity of repairing, replacing, or adding telephone wires between the end-users and the CO.

6.34.2.2 User Operation

The service provider controls the activation and deletion of delayed messages from the CO, RCMAC, and SCC.

The service provider can also allow or inhibit delayed messages from a telephone on a line defined with a class of service of "activate service order."

NOTE: The telephone activation line could be a spare pair within the cable vault that is temporarily assigned this function until the cable throw is complete.

6.34.2.3 Activation

The RCDM telephone activation line is set up using the following:

(1) RC View 4.1 (LINE CLASS CODE) to assign:

- an LCC of **SOA**
- a SERVCL of **RCDM**.

(2) RC View 1.6 (COMPOSITE LINE) to assign it to a line.

A typical scenario, using a telephone activation line, is as follows:

- A cable splicer goes off-hook and receives dial tone.
- The cable splicer then dials a 5-digit order number (prefixed with leading zeros, if necessary) and waits for a response.
- At this point, call processing builds a *UNIX*[®] system message with the five collected digits and sends the order request to RC.
- When this order is verified as one of its RCDMs, RC activates the RCDM and sends an OK message back to call processing.

NOTE: During this time, the cable splicer is hearing silence.

- When the OK message is received, call processing returns dial tone to the dialer.

NOTE: This signifies the request for activation of the RCDM was received successfully and the cable splicer is now able to enter another order, if desired.

- If RC cannot process the RCDM order due to lack of resources, busy signal is returned to the cable splicer.
- If a message is not returned in 15 seconds, the RC queue is full/undefined, or all available batch processes are in progress, busy signal is returned to the cable splicer.

The following input message allows telephone activations of RCDM into the system if they were previously inhibited.

MML Format: **ALW:RCDLY;**

Response: PF = Printout follows.

The following input message displays current telephone activation status of RCDMs:

MML Format: **OP:RCDLY;**

Response: REPT RCDLY INH = Telephone activations of RCDMs currently inhibited.

REPT RCDLY ALW = Telephone activations of RCDMs currently allowed.

The following output message reports the current status of telephone activations of RCDMs.

MML Format: **REPT RCDLY a**

Where: a = ALW or INH (RCDM telephone activation status)

6.34.2.4 Operational Limitations

Lines with an RCDM class of service:

- Can only originate (termination is denied).
- May only dial the 5-digit service order **numbers**.

NOTE: The service order number must not include a # or * .

- Are not subject to billing or charging.

6.34.2.5 Deactivation

The following input message inhibits all telephone activations of RCDMs:

MML Format: **INH:RCDLY;**

Response: OK = The inhibit request was accepted.

6.34.2.6 Interactions

Not applicable.

6.34.3 Engineering

Not applicable.

6.34.4 Assignment Guidelines

6.34.4.1 Forms and Views

6.34.4.1.1 Translation Guide Forms

This feature requires no new or changed forms.

6.34.4.1.2 Recent Change Views

This feature requires no new RC views. With this feature, the value **RCDM** is valid in the SERVCLASS field and **SOA** is valid in the LCC field on RC View 4.1.

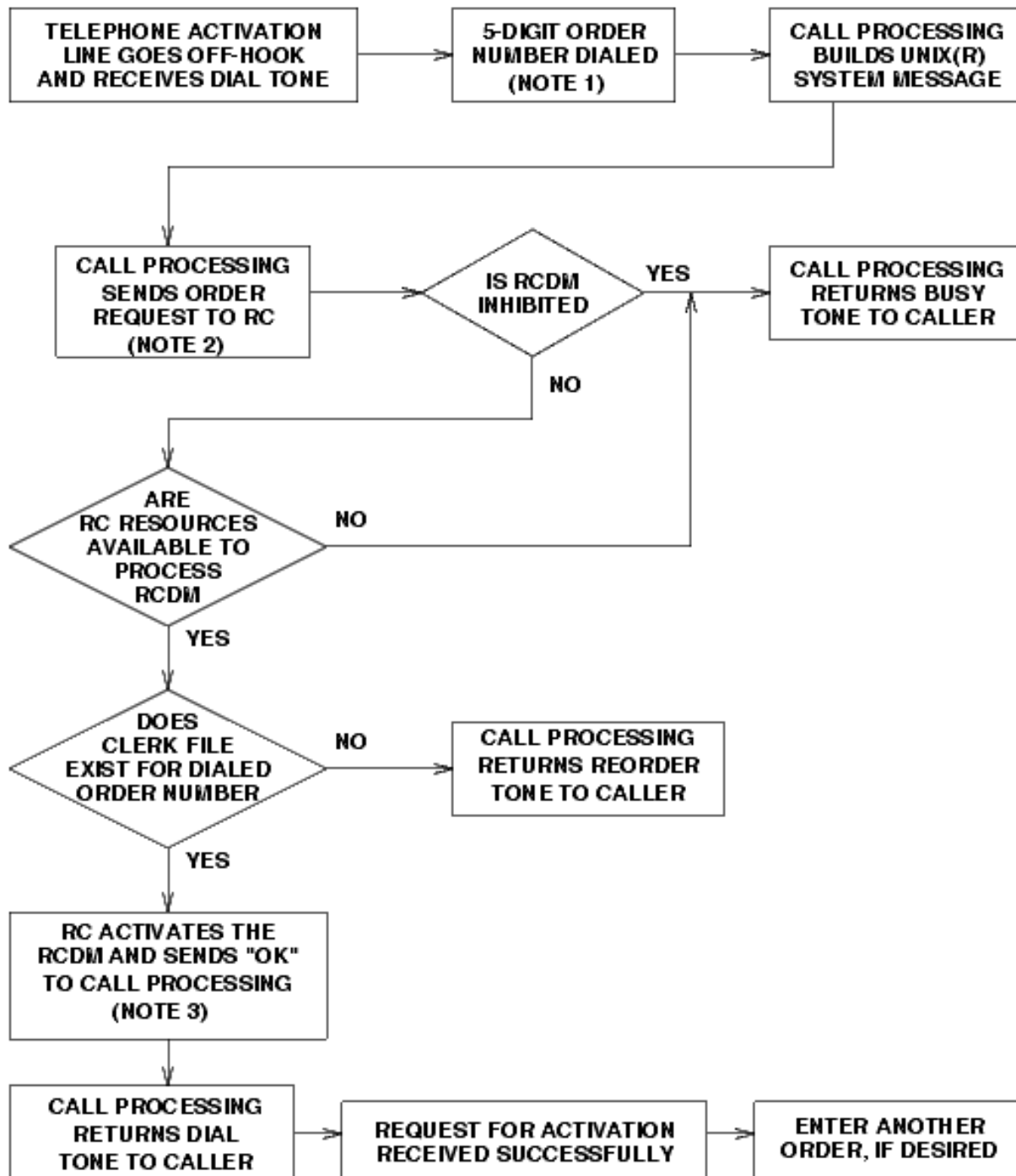
6.34.4.2 Assignment Limitations

The RCDM telephone activation line:

- must be analog POTS, and cannot be multiline hunt group number.
- has an assigned telephone number
- cannot have any assigned features
- does not allow termination
- must be an individual party
- cannot have intercept allowed
- cannot have customer-originated trace allowed.

6.34.5 System Operation

Typical feature operation is shown in Figure 6-12 .



NOTE 1: CHARACTERS # AND * NOT PERMITTED

NOTE 2: IF A MESSAGE IS NOT RETURNED TO CALL PROCESSING WITHIN 15 SECONDS, BUSY TONE IS RETURNED TO CALLER.

NOTE 3: DURING THIS TIME, CALLER HEARS SILENCE

Figure 6-12 Recent Change Delayed Message Feature Flow Diagram**6.34.6 Administration****6.34.6.1 Measurements**

For a line with a class of service of RCDM, the following measurements are reported:

- Total attempts count

NOTE: This count is pegged only if the global variable MSisInon is set.

- Line originations
- Origination time-out permanent signals
- Origination false starts
- Partial dial abandons
- Origination abandons.

The totals of reorder or busy signals received on this type of line are not reported.

6.34.6.2 Billing

The 5ESS[®] switch does no charging or billing for a line with a class of service of RCDM.

6.35 MACHINE-DETECTED INTEROFFICE IRREGULARITIES (MDII) TRUNK FAILURE SCANNING**6.35.1 Overview****6.35.1.1 Definition**

The Machine-Detected Interoffice Irregularities (MDII) Trunk Failure Scanning feature enables telephone company personnel (craft) to obtain complete counts of all MDIIs that occur per trunk group in an office over the course of a day. A new part (PART24) for the PLNT24 report, containing MDII data by trunk group number, is available for automatic printing on a daily basis. An "on demand" MDII report, containing data collected in the most recent 24-hour period, is also available.

NOTE: The new MDII Trunk Group Measurements report (PART24) is not provided as a part of the monthly plant report.

PART24 of the PLNT24 report lists four different types of MDII counts per trunk group. These are as follows:

- (1) The number of incoming partial dial time-outs (PDT) MDIIs.
- (2) The number of other incoming MDIIs, excluding PDTs.
- (3) The number of outgoing trial 1 MDIIs.
- (4) The number of outgoing trial 2 MDIIs.

This feature allows a maximum of 2000 trunk groups in an office to be measured and reported.

NOTE: If a very large number of different trunk groups (that is, well over 1000) report MDIIs in one 24-hour period, it is possible that the switch could discard some PART24 output messages in the automatic report. In that event, however, a demand report (OP:PLNT24:PART24) should still print the entire PART24 report (up to 2000 trunk groups).

6.35.1.2 Background

The identification of signaling problems between switching systems are MDIIs. MDIIs are generated for incoming, outgoing, and 2-way trunks. The MDII is based on the direction (incoming or outgoing) of the call being attempted at the time the signaling problem is detected. The PDT, other incoming, outgoing trial 1, and outgoing trial 2 MDII counts are incremented as they occur in each switching module (SM) on a trunk group basis.

Prior to this feature, the 5ESS[®] switch could only study up to 20 trunk groups using recent change (RC) View 14.8. Because of this limitation, the PART5 (Trunk Error Report Analysis [TERA]) summary report in the 24-hour plant measurements report may not have included complete MDII information.

6.35.1.3 Economic Worth

PART24 of the PLNT24 report lists **all** trunk groups that have had at least one MDII occurrence. PART24 of the PLNT24 report is collected for a 24-hour period beginning at approximately 2:07 a.m. daily. During the next 24-hour period, the data collected in the most recent 24-hour period is available for on-demand requests.

The data gathered with this feature is valuable in determining how many MDIIs have been generated per trunk group. By determining which trunk groups are experiencing MDIIs, this feature helps the craft to isolate and resolve trunk group problems associated with MDIIs.

6.35.1.4 Availability

This feature is available with 5E7 and later software releases.

NOTE: Consult your Lucent Technologies Account Executive for availability.

6.35.1.5 Feature Provision Basis

This feature is provided on a per-office basis.

6.35.2 User Perspective

6.35.2.1 User Profile

This feature has no impact on the end user.

The service provider can use this feature to obtain information on trunk signaling errors occurring in the most recent 24-hour period.

6.35.2.2 User Operation

The service provider can use input and output messages to obtain MDII measurements on all trunk groups in the office.

6.35.2.3 Feature Control

This feature is controlled with input messages entered by service provider maintenance personnel. As with the other parts of the PLNT24 report, these messages may be input at the master control console (MCC) or the Switching

Control Center System (SCCS) using existing interfaces.

The input messages associated with PART24 of the PLNT24 report are as follows:

- **ALW:PLNT24,PART24** - Activates (allows) automatic printing of PART24 of the PLNT24 report.
- **ALW:PLNT24,ALL** - Activates (allows) automatic printing (except PART24) of all parts of the PLNT24 report.
NOTE: By default, PART24 is inhibited for the ROP, and ALW:PLNT24:ALL will not cause PART24 to be allowed for the ROP. PART24 can only be allowed for the ROP by entering ALW:PLNT24:PART24.
- **INH:PLNT24,PART24** - Turns off (inhibits) automatic printing of PART24 of the PLNT24 report.
- **INH:PLNT24,ALL** - Turns off (inhibits) automatic printing of all parts of the PLNT24 report.
- **OP:PLNT24,PART24** - Requests printing of PART24 of the PLNT24 report "on demand" (at a time other than the scheduled report time).
- **OP:PLNT24,ALL** - Requests printing of all parts of the PLNT24 report "on demand."
- **OP:STATUS:PLNT24** - Requests print status for all parts of the PLNT24 report.

The output messages associated with PART24 of the PLNT24 report are as follows:

- **OP STATUS PLNT24** - Reports the print status (allowed or inhibited) for all parts in the PLNT24 report.
- **OP PLNT24 PART24** - Displays the most recent PART24 output report.

6.35.2.4 Operational Limitations

This feature has the following limitations:

- The maximum number of trunk groups reported on each SM is 120 (this is a system limitation).
- The maximum number of trunk groups reported per office is 2000 (this is a system limitation). Refer to trunk group printing note in Section 6.35.1.1 .
- Each MDII count is limited to 65535 (any count exceeding 65535 rolls over to zero).
- The report only contains data for trunk groups having at least one non-zero MDII peg count.
- PART24 of the PLNT24 report is not provided as part of the monthly plant report.

6.35.2.5 Interactions

Not applicable.

6.35.3 Engineering

Not applicable.

6.35.4 Assignment Guidelines

Not applicable.

6.35.5 System Operation

Machine detected interoffice irregularities data is collected daily at 2:07 a.m. and follows the existing PLNT24 collection scheme. Once daily, the AM requests and collects MDII data from each SM. The report data for PART24 is marked INVALID if any of the following errors occur:

- The time allotted for the data collection process expires.
- Data messages do not reach their destination processor.
- Data is lost due to processor initializations.
- An SM is not operational or active.

NOTE: The counts are reset (zeroed) immediately after collection in the SM.

The AM then sorts the MDII data by trunk group number. When allowed by an input message, the new PART24 of the PLNT24 report is printed automatically at approximately 2:07 a.m. each day.

6.35.6 Measurements

A daily plant measurement report is provided for all trunk groups on which MDIIs have occurred. A new PART24 for the PLNT24 report is available to report on these MDIIs per trunk group. The new PART24 is formatted as follows:

```
OP PLNT24      PART24
TIME  HH:MM:SS      (Status of Data)
      MDII TRUNK GROUP MEASUREMENTS
      INCOMING      OUTGOING
      TG      PDT      OTHER      TRIAL1      TRIAL2
      .      .      .      .      .
      .      .      .      .      .
      .      .      .      .      .
```

Where: TIME is in the form hours:minutes:seconds (time of report preparation)
 Status of Data is **DATA IS VALID** or **DATA MAY BE INVALID**
TG is the trunk group number
PDT is the number of incoming partial dial time-out MDIIs occurring on this trunk group
OTHER is the number of other incoming MDIIs, except PDT, occurring on this trunk group
TRIAL1 is the number of outgoing trial 1 MDIIs occurring on this trunk group
TRIAL2 is the number of outgoing trial 2 MDIIs occurring on this trunk group.

NOTE: Every time an MDII occurs on a trunk group, the corresponding count is pegged.

The new **PART24** of the PLNT24 report:

- Prints only trunk groups with at least one MDII during the reporting period.
- Prints **0** (not a null) in columns not pegging MDIIs.
- When allowed or manually requested, prints header lines whether MDIIs occurred or not.
- Printing is controlled by craft entered input messages.

NOTE: The default case is inhibited (do not print), unlike the other parts of the PLNT24 report. When printing is allowed, the report is printed automatically at approximately 2:07 a.m. each day.

- Is available on demand.

NOTE: PART24 of the PLNT24 report is collected for a 24-hour period beginning at approximately 2:07 a.m. daily. During the next 24-hour period, the data collected in the most recent 24-hour period is available for on-demand requests. It is not recommended that this feature be requested on demand during the busy hours because entering this request could generate many pages of ROP output.

- Is sorted in numerical order by trunk group number.

6.36 ESSENTIAL SERVICE PROTECTION (ESP) BACK LIGHTING OPTION

6.36.1 Definition

The ESP Back-Lighting Option special feature provides the ability to control how ESP status is indicated on the Master Control Center (MCC). Some offices prefer to have ESP allowed at all times and would like the indicator to show an off-normal condition when ESP is inhibited. Other offices do not want ESP allowed and want the indicator to remain as it is currently implemented (that is, to show an off-normal condition when ESP is allowed). This feature introduces a new field in Recent Change which allows each office to define how ESP off-normal condition will be displayed. This feature does not change the operating characteristics of ESP.

6.36.2 Cross-References

The following cross-references are applicable to the Essential Service Protection (ESP) Back-Lighting Option feature:

- Feature number: 99-5E-1132
- NSEP/5SEP code: Not available.

6.36.3 Background

This feature is an Operations, Administration, and Maintenance (OA&M) improvement to prevent confusion as to when an overload condition exists. Under the current ESP implementation, when ESP is allowed, the overload indicator in the summary status area (SSA) back-lights. This causes two problems. First, it may lead the operating personnel to believe the switch is in overload when it is not. Second, for those companies that keep ESP allowed continuously, the back-light may give a false sense of security and operating personnel may ignore a real overload condition.

Under the new operation, an office can set ESP allowed to be the normal condition. Then when ESP is allowed, no indicators are changed since this describes the normal condition. When ESP is inhibited, an indicator on MCC page 109 is back-lit yellow and the OVERLOAD indicator in the SSA is back-lit blue. This setting alerts office personnel that an off-normal condition exists.

If an office sets ESP inhibited to the normal condition, the feature will operate as it previously existed. When ESP is allowed, an indication on MCC page 109 is back-lit white and the OVERLOAD indicator in the SSA is back-lit blue. When ESP is inhibited, no indicators are changed.

When an overload condition occurs, the OVERLOAD indicator in the SSA operates identically under the old and new operation. For minor overloads, the OVERLOAD indicator is back-lit black on white flashing and the MINOR alarm is back-lit. For major overloads, the OVERLOAD indicator is back-lit red on yellow flashing and the MAJOR alarm is back-lit.

6.36.4 Availability

This special feature is available with the 5E8 software update and later software releases.

6.36.5 Feature Application

This feature is provided on a per-office basis.

6.36.6 User Profile

The ESP Overload Back-Lighting Option feature provides the service provider with the capability to control how ESP off-normal status is indicated on MCC page 109.

6.36.7 User Operation

An RC/V office parameter defines the normal mode of operation for ESP. This parameter controls how certain indicators on MCC page 109 and in the SSA are displayed. Table 6-1 shows the previous operation and Table 6-2 describes the new operation.

Table 6-1 Previous ESP MCC Displays

MCC DISPLAY		EXISTING OPERATION	
PAGE INDICATOR		ALW:ESP	INH:ESP
109 ESP	Text Color B/W	ALLOWED Backlit Yellow Backlit White	INHIBITED Black Black
SSA OVERLOAD	Color B/W	Backlit Blue Backlit White	Black Black

Table 6-2 New ESP MCC Displays

MCC DISPLAY		NEW OPERATION (INHIBIT IS NORMAL)		NEW OPERATION (ALLOW IS NORMAL)	
PAGE INDICATOR		ALW:ESP	INH:ESP	ALW:ESP	INH:ESP
109 ESP	Text Color B/W	ALLOWED Backlit White Backlit White	INHIBITED Black Black	ALLOWED Black Black	INHIBITED Backlit Yellow Backlit White
SSA OVERLOAD	Color B/W	Backlit Blue Backlit White	Black Black	Black Black	Backlit Blue Backlit White

6.36.8 Activation

Recent Change is used to define the normal mode of operation of ESP to be either inhibited or allowed. The feature is controlled by a new RC field (ESP NORM ALW) on Recent Change and Verify (RC/V) view 8.1 (Office Parameters). ESP NORM ALW is set to Y or N. The default value is N.

6.36.9 Recent Change Procedures

Office personnel should select the normal operating mode of ESP for each office. The field "ESP NORM ALW" on RC/V View 8.1 will be used. A value of "N" indicates the normal operation of ESP is inhibited. A value of "Y" indicates the normal operation of ESP is allowed. The default value is "N" and is the same as the existing operation, where ESP is inhibited for the normal mode of operation.

6.36.10 Assignment Verification

To verify feature operation, set RC/V View 8.1 ESP NORM ALW to desired value and verify indication on MCC page 109 as described in Table 6-2 when ESP is inhibited or allowed.

6.36.11 Billing

This feature has no impact on Billing.

6.37 MODIFIED CALLING LINE DISCONNECT PROCEDURE FOR FRAUD PROTECTION ENHANCEMENT (MCLDFP-E)

6.37.1 Definition

The MCLDFP-E feature allows the service provider to decide, on a per switch basis, what the disconnect treatment will be for the terminating analog lines served by the switch. Once the feature has been activated for the office, the office default will be to provide permanent signal treatment after Delay Disconnect Timing (DDT).

A "per-line attribute" allows service providers to identify via Recent Change/Verify the analog lines that do not want the permanent signal treatment but have instead subscribed to receive dial tone after the MCLDFP-E feature is activated.

6.37.2 Cross-References

The following cross-reference is applicable to the MCLDFP-E:

- Feature number: 99-5E-1254.

6.37.3 Background

The following events currently exist:

- (1) The originator of a call goes on-hook; the terminator remains off-hook.
- (2) Terminator begins delay disconnect timing.
- (3) After DDT has expired, the line is idled. A consequence of being idled is being scanned and immediately receiving an off-hook and then given dial-tone. Permanent signal treatment is presently given to direct connect and manual lines that remain off-hook after DDT has expired. This applies to loop and ground start lines.
- (4) FPr_idle is executed whenever lines are idled.

With this feature and after DDT has expired, the following will occur:

- (1) The global parameter, a per-line parameter, and the class of service are checked to determine if the line should be given dial tone or permanent signal treatment.
- (2) If permanent signal treatment is given, existing functions are called to typically give announcement; off-hook tone remains, which then puts the line out of service (OOS).
- (3) A 20-second silent delay followed by signal treatment is given if the called line remains off-hook for more than 10-11 seconds after the calling party has gone on-hook.

6.37.4 Availability

This is a secured special feature and is available with 5E8 and later software releases. There is a Right-to-Use fee associated with this feature. This information will be supplied upon ordering.

6.37.5 Feature Application

Not applicable for this feature.

6.37.6 User Perspective

6.37.6.1 User Profile

Local operating companies receive only a token benefit from this feature. The primary benefit is in the prevention of long distance fraud. However, the feature is installed in the end offices and must be administered by them.

6.37.6.2 Customer Premises Equipment

No special customer premises equipment (CPE) is required.

6.37.7 User Operation

6.37.7.1 Subscriber

Most end-users will be unaware of a change since less than one-half of one percent of all parties remain off-hook long enough to get dial tone following the completion of a call. Users that deliberately remain off hook following a call will quickly become aware of the change. The CPE should not be affected by this change since an 800 ms open is given by the 5ESS[®] switch to indicate calling party disconnect. There is no known CPE that listens for dial tone. The override of the feature is provided in case CPE does exist that listen for dial tone. The number of these is expected to be very small.

6.37.7.2 Activating the Feature

Just as all other special features are installed inactive, MCLDFP-E will not be active immediately after installation. This feature can be activated through RC View 8.22. The user will be allowed to override the feature on a per-line basis by setting MCLD_OV field to YES on analog line assignment views (for example, View 1.6).

Once the office option is set to provide permanent signal treatment, the service provider will be allowed to override the office option on a per-line basis in order to provide the current treatment of dial tone. If the office option is not turned on to allow MCLDFP-E treatment, the per-line bit will not be examined by call processing. The default per-line value (DBNO) will be to provide MCLDFP-E (permanent signal) treatment. The DBNO value will mean "don't override permanent signal treatment."

6.37.7.3 Invoking the Feature

This feature is automatically invoked when assigned; thus, no subscriber action is involved.

6.37.7.4 Deactivation

This feature can be deactivated through RC View 8.22.

6.37.8 Compatibilities

Not applicable for this feature.

6.37.9 Interactions

There are no interactions identified.

6.37.10 Engineering

6.37.10.1 Special Planning Considerations

Not applicable for this feature.

6.37.10.2 Hardware

Not applicable for this feature.

6.37.11 Assignment Dependencies and Limitations

When the called party is receiving a permanent signal announcement, a path is up between the called party and the announcement port. There are a limited number of announcement ports in an office. If all the announcement ports are busy, the called party will receive reorder.

6.37.12 Service Order Perspective

Not applicable for this feature.

6.37.13 Feature Operation

Not applicable for this feature.

6.37.14 Administration

6.37.14.1 Measurements

Currently, a count is pegged in Section 6 of the 30-minute traffic report when permanent signal treatment is given. This count will be pegged for scenarios in which the terminator remains off-hook after the called party has gone on-hook.

Without MCLDFP-E, terminators would return to dial tone and, then if the terminator does not dial any digits but goes on-hook during dial tone, a false start measurement is pegged. Because MCLDFP-E does not allow the terminator to return to dial tone, the number of false start peg counts for the office will be reduced.

6.37.14.2 Billing

There is no impact in this area.

6.38 DUAL POINT CODES

6.38.1 Definition

The Dual Point Codes Feature (DPCF) is a special feature that allows the RBOC to resect Signal End Point (SEP) point codes to align with the Local Access Transport Area (LATA) boundaries prior to interconnection with interexchange carriers. This feature is required to comply with Modification Final Judgement (MFJ) rulings. The DPCF gives a customer the capability to change the point code of a switch to create new clustering arrangements with minimal Signaling System 7 (SS7) service interruptions.

The DPCF gives a customer the capability to change the point code of the switch to create new clustering arrangements with minimal SS7 service interruptions. This feature allows SEP point codes to be resected to align with the LATA boundaries prior to their interconnection with interexchange carriers.

This feature is not intended to be a permanent feature. After the new clustering arrangements are created, this feature should be deactivated. When this feature is activated, SS7 Level 3 protocol error detection is inhibited.

6.38.2 Cross-References

The following cross-references are applicable to the DPCF:

- Feature number: 99-5E-1341
- NSEP/5SEP code: Not available.

6.38.3 Availability

This feature is not available until the purchaser has made the necessary arrangements with Lucent Technologies. It requires special software to be downloaded to the CNI link node. Information on feature availability and use will be provided upon ordering. Contact your Lucent Technologies Account Representative for the ordering information and RTU fee associated with this feature. The DPCF is available in 5E6 and 5E7 by Software Update (SU) and in 5E8 and later software releases.

6.38.4 Feature Application

This feature is provided on a per-office basis.

6.38.5 User Perspective

The DPCF is intended to provide a "temporary" way for a customer to change the point code of the switch in new clustering arrangements with minimal SS7 service interruptions. This feature is not intended to be a permanent feature. This feature requires data coordination among all of the switches in the cluster arrangements going through resectorization, and these areas will also be included in the Operational Procedure.

6.38.5.1 Activating the Feature

To enable the DPCF in an office, the Equipment Configuration Database (ECD) must be modified and a special link node load downloaded to all of the link nodes. A detailed operational procedure is being provided by members of the Network Services Customer Support group. This procedure will be made available to customers who have purchased this feature. The procedure includes items such as retrofit impacts, feature interactions, signal transfer point (STP) and 5ESS[®] switch software requirements, recent change/data administration, and steps required to turn the feature on and off.

6.38.5.2 Invoking the Feature

The feature is automatically invoked when activated, thus no subscriber action is required.

6.38.6 Interactions

The following list itemizes the known *Dual Point Code* feature interactions:

- Message Transfer Part (MTP) and Integrated Services Digital Network User Part (ISUP) signaling is supported for the secondary point code.
- SCCP signaling, excluding SCCP network management, is not explicitly supported.
- To operate correctly in the SS7 network, STP software must support the Dual Point Code feature loaded in the SEPs.
- The *Pseudo Point Code* capability in a 1A ESSTM switch or 5ESS[®] switch cannot be operational while the *Dual Point Code* feature is active.

6.38.7 Engineering

6.38.7.1 Hardware

The following Lucent Technologies signaling products are required to implement this feature:

- 1A ESSTM Switch
- 4ESSTM Switch
- 5ESS[®] Switch
- Advanced Services Network (ASN) service circuit node signal transfer point.

6.38.7.2 Software

Common Network Interface (CNI) software modifications are also required to implement this feature.

6.38.8 Assignment Dependencies and Limitations

SCCP is not supported.

6.38.9 Feature Operation

This feature allows calls routed for an SEP secondary point code to enter the 5ESS[®] switch and be processed as usual. Refer to Section 6.38.6 for the types of switch activity not supported.

6.38.10 Measurements

There are no new measurements identified for this feature.

6.38.11 Billing

Not Applicable.

6.39 DOMESTIC STATIC PROPORTIONATE BIDDING

6.39.1 Definition

The Domestic Static Proportionate Bidding feature provides traffic allocation capabilities. It has the ability to distribute outgoing international calls proportionately among competing carriers which carry traffic to a given location. A report of the actual and desired traffic distribution is printed daily. The operating company uses Recent Change to fix the desired proportions, per contract with the carriers, based on the number of incoming calls delivered by each carrier.

6.39.2 Cross-References

The following cross-references are applicable to the Domestic Static Proportionate Bidding feature:

- Feature number: 99-5E-1315
- NSEP/5SEP code is not available.

6.39.3 Availability

This feature is available for *foreign switches* which have a domestic 5ESS® switch equipped with the 5E6 or later software release.

NOTE: This feature is not compatible with U.S. switches following the "equal access" plan.

This is a secured feature and is not activated until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature activation is provided upon ordering. Please contact your Lucent Technologies Account Representative for ordering information and the Right-to-Use (RTU) fee associated with this feature.

6.39.4 Feature Provision Basis

This feature is designed to not impact operation on a switch for which it has not been purchased. Where it has been purchased, base relations are populated by Recent Change. Calls routed to designated Route Indexes are distributed to up to four other Route Indexes based on populated proportion data, and the results of the distribution are reported daily in a new plant report.

NOTE: The daily report is available only in the 5E8 and later software releases.

6.39.5 Limitations and Restrictions

The limitations and restrictions are as follows:

- Up to 32 Route Indexes may be routed based on proportions, specifically Route Indexes in the range 1001-1032.
- Apportioning for each of the 32 Route Indexes may be made among up to 4 places or "carriers."
- Each "carrier" has a number in the range 1-999 associated with it for reference.
- This feature when used adds some real-time to the Routing and Terminal Allocation (RTA) processing of a call.
- Collection and reporting of the Plant 24-hour measurements take longer when this feature is enabled.
- A maximum of 7 Proportionate Bidding data records are sent from the AM to the HM subsystem in one message when the 24-hour plant report gets printed.
- This feature is provided in only the PLNT24 report and is not being provided in the monthly plant report.
- PB route indices that experience no calls do not send any data to the AM.
- As in most of the other plant parts, the PROPORTIONATE BIDDING (PART 27) part of the 24-hour plant report is by default allowed to print with the automatically scheduled 24-hour report. It can also be inhibited or allowed manually by way of the appropriate input message.

6.39.6 User Perspective

6.39.6.1 Subscriber

This feature will not change any subscriber perceptions of the switch in any way. Perceptions of long distance service may be impacted because of the random apportioning, since subsequent calls might be routed by a different carrier.

6.39.6.2 Local Exchange Carrier (LEC)

The operating company can use Proportionate Bidding to check how many calls reach each carrier bound for each international location.

Assignment of Routing Indexes for apportioning, including the Carrier numbers, percentages, and carrier Route Indexes is handled through a new view, 10.37. The Route Indexes involved must already exist prior to assignment, and while the switch checks that the percentages add up to 100%; no help is given to the user with the arithmetic. This type of interface is a standard one for the user, and is best described by the RC/V views and cross checks.

6.39.6.3 Feature Application

Not applicable.

6.39.6.4 User Profile

This feature was primarily designed for Local Exchange Carriers (LECs).

6.39.6.5 Customer Premises Equipment

Not applicable for this feature.

6.39.7 Interactions

This feature may interact with local Carrier Interconnect.

6.39.8 Feature Implementation

6.39.8.1 ODA Implementation

The PROPBID form allows the Local Exchange carrier (LEC) to create on a per route index basis, a list of carriers (up to 4) that will be used to route calls sent to this route index from the digit analysis forms. This form specifies carriers, what percentage of calls each carrier should handle and the route index each carrier uses to route out of the office.

6.39.8.2 Recent Change Procedures

The new recent change view associated with this feature is 10.37.

- (1) RTI - The "pseudo" route index used for proportionate bidding.
 - ODIN help: Route index for proportionate bidding enter 1001 - 1032.
 - ODIN error: PB RTI: Invalid. Enter 1001 - 1032.
 - Status: Required key; no default.
- (2) ACTIVE - Indicates if proportional bidding is currently active for this particular "pseudo" route index.
 - ODIN help: Is proportionate bidding active for this route index? Enter Y or N.
 - ODIN error: ACTIVE Invalid. Enter Y or N.
 - Status: Required; defaulted to "Y."

(3) CARRIER LIST - A 4 element list consisting of CARRIER, PROPORTION and CARRIER RTI.

- CARRIER - The number of the carrier that will route some portion of calls to the key route index, RTI.

ODIN help: The carrier number to receive a portion of the calls. Enter 1 - 999.

ODIN error: CARRIER Invalid. Enter 1 - 999.

Status: Optional; no default.

- PROPORTION - The proportion of calls, in percentile format, that will be handled by the carrier specified by CARRIER.

ODIN help: Percentage of calls to be handled by the carrier. Enter 0-100.

ODIN error: PROPORTION Invalid. Enter 0-100.

Status: Optional; no default.

- CARRIER RTI - The "real" route index that will be used to route the call to the specified CARRIER.

ODIN help: route index for the carrier. Enter 1-99 or 132 -3617.

ODIN error: CARRIER RTI:Invalid. Enter 1-99 or 132-3617.

Status: Optional; no default.

6.39.9 Feature Operation

Figure 6-13 shows the layout of the offices involved in a call given Proportionate Bidding. There is a local operating company served by five international carriers. Two carriers connect to International Destination #1, while four connect to International Destination #2. Each International Destination can be thought of as some large portion of geography, such as one or more countries or a large part of the United States. One of the international carrier connects to both sample destinations and might well have a single intermediate switch covering the two of them. That is, the two international switches labeled "DEF" might be the same physical switch. Trunk groups 2 and 3 might also be the same physical trunk group.

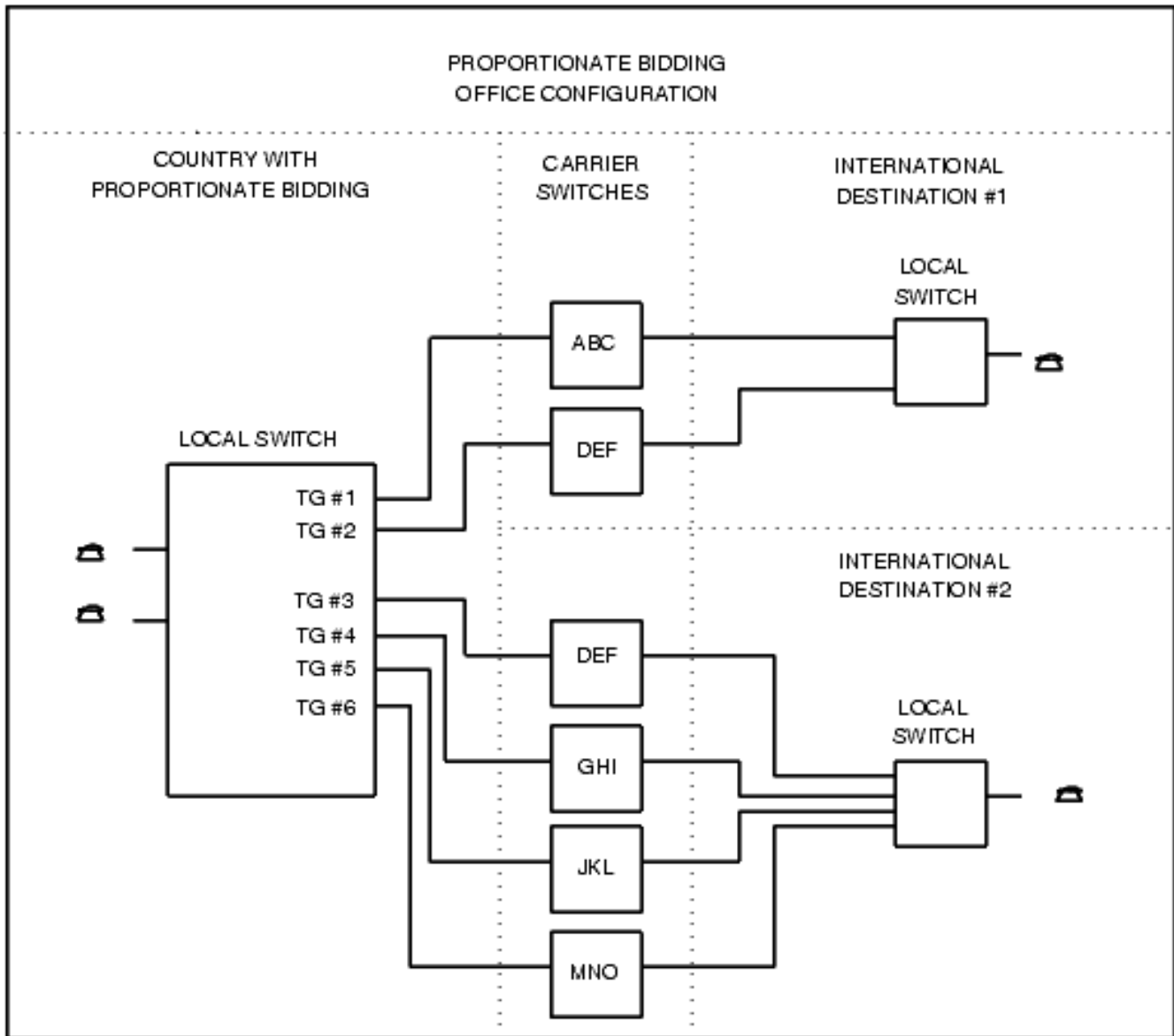


Figure 6-13 Proportionate Bidding Office Configuration Example

The dial codes for the two destinations are translated to the same Code Index (CDI on view 9.3 or 9.6) since the billing is the same. However, the Route Indexes for the two destinations differ to separate traffic for the different carriers based on the target country. In screening, the code index gives a charge index for all prefixes, and then indicates that the call should use the Route Index from digit analysis (RTI1 or RTI2). These two Route Indexes are considered to be within the hard-coded range for Proportionate Bidding Route Indexes.

Without the PB feature, the default routing for destination 1 is to try carrier ABC first (trunk group #1) and overflow to carrier DEF (trunk group 2). This overflow trunk is reached by RTI #3, which must be outside the PB RTI range when the feature is turned on. Destination 2 has a similar fixed tree for overflow treatment, where the trunks for the other carriers are reached by RTIs that are again outside the range reserved for PB RTI.

The placeholder relation RLsf_10 (for 5E6 and 5E7 only) will contain information from the new Recent Change view as shown. Both PB_RTIs show up there, and are assumed active. Calls to the first International Destination are divided between two carriers. If the first carrier is chosen based on the assignment algorithm using PROP_1,

PROP_2 (which must add up to 100), and the recent history of allocation, then Carrier_RTI RTI7 would be used to route the call to trunk group 1. RTI7 (and others used for carrier routing) are outside the reserved range for Proportionate Bidding. If trunk group 1 has no idle members, then the call routes to RTI8, trunk group 2 for carrier DEF. This overflow must avoid the carrier_RTI used for DEF to prevent creating a loop connected via overflow. (Population rules prevent loops in the overflow sequence.) The carrier_RTI for carrier DEF similarly overflows to an RTI pointing to the ABC trunk. This assumes that the local operating company wants the call to go through even in the face of exhaustion of one or more carriers' facilities.

Calls to the second International Destination are similarly divided between four carriers. Calls using the four carrier routes (carrier_RTIs) also use distinct sequences of four RTIs for overflow, so that the carrier with the most traffic (assumed to be DEF for this destination) is most likely to get the first chance to handle any calls reaching a busy first carrier. In reality, the operating company might want some other overflow scheme which could use fewer RTIs; this is a reasonable extreme case which the switch must support.

6.39.10 Measurements

The information contained in this section only applies to the 5E8 and later software releases.

Measurements are made and reported daily on all apportioned Routing Indexes. Existing interfaces to print the last report are all standard and allow inhibiting, printing, etc. The new report is Part 27. The reported data can be used to verify that the outgoing calls are proportioned as desired. Changing the proportions, carriers, and routes for a given Proportionate Bidding Route Index might cause inconsistent data to be printed in the subsequent reporting period.

The new PART-27 of the 24-hour plant report will peg up to 4 counts of the number of calls (to different carriers) for each of up to 32 different Proportionate Bidding Route Indexes. Since the peg request comes from the RTA subsystem, the macro resides in MSrtmacros.G global header.

PART 27 reports, for each Proportionate Bidding Route Index, the Proportionate Bidding Route Index, the carrier number, the number of calls offered to each carrier, and the percentage of the total number of calls to the Proportionate Bidding Route Index represented by the count for each carrier.

As with other parts of the 24-hour report, the PART-27 data is sent to the Switch Control Center System (SCCS), to the SCCS/Network Administration Center (NAC), and to the 5ESS[®] switch MCC. The counts are accumulated over a 24-hour period and are collected just once per day, shortly after 2:07 a.m. The report is also available at any time via a manual input request, but the data reported is from the last collection interval, **not** a running total of the counts for the day up to the time of the manual request.

While all the PB route indices in the switch are considered, only those that have one or more counts during the reporting interval get reported.

Like other parts, this part is allowed for scheduled ROP output by default (assuming the secured feature is active). It can be inhibited manually by way of an input message. Unlike other parts of the report, PART-27 is not provided with the monthly plant report. For more information refer to 235-600-700, 5ESS[®] *Input Message Manual*, 235-600-750, 5ESS[®] *Output Message Manual*, and 235-070-100, Appendix 1, *Administration Engineering Guidelines — Appendix 1, Traffic and Plant Measurements*.

6.40 INITIALIZING OFS PARAMETERS IN NEWLY GROWN SMs

6.40.1 Definition

The Feature Optioning System (OFS) options are always initialized to OFF (DBNO) in newly grown SMs. This can lead to customer complaints and confusion if the service provider uses features in the new SM that depend on OFS.

Although OFS options are SM partitioned, a large majority of customers treat them as redundant data. Some OFS options are forced to be SM redundant by the form checks of view 8.22 but can become nonredundant when a new

SM is added, which is an inconsistency.

This problem is becoming more serious as more and more error fixes, transparencies, and special features use OFS options to permit Software Update (SU) delivery.

This feature provides the user with two new services:

- (1) The maintenance of the office's OFS data in the CMP. The CMP OFS data will represent the "norm" for all features in the office and will be used during SM growth to determine which options should be turned on or off in the newly added SM.
- (2) The capability to perform on-demand audits of all features in the office. This will be a 3-step audit that will use the CMP data as its basis of reference for comparison with the SM's OFS data. The audit operation will highlight any inconsistencies that may exist between the CMP's OFS data and the OFS data in the SMs.

Service 1 automates the SM growth process, and service 2 gives the service provider personnel an audit capability similar to the secured features audit function for use with unsecured features. The changes that are being made will change the SM growth process by making it possible to maintain feature redundancy during the growth process. The audit operation automates the audit process and reduces the amount of time required to check for consistency among the features in an office.

The current OFS operations are not changed by this feature except during SM growth. Once this feature is deployed, it is possible to maintain feature redundancy in an office during SM growth.

In addition to the capability for the maintenance of feature redundancy during SM growth, this feature also provides the user with the capability to conduct on-demand audits. The audit is a 3-step audit that can be used to check for any inconsistencies among the features (unsecured features) that are active/inactive in a given office.

6.40.2 Cross-References

The following cross-references are applicable to the Initializing OFS in the Newly Grown SMs feature:

- Feature number: 99-5E-1383
- NSEP/5SEP code is not available.

6.40.3 Background

In offices where a new SM is added, customers are experiencing problems. In newly grown SMs, OFS options are always initialized to OFF (DBNO). This leads to customer complaints and confusion if the service provider uses features in the new SM that depend on OFS options.

Although OFS options are SM partitioned, a large majority of customers treat them as redundant data. Some OFS options are forced to be redundant by RC view 8.22 or 8.31 [view 8.31 is the new Optioned Feature Upgrade view being introduced in 5E9(1)] but can become nonredundant when a new SM is grown, which is an inconsistency.

This problem is becoming more serious as more and more error fixes, transparencies, and special features use OFS options to permit SU delivery.

Presently the only way to correct this problem is for the customer to manually check the office options for all features and manually update the feature(s) on the newly grown SM. The solution to this problem calls for a feature that will make it possible for newly grown SMs to be initialized at growth time to values other than off (DBNO), based on whether or not a feature is SM redundant.

The user has the ability to perform an on-demand audit of the optioned features in an office. The audit provides the user with information on the status (on or off) of the optioned features in the office and highlights any inconsistencies that may exist between the features on an SM and the office "norm." The office-wide OFS data stored in the CMP will represent the "norm" for all optioned features.

6.40.4 Availability

This feature is not a secured or optioned feature, it is a free special feature that is being developed for the convenience of our customers. It is available by a Software Update (SU) in the 5E6, 5E7, and 5E8 Software Releases (SRs) and is also available with the 5E9(1) Software Release.

6.40.5 Hardware

This feature does not require the introduction of new or modified hardware into a working office.

6.40.6 Feature Operation

Transparency Feature Optioning System (OFS) is used to turn features on or off in an office. This optioning system gives the operating companies the ability to option (that is, turn on or off) features either on a per SM or office basis. The RC views 8.22 (Secured Feature Upgrade for 5E6 to 5E8) and 8.31 [Optioned Feature Upgrade - new in 5E9(1)] are used for the updating of optioned features. Optioned features can be turned on or off for individual SMs or can be made SM redundant (that is, turned on in all operational SMs). All OFS options are stored in 32-bit global parameters in the SMs. Each SM has four (4) global OFS parameters, which represent up to 128 features in 5E6 to 5E8. In 5E9(1) and later SRs, the number of global OFS parameters will be expanded to 8, which represents 256 features instead of 128.

At present, when a new SM is added to an office, the values of its OFS parameters are always defaulted to off (DBNO) during SM growth. This can create a problem since customers usually depend on some features to be SM redundant. Once this feature is deployed, the global OFS parameters in newly grown SMs will no longer default to off (DBNO) during SM growth. The operating companies will have the capability to automatically initialize OFS parameters to on (DBYES) during SM growth if the feature is SM redundant.

This feature introduces a number of new events to the SM growth procedure. Office-wide data on the status of all OFS options are stored in the CMP. The new CMP OFS data represents the office "norm" for the status of all features that are active/inactive in a given office. During SM growth the office OFS data that is stored in the CMP will be used to determine the settings that are given to the OFS parameters in the new SM being added to the office.

The feature introduces the following new events:

- Creation of office-wide OFS data in the CMP through the polling of OFS parameters on all of the operational SMs in the office. The data polled from each SM is used to form the office "norm" for all features.
- Use of CMP global OFS data to initialize OFS parameters in the SM being added to the office. The data stored in the CMP is used to initialize the new SM based on the office "norm" for all features.
- On subsequent update of any feature in the office, the CMP data must be updated to reflect the new status of the feature. The CMP data must keep its OFS data current.
- The polling of all operational SMs to provide audit information. The audit operation polls all of the operational SMs and compares their OFS data to the CMP office-wide OFS data to check for inconsistencies.

Based on the population rules that govern the determination of the office "norm" for features in an office, it is possible for a population rule violation to occur. A population rule violation can occur as the result of using ODBE to change the office data or a program error. In situations where there are population rule violations, the OFS

parameter is set to off (DBNO) during SM growth. If such violations are discovered during the audit operation, an error message will be displayed on view 8.22/8.31. Craft personnel should reference the audit manual as to what course of action to take whenever there are inconsistencies between the data that represents the office "norm" for OFS options and the OFS data in the SMs.

6.40.7 RDL Initialization

A per-office one-time initialization of RLsf12 is required so that subsequent SM growth populates the OFS values correctly.

The recommended way to trigger the initialization of RLsf12 [GLFFANY* and GLFFALL* in 5E9(1) and later] is to use view 8.22/8.31 to perform an update upon office bring up. An update in view 8.22/8.31 using a feature of 900 and a module of CMP initializes and populates the RLsf12 [GLFFANY* and GLFFALL* global parameters in 5E9(1) and later] tuples with the office's current OFS data. Any subsequent update of features in the office automatically updates the RLsf12 [GLFFANY* and GLFFALL* global parameters in 5E9(1) and later] tuples. On retrofits, LTG, or new starts, ODA takes care of the initialization of the CMP data.

6.40.8 Recent Change

This feature impacts Recent Change and Verify (RC/V) views 8.22—Secured Feature Upgrade (in 5E6, 5E7, and 5E8), 8.31—Optioned Feature Upgrade (5E9 and later), and 18.1—Switching Module Growth (SM Growth).

6.40.9 Interactions

This feature changes the existing process for doing SM growth. Whereas in the past all OFS options on newly grown SMs were automatically defaulted to DBNO (off), this feature provides the capability to set the OFS options to DBYES (on) based on whether or not the feature is SM redundant. The data stored in the CMP [relation in 5E6 to 5E8 and global parameters in 5E9(1)] is used to determine the redundancy of a given feature. This feature changes the growth procedure by making it possible for OFC data to be treated as SM redundant data during the SM growth process.

The updating of OFS options is also changed by this feature. On all subsequent updates of office optioned features, the data stored in the CMP must also be updated to keep current. Whenever a feature is turned on or off, there is a corresponding updating of the CMP data to reflect the change in the status of the feature option.

This feature also impacts the retrofit and new starts process. The CMP data is initialized automatically by ODA during retrofits or new starts.

6.40.10 Limitations

This feature changes RC view 8.22 to accept a maximum feature value of 900 in 5E6, 5E7, and 5E8 and view 8.31 in 5E9(1) and later.

6.40.11 User Perspectives

6.40.11.1 Subscriber

This feature does not require any changes to the subscriber interface for analog or ISDN lines.

6.40.11.2 Operating Company Personnel (R/DDO)

This feature provides the service provider with the capability to automate the population of OFS parameters during SM growth. Presently, when a new SM is added to an office, all OFS parameters are defaulted to off (DBNO). This can cause problems and confusion when customers use features in the new SM that are OFS dependent. As more and more error fixes, transparencies, and special features use OFS options to permit Software Update delivery, the

problem is becoming more widespread.

This feature corrects the problem previously stated by providing the service provider with the ability to automatically configure OFS options in newly grown SMs. This feature makes it possible for OFS redundancy to be maintained during SM growth.

Once this feature becomes available, there should be a reduction in inadvertent customer complaints due to switch module growth.

In addition to the ability to automate the population of OFS parameters, this feature also provides the service provider with the capability to perform office audits on demand. This audit function is similar to the existing Secured Features audit function. The audit function allows the operating company personnel to audit the features on all the SMs in an office, on a given SM, or for a particular feature on a given SM. The OFS data stored in the CMP represents the "norm" for all features in the office. The audit reads the data in the CMP and compares it to the OFS data in the SM. If the data read in the SM's OFS parameters is different from what was read in the CMP data, the SM is marked as being inconsistent and fails the audit. If the SM data is consistent with CMP data, then the SM passes the audit.

Presently the service provider personnel does not have the capability to audit the optioned features in an office. The audit function gives the service provider personnel the capability to automatically audit an entire office and check for any inconsistencies that may exist among the active/inactive features in an office and the "norm" for the office.

Once this feature is deployed, operating company personnel must perform a per-office one-time initialization of RLsf12 (or GLFFALL* and GLFFANY* parameters in 5E9(1) and later) so that subsequent SM growth will populate the OFS values correctly. The one-time initialization of the CMP OFS data is done via RC/V view 8.22/8.31 (Secured Feature Upgrade/Optioned Feature Upgrade) using feature number "900" with a module of "CMP" with an operation of "u" (update). The procedure for doing the one-time update is outlined in the RC/V manual and for ODA in the retrofit procedures.

6.41 DIRECTORY NUMBER MEASUREMENTS FOR EADAS

The Directory Number Measurements (DNM) for Engineering and Administration Data Acquisition System (EADAS) traffic measurements feature is described in 235-070-100, Appendix 1, *5ESS® Switch Administration and Engineering Guidelines — Appendix 1, Traffic And Plant Measurements*. Please refer to this document for information on this feature.

6.42 RCOS APPTXT FORWARD TRANSLATION (AFT)

6.42.1 Overview

6.42.1.1 Definition

The following definitions apply to terms used in this feature description:

- *MARCH*® - Bellcore's remote memory administration operations system (OS).
- *MIZAR*™ - Previous name of Bellcore's remote memory administration OS.
- OS - Operations System - Applications that administer, collect, analyze, filter and summarize switching system data and reduce the human work involved with administering, maintaining and operating of a network. In the past, the synonymous acronym, OSS, was used, which stands for "operations support system."
- RCMAC - Recent Change Memory Administration Center - A remote memory administration center performing primarily line RC on multiple switches in a service providers network. Nearly all memory administration from these centers is conducted through a Recent Change Operations System (RC OS), such as Remote Memory

Administration System (RMAS) or *MARCH*[®].

- RCOS - Recent Change Operations Systems Interface - The *5ESS*[®] switch interface to the RC Remote Memory Administration Centers. The connections on the interface can be established via asynchronous or synchronous connection. The synchronous connection can establish four virtual channels on the one physical channel, while the asynchronous connection is limited to the one physical channel.

The Recent Change Operations System AFT feature provides an RC/V Text Interface software translation mechanism that allows the service provider to retrofit the *5ESS*[®] switch with the current software release while the supporting Memory Administration OS remains on the previous software release. For example, a *5ESS*[®] switch could be retrofit from 5E8 to 5E9(1), while the supporting *MARCH*[®] system remains on the software supporting the 5E8 software release. The RC/V Text Interface translation mechanism of the AFT feature is based on the RC evolution process used during *5ESS*[®] switch retrofits. The AFT translator converts Apptext commands generated in the format of a preceding software release into the format of the current *5ESS*[®] switch software release.

NOTE: The AFT feature is intended as a convenience feature of short duration. The feature is to be used for short periods of time between the availability of the *5ESS*[®] switch 5E9(1) software release and the availability of OSs that support the 5E9(1) software release. It may be used to allow the software update of an OS to be accomplished on a schedule separate from the *5ESS*[®] switch operating company deployment schedule. This flexibility, though, is intended only for the early retrofits.

6.42.1.2 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 99-5E-1397
- NSEP Number: Not available at date of publication.

6.42.1.3 Background

Lucent Technologies' largest customers are increasing their deployment of non-Lucent Technologies Recent Change Operations Systems (RC OSs). At this time, it is evident that the Bellcore *MARCH*[®] OS is the most widely deployed system.

This fact has introduced a significant amount of uncertainty in the marketing and deployment of *5ESS*[®] switch software releases. First, the service providers expect to have the *5ESS*[®] switch and supporting OS software release available simultaneously. Recent experience shows that non-Lucent Technologies RCOS software development lags the availability of the switch software. This has caused operating companies to reconsider the timing of their *5ESS*[®] switch first office application (FOA) and deployment schedules. In addition, the current environment requires service providers to coordinate the software releases of two significant software systems simultaneously. The RCOS Apptext Forward Translation (AFT) feature addresses this condition by de-coupling the simultaneous development and deployment of the *5ESS*[®] switch and supporting RC OSs.

6.42.1.4 Availability

This feature is available with the 5E9(1) and subsequent software releases of the *5ESS*[®] switch.

6.42.1.5 Feature Application

This feature is provided per *5ESS*[®] switch.

6.42.2 User Profile

This feature was primarily designed for use by operating telephone company personnel in the memory administration centers.

6.42.3 User Operation

6.42.3.1 Activation

6.42.3.1.1 Operations - Memory Administration

The AFT feature is used principally by memory administration centers in the service providers provisioning organizations.

The AFT feature requires no special *5ESS*® switch data base memory administration to activate the feature. This means that no RC activity needs to be accomplished before the feature is usable by the RCMAC.

6.42.3.1.2 OS Needed

The feature is motivated by the presence of RC OSs in the service provider companies. The use of a RC OS is assumed and is anticipated to be the Bellcore *MARCH*® OS. The configuration for the scenarios is an asynchronous or synchronous connection of the *MARCH*® system to the *5ESS*® switch for the conduct of memory administration.

6.42.3.1.3 Service Provider Scenarios

6.42.3.1.3.1 Normal Operation

6.42.3.1.3.1.1 Overview

The *5ESS*® switch translator uses a "version=X" session parameter. The variable "X" used with the parameter identifies an integer value representing the *5ESS*® switch software release with which the supporting RC OS was designed to be used. For example, a *MARCH*® OS release written for 5E8 and establishing a session through the translator to a 5E9(1) release will send "version=8." At the completion of the RC activity, the Apptext session is terminated normally. Reestablishing the RC connection requires repetition of the entire process, including the sending of the "version=X" parameter if invocation of the translator is desired.

6.42.3.1.3.1.2 Service Provider Setting

The setting is a typical RCMAC environment using the *MARCH*® operations system. The state of the *5ESS*® switch is that it has just completed a software release retrofit and, now, the RCMAC wishes to perform memory administration on the new *5ESS*® switch using the existing *MARCH*® software release. The scenario participants are the service provider craft who perform RC administration on the *5ESS*® switch from the RCMAC.

6.42.3.1.3.1.3 Asynchronous Connection

Common Async Scenario

The craft establishes an asynchronous RC Apptext session with the *5ESS*® switch using the session parameters and the additional session "version=X" parameter. For example, a *MARCH*® OS release written for 5E8 and establishing a session through the translator to a 5E9(1) release will send "version=8." In this scenario, the Apptext session may be established using the Apptext message, "rcv:Apptext,data,version=8,...!", followed by the RC forms until an "end;" is encountered.

Direct Connect Scenario

The craft wishes to perform RC activity on features or attributes on the new 5ESS[®] switch software release that are not consistent with the existing RC OS implementation. In this case, the craft opens a direct RC channel to the 5ESS[®] switch. This RC channel may be established via a pass-through the RC OS, using the OS's communication software. On a direct RC channel using the menu interface, the translator is not invoked and all interface outputs, that is, views, error messages, and so forth, are in the format resident on the 5ESS[®] switch.

6.42.3.1.3.1.4 Synchronous Connection Scenario

The craft establishes a synchronous RC Apptext session with the 5ESS[®] switch using the session parameters and the new session "version=X" parameter. For example, a MARCH[®] OS release written for 5E8 and establishing a session through the translator to a 5E9(1) release will send "version=8."

In this scenario, the Apptext session may be established using the synchronous message, "1100version=8,form=..." until a termination message is encountered.

6.42.3.1.3.1.5 No Version Selected

If no 5ESS[®] switch version is selected, the switch assumes that Apptext messages received are in the 5E9(1) software release format and the translator is not invoked. This is a normal condition and the expected method of operation by the service providers when both OS and 5ESS[®] switch software are on current releases.

6.42.3.1.3.2 Error Conditions

6.42.3.1.3.2.1 Parameter Placement

Apptext session parameters must typically be entered at the beginning of an Apptext session, before the first "form=" name/value pair. Similarly, the "version=X" session parameter must be entered at the beginning of the session. An error will result if the "version=X" parameter is sent at other than the beginning of the session.

6.42.3.1.3.2.2 Version Selection Incompatible

If a 5ESS[®] switch version is selected that is not compatible, an error message is sent to the OS from the switch and the session is not established. That is, an error message is sent if a version is selected such that "X" equals an alpha character or a numeric value for a non-existent or unsupported software release of the 5ESS[®] switch, for example, "version=5," "version=10" or "version=a."

6.42.3.1.3.2.3 Version Selection Equals 5E9(1)

If a 5ESS[®] switch version is selected that equals the current 5ESS[®] switch software release, then the translator is not invoked and the parameter is ignored. For example, a MARCH[®] OS release written for 5E9(1), and establishing a session through the translator to a 5E9(1) release, sends "version=9" causing the translator to be ignored.

6.42.3.1.3.2.4 Other Conditions

The RC verify activity on features or attributes on the new 5ESS[®] switch software release is returned to the OS in the format of the 5E9(1) 5ESS[®] switch. That is, there is no reverse translation of the verify to present the verify results in the format of the earlier software release. Failure output, similarly, is in the format of the 5E9(1) 5ESS[®] switch software release.

The AFT feature is an Apptext feature, consequently, the robustness of other RC OS activity is not guaranteed when using the AFT feature. ACSR and Office Records activity, for example, may or may not succeed, depending on the

changes made in the 5ESS[®] switch software release. The output of any miscellaneous RC OS activity is presented in the format resident on the switch at that time.

6.42.3.2 Deactivation

Not applicable.

6.42.3.3 Restriction Capability

Not applicable.

6.42.4 Compatibilities

This feature is compatible with all other features existing in the 5ESS[®] switch.

6.42.5 Interactions

Not applicable.

6.42.6 Engineering

6.42.6.1 Special Planning Considerations

The RC response times are affected by each RC message being translated to the new software release. This translation, of course, adds a time increment to the response time.

6.42.6.2 Hardware

There is no hardware unique to this feature.

6.42.7 Assignment Dependencies and Limitations

6.42.7.1 Dependencies

There are no other features that must be operational in the 5ESS[®] switch before this feature can be implemented.

6.42.7.2 Limitations

The AFT feature is an Apptext feature; consequently, the robustness of other RC OS activity is not guaranteed when using the AFT feature. Automatic Customer Station Rearrangements (ACSR) and Office Records activity, for example, may or may not succeed, depending on the changes made in the 5ESS[®] switch software release. The output of any miscellaneous RC OS activity is presented in the format resident on the switch at that time.

6.42.8 Feature Implementation Procedures

6.42.8.1 Office Data Administration (ODA) Implementation

Not applicable.

6.42.8.2 Recent Change Procedures

Not applicable.

6.42.8.3 Assignment Verification

Not applicable.

6.42.9 Feature Operation

See Section 6.42.3.1.1 for a general description of how this feature operates within the system.

6.42.10 Administration

6.42.10.1 Measurements

Not applicable.

6.42.10.2 Billing

Not applicable.

6.43 5ESS® SWITCH COMMAND RESTRICTION

6.43.1 Overview

6.43.1.1 Definition

The 5ESS® switch Command Restriction feature provides control over access to 5ESS® switch input commands and their associated command pokes. It also provides a command logging mechanism. Restricting and logging commands is based on command groups. Command groups may be assigned to logins and/or terminals. Furthermore, terminals can be configured with terminal-level or user-level restrictions.

The system administrator can, on a command group basis, specify whether input requests are logged in a command log and/or alarmed on the Receive Only Printer (ROP).

6.43.1.2 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 99-5E-1227
- NSEP Number: Not available at date of publication.

6.43.1.3 Background

The 5ESS® switch Command Restriction feature is being provided as a result of customer requests for enhanced security on the 5ESS® switch. The goal of the feature is to provide mechanisms for controlling access to craft commands and for tracking input command usage.

6.43.1.4 Availability

This feature is available with the 5E9(1) and subsequent software releases of the 5ESS® switch.

6.43.1.5 Feature Application

This feature is provided per 5ESS® switch.

6.43.2 User Profile

This feature was designed for telephone company switch administration personnel.

6.43.3 User Operation

6.43.3.1 Activation

The system administrator adds person (user) and terminal identities (IDs) to the authority data base. User IDs and initial passwords are specified via the **ADD:PAUTH** command. The user is forced to change their password at first login. Terminal IDs are specified via the **ADD:TAUTH** command.

Command groups and/or profiles are assigned to users and terminals via the **ADD:PCGRP** and **ADD:TCGRP** commands. Profiles are simply lists of command groups.

The system administrator determines the level of restriction [terminal, user, or none (default)] for each device. The restriction level is set in the Equipment Configuration Database (ECD) getty form(s) for the device. For user-level restrictions to be in effect on a device, the device must also be configured to run the login process.

Refer to 235-600-700, *5ESS[®] Switch Input Messages Manual*, for input message explanations.

6.43.3.2 Deactivation

Command Restriction can be deactivated for a device by configuring the device with neither terminal-level nor user-level restrictions.

6.43.3.3 Restriction Capability

Not applicable.

6.43.4 Compatibilities

This feature is compatible with all features assignable to the *5ESS[®]* switch.

6.43.5 Interactions

There are no adverse interactions between this feature and other features existing in the *5ESS[®]* switch.

6.43.6 Engineering

6.43.6.1 Special Planning Considerations

The system administrator needs to plan restriction levels (terminal, user, or none) and command group assignments.

6.43.6.2 Hardware

There is no unique hardware associated with this feature.

6.43.7 Assignment Dependencies and Limitations

6.43.7.1 Dependencies

This feature is not dependent on any other feature or service being assigned or operational in the *5ESS[®]* switch.

6.43.7.2 Limitations

Command group names and assignment of input messages to command groups is fixed with the software release.

6.43.8 Feature Implementation Procedures

6.43.8.1 Office Data Administration (ODA) Implementation

The 5ESS[®] switch Command Restriction device parameters for new start offices can be configured through the ECD OPT ODA form.

6.43.8.2 Recent Change Procedures

The 5ESS[®] switch Command Restriction device parameters for terminal growth can be configured through high level ECD recent change forms.

6.43.8.3 Assignment Verification

To verify assignment, dump the ECD getty forms and verify the auth_chk field values for all terminals. If any terminal is configured with terminal-level ('t') or user-level ('u') restrictions, then the feature is enabled.

6.43.9 Feature Operation

The 5ESS[®] Switch Command Restriction feature provides control over access to 5ESS[®] switch input commands and their associated command pokes. It also provides a command logging mechanism. Restricting and logging commands is based on command groups, which are sets of commands grouped together because they share a common function, operate on a common unit, or have some other common characteristics. Each input command is a member of one and only one command group.

Command groups may be assigned to logins and/or terminals. Furthermore, terminals can be configured with terminal-level or user-level restrictions. Terminal-level restrictions mean only commands in the terminal's command group(s) are permitted. User-level restrictions mean only commands in both the terminal's and user's command group(s) are permitted.

The system administrator can, on a command group basis, specify whether input requests are logged in a command log and/or alarmed on the Receive Only Printer (ROP).

This feature does not affect Emergency Action Interface (EAI) commands. The Switching Control Center (SCC) and the Maintenance Control Center (MCC) terminals support terminal-level restrictions only.

6.43.10 Administration

6.43.10.1 Measurements

Not applicable.

6.43.10.2 Billing

Not applicable.

6.44 SOFTWARE UPDATE PROCESS AUTOMATION

6.44.1 Overview

6.44.1.1 Definition

The Software Update (SU) Process Automation feature provides enhancements to the 5ESS[®] switch SU process to enable SU administration to become an automated process. Its primary target is for Customer Service Computer Access Network System (CSCANS) users. It provides support for CSCANS queries of this information and CSCANS requests to invoke SU commands. However, some of the benefits provided by this feature are also available to non-CSCANS users via the normal craft interface.

This feature allows automation of the SU process, both application and administration. This feature provides for the following:

- A Health Check - A mechanism to easily determine if the state of the switch is such that SUs should be downloaded or automatically applied. This is in the form of a message that summarizes key office indicators, such as initializations in the last two hours and checks that major units are duplex.
- An Office Profile - A mechanism to allow the users to schedule and specify the SU application process start time and terminate state for a specific office. The auto SU application process can be scheduled and set according to the office specification.
- Inhibit of Automatic Application - A mechanism to manually and/or automatically block the automatic application of SUs. This mechanism tracks the reason the automatic process is blocked, so that the reason is available for SU administration purposes.
- Non-Automated Steps - A Craft Initialization (CFT INIT) is an example of an action that is not expected to be automated. A mechanism for handling the non-automated portion of a SU is provided.

This feature eases the task of managing the application of SUs across several offices. Building on the CSCANS SU Number Upload feature provided in the 5E7 software release that enables CSCANS to query the switch for the number of the official SU last made official, this feature provides for additional control of the SU process from CSCANS. This feature required CSCANS development in addition to the switch development. The following CSCANS development has been done based on the new interface specification:

- Message to inhibit/allow automation feature.
- Message to query automation status.
- Message to query health check conditions.
- Message to update office SU parameters and health check conditions.
- Message to allow options to specify, during download, which SU to be scheduled for auto application, transaction state (for example, stop after soak), and application start time.
- Message to query scheduled SU status.
- Message to re-schedule SU start time and transaction state for a specified SU.

6.44.1.2 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 99-5E-1244
- NSEP Number: Not available at date of publication.

6.44.1.3 Background

This feature builds on the CSCANS SU Number Upload feature provided in the 5E7 software release that enables CSCANS to query the switch for the number of the official SU last made official.

6.44.1.4 Availability

This feature is available with the 5E9(1) and subsequent software releases of the 5ESS[®] switch.

6.44.1.5 Feature Application

This feature is provided per 5ESS[®] switch when purchased for that particular 5ESS[®] switch.

6.44.2 User Profile

This feature was designed for 5ESS[®] switch craft personnel and CSCANS craft personnel involved in the SU of the 5ESS[®] switch.

6.44.3 User Operation

6.44.3.1 Activation

Information on feature activation is provided upon ordering. Please contact your Lucent Technologies Account Representative for ordering information and the Right-to-Use (RTU) fee associated with this feature.

6.44.3.2 Deactivation

It is possible to manually inhibit automatic application via an input message, an MCC poke, or message for CSCANS.

6.44.3.3 Restriction Capability

Not applicable.

6.44.4 Compatibilities

This feature is compatible with all other features assignable to the 5ESS[®] switch.

6.44.5 Interactions

Not applicable.

6.44.6 Engineering

6.44.6.1 Special Planning Considerations

Not applicable.

6.44.6.2 Hardware

There is no hardware unique to this feature.

6.44.7 Assignment Dependencies and Limitations

6.44.7.1 Dependencies

Not applicable.

6.44.7.2 Limitations

Only one SU may be installed at any given time (that is, SUs may be either automatically applied or manually applied, but the automatic and manual applications are mutually exclusive operations).

6.44.8 Feature Implementation Procedures

6.44.8.1 Office Data Administration (ODA) Implementation

Not applicable.

6.44.8.2 Recent Change Procedures

Not applicable.

6.44.8.3 Assignment Verification

Not applicable.

6.44.9 Feature Operation

From a system perspective, this feature adds new capabilities to the existing SU download and installation processes, to improve SU administration, download, and installation.

6.44.10 Administration

6.44.10.1 Measurements

Not applicable.

6.44.10.2 Billing

Not applicable.

6.45 BALANCE

6.45.1 Description

The BALANCE feature (99-5E-4421) provides data for blocked call identification on analog line units.

With increased usage of the Internet, the number of longer calls has dramatically increased, with many calls lasting three or more hours. This increase in the number of longer-term calls has caused traffic blocking and distribution problems for service providers. The BALANCE feature identifies the lines being blocked and the lines that are the source of blocking, providing information to the switch administrator that can be used to balance the traffic load.

Traditionally, several reports had to be reviewed over a period of several months to identify the offending lines. The BALANCE feature now provides this information to switch administrators quickly, allowing them to move offending lines to more appropriate line units.

6.45.2 Availability

The BALANCE feature (99-5E-4421) is available as a software update for the 5E11 and 5E12 software releases and is included in the 5E13 and later releases.

6.45.3 Environment

This feature is provided on a per-office basis.

6.45.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-4421

6.45.5 Background

Not applicable.

6.45.6 Feature Operation

The blocked call identification data is delivered to the Administrative Module (AM) via output messages.

The BALANCE feature causes data to be generated in the Switching Module (SM) to measure blocked calls. The data is packed into an output message and sent to the AM using a new message class. The data is stored in the AM log files or is directly passed through to the data link. Later, one or more algorithms can be run against the data to determine which subscribers are causing blockage, as well as those that are being blocked.

6.45.7 User Operation

6.45.7.1 For Subscribers

No subscriber actions are associated with this feature.

6.45.7.2 For Switch Personnel

Switch personnel must retrieve the blocked call identification data by making the appropriate modifications to the Equipment Configuration Data (ECD) data base and directing the data to a dedicated TTY port (connecting to a serial port on a PC or workstation), existing TTY port (such as for ROP0), or to 3B log files.

NOTE 1: In 5E11 and 5E12, only an existing TTY can be assigned.

NOTE 2: In 5E11 and 5E12, the log files are not pre-allocated. Switch personnel can modify the Emergency Changeover Order (ECO) to use existing but unused disk space. In 5E13 and later, the log files are each one megabyte in length and are named BALANCE0 and BALANCE1.

6.45.8 Engineering

6.45.8.1 Hardware Resources

No hardware considerations are associated with this feature.

6.45.8.2 Software Resources

No software considerations are associated with this feature.

6.45.8.3 Transition Considerations

No transition considerations are associated with this feature.

6.45.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

6.45.10 Incompatibilities

No incompatibilities are associated with this feature.

6.45.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

6.45.12 Isolation Constraints

No isolation constraints are associated with this feature.

6.45.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the BALANCE feature by populating the following fields in recent change and verify (RC/V) view 8.31 (OPTIONED FEATURES):

FIELD	VALUES
FEATURE ID	723
MODULE	OFC
ACTIVE	Y

6.45.14 Customer Premises Equipment (CPE)

No special Customer Premises Equipment (CPE) is required for the BALANCE feature.

6.45.15 Maintenance Considerations

Not applicable.

6.45.16 Administration

6.45.16.1 Measurements

The switch checks to see if the BALANCE feature is activated before generating event data or doing any significant work. When a path hunt fails in the line unit concentrator grid (there is a blocked call) the BALANCE feature is initiated. The SM generates a record for every blocked call on Line Unit 1 (LU1), LU2, or LU3. This record includes the following fields.

- date in the format YYMMDD (year, month, day)
- time in the format HHMMSS (hour, minute, second)
- DN of the blocked line in the format AAABBBCCCC (NPA, office code, suffix)
- the Line Equipment Number (LEN) of the line that is blocked in the format SMNUUGHSL, where SMN is the

three-digit SM Number, UU is the two-digit line unit number, G is the Grid, H is the Half Grid (board), S is the Switch, and L is the Level

- first blocking A-Link Switch (0-7) and Level (0-3)
- second blocking A-Link Switch (0-7) and Level (0-3)
- third blocking A-Link Switch (0-7) and Level (0-3)
- fourth blocking A-Link Switch (0-7) and Level (0-3)
- originating/terminating flag (0 if originating side is blocked, 1 if terminating side is blocked).

NOTE: When information on any of the blocking A-Links are not available, the record will contain a two digit code for that A-Link, as listed in Table 6-3 .

Table 6-3 Blocked Record A-Link Status Codes

Status of A-Link	Status Code
unknown due to selective init	80 (5E11 and 5E12 only)
A-Link out-of-service	81
A-Link idle, B-Link blocked	82
switch and level unknown, abnormal situation	83

6.45.16.2 Billing

This feature does not impact billing.

6.46 INHIBIT DELETE DISPLAY FOR SELECTED LINES AND TRUNKS

6.46.1 Description

The Inhibit Delete Display For Selected Lines and Trunks feature (99-5E-3900.A) gives service providers the ability to add an additional level of security for critical lines, trunks, and Integrated Services Digital Network (ISDN) Digital Subscriber Lines (DSLs), drastically reducing the chances that such designated facilities will be inadvertently removed.

6.46.2 Availability

The Inhibit Delete Display For Selected Lines and Trunks feature (99-5E-3900.A) is available as a software update for the 5E13 software release and is included in the 5E14 and later releases.

6.46.3 Environment

This feature is provided on a per-line or per-trunk member basis.

6.46.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-3900.A

6.46.5 Background

Not applicable.

6.46.6 Feature Operation

This feature uses Recent Change cross-checks to disallow the deletion of lines and trunks secured by this feature, returning an Inhibit Delete error message with each deletion attempt. The Inhibit Delete error message also tells switch personnel how to delete the circuit, should that actually be intended.

6.46.7 User Operation

6.46.7.1 For Subscribers

No subscriber actions are associated with this feature.

6.46.7.2 For Switch Personnel

To protect a circuit with the Inhibit Delete Display For Selected Lines and Trunks feature, switch personnel set the INHIBIT DEL field to "Y" on the appropriate RC/V view, as listed in Table 6-4. This will inhibit deletion of that circuit. If switch personnel really do want to delete a protected circuit, they must first reset the INHIBIT DEL field on the appropriate RC/V view to "N."

Table 6-4 RC/V Views That Include The INHIBIT DEL field.

INHIBIT DEL Field On RC/V View	Provides Deletion Protection For
1.6 [COMPOSITE LINE (LINE ASSIGNMENT)]	analog line
1.8 (ANALOG LINE/BRCS ASSIGNMENT)	analog line
1.8 (ANALOG LINE/BRCS ASSIGNMENT) - verify view	analog line
5.5 (TRUNK MEMBER)	trunk group
5.9 (VERIFY TRUNK MEMBER) - verify view	trunk group
23.2 (DIGITAL SUBSCRIBER LINE)	DSL
23.8 (DSL/BRCS ASSIGNMENT)	DSL
23.8 (DSL/BRCS ASSIGNMENT) - verify view	DSL

6.46.8 Engineering

6.46.8.1 Hardware Resources

No hardware considerations are associated with this feature.

6.46.8.2 Software Resources

No software considerations are associated with this feature.

6.46.8.3 Transition Considerations

No transition considerations are associated with this feature.

6.46.9 Interactions and Limitations

Inhibit Delete Display for Route Indices (99-5E-7427)

The Inhibit Delete Display for Route Indices feature (99-5E-7427) gives service providers the ability to add an additional level of security for lines terminating to a route index that are designated critical by the customer. The feature checks the status of the INHIBIT DEL field on RC/V view 1.6 before allowing a deletion to occur. If the field is set to Y, the deletion will be blocked and an error message is sent. If the field is set to N, the deletion will continue. N is the default.

The Inhibit Delete Display For Route Indices feature (99-5E-7427) is available as a software update for the 5E13

software release and is included in the 5E14 and later releases.

6.46.10 Incompatibilities

No incompatibilities are associated with this feature.

6.46.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

6.46.12 Isolation Constraints

No isolation constraints are associated with this feature.

6.46.13 Recent Change Provisioning

The Inhibit Delete Display For Selected Lines and Trunks feature is not secured, so no switch personnel action is required to enable the feature.

6.46.14 Customer Premises Equipment (CPE)

Not applicable.

6.46.15 Maintenance Considerations

Not applicable.

6.46.16 Administration

6.46.16.1 Measurements

This feature does not impact measurements.

6.46.16.2 Billing

This feature does not impact billing.

6.47 AIU PER-LINE IMPEDANCE

6.47.1 Description

The AIU Per-Line Impedance feature (99-5E-7245) allows switch personnel to assign a higher DC feed impedance in the on-hook state to specific subscriber lines on any Access Interface Unit (AIU) without changing the line impedance for the entire AIU. This allows a subscriber's security or other auxiliary system to send and receive tones while the subscriber's line is in the on-hook state, without interference from the line's quiescent power. There will be a slight increase in power consumption on lines to which this feature is assigned, so it should only be assigned where needed.

6.47.2 Availability

The AIU Per-Line Impedance feature (99-5E-7245) is available as a software update for the 5E12 and 5E13 software releases and is included in the 5E14 and later releases.

6.47.3 Environment

This feature is provided on a per-line basis.

6.47.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-7245

6.47.5 Background

With AIU lines set at the standard impedance, signals from subscribers' alarm systems sent while the line was in the on-hook or scan state were being overridden by the line's quiescent power.

6.47.6 Feature Operation

AIUs serving lines that have the AIU Per-Line Impedance feature assigned to them have updated firmware that supports the partial power-up of the AIU Coder/Decoder (CODEC). Also, the scan state (on-hook) impedance of the Application Processor (AP) board in the AIU is set to be greater or equal to the programmed termination impedance of the AP. This allows tones to be exchanged on those lines when they are in the on-hook state.

As the application of this feature slightly raises the line's power consumption, it should only be applied where needed.

6.47.7 User Operation

6.47.7.1 For Subscribers

No subscriber actions are associated with this feature.

6.47.7.2 For Switch Personnel

Switch personnel assign the AIU Per-Line Impedance feature to a specific line by entering the value CLS1 in the LNEQ field on the Recent Change view 1.6 [COMPOSITE LINE (LINE ASSIGNMENT)] for that line. To disable the feature, switch personnel set the LNEQ field to STDEQ.

6.47.8 Engineering

6.47.8.1 Hardware Resources

The LPZ100B circuit pack for any line that has the AIU Per-Line Impedance feature assigned to it must be upgraded to an LPZ100C circuit pack.

6.47.8.2 Software Resources

No software considerations are associated with this feature.

6.47.8.3 Transition Considerations

No transition considerations are associated with this feature.

6.47.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

6.47.10 Incompatibilities

No incompatibilities are associated with this feature.

6.47.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

6.47.12 Isolation Constraints

No isolation constraints are associated with this feature.

6.47.13 Recent Change Provisioning

See 235-118-2xx, *5ESS®- Switch Recent Change Reference*, for detailed information on allowed values.

The AIU Per-Line Impedance feature is not a secured feature, so no SFID needs to be entered in Recent Change.

Switch personnel assign the AIU Per-Line Impedance feature to a subscriber line by populating the following field in the instance of RC/V view 1.6, COMPOSITE LINE (LINE ASSIGNMENT) for that line:

RC/V VIEW	VIEW NAME	FIELD	ALLOWED VALUES
1.6	COMPOSITE LINE (LINE ASSIGNMENT)	LNEQ	CLS1

Switch personnel disable the AIU Per-Line Impedance feature on a subscriber line by populating the following field in the instance of RC/V view 1.6, COMPOSITE LINE (LINE ASSIGNMENT) for that line:

RC/V VIEW	VIEW NAME	FIELD	ALLOWED VALUES
1.6	COMPOSITE LINE (LINE ASSIGNMENT)	LNEQ	STDEQ

6.47.14 Customer Premises Equipment (CPE)

This feature allows certain types of Customer Premises Equipment (CPE) to operate. While the AIU Per-Line Impedance feature does not require any particular CPE, this feature should only be applied where needed, as it slightly raises the line's power consumption.

6.47.15 Maintenance Considerations

Not applicable.

6.47.16 Administration

6.47.16.1 Measurements

This feature does not impact measurements.

6.47.16.2 Billing

This feature does not impact billing.

7. MAINTENANCE

Maintenance is that overall process designed into the switching system to minimize the effects of failures on system performance while providing the craftsperson with the information and tools required to locate and repair the troubles quickly. Through the use of both hardware and software error detectors, automatic fault recovery procedures, and duplicated units, the 5ESS[®] switch is able to locate and reconfigure around faulty units, schedule and run diagnostics, and generate trouble reports without service interruption. In addition to the automatic recovery and diagnostic processes, capabilities are provided for manual control of diagnostics, system configuration, and the office data base. Procedural information manuals are available and give the craftsperson step-by-step procedures to effect rapid trouble isolation, repair, and system recovery.

Provision is made for remote centralization of the maintenance functions through a BX.25 interface to a remote maintenance system, thus allowing the office to be unstaffed except for functions such as circuit pack replacements and battery checks which require a craftsperson to be at the remote site.

This section describes the maintenance features provided for switch and connecting circuit maintenance and includes capabilities provided for precutover testing and software release retrofits and updating.

7.1 SYSTEM MAINTENANCE FEATURES

7.1.1 Overview

System maintenance features (35-00-0000) consist of the following categories of features:

- (a) Trouble Detection (35-01-0000)
- (b) Service Recovery (35-02-0000)
- (c) Trouble Notification (35-03-0000)
- (d) Trouble Isolation (35-05-0000)
- (e) Maintenance Person-Switching System Interface (35-07-0000)
- (f) Switching System Control and Display Interface (35-07-0200).

These categories of system maintenance features are listed and described in the following sections.

7.1.2 Trouble Detection

7.1.2.1 Feature Description

7.1.2.1.1 Overview

Facilities and/or procedures for detecting all possible troubles (35-01-0000) are provided by continuous automatic tests, per-operation and per-call automatic tests, automatic routine tests, semiautomatic routine tests, 1-person manual tests, and 2-person manual tests.

7.1.2.1.2 Availability

Trouble detection features are available with 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.1.3 Applications

Trouble detection features are used to detect problems in both the hardware and software. The hardware is tested regularly by:

- Continuous automatic tests
- Per-operation or per-call tests
- Parity and cyclic redundancy checks
- Routine exercises.

Error analysis identifies transient or intermittent troubles. The integrity of the software and office data base is maintained by:

- Continuous software monitoring
- Audits and hash sum checks
- Manual change capability.

Software correction is made through the audits and hash sum checks. Regular plant measurements monitor the service and performance of the overall system.

7.1.2.1.4 Feature Operation

7.1.2.1.4.1 Trouble Detection Speed

Per-call and per-operation tests detect cut-off calls, network path troubles, and tip and ring reversal troubles as they occur. In addition, periodic automatic tests are performed to detect troubles before they can affect system performance.

7.1.2.1.4.2 Trouble Detection on Service

Major system hardware is duplicated or arranged such that on detection and verification of a fault, the system automatically switches to a standby unit or bypasses the fault unit with little or no effect on service. Redundant hardware programs, data and self-checking and correcting hardware maximize the completion rate of any calls in progress after the system has recovered from a failure. At the lower levels of initialization, no stable calls are lost and the number of transient calls affected is minimized. Rapid automatic corrective actions restore the system capability to respond to all new service requests after a trouble has been detected.

7.1.2.1.4.3 Trouble Detection Granularities

Routine exercises and automatic or manually initiated diagnostics normally detect and isolate troubles to a single circuit pack. Software checks are made at various levels depending on data structures. Testing may be over a total block of data, or at word level in such tests as hash sum checks, or at bit level (for functions such as critical status indicators and inhibits) depending on the nature and criticality of the data with respect to system performance.

7.1.2.1.4.4 Trouble Detection Strategy

Facilities are provided to detect all possible troubles using detection strategies in the following order:

- Continuous automatic tests (both hardware and software)
- Per-operation or per-call automatic tests

- Periodic automatic tests
- Semiautomatic tests
- Manual routine tests.

7.1.2.2 Hardware Redundancy

7.1.2.2.1 Feature Description

7.1.2.2.1.1 Overview

The hardware redundancy feature (35-01-0100) refers to the major system components of the 5ESS[®] switch which are duplicated. Because the major system components are duplicated, this allows the machine to switch around a faulty unit. The hardware that is duplicated operates in an active/standby arrangement. Hardware error detectors and automatic fault recovery procedures provide for the automatic detection of hardware faults and reconfiguration around faulty units. The major system components which are duplicated are as follows:

- Switching module (SM) processor and its memory
- Communication module (CM) (time multiplex switch and the message switch)
- Administrative module (AM) and its memory.

The message switch has duplicated processors and redundant communication paths. In addition, all essential data and control links are duplicated including network control and timing links, peripheral interface data buses, and peripheral interface control buses.

System elements common to more than 64 circuits are duplicated in order to achieve adequate system availability and limit the number of lines and trunks affected by a fault.

7.1.2.2.1.2 Availability

The hardware redundancy feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.2.2 Resource Utilization

There is no significant real-time impact on system resources due to this feature. Each of the major system components is duplicated. This means that there are two identical pieces of a component with the same hardware and software both capable of performing the same function. One duplicated component is designated as active and the other component designated as standby.

7.1.2.2.3 Implementation and Administration

A switch from the active/standby status of the duplicated units may be made automatically or via input messages or via the MCC display pages. Duplicated units may be locked on-line or forced out of service. No specific administration is required except to repair out-of-service equipment when failures occur.

7.1.2.3 Hardware Checks

7.1.2.3.1 Feature Description

Hardware checks (35-01-0200) are performed through the use of hardware self-checking circuits and operational checks (pass/fail tests). The duplicated units in the 5ESS[®] switch run in an active/standby state in which one of the units performs the actual call processing function. When a fault is detected in the active unit, the unit is placed out of service (OOS) while the standby unit is made active. The OOS unit is diagnosed in order to isolate the fault to a particular circuit pack.

7.1.2.3.2 Availability

The hardware checks feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.4 Software Checks - General

7.1.2.4.1 Feature Description

Various trouble detection strategies are employed by the 5ESS[®] switch to minimize the effect of troubles on system performance. The software trouble detection strategies (software checks, 35-01-0300) include, in decreasing order of preference, continuous automatic tests, per-operation and per-call automatic tests, periodic automatic tests, semiautomatic tests, and manual routine tests.

7.1.2.4.2 Availability

The software checks feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.5 Continuous Automatic Tests

7.1.2.5.1 Feature Description

Continuous automatic tests (35-01-0310) are provided to monitor and detect troubles in the following areas:

- (a) Data transmission
- (b) Active and standby equipment
- (c) Equipment power
- (d) Overall system operation.

Examples of continuous automatic tests are audits which detect, record, and correct data errors before they can propagate and lead to system outages. Another example of this test is the sanity test which monitors program sequences and timing to ensure overall system sanity and normal call processing.

7.1.2.5.2 Availability

Continuous automatic tests are available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.6 Audit Programs

7.1.2.6.1 Feature Description

7.1.2.6.1.1 Overview

The audit programs (35-01-0311) are provided as a feature that detects and corrects data errors before they can propagate and lead to significant system outages or degradation of service. These programs, on a routine basis and

interleaved with normal call processing, continuously check various data for accuracy and internal consistency.

If errors are detected, they are corrected or the data initialized to some normal state that allows call processing to continue normally without a degradation of service. The audit programs provide an output of detected errors and of the system corrective actions taken. In addition to the continuous audit programs, the capability of manually requesting specific audit programs be run is provided. The capability of selectively inhibiting specific audits from running or printing error messages is also provided, but this is indicated by periodic output messages and/or visual display.

7.1.2.6.1.2 Availability

Audit programs are provided with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.6.1.3 Feature Operation

Program segmentation is a mechanism used to increase efficiency. To reduce call processing interference, audit programs are segmented. These audits do not run entirely from beginning to end. When an audit is run, the first segment runs and returns control back to the operating system. Additional audit segments are executed until the entire audit is run.

Audits can run in five different modes. These modes are as follows:

- Routine segmented
- Elevated segmented
- Nonsegmented
- Initialization
- Post-initialization.

7.1.2.6.1.3.1 Audit Groups

Audits in the 5ESS[®] switch are subdivided functionally into groups. Some audits run in the AM only, while some audits run only in the SMs. In addition, some audits run in both the SM and AM. The following types of audits are run in the 5ESS[®] switch.

- (a) **Operating System Audits:** The operating system provides for the various software subsystems (call processing, administrative, data base, maintenance, and other subsystems) services such as timing, communication, control, and scheduling. To provide these services, various data structures which contain software resources (buffer areas, stacks, etc.) are needed for each of the software subsystems. The operating system has a fixed number of each of these resources. The operating system maintains various lists and queues which group common types of resources based on their state (for example, idle, ready, allocated, etc.). The operating system audit programs examine these various lists to detect errors and make necessary corrections.
- (b) **Data Base Audits:** Data base audits verify the integrity and administration of data stored in the data base.
- (c) **Administrative Audits:** Administrative audits are used to detect and correct call record inconsistencies. A call record is a block of memory associated with an active call. A call record contains call processing information used for billing and is assigned to a particular call for its duration. Errors may occur such that idle call records are listed as busy or contain irrelevant data. Administrative audits identify and release busied records which are not associated with a call.

- (d) **Switch Maintenance Audits:** Switch maintenance audits verify that the hardware status information (for example, active, standby) stored in the data base is correct. Calls waiting for the usage of hardware facilities are audited. Linkages and hardware interrupt inhibits are audited.
- (e) **Terminal Maintenance Audits:** Terminal maintenance audits verify that the status information pertaining to line and trunks is correct. Terminal maintenance audits verify that linkage information stored in the data base is correct.
- (f) **Diagnostic Audits:** Diagnostic programs detect faults in the system by running detailed tests on various hardware.
- (g) **Utility Programs:** Utility programs, known as generic access program (GRASP), aid in the isolation and resolution of software problems. The GRASP audits ensure the integrity of resources and tools employed by GRASP.
- (h) **Call Processing Audits:** Call processing audits consists of audits for the feature control (FC) subsystem, routing and terminal allocation (RTA) subsystem, peripheral control (PC) subsystem, and static data. The FC audits ensure the integrity of the data structures used during call processing sequencing. The RTA subsystem is responsible for routing the call. Information required by RTA includes class of service, the directory number, and the call status. The information required by RTA is audited by RTA audits. Peripheral control audits ensure the integrity of information required by peripheral control. Static data, which includes programs and all nonvolatile data, may be mutilated from both software errors and hardware faults. Audits are used to ensure the integrity of such data.

7.1.2.6.1.3.2 Error Reporting

The audit system uses output messages to alert maintenance personnel to errors in the data structures. Normally, diagnostic messages often pinpoint the bad circuit pack. If they do not, an interrupt message may reveal the source of the problem. If not, the audit output message may provide information to help locate the problem.

When the audits locate software problems, output messages may reveal whether the problem occurred in the source code (software release) or in the ODD. Most audit messages are logged (stored) in the 5ESS[®] switch to provide a history of error detection and correction activity. These messages are not automatically printed as they occur. If maintenance personnel need these messages, they can be retrieved by entering an input message. If an audit cannot recover an error, a message is printed indicating the need for manual action by maintenance personnel.

7.1.2.6.2 Resource Utilization

When audits run, real time is sacrificed. Therefore, it becomes necessary to make efficient use of real time to optimize both functions. The operating system attempts to perform this function by scheduling and assigning system resources. However, additional mechanisms internal to the audits structure are used to make efficient use of real time in the form of audit modes of operation.

7.1.2.6.3 Implementation and Administration

A 3-volume 5ESS[®] Switch Audits Reference Manual provides maintenance personnel with audit descriptions, error codes, and basic audit structure comments. The 3-volume set consists of a Description and Procedures Manual (PA-5D002-01) and two volumes of a Reference Manual (PA-5D003-01). Refer to these manuals for detailed information on 5ESS[®] switch audits.

7.1.2.7 Sanity Tests

7.1.2.7.1 Feature Description

Sanity checks (35-01-0312) are continuously made to ensure that the call processing program modules are cycling in proper sequence and on a timely basis. Emergency action software is capable of invoking actions to recover from fault conditions with a minimum degradation of system call processing capability.

7.1.2.7.2 Availability

Sanity checks are provided with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.1.2.8 Per-Operation and Per-Call Trouble Detection Tests

7.1.2.8.1 Feature Description

Per-operation or per-call trouble detection tests (35-01-0320) are performed to detect the following:

- (a) Call processing data base troubles
- (b) Cut-off calls
- (c) End-to-end network path troubles
- (d) Tip and ring reversals.

7.1.2.8.2 Availability

The per-call and per-operation trouble detection tests feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.1.2.9 Call Processing Dynamic Data Trouble Detection

7.1.2.9.1 Feature Description

The call processing data base trouble detection (35-01-0321) feature consists of call processing audits. These audits detect faults and ensure the integrity of call processing information. Call processing audits consist of the following:

- (a) **FC Audits:** The FC subsystem controls the status of customer calls. It schedules the actions required to complete a call based on the customer's features and actions. The FC audits ensure the integrity of the data structures used during call processing action sequencing.
- (b) **RTA Audits:** The RTA subsystem is responsible for routing the call once the FC subsystem has collected input for the call. Information required by RTA includes the service class, the directory number, and the call status.
- (c) **PC Audits:** The PC subsystem isolates the other software subsystems from the hardware configuration. This software subsystem contains software to implement customer demands collected by feature control. The PC audits ensure the integrity of information required by the FC subsystem.

The 235-600-400, *5ESS® Switch Audits Manual* provides maintenance personnel with audit descriptions, error codes, and basic audit structure comments. Refer to this manual for detailed information on 5ESS® switch audits.

7.1.2.9.2 Availability

The call processing dynamic data trouble detection feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.10 Call Processing Resource Availability Tests

7.1.2.10.1 Feature Description

These tests (35-01-0322) detect the lack of available call processing resources such as software call processing registers and queue lists.

7.1.2.10.2 Availability

The call processing resource availability tests are available with the 5E6 and subsequent software releases.

7.1.2.11 Ineffective Attempt Detection

7.1.2.11.1 Feature Description

These tests (35-01-0323) automatically detect ineffective attempts which are any valid bids for service which do not complete or outpulse, as appropriate, in the normal manner.

7.1.2.11.2 Availability

The ineffective attempt detection feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.12 Cutoff Call Trouble Detection

7.1.2.12.1 Feature Description

Different categories of cutoff calls are detected (35-01-0324) and reported as plant measurements in the 5ESS[®] switch.

Facility cutoff calls are calls which drop out of the talking state prior to the receipt of a disconnect from the customer, due to equipment trouble in the facility.

Switch cutoff calls are calls that drop out of the talking state prior to the receipt of a disconnect indication from the customer due to time slot discontinuity. The result of time slot discontinuity is that the call is removed from the system.

7.1.2.12.2 Availability

The cutoff call trouble detection feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.13 Network Path Integrity Tests

7.1.2.13.1 Feature Description

Connections set up through the network are tested (35-01-0325) before being used. In accordance with system architecture, the following tests are provided:

- Assurance of customer privacy

- Periodic automatic tests
- Semiautomatic trouble detection tests
- Network continuity tests.

7.1.2.13.2 Availability

The network path integrity test is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.14 Assurance of Customer Privacy of Communications Test

7.1.2.14.1 Feature Description

This test (35-01-0326) protects customer privacy of communication by checking for connections with other network paths.

7.1.2.14.2 Availability

The assurance of communications test feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.15 Tip and Ring Polarity Check Test

7.1.2.15.1 Feature Description

This test (35-01-0327) detects tip and ring reversals in the lines connected to the system.

7.1.2.15.2 Availability

The tip and ring polarity check test feature is available with the 5E6 and all subsequent software releases.

7.1.2.16 Periodic Automatic Tests

7.1.2.16.1 Feature Description

Periodic automatic tests (35-01-0330) are designed to detect latent system troubles before they affect service. These tests run with call processing in a time-shared mode so as not to interfere with normal system operation. The design takes advantage of the distributed architecture and allows concurrent diagnostic activities on the multiple processors within the system. These tests routinely exercise standby, and possibly active, units of duplicated unit pairs operating in an active/standby mode, and may include a switch from standby to the active state to ensure that the standby units can perform in an active state configuration. Test failures inhibit switching from the standby to active state and result in an alarm message.

Periodic automatic tests are also run on server group equipment, such as service circuits providing transmit or receive functions. Units or circuits passing these tests are restored to their pretest conditions. Failures in server group tests result in the failed units being removed from service and identified on an OOS list. The OOS limits are established for some server groups such that the number of circuits that can be removed from service may not exceed those limits. This prevents the removal of an entire group and insures a level of service from each group. If a removal would exceed the OOS limit for the group, the unit is left in service, and an alarm message is generated to alert the craft to the trouble. Automatic tests are also capable of being run on manual request from the MCC, through the remote maintenance channel, or from the equipment frame locations. Tests run from the MCC or through the remote maintenance channel may be initiated using menu selections on the video displays, or they may

be initiated using text message input commands. From the frame locations, tests are initiated with text messages using a portable terminal. Test results via output messages are available at the location from which the test is initiated.

Certain diagnostics not required for continuous or periodic automatic testing are run only on demand. Diagnostic programs are structured such that several phases constitute the test of a repair group which may consist of several circuit packs. Capability is provided to run an entire diagnostic, a single phase to test only one circuit pack or interface within the group, or a phase segment to test a single function. Segments may be run repeatedly in a loop to assure consistency of results.

7.1.2.16.2 Availability

The periodic automatic test feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.17 Semiautomatic Trouble Detection Tests

7.1.2.17.1 Feature Description

Any individual automatic trouble detection test (35-01-0340) can be requested on demand, from an equipment frame location and the local and remote maintenance facility, and the results presented.

7.1.2.17.2 Availability

The semiautomatic trouble detection test is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.18 Manual Tests

7.1.2.18.1 Feature Description

The 5ESS[®] switch provides tools for performing manual tests (35-01-0350). Manual testing capabilities include the testing of lines and trunks.

7.1.2.18.2 Availability

The manual tests feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.2.19 Inhibit of Trouble Detection

7.1.2.19.1 Feature Description

This feature (35-01-0360) allows the system to inhibit trouble detection strategies in order to increase call processing capacity during overload or to provide limited service rather than no service at all. A periodic automatic reminder of all active trouble detection inhibits is provided.

7.1.2.19.2 Availability

The inhibit of trouble detection feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.3 Service Recovery

7.1.3.1 Feature Description

7.1.3.1.1 Overview

Service recovery (35-02-0000) capabilities are designed into the system to automatically recover the system from detected errors or troubles, both internal and external to the switching system, to protect service with minimal impact on customers.

Automatic recovery is supplemented by the capacity to reinitialize or reconfigure the system manually from either the local maintenance terminal or through the remote maintenance interface. A detailed description of the switch recovery can be found in 235-105-220, *5ESS® Switch Corrective Maintenance Procedures*.

7.1.3.1.2 Recovery Strategies

Recovery strategies are designed such that stable calls are protected first, and then transient calls. Recovery is hierarchical in nature, beginning first with the smallest element that can be corrected without affecting other software or hardware, and escalating to a higher level only when a lower level recovery action is not successful in clearing the problem.

Service recovery features are listed in the following sections.

7.1.3.2 Fault Recovery Programs

7.1.3.2.1 Feature Description

Software programs are provided for fault recovery (35-02-0100).

7.1.3.2.2 Availability

Fault recovery programs are available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.1.3.3 Initializations

7.1.3.3.1 Feature Description

When software troubles or multiple hardware faults cause a severe degradation of call processing capability, varying levels of predefined system hardware and software initializations (35-02-0200) are capable of restoring both hardware and software to a known operating state. The levels of system recovery initializations provide for escalating steps of initializations, with each step encompassing more software and more hardware to clear the system of faulty states that have eluded the previous step. The final step initializes all software and all applicable hardware.

7.1.3.3.2 Availability

Initializations are available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.1.3.3.3 Feature Operation

There are generally three stages of initialization. These are as follows:

- Initialization analysis stage
- Software initialization

- Post-recovery stage.

The initialization analysis deals with the selection of crucial hardware units and the testing of accuracy of software programs and permanent data. Hash sum checks on programs and translation data and the switch of a module processor are in this stage. Hardware unit selection data and interrupt information which have triggered an initialization are collected in this stage for subsequent analysis. This stage also analyzes historical data (for example, error counts) and initialization triggers to determine which level of initialization should be invoked.

After the initialization analysis stage has been completed, the corresponding software initialization runs using the hardware units which the switch maintenance subsystem determines to be reliable, or more suitable to initialization than other hardware units. The software initialization stage pumps up programs, if needed, to guarantee that the permanent data and programs are correct, generally on a block-to-block basis. Ensuring the consistency of transient data for calls also belongs to the software initialization stage. The consistency of transient data (dynamic call data) is obtained either by reconstructing partial data for saving stable calls or by tearing down calls.

The post-recovery stage deals with the resumption of call processing after the system is brought to a sane state. The tasks involved include (post-mortem) dumps.

Initializations, in general, occur on a per-processor basis. Initialization action in one processor does not require initialization action(s) in another processor except to resynchronize related data that is distributed across processors. However, system-wide initialization (AM and SMs), implemented manually only, may be required to recover extreme trouble conditions.

Each processor has several predefined levels of initialization which may be triggered manually and/or automatically. The lowest levels have minimal impact on call processing while the highest level completely initializes the system, clearing all stable calls. The appropriate level for a particular problem or condition has two boundary conditions that govern the escalation strategy. First, it should have minimum impact on the system and second, it should be high enough to clear the problem.

Initializations may be triggered by various mechanisms as follows:

- Hardware interrupts
- Hardware resets
- Asserts (Asserts are defensive checks or statements embedded within the software which detect errors and inconsistencies by making assertion about the value of program variables and relationships among these variables)
- Audits
- Integrity monitor checks
- Manual requests by craft
- SM initializations.

7.1.3.4 Automatic Service Recovery

7.1.3.4.1 Feature Description

Automatic service recovery (35-02-0300) in the 5ESS[®] switch consists of the following:

- (a) Each processor has several predefined levels of initialization in a hierarchical structure. Automatic recovery

begins with the lowest level, which may only affect a single transient call or no calls at all, and escalates only when the first level is not successful in correcting the problem. This protects stable calls, affects the smallest number of transient calls, and retains the capability to respond to subsequent call attempts. At each level, the recovery process is designed to protect as many stable calls as possible and have minimum impact on transient calls. The highest initialization levels, which can affect all stable calls, can only be initiated manually.

- (b) Transient calls that cannot complete during recovery are routed to reorder or announcement.
- (c) Software errors are monitored by mechanisms such as hardware checks, defensive software checks, and audits and are corrected when detected to prevent propagation and more serious effects on call processing.
- (d) Major hardware units are duplicated and service groups are engineered with sufficient redundancy to allow faulty units to be removed from service without affecting normal call processing.
- (e) Faulty hardware is removed from service as soon as a trouble is detected unless removal causes system operation to be more severely degraded or the removal is inhibited by previous manual action. Transient hardware errors are monitored, and when the number of detected errors for a unit exceeds an established threshold, the unit is removed from service.
- (f) The number of server group units or circuits that can be taken out of service is limited to prevent an entire group from being removed and to ensure at least a level of degraded service in lieu of no service at all. When such a removal would exceed an established threshold, the unit is kept in service and an alarm message is generated.
- (g) For incompleting calls requiring special treatment such as reorder or recorded announcement, special treatment is not applied when the system detects a hazardous condition (for example, power cross on the line) in order to protect the system from potential damage.

Automatic service recovery features are listed in the following sections.

7.1.3.4.2 Automatic Treatment of Errors

7.1.3.4.2.1 Feature Description

Errors are monitored (35-02-0310) such that equipment experiencing system correctable errors is not removed from service unless an excessive error rate occurs.

7.1.3.4.2.2 Availability

The automatic treatment of errors feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.3.4.3 Automatic Treatment of Faults

7.1.3.4.3.1 Feature Description

Equipment experiencing fault conditions is removed from service (35-02-0320) as soon as the fault is detected unless system operation could be severely degraded.

7.1.3.4.3.2 Availability

The automatic treatment of faults feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.3.4.4 Equipment Selection Procedures

7.1.3.4.4.1 Feature Description

Automatic equipment selection software (35-02-0330) insures that calls encountering a trouble have a high probability of completion on subsequent customer or switching system retries (for example, random selection of server group circuits).

7.1.3.4.4.2 Availability

The automatic equipment selection procedures feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.3.4.5 Out-of-Service Limit for Trunks

7.1.3.4.5.1 Feature Description

The 5ESS[®] switch maintains an OOS limit called the automatic maintenance limit (AML) (35-02-0340) for 2-way and outgoing trunks. The AML establishes the number of trunks in a trunk group that can be removed from service automatically. If the number of trunks in a trunk group equals the AML, the next faulty trunk in the trunk group remains in service. The AML is used to keep an excessive number of trunks from being automatically removed from service. If the AML is exceeded for a trunk group, telephone personnel can still manually remove an in-service trunk from service. Status displays at the MCC indicate when a circuit limit has been exceeded.

7.1.3.4.5.2 Availability

The OOS limit for server group equipment feature is available with the 5E6 and subsequent software releases for the 5ESS[®] switch.

7.1.3.4.6 Manual Service Recovery

7.1.3.4.6.1 Feature Description

Manual service recovery (35-02-0400) is provided for craft to initiate any initialization level manually. Manual recovery actions can be directed toward any single module or to various combinations of modules.

7.1.3.4.6.2 Availability

The manual service recovery feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.4 Trouble Notification

7.1.4.1 Feature Description

The 5ESS[®] switch is designed to provide trouble notification (35-03-0000) to alert the craftsman to the existence and severity of any switching system troubles.

7.1.4.2 Alarmed Trouble Notification

The system trouble notification includes audible and visual alarm severity, trouble type, and other diagnostic information associated with troubles which have immediate or potential impact on system operation and performance. In addition to printing alarm trouble messages on the receive-only printer (ROP), the system displays

alarms and critical indicator status at the top of each MCC display page. Display pages identify and indicate the status of the specific units reporting troubles.

7.1.4.3 Nonalarmed Trouble Notification

Nonalarmed information is provided when no craftsperson action is necessary. An example is results of manually initiated diagnostics.

7.1.4.4 Centralized Reporting of Troubles and Alarms

The 5ESS[®] switch provides trouble notification at the MCC as well as the Switching Control Center System (SCCS) interface. This includes alarms, messages, and MCC display page information.

Miscellaneous alarms reflecting troubles outside the 5ESS[®] switch (that is, building, environment, power, etc.) are provided both at the MCC and the remote maintenance interface through the 5ESS[®] switch.

7.1.4.5 Notification of Machine Actions

The results of all automatic actions, in response to a trouble condition, are reported to the craftsperson. Examples include system reconfiguration, equipment taken out-of-service, and automatic diagnostic results. Unsuccessful automatic recovery attempts by the system are also reported.

7.1.4.6 Notification of Single Troubles

Normally a single trouble generates only one alarm message. However, all initializations, whether resulting from a single trouble or multiple troubles, are reported.

Also, the 5ESS[®] switch is designed such that certain single troubles such as battery discharging, do not result in the loss of call processing capability or physical damage to equipment. These single troubles result in repeating the alarm message with a clear indication of the type of trouble to periodically remind the craft of the trouble condition.

Trouble notification features are listed in the following sections.

7.1.4.7 3-Level Alarm Structure

7.1.4.7.1 Feature Description

Alarm conditions are separated by decreasing severity into three levels (35-03-0100): critical, major, and minor. Each level has a distinctive audible tone and visual indication.

- (a) **Critical Alarm:** Critical alarms indicate severe service-affecting troubles. These conditions require immediate corrective action.
- (b) **Major Alarm:** Major alarms report hardware or software trouble conditions which indicate the malfunction or failure of important circuits or troubles which may cause a serious disruption in service. These troubles require immediate attention to restore or maintain system capability.
- (c) **Minor Alarm:** Minor alarms are associated with troubles which do not have an immediate or potential serious effect on customer service, or for troubles in circuits that are not essential to switching system call processing operation.

7.1.4.7.2 Availability

The 3-level alarm structure feature is available with the 5E6 and all subsequent software releases for the 5ESS[®]

switch.

7.1.4.8 Audible Alarms

7.1.4.8.1 Feature Description

The system provides the software and hardware for generating audible alarms (35-03-0200). Unique audible alarms are used to distinguish different alarm levels.

7.1.4.8.2 Availability

The audible alarms feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.4.8.3 Restrictions

This capability is provided at the MCC and the remote maintenance facility to silence audible alarms. This alarm release does not remove the status display information that indicates when a trouble exists in the system.

7.1.4.9 Visual Alarm Indicators

7.1.4.9.1 Feature Description

Visual alarm indicators (35-03-0300) in the 5ESS[®] switch consist of the following:

- Peripheral frame control/displays
- Alarm indicators on the MCC status displays
- Aisle alarms.

Added alarm indicators for fuse failures and equipment cooling fan failures are provided at the equipment frames. These indicators supplement the status and display information displayed on the MCC to aid in trouble location. End-guards on each equipment aisle are marked to identify the equipment in each aisle. Output messages available on the ROP identify faulty units by means of equipment location codes corresponding to the end-guard markings. End-guard markings, together with the equipment location codes given in the output messages, direct the craft to the correct aisle, frame, and unit to locate a failing circuit. Indicator lamps on control and display packs and power converters within the frames supplement the visual indicators for rapid trouble location.

In addition to the visual alarm indicators already mentioned, an office alarm subsystem is provided. This unit provides visual and audible alarms and is functionally independent from the MCC and other remote maintenance interfaces.

7.1.4.9.2 Availability

The visual alarm indicators are available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.4.9.3 Restrictions

An alarm release capability is provided at the MCC and a remote maintenance facility to retire visual alarm indications. This alarm release does not remove the status display information that indicates when a trouble exists in the system.

7.1.4.10 Output Messages

7.1.4.10.1 Feature Description

Output messages (35-03-0400) can be generated autonomously or as a response to an input request and can be displayed at the MCC video display terminal, ROP, or logged in a disk file.

The output messages are comprised of a priority of action field followed by an abbreviated time stamp, an identification field, and an optional data field.

The priority of action field indicates which of the six levels of "action to be taken" are associated with each output message. The six levels are:

- Critical
- Major
- Minor
- Manual - direct response to input request
- Auto_act - action required (automatically generated)
- Auto_info - provides information (automatically generated).

The abbreviated time stamp specifies the minutes after the hour at which the output message was generated.

The identification field generally consists of a unique verb (first keyword combination of an input request for those messages which are in direct response to an input message). For output messages that are automatically generated, the identification field is identical to output messages responding to the manual request.

The data field can be null, a termination report, or a termination report followed by additional information. The absence of a termination report implies normal completion of the action. The termination report which indicates the noncompletion of an action are followed by an explanation. The progress reports (in progress, started, etc.) may be used as supplements to indicate the continuation of some action.

Output messages which contain large amounts of data with multiline output are printed with the data aligned in column/rows to ensure readability.

Output messages resulting from recovery actions are printed on the ROP and routed to the remote maintenance channel for display and logging in the SCCS. In addition, processor recovery messages (PRMs) are sent to the MCC display. After system sanity is restored, a postmortem dump message is generated within approximately 1 to 5 minutes, giving detailed data (for example, control process name, control register values, error register contents, and counter values) related to the trouble.

7.1.4.10.2 Availability

Output messages are available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.1.4.11 Trouble Status Indicators

7.1.4.11.1 Feature Description

Trouble status indicators (35-03-0500) in the office include:

- (1) System status indicators which display the status of the major units of equipment of the system as well as any active troubles and main programs inhibited for any reason

- (2) State of health indicators which do not necessarily denote trouble but report such conditions as system load, program cycle rates, program controls in effect, and active queues.

7.1.4.11.2 Availability

Trouble status indicators are available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.4.12 Office Alarm Subsystem

7.1.4.12.1 Feature Description

An office alarm subsystem (35-03-0600) together with the local and remote maintenance facility displays provide alarm information for system troubles.

The office alarm subsystem in the 5ESS[®] switch provides the following:

- Audible alarms
- Visual displays
- Alarm circuit power detection.

There are basically two alarm classes. These are the frame power alarms and the system (software) alarms. Both classes produce suitable alarm messages at the MCC and SCCS, light alarm indicators on the MCC status display, and sound the appropriate audible alarm. In addition, frame power alarms light circuit alarm lamps and produce a power failure output message. These alarms may be retired at the MCC or at a remote maintenance facility.

System alarms are detected by software only. Personnel are advised of a system problem by audible alarms in the same manner as a frame power problem; however, no circuit alarm lamps are displayed. An output message is printed showing the location and extent of the fault. System alarms are retired at the MCC or remote maintenance facility only.

7.1.4.12.2 Availability

The office alarm subsystem is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.4.13 Trouble Verification

7.1.4.13.1 Feature Description

Test hardware, software, and procedures are provided to locate a defective unit with no disruption of service once a trouble condition has been detected and verified (35-04-0000).

7.1.4.13.2 Availability

Trouble verification is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.5 Trouble Isolation Features

7.1.5.1 Feature Description

The 5ESS[®] switch incorporates extensive software to provide sophisticated trouble isolation (35-05-0100). This

process automatically isolates troubles to a unit, allowing the system to take recovery action so as to protect stable calls and retain the highest level of call processing capability. The trouble isolation capability also minimizes the repair effort required with equipment failures.

Trouble isolation features are listed in the following sections.

7.1.5.2 Trouble Location Procedures

7.1.5.2.1 Feature Description

The trouble location procedure (TLP) (35-05-0100) provides a list of replaceable circuits arranged in the order of the circuits probability of causing the trouble. The switching system output is a list of replaceable circuits to be used in conjunction with switching system documentation.

7.1.5.2.2 Automatic Trouble Location Procedure

The automatic TLP includes automatic diagnostics at the circuit board level. The TLP software maintains a list, ordered by priority, of suspect circuit boards. This list includes equipment location information and is printed on the ROP. Combined use of this list and the frame and shelf-mounted designation strips provide direct access to circuit boards. Manual translation of location codes is eliminated.

7.1.5.2.3 Manual Trouble Location Procedure

If the automatic TLP does not pinpoint the fault, a manual TLP is available. The video display pages and system status summary display can be used to locate faults. Documented procedures are available for using the manual TLP.

7.1.5.2.4 Availability

Trouble location procedures are available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.5.3 Diagnostics

7.1.5.3.1 Feature Description

These programs (35-05-0200) are provided to identify the failing circuit in a faulty unit to a relatively few quickly changeable spare parts (for example, a circuit pack or a plug-in module of apparatus). After a suspected failed part or parts have been replaced, diagnostic programs are capable of being requested in order to determine if the trouble has been cleared or the unit is still faulty.

The output of the diagnostic tests of a faulty unit yields direct information as to the location of the failed replaceable circuit.

The diagnostic programs do not interfere with the normal call processing programs or system operation.

7.1.5.3.2 Availability

Diagnostic programs are available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.5.4 Error Analysis

7.1.5.4.1 Feature Description

The system distinguishes troubles as either faults (hard trouble) or errors (transient or intermittent faults which do

not yield consistent diagnostic test results). Statistics on errors are kept and analyzed (35-05-0300) periodically, and the results printed out. Whenever error thresholds or analysis indicate that equipment could cause trouble, it is automatically removed from service.

Error analysis varies depending on the hardware and software processes involved. Error analysis in the 5ESS® switch is characterized by:

- (a) Error history data is collected and maintained within the switching system for automatic analysis by fault recovery programs.
- (b) Status of equipment monitored by error analysis is available on MCC displays or through manually requested status lists.
- (c) Whenever error analysis indicates that an equipment unit or circuit is faulty, the faulty equipment is automatically removed from service except as noted below. Removals result in output messages which may be alarmed depending on the circuit removed and the effect on service.
- (d) In forced equipment configurations, standard maintenance actions may be suspended to lessen the impact on the rest of the system. Critical indicator displays on each MCC page indicate when system inhibits are in effect, and the associated display page identifies all inhibits invoked.
- (e) Two types of error analysis are performed on trunks (quick-check and peer-group analysis). Error analysis monitors trunk groups, group members, and service circuits by using machine-detected interoffice ineffective attempts. Quick-check analysis checks failures on each failing trunk against a trunk threshold and removes the failing circuit when the threshold is reached. Peer-group analysis measures failures on members within a group against a group threshold to determine whether maintenance action is required on the group or on specific members within the group. Thresholds for allowable out-of-service trunks or service circuits are functions of group sizes. When a threshold has been reached, the system inhibits further removals and generate an alarm trouble message each time a faulty circuit is encountered.

7.1.5.4.2 Availability

Error analysis is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.1.5.5 Repair

7.1.5.5.1 Feature Description

In most cases, the actual repair consists of an in-place maintenance operation (for example, a simple adjustment or replacement of a plug-in unit). One craftsperson, working alone, is able to perform most repairs.

Procedures for removal of any unit do not affect any in-service units. Special sequences or precautions for the removal of power are clearly documented and identified. Whenever practical, interlocks are provided so that power cannot be manually removed from both units simultaneously (for example, redundant major equipment located on one frame).

7.1.5.5.2 Availability

The repair feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.1.6 Maintenance Person-Switching System Interface

The 5ESS® switch is designed to allow one craftsperson at the MCC to monitor overall switching system status and performance and control the switching system maintenance functions. The MCC supports a video display terminal

with keyboard, ROP, key telephone set with loudspeaker, and a trunk and line work station (TLWS) test access unit (TAU). This position is designed to allow one craftsperson to perform fault recovery, fault isolation, and repair functions using the built-in equipment. In a small percentage of cases, additional available test equipment and documentation may be needed. All activities performed through the MCC are available at the TLWS, except emergency actions.

The MCC is fully functional without any external support systems such as the SCCS.

Maintenance person-switching system interface (35-07-0000) features are listed in the following sections.

7.1.6.1 Master Control Center

7.1.6.1.1 Feature Description

The MCC is the primary communication link between the on-site maintenance personnel and the switching system. The MCC provides the interface capability for both administrative and maintenance tasks. The major components of the MCC consist of the following:

- Video display terminal with keyboard, a teletypewriter terminal, or equivalent
- ROP
- Key telephone set with loudspeaker
- TLWS TAU.

Page displays on the video terminal provide the status and control information needed to perform maintenance tasks. Maintenance requests are input using the keyboard. The ROP provides a hard copy of input and output messages. Thus, a record is available for future reference. The key telephone set is used to communicate with work areas outside the office. This telephone set can be used independently of the switching office, thereby ensuring outside communication if an office outage occurs. A loudspeaker is provided for communications at times when maintenance personnel need the use of their hands. The TAU telephone jack provides communication to other work areas within the office. The TLWS test jacks provide access to trunks and lines for maintenance activities.

7.1.6.1.2 Availability

The MCC is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.6.1.3 Feature Operation

7.1.6.1.3.1 Function Keys

The MCC uses four function keys. When one of these keys is depressed, the system performs the corresponding function. The keys are:

- ALM RLS (alarm release)
- CMD/MSG (input command or input message)
- NORM DISP (normal display)
- EA DISP (emergency action display).

When the system is in the manual retire mode, the ALM RLS function key releases audible and visual alarm

indications (critical, major, minor, and flashing indicators). Flashing indicators go to steady reverse video when retired.

The CMD/MSG function key configures the MCC to accept either input commands or input messages. The key acts as a toggle and allows input in one mode or the other. The user may switch between either mode after acknowledgment of the previously entered message. Any unexecuted data in either area is lost if a switch is made before an acknowledgment is received. Unexecuted data in the input message area is normally saved until an intercharacter time-out occurs. If a time-out occurs before the message is completed, all data is lost. The position of the cursor on the video display indicates which input mode the MCC is in. The cursor resides in the input message line area while in the MSG mode. If the MCC is in the CMD mode, the cursor resides at the CMD entry area (at the top left of the control and display area). Whenever the display is brought on-line or a new page is selected, the input mode remains unchanged.

The NORM DISP function key places a page controlled from the AM on the display. The page displayed is the previously displayed page. Depressing the NORM DISP key again redraws a clean display without aborting any processes in progress.

The EA DISP function key places the system in the emergency action mode and displays the emergency action interface page on the screen. This page is used during a system emergency for trouble clearing functions. Depressing the EA DISP function key again aborts all incompletely entered actions and redraws the emergency action interface page display.

Most other keyboard keys are used in a normal fashion to enter numeric codes, input messages, and alphanumeric responses to the system. Their input is respective to the symbol designated on the key.

7.1.6.1.3.2 MCC Page Selection

The MCC provides the ability to select any control and display page at any time. This means any SM display can be accessed from any page display. For example, to reach the status display for SM 24, you would enter 1010,24. It is possible to enter a page identifier in the command entry area if the appropriate page identifiers are known. The page index display can be used to determine the appropriate page identifier. The index display is brought into the control and display area by entering 100 (into the CMD entry area) and executing it. This page consists of a list of all possible MCC control and display pages. The needed page can be selected by entering the page identifier in the command area and executing it.

A display page can be selected by entering its unique 1- or 4-digit identifier. All display page commands begin with the number 1. For example, 100 is the index display. Identifiers 105 through 116 are directly related to the summary status area indicators. The page number for the page can be derived from the physical position of the indicator. For example, building and power (BLDG/PWR) is the fifth summary status indicator; its associated page is 114. The system emergency page, corresponding to the SYS EMER (system emergency) indicator, is to be displayed by depressing the EA DISP function key. Page displays are not provided for alarm level indicators. Other pages are assigned the remaining identifiers grouped on a functional basis, where possible. New identifiers will be added as new pages become available.

Whenever the MCC terminal is brought on-line from an off-line state, the terminal displays the identification line, the status summary indicators, the emergency action page, and the input message entry area. The time-of-day indicator should be checked immediately to determine display validity.

7.1.7 Switching System Control And Display Interface

Switching system control and display interface features (35-07-0200) are listed in the following sections.

7.1.7.1 Alarm Release

7.1.7.1.1 Feature Description

There are two system alarm release (35-07-0210) modes: automatic alarm release and manual alarm release. If the system is in the automatic alarm release mode, the audible alarm and the flashing alarm conditions are released 5 seconds after initialization. If the system is in the manual alarm release mode, the audible alarm and flashing alarm conditions are released by operating the ALM RLS key on the video terminal keyboard. Released alarms and controls in effect, remain in the alarm condition until the system has been restored to normal operating condition. The alarm release mode is changed via an input command or message.

7.1.7.1.2 Availability

The alarm release feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.7.2 Alarm Transfer

7.1.7.2.1 Feature Description

Alarms (35-07-0220) may be transferred from an unattended office to another office or to the SCCS. These alarms are released at the controlling office or SCCS in the same manner as described in the Alarms Release feature.

7.1.7.2.2 Availability

Alarm transfers are available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.7.3 Extended Maintenance Center (Beltline)

7.1.7.3.1 Feature Description

This feature (35-07-0400) allows a craftsman to perform equipment tests anywhere in an office by using a portable TTY connected to the MCC via the beltline telephone jacks.

7.1.7.3.2 Availability

The extended maintenance center (beltline) feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.7.4 Remote Maintenance Center

This feature (35-08-0000) provides interfaces permitting full remote maintenance capabilities excluding activities that require physical action on equipment, such as circuit pack replacement. At the remote maintenance center, the craftsman has the alarms, status information, and control capability to monitor switching system performance and the ability to perform system reconfiguration and initialization, when necessary.

7.1.7.5 SCCS Synchronous Interface

7.1.7.5.1 Feature Description

This feature (35-08-0200) permits the implementation of the Remote Maintenance feature by means of a synchronous interface to an SCCS at a remote maintenance facility. This SCCS interface consists of two data links. One data link is a backup that provides the means to transmit configuration and control data. The other data link is used to transmit maintenance and administrative messages between the Stored Program Control System (SPCS) and the SCCS. These data links are governed by the BX.25 protocol. The telemetry data and the maintenance and administrative data are transported on different virtual circuits supported by the protocol.

7.1.7.5.2 Availability

The SCCS synchronous interface is available with the 5E6 and subsequent software releases for the 5ESS[®] switch.

7.1.7.6 Maintenance Measurements

7.1.7.6.1 Feature Description

Maintenance measurements (35-09-0000) are comprised of trunk and line measurements requested via the MCC and/or the TLWS.

Trunk measurements are made using a variety of inputs from the TLWS and the use of several types of outgoing test calls (for example, 100-, 101-, 102-, 103-, 104-, and 105-type test lines). The following types of trunk measurements may be performed:

- Balance quiet termination
- AC open termination
- AC short termination
- C-message weighted noise
- C-notched noise
- Echo return loss
- Singing return loss
- Singing return loss high
- Broadband power measurement
- Tone measurement at 404, 1004, or 2804 Hz
- Quiet termination
- AC and DC voltage
- Resistance
- Capacitance
- Tip-to-ground and ring-to-ground measurements for AC and DC voltage, resistance, and capacitance.

Line measurements may be made automatically by using pokes from the MCC menu pages. This method is the preferred method of performing line tests and is easier because no external test equipment is required. The same tests may be conducted using the TAU but external test equipment is required. The line measurements are as follows:

- C-message weighted noise
- C-notched noise
- Echo return loss
- Singing return loss

- Singing return loss high
- Broadband power measurement
- Tone measurements at 404, 1004, or 2804 Hz
- Monitor line supervision
- Ring line
- Apply ROH tone to line
- AC and DC voltage
- Resistance
- Capacitance
- Tip-to-ground and ring-to-ground measurement for AC and DC voltage, resistance, and capacitance
- Coin station test
- Distance to open
- Ringer count.

The automatic line insulation test (ALIT) automatically makes line resistance measurements.

7.1.7.6.2 Availability

Maintenance measurements are provided with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.1.8 OP:ALM,ALL Input Message

7.1.8.1 Definition

The OP:ALM Input Message feature provides one input message to request a printout of the current off-normal (active) building, power, and miscellaneous alarms on the 5ESS[®] switch. This feature provides service provider maintenance personnel with the ability to monitor the status of all current alarms for an entire office, including alarms at any remote sites attached to the office.

When the maintenance personnel need to know the uncleared alarm status in an office, they can enter the input message **OP:ALM,ALL**. The active alarms covered by the following input messages and Master Control Center (MCC) pages are reported in a segmented output message.

MCC PAGES:

- 105/106 (Building/Power & Alarm Controls)
- 115 (Communication Module Summary)
- 116 (Miscellaneous)
- 118 (Common Network Interface and Common Channel Signaling Status)
- 119 (Miscellaneous Alarms)

- 1010,X (Switch Module X Status)

NOTE: For MCC pages 105/106, alarms numbered 02-27 will now have the "repeatability" option. An asterisk (*) will be added to the MCC display to designate an alarm as "repeating."

INPUT MESSAGES:

- OP:CFGSTAT,CM,PWRALM
- OP:CGA
- OP:ALM,RBPSC,SM=X
- OP:S96,ALM
- OP:MSUSP=X-A-B-C
- OP:ALM,RIBMSC,SITE=Y
- OP:ALM,RISLUSC,SITE=Y

NOTE: The "CHG:ALM" input message now contains the parameter REPEAT=x, where x = Y(es) or N(o).

7.1.8.2 Economic Worth

This feature is most beneficial to the Switch Control Center (SCC) which monitors 15 or more offices at one time. With this feature, SCC personnel will no longer need to enter several input messages and display six MCC pages to obtain alarm status for an office.

7.1.8.3 Availability

This feature is available with 5E7 and later software releases. The feature is also available for the 5E6 software release, via a software update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

7.1.8.4 Feature Provision Basis

This feature is provided on a per-switch basis.

7.1.8.5 User Perspective

7.1.8.5.1 User Profile

Telephone maintenance personnel use this feature to obtain current alarm information on an entire office.

7.1.8.5.2 User Operation

The service provider/SCC inputs a single input message to receive current alarm information on the receive only printer (ROP) and the requesting terminal.

7.1.8.5.3 Activation

Activate the feature by inputting the following message: **OP:ALM,ALL**

NOTE: The feature should not be implemented during busy times, or when system problems are already flooding the ROP.

The output message resulting from the OP:ALM,ALL request is segmented. The message headers for each segment of the alarm status request are as follows:

(1) **OP ALM ALL - BPSC ALARM SUMMARY qualifier**

The "qualifier" will be one of the following:

- **FIRST RECORD**
- **NEXT RECORD**
- **LAST RECORD**
- **NO ACTIVE ALARMS**

(2) **OP ALM ALL - MISC ALARM SUMMARY qualifier**

The "qualifier" will be one of the following:

- **FIRST RECORD**
- **NEXT RECORD**
- **LAST RECORD**
- **NO ACTIVE ALARMS**

(3) **OP ALM ALL - CNI ALARM SUMMARY qualifier**

The "qualifier" will be one of the following:

- **FIRST RECORD**
- **NEXT RECORD**
- **LAST RECORD**
- **NO ACTIVE ALARMS**

(4) **OP ALM ALL - CM POWER ALARM SUMMARY record**

The "record" will be one of the following:

- **FIRST RECORD**
- **NEXT RECORD**
- **LAST RECORD**

(5) **OP ALM ALL - CGA SUMMARY qualifier**

The "qualifier" will be one of the following:

- **COMPLETED**
- **CONTINUED**
- **STARTED**

(6) **OP ALM ALL - S96 ALARM SUMMARY record qualifier**

The "record" will be one of the following:

- **FIRST RECORD**
- **NEXT RECORD**
- **LAST RECORD**

The "qualifier," when it appears, is one of the following:

- **NO ACTIVE ALARMS**
- **DATA MAY BE INCOMPLETE**

(7) **OP ALM ALL - FAN & FAN/PERIPH FUSE ALARM SUMMARY qualifier**

The "qualifier" will be one of the following:

- **FIRST RECORD**
- **NEXT RECORD**
- **LAST RECORD**
- **NO ACTIVE ALARMS**

(8) **OP ALM ALL - MSUP=a-b-c-d ALARM SUMMARY COMPLETED**

NOTE: There will never be more than one record per board, so no record identifier is needed.

(9) **OP ALM ALL -RBPSC ALARM SUMMARY SM x record**

The "x" is the SM number.

The "record" will be one of the following:

- **FIRST RECORD**
- **NEXT RECORD**
- **LAST RECORD**

- **NO ACTIVE ALARMS**

(10) **OP ALM ALL - RISLUSC ALARM SUMMARY record**

The "record" will be one of the following:

- **FIRST**
- **NEXT**
- **LAST**

(11) **OP ALM ALL - RIBMSC ALARM SUMMARY SITE # record**

The "record" will be one of the following:

- **FIRST**
- **NEXT**
- **LAST**

After the last alarm record, a list of SMs not responding is printed. This list includes to which alarm type the SM did not respond.

NOTE: If an SM did not respond to any requests, the message type is **ALL**.

At the conclusion of the OP:ALM,ALL request, the message **OP ALM ALL COMPLETED** is printed.

7.1.8.5.4 Operational Limitations

The **OP:ALM,ALL** message does not allow multiple requests to run at one time.

NOTE: If an **OP:ALM,ALL** is in progress, the acknowledgement is

RL - ALREADY IN PROGRESS.

An **OP:ALM,ALL** request is rejected if any of the following are in progress:

- OP:CGA
- OP:S96,ALM

NOTE: If one of these are in progress, the acknowledgement is **RL - "reason"**. The reason is appropriate to the request already in progress.

The output from **OP:ALM,ALL** comes asynchronously from all equipped and operational SMs in the office. Because of this, the amount of time from the request to completion of the report is not controllable. The amount of time also depends on the number of SMs, RSM sites, and RISLU sites associated with the office.

7.1.8.5.5 Deactivation

The feature may be deactivated at any time by inputting the following message:

STP:OP:ALM,ALL

When this stop message is input, the OP:ALM,ALL process outputs a termination message and stops reporting alarms.

NOTE: The termination message is **OP ALM ALL MANUAL TERMINATION**.

A timer is maintained to determine the run time of the entire OP:ALM,ALL process. If this timer times-out, the following termination message is output:

OP ALM ALL TERMINATION DUE TO TIMEOUT

7.1.8.5.6 Interactions

This feature may be ROP and system intensive due to the high potential of active alarms in a large office.

7.1.8.6 Engineering - System Resources

Not applicable.

7.1.8.7 Assignment Guidelines

Not applicable.

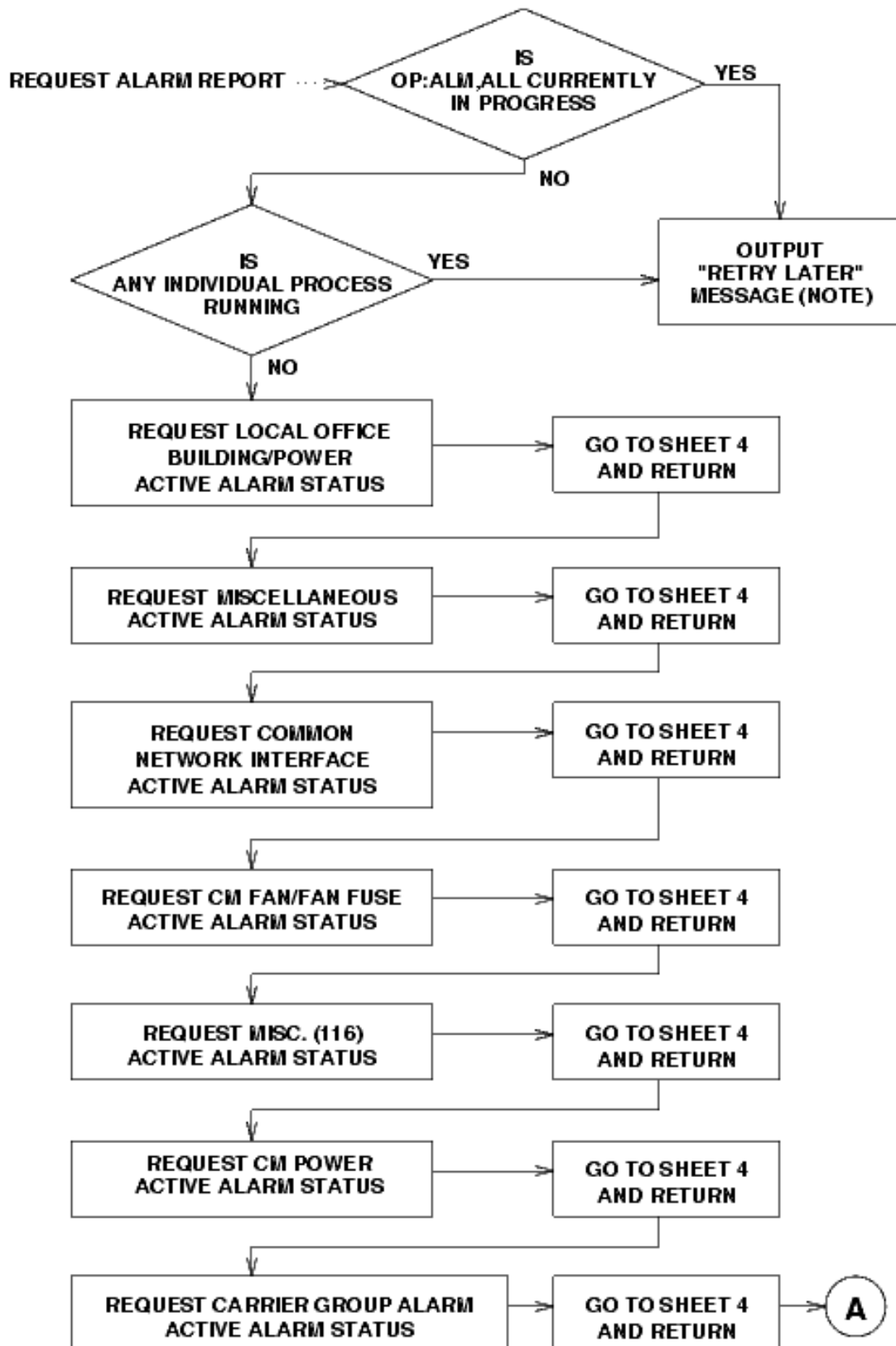
7.1.8.8 System Operation

The maintenance/SCC personnel enter the new input message **OP:ALM,ALL** and the active alarms contained on the four MCC pages, and the seven input messages are output to the ROP and the requesting terminal in a segmented report.

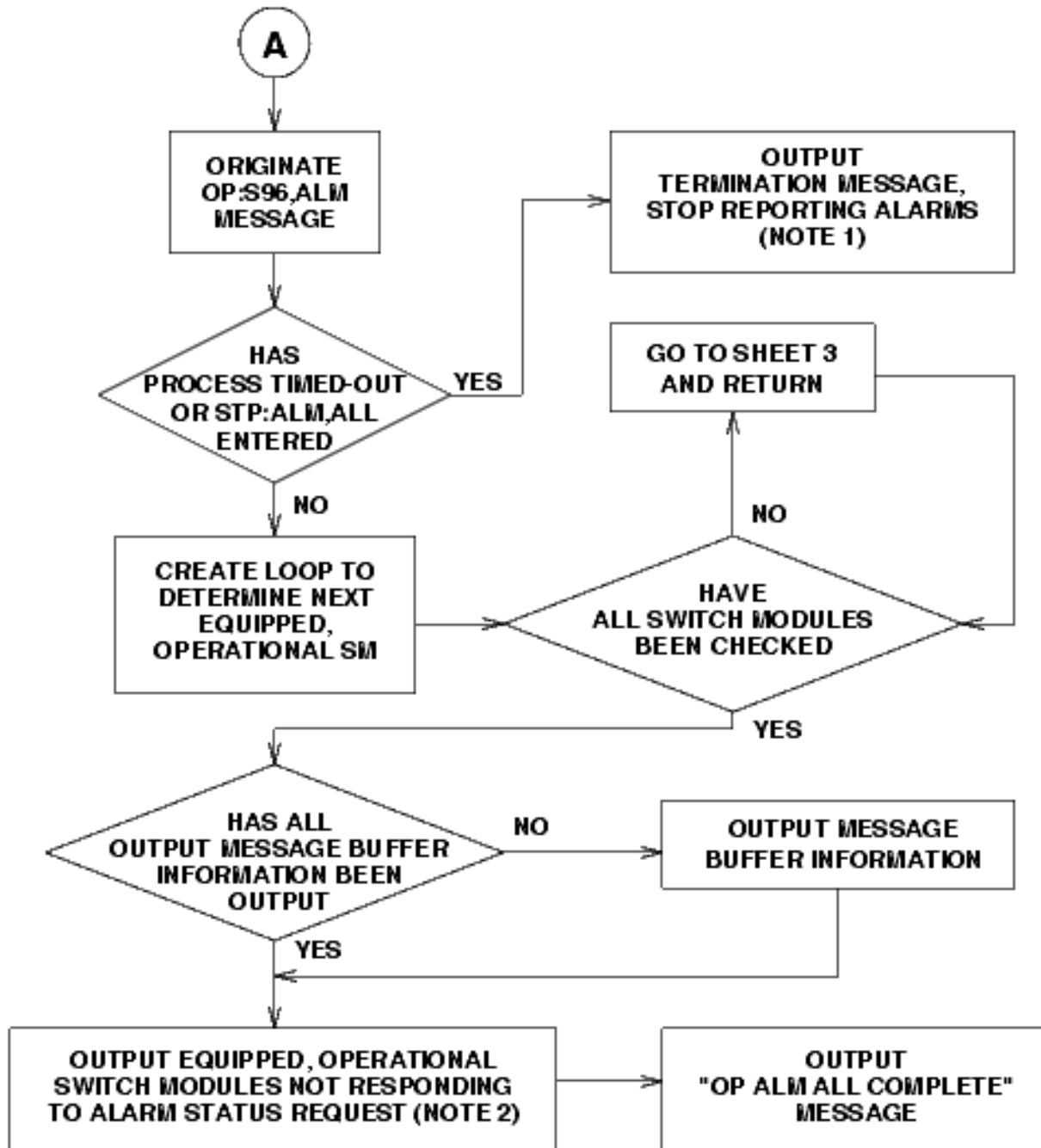
Any SMs not responding to the alarm status requests directed to them are noted and listed in a final segment as to which SMs failed to respond to which messages. When all alarms covered by this feature have been reported, a "completed" message is output.

Another new input message, **STP:ALM,ALL**, is also available allowing the maintenance personnel to stop the feature, if in progress.

The OP:ALM,ALL feature data flow is shown in Figure 7-1

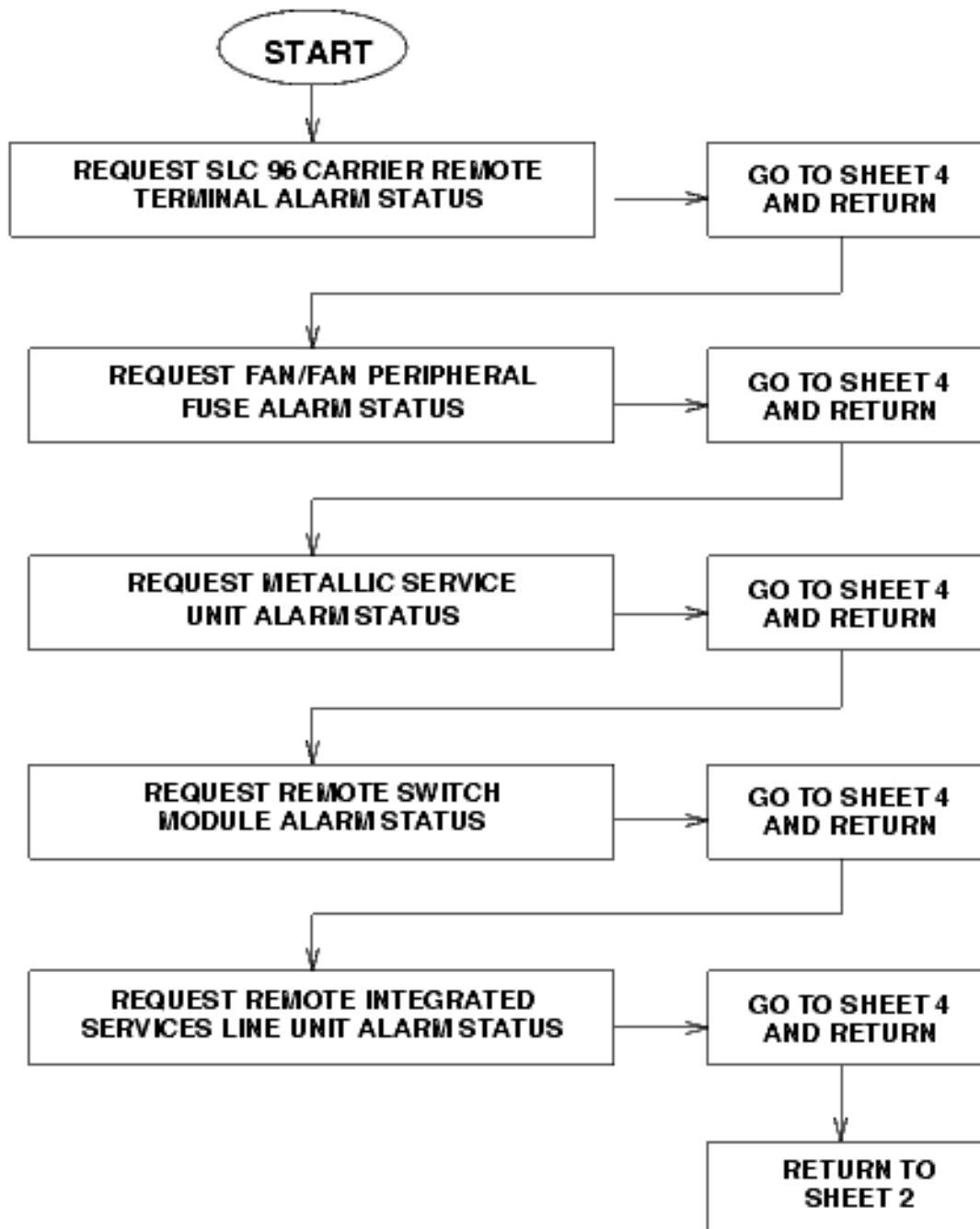


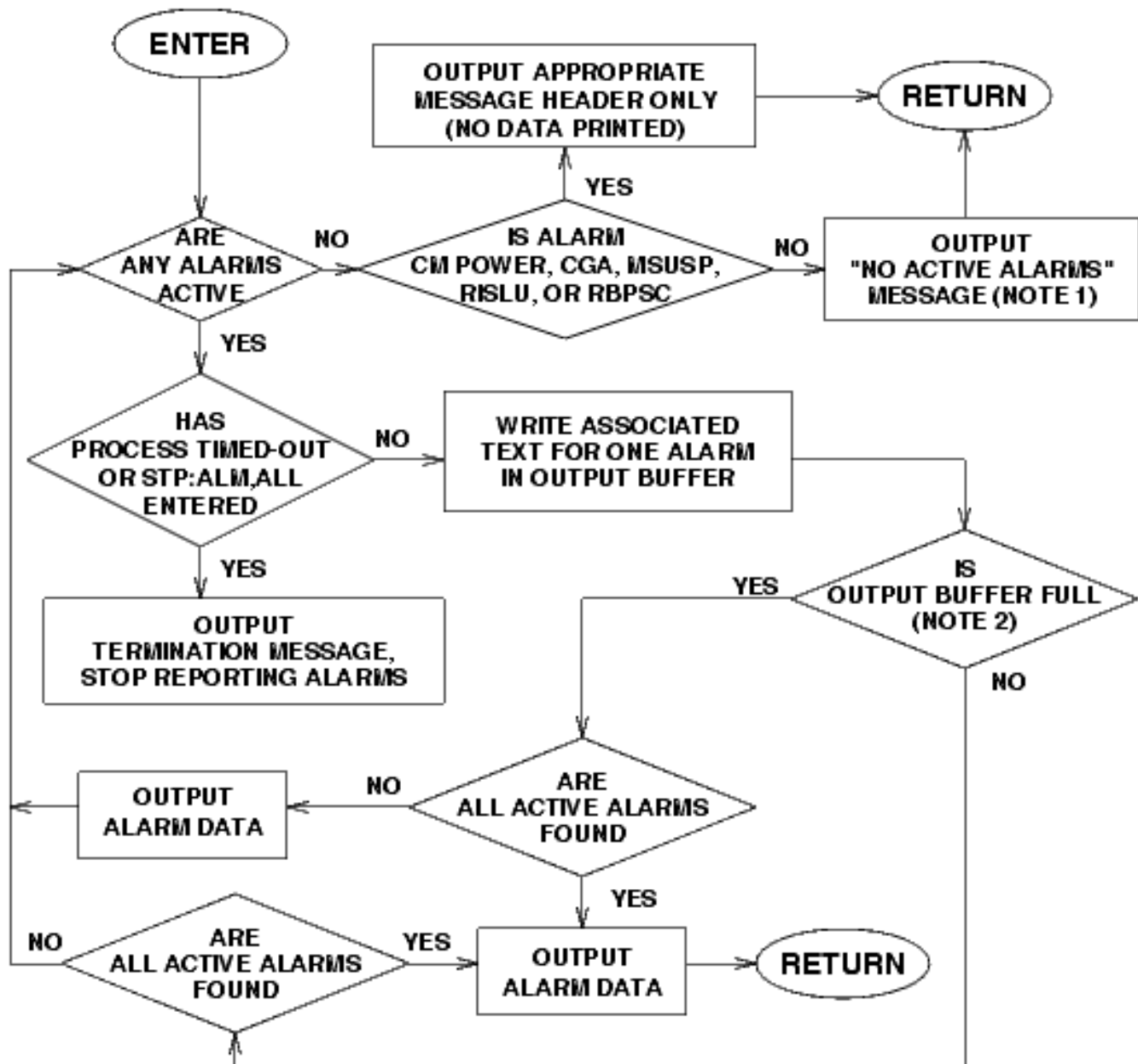
NOTE: MESSAGES AND ALARM DATA ARE OUTPUT TO ROP AND REQUESTING TERMINAL.



NOTE 1: MESSAGES AND ALARM DATA ARE OUTPUT TO THE ROP AND REQUESTING TERMINAL.

NOTE 2: OUTPUT CONTAINS SWITCH MODULES NOT RESPONDING AND TO WHICH ALARM TYPE THEY DID NOT RESPOND.





NOTE 1: MESSAGES AND ALARM DATA ARE OUTPUT TO THE ROP AND REQUESTING TERMINAL.

NOTE 2: IF MORE THAN 10 ALARMS ARE FOUND, THE BUFFER IS FULL AND THE RECORD IS OUTPUT WITH A MESSAGE QUALIFIER OF "FIRST RECORD". EACH SUCCEEDING TIME THE BUFFER IS FILLED, THE MESSAGE QUALIFIER IS "NEXT RECORD". WHEN THE LAST OF THE ALARMS ARE OUTPUT, THE MESSAGE IS "LAST RECORD".

Figure 7-1 OP:ALM,ALL Feature Data Flow

7.1.8.9 Administration

Not applicable.

7.1.9 Single Protocol Error Record Triggers For Protocol Monitoring

7.1.9.1 Definition

This feature allows the craftsperson to specify a single abnormal protocol condition [for example, protocol error record (PER) code] as a trigger for protocol monitoring.

The value-added benefit of this feature is the ability to capture the protocol exchange information surrounding a given (specific) abnormal condition as perceived internally by the switch. In the case where a specific protocol error is occurring, as evidenced by the generation of a certain PER by the switch, the craftsperson can then invoke a protocol monitoring session using that particular PER as the trigger condition, thereby controlling the actual collection of data related to an occurrence of that error.

This capability will continue to provide monitoring information for the LAPB, LAPD, Q.931, X.25, and X.75(P) protocols.

7.1.9.2 Background

The Protocol Monitoring feature was developed in the 5E6 software release. Prior to the 5E7 software release, protocol monitoring was started by invoking the **EXC:PM** input command. This input command included the triggering mechanism. Protocol capture was continuous until the trigger event, at which time the remainder of the buffer was filled with protocol data and the results of the session printed. One of the triggering mechanisms was the first protocol error record (PER) that occurred. Prior to the 5E7 software release, layer 3 protocol monitoring (PM) event reports did not display the terminal endpoint identifier (TEI). The lack of this information made identifying an unbound user on a multipoint digital subscriber line (DSL) nearly impossible.

The Single PER Triggers for Protocol Monitoring feature provides the following enhancements to the Protocol Monitoring feature:

- Refined triggering mechanisms

The ability to trigger the conclusion of the capture of protocol by triggering on a specific PER

The ability to trigger the conclusion of the capture of protocol by triggering on a message from a specific user.

- Improved detail in output messages
- Increasing the event limit.

The Single PER Triggers for Protocol Monitoring feature adds the TEI to the protocol monitoring output on the read only printer (ROP) for all link access protocol D (LAPD) channel protocols. A special message class for the output messages has been created so that PM event reports can be routed to their own devices. This feature also increases the event limit from 40 to 80 PM recorded events without increasing the buffer size by cutting the block size in half. This has been done to improve the efficiency of memory usage.

7.1.9.3 Availability

This feature is available with the 5E7 and subsequent software releases of the 5ESS[®] switch.

7.1.9.4 Feature Application

This feature is provided per 5ESS[®] switch.

7.1.9.5 User Profile

This feature was primarily designed for telephone operating company maintenance personnel. It can help reduce costs when ISDN is deployed on a large scale by reducing the dependence on external test equipment and the need to dispatch personnel to temporarily install this equipment on the line to capture data.

7.1.9.6 User Operation

7.1.9.6.1 Activation

The Single PER Triggers for Protocol Monitoring feature is activated by the craftsperson by typing the following input message to execute protocol monitoring:

```
EXC:PM,a[,CH=q][,PROT=r][,TRIGLVL=s],PER[="v"]
[,OFF=w][,DUR=x][,PRINT];
```

The [= "v"] is the addition made to the command line. The value of v corresponds to a valid protocol error code (PEC). The PEC string must be encased in double quotes when it is input. A valid PEC serves as the single PER trigger.

Refer to 235-600-700, *5ESS® Switch Input Messages Manual*, for an explanation of the other input message variables.

The craftsperson uses the equipment configuration data base (ECD) to define the destination of the PM output. The ECD provides a list of possible destinations for each message class. (For example, route to a given TTY, route to the ROP, route to the day log). Through the classdef relation in the ECD, the craftsperson selects the output's destination.

7.1.9.6.2 Deactivation

This feature is deactivated by inputting the appropriate format of the **STP:PM** input message requesting a specific ISDN channel protocol monitoring session be stopped.

7.1.9.6.3 Restriction Capability

Not applicable.

7.1.9.7 Compatibilities

Not applicable.

7.1.9.8 Interactions

There are no interactions between this feature and other features available in the *5ESS®* switch.

7.1.9.9 Engineering

7.1.9.9.1 Special Planning Considerations

Not applicable.

7.1.9.9.2 Hardware

There is no unique hardware associated with this feature.

7.1.9.10 Assignment Dependencies and Limitations

7.1.9.10.1 Dependencies

Not applicable.

7.1.9.10.2 Limitations

There can be four concurrent protocol monitoring sessions per office, two concurrent per switching module (SM) [not including protocol handlers (PHs) in this SM], and two concurrent per PH. There is also a limit of three concurrent monitoring sessions per DSL, of which only one can be a D-channel session.

There is an event limit of 80 PM recorded events.

7.1.9.11 Feature Implementation Procedures

7.1.9.11.1 Office Data Assembler (ODA) Implementation

Not applicable.

7.1.9.11.2 Recent Change Procedures

Not applicable.

7.1.9.11.3 Assignment Verification

Not applicable.

7.1.9.12 Feature Operation

The Single PER Trigger feature allows the craftsperson the option of narrowing the focus of the triggering mechanism for protocol monitoring.

By specifying PER="v" as a parameter of the input command (where v is a valid PER code for the triggering protocol), the craftsperson requests that specific PER to act as the trigger for a protocol monitoring session.

When the craftsperson gives the Directory Number (DN), Directory Number with Packet Switch Service (PKTDN), or Multi-Line Hunt Group (MLHG) as the line identifier in the input command, it is assumed to be an individual user identifier. This type of input command allows triggers to occur only for the port and party associated with that DN, PKTDN, or MLHG. An input line identifier other than DN, PKTDN, or MLHG is considered to be a line identifier and actions are independent of any users.

7.1.9.13 Administration

7.1.9.13.1 Measurements

Measurements are not applicable to this feature.

7.1.9.13.2 Billing

Billing is not applicable to this feature.

7.1.10 Hotel/Motel Charge Table Options

7.1.10.1 Definition

This feature allows two options for the Hotel/Motel line when it fails to read the relation RLCHGTBL as follows:

- (1) When the feature is active and the Hotel/Motel line failed to read the relation RLCHGTBL with a key of zero or out of range, the call is free without taking a craft assert.
- (2) When the feature is not active and the Hotel/Motel line failed to read relation RLCHGTBL with a key of zero or out of range, the call is terminated with a craft assert.

7.1.10.2 Cross-References

The following cross-references are applicable to the Hotel/Motel Charge Table Options feature:

- Feature number: Not applicable.
- NSEP/5SEP code: Not applicable.

7.1.10.3 Background

Before implementing this feature, the Hotel/Motel line was taking an assert, and the call was terminated. After implementing this feature, the Local Exchange Carrier (LEC) has two options to select.

7.1.10.4 Availability

This feature is available with a 5E8 software update and later software releases.

7.1.10.5 Feature Application

The LEC can select these options per SM or all SMs using this feature.

7.1.10.6 User Perspective

7.1.10.6.1 User Profile

This feature was designed for telephone company maintenance personnel.

7.1.10.6.2 Activation

To activate this feature in all SMs complete, the following steps:

- (1) Select RC View 8.22 in 5E8 and later software releases.
- (2) Enter **u** for update mode.
- (3) In the Feature ID field, enter 558.
- (4) In the MODULE field, enter OFC (office).
- (5) In the PASSWD field, enter password. (This will be supplied upon ordering this feature.)
- (6) In the ACTIVE field, enter **Y** (yes).
- (7) Leave all remaining fields blank.
- (8) Enter **u** to update the form.

To activate this feature in one SM only, complete the following steps:

- (1) Select RC View 8.22 in 5E8 and later software releases
- (2) Enter **u** for the update mode
- (3) In the FEATURE ID field, enter 558.
- (4) In the MODULE field, enter (SM number, 1-192)
- (5) In the PASSWD field enter password. (This will be supplied upon ordering this feature.)
- (6) In the ACTIVE field, enter **Y** (yes).
- (7) Leave all remaining fields blank.
- (8) Enter **u** to update the form.

7.1.10.6.3 Invoking the Feature

The feature is automatically invoked when assigned, thus no subscriber action is needed.

7.1.10.6.4 Deactivation

To deactivate this feature in all SMs, complete the following steps:

- (1) Select RC View 8.22 in 5E8 and later software releases.
- (2) Enter **u** for update mode.
- (3) In the FEATURE ID field, enter 558.
- (4) In the MODULE field, enter OFC (office).
- (5) In the PASSWD field, enter password. (This will be supplied upon ordering this feature.)
- (6) In the ACTIVE field, enter **N**.
- (7) Leave all remaining fields blank.
- (8) Enter **u** to update the form.

To deactivate this feature in one SM only, complete the following steps:

- (1) Select RC View 8.22 in 5E8 and later software releases.
- (2) Enter **u** for the update mode.
- (3) In the FEATURE ID field, enter 558.
- (4) In the MODULE field, enter (SM number, 1-192)
- (5) In the PASSWD field, enter password. (This will be supplied upon ordering this feature.)
- (6) In the ACTIVE field, enter **N**.

- (7) Leave all remaining fields blank.
- (8) Enter **u** to update the form.

7.1.10.6.5 Assignment Verification

To verify the status of the feature in an SM, complete the following steps:

- (1) Select RC View 8.22 in 5E8 and later software releases.
- (2) Enter **r** for the review mode.
- (3) In the FEATURE ID field, enter 558.
- (4) In the MODULE field, enter (SM number, 1-192).
- (5) If field 4 (ACTIVE) is equal to Y, then the feature is active in the SM specified. If ACTIVE is equal to N, then the feature is disabled in the SM.

NOTE: Repeat this procedure for each SM to be verified, as desired. Do not use OFC in field 2 (MODULE) for verify.

7.1.10.7 Feature Operation

The following scenario demonstrates this feature's operation:

- (1) Line A is a Hotel/Motel line.
- (2) Line B is a plain old telephone service (POTS) line.
- (3) Line A goes off-hook and dials line B's DN.
- (4) Line B is ringing and goes off-hook.
- (5) When line B goes off-hook, Line A receives answer supervision and attempts to read relation RLCHGTBL for how to charge.
- (6) If LEC selects option 1, the call will be free without firing an assert.
- (7) If the customer selects option 2, the call will be terminated with taking an assert.

7.1.11 AM Off-Line Boot Verification

7.1.11.1 Definition

The AM Off-line Boot Verification (OFLBOOT) feature permits office personnel to determine the "bootability" of the switch without incurring system downtime. The feature performs a boot of the off-line side while the on-line side continues to process calls in a normal manner. In addition, the feature can be used to ensure the integrity of the disk image prior to making a copy of the disk image onto backup tapes.

This feature tests the bootstrap capabilities of the off-line Administrative Module (AM) processor while the active side is operating normally. The purpose of this step is to verify the "bootability" of the current processor and disk data combination. The off-line side consists of the off-line Control Unit (CU), a Message Switch (MSGs), an Office Network and Timing Complex (ONTc), and half of the Common Network Interface (CNI) ring.

The OFLBOOT Verification feature is a maintenance feature used to verify the integrity of AM, CM, and CNI initialization code and data without interrupting call processing. It will be used as a prelude to software release transitions.

During the OFLBOOT procedure, the AM, CM, and CNI is split into two simplex configurations. One side is on-line; the other side is off-line. The on-line side handles call processing and other operational related activities.

The off-line side is then initialized with parameters provided by the on-line side.

7.1.11.2 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 99-5E-1010
- NSEP Number: Not available at date of publication.

7.1.11.3 Background

This feature is first available in the 5E9(1) software release of the 5ESS[®] switch. Service appearance is not affected from the end-user perspective when this feature is available on the 5ESS[®] switch.

7.1.11.4 Availability

This feature is available with the 5E9(1) and subsequent software releases of the 5ESS[®] switch.

7.1.11.5 Feature Application

This feature is provided per 5ESS[®] switch.

7.1.11.6 User Profile

This feature was provided for 5ESS[®] switch maintenance personnel.

7.1.11.7 User Operation

7.1.11.7.1 Activation

- (1) Before initiating the procedure (from the MCC or SCC), the craft ensures that the system is healthy with no known hardware faults.
- (2) To select the OFLBOOT Off-line Side, the craft optionally reconfigures the CU, MSGS, ONTC, and half of the CNI ring to prepare for OFLBOOT procedures. Other optional craft reconfiguration procedures can include the forcing of hardware and the selection of system inhibits to limit the automatic recovery processes built into the OFLBOOT process.
- (3) From the EA page the MHDs must be selected via a page poke. Note that MHD selection takes affect during an AM boot (or off-line boot) and will force the CU to initialize on the correct MHD for the CU.
- (4) The OFLBOOT procedure is now initiated via the TTY input message **EXC:OFLBOOT**. The input message allows the initialization level, an optional application parameter, as well as other options to be specified.
- (5) The craft can specify a TTY terminal to be used for Input/Output during the procedure; although a TTY is not

mandatory. The test results are stored in a logfile on the off-line side, and are copied to the current active side at the completion of the OFLBOOT procedures as part of the STOP:OFLBOOT process.

- (6) After the OFLBOOT procedure has completed the initialization successfully, the off-line side continues to cycle until the system is manually restored to normal duplex mode operation by inputting the **STOP:OFLBOOT** input message.

7.1.11.7.2 Deactivation

The OFLBOOT activity may be stopped at any point in the procedure and the system restored to normal duplex operation by using the input command **STOP:OFLBOOT**.

7.1.11.7.3 Restriction Capability

Not applicable.

7.1.11.8 Compatibilities

This feature is compatible with all other features assignable to the 5ESS[®] switch.

7.1.11.9 Interactions

This feature has no known interactions with any of the other features existing in the 5ESS[®] switch.

7.1.11.10 Engineering

7.1.11.10.1 Special Planning Considerations

Not applicable.

7.1.11.10.2 Hardware

There is no hardware unique to this feature.

7.1.11.11 Assignment Dependencies and Limitations

7.1.11.11.1 Dependencies

This feature is not dependent on any other features or services being operational in the 5ESS[®] switch before it can be implemented.

7.1.11.11.2 Limitations

Not applicable.

7.1.11.12 Feature Implementation Procedures

7.1.11.12.1 Office Data Administration (ODA) Implementation

Not applicable.

7.1.11.12.2 Recent Change Procedures

Not applicable.

7.1.11.12.3 Assignment Verification

Not applicable.

7.1.11.13 Feature Operation

The OFLBOOT is initiated manually with a craft command. The command has a default set of parameters to determine the Real Time Reliable (RTR)/ Software/Hardware/CNI initialization levels and has optional parameters to add most all of the flexibility which previously existed to tailor the initialization. The OFLBOOT selects hardware which would at the start of the OFLBOOT be the out of service (OOS), growth, standby, active minor or otherwise nonactive side of the duplex configuration. This enables specific hardware to be selected by placing the desired component manually in the nonactive condition. Force of the CM is optional. If none is forced, OFLBOOT selects the CM which would at that time be designated as standby or OOS; however, manual force of the disk is required via an Emergency Action Interface (EAI) page poke.

The *UNIX*® RTR system receives, acknowledges, and responds to craft requests to initiate, stop, or switch OFLBOOT. The *UNIX*® RTR also coordinates the AM hardware/software specific activities involved with splitting the *5ESS*® switch into simplex halves. The Application Integrity Monitor (AIM) process coordinates *5ESS*® switch hardware/software activities involving the various application processes. The AIM is the communication coordinator for the messages to/from RTR and the Application Processes as well as between the Application Processes where appropriate.

Communication between *5ESS*® switch AM processes is performed with messages and global data. The OFLBOOT conditions are identified via new global data items that may be accessed via a primitive. These data items enable the *5ESS*® switch processes to distinguish between the on-line and off-line sides in the event that recovery action becomes necessary on the on-line side. These data items also record that an OFLBOOT is in progress and that the off-line side is booting for the first time in the OFLBOOT condition.

The OFLBOOT is aborted automatically if conditions indicate that operational activities may be degraded on the on-line side.

Various prechecks are necessary to validate the condition of the *5ESS*® switch before proceeding with the OFLBOOT. The OFLBOOT is not permitted to start if conditions exist which could jeopardize call processing.

There are several points during the execution of the off-line boot verification and AM side switch steps that a precheck of the system hardware is required to guarantee system integrity. At each of these points, RTR requests the *5ESS*® switch AIM process for precheck information. The AIM, in turn, asks each of its client processes for the precheck data, consolidates the responses, and returns a composite status to RTR. The major client processes of AIM include the Switch Maintenance Kernel Process (SMKP) which is responsible for the CM; and the Common Network Interface Initialization Process (CNIINIT) and the Ring Monitor Kernel Process (RINGMON) which together maintain the CNI Ring. A precheck failure causes the associated step to block.

7.1.11.14 Administration

7.1.11.14.1 Measurements

Not applicable.

7.1.11.14.2 Billing

Not applicable.

7.1.12 5ESS[®] Switch Line Editing And History

7.1.12.1 Definition

The 5ESS[®] Switch Line Editing and History feature maintains a history of previously entered commands and provides a mechanism for accessing them. This mechanism may be used to execute previous commands, correct minor mistakes in commands, or reexecute commands with modifications.

7.1.12.2 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 99-5E-1245
- NSEP Number: Not available at date of publication.

7.1.12.3 Background

Telephone company personnel have repeatedly emphasized the need for a craftshell editing and history feature, as it helps improve maintenance activities by providing greater flexibility and faster access to commands.

7.1.12.4 Availability

This feature is available on the 5E9(1) and subsequent software releases of the 5ESS[®] switch.

7.1.12.5 Feature Application

This feature is provided per 5ESS[®] switch.

7.1.12.6 User Profile

This feature was designed for telephone company central office maintenance personnel to improve productivity in daily maintenance of the 5ESS[®] switch. The Input Message Editing and History software is designed specifically for Maintenance Control Center (MCC), Supplementary Trunk and Line Work Station (STLWS), Switching Control Center System (SCCS), and Recent Change/Verify (RC/V) terminals on the 5ESS[®] switch. Terminals running a craftshell are required to utilize this feature.

7.1.12.7 User Operation

The user executes 5ESS[®] switch Man-Machine Language (MML) commands. All commands which are executed (up to a maximum of 200 commands) are saved in the history buffer. If the user wishes to review the commands saved in the history buffer, the **OP:HIST** command is executed for display purposes. The commands stored in the history buffer are displayed, preceded by a number by which the command may be referenced. The user may then re-execute a specific command by typing **#** followed by the assigned reference number and a carriage return. To recall the last executed command, **##** is entered. The last command containing a specific string may be recalled by typing **#^ string**.

Users may append text to any command stored in the history buffer. To do so, the user recalls the command using one of the methods just mentioned and appends a string with **^string**.

Commands being displayed may also be modified by users. If the user chooses to substitute text in a displayed command, the **^old^new** construct may be used, where **old** represents the text to be replaced and **new** represents the replacement text.

At the end of a user's session the contents of the history buffer may be cleared by executing the **CLR:HIST** command. The command removes all commands stored in the history buffer. The history buffer can also be cleared by logging off or powering down the terminal.

7.1.12.7.1 Activation

To enable history logging, type **ALW:HIST**. Logging is enabled by default.

7.1.12.7.2 Deactivation

To disable history logging, type **INH:HIST**.

7.1.12.7.3 Restriction Capability

Not applicable.

7.1.12.8 Compatibilities

This feature is compatible with all features assignable to the **5ESS[®]** switch; however, this feature is not supported on terminals that do not run a craftshell.

7.1.12.9 Interactions

Not applicable.

7.1.12.10 Engineering

7.1.12.10.1 Special Planning Considerations

Not applicable.

7.1.12.10.2 Hardware

There is no hardware unique to this feature.

7.1.12.11 Assignment Dependencies and Limitations

7.1.12.11.1 Dependencies

There are no other features that must be operational in the **5ESS[®]** switch before this feature can be implemented.

7.1.12.11.2 Limitations

A maximum of 200 commands can be stored in the terminal's history buffer.

7.1.12.12 Feature Implementation Procedures

7.1.12.12.1 Office Data Administration (ODA) Implementation

Not applicable.

7.1.12.12.2 Recent Change Procedures

Not applicable.

7.1.12.12.3 Assignment Verification

At one of the 5ESS[®] switch maintenance terminals, enter the command **ALW:HIST**. After executing several commands at this terminal, enter the **OP:HIST** command. Check to see that up to 15 commands are printed with numbers by which they can be referenced.

See Section 7.1.12.13.2 for Command Recall, Section 7.1.12.13.3 for Text Substitution, Section 7.1.12.13.4 for Appending Text, and Section 7.1.12.13.5 for Help.

7.1.12.13 Feature Operation

7.1.12.13.1 Command History

The Input Message Editing and History feature creates a history buffer for the purpose of storing executed commands. Each terminal has a separate history buffer. Only those commands executed on a particular terminal are stored in that terminal's history buffer. Up to 200 commands can be stored in the terminal's history buffer. Commands that are abandoned prior to execution are not saved in the history buffer. The buffer always contains the last series (200 or fewer) of commands executed since the craftshell was started or since the history buffer was last cleared, assuming history recording is allowed.

Two new commands, **OP:HIST** and **CLR:HIST** have been introduced for accessing the command history buffer. The **OP:HIST** command allows users to display the contents of the history buffer. Users may specify which commands are to be displayed by **OP:HIST**. An example of this is **OP:HIST,CMD=12&&20**, where the first history buffer command being displayed is command number **12**, the last command displayed is command number **20**. If no range is specified, the 15 most recent input requests are displayed. Other **OP:HIST** options are described in 235-600-700, *5ESS[®] Switch Input Messages Manual*.

The **CLR:HIST** command allows users to clear the contents of the history buffer. The history buffer contents is cleared automatically when the craftshell is exited, the terminal is powered down, or the user logs off.

To provide input command editing yet prevent the logging of commands, users have the ability to disable/enable the history logging. Enabling/disabling history logging is provided on demand. The **INH:HIST** and **ALW:HIST** commands disable and enable message logging respectively. By default, history buffer logging is enabled. This mechanism is particularly useful in preventing easy access to sensitive commands or commands which can cause interruptions in service.

7.1.12.13.2 Command Recall

The Input Message Editing and History feature utilizes the pound **#** symbol to recall previously executed commands. By typing a **#** symbol, followed by a numerical value stored in the history buffer, previous input requests are recalled. Commands can also be recalled by search string by typing **#^string**. The previous command can always be recalled by typing **##**.

7.1.12.13.3 Text Substitutions

This feature uses the caret **^** symbol for text substitutions. The format used for substitutions consists of **^old^new** where **old** represents the text being replaced, and **new** represents the replacement text. Multiple text substitutions are allowed prior to command execution. Between the recall and command execution, the craftshell is in edit mode, signified by a **<<** prompt instead of the normal **<**. The craftshell editor displays the text substitution following execution of a carriage return. Users may then make additional text substitutions or may choose to execute the displayed command by typing a second carriage return.

The **^old^new** sequence used in conjunction with the **#number** sequence provides the ability to recall commands and replace text simultaneously.

7.1.12.13.4 Appending Text

This feature allows users to append text to previously executed commands. The commands stored in the history buffer may be recalled using any recall method followed by a **^** and the additional text. Whatever text the user wishes to append is typed with the appropriate parameter separators (for example, commas or colons).

7.1.12.13.5 Help

Input Message Editing and History provides help to users. While in the edit mode, the **?** is used to obtain assistance with craftshell editing. A brief explanation of the commands and symbols used by the editor are provided to users.

7.1.12.14 Administration

7.1.12.14.1 Measurements

There are no measurements applicable to this feature.

7.1.12.14.2 Billing

Not applicable.

7.1.13 Software Release Transition Downtime Reduction Via AM Off-Line Boot

7.1.13.1 Definition

The Software Release Transition Downtime Reduction Via AM Off-line Boot(AM OFLBOOT) feature builds upon the AM OFLBOOT feature to integrate an "AM side-switch" (AM SWITCH) functionality into existing Software Release Transition processes thereby reducing AM downtime previously incurred.

7.1.13.2 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 99-5E-1258
- NSEP Number: Not available at date of publication.

7.1.13.3 Background

This feature is first available in the 5E9(1) software release of the 5ESS[®] switch. Service appearance is not affected from the end-user perspective when this feature is available on the 5ESS[®] switch.

7.1.13.4 Availability

This feature is available with the 5E9(1) and subsequent software releases of the 5ESS[®] switch.

7.1.13.5 Feature Application

This feature is provided per 5ESS[®] switch.

7.1.13.6 User Profile

This feature was provided for 5ESS[®] switch maintenance personnel.

7.1.13.7 User Operation

7.1.13.7.1 Implementation

The following is a user scenario for an AM SWITCH in the context of a Software Release Transition process. The scenario illustrates the integration of the AM SWITCH into previously existing Software Release Transition processes and procedures.

Note that this scenario does not represent the entire software release transition process. The actual integration of the AM OFLBOOT feature into the transition procedures is documented in the specific transition manuals for the 235-106-10x, 5ESS[®] *Switch Software Release Retrofit Procedures*, 235-106-20x, 5ESS[®] *Switch Software Release Update Procedures*, 235-106-30x, and 5ESS[®] *Switch Large Terminal Growth Procedures*.

- (1) Before initiating the procedures, the craft ensures that the system is healthy with no known hardware faults.

Note that diagnostics on both sides of all "essential duplex equipment," such as the CU, IOPs, DFCs, MSGS, ONTC, SMs, and the CNI ring, are performed just prior to the start of the scheduled Software Release Transition tape loading operations.

- (2) Perform Software release Transition procedures up to the PROCEED stage.

At this point in the software Release Transition a typical system configuration has the odd MHDs off-line (OFL) and the SMs forced active and off-line pumped (the active SM side contains the "old" software release while the off-line pumped SM side contains the "new" software release). Note the CMP is no-longer off-line pumped, as was previously done, but instead it is pumped and initialized as part of the AM OFLBOOT.

- (3) To initiate an AM OFLBOOT the craft person performs a transition PROCEED stage from MCC Page 124 by entering a 702 poke.

- (A) Files currently copied to the OFL MHDs during the PROCEED stage are still copied by the PROCEED stage software.
- (B) Since the OFL MHDs are not available after the PROCEED stage, files currently copied to off-line MHDs during the SWITCHFWD process are copied during the PROCEED stage.
- (C) Transition software verifies that the AM is in an ACT/STBY configuration. The AM should be ACT on side 0 and STBY on side 1. If the AM is not in this configuration transition software will automatically perform an AM switch (SW:CU) to put the AM in the correct configuration.
- (D) Transition software executes an AM OFLBOOT of the STBY AM side. To perform the AM OFLBOOT, hardware on the STBY AM side is removed and marked UNEQIP (unequipped) in the INCORE ECD (The ROOT ECD is not affected by AM OFLBOOT). This includes IOP-1, DFC-1 and DFC-3 (if equipped). Initialization PRMs are printed on the ROP but other messages from the off-line booted AM are not printed. Software on the ACT AM side monitors performance of the off-line booted AM. Messages are printed on the ROP by transition software indicating the progress of the AM OFLBOOT.
- (E) After the PROCEED complete message is printed on the ROP, transition procedures continue with an AMA dump and other activity currently performed after the PROCEED process completes during a software transition.

- (4) To perform the AM side switch (AM SWITCH), the SWITCHFWD process is executed using the 901 poke on

MCC Page 124.

SWITCHFWD automatically performs the following activities related to AM OFLBOOT and AM SWITCH:

- (A) The AM is "prechecked" to verify it is functioning normally.
 - (B) The SMs are switched to the new software release side.
 - (C) The SMs are "post-checked" to confirm they have successfully switched to the new software release side.
 - (D) The AM is switched (AM SWITCH) to the new software side.
- (5) When the AM SWITCH is complete the call processing is supported by the new software side. The old software side of the AM, including IOP-0, the even MHDs, and the even DFCs are all marked UNEQIP in the ECD.
- (6) To duplex the AM, the AM OFLBOOT process must be manually stopped. This is accomplished by the **STOP:OFLBOOT,RST** message for the MCC. This message terminates the AM OFLBOOT process and returns the old software release hardware to the status indicated in the ROOT ECD. Thus the AM-0 is STBY and AM-1 is ACT. The IOPs and DFCs return to duplex ACT, and the odd MHDs are marked off-line (OFL).
- (7) The transition is completed using current procedures.

7.1.13.7.2 Deactivation

Not applicable.

7.1.13.7.3 Restriction Capability

Not applicable.

7.1.13.8 Compatibilities

This feature is compatible with all other features assignable to the 5ESS[®] switch.

7.1.13.9 Interactions

This feature has no known interactions with any of the other features existing in the 5ESS[®] switch.

7.1.13.10 Engineering

7.1.13.10.1 Special Planning Considerations

Not applicable.

7.1.13.10.2 Hardware

There is no hardware unique to this feature.

7.1.13.11 Assignment Dependencies and Limitations

7.1.13.11.1 Dependencies

This feature builds on the AM Off-line Boot Verification feature.

7.1.13.11.2 Limitations

Not applicable.

7.1.13.12 Feature Implementation Procedures

7.1.13.12.1 Office Data Administration (ODA) Implementation

Not applicable.

7.1.13.12.2 Recent Change Procedures

Not applicable.

7.1.13.12.3 Assignment Verification

Not applicable.

7.1.13.13 Feature Operation

The OFLBOOT is initiated manually with a craft command. The command has a default set of parameters to determine the Real Time Reliable (RTR)/ Software/Hardware/CNI initialization levels and has optional parameters to add most all of the flexibility which previously existed to tailor the initialization. The OFLBOOT selects hardware which would at the start of the OFLBOOT be the out of service (OOS), growth, standby, active minor or otherwise nonactive side of the duplex configuration. This enables specific hardware to be selected by placing the desired component manually in the non-active condition. Force of the CM is optional. If none is forced, OFLBOOT selects the CM which would at that time be designated as standby or OOS; however, manual force of the disk is required via an Emergency Action Interface (EAI) page poke.

The *UNIX*® RTR receives, acknowledges, and responds to craft requests to initiate, stop, or switch OFLBOOT. The *UNIX*® RTR also coordinates the AM hardware/software specific activities involved with splitting the *5ESS*® switch into simplex halves. The Application Integrity Monitor (AIM) process coordinates *5ESS*® switch hardware/software activities involving the various application processes. The AIM is the communication coordinator for the messages to/from RTR and the Application Processes as well as between the Application Processes where appropriate.

Communication between *5ESS*® switch AM processes is performed with messages and global data. The OFLBOOT conditions are identified via new global data items that may be accessed via a primitive. These data items enable the *5ESS*® switch processes to distinguish between the on-line and off-line sides in the event that recovery action becomes necessary on the on-line side. These data items also record that an OFLBOOT is in progress and that the off-line side is booting for the first time in the OFLBOOT condition.

The OFLBOOT is aborted automatically if conditions indicate that operational activities may be degraded on the on-line side.

Various prechecks are necessary to validate the condition of the *5ESS*® switch before proceeding with the OFLBOOT. The OFLBOOT is not permitted to start if conditions exist which could jeopardize call processing.

There are several points during the execution of the off-line boot verification and AM side switch steps that a precheck of the system hardware is required to guarantee system integrity. At each of these points, RTR requests the *5ESS*® switch AIM process for precheck information. The AIM, in turn, asks each of its client processes for the precheck data, consolidates the responses, and returns a composite status to RTR. The major client processes of AIM include the Switch Maintenance Kernel Process (SMKP) which is responsible for the CM; and the Common

Network Interface Initialization Process (CNIINIT) and the Ring Monitor Kernel Process (RINGMON) which together maintain the CNI Ring. A precheck failure causes the associated step to block.

An immediate benefit of the OFLBOOT is a format which aids in the reduction of the AM downtime associated with a Software Transition by it not being necessary to boot the 5ESS[®] switch on-line side to read in the new Software Release text and data. The Software Retrofit procedure initializes the off-line side with a new software release and "Side Switch" to make the off-line side active. This ability greatly reduces the call processing downtime in a Retrofit Procedure when the 5ESS[®] switch is booted on-line.

7.1.13.14 Administration

7.1.13.14.1 Measurements

Not applicable.

7.1.13.14.2 Billing

Not applicable.

7.1.14 Advanced Automatic Circuit Pack Return Tag

7.1.14.1 Definition

The Advanced Automatic Circuit Pack Return Tag feature provides the 5ESS[®] switch with the capability to print a complete circuit pack tag to the read-only printer (ROP). This electronic tag can be attached to the faulty circuit and sent to the factory for repair. This feature ensures that the information about the office and the circuit pack fault is correct and readable, which should minimize the No-Trouble-Found (NTF) circuit packs.

The return tag is invoked by either the MCC, TLWS, or UNIX[®] system terminal. The return tag interface is a menu driven process. Quit and help options are included in every menu page entry. An error message is displayed on the terminal whenever an invalid input is entered.

The return tag is printed on regular ROP paper. No special labels or forms are required. The return tag is preceded and followed by a form feed to preserve the normal ROP printouts. A message prior to the form feed before the return tag and a message after the form feed following the return tag is printed indicating the beginning and end of the return tag.

This feature is capable of generating tags that are not associated with any failure (that is, update tags).

7.1.14.2 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 99-5E-1323
- NSEP Number: Not available at date of publication.

7.1.14.3 Background

The 5ESS[®] switch customers spend thousands of dollars every year returning circuit packs with noncompliant tags for repair. Noncompliant tags increase the maintenance cost of the 5ESS[®] switch and have the potential of causing outages. This feature should improve the overall circuit pack return process, saving the operating companies time and outages, and reducing the cost of maintaining the 5ESS[®] switch.

7.1.14.4 Availability

This feature is available with the 5E9(1) and subsequent software releases of the 5ESS[®] switch.

7.1.14.5 Feature Application

This feature is provided per 5ESS[®] switch.

7.1.14.6 User Profile

This feature was primarily designed for telephone company maintenance personnel and testing center personnel. It has no direct impact on subscribers. The user interacts with this feature through new input commands, new output messages, and return tag printouts.

7.1.14.7 User Operation

7.1.14.7.1 Activation

The Return Tag tool can be invoked by any of the following three methods:

- (1) At the UNIX[®] system terminal, type /usr/bin/rtag at the prompt.
- (2) At the TLWS terminal, type **RCV:MENU:RTAG**; at the prompt.
- (3) At the MCC terminal, poke page 194, then select RTAG. The user can also invoke the RTAG tool by entering **RCV:MENU:SCREEN**; and selecting RTAG.

At whatever terminal is used to invoke the Return Tag tool, follow the menu-driven prompts to make selections, enter data, and print a return tag.

7.1.14.7.2 Deactivation

Not applicable.

7.1.14.7.3 Restriction Capability

Not applicable.

7.1.14.8 Compatibilities

This feature is compatible with all features and hardware items that can exist in a 5ESS[®] switch.

7.1.14.9 Interactions

There are no interactions between this feature and other features that can exist in a 5ESS[®] switch.

7.1.14.10 Engineering

7.1.14.10.1 Special Planning Considerations

Not applicable.

7.1.14.10.2 Hardware

There are no unique hardware items required for this feature.

7.1.14.11 Assignment Dependencies and Limitations

7.1.14.11.1 Dependencies

There are no other features or services that must be operational in the 5ESS[®] switch before this feature can be implemented.

7.1.14.11.2 Limitations

A maximum of 200 fault messages can be stored in the Circular Data Base Manager (CDBM) which is the source for the Advanced Automated Circuit Pack Return Tag feature.

7.1.14.12 Feature Implementation Procedures

7.1.14.12.1 Office Data Administration (ODA) Implementation

Not applicable.

7.1.14.12.2 Recent Change Procedures

Not applicable.

7.1.14.12.3 Assignment Verification

See Section 7.1.14.7.1 and check for proper response to the RTAG selection.

7.1.14.13 Feature Operation

7.1.14.13.1 Circular Data Base Manager

The 5ESS[®] switch diagnostic processes send the initial diagnostic failing results to the Circular Data Base Manager (CDBM). The CDBM stores the failing results in a circular buffer in its program image. The disk always keeps a backup copy, which is the same as the circular buffer. The reason for using a circular file is that it always stores the most recent failures. If the CDBM dies, the CDBM is re-created automatically by the UNIX[®] Level Automatic Restart Process (ULARP). The circular buffer in the CDBM is pumped with the disk backup copy.

The CDBM also takes review and update commands from the user interface(s). The incoming commands are handled in a message-driven manner, that is, first come, first serve. This message-driven manner also serves the purpose of transaction management, so that data base accesses are handled in a manner of single transaction queue.

7.1.14.13.2 Return Tag User Interface Controller

The Return Tag is invoked at the request of the maintenance personnel. The reasons for executing this tool is to allow the maintenance personnel to review, update the faulty circuit pack information, or generate the return tag for the faulty circuit pack. The introduction of the return tag tool reduces the problem of wrong or missing circuit packs and diagnostic failure information on the return tags. The faulty circuit packs are sent to the factory for repair. The factory uses the return tags to verify the faults and fixes on the circuit packs. The RTAG User Interface Controller provides users a friendly menu-driven interactive interface. The user interface allows the user to fill in the equipment status, 24-hour failure indicator, faulty pack code, series, and hardware serial number to complete the failure entry and generate the return tag. The return tag is printed on the ROP. The completed failure entry with faulty pack data

can then be updated in the circular data base through the CDBM. The RTAG user interface also provides the functionality to generate the update tag for the returned circuit pack whose return reason is due to update.

7.1.14.14 Administration

7.1.14.14.1 Measurements

There are no measurements associated with this feature.

7.1.14.14.2 Billing

Not applicable.

7.1.15 Automated Static ODD Audit

7.1.15.1 Definition

The Automated Static ODD Audit feature replaces the existing switch-resident ODD Population Rule Audit (the major component of the Static ODD Audit) with a much more comprehensive version that allows the operating company to maintain a cleaner data base. This new audit was automatically generated from the PRL5 data base population rule source files, ensuring completeness and accuracy.

The following are the three modes of audit execution:

- (1) **Full Audit** - The full audit validates the ODD with respect to a 149 relation set of population rules. The feature executes in a on-going loop, auditing the 149 relations from beginning to end in a continuous review of data. The audit starts and suspends itself according to a schedule selected by the operating company. Each time the audit resumes execution, it commences where the previous execution was suspended. A single cycle through the full audit may take several weeks because of the thoroughness of the audit. When the audit is first deployed, it has a 7-day, 24-hour schedule set up automatically. Operating company personnel can change this schedule to one more suitable to the particular office.
- (2) **Incremental Audit** - The incremental audit automatically executes after each successful ODD backup (BKUP:ODD). It validates data base transactions (both RCs and CORCs) input since the previous BKUP:ODD.
- (3) **Entity Audit** - The craft can request immediate execution of the audit. Such requests typically limit the scope of an audit to a particular processor and relation, or to a particular data base entity such as a line, a trunk, a multiline hunt group, or a trunk group.

Each audit execution produces a summary message indicating how many errors were found. Additionally, each audit execution produces a detailed log of individual error conditions. The high runner error conditions will be documented by special error messages. Other error conditions will be documented by mechanically generated error messages. Tools are provided to output this detailed error log.

Refer to 235-105-220, *5ESS® Switch Corrective Maintenance Procedures*, for detailed information on analyzing error messages, and making appropriate corrections.

7.1.15.2 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 99-5E-1334

- NSEP Number: Not available at date of publication.

7.1.15.3 Background

For background on this feature refer to Section 7.1.15.1 .

7.1.15.4 Availability

This feature is available with the 5E9 and subsequent software releases of the 5ESS[®] switch.

7.1.15.5 Feature Application

This feature is provided per 5ESS[®] switch.

7.1.15.6 User Profile

This feature was primarily designed for operating company personnel to assist in their daily ODD maintenance.

7.1.15.7 User Operation

7.1.15.7.1 Activation

7.1.15.7.1.1 Schedule for the Full Audit

When deployed, the Full audit is automatically started with a 24-hour-a-day 7-day-a-week schedule. The craftsperson may alter that using the **SCHED:AUD** input message. Refer to 235-600-700, *5ESS[®] Switch Input Messages Manual*, for an explanation of the input message variables.

Refer to 235-105-210, *5ESS[®] Switch Routine Operations and Maintenance Procedures*, for detailed procedures pertaining to the Automated Static ODD Audit feature.

7.1.15.7.1.2 Schedule for the Incremental Audit

The incremental log file directed audit is automatically scheduled for execution after each successful **BKUP:ODD** command. When the craft establishes the backup schedule using the **BKUP:ODD** command, they are also implicitly establishing the incremental audit schedule.

7.1.15.7.1.3 Immediate Execution of an Entity Audit

The craft may elect to investigate certain subscriber complaints by running the ODD Population Rule Audit on a specific entity, such as a subscriber line. The craft can type in input message **EXC:AUD=SODD** to request immediate execution of this entity audit, and then analyze the resulting error log file to determine if the cause of the subscriber trouble is data related.

7.1.15.7.1.4 Inhibiting/Allowing Scheduled Audits

The craft can enter input message **INH:AUD=SODD,FULL**, which inhibits the execution of the explicitly scheduled full audit, or **INH:AUD=SODD,INCR** to inhibit the implicitly scheduled log file directed incremental audit. The craft can also enter input message **ALW:AUD=SODD,FULL** or **ALW:AUD=SODD,INCR** to re-allow these audits.

7.1.15.7.1.5 Monitoring Automated SODD Audit Status

The craft can enter input message **REPT:AUD=SODD**, to determine the current status of the audit. This status

includes an indication of which audits are active, which entity they are currently auditing, how far along they are, and so forth.

7.1.15.7.1.6 Analyzing and Repairing Automated SODD Audit Error Reports

Each audit execution concludes with a summary message indicating how many errors were detected. To obtain the contents of an existing error log generated by a previously executed full or incremental audit, the craft can enter input message **OP:AUD=SODD,ERRLOG**. After investigating the reported error, the craft can make any necessary data base corrections using RC (and ODBE when needed). The craft can then request an entity audit to verify the corrections.

Refer to 235-105-220, *5ESS® Switch Corrective Maintenance Procedures*, for detailed information on analyzing error reports and making data base corrections.

7.1.15.7.1.7 Stopping and Restarting Automated SODD Audits

The **STP:AUD=SODD,FULL** command stops the current execution of the Full Audit and the **STP:AUD=SODD,INCR** command stops the current execution of the Incremental Audit. The proper format of the **STP:AUD=SODD** command stops the execution of that Entity Audit. If multiple Entity Audits are running, each is stopped individually.

If the **STP:AUD=SODD,FULL** command has been used, the **EXC:AUD=SODD,FULL** command can be used to restart the Full Audit again (provided the schedule allows it). If the Incremental Audit is stopped, it does not restart until after the next backup is completed. Hence some of the transactions from the first log file that were not audited may not get audited. If the **STP:AUD=SODD,INCR** command has been used, the **EXC:AUD=SODD,INCR** command can be used to restart the Incremental Audit again.

If the **STP:AUD=SODD** command is used without any parameters following the command, all running audits (Full, Incremental and Entity) are stopped.

7.1.15.7.2 Deactivation

Not applicable.

7.1.15.7.3 Restriction Capability

Not applicable.

7.1.15.8 Compatibilities

All features and hardware are compatible with this feature.

The current version of the static ODD audit (prior to the Automatic SODD Audit) that could be scheduled in the user cron, will no longer be supported when Automatic SODD is available (5E9 and later software releases).

7.1.15.9 Interactions

This feature replaces the ODD Population Rule Audit portion of the 5E8 software release Static ODD Audit. This feature interacts with the previously existing ODD Backup feature. This feature does not interact with call processing. The audits inhibited box lights on the Master Control Center (MCC) page 110, when the static data audits are inhibited.

7.1.15.10 Engineering

7.1.15.10.1 Special Planning Considerations

There are no special planning considerations associated with this feature.

7.1.15.10.2 Hardware

There is no hardware unique to this feature.

7.1.15.11 Assignment Dependencies and Limitations

7.1.15.11.1 Dependencies

No other features need to be operational in the 5ESS[®] switch before this feature can be implemented.

7.1.15.11.2 Limitations

The ODD Population Rule Full Audit runs in a continuous loop, starting and suspending itself according to a craft supplied schedule. If the craft supplies a schedule that severely limits the audit execution time, the audit may run a very long period to complete a cycle through the ODD.

7.1.15.12 Feature Implementation Procedures

7.1.15.12.1 Office Data Administration (ODA) Implementation

Not applicable.

7.1.15.12.2 Recent Change Procedures

Not applicable.

7.1.15.12.3 Assignment Verification

To ensure proper assignment of the feature, use the following input messages and check for proper output messages:

- **OP:STATUS,AUD=SODD,FULL;**
- **OP:STATUS,AUD=SODD,INC;**
- **REPT:AUD=SODD,SCHED;**
- **REPT:AUD=SODD,STATUS;**

Refer to 235-600-700, *5ESS[®] Switch Input Messages Manual*, for an explanation of the input message variables.
Refer to 235-600-750, *5ESS[®] Switch Output Messages Manual*, for an explanation of the output message variables.

7.1.15.13 Feature Operation

For a general description of how this feature operates within the system, refer to Section 7.1.15.1 .

7.1.15.14 Administration

7.1.15.14.1 Measurements

Not applicable.

7.1.15.14.2 Billing

Not applicable.

7.1.16 ODD Conversion Tool UMKDSK

7.1.16.1 Definition

The Office Dependent Data (ODD) Conversion Tool UMKDSK feature allows Load Disk From Tape (LDFT) formatted tapes generated on the 3B20D processor to be read onto a support processor. The tool resides in the gen subsystem and only executes on a support processor.

7.1.16.2 Cross-References

The following cross-references are applicable to this feature:

- Feature Number: 99-5E-1148
- NSEP Number: Not available at date of publication.

7.1.16.3 Background

This feature is first available in the 5E9(1) software release. It has been provided to fulfill a request for a tool with the capability of reading LDFT formatted tapes on a support processor. Since generating tape copies of the ODD data bases in LDFT format rather than in cpio format is easier and much faster, this tool saves a significant amount of the 5ESS[®] switch customer's time.

7.1.16.4 Availability

This feature is available in the 5E9(1) and subsequent software releases of the 5ESS[®] switch.

7.1.16.5 Feature Application

This feature is provided per 5ESS[®] switch.

7.1.16.6 User Profile

This feature was primarily designed for telephone company maintenance personnel.

7.1.16.7 User Operation

7.1.16.7.1 Activation

This feature is activated by using input command **COPY:ODD,TAPE,ALL**. Refer to 235-600-700, 5ESS[®] *Switch Input Messages Manual*, for an explanation of the input message variables.

7.1.16.7.2 Deactivation

Not applicable.

7.1.16.7.3 Restriction Capability

Not applicable.

7.1.16.8 Compatibilities

This feature is compatible with all other features assignable to the 5ESS[®] switch. The UMKDSK tool does not operate on the 5ESS[®] switch. The command **COPY:ODD,TAPE,ALL** is on the 5ESS[®] switch. The UMKDSK tool reads tapes created with the **COPY:ODD,TAPE** command. The UMKDSK tool resides on support processors only.

7.1.16.9 Interactions

This feature has no adverse interactions with any other features available in the 5ESS[®] switch.

7.1.16.10 Engineering

7.1.16.10.1 Special Planning Considerations

There are no special planning considerations associated with this feature.

7.1.16.10.2 Hardware

There is no hardware unique to this feature.

7.1.16.11 Assignment Dependencies and Limitations

7.1.16.11.1 Dependencies

There are no other features that must be operational in the 5ESS[®] switch before this feature can be implemented.

7.1.16.11.2 Limitations

Not applicable.

7.1.16.12 Feature Implementation Procedures

7.1.16.12.1 Office Data Administration (ODA) Implementation

Not applicable.

7.1.16.12.2 Recent Change Procedures

Not applicable.

7.1.16.12.3 Assignment Verification

Not applicable.

7.1.16.13 Feature Operation

This feature operates in the system to allow LDFT formatted tapes generated on the 3B20D processor to be read onto a support processor.

7.1.16.14 Administration

7.1.16.14.1 Measurements

Not applicable.

7.1.16.14.2 Billing

Not applicable.

7.1.17 Provide For Testing Of Audio And Visual Switch Alarms

7.1.17.1 Definition

This feature allows craft to light alarm lamps and activate audible alarm devices using a new input command, TST:ALM,LVL=level. The command triggers the alarm audibles and visuals in the office and at the Switching Control Center (SCC), allowing the switch personnel to verify that the indicators and devices are functional.

7.1.17.2 Cross-References

The following cross-references are applicable to the Provide for Testing of Audio and Visual Switch Alarms feature:

- Feature number: 99-5E-1331
- NSEP/5SEP code: Not available.

7.1.17.3 Availability

This feature is available with the 5E9(1) and later software releases and is a base feature.

7.1.17.4 Feature Application

This feature is provided on a per office (switch) basis.

7.1.17.5 User Perspective

7.1.17.5.1 User Profile

The user for which this feature was primarily designed is telephone company maintenance personnel.

7.1.17.5.2 Customer Premises Equipment

This feature does not impact customer premises equipment (CPE).

7.1.17.6 User Operation

To use this feature, the user enters the input message, specifying the alarm level to be tested. The input message format is as follows **TST:ALM,LVL={CR|MJ|MN}** where **CR** specifies that the critical alarm reporting mechanism be tested, **MJ** specifies that the major alarm reporting mechanism be tested, and **MN** specifies that the minor alarm reporting mechanism be tested. The user then verifies that the appropriate alarm level audible is sounding and the appropriate alarm level visual devices are working and monitors the output message at the input terminal or at the ROP. The output message format is as follows:

```
TST ALM - a ALARM TEST IN PROGRESS
FOR AUDIBLE AND VISUAL ALARM REPORTING
```

Where variable **a** is CRITICAL, MAJOR, or MINOR according to the alarm level specified by the input message for testing. The user should verify that the output message is appropriately marked in the left margin for the alarm level

that was tested. To complete the test, the user must retire the alarms using either the **CLR:ALARM** command or the alarm release key and the **CLR:LAMPS** command.

7.1.17.7 Assignment Dependencies and Limitations

This feature tests the alerting mechanisms only, and does not actually verify that alarm-triggering sensors and software checks are functional.

7.1.17.8 Billing

This feature has no impact on billing.

7.1.18 Digital Facility Interface 2 (DFI-2) Performance Monitoring Enhancements

7.1.18.1 Feature Definition

The Digital Facility Interface 2 (DFI-2) Performance Monitoring Enhancements feature enhances the performance monitoring capability of the DFI-2 by providing:

- Additional error counts and reporting capabilities
- New history reports
- Customer definable thresholds for the error counts.

These reports can be generated either on an on-demand basis (using I/O messages) or automatically whenever the thresholds are exceeded. It makes DFI-2 Performance Monitoring as consistent as possible with T1M1.3 and Bellcore requirements without any hardware/firmware changes.

Performance Monitoring reporting for DFI-2 is used by the service provider to identify degraded service on T1 carriers and to sectionalize problems caused by layer 1 transmission errors. Both line and path monitoring are done for DS1s deployed with DFI-2. The performance data is stored in 15-minute intervals. At initialization there is no history data, the number of actually useful intervals increases over time to a maximum of 32 useful history intervals. The performance monitoring data is accumulated and printable on both an interval and day basis.

7.1.18.2 Cross-References

The following cross-references are applicable to the DFI-2 Performance Monitoring Enhancements feature:

- Feature number: 99-5E-0832
- NSEP/5SEP number is not available.

7.1.18.3 Background

The DFI-2 resides in the Digital Line Trunk Unit 2 (DLTU2), a peripheral unit of the switching module (SM) and terminates up to two Digital Signal 1 (DS1) facilities (one is not cost effective) per circuit pack onto the 5ESS[®] switch.

The DFI-2 was developed as a cost reduction feature. The circuit packs for DFI-2 are MC5D223A1B (TN1611B) and MC5D224A1B (TN1612B). The MC5D223A1B (TM1611B) can terminate up to two DS-1 facilities used for trunk and PRI communications. The MC5D224A1B (TM1612B) can terminate up to two DS-1 facilities used for umbilical connections between HSM/RSMs and RSM/RSMs.

Performance Monitoring (PM) is defined as the systematic monitoring of a particular entity's health through continuous collection and analysis of data derived by observing its performance. Performance monitoring is required to capture gradual or intermittent performance degradations as well as significant and continuous degradations in digital networks and provide the basis for effective network maintenance. In the context of this feature, the term performance monitoring refers to the set of functions and capabilities necessary for a 5ESS® switch to collect, store, threshold, and report performance parameters associated with the DS1s terminating on the DFI-2s.

7.1.18.4 Availability

The DFI-2 Performance Monitoring Enhancements feature is available with 5E8 and later software releases.

7.1.18.5 User Perspective

The performance parameters of the DFI-2, are accumulated, stored and reported by this feature. A record of the performance data is kept for up to 8 hours in intervals of 15 minutes providing some performance history. Also, the data will be accumulated and totaled for current day and previous day.

The telephone company can define and set the threshold values of the DFI-2 PM parameters by using the Recent Change features of the system. When these thresholds are crossed, automatic reports (alerts) are generated.

There are three types of reporting mechanisms for the performance monitoring data. These types of reporting mechanisms are as follows:

- Automatic—Based on crossing the parameter thresholds.
- On-Demand basis—Allowing service providers to report/display the parameter values and threshold values for threshold crossing alerts at any time through the use of I/O messages. Four different intervals of reporting can be specified by the telephone company.
- 24-Hour Schedule Basis—Values of the PM parameters of the first 64 DS1s in the office that have crossed any of their thresholds over the last 24 hours will be reported via the switch Plant 24-Hour Report.

7.1.18.5.1 Automatic Reporting (Thresholds Crossing Alerts)

When a predefined threshold is first met or exceeded while accumulating the parameters during the current 15-minute interval or current day, a report (alert message) is usually sent (when the reporting mechanism is set to "allow") to the ROP, MCC, and over the maintenance I/O channels to the SCCS. However, the message class for the report can be modified which impacts where the report is sent to. Additionally, when the new PM count is generated, a report (alert) will be sent to the ROP, MCC, over the maintenance I/O channels to the SCCS, or to output device specified by the message class of the PM report.

The telephone company will be able to turn the automatic reports on or off via Recent Change as well as I/O messages. The default case will be "on." The service provider can activate the reports for individual DS1 facilities, both DS1s terminating at a DFI-2, and all DS1s terminating on a DLTU2.

7.1.18.5.2 On-demand Reporting

The telephone company will be able to report/display the parameter values and threshold values for threshold crossing alerts on an on-demand basis. When accessing performance data, the craft can specify a single DS1 facility, both facilities for a DFI-2, or all facilities on a DLTU2. Note that in both types of reporting, the reports for the DFI-2s and DLTU2s consist of separate data for individual DS1s terminating to those units (rather than adding them all together for a DFI-2 or a DLTU2). The reporting is accomplished by the use of I/O messages.

The data to be reported can be specified by the telephone company. The possible data to be reported are as

follows:

- (A) Current data which includes the current 15-minute interval and current day counts
- (B) The previous data which includes the previous 15-minute and previous day counts
- (C) History data which contains the 32 most recent 15-minute intervals (that is, the craft can request up to 8 hours of history with 15-minute granularity)
- (D) All data which includes all of the PM counts in A through C.

The 15 minute interval was chosen to provide the service provider the opportunity for quicker response to a network degradation problem and finer time granularity for historical analysis of a reported trouble. Also, it is consistent with recommendations of the Performance Monitoring Task Force.

The demand reports contain the identity of the DS1, the report type, the parameter values, and the parameter threshold values. The parameter threshold value is the current value of the threshold as of the time of the request for the output. Note if the threshold value is changed to a lower level than the current level, no reports of threshold crossing will be made. The threshold values will appear to not take effect until the next interval.

7.1.18.5.3 Scheduled Reporting

In addition to the two reporting mechanisms discussed previously, the telephone company will receive the DFI-2 PM information via the 5ESS[®] switch 24-Hour Plant Report. The information in the 24-Hour Plant Report includes 8 new PM counts for the first 64 DS1s in the office that have crossed any of their thresholds over the last 24 hours ending at midnight. These PM counts are as follows:

- (1) LOS/BPV Event Count
- (2) Code Violations (CV) Count
- (3) Errored Seconds (ES) Count
- (4) Bursty Errored Seconds (BES) Count
- (5) Severely Errored Seconds (SES) Count
- (6) SLIP Count
- (7) Failed Seconds (FS) Count
- (8) Change of Frame Alignment (COFA) Count.

These counts are on a DS1 facility basis for DFI-2s and are reported in a new part of the 24-Hour Plant Report.

The performance monitoring data is used by the telephone company to forecast and identify service degradation on DS1 carriers and to sectionalize problems caused by layer 1 transmission errors. Performance monitoring information can also be used to provide proactive information for facility path quality.

7.1.18.6 Feature Implementation

7.1.18.6.1 RC Views and Forms

7.1.18.6.1.1 Views

The Digital Facility Interface 2 (DFI-2) Performance Monitoring Enhancements feature requires no new Recent Change Views or ODA Forms. However, existing RC Views are affected by this feature.

If it is necessary to inhibit the performance monitoring of all DFI-2 facilities in the switch, an existing field in RC/V 8.1 - Global Parameter - allows the customer to enable or inhibit DFI-2 facilities (DS1 facility PM alerts) throughout the switch. This is accomplished with the global parameter GLswfacpm.

Recent Change View 19.4 (Digital Line Trunk Unit) sets up the DLTU2 shelf. A user must specify:

- (1) SM number (1-192)
- (2) DLTU pack (0-7)
- (3) DLTU type (DLTU48 is the type for DFI-2)
- (4) Equipment location bay number
- (5) Equipment location unit vertical position number
- (6) Equipment location aisle number
- (7) DLTU2 cable series name
- (8) DLTU2 cabling distance

Customers can assign individual DFI-2 facilities to particular performance monitoring (PM) groups through RC/V 20.4 (Digital Line Trunk Unit). This view essentially provisions the DFI-2 facilities, and assigns them to a PM group. A default group is assigned if none is specified on the view. User must specify:

- (1) SM number (1-192)
- (2) DLTU number (0-5)
- (3) DFI pack number (1-10)
- (4) Facility indicator
 - Enter 1 for facility 0 of the DFI-2
 - Enter 2 for facility 1 of the DFI-2
 - Enter 3 for both facilities of the DFI-2
- (5) Control Interface Number
- (6) PICB
- (7) CLEI™

The Recent Change View 22.15 (Performance Monitoring Threshold Group), shown in Exhibit 7-1, is used to create, modify, or delete performance monitoring groups and to define thresholds for monitoring DFI-2 facilities. If no thresholds are entered, default thresholds are assigned to the PM group. The default thresholds are read from the FACDEF tuple in RLdf2thrsh. The user must specify:

- (1) Performance monitoring group name

(2) Performance monitoring type (enter DLTU2 for entry of DFI-2 thresholds)

This view, Performance Monitoring Threshold Group, allows the user to insert PM Groups for DSL, IFAC, or DFI-2. Thresholds can be updated as desired, and the PM group may be deleted. Recent Change view 22.15, Performance Monitoring Threshold Group, was modified to add a third page which contains DFI-2 threshold alerts. Field 2 on the view, PM TYPE, allows the option of entering DFI2, in addition to the existing options of IFAC or DSL.

```

                                5ESS(R) SWITCH
SCREEN 1 OF 3                RECENT CHANGE - 22.15
(5948)                     PERFORMANCE MONITORING - THRESHOLD GROUP

*1. PM GRP  -----   #2. PM TYPE  -----   3. DSL INH GRP  -
4. REMARKS  -----

```

```

                                PERFORMANCE MONITORING THRESHOLDS (DSL)
DSL PATH ALERTS                DSL REPORTS
5. CUR HR ES    ---          11. CUR INT ES    ---
6. CUR HR SES   ---          12. CUR INT SES   ---
7. INH CUR HR   -           13. INH CUR INT   -
8. CUR DAY ES   ----         14. CUR DAY ES   ----
9. CUR DAY SES  ----         15. CUR DAY SES  ----
10. INH CUR DAY -           16. INH CUR DAY  -

```

```

                                5ESS(R) SWITCH
SCREEN 2 OF 3                RECENT CHANGE - 22.15
(5948)                     PERFORMANCE MONITORING - THRESHOLD GROUP

```

```

                                PERFORMANCE MONITORING THRESHOLDS (IFAC)
IDCU FACILITY LINE ALERTS      IDCU FACILITY PATH ALERTS
>17. CUR INT ES    ----      >23. CUR INT ES    ----  29. CUR DAY ES    -----
18. CUR INT SES    ----      24. CUR INT SES    ----  30. CUR DAY SES    -----
19. INH CUR INT    -         25. CUR INT FLS    ----  31. CUR DAY FLS    -----
20. CUR DAY ES     -----    26. CUR INT SS     ----  32. CUR DAY SS     -----
21. CUR DAY SES    -----    27. CUR INT UAS    ----  33. CUR DAY UAS    -----
22. INH CUR DAY    -         28. INH CUR INT    -    34. INH CUR DAY    -

```

```

                                5ESS(R) SWITCH
SCREEN 3 OF 3                RECENT CHANGE - 22.15
(5948)                     PERFORMANCE MONITORING - THRESHOLD GROUP

```

```

                                PERFORMANCE MONITORING THRESHOLDS (DFI-2)
DFI-1 FACILITY LINE ALERTS      DFI-2 FACILITY PATH ALERTS
>35. CUR INT BPV    ----      >39. CUR INT ES    ----  47. CUR DAY ES    -----
36. CUR DAY BPV     -----    40. CUR INT BES    ----  48. CUR DAY BES    -----
37. INH CUR INT    -         41. CUR INT SES    ----  49. CUR DAY SES    -----

```

38. INH CUR DAY -	42. CUR INT COFA ----	50. CUR DAY COFA -----
	43. CUR INT SS ----	51. CUR DAY SS -----
	44. CUR INT FS ----	52. CUR DAY FS -----
	45. CUR INT CRC ----	53. CUR DAY CRC -----
	46. INH CUR INT -	54. INH CUR DAY -

Exhibit 7-1 Recent Change View2.15
7.1.18.6.1.2 View Attribute Descriptions

Descriptions of each of the attributes associated with DFI-2 performance monitoring are as follows. (The same attributes are used for RC/V 22.15 and the ODA form PMTHRESH.)

- PM GRP** - Name of the performance monitoring group to be defined. PM GRP is the key field for the view, and can be from one to eight characters. This field is the key for one of three relations which store the thresholds for the PMGRP:
- (1) RLpmthresh for DSL
 - (2) RLfacthrsh for IFAC
 - (3) RLdf2thrsh for DFI-2
- PMTYPE** - Type of data link associated with this PM GRP. This can be DSL, IFAC, or DFI2. An entry of DFI2 allows the user to enter monitoring thresholds for DFI-2 facilities on a DLTU2.
- PM Thresholds** PERFORMANCE MONITORING THRESHOLDS - These fields set thresholds for the number of tolerated errors for DSLs, IFACs, and DFI-2s. If the errors exceed a set threshold, an alert is sent to the customer via the MCC screen, the maintenance I/O channel, or the ALIT channel. Thresholds for DFI-2 can be set for interval or day. Thresholds for DSL and IFAC remain the same as prior to the introduction of this feature.
- **DFI-2 LINE ALERT THRESHOLDS**
 - (1) BPV - Bipolar violation. A BPV is a violation of bipolar line coding in which two logically level consecutive pulses occur with the same polarity, excluding B8ZS coding.
 - (2) INH - Inhibit the reporting for DFI-2 line and path alerts on an interval or day basis. Domain is BOOL, default is 'NO' (do not inhibit). Because the reporting for DFI-2 lines and paths asserts are inhibited together, the 2 fields CUR INT INH and CUR DAY INH must always be the same.
 - **DFI-2 PATH ALERT THRESHOLDS**
 - (1) ES - Errored second. A second with at least one CRC-6 error, LOFA, or SLIP.
 - (a) CRC-6 Error: A cyclic redundancy check error occurs when the computed CRC-6 code for the incoming signal does not match the received code. This event applies only to DS1 extended superframe format (ESF).
 - (b) LOFA: A loss of frame alignment occurs when there are two or more framing bit errors out of four consecutive framing bits.
 - (c) SLIP: A slip event is the insertion or deletion of data bits into or from the data

stream and is the direct result of equipment buffer overflow or underflow resulting from improperly timed network equipment.

- (2) BES - Bursty errored second. A second with at least 1 but less than 320 CRC-6 errors.
- (3) SES - Severely errored second. A second with at least 320 CRC-6 errors, at least 1 LOFA, or at least 1 SLIP.
- (4) COFA - Change of frame alignment. One COFA count is pegged for one or more COFA events in a 10 second interval. A COFA event is declared after a LOFA if the current frame alignment is incorrect.
- (5) SS - Slip second. A SLIP is counted whenever one or more SLIP events occur during a given 10-second interval.
- (6) FS - Failed second. A second with a failed signal condition: Red alarm, alarm indication signal (AIS), or framing bit error (FER). During a failed second, ES, SES, BES, and SS are not accumulated.
 - (a) Red alarm and AIS are two types of carrier group alarms.
 - (b) FER: A framing bit error is an error in the received framing bit pattern.
- (7) INH - Inhibit the reporting for DFI-2 line and path alerts on an interval or daily basis. Domain is BOOL, default is 'NO' (do not inhibit). Because the reporting for DFI-2 lines and paths alerts are inhibited together, the two fields CUR INT INH and CUR DAY INH must always be the same.

7.1.18.6.1.3 ODA Forms

The ODA form PMTHRESH - PM Threshold Group was modified to allow entry of PM thresholds for DFI-2 PM groups. The ODA form EQDUP was also modified to allow assignment of a DFI-2 PM group to an individual DFI-2 facility.

7.1.18.6.1.3.1 Modified ODA Form PMTHRESH

The PM Threshold Group, ODA form allows the user to insert PM Groups for DSL, IFAC, or DFI-2. Thresholds can be updated as desired, and the PM group may be deleted.

Screen Layout

The ODA screen layout for PMTHRESH form is identical to RC View 22.15 except for the top 3 header lines.

View Attribute Descriptions

Attributes used for performance monitoring are the same as those described for RC View 22.15.

Retrofit Considerations

Performance monitoring thresholds from the PMTHRESH form must be preserved across a retrofit. For a retrofit from pre-5E8 software releases to the 5E8 software release, or to post-5E8 software releases, only the default

performance monitoring group data will be created unless ODA is used to create more groups.

Modified ODA Form EQDUP

This modified form, DIGITAL LINE/TRUNK UNIT PACK EQUIPAGE, allows DFI-2 facilities to be assigned to a DLTU2. It will be modified to add two new PM GRP fields, one for each facility in the DFI-2. Refer to Exhibit 7-2 .

5ESS(R) SWITCH				
OFFICE DATA ADMINISTRATION				
(5730-2) DIGITAL LINE/TRUNK UNIT PACK EQUIPAGE				
*1. SM	---		FAC 0	FAC 1
*2. DLTU	-		-----	-----
*3. DFI PACK NBR	--	DFI USAGE	9. -----	20. -----
4. FAC IND	-	EQUIPMENT STATUS	10. -	21. -
#5. CONTROL GROUP	-	DATA GROUP	11. -	22. -
#6. CONTROL PORT	--	DATA PORT	12. --	23. --
#7. CLI	-----	VRBS	13. -	24. -
8. CLEI	-----	CLFI	14. -----	25. -----
		STUFFING PATTERN	15. -	
		DFI MODE	16. -----	26. -----
		FIU SUBGROUP	17. -	27. -
		FIU PORT	18. -	28. -
		PM GRP	19. -----	29. -----

Exhibit 7-2 ODA Form EQDUP

View Attribute Descriptions

Fields 19 (FAC 0 PM GRP) and field 29 (FAC 1 PM GRP) are new to this view.

- 19. FAC 0 PM GRP - Performance monitoring group assigned to facility 0 of the DFI-2.
- 29. FAC 1 PM GRP - Performance monitoring group assigned to facility 1 of the DFI-2.

7.1.18.6.1.3.2 Retrofit Considerations

Information from the EQDUP form must be preserved across a retrofit. For a retrofit from pre-5E8 software releases to the 5E8 software release , or to post-5E8 software releases all DFI-2 facilities will be added to the default PM group for DFI-2 facilities unless ODA is used to modify them.

7.1.18.6.2 Feature Operation

The objective of DFI-2 Performance Monitoring (PM) feature is to allow timely detection of performance degradations or related troubles in the DS1 facilities that terminate on the DFI-2s, preferably before the failure of the facilities. Therefore, this monitoring is performed in-service as opposed to out-of-service testing that is normally performed in response to failure conditions or customer trouble reports.

The 5ESS® switch detects, verifies, and isolates troubles for DFI-2 facilities, initiates service protection, and notifies the craft of troubles through status indications, output messages, and alerts. The status indications and output messages identify the location and nature of the trouble to aid in trouble isolation and repair. Therefore essentially this feature involves the collection of performance maintenance data, the storing of the collected data, and reporting

the results.

7.1.18.6.3 Data Collection and Storage

7.1.18.6.3.1 Overview

All daily line and path performance parameters, as listed and defined in this section, are accumulated on a continuous basis except during Failed Seconds. During Failed Seconds, if the monitoring of some parameters is stopped, their counters should not be zeroed.

- (1) LOS/BPV Event Count: This count is the raw number of LOS/BPV events. A LOS/BPV event is the occurrence of either a LOS or a BPV in a 3-ms interval.
- (2) Code Violations (CV): It is an absolute count of CRC-6 errors since the board was initialized in the ESF mode.
- (3) Errored Seconds (ES): This count is the raw number of errored seconds. An ES is a second with one or more CRC-6 errors, OR one or more LOFAs, OR one or more SLIPs.
- (4) Bursty Errored Seconds (BES): This count is the raw number of bursty errored seconds. A BES is a second with more than one but less than 320 CRC-6 errors.
- (5) Severely Errored Seconds (SES): This count is the raw number of severely errored seconds. A SES is a second with more than 320 CRC-6 errors OR one or more LOFAs OR one or more SLIPs.
- (6) SLIP Count: SLIP is counted whenever one or more slip events occur during a given 10-second interval.
- (7) Failed Seconds (FS): This count is the raw number of failed seconds. An FS is a second with a failed signal condition: Red Alarm, Alarm Indication Signal (AIS), or FER. During a Failed Second, ES, SES, BES, and SLIPs are not accumulated.
- (8) Change of Frame Alignment (COFA) Count: One COFA count is pegged for one or more COFA events in a 10-second interval.

In D4 mode, CRC-6 and BES parameters are not generated. In ESF mode, all parameters are available

A record of the data is kept for up to 8 hours of 15-minute intervals and for current and previous day. The registers structure consists of the following:

- 1 current 15-minute register
- 32 recent 15-minute registers
- 1 current day register
- 1 previous day register
- 35 corrupt indicators (CI) (All intervals have an corrupt indicator).

The 15-minute recent registers operate in a sliding window (FIFO rolling) manner with the current 15-minute register. The firmware can restart its 15 minute timers for three reasons:

- (1) Hardware initialization
- (2) Download of PM thresholds

- (3) Initialization of PM count (User requests).

7.1.18.6.3.2 DFI-2 PM Thresholds

The telephone company can define and set the threshold values of the DFI-2 PM parameters by using the Recent Change features of the system. When these thresholds are first met or exceeded, and the reports are "allowed," the automatic reports (alerts) are generated. (These automatic reports can be allowed or inhibited.)

The granularity of the thresholds is based on assigning the DFI-2 facilities to "PM groups." Refer to Section 7.1.18.6 for information on how to assign PM groups.

For each parameter, there are 2 thresholds required, that is, a 15-minute threshold and a 24-hour threshold. All performance monitoring groups must have all the data filled in, including the default value.

A different set of threshold values can be specified for each DS1 or a set of threshold values can apply to several DS1. The maximum number of performance monitoring groups is 255. This is the total number of groups available to be used for DIF-2, DSL and IDC. Lucent Technologies-supplied defaults are provided for each threshold not specified. The following table, Table 7-1, provides the settable ranges and the Lucent Technologies-mode defaults of the thresholds:

Table 7-1 Ranges and Defaults for DS1 Threshold Crossing Alerts

DS1 PARAMETER	SETTABLE RANGES		THRESHOLD DEFAULTS	
	15 Min.	Daily	15-Min.	Daily
LOS/BPV Count	1-4095	1-65,535	4095	65,535
CRC-6 (Path CV)	1-4095	1-65,535	4095	65,535
ES	1-4095	1-65,535	75	1,706
BES	1-4095	1-65,535	100	600
SES	1-4095	1-65,535	30	90
COFA	1-4095	1-65,535	17	511
SLIP	1-4095	1-65,535	4	255
FS	1-4095	1-65,535	30	90

This feature can be used by the telephone company craft to forecast and identify service degradations on the DS1 carriers and for the analysis of the failures.

7.1.18.6.4 Automatic Threshold Crossing Alert Reports

Whenever a DFI-2 PM firmware-supported count meets or exceeds its threshold, an automatic output message is generated, if the reporting mechanism is "allowed," to notify the craft. These automatic messages can also be generated when Recent Change is done such that a PM threshold is not greater than the current value of its associated PM count. The output is sent to the MCC, ROP, SCCS or the destination determined by the message class for the PM report.

The telephone company must be able to turn the automatic reports on or off via I/O messages. The default case must be "on."

The INH:FAC and ALW:FAC I/O messages must be modified to support this on/off functionality.

The Telco must be able to activate the automatic reports for individual DS1 facilities, both DS1s terminating at a DFI-2, and all DS1s terminating on a DLTU2.

The status of alerting (on or off) is available on OP FAC demand report.

Each Alert report must contain the identity of the DS1, the alerting interval (15-minute or daily), the identity of the parameter whose threshold is reached, and the values of the monitored parameters. Note that the values reported are the current values, and the value of the parameter whose threshold was reached may be greater than the

threshold value.

7.1.18.6.5 Demand Mode Reports

The telephone company must be able to report/display the parameter values and their histories as well as the threshold values for threshold crossing alerts on an on-demand basis.

Any integer value stored in a register, from 0 to the maximum, is readable on demand and the value cannot not be changed or reset as a result of being read.

When accessing performance data, the craft must be able to specify a single facility, both facilities for a DFI-2, or all facilities on a DLTU2.

The on-demand reporting must be done by the use of OP:FAC I/O message. Note that in all types of reporting, the reports for the DFI-2s and DLTU2s will consist of separate data for individual DS1s terminating to those units (rather than adding them all together for a DFI-2 or a DLTU2).

The intervals of reporting and the data to be reported must be selectable by the telephone company. The possible reporting intervals and data to be reported are:

- (A) Current Data which includes the current 15-minute interval and current day counts; the data is to be reported immediately (if available) without waiting for the end of the interval. This is the default case.
- (B) Previous Data which includes the previous (most recent) 15-minute and previous day counts.
- (C) History Data which includes the 32 recent 15-minute intervals (that is, the craft can request up to 8 hours of history with 15-minute granularity)
- (D) All Data which includes all PM counts in A, B, and C.

The 15 minute interval was chosen to provide the service provider the opportunity for quicker response to a network degradation problem and finer time granularity for historical analysis of a reported trouble. Also, it is consistent with recommendations of the Performance Monitoring Task Force.

The demand reports must contain the identity of the DS1, the report type (current, previous, or history), the identity of the reported parameters, the parameter values, and the values of the alerting thresholds. (The time of the reported interval is supplied by the switch.)

7.1.18.6.6 Scheduled Reports

In addition to the two reporting mechanisms, the DFI-2 PM counts will be reported on a routine basis by the 24-Hour Plant Report of the 5ESS[®] switch.

The telephone company craft personnel must be able to turn the report for this part on/off by use of existing Plant Report I/O messages. This report should contain the identity of the DS1, the identity of the reported parameters, and the values of the PM counts for the 24-hour interval during the last 24 hours (midnight to midnight or since the last PM initialization, if there is any, to midnight).

Printing of these counts should not be coupled with printing of the automatic threshold crossing alerts.

The DFI-2 PM supports the functions of trouble isolation, maintenance decisions, and service quality assessment. The line and path performance parameters constitute a fundamental set of measures from which more focused views can be derived. Both line and path performance monitoring will be done for DS1s deployed with the DFI-2s.

The bipolar violation (BPV) count is the only line parameter. All other parameters are path parameters. In D4 mode,

the DFI-2 facilities does not collect the bursty errored seconds (BES), and cyclic redundancy check (CRC-6) parameters. In ESF mode, the DFI-2 facilities collects all parameters.

7.1.18.6.7 Line and Path Performance Events

The DFI-2 Performance Monitoring Enhancements provide for the processing of the following performance primitives (events). Note that BPV is the only line primitive and the rest are all path primitives.

- **Bipolar Violations (BPV):** A BPV is a violation of bipolar line coding in which two logically level consecutive pulses occur with the same polarity, excluding the B8ZS coding.
- **Cyclic Redundancy Check (CRC-6) Error:** A CRC-6 occurs when the computed CRC-6 code for the incoming signal does not match the received code. This event applies only to DS1 Extended Superframe (ESF) format.
- **Framing Bit Error (FER):** It is the occurrence of an error in the received framing bit pattern.
- **SLIP Event:** A slip event is the insertion or deletion of data bits into or from the data stream and is the direct result of equipment buffer overflow or underflow resulting from improperly timed network equipment.
- **Loss of Frame Alignment (LOFA):** A LOFA happens when there are two or more framing bit errors out of four consecutive framing bits.
- **Change of Frame Alignment (COFA) Event:** A COFA event is declared after a LOFA if the current frame alignment is found to be incorrect.
- **ESF Error:** It is the occurrence of a LOFA within a 3-ms interval.
- **Loss of Signal (LOS):** It is defined as the absence of bipolar code for 100 ms.

7.1.18.7 Administration

7.1.18.7.1 Measurements

In general, there are three "events" which measurements must handle:

- Craft requests
- Report generation
- Macro invocations.

7.1.18.7.1.1 Craft Requests

For PLNT24 there are four input requests that must correctly process Part 26 individually (PART26) and/or as part of the whole (ALL) report:

ALW:PLNT24:{ALL PART26}	Allows for regularly scheduled output to the ROP
INH:PLNT24:{ALL PART26}	Inhibits regularly scheduled output to the ROP
OP:PLNT24:{ALL PART26}	Output the most recent (that is, collected at the most recent regularly scheduled mark - currently 2:07 a.m.) copy of the requested part(s)
OP:STATUS:PLNT24	Reports the status (allowed or inhibited) for every part of the PLNT24

Whether allowed or inhibited for ROP, the PLNT24 is sent to the SCCS.

7.1.18.7.1.2 Report Generation

Report generation refers to the process by which a regularly scheduled report is collected and output; this is also referred to as automatic reporting.

A PLNT24 cyclic AM timer expires initiating the automatic collection and reporting of the PLNT24. Simply, a PLNT24 AM terminal process is created which in turn communicates with the other processors causing a PLNT24 terminal process to be created in each of them. Normally when the SM terminal process is created the SM counts are collected; however, for this DFI-2 feature a measurement subsystemS will simply read **RLhisdfipm** at the regularly scheduled collection time and "collect" (that is, copy) the "previous day" values into an SM message which is sent to the AM where the data is formatted into a part-specific PLNT24 buffer which is output to the SCCS and, if allowed, the ROP.

The DFI-2 feature adds 8 counts for the first 64 DSI facilities that cross any of the 8 thresholds as a new part (26) to the 24-Hour Plant Report (PLNT24). The eight counts correspond to the PM parameters/counts described previously.

7.1.18.7.1.3 Macro Invocation

For DFI-2 the count generation is done automatically in the firmware monitoring incoming DS1 signals and the PM code itself does not know when each count has been incremented. Therefore, rather than a macro interface the measurement subsystem depends on the PM code to copy the daily PM counts into the "previous day" fields at midnight before they are cleared.

7.1.18.7.2 Operating System Interfaces

7.1.18.7.2.1 SCCS

The SCCS OS supports the PM messages modified by this capability. These messages include ALW:FAC, INH:FAC, REPT:FAC, INIT:FAC, and OP:FAC. The message class for each of the messages must be set correctly to allow SCCS to get the message.

7.1.18.7.2.2 Predictor

The Predictor system supports the PM messages modified by this capability. These messages include ALW:FAC, INH: FAC, REPT:FAC, INIT:FAC, and OP:FAC. The message class for each of the messages must be set correctly to allow Predictor to get the message.

7.1.18.7.2.3 *MIZAR*SM Operating System

*MIZAR*SM, supports Recent Change for update of DFI-2 facility PM threshold data. *MIZAR*SM is a provisioning operating systems used by end-users. The owners of *MIZAR*SM are responsible for creating the new views and code development to integrate this feature into their operating system.

7.1.18.7.2.4 RMAS

The Remote Memory Administration System (RMAS) supports Recent Change for update of DFI-2 facility PM threshold data. RMAS is a provisioning operating systems used by the Regional Bell Operating Company. The owners of RMAS are responsible for creating the new views and modifications to integrate this feature into their operating system.

7.1.18.7.2.5 Audits

The way audits are scheduled will not change. however, the Audit subsystem will be used to verify and correct the

static alert status bits in **RLfacpm** for DFI-2 PM related data. For DFI-2 PM, the **RLdf2thrsh** relation is read to verify the static alert status bits in **RLfacpm**. However, the FACPM audit was modified slightly.

The audit for **RLfacpm** currently uses the **RLfacthrsh** relation to verify automatic PM reporting data. This data is used to control (allow/disallow) the production of automatic PM alerts. FACPM audit will access **RLdf2thrsh** for DFI-2 facility PM data if the circuit type is not PCIFAC. Using **RLdf2thrsh**, the FACPM audit will verify the static alert status bits (salrt15 and salrtday) in **RLfacpm**.

7.1.19 Performance Monitoring For Digital Networking Unit - SONET (DNU-S)

Performance monitoring is the systematic monitoring (or tracking) of a particular entity's health through the continuous collection and analysis of data derived by observing its performance. Performance monitoring detects changes in the quality of service which may indicate impending trouble for the Digital Networking Unit - SONET (DNU-S) or SONET transmission equipment connected to the DNU-S.

7.1.19.1 Performance Parameters

In order to provide end-to-end performance measurements of a digital path, performance data must be calculated by the network entities that terminate the path. Termination is defined to be where the frame format is generated and transmitted or received and decoded. These monitoring actions are required to capture the performance degradations and provide a basis for network maintenance.

For the DNU-S, performance monitoring refers to the set of functions and capabilities necessary for the DNU-S to collect, store, threshold, and report end-to-end performance parameters associated with the digital signal level 1 (DS1), virtual tributary 1.5 (VT1.5), and SONET terminating equipment (STE). Performance parameters are counts of various error events, or counts of seconds containing such events, accumulated over specified collection periods.

The performance monitoring process in the DNU-S transmission multiplexer (TMUX) collects and updates error counts every second. In the DNU-S common control (CC), performance parameters are normally collected continuously in 15-minute and 1-day (current-day) registers.

Default values for all performance monitoring threshold registers embedded in the DNU-S hardware are read by the software at power up and during initialization and recovery. Most performance monitoring parameters have a corresponding user-settable threshold register. Registers containing performance monitoring parameters can be reset (zeroed) either autonomously by the switch or manually on demand.

7.1.19.2 Threshold Violations

The performance monitoring counts are reported autonomously when any of the error counts has reached or exceeded its threshold. The DNU-S will recognize a 15-minute threshold crossing within one minute of its occurrence and a daily threshold crossing within 15 minutes of its occurrence. When the DNU-S recognizes a threshold crossing for a parameter, a threshold crossing alert (TCA) is sent to the ROP and SCC. The TCA messages identify the particular facility (DS1, VT1.5, or STE) being monitored, the parameter register (specific parameter), the current threshold value, the direction of transmission (near end or far end), the accumulation interval (15 minutes or 1 day), and the current register value. There is a maximum of one TCA per collection interval for each PM count, if the facility remains in service throughout the collection interval.

7.1.19.3 Performance Monitoring Commands

The autonomous performance monitoring can be inhibited/allowed by input message **INH:FAC/ALW:FAC** or through recent change. Performance monitoring counts can be reported on demand for a specified facility or range of facilities by using the input message **OP:FAC**. The counts can be initialized on any given facility or range of facilities by input command **INIT:FAC**. (The PM counts are cleared.)

For additional information on DNU-S performance monitoring commands, refer to 235-600-700, *5ESS® Switch Input Messages Manual* and 235-600-750, *5ESS® Switch Output Messages Manual*.

7.1.19.4 Performance Monitoring And The DNU-S Hierarchy

Table 7-2 shows the hierarchy of performance monitoring inhibits and allows on DNU-S facilities. The hierarchy runs from top to bottom of the table, and then from left to right. In other words, allowing or inhibiting Performance Monitoring (PM) in one unit also allows or inhibits PM in any subservient units. The INH:FAC input message, where applicable, overrides what is in the applicable RC/V view. Refer to 235-118-2xx, *5ESS® Switch Recent Change Procedures* and 235-118-2xx, *5ESS® Switch Recent Change Reference* for customization information and to 235-600-700, *5ESS® Switch Input Messages Manual* for more information on the INH:FAC input message.

Table 7-2 PM Threshold Crossing Alerts Inhibit/Allow Request

Hierarchy	Unit	Input Message	RC/V View
1	Office		8.1 - PM
2	SM	INH:FAC-B	
3	DNU-S	INH:FAC-B	
4	STE	INH:FAC-B	20.25 - STE PM GRP
5	VT1.5	INH:FAC-B	20.25 - VT1.5 PM GRP
6	DS1	INH:FAC-B	20.25 - DS1 PM GRP

Manually restoring a facility clears its PM counts and the PM counts of all facilities below it in the DNU-S hierarchy. However, if a facility is automatically restored due to a CGA, its PM counts, and any PM counts for facilities below it in the hierarchy, remain active. Manually removing a facility stops PM. No PM counts are incremented, but existing PM counts remain intact.

7.1.19.5 Performance Monitoring Counts

There are DNU-S performance monitoring counters for most levels of the DNU-S hierarchy: Section, Line, Virtual Terminal Path Near End, Virtual Terminal Path Far End, and DS1 Path (but not for STS level).

7.1.19.5.1 Section And Line Performance Monitoring Counts

The DNU-S Line performance monitoring counts are as follows:

- The Severely Errored Framing Seconds (SEFS) counter indicates the number of seconds in which an Out Of Frame (OOF) condition is detected on the incoming STSX-1 interface. An OOF condition is four or more consecutive errored STSX-1 framing patterns. The STSX-1 Synchronous Payload Envelope (SPE) framing resides in the A1 and A2 bytes of the Section Overhead.
- The line Coding Violation (CV) counter is the sum of the BIP errors detected at the Line layer of the incoming SONET signal. The line CV counter is incremented for each BIP error detected. Each line BIP-8 can detect up to eight consecutive errors per STS-1 frame, with each error incrementing the CV counter. CVs for the Line layer are collected using the BIP-8 codes in the B2 byte located in the Line overhead of each STS-1.
- The line Errored Seconds (ES) counter indicates the number of seconds in which at least one Line CV was detected on the incoming STSX-1 interface, or the number of seconds during which an LOS, LOF, or Line AIS condition was declared on the incoming STSX-1 interface.
- The line Severed Errored Seconds (SES) counter indicates the number of seconds in which at least twelve Line CV were detected on the incoming STSX-1 interface, or the number of seconds during which LOS, LOF, or Line AIS condition was declared on the incoming STSX-1 interface.

7.1.19.5.2 Virtual Terminal Path Near End Performance Monitoring Counts

The DNU-S Virtual Terminal (VT) Path Near End (NE) performance monitoring counts are as follows:

- The VT Path CV NE counters are the sum of the BIP errors detected at the VT Path layer of the incoming STSX-1 interface. The VT Path CV counters are incremented for each BIP error detected. Each VT Path BIP-2 can detect up to two errors per VT1.5 facility. The VT Path CVs must be computed using the BIP-2 codes in bits 1-2 within the V5 byte of the VT Path Overhead. The BIP-2 code is calculated over all bits in the previous VT SPE.
- The VT Path ES NE counter indicates the number of seconds in which at least one VT Path CV NE occurred, or the number of seconds during which an LOS, LOF, AIS (Line, STS, or VT), or LOP (STS or VT) condition, was declared for the incoming VT1.5 facility.
- The VT Path SES NE counter indicates the number of seconds in which at least four VT Path CVs NE were detected on the incoming VT1.5 facility, or the number of seconds during which an LOS, LOF, or AIS (Line, STS, or VT), or LOP (STS or VT) condition, was declared for the incoming VT1.5 facility.
- The VT Path UnAvailable Seconds (UAS) NE counter indicates the number of seconds for which the VT1.5 facility was considered unavailable. Unavailability begins, and UAS accumulation starts, when ten consecutive VT Path NE SESs are detected. Unavailability ends, and UAS accumulation stops, when ten consecutive VT Path NE non-SESs are detected.

7.1.19.5.3 Virtual Terminal Path Far End Performance Monitoring Counts

The DNU-S Virtual Terminal (VT) Path Far End (FE) performance monitoring counts are as follows:

- The VT Path CV FE counter is the sum of BIP errors that are detected at the far end at the VT Path layer, and are conveyed back to the DNU-S via the VT Path Overhead (V5) byte of the incoming STSX-1 facility. The VT Path CVs FE are collected using the VT Far End Block Error (FEBE) indication in bit 3 within the V5 byte.
- The VT Path ES FE counter is the number of seconds in which at least one VT path CV FE occurred.
- The VT Path SES FE counter is the number of seconds in which at least four VT path CVs FE occurred.
- The VT Path UAS FE counter indicates the number of seconds for which the VT1.5 facility was considered unavailable. Unavailability begins, and UAS accumulation starts, when ten consecutive VT Path FE SESs are detected. Unavailability ends, and UAS accumulation stops, when ten consecutive VT Path FE non-SESs are detected.

7.1.19.5.4 DS1 Path Performance Monitoring Counts

The DNU-S DS1 Path performance monitoring counts are as follows:

- The DS1 Path CV counter for DS1 facilities using Extended Super Frame (ESF) format indicates the number of detected CRC-6 errors.

The DS1 Path CV counter for DS1 facilities using Super Frame (SF) format indicates the number of detected framing bit errors.

- The DS1 Path ES counter for DS1 facilities using either Extended Super Frame (ESF) format or Super Frame (SF) format indicates the number of seconds during which at least one of the following has occurred:

- a DS1 Path CV,
- a controlled slip,

- a Severely Errored Framing (SEF) event,
 - LOS,
 - LOF (Section or DS1),
 - AIS (Line, STS, VT, or DS1), or
 - LOP (STS or VT).
- The DS1 Path SES counter for DS1 facilities using Extended Super Frame (ESF) format indicates the number of seconds during which at least one of the following occurred:
 - 320 or more DS1 Path CVs,
 - an SEF event,
 - LOS,
 - LOF (Section or DS1),
 - AIS (Line, STS, VT, or DS1), or
 - LOP (STS or VT).

The DS1 Path SES counter for DS1 facilities using Super Frame (SF) format indicates the number of seconds during which at least one of the following occurred:

- 8 or more DS1 Path CVs,
 - an SEF event,
 - LOS,
 - LOF (Section or DS1),
 - AIS (Line, STS, VT, or DS1), or
 - LOP (STS or VT).
- The DS1 Path SEFS counter for DS1 facilities using Extended Super Frame (ESF) format and Super Frame (SF) format indicates the number of seconds during which at least one SEF event has occurred.
 - The DS1 Path Controlled Slip Seconds (CSS) counter for DS1 facilities using Extended Super Frame (ESF) format and Super Frame (SF) format indicates the number of seconds during which a controlled slip has occurred.
 - The DS1 Path UAS counter indicates the number of seconds for which the DS1 facility was considered unavailable. Unavailability begins, and UAS accumulation starts, when ten consecutive DS1 Path SESs are detected. Unavailability ends, and UAS accumulation stops, when ten consecutive DS1 Path non-SESs are detected.

7.1.19.5.5 Performance Monitoring Counts Interactions

Some PM counts are not incremented (inhibited) when other PM counts are incremented. Table 7-3 shows which PM counts inhibit others. Table 7-3 lists the PM counts that might be incremented down the left-hand side. The counts that are inhibited are listed for each. For instance, in the row for VT SES NE count incremented, "CV" is listed in the VT NE column, indicating that when the VT SES NE count is incremented, the VT CV NE count is inhibited.

NOTE: All VT-FE PM counts are inhibited when an LOS, LOF (Section or DS1), AIS (Line, STS, VT, or DS1), or LOP (STS or VT) condition is declared on incoming facility.

Table 7-3 PM Count Inhibit Interactions

Count Incremented	Other Counts Inhibited			
	Line	VT NE	VT FE	DS1
SEFS				
Line CV				
Line ES				
Line SES	CV			
VT CV NE				
VT ES NE				
VT SES NE		CV		
VT UAS NE		CV, ES, SES		
VT CV FE				
VT ES FE				
VT SES FE			CV	
VT UAS FE			CV, ES, SES	
DS1 CV				
DS1 ES				
DS1 SES				CV
DS1 SEFS				CV
DS1 CSS				CV
DS1 UAS				CV, ES, SES, SEFS, CSS

7.1.19.6 Retrieving Performance Monitoring Results

The OP:FAC input message can be used to output performance monitoring results. For more information, see the 235-600-700, *5ESS® Switch Input Messages Manual*.

If the PM counts have been corrupted, you will receive a Corrupt Indication (CI) flag when you use the OP:FAC input message to retrieve PM results. PM count corruption may occur for a number of reasons:

- an INIT:FAC input message has been executed,
- a facility has been removed or restored,
- too short a collection interval, possibly due to a SET:CLK input message having been executed, or
- certain failure conditions having occurred.

7.2 TRUNK, LINE, AND SPECIAL SERVICE CIRCUIT TEST FEATURES

7.2.1 Overview

Trunk, line, and special service circuit test features (40-00-0000) consist of the following categories:

- Trunk Maintenance (40-00-1000)
- Trunk Test Features at the TLWS (40-01-0000)

- (c) Transmission Measurements (40-01-0500)
- (d) Remote Trunk and Line Maintenance (40-02-0000)
- (e) Remote Trunk Maintenance (40-02-0100)
- (f) Remote Line Maintenance (40-02-0300)
- (g) Local Office Test Lines (40-03-0000)
- (h) Automatic Retest (Treatment) of Permanent Signals (40-12-0000)
- (i) Manual Testing (40-17-0000)
- (j) Treatment of Trunks With Machine-Detected Interoffice Irregularities (40-18-0000)
- (k) Call Irregularities Due to Trunk Failures (40-18-0500).

7.2.2 Trunk Maintenance

Trunk maintenance (40-00-1000) features are listed in the following sections.

7.2.2.1 Trunk and Line Control Display Interfaces

7.2.2.1.1 Feature Description

A test position is provided to permit central office maintenance personnel to maintain trunks, lines, special service circuits, and switching machine service circuits [such as dial pulse (DP) transmitters, multifrequency (MF) receivers, etc.]. This interface, together with the trunk and line maintenance I/O interface (40-00-1200), is referred to as the MCC TLWS.

7.2.2.1.2 Availability

Trunk and line control display interfaces are available with the 5E6 and subsequent software releases for the 5ESS[®] switch.

7.2.2.2 Trunk and Line Maintenance I/O Interface

7.2.2.2.1 Feature Description

A trunk and line maintenance I/O interface (40-00-1300) is provided to permit the craftsperson to enter input messages concerning trunks and lines and to receive appropriate output messages.

7.2.2.2.2 Availability

The trunk and line maintenance I/O interface feature is available with the 5E6 and subsequent software releases.

7.2.2.3 Trunk and Line Maintenance I/O Interface (Expanded)

7.2.2.3.1 Feature Description

This feature (40-00-1300A) provides enhancements to the basic feature 40-00-1300.

7.2.2.3.2 Availability

The trunk and line maintenance I/O interface (expanded) feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.2.2.4 Supplementary Trunk and Line Work Station

7.2.2.4.1 Feature Description

7.2.2.4.1.1 Overview

In larger offices, additional trunk and line test facilities may be required to enable concurrent testing at several test positions. The supplementary trunk and line work station (STLWS) (40-00-1400) provides this capability and makes it possible to equip a 5ESS® switch with separate trunk and line testing stations separate from the MCC. A TLWS is included in the MCC, and the TLWS shares the cathode-ray tube (CRT) terminal keyboard and ROP with the MCC. The talk and monitor telephone line and the TAU are part of the TLWS. A fully equipped STLWS provides all trunk and line testing features available with the TLWS that is part of the MCC. These work stations need not be physically close to the MCC.

7.2.2.4.1.2 Availability

The supplementary TLWS is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.2.2.4.1.3 Limitations and Restrictions

A 5ESS® switch may have from zero to six STLWSs. The 5ESS® switch allows for growth and degrowth of an STLWS and its optional components.

7.2.2.4.1.4 Interactions

The STLWS interacts with all existing and concurrently developed line and trunk testing capabilities. All of these capabilities are usable from a fully equipped STLWS.

7.2.2.4.2 Resource Utilization

In order to add a fully equipped STLWS to a 5ESS® switch using growth procedures, the following hardware must be installed.

- TN74B circuit pack installed in the input/output processor (IOP) 1, peripheral community 22
- STLWS ROP cabled to the correct port and channel on the TN74B
- STLWS CRT cabled to the correct port and channel on the TN74B
- TAU and associated hardware (trunks for AC jacks, metallic test buses and signal distribute points for DC jacks)
- Talk and monitor telephone line
- General use telephone line.

7.2.3 Trunk Test Features At The Trunk And Line Work Station

7.2.3.1 Feature Description

The TLWS is a test facility that provides facilities for the testing of subscriber lines, and the transmission and operational testing of trunks. The TLWS shares the same physical equipment as the 5ESS[®] switch MCC.

The TLWS is equipped with a TAU which is a panel of plug-in type jacks. These jacks are used in conjunction with portable test equipment to gain trunk or line access and perform tests.

The 5ESS[®] switch offices which are not equipped with integrated test equipment such as the directly connected test unit (DCTU) may require external test equipment to perform some tests.

During test calls, trunks are removed from service, tested, and restored to service. Transmission test calls allow maintenance personnel to measure trunk transmission characteristics. Operational test calls check signaling and end-to-end continuity of trunk circuits. The outgoing transmission test calls provided are as follows:

- Balance (100-type test line)
- Communication (101-type test line)
- Milliwatt (102-type test line)
- Supervisory and signaling (103-type test line)
- Transmission measuring and noise checking (104-type test line)
- Automatic Transmission Measurement System (105-type test line).

The outgoing operational test calls provided are as follows:

- Synchronous test
- Nonsynchronous test
- Permanent busy test
- 103 test.

The automatic progression testing (APT) routinely tests the operational characteristics of outgoing trunks. The APT tests trunks, identifies trunk signaling problems, and removes faulty trunks from service. Maintenance personnel at the TLWS can override the preprogrammed APT schedules if desired.

NOTE: The APT is disabled in a 5ESS[®] switch setup for AUTOPLEX[®] System 1000.

The automatic trunk test scheduler (ATTS) provides a means of scheduling automatic execution of specific types of operational tests on outgoing trunks and logging the individual test results on the AM disk for retrieval at a later time.

NOTE: The ATTS is a secured feature and comes in two versions: SFID 130 for the ATTS feature as part of AUTOPLEX[®] and SFID 134 for ATTS as a stand-alone feature for 5ESS[®] switches without AUTOPLEX[®].

Interactive trunk actions are requested via the TLWS page displays. Interactive manual trunk test capabilities consists of:

- (a) **AC Jack Access** (located on the TAU)
 - Connecting the trunk under test to jack
 - Connecting the trunk under test to jack with talk and monitor capability

- Putting a seizure on the trunk under test, outputting the specified digits, and connecting the trunk under test to jack with talk and monitor capability
 - Releasing the trunk from the jack.
- (b) ***DC Jack Access*** (located on the TAU)
- Connecting the analog trunk under test to the jack
 - Releasing the analog trunk from the jack.
- (c) ***Monitor Busy Trunk or Line***
- Bridge the talk and monitor line onto a busy trunk under test in the listen-only mode
 - Release the bridge connection to the trunk under test.
- (d) ***Requesting Manual Terminations***
- Balance quiet termination
 - AC open termination
 - AC short termination.
- (e) ***Signaling State Supervision***
- Monitor far-end supervision
 - Monitor near-end supervision
 - Alter signaling states.
- (f) ***Requesting Responder Functions***
- C-message weighted noise
 - C-notched noise
 - Echo return loss
 - Singing return loss
 - Singing return loss high
 - Broadband power measurement
 - Tone measurements at 404, 1004, or 2804 Hz.
- (g) ***Sending Tones at Specified Level and Frequency***
- 404 Hz at 0 dBm

- 404 Hz at -16 dBm
- 1004 Hz at 0 dBm
- 1004 Hz at -16 dBm
- 2804 Hz at 0 dBm
- 2804 Hz at -16 dBm
- Quiet termination.

(h) ***Metallic Measurements Using DCTU***

- AC and DC voltages
- Resistance
- Capacitances
- Tip-to-ground and ring-to-ground measurements for each of the measurements just listed.

The TLWS performs the following functions that are related to the maintenance of trunk and lines:

- Talk and monitor
- Retiring alarms
- Removing camp-on activities
- Message routing
- Test scheduling
- Outputting general information
- Outputting machine-detected interoffice irregularity (MDII) reports.

7.2.3.2 Implementation and Administration

The office data for the TLWS can be made via the initial office data administration (ODA) run or by the recent change /verify (RC/V) capability for the 5ESS[®] switch. Translation arrangements for the ODA run and RC/V can be made via the video display terminal, *TELETYPE*[®] 4025BS teletypewriter terminal, VT100[™] video terminal, or equivalent, using an interactive process where the user is provided with a series of menus and views.

Office data for the TLWS consists of:

- (a) ***Device ID:*** This data identifies the type of terminal device (TLWS).
- (b) ***TLWS Number:*** This data identifies which TLWS, 1 through 9.
- (c) ***Location:*** The telephone location may be identified which is an optional remark of up to 16 characters.

- (d) **Talk & Monitor:** This category of information consists of the talk & monitor telephone number, outside telephone number (prefix digit number for the talk & monitor telephone or remote telephone number), logical test port (LTP) of the remote station, and carrier ID.
- (e) **DC Jack:** This category of information specifies the logical test port (SM [001-048] and port [000-255]), metallic test bus, cut-through distribute point, and diode distribute point for DC test jacks.
- (f) **AC Jack:** This data specifies the trunk equipment number for the AC jacks.

Other trunk test features at the TLWS (40-01-0000) are listed in the following sections.

7.2.3.3 Diagnostic Tests

7.2.3.3.1 Feature Description

Outgoing trunks are checked by placing program initiated and controlled test calls to test lines in the distant office and detecting the response signals received over the trunk. Incoming trunks are tested (40-01-0100) for the ability to change state under manually initiated or system controlled processes. Test results are reported on the appropriate ROP channel, and when a failure results, trouble data is used to isolate faulty components.

The system provides diagnostic data results which indicate the result of each failing test performed by a diagnostic program. It is possible to run a diagnostic test several times on a specified trunk or service circuit via a single test request. Means are provided to allow a diagnostic test of an outgoing trunk to a specified type of far-end operational test line (synchronous or nonsynchronous) or a permanent busy, instead of the normal diagnostic test.

7.2.3.3.2 Availability

Diagnostics tests are available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.3.4 Outpulsing Tests

7.2.3.4.1 Feature Description

The outpulsing test (40-01-0200) is a feature that provides the means to place a call and talk or listen over a specified outgoing trunk. It is possible to specify the digits to be outpulsed over the trunk, and the supervision returned over the trunk is displayed at the test position.

7.2.3.4.2 Availability

The outpulsing test is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.3.5 Make-Busy/Make Idle Control

7.2.3.5.1 Feature Description

This feature (40-01-0300) provides the ability to make a specific trunk maintenance busy or idle by manual request.

7.2.3.5.2 Availability

The Make-Busy/Make Idle Control is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.3.6 DC Voltmeter

7.2.3.6.1 Feature Description

It is possible to connect a DC voltmeter (40-01-0400) circuit to a trunk under test and to place the trunk circuit in a state where the tip and ring conductors of the facility are presented to the voltmeter. Voltage, resistance, and capacitance measurement capabilities are provided through an external set of jacks in the TAU. The DC type test are also available using pokes from the TLWS menu pages.

7.2.3.6.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.3.7 TLWS Dialing/Monitoring In-Service Trunks/Lines

7.2.3.7.1 Definition

The Trunk and Line Work Station (TLWS) Dialing/Monitoring In-Service Trunks/Lines feature provides an additional version of the talk & monitor (T/M) function. This feature adds the MNTR IDLE (monitor idle) function giving the craft more monitoring flexibility and allowing off-hook requests to be processed while the MNTR IDLE function is occurring. This feature alleviates two problems; it allows the craft the ability to monitor a trunk/line *before* the call originates, and a phone call can originate while the craft is applying the monitor function.

This feature is referred to by its functional name, MNTR-B&I. This is the functional name appearing on the MISC CMDS menu page 9000.

7.2.3.7.2 Availability

SOFTWARE RELEASE	DEPLOYMENT METHOD
5E6(1)	General Availability

Note: Consult your Lucent Technologies Account Executive for availability.

7.2.3.7.3 Feature Provision Basis

This feature is provided on a per-system basis.

7.2.3.7.4 User Perspective

7.2.3.7.4.1 User Profile

This feature is used primarily by the Plant Maintenance personnel.

7.2.3.7.4.2 User Operation

This feature allows the user to:

- Choose either **MNTR BUSY** or **MNTR B&I** in the MCC/TLWS 160 through 168 menu pages.
- Enter **BUSY**, **IDLE**, or neither in the **TST:WSMNTR** input message (no entry defaults to **BUSY**).
- Receive any monitor related messages, on the TLWS screen, specifying the type of monitor function (BUSY or IDLE) currently being used.

7.2.3.7.4.3 Activation

The user can activate this feature by either entering a poke command or an appropriate input message. When an input message is entered, the test results are displayed on the TLWS screen but are not printed on the receive-only printer (ROP). If a printout is desired, enter this function via the TLWS menu commands.

The following steps are used to activate this feature:

- (1) On the TLWS select Page 160 (Test Position Summary)
- (2) Request to seize an unused TP
- (3) Seize a PORT
- (4) Proceed to the MISC CMDS page

Page number: **9000**

- (5) Enter the MNTR-B&I poke command or input message

Poke command: **4601**

Input message: MML

TST:WSMNTR,TP=a(,MODE=b);

Where: a = TLWS test position (1 to 8)
b = Mode for monitor function

- **BUSY** (user can monitor only a busy trunk/line)
- **IDLE** (user can monitor either a busy or an idle trunk/line).

The following TLWS display terminal messages are changed or added:

- **ONLY MNTR-BUSY (4600) VALID** is changed to:
DO MNTR-BUSY (4600) OR B&I (4601) ONLY
- **MNTR BUSY** is displayed in the Response Block when the MNTR-BUSY function is requested.
- **MONITOR B&I** is displayed in the Response Block when the MNTR-B&I function is requested.
- **MONITOR BUSY** is displayed in the Test Access field of TLWS Page 160 for the selected TP when MNTR-BUSY or MNTR-B&I is chosen.
- **MONITOR B&I** is displayed in the Test Access field of TLWS Page 160 for the selected TP when MNTR B&I is chosen.

7.2.3.7.4.4 Operational Limitations

The following limitations apply:

- The MNTR-B&I feature is used only on analog lines, analog trunks, and digital trunks. If MNTR B&I is attempted on ISDN lines or extended digital subscriber loops (EDSLs), a message is displayed on the error message line.
- A valid test position (TP) must be selected, and this TP cannot be used by any other TLWS.

- A test cannot run after the MNTR B&I feature is requested.
- If the PORT is BUSY when seized, the user is placed in the CAMP-ON state. The user has 5 minutes to enter the MNTR B&I command. After the 5-minute period, the CAMP-ON state is canceled and a time-out message is displayed on the error message line.
- A T/M phone must be assigned to the TLWS being used.

7.2.3.7.4.5 Deactivation

The MNTR B&I feature can be stopped by the following:

- Releasing the seized PORT
- Selecting new PORT data at the same TP
- Entering a Release Test command

Poke command: **5990**

- Entering Drop T&M phone

Poke command: **4300**

- Entering a 20x - Release Test Position (where x=1 to 8)
- The expiration of an internal 60-minute switch timer.

When the MNTR B&I is released, the "MNTR B&I" display is removed, and the **MONITOR B&I** message is removed from the test access field of TLWS menu Page 160.

7.2.3.7.4.6 Interactions

Not applicable.

7.2.3.7.5 Engineering - System Resources

Not applicable.

7.2.3.7.6 Assignment Guidelines - Assigning to Customer

After the new codes are applied to an SM by a Software Update, the input message "init:sm=<sm#>,spp,pid=26" must be entered via MCC. This message starts the PSIM process and invokes the status detection function.

7.2.3.7.7 System Operation

For this feature, a new terminal process for the SM runs only when these two conditions exist:

- (1) The MNTR B&I function is selected.
- (2) The line/trunk is in the idle state.

The process checks the port at a regular interval (presently set at 2.0 seconds) to determine whether the line or trunk member of interest is in the IDLE or BUSY state. The process keeps sampling the port until it becomes BUSY. When this situation occurs, the process terminates and the camp-on occurs.

Assuming the sampling rate is at 2.0 seconds, the following occurs during phone calls:

- (1) On an originating call (from the monitored line), up to 2.0 seconds worth of digit dialing occurs before the T/M phone rings to indicate a call to be monitored.
- (2) On the terminating end (to the monitored line), up to 2.0 seconds worth of received audio occurs before the T/M phone rings to indicate a call to be monitored.

Since there are 8 test positions for each AM, a maximum of 8 of these processes can run simultaneously in an SM.

The terminal process will terminate when either of these conditions are present:

- (1) The MNTR B&I function is terminated.
- (2) The line/trunk becomes BUSY with a call.

7.2.3.7.8 Administration

Not applicable.

7.2.4 Transmission Measurements

Transmission measurement features (40-01-0500) are listed in the following sections.

7.2.4.1 Basic Transmission Measurements

7.2.4.1.1 Feature Description

Basic transmission measurements (40-01-0501) are made by sending a tone and measuring the receive tone level and frequency. This makes possible 2-way determination of the standard transmission parameters affecting voice communications: loss (level), C-message noise, C-notch noise, gain-slope, and return loss. An AC open, an AC short, or a balance termination may also be applied to a trunk.

7.2.4.1.2 Availability

The basic transmission measurements feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.4.2 Supervisory Tests

7.2.4.2.1 Feature Description

Upon request, the system will display the status of incoming supervision on trunks and allow control of the state of outgoing supervision (40-01-0600).

7.2.4.2.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.4.3 Trunk Circuit Diagnostics

7.2.4.3.1 Feature Description

Trunk circuit diagnostic (40-01-0700) results are provided in response to a manual request.

7.2.4.3.2 Availability

This feature is available with the 5E6 and all subsequent software releases for 5ESS[®] switch.

7.2.4.4 Monitor-Transmission Measurements

7.2.4.4.1 Feature Description

This capability (40-01-0800) is provided to monitor a line or trunk that is service busy.

7.2.4.4.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.4.5 Talk-Transmission Measurements

7.2.4.5.1 Feature Description

This capability (40-01-0900) is provided to set up a talk and listen connection to a specific idle trunk without outpulsing digits or altering supervision. Thus, a craftsperson with the same capability at the far-end of the trunk can talk and listen over the facility on a prearranged basis.

7.2.4.5.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.4.6 Test Set Connections

7.2.4.6.1 Feature Description

Test set connections (40-01-1100) make it possible to connect portable transmission and signaling test equipment to trunks at the test position.

7.2.4.6.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.5 Remote Trunk And Line Maintenance

The remote trunk and line maintenance features (40-02-0000) consist of two major categories:

- Remote Trunk Maintenance Features (40-02-0100)
- Remote Line Maintenance Features (40-02-0300).

7.2.5.1 Remote Trunk Maintenance

Remote trunk maintenance features (40-02-0100) are listed in the following sections.

7.2.5.1.1 Centralized Trunk Test Unit Interface

7.2.5.1.1.1 Feature Description

7.2.5.1.1.1.1 Overview

The centralized trunk test unit (CTTU) (40-02-0101) is the test position for remote trunk testing and limited line testing. The interface between a CTTU and the local switch is a 1200-baud, full-duplex, synchronous data link. Primary access to this interface is the direct distance dialing (DDD) network rather than the data network. (Although the CTTU is located at a remote maintenance facility, this link is separate from the SCCS link.) Security for the DDD interface is provided by an initial security exchange between the local switch and the CTTU.

7.2.5.1.1.1.2 Availability

The CTTU interface is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.2.5.1.1.1.3 Feature Operation

In the 5ESS® switch, the CTTU interfaces directly to the switch with the remote trunk test unit (RTTU) provided by the 5ESS® switch software. The RTTU software interprets requests from the CTTU, performs the appropriate line or trunk test locally, and returns the results to the CTTU. The CTTU communicates with the 5ESS® switch over a synchronous dial-up data-link, operating at 1200 b/s. The dial-up line is defined as a denied originating line and is connected to an auto-answer 212 data set. The data set is connected to an appropriate slot in the AM IOP.

There are 39 possible CTTU users, numbered 2 through 9 and 20 through 49. There are four classes of CTTU users. Class A users have unrestricted control over the trunk maintenance state and the ability to monitor traffic busy circuits. This work location has plant control office responsibility for the circuits involved (that is, in-service/out-of-service control over them). Class B users can make trunks temporarily unavailable for call processing and monitor the trunk under test during manual access. Class C users have the ability to remove a limited number of trunks from service (up to the automatic maintenance limit). Class C users are generally mechanized systems that are operating in an automatic mode to routinely test trunks. Class D users are only allowed to test traffic idle circuits and cannot invoke the talk and monitor feature. Class D users are not allowed to remove trunks from service.

Since the class A, B, and C users can affect system performance, security measures are taken. The CTTU sends a message to the 5ESS® switch containing a user ID number. The security protocol consists of a security callback telephone number for each class A, B, and C user ID number, and the talk and monitor telephone number for class A and B users is maintained in the 5ESS® switch office data. This office data can be entered via RC/V or the 5ESS® switch.

7.2.5.1.1.2 Implementation and Administration

The office data necessary to provide the CTTU interface feature can be made via the initial ODA run or by the RC/V capability for the 5ESS® switch. Translation arrangements for the ODA run and RC/V can be made via the video display terminal, *TELETYPE*® 4025BS teletypewriter terminal, *VT100*™ terminal, or equivalent, using an interactive process where the user is provided with a series of menus and views.

Data for the CTTU interface can be defined via RC/V and consists of the following:

- Logical test port digit analysis and screening
- Logical test port trunk group and member for the callback function

- CTTU security and callback data.

The RC/V view for the CTTU consists of the following data assignments:

- (a) **USERNO:** The CTTU user number is a number from 2 through 9 or 20 through 49. The CTTU security classification code must be A for USERNO 2. The CTTU talk and monitor number is required for USERNO 2. Any valid user number except 2 may be to any security classification code. If any CTTU users are defined, user number 2 must be defined. For consistency with previous switching systems, it is recommended, but not required, that users 2, 3, and 4 be class A, user 5 be class C and all other users (6 through 9, 20 through 49) be class B.
- (b) **SECCLASS:** The SECCLASS is the CTTU user security classification code (A, B, or C). A talk and monitor telephone is not allowed for a user with a SECCLASS of C.
- (c) **CLBKTN:** The CTTU callback or talk and monitor telephone can be 7, 8, 9, or 11 digits.
- (d) **TMTN:** The talk and monitor telephone number can be 7, 8, 10, or 11 digits. A CTTU logical test port is required when a TMTN is specified.
- (e) **TMLTP:** The CTTU logical test port is a 6-digit number for the talk and monitor circuit. A CTTU logical test port is required when a TMLTP is specified.
- (f) **CARRIER ID:** The CARRIER ID specifies which inter-LATA carrier to use.

7.2.5.1.2 Remote Office Test Line

7.2.5.1.2.1 Feature Description

7.2.5.1.2.1.1 Overview

The remote office test line (ROTL) (40-02-0200) allows 2-way transmission tests to be made automatically on trunks outgoing from the office containing the ROTL. These tests are capable of being initiated from a remote location. It also allows interrogation of trunk or trunk group maintenance busy status from a remote location. The ROTL is also capable of operating with the Centralized Automatic Reporting on Trunks (CAROT) system or with a processor controlled capability (or equivalent) which permits locally initiated semiautomatic ROTL tests.

7.2.5.1.2.1.2 Availability

The ROTL feature is available with the 5E6 and subsequent software releases for the 5ESS[®] switch.

7.2.5.1.2.1.3 Applications

The ROTL supports the following:

- Transmission tests - 100-, 102-, and 105-type test lines
- Connection appraisal - 100-, 102-, and 105-type test lines
- Security callback
- Trunk make-busy and restore
- Trunk status request

- Balance and long-term test.

NOTE: The 100-, 102-, and 105-type test lines are at the far-end of the trunk. Transmission test calls and connection appraisal calls are placed via ROTL toward the distant test lines. The 5ESS[®] switch ROTL supports test calls toward the indicated test lines by providing trunk access and seizure, outpulsing of the digits necessary to reach the test line, and a tone detection capability which recognizes when the indicated test line has answered the test call.

7.2.5.1.2.1.4 Feature Operation

The 5ESS[®] switch ROTL is capable of making test calls to 100-type, 102-type, and 105-type far-end transmission test lines. The transmission measuring circuits perform loss and noise measurements and self-checks on an originating and terminating basis. Far-to-near transmission loss and near-end noise measurements are made in conjunction with the 100-type test line. Only far-to-near loss measurements are made with the 102-type test line. The 105-type test line provides 2-way transmission loss and noise measurements, noise with tone, gain slope, and return loss measurements.

NOTE: The ROTL feature is denied access to AUTOPLEX[®] cellular telecommunications system type trunks.

A remote test facility originates a call to the ROTL office via a DDD network connection. The call is processed with the central office switching equipment in the same manner as a regular call. When the ROTL has been seized, it returns a 2225-Hz test progress tone to the test facility. When the 5ESS[®] switch is prepared to receive test priming information (an MF receiver is connected), the test progress tone is turned off. This is an indication to the test facility to transmit information to the ROTL. This priming information includes the type of action to be performed. Any error detected in the priming information results in 120 interruptions per minute (IPM) being returned by the ROTL. When the action specified is a transmission test, the priming information also includes the trunk under test identity and the far-end test line (FETL) digits. At the conclusion of each action either successful or unsuccessful, the ROTL can be given a recycle command (1 second of 1300 Hz). The ROTL returns to the state of preparing to receive digits. The ROTL sends the test progress tone, and when it is ready to receive a new command, the test progress tone terminates. At the conclusion of all the testing, CAROT sends a drop access command (2 seconds of 1300 Hz) which causes ROTL to disconnect. If CAROT disconnects, the ROTL also disconnects and releases all resources associated with the call.

7.2.5.1.2.2 Hardware

In the 5ESS[®] switch, the ROTL hardware functions are provided by the transmission test function (TTF). The TTF is provided by a group of circuit packs in the global digital service unit (GDSU). These circuit packs are not provided exclusively for the ROTL, but the ROTL utilizes the capability provided by this hardware to perform its functions.

The 5ESS[®] switch should be equipped with at least two ROTL ports. It has the ability to park incoming ROTL calls by returning test progress tone back to the CAROT system while the ROTL waits for the resources needed to complete the calls. This is because the tone detector that listens for recycle is the resource that is unavailable. The number of ROTL calls that can be served simultaneously is determined by the lesser of the number of ports and the number of TTF circuits available to the ROTL. The minimum TTF configuration contains one measurement circuit pack (TN304). It is capable of supporting one ROTL call. Some of the circuits on this circuit pack are shared with other test features and contention can occur. The most heavily used resource is the responder, and the ROTL is given a higher priority than other users of this resource. Additional measurement circuit packs may be added in a GDSU group if unequipped circuit pack locations in the unit are available. Each TN304 circuit pack can accommodate one ROTL call. Only one TTF can be assigned in an SM, but any number of SMs can be equipped with TTFs. To make use of the additional TTFs, ROTL ports would have to be assigned across the respective switching modules.

7.2.5.1.2.3 Implementation and Administration

The ODD is required in the 5ESS[®] switch for the ROTL feature. The CAROT accesses the ROTL through the DDD network by dialing a directory number assigned to the ROTL which terminates at test software in the 5ESS[®] switch. Since a directory number is assigned to the ROTL, the ROTL directory number must be associated with a unique route index. A route index defines how a call is to be routed. The route index associated with the ROTL directory number routes to a trunk group of ROTL test ports. The ROTL test ports must be assigned in the switching modules with transmission test functions.

The 5ESS[®] switch data base must contain the callback directory number of the CAROT and any directory number of authorized manual locations(s) for the ROTL security callback. The list of authorized locations must be defined in the 5ESS[®] switch. The list also contains the authority for each directory number (none, manual, or automatic). The ``none" maintenance test mode inhibits any and all callers from a given CAROT from changing the trunk status of the test trunks. All ``manual" mode locations have the authority to remove trunks from service allowing the automatic maintenance limit to be exceeded. The ``auto" maintenance test mode indicates that the CAROT or control location can automatically remove trunks from service if they fail specific tests. The automatic maintenance limit with ``auto" mode cannot be exceeded. The automatic maintenance limit is established by the operating telephone company customer and states the number of trunks that can be removed from service.

The screening index and digit analysis selector that is used for ROTL security callback and connection appraisal call must be defined. The screening index and digit analysis selector are accessed during digit analysis of ROTL calls.

The assignment of office dependent data is made via the initial ODA run or recent change menus and views. The data assignments required for ROTL consist of the following:

- A trunk group and trunk group member for ROTL test ports
- Route index to the trunk group of ROTL test ports
- ROTL code
- ROTL directory number
- Digit analysis selector and screen index data
- CAROT code and security callback data
- Carrier ID for inter-LATA callbacks (The carrier ID is a 3-digit number between 000 and 999).

Refer to the following documents for more information on ODD requirements:

- 235-600-700, 5ESS[®] *Switch Input Message Manual*
- 235-080-100, 5ESS[®] *Switch Translations Guide (TG-5)* for the 5ESS[®] Switch
- 235-118-2xx, 5ESS[®] *Switch Recent Change Procedures*.

7.2.5.2 Remote Line Maintenance

Remote line maintenance features (40-02-0300) are listed in the following sections.

7.2.5.2.1 Interface to Local Test Desk and Related Systems

7.2.5.2.1.1 Feature Description

A test trunk is used to provide compatibility between the switch and existing maintenance systems such as the No. 14 Local Test Desk, the No. 16 Local Test Desk, and Mechanized Loop Test System (MLT) (40-02-0301).

The switch provides a means for establishing a metallic connection between a line to be tested and any of the above external maintenance systems. These systems are equipped for testing via a standard trunk test circuit which uses sleeve lead signaling.

7.2.5.2.1.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

The Mechanized Loop Testing System Generation 2 (MLT-2) release 2.0 and subsequent software releases and the corresponding MLT-1 software release are compatible with the 5E6 and subsequent software releases for the 5ESS[®] switch.

7.2.5.2.2 Integrated Mechanized Loop Test System No. 2 Interface

7.2.5.2.2.1 Feature Description

7.2.5.2.2.1.1 Overview

Remote testing of loops requires an interface (40-02-0302) to the 5ESS[®] switch and the MLT-2 or its equivalent. The MLT-2 is an external operations system for the testing of customer lines (loops) in the 5ESS[®] switch.

The interface between MLT-2 and the switch is a 2400-baud, full duplex, synchronous data link using X.25 protocol. Access is either by a private line or the DDD network, and security for the DDD connection is ensured by an initiation protocol between the MLT-2 controller and the switch.

The integrated MLT-2 feature allows an MLT-2 to communicate directly with a 5ESS[®] switch via the AM and control test peripherals [such as the directly connected test unit (DCTU) and the transmission test function] integrated into the switch. The metallic connections between the test peripherals and the customer lines are provided by the MSU via metallic test buses. Testing capabilities are provided by the test peripherals and the test peripherals are controlled by the MLT-2. The DCTU is used to perform all the DC and low frequency AC measurements requested by MLT-2. The TTF is used to perform the touch-tone analysis test. Tests may also be run on customer loops served by pair-gain system such as a SLC[®] 96 carrier system.

7.2.5.2.2.1.2 Availability

The integrated MLT-2 interface is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.5.2.2.1.3 Applications

The integrated MLT-2 interface feature provides the functions necessary for the MLT-2 to remotely test lines connected to the 5ESS[®] switch, its distributing frame, its remote switching modules, and its SLC[®] 96 carrier systems.

7.2.5.2.2.1.4 Limitations and Restrictions

The following limitations and restrictions apply to this feature:

- The number of simultaneous metallic connections which MLT-2 can generate in the AM is limited to a total of 36 (31 test access processes and 5 administration processes). During AM or SM overload, no new metallic

connections are generated.

- The integrated MLT-2 interface requires a DCTU. The DCTUs are also required in each remote switching module (RSM) where metallic testing is to be provided.
- Testing lines connected to a universal *SLC*[®] 96 carrier system requires that a pair-gain test controller be available.
- The *5ESS*[®] switch can run sanity tests on DCTU precision measurement units (PMUs) and port circuits. These sanity tests cause the standard DCTU diagnostic to run on the appropriate subtending circuit. The *5ESS*[®] switch software allows only one sanity test on one subtending circuit to be executing at any given time.
- Integrated *SLC*[®] 96 carrier systems which are connected to the *5ESS*[®] switch by fiber-optic T1 links can only be tested if a metallic test pair is available between the switch and the remote terminal (RT).
- Since the *5ESS*[®] switch does not have unique and dedicated metallic networks assigned on a per DCTU basis, MLT-2 is restricted in establishing test accesses in which the double-sided, fault-sectionalization operational test is run. This test requires that two metallic accesses be available for connection to the same PMU. These two accesses (line-under-test and auxiliary) must be made to two port circuits on the same DCTU. This test requires that MLT-2 specify a particular DCTU when the request is made to establish the auxiliary access [this test is compatible with the 5E6 and subsequent software releases for the *5ESS*[®] switch].

7.2.5.2.1.5 Interactions

The integrated MLT-2 is not allowed to run LTS (loop testing system) type diagnostics or to control the operational status of any equipment integrated into the *5ESS*[®] switch. The integrated MLT-2 can only request results of sanity checks on the DCTU PMUs and port circuits. These sanity tests consist of standard DCTU diagnostics which can be run without affecting the other users of the DCTU. An exception would be running a PMU sanity test on a DCTU which has only one operating PMU. This would cause all DCTU testing, which requires a PMU, to fail or be delayed.

7.2.5.2.1.6 Feature Operation

The integrated MLT-2 interface enables personnel at the MLT-2 to test lines terminating on a *5ESS*[®] switch. For integrated MLT-2 testing, all test equipment used to test the lines is integrated into the *5ESS*[®] switch and is available to users other than MLT-2 (for example, TLWS and CTTU).

In the integrated MLT-2 environment, MLT-2 communicates directly with the switch via a BX.25 data link that terminates on the IOP. Software in the AM interprets the commands from MLT-2 and establishes a metallic connection between the DCTU and the line under test. The DCTU serves as the measuring equipment and is internal to the switch. The distributing frame test access circuit pack that resides in the metallic service unit (MSU) enables the switch to perform distributing frame testing in the integrated environment. Although a large *5ESS*[®] switch has more than one DCTU, and since RSMs have dedicated DCTUs, a single integrated MLT-2 interface is capable of testing a network of customer lines.

A maintenance administrator at the automated repair service bureau interacting with the MLT-2 system should not notice any difference between test runs using the integrated MLT-2 interface, an LTS connected to a *5ESS*[®] switch, or an LTS connected to some other type of switch. Response times for metallic access to a line on a *5ESS*[®] switch are slightly longer than access to a line on other switches. The increased time required to obtain metallic access to the *5ESS*[®] switch is the same for the integrated MLT-2 as it is for the LTS.

When distributing frame testing is required, the maintenance administrator at the automated repair service bureau obtains metallic access to one of the trunk test circuits on the distributing frame. The maintenance administrator then telephones the frame attendant at the *5ESS*[®] switch and instructs the frame attendant to establish a

connection between the trunk test circuit and the line to be tested. The frame attendant removes the appropriate protector coil and connects a test shoe between the trunk test circuit and the line to be tested.

When testing on the line has been completed, the maintenance administrator again telephones the frame attendant and requests that the test shoe be removed and the line be returned to normal service.

7.2.5.2.2.2 Resource Utilization

A dedicated BX.25 data link operating at 2400 b/s is used to connect the 5ESS[®] switch to the MLT-2 host system. The data link connects to a TN75C peripheral controller in the 5ESS[®] switch IOP. The peripheral controller has a fixed assignment to IOP 0 slot 1 community, of the IOP growth unit per J1C130B-1, List 3 and 11, and uses an auto answer 2024A-type data set.

The TN75C requires level 2 of the BX.25 synchronous communication protocol operating with non-return-to-zero (NRZ) logic. The link has an NRZ logic. The link also has a DDD backup, consisting of two DDD lines controlled by a telephone set and a 48ER1 dial backup unit (DBU) at the MLT-2 site with a 53A single number dialer and a 48ER1 DBU at the central office.

The distributing frame test access circuit (DFTAC), TN1040 is a circuit pack designed for the integrated MLT-2 interface feature. It is used to allow the MLT-2 host to test customer lines and unequipped lines at the distributing frame. The DFTAC occupies a board position in the MSU. The DFTAC can be equipped in either type of MSU. Ordering information is available per J-drawings J5D003AL-02 and J5D003DB-1 for the regular and modular MSUs, respectively. No additional power converters are needed when adding the DFTAC to an MSU.

The DFTAC contains a tip-ring pair which is wired to a denied origination line appearance on a line unit. This tip ring pair provides the dedicated line connection for the MLT-2 callback telephone feature.

When the integrated MLT-2 is used to test universal SLC[®] 96 carrier lines, a pair gain test controller must be provided. The universal SLC[®] 96 carrier system is a system that requires a central office terminal at the 5ESS[®] switch office. Two distribute points are required to operate the sleeve lead on the pair gain test controller. Also, two metallic test buses are required to make the metallic connection to the universal SLC[®] 96 carrier line.

A typical test session on a customer's line involves hardware resources of the DCTU, one or two MSUs, and an LU. Most of these resources are occupied for the duration of the metallic access which lasts an average of 50 seconds. A typical test on a SLC[®] 96 carrier line takes 10 seconds longer.

Interactive testing, involving a second person at the distributing frame or customer's station, requires long-term access and can occupy 5ESS[®] switch testing resources for extended periods of time. Tests involving the distributing trunk test circuit, fault sectionalization, tracing tones, or monitor for short can last for tens of minutes.

This feature adds less than 2000 bytes of dynamic data to the AM. This feature adds no dynamic data in the SM.

Less than 1000 bytes of ODD to the AM are added because of this feature. Less than 1500 bytes of ODD are added for all the SMs in the entire office.

This feature adds less than 200 bytes of static data to the AM and none to the SMs.

The total real-time allocation for non-per-call processor occupancy by the terminal maintenance subsystem is 2.7 percent for the AM and 1.0 percent for each SM during the busy hour.

The integrated MLT-2 interface feature consumes less than 1 percent of the AM processor real time during the busy hour. Since most of the automatic terminal maintenance occurs at night, the addition of this capability should not cause the terminal maintenance subsystem to exceed its busy-hour, real-time allocation in the AM.

The major user of real time in the SM for this feature is the communication link between the SM and the DCTU. To

transfer a single byte of data requires 100 microseconds of real time. Assuming each DCTU test takes approximately 3 seconds for the PMU to complete, a 2-message frame takes 6 seconds. If the DCTU is fully equipped (three PMUs) and operating at its maximum rate, a command/response frame pair is processed by the DCTU every 2 seconds. If the typical frame pair requires 11.3 milliseconds of SM real time, the DCTU communication software requires approximately 0.00565 seconds or 0.57 percent of the SM processor real time.

Any other metallic testing (ALIT, DC jacks, DCTU) uses the same resources as the MLT/integrated MLT, which is the MSU/modular metallic service unit (MMSU). If ALIT is running during MLT testing, it is possible that all of the logical test ports at the MSU would be busy and block access to the MLT. To minimize this, no other metallic testing should be scheduled during MLT testing.

7.2.5.2.2.3 Implementation and Administration

7.2.5.2.2.3.1 Translation Data

The translation necessary for the integrated MLT-2 interface can be made via the initial ODA run or by RC messages. The translation arrangements for the ODA run and RC/V can be made via video display terminal, *TELETYPE*® 4025BS teletypewriter terminal, *VT100*™ video terminal or equivalent, using an interactive process where the user is provided with a series of menus and views.

Translation data for the integrated MLT-2 interface consists of:

- (a) **Callback Requirements:** The integrated MLT-2 requires a trunk group of logical test ports for callback. A trunk with a minimum of six members of logical test ports is required for the integrated MLT-2 callback. Data assigned for this trunk group includes the trunk direction (LTP), hunt type, trunk class (CALLBK), carrier ID, and other information.
- (b) **DFTAC Requirements:** (optional circuit pack) The DFTAC circuit is located in the MSU/MMSU. This circuit requires a dedicated line to a line unit and a logical test port. The logical test port must be assigned in the same SM as the DFTAC circuit location. Each DFTAC circuit pack has a dedicated line equipment number on a line unit. This is a normal POTS [(plain old telephone service), for example, 1-flat rate, 1-message rate] with denied origination. Each DFTAC requires a logical test port. The trunk group of logical test ports must be equal to the main distributing frame number and the logical test port trunk member number.
- (c) **Pair Gain Test Controller (PGTC) Requirements:** The pair gain test controller is an optional external facility used to test universal *SLC*® 96 carrier lines. The PGTC if configured, requires two metallic test buses and two distribute points. In order to use the PGTC test circuit, it is necessary to wire two metallic test buses, to the PGTC test circuit (one to the input and one to the output of the PGTC). Two distributor points are wired through the *5ESS*® switch resistor panel out to the sleeve control input of the PGTC test circuit.

7.2.5.2.2.3.2 Operational Considerations

The following operating characteristics should be taken into consideration:

- (1) When the integrated MLT-2 is activated, it provides more than 90 percent of the testing traffic for the DCTU.
- (2) There are two busy-hour peaks for testing during the working day, however, testing is required on a 24-hour basis. It is recommended that the scheduling of routine diagnostics for the DCTU be done in cooperation with the MLT Facility Manager.
- (3) The telephone company loop maintenance organization is critically dependent upon use of the DCTU. If the DCTU is put into an OOS condition, it seriously affects loop maintenance operations. It is recommended that the MLT Facility Manager be immediately notified if the DCTU is put into an OOS condition for whatever reason.

- (4) The MLT Facility Manager may be able to provide assistance in diagnosing problems with the DCTU because of similarities between the LTS and the DCTU.

7.2.6 Local Office Test Lines

The local office test lines (40-03-0000) are listed in the following sections.

7.2.6.1 100-Type Test Line

7.2.6.1.1 Feature Description

A 100-type test line (40-03-0100) provides a local office with equipment that first applies a precise (1004 Hz at 1 mW) tone for a timed period, then a balanced termination for transmission level and noise measurements. Line and trunk access is provided to the 100-type test line.

7.2.6.1.2 Availability

The 100-type test line is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.6.2 101-Type Test Line

7.2.6.2.1 Feature Description

A 101-type test line (40-03-0200) provides a communication line to a craft position.

7.2.6.2.2 Availability

The 101-type test line is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.6.3 102-Type Test Line

7.2.6.3.1 Feature Description

A 102-type test line (40-03-0300) applies a precise (1004 Hz at 1 mW) tone for approximately 9 seconds on, 1 second off, in a repetitive sequence.

7.2.6.3.2 Availability

The 102-type test line is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.6.4 105-Type Test Line

7.2.6.4.1 Feature Description

A 105-type test line (40-03-0500), with responder, provides for automatic 2-way loss and noise measurements, plus gain slope, return loss, and noise in the presence of tone on trunks requiring transmission testing.

7.2.6.4.2 Availability

The 105-type test line is available with the 5E6 and subsequent software releases for the 5ESS[®] switch.

7.2.6.5 Nonsynchronous Test Line

7.2.6.5.1 Feature Description

A nonsynchronous test line (40-03-0700) tests incoming trunk equipment. Supervisory pulses are repeated until disconnection takes place.

7.2.6.5.2 Availability

The nonsynchronous test line is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.6.6 Permanent Busy Test Line

7.2.6.6.1 Feature Description

A permanent busy test line (40-03-0800) returns a permanent busy signal.

7.2.6.6.2 Availability

The permanent busy test line is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.6.7 Coin Station Test Line Access

7.2.6.7.1 Feature Description

This feature (40-04-0000) allows a craftsperson at a coin telephone station to obtain dialed access via an outgoing test trunk to a coin station test line and command it, via dialed codes, to test without other assistance, line resistance, line leakage, and coin control signals.

7.2.6.7.2 Availability

The coin station test line access feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.6.8 Dual Tone Multifrequency Station Test Circuit

7.2.6.8.1 Feature Description

This circuit (40-05-0000) provides the capability for an installer (or customer assisted by test desk personnel) to test the station ringer and directory number — line assignment in the central office. It is also possible to test dual tone multifrequency (DTMF) stations including 12-button sets and touch-a-matic repertory dialers.

7.2.6.8.2 Availability

The DTMF station test circuit is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.6.9 Automatic Progression Trunk and Service Circuit Testing

7.2.6.9.1 Feature Description

Automatic progression trunk and service circuit testing (40-08-0000) is performed during specified periods. Trunks are automatically and sequentially tested via connections to the appropriate operational test lines in the connecting offices or, if no test lines are available and the trunk is an outgoing loop supervised trunk, by a continuity and polarity test. The operational capabilities of transmitters and receivers are verified. Tone generation circuits are tested for the presence of tone, and the interruption rate checked where appropriate. Faulty circuits are removed from service

and a trouble report generated. Safeguards are provided to limit the number of circuits that can be automatically removed from service.

Additionally, the Automatic Trunk Test Scheduler (ATTS) an integrated 5ESS[®] switch software-based feature, provides a means of scheduling automatic execution of specific types of operational tests. The results of the test are logged on the AM disk and can be retrieved at a later time. The scheduling of the tests is accomplished by creating and maintaining a set of tests (sessions) in a schedule of tests created using the RC/V interface. The ATTS can be accessed from normal maintenance channels such as the TLWS. A maximum of 20 schedules can run concurrently. Entries in each schedule correspond to scheduled tests (sessions). Each schedule is operated independently with the schedule data base accessible to multiple users, simultaneously.

7.2.6.9.2 Availability

Automatic progression trunk and service circuit testing is available with the 5E6 and subsequent software releases for the 5ESS[®] switch.

7.2.6.10 Automatic Line Insulation Tests

7.2.6.10.1 Feature Description

The ALITs (40-09-0000) are performed routinely on line appearances in automatic sequence. The ALIT provides tip-to-ring, tip-to-ground, and ring-to-ground leakage tests. Upon request, a craftsman is capable of performing line insulation tests (LITs) on a single specified line appearance.

7.2.6.10.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.6.11 Test Incoming Trunks in Tandem or Local State

7.2.6.11.1 Feature Description

The system provides the ability to place incoming trunks in the local or tandem state (40-11-0000) on incoming calls to 100-, 102-, and 105-type test lines. The choice of state is based on the directory number received from the originating office.

7.2.6.11.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.7 Automatic Retest (Treatment) Of Permanent Signals

Features that provide automatic retest of permanent signal (40-12-0000) conditions are listed in the following sections.

7.2.7.1 Lines

7.2.7.1.1 Feature Description

Lines (40-12-0100) which are not cleared during initial permanent signal treatment are recorded in a list. The system automatically returns lines from this list to service after the permanent signal condition has cleared. Lines in the line lockout state can be removed from that state by manual action only. The capability is provided to output either list at the request of a craftsman.

7.2.7.1.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.2.7.2 Trunks (False Seizures)

7.2.7.2.1 Feature Description

Trunks causing incoming seizure with no subsequent signaling are removed from service, monitored for supervision, and restored to service when the seizure is removed (40-12-0200).

7.2.7.2.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.2.8 Manual Testing

Manual testing features (40-17-0000) are listed in the following sections.

7.2.8.1 Manual Test of Line

7.2.8.1.1 Feature Description

This feature (40-17-0100) provides a craftsperson at a TLWS, or another local test position, an interface with the switching system to perform line maintenance functions such as:

- Remove lines from service
- Restore lines to service
- Verify the status of lines
- Access to lines for basic test capabilities (resistance, leakage and current measurements, and ringing and coin control signals).

7.2.8.1.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.2.8.2 Manual Test of Trunks

7.2.8.2.1 Feature Description

This feature (40-17-0200) provides a craftsperson at a TLWS, or another local test position, an interface with the switching system to perform trunk maintenance such as:

- Remove trunks from service
- Restore trunks to service
- Verify trunk states
- Access trunks for basic test capabilities (resistance, leakage and current measurements, supervisory test, and VF parameter measurements).

7.2.8.2.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.9 Treatment Of Trunks With MDII

Features that deal with trunks using MDIIs (40-18-0000) are listed in the following sections.

7.2.9.1 Removal From Service of Trunks With MDII

7.2.9.1.1 Feature Description

When this feature (40-18-0100) is activated, a trunk on which an unexpected stop dial signal or a stop dial time-out occurred is held off-hook and kept out of service. On occurrence, a message identifies the affected trunk. For service protection, the number of trunks thus withheld from service must be limited. Trunk service activation is by a manual input command. This feature assists in the location of wiring transpositions external to the switching system.

7.2.9.1.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.9.2 Selective Suppression of MDII Messages

7.2.9.2.1 Feature Description

This feature (40-18-0200) permits, when activated, suppression of MDII reports associated with ineffective call attempts due to unexpected stop dial signals or stop dial time-outs, based on the address signaling type and call direction of a trunk.

7.2.9.2.2 Availability

The selective suppression of MDII messages is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.10 Call Irregularities Due To Trunk Failures

Features that deal with call irregularities due to trunk failures are listed in the following sections.

7.2.10.1 Detection, Reporting, Automatic Diagnostic, and Trunk Removal Safeguards

7.2.10.1.1 Feature Description

This feature (40-18-0501) provides the following for call irregularities due to trunk failure.

- (a) Call attempts that use a trunk and fail to complete are detected, reported, and counted. (Calls are completed over other trunks if a failure persists.)
- (b) The information reported includes all equipment involved in the connection, type of failure, and address information. A retry is provided where required to meet blocking objectives.
- (c) Diagnostic tests of suspected units are automatically initiated.

7.2.10.1.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.2.10.2 Trunk Error Analysis

7.2.10.2.1 Feature Description

The system provides error analysis (40-18-0502) of call irregularities due to trunk failure. Maintenance error counts are kept for a limited number of trunks. If the error rate is too high on a trunk or service circuit, it is removed from service and reported to the maintenance craft. Safeguards prevent automatic removal of excessive trunks from any trunk group.

7.2.10.2.2 Availability

The trunk error analysis feature is provided with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.2.10.3 Identification of Tip-Ring Reversals Associated With Spurious Answer Signals

7.2.10.3.1 Feature Description

On demand, the system provides a report that identifies (40-18-0600) the loop supervision trunk on which an anomalous supervisory state (false answer) is detected at the end of outpulsing. This capability is applied to help locate a probable external source of the malfunction. In addition, if the system permits (because of manufacturing errors, improper repairs, or system faults) the occurrence of supervisory reversals, appropriate maintenance capabilities assist in locating the internal system source of the malfunction.

7.2.10.3.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.2.10.4 Demand Listing of Trunk Numbers of a Specified Trunk Group

7.2.10.4.1 Feature Description

Upon request, the system can list all trunk assignments associated with the trunk group specified (40-19-0000).

7.2.10.4.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.2.10.5 Print the Trunk-Out-of-Service List

7.2.10.5.1 Feature Description

Upon request, all trunks on the trunk-out-of-service (TOS) list are outputted (40-20-0000) based upon the sequential assignment of trunk groupings or trunk appearances depending upon the type of list requested.

7.2.10.5.2 Availability

The print TOS list feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.2.10.6 Trunk Group-Remove From Service (Make-Busy)

7.2.10.6.1 Feature Description

Upon request, the system places all idle (not traffic busy) trunks in a specified trunk group in the OOS locked out manual, or an OOS disabled manual state as requested (40-22-0000). Traffic busy trunks are camped-on and, as they become idle, are also placed in the requested state. This feature does not apply to essential trunk groups.

7.2.10.6.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.10.7 Transmission Testing of Trunk Groups

7.2.10.7.1 Feature Description

Upon TTY or TLWS request, all trunks of a specified trunk group are transmission tested (40-24-0000).

7.2.10.7.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.10.8 Line Access to TLWS

7.2.10.8.1 Feature Description

The system provides craftspersons with the ability to dial from a line directly to the work station (40-27-0000). In the test state, all normal line tests are available.

7.2.10.8.2 Availability

The line access to TLWS feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.10.9 Multiple Trunk Test Capability

7.2.10.9.1 Feature Description

The system provides the software capability to conduct tests on an engineered number of trunks in parallel (40-28-0000).

7.2.10.9.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

7.2.10.10 Trunk-to-Trunk Test Connection

7.2.10.10.1 Feature Description

This feature (40-29-0000) provides a capability to establish and disconnect stable connections between trunks and service or test circuits, in response to manual requests, for the purpose of special tests. Active paths are printed out periodically as a reminder to the maintenance force.

7.2.10.10.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS® switch.

7.2.10.11 Carrier Group Alarm

7.2.10.11.1 Feature Description

7.2.10.11.1.1 Overview

The system provides the capability to detect a carrier group alarm (CGA) (40-32-0000 & 40-32-0000A). Upon the detection of this alarm, all associated outgoing trunks are automatically made busy to subsequent customer call attempts. This feature provides immediate action to remove from service any trunks associated with a failed carrier system and reports to maintenance personnel via messages describing the source and reason for the alarm. The feature also provides automatic restoral of the trunks to service when a carrier system has been diagnosed and restored to service.

The CGA feature provides the capability of recognizing carrier failures and outages and taking effective measures to protect the switching system against their effects. Some of the adverse effects are inaccurate signaling and false originations. The following capabilities are available with this feature.

- On the DLTU, the alarm level related to facility failures is reported as a minor alarm.
On the DNU-S, the alarm levels reported vary, depending on the severity of the failure.
- Information in the output messages sent to maintenance personnel identifies the source of the alarm.
- An hourly status report of all active carrier alarms is printed.
- Changes to the MCC display pages for the digital facility interface (DFI) facility, digital trunk unit, and DNU-S have been made to indicate the reason for the CGA.
- Consistency checks are used to verify the integrity of carrier alarm status data and data associated with the DFI facility.

7.2.10.11.1.2 Availability

The CGA feature is available with all software releases for the 5ESS® switch.

7.2.10.11.1.3 Interactions

There are various external interfaces with the CGA feature. When carrier alarms are reported, a message is sent to the maintenance personnel at the 5ESS® switch. This message is also sent to the SCCS. For the CGA feature to work, the switch must be equipped with DFI facility circuit packs, MSU scanner circuit packs, or DNU-S. Office dependent data must be populated with data describing where the DFI facility, where the MSU scan point hardware has been placed in the SM, or a DNU-S unit.

7.2.10.11.1.4 Feature Operation

7.2.10.11.1.4.1 CGA Reporting

The REPT CGA and the REPT ALMPG output messages indicate the alarms.

The REPT CGA output message is used to report the occurrence of a CGA and/or the occurrence of an error threshold that is exceeded by the DFI facility circuits in the digital trunk unit or that a metallic service unit scan point changed state.

If the alarm is a DFI facility alarm and it remains for an extended period of time (1 to 2 minutes), the far-end office connected to the T1 facility in question (if known) may be contacted to determine if testing or diagnostics are being run on the far-end. Activity on the far-end could cause a DFI facility alarm condition. If no activity is being performed at the far-end, diagnostics on the DFI facility reporting the alarm are conducted. If all tests pass, contact the operating company repair personnel to have the T1 span checked. The problem may lie in the span itself, as there could be a bad repeater or a broken cable.

If the alarm is for scan point change of state, the problem may be referred to personnel with carrier maintenance responsibility since the scan point cannot be diagnosed.

If the alarm is a DNU-S facility alarm and it remains for an extended period of time (1 to 2 minutes), the far-end termination point for the particular DNU-S facility may be contacted to determine if any type of testing is being conducted. Activity on the far-end or on SONET transmission equipment within the SONET network could cause a DNU-S facility alarm condition. If no activity is being performed at the far-end, diagnostics can be run on the local DNU-S circuit packs. If all tests pass, the problem could exist anywhere in the SONET network to the far-end termination point for that particular DNU-S facility.

7.2.10.11.1.4.2 CGA Alarm Levels

CGAs related to facility failures on the DLTU are reported as minor alarms.

The alarm levels for CGAs on the DNU-S are as listed in Table 7-4 .

Table 7-4 CGA Levels For DNU-S

Alarm Level	Failure On An STE
Minor Alarm	1 DS1/VT1.5
Major Alarm	2 to 5 DS1/VT1.5
Critical Alarm	6 or more DS1/VT1.5, 1 STS-1, or the STE

Manually removing a DNU-S facility will clear CGAs on that facility or subtending facilities. Manually restoring a DNU-S facility will regenerate CGAs on that facility or subtending facilities.

7.2.10.11.1.4.3 Identification of Alarm Source

Information in the output messages sent to maintenance personnel identifies the source of the alarm. The output messages give enough information so that maintenance personnel can identify which carrier device is having an alarm. The messages used to report the state of carrier alarms are:

- REPT CGA
- OP CGA
- OP FAC
- OP REG.

Since the CGAs on some DNU-S facilities (STS-1, VT1.5, DS1) are bundled into REPT CGA output messages based on the alarm level, the OP:CGA,STEFAC input message can be used to list all the DNU-S facilities on an STE facility having a CGA. The REPT CGA output message for an STE facility always identifies the source of the alarm.

7.2.10.11.1.4.4 REPT {ALMCG|CGA}

This message prints for all CGA and performance events. The "reason" field in the message indicates what event

the message is for. This message only prints in an automatic mode.

7.2.10.11.1.4.5 Hourly Status Report of CGAs

The information provided in the OP CGA output message is provided as an hourly status report. This data reports all carriers throughout the entire switch that are in the active alarm state. The OP CGA output can be requested on demand. This is done by use of the OP:CGA input request. For DNU-S, an OP:CGA,STEFAC input message can be used for a more localized request.

7.2.10.11.1.4.6 OP FAC

The OP FAC output provides the current values of the performance measure counters, and the CGA status of a DFI facility or some DNU-S facilities (STE, VT1.5, DS1). This only prints in demand mode as a response to the OP:FAC input request. The INIT:FAC input request may be used to initialize the counts. OP:REG and INIT:REG provide similar functions on a DFI (not DFI facility) basis.

7.2.10.11.1.4.7 MCC Display Page

The MCC display pages for the DFI facilities, the digital trunk unit, and the DNU-S facilities indicate the reason for the CGA. The DFI facility is shown on the SM digital trunk unit MCC page by reverse video on the affected DFI facility. In addition to this information on the display, the cause of the alarm is also given.

7.2.10.11.1.4.8 Prevention of False Alarm Reporting

An alarm status table is maintained in each of the SMs to protect against false alarms originating from control interface scanning. This table provides a last look before reporting carrier alarms. If the check against the table fails, digital trunk unit fault recovery software is notified that something may be wrong with the DFI facility.

7.2.10.11.1.4.9 Consistency Checks for Carrier Alarms

Audits are provided to verify that the CGA condition of the hardware matches the affected ports software status. A checking mechanism verifies that when the carrier alarm condition clears, all affected ports have the out-of-service facility failure state removed. If the carrier alarm is still active, audits verify that the port status is in a facility failure or higher precedence out-of-service state.

Other consistency checks are performed when audits, or other software subsystems request the status of a trunk associated to a DFI facility.

7.2.10.11.2 Implementation and Administration

The CGA feature requires resources that are office engineered. These resources are defined in the 5ESS[®] switch data base. Data is required for the DFI facility, DNU-S facility, and the metallic service unit. In order to make assignments for this equipment, ODA must have the office dependent static data available on the DFI facility, DNU-S facility, and metallic service unit scan points. The RC/V capability can be used to update the office data for administration of alarmable units.

7.2.11 Open Circuit Test Line

7.2.11.1 Feature Description

The open circuit test line (OCTL) feature allows craft personnel the flexibility to test a line in the field in lieu of the central office or a centralized maintenance office becoming intimately involved.

7.2.11.2 Availability

This feature is available with the 5E6 and subsequent software releases.

7.2.11.3 Operation

After the craftsperson dials a special NANP DN without the NPA number, the OCTL program returns an optional 5-second tone burst followed by 30 to 60 seconds of an open circuit (that is, first stage and scan crosspoint turned off), after which the OCTL program disconnects. The 30 to 60 seconds of an open circuit allows the craft personnel to test a line for shorts, crosses, and/or sectionalize resistive faults.

7.2.11.4 Limitations

Since the 5ESS[®] switch cannot supply a perfect open circuit due to the solid-state nature of the concentrator, some of the tests are slightly impaired. The tests most subject to this nonperfect open circuit are resistive tests measured with respect to ground. The OCTL capability has great value to the user for resistive faults less than or equal to 450 K ohms.

7.2.12 Disk Independent Operation

7.2.12.1 Feature Description

The disk independent operation (DIOP) feature provides the means to continue call processing uninterrupted when the essential system disks duplex fail. The objective for this feature is for the system to be capable of sustaining operation in this mode indefinitely, in the absence of other faults.

7.2.12.2 Availability

This feature is available with the 5E6 and subsequent software releases.

7.2.12.3 Operation

The DIOP design can be explained as a set of states the 5ESS[®] switch goes through and the type of program and craft events which are associated with each state. The following subsections describe the events which are associated with each state.

7.2.12.3.1 Normal Duplex Operation

This state represents the 5ESS[®] switch running with both moving head disks (MHDs) and disk file controllers (DFCs) active and operational. It is necessary to have a periodic audit of the data delivery (DD) DIOP bit to ensure that the application does not erroneously go into the DIOP mode. This audit is requested from the Audit Subsystem (AU). It compares the state of the DD bit to what UNIX[®] RTR 1 operating system reports as the state of the system in the ECD (equipment configuration data base).

7.2.12.3.2 Simplex Operation

This state refers to a situation where the essential MHD or DFC has been removed from service. Once the system goes into a simplex disk configuration, UNIX[®] RTR 1 operating system locks essential processes into main memory. To lock a process into main memory for application kernel processes means to set a special flag in the dispatch control table (DCT). For processes which are swapped into memory (that is, UNIX[®] operating system or supervisor) it means to swap them in and not swap them out. An output message is generated by UNIX[®] RTR operating system indicating that disk limp mode (DLM) simplex processing has completed. No major degradation to craft input/output (I/O) response times occurs during simplex operation as a result of having these processes locked into main memory.

When the craft goes into a scheduled simplex disk configuration (for example, such as for monthly routine exercises), they should ensure that their tape drive is operational. This prevents any problem should the tape drive be needed to load in a software release tape while in DIOP. Normal disk restoral should be handled as before.

7.2.12.3.3 Entering Disk Independent Operation

This state refers to the transition of the 5ESS[®] switch into the DIOP mode due to a duplex failure. Once the 5ESS[®] switch disks have duplex failed, there is a short period of time before the entry into a steady state disk independent operation. In this transition period, UNIX[®] RTR 1 operating system and the application perform functions which set up the environment for the DIOP state.

Once the disk driver fails due to excessive errors on accessing the disk, it notifies the Duplex Multi-Environment Real-Time Operating System (DMERT) kernel, updates the ECD, and sends an IOSYSDLM message to system integrity monitor (SIM) indicating that DIOP mode is in effect. Subsequently, it notifies all client processes accessing the faulty disk by returning an error code indicating that DLM is in effect. The kernel immediately terminates all nonessential processes. The SIM notifies application integrity monitor (AIM) of this state by passing the IOSYSDLM message to it. The AIM notifies the 5ESS[®] switch application by setting the DIOP data delivery bit.

Any process which tries to access the faulty unit is informed of failure due to DIOP. The disk driver returns IODLM for IOREAD, IOWRITE, and IOOPEN, and SUCCESS for IOCLOSE. The file manager accepts acknowledgment message IODLM from the disk driver and returns EDLM in the message status to its client process. All application processes which would try to access the disks through these two resources handle these failure returns and terminate their activity gracefully. This state is very short in duration, and the craft is only aware of its passing after the 5ESS[®] switch is in the DIOP mode.

7.2.12.3.4 Disk Independent Operation

In this state, UNIX[®] RTR 1 operating system and the 5ESS[®] switch application have transitioned into and are operating in a mode they recognize as disk independent operation. In this state, they operate in a manner conducive to providing uninterrupted call processing.

The UNIX[®] RTR 1 operating system provides a critically alarmed report indicating that DIOP is in effect. It provides audible and visual alarms as well as a DIOP access page which the craft can use to repair their faulty disks. The UNIX[®] RTR 1 operating system also provides a periodic output message indicating the system is in DIOP. This critically alarmed message prints every 15 minutes.

Application processes which are marked essential continue to run during DIOP and are able to function in a non-system-degrading mode despite the fact that the environment has changed to a diskless system.

The AIM does not allow processes to escalate to a system bootstrap. The AIM handles all escalations while in DIOP similar to the way it does when the system software checks are inhibited.

When the craft notices that the 5ESS[®] switch has gone into disk independent operation, craft personnel are dispatched to the site to repair the faulty disks.

The craft uses the disk file access page to repair the faulty disks. From this page, the craft can initialize an MHD, verify it, restore a DFC, dump an MHD defect table, and load an MHD from tape. Each of these functions can be initiated by menu-driven commands, and a help facility is provided. This functionality is completely provided by UNIX[®] RTR 1 operating system DIOP feature.

7.2.12.3.5 Restoral From Disk Independent Operation

In this state, it is assumed that the 5ESS[®] switch disks have been repaired, and the system is transitioning out of the disk independent mode of operation by way of a bootstrap.

The craft restores the 5ESS® switch from the DIOP mode by performing a 52 or higher initialization. The AIM clears the DIOP DD bit on all bootstrap initializations.

The craft restores the 5ESS® switch from disk independent operation by performing a 52 or 53 initialization in order to preserve stable calls and billing data. The craft then ensures that the system successfully exits the DIOP state. Failures at this point cause an AM outage and must be handled by the appropriate documentation.

If it was necessary to perform a load from tape while in DIOP and/or a 53 initialization was used to exit from DIOP, any missing ECD and ODD changes must be reinstalled to make the data bases current. Special recovery procedures may be necessary for the recovery of AMA data and customer-originated recent changes (CORCs).

7.2.13 Trunk And Line Work Station (TLWS) Display Dialed Digits

7.2.13.1 Definition

This feature enhances the Monitor Busy and Idle (MNTR B&I) feature by allowing the dialed digits and associated signals/tones to be displayed on the TLWS screen and printed on the receive-only printer (ROP). The TLWS Display Dialed Digits feature provides the ability to monitor lines or trunks from the TLWS and display the digits and signals sent/received by the 5ESS® switch. When this feature is activated, every call originating on the line or trunk is monitored. The dialed digits and switch signals are displayed as they are sent/received, prior to any digit prefixing, deletion, interpretation, or modification by the 5ESS® switch. The signals and tones sent or received by the switch get displayed in addition to dialed digits to help in debugging call failures.

NOTE: A **signal** is non-audible or out-of-band, a **tone** is audible or in-band.

This feature applies to analog lines using dial pulse (DP) or dual tone multi frequency (DTMF). The DTMF includes the four digits used in Defensed Switched Network (DSN) [that is, F (flash), P (priority), I (immediate), and O (override)]. This feature also applies to trunks using DP or multi frequency (MF) signaling.

NOTE: This feature does not apply to ISDN lines or Common Channel Signaling (CCS) trunks.

7.2.13.2 Economic Worth

This feature is used by service provider plant maintenance personnel to identify incorrect usage of Business and Residence Custom Services (BRCS) by subscribers. This feature is used to help diagnose incorrect dialing and to debug problems related to incorrect office translations. It allows the craft to use the TLWS to verify if an automatic dialer or PBX is misprogrammed.

This feature may be used in conjunction with the Verify Office feature to determine why a call is failing. The Verify Office feature provides a quick check of static office translations used by the switch to route a call. The digits displayed on the TLWS may be used as an input to the Verify Office feature to verify call routing.

7.2.13.3 Availability

This feature is available with 5E7 and later software releases. The feature is also available for 5E6 software releases, via software update.

NOTE: Consult your Lucent Technologies Account Executive for availability.

7.2.13.4 Feature Provision Basis

This feature is provided on a per-switch basis.

7.2.13.5 USER PERSPECTIVE

7.2.13.5.1 User Profile

This feature is used primarily by plant maintenance personnel.

7.2.13.5.2 User Operation

This feature allows the user to do the following:

- Monitor a line using DP or DTMF dialing.
- Monitor a trunk using DP or MF signaling.
- Observe, on the TLWS, digits and signals/tones associated with a call.
- Print out test results on the ROP.

The craft may use this feature to diagnose a problem with a programmable dialer or PBX. If the call origination from the dialer fails, the problem could be either a wrong number programmed or a routing failure.

The port could be monitored via the MNTR B&I feature with the print option turned on before the port goes busy. As the dialer starts to originate the call, the dialed digits received are displayed along with the switch signals. The TLWS screen displays the necessary data to troubleshoot the call failure. The output message format is shown in Table 7-5. The dialed digits may be used as input to the Verify Office feature to perform a quick check of the office translations. Output messages for tones/signals **sent** by the switch are shown in Table 7-6. Output messages for tones/signals **received** by the switch are shown in Table 7-7.

Table 7-5 Output Message Format

DISPLAY	DESCRIPTION
ORIG=hh:mm:ss MSG=id	ORIG = Time call originated (or when monitor started) in hours, minutes, and seconds. MSG = Message identification number, used to track successive output messages for a single call.
RESULT1 RESULT2 RESULT3 RESULT4 RESULT5	RESULT = Contains 5 lines of signals/tones sent or received by the switch, including dialed digits (1234567890#), and Defense Switched Network (DSN) dialing (F=flash, P=priority, I=immediate, O=override).

Table 7-6 Output Messages for Tones/Signals Sent by Switch

DISPLAY	DESCRIPTION	DISPLAY	DESCRIPTION
??s	Unknown signal sent	FLSH	Flash
ABC	Abandon call check	ERW OFHs	Off-hook sent
BRG	Barge-in tone	OIT	Operator intrusion tone
BUSY	Busy tone	ONHs	On-hook sent
CCOL	Coin collect	OPA	Operator attached
CRET	Coin return	OPNI	Open interval
CT	Confirmation tone	OPR	Operator release
HTOT	Home totalizer	ORCC	Operator release coin collect
CW	Call waiting tone	PDT	Party departure tone
DD	Delay dial	PT	Preemption tone
DRF	Double ring forward	RBAK	Ringback
DSAs	DSN alert signal sent	RBAT	Reverse battery
DSCs	DSN clear wink sent	RING	Ring tone
DSRs	DSN reuse wink sent	ROH	Receiver off-hook
DSTs	DSN test signal sent	RT	Reorder tone
DT	Dial tone	WINK	Wink
ERW	Expensive rate warning	ZIP	Zip tone

FBAT	Forward battery		

Table 7-7 Output Messages for Tones/Signals Received by Switch

DISPLAY	DESCRIPTION
??r	Unknown signal received
DSCr	DSN clear wink received
DSFr	DSN wink failure received
DSRr	DSN reuse wink received
DSTr	DSN test signal received
KP	Multifrequency (MF) start pulse
OFHr	Off-hook received
OFPL	Off pulse
ONHr	On-hook received
ONPL	On pulse
ST	MF stop pulse
ST1	MF stop pulse
ST2	MF stop pulse
ST3	MF stop pulse
0 to 9, *, #	Dialed digits/characters

The **9500** poke command provides the craft with immediate printout of the TLWS Response Area. The **9500,LOG** poke command toggles the automatic print option on or off. The automatic print option is best used by toggling it on while the port is idle. Then any digits or signals displayed on the screen are sent to the ROP when the call terminates. If the TLWS screen area is filled to capacity, it is cleared, but the corresponding data is sent to the ROP so that no data is lost. Toggle the print option off when the port goes idle or when printing to the ROP is no longer required.

7.2.13.5.3 Activation

The user activates this feature by entering poke command on the TLWS. When activated, test results are displayed on the TLWS. When the print option is enabled, test results are automatically printed on the ROP at the conclusion of the test. The current results on the screen can be printed on-demand with a manual request.

The following steps are used to activate this feature:

- (1) On the TLWS or master control console (MCC), select Page 160 (Test Position Summary).
- (2) Access an available test position by entering the **16x** poke command (for software releases prior to 5E7, x = 1 through 8 ; for software releases 5E7 and later, x = 1 through 32).
- (3) Go to Page 4000
- (4) Use Page 4000,1 to select the line, or Page 4000,2 to select the trunk to be monitored.

NOTE: One of the following occurs:

- (a) The port is IDLE.
 - The port is seized and the word **SEIZED** is displayed.
 - (b) The port is BUSY.
 - **CAMPED-ON** is displayed and
 - **DO MNTR-BUSY OR MNTR-B&I ONLY** is displayed.
- (5) Select Page 16x to access the 9000 - Miscellaneous TLWS Commands.

- (6) Enter the MNTR-B&I poke command (**4601**) or MNTR-B&I input message to activate monitoring. A T&M phone is automatically reserved for the MNTR-B&I feature.

NOTE: The following are displayed when monitoring is activated:

- **MONITOR B&I** is displayed in the Test Access field on Page 160.
- **MONITOR B&I** is displayed in the Response Block on Page 16x.
- **PRINT OPTION OFF** is displayed in the Response Area on Page 16x.

- (7) To provide printing, do the following:

- (a) To manually request immediate printing, enter poke command **9500**.
- (b) To obtain automatic printing of MNTR B&I results, enter the **9500,LOG** poke command to toggle the print option on. **PRINT OPTION ON** is displayed in the Response Area on Page 16x.

NOTE: With the print option on, test results are printed on the ROP when:

- The monitored line/trunk goes from busy to idle.
- The TLWS Response Area is full and additional information must be displayed.

Monitor the audio and manually record disposition of calls. Communicate with the subscriber using the T&M phone as necessary.

7.2.13.5.4 Operational Restrictions

The following limitations apply:

- The Display Area is not large enough to display all digits and signals generated by a complicated call. Therefore, successive output messages are sent to the ROP every time the TLWS/MCC screen is filled to capacity..
- Not all signals/tones are needed in troubleshooting call failures. Therefore, only the necessary signals and tones are displayed on the TLWS.
- The audible ring (RING) signal is only displayed on incoming OSPS trunk calls, and if all the operators are busy. The busy (BUSY) signal is displayed only for intraoffice calls.
- This feature only displays digits and signals for dial pulse, multi frequency, and dual tone multi frequency signaling.
- This feature is used to monitor only analog lines/trunks and digital trunks. If this feature is used to attempt monitoring ISDN lines or CCS7 trunks, an error message is displayed.
- A valid test position (TP) must be selected, and until released, this TP cannot be used by any other TLWS.
- The T&M phone, assigned to the TLWS used for monitoring, is not available for other test positions or test calls.
- The test position used for monitoring is released one hour after the MNTR B&I feature is activated.

7.2.13.5.5 Deactivation

Under normal operation, this feature may be deactivated by any of the following:

- Enter poke command **4300** - Drop T&M Phone
- Enter poke command **5990** - Release Test
- Enter poke command **4999** - Release Line/Trunk
- Enter **20x** - Release Test Position (for software releases prior to 5E7, x = 1 through 8 ; for software releases 5E7 and later, x = 1 through 32).
- The expiration of an internal 60-minute timer.

7.2.13.5.6 Interactions

Not applicable.

7.2.13.6 Engineering - System Resources

Not applicable.

7.2.13.7 ASSIGNMENT GUIDELINES

Not applicable.

7.2.13.8 SYSTEM OPERATION

This feature is driven from the peripheral control (PC) subsystem which provides information necessary to display the signals and tones. The terminal maintenance (TM) subsystem receives any signal or tone that is detected and analyzed by the PC subsystem. For the MNTR B&I feature to work, the TM subsystem interfaces with PC to get the following information:

- When a transition from an IDLE to a BUSY state occurs
- Whether the BUSY state is due to the monitored line going off-hook with an originating call
- Whether the BUSY state is due to the monitored line ringing with a terminating call
- The value of the digit, signal, or tone being received or sent by the switch on the monitored line.

7.2.13.9 ADMINISTRATION

Not applicable.

8. RECORDED ANNOUNCEMENTS

8.1 RECORDED ANNOUNCEMENT SERVICE (NETWORK ANNOUNCEMENT)

8.1.1 Feature Description

8.1.1.1 Feature Definition

The announcement arrangements consist of hardware and software combinations for supplying information to customers through the use of recorded announcements. Announcements are used to inform customers and operators of certain conditions.

The Alternate Language Local Area Signaling Services (LASS) Announcement Capability feature (99-5E-2331.A) offers Recorded Announcement Unit (RAU) interactive announcements in either of two languages on a per-line basis. The LASS Selective Features that support this special feature are:

- Selective Call Acceptance (SCA)/Computer Access Restriction (CAR),
- Selective Call Forwarding (SCF),
- Selective Call Rejection (SCR),
- Selective Distinctive Alert (SDA), and
- 2-Level Automatic Callback (AC) and 2-Level Customer Originated Trace (COT).

A per-line subscription option provides the LASS announcements in either the *main* language (for instance, English) or the *alternate* language (for instance, Spanish). The service provider (telephone company) determines which language is the *main* language for the office.

8.1.1.2 Availability

The announcement arrangements described in this section are available with all software releases for the 5ESS[®] switch.

8.1.1.3 Limitations

The 15A Recorded Announcement Unit (RAU) can supply up to sixteen channels of recorded announcements, and the 16A RAU can supply up to twenty-four channels of recorded announcements. One channel provides the capability of recording and supplying one announcement. If more than twenty-four channels are needed, an extra 15A Announcement System with four, eight, twelve, or sixteen channels (messages) or a 16A Announcement System with up to twenty-four channels (messages) is required. The 15A and 16A can be equipped with remote record circuits to allow access (recording or monitoring) from any touch tone telephone. The 15A connects to the switch via analog trunks and the 16A via digital trunks.

The 15A and 16A can provide variable message lengths from one second to 120 seconds per channel.

8.1.1.4 Interactions

Not applicable.

8.1.1.5 Restriction Capability

Not applicable.

8.1.1.6 User Operation

For this feature, the customer (user) is defined as the telephone subscriber. The customer performs no special procedures in order to activate the announcement feature. The following announcements are provided by the local announcement machine unless otherwise indicated.

Dial-Tone-First Coin Announcement

Coin stations which have the Dial-Tone-First (DTF) feature return dial tone to the customer before the initial deposit is made. Customers are permitted to make free calls to any number designated by the operating telephone company (OTC), such as directory assistance, emergency service bureau, etc., without an initial deposit. When a deposit is required and the customer dials without a deposit, the DTF coin announcement is returned. This announcement directs the customer to hang up and try the call again after depositing the necessary coin(s).

Local Coin Call Overtime Announcement

In areas with overtime charging, a local call from a coin station is timed. The customer makes a deposit at the beginning of the call for an initial period. The initial period begins when the called party answers. Prior to the end of the initial period, the deposit is collected by the local office. The customer usually hears the movement of coins at the coin station which is an indication that the period is nearing completion. If the coin(s) has not been deposited at the end of the initial period, the local coin overtime announcement informs the customer that an additional deposit is required for an overtime period. Both the calling and called parties hear the announcement. If a deposit is not made, the call is disconnected.

Partial Dial Announcement

If a customer begins to dial a telephone number but does not complete dialing within a specified time interval (usually 16 to 24 seconds), partial dial treatment is returned. The partial dial announcement explains that the call cannot be completed as dialed, and that the customer must hang up and try again.

Permanent Signal Announcement

If the customer fails to begin dialing within a specified time interval after going off-hook, the permanent signal announcement is returned. The announcement explains that the customer must hang up briefly before any call can be placed.

No 1+ Dialing Error Announcement

A customer is connected to the no 1+ dialing error announcement when a NANP DN without the NPA or full NANP DN is dialed without a prefix even though the OTC has specified a 1 prefix requirement. This announcement states that the 1 prefix must precede the telephone number when making such a call. The customer must then hang up before trying to redial. Permanent signal treatment is administered if on-hook does not occur.

Extra 1+ Dialing Error Announcement

The extra 1+ dialing error announcement is reached when a 1 prefix is dialed followed by a number which has not been designated by the OTC as requiring a prefix. The announcement states that local calls must not be prefixed with a 1. The customer must then hang up before trying to redial. Permanent signal treatment is administered if on-hook does not occur.

Vacant Code Announcement

The vacant code announcement is reached when the customer has dialed an invalid office code. This announcement explains that the call cannot be completed as dialed and that the customer should check the number and try again. The customer must then hang up before trying to redial. Permanent signal treatment may be

administered if on-hook does not occur.

Custom Calling Error Announcement

When a customer makes a dialing error while attempting to use a custom calling feature or attempts to use a feature which has not been purchased, the custom calling error announcement is returned. This announcement explains that the call cannot be completed as dialed, or the feature cannot be activated or deactivated as requested, and that the customer should check the instruction book to determine the proper method of utilizing the feature. The customer must then hang up before trying to redial. Permanent signal treatment is administered if on-hook does not occur. The announcement is used for Speed Calling feature errors or for errors with Call Forwarding activation or deactivation. For example, the announcement is used when a customer tries to deactivate Call Forwarding and the feature is already deactivated.

Intercept Announcements

A customer reaches an intercept announcement when attempting to call a telephone number that is vacant or has been changed, disconnected, or is temporarily out of service. The Automatic Intercept System (AIS) provides the intercept announcement. These announcements explain to the customer the condition of the called number (changed, vacant, disconnected, or temporarily out of service). The customer must then hang up before trying to redial. Permanent signal treatment may be administered if on-hook does not occur.

Emergency Overload Announcement

The emergency overload announcement may be provided in place of reorder tone whenever unusual circumstances (such as equipment damage, heavy holiday traffic, etc.) prevent normal calls from being completed. In this case, the announcement is reached even though the customer has dialed correctly. This announcement explains that the call cannot be completed at this time and that it should be attempted again later.

Coinless Public Telephone Service (Charge-a-Call) Announcement

The coinless public telephone service announcement will be given whenever a customer attempts to make a call requiring a coin deposit from a coinless (Charge-a-Call) public telephone. This announcement explains that the call cannot be completed from the coinless telephone, and the instruction card should be referred to, or the operator should be dialed for further instructions.

For information on announcements relating to the Carrier Interconnect feature, refer to Section 3, Carrier Interconnection.

8.1.1.7 System Operation

All local announcements are provided by an RAU which uses the 15A or 16A Announcement System in the 5ESS[®] switch. The software that is used in the 5ESS[®] switch to set up, monitor, provide, and take down announcements and tones, are the feature control call processing programs. These programs provide busy tone, reorder tone, and announcements for calls which must be terminated to a tone or announcement.

8.1.2 Hardware Requirements

Local announcements are provided by the RAU. The 15A or 16A Announcement System is located in any J5D005C miscellaneous cabinet, per SD-97815-01 and J1C267A-1 (for the 15A), and per SD-97816-01 and J1C273A-1 (for the 16A).

The main component of the RAU is the 15A or the 16A Announcement System. Both systems are state of the art microprocessor-controlled digital units with unsurpassed speech quality. The messages are indefinitely stored on Electrically-Erasable Programmable Read Only Memory (EEPROM) chips without batteries or external power.

The following circuit packs can be used in both the 15A and the 16A (except where noted):

- BLD3, 8 channels, 60 seconds per channel,
- BLD4, 8 channels, 60 seconds per channel, one announcement phased or cascaded,
- BLD5, 8 channels, 120 seconds per channel,
- BLD20, 4 channels, 60 seconds per channel,
- BLD21, 4 channels, 60 seconds per channel, line side connection,
- BLD22, 4 channels, 120 seconds per channel,
- BLD23, 4 channels, 120 seconds per channel, line side connection,
- BLD10, digital interface circuit pack that encodes and frames twenty-four channels of announcements into DS1 format (D4 format, AMI line coding) for connection to a T1 trunk interface (16A only), and
- 400B, remote record circuit module (one per BLD circuit pack).

8.1.3 Implementation and Administration

8.1.3.1 Implementation

The translation necessary to provide the Recorded Announcement Service feature can be made via the initial office data administration (ODA) run or by recent change (RC) messages.

8.1.3.2 Administration

8.1.3.2.1 Measurements

Measurements applicable to this feature include peg counts and usage counts assigned to the 15-minute, 30-minute, and 24-hour traffic schedules. Peg counts and usage counts such as partial dial time-out, system block calls, customer dialing irregularities, and terminating calls to intercept can be used for this feature. Refer to 235-070-100, Appendix 1, *5ESS® Switch Administration and Engineering Guidelines — Appendix 1, Traffic And Plant Measurements*, for further details.

8.1.3.2.2 Charging

All announcements are provided to the customer free of charge.

8.1.4 Other Considerations

The permanent signal and partial dial announcements may be combined into one announcement as well as the no 1+ and extra 1+ dialing error announcements. The different types of custom calling feature error announcements may also be combined into one announcement. All announcements are provided either through the use of the RAU or through dedicated facilities to announcement systems such as the AIS or a 6A Intercept System.

In order to implement this feature, the following decisions must be made:

- How many and which announcements are necessary?
- Should permanent signal and partial dial announcements be utilized? Should they be combined into one announcement?

- Should the no 1+ dialing error and the extra 1+ dialing error announcements be combined into one announcement?
- Should the custom calling error announcement be combined into one announcement?
- How many announcement frames are required to provide the necessary announcements?

8.2 RECORDED ANNOUNCEMENT FUNCTION FEATURE

8.2.1 Definition

The Recorded Announcement Function feature uses 32 kb/s speech encoding for variable length, variable content announcement. It is realized in hardware with the Digital Service Unit Model 2 (DSU2) pack in tandem with one to three erasable programmable read only memory (EPROM) array packs capable of 250 seconds of storage capacity each, updatable through firmware. The Operator Services Position System (OSPS) directory assistance (DA) recorded announcement function is built upon this base.

The Custom Announcement capability allows the customer to selectively customize specific phrases which are then linked to form an announcement. The term *phrase* refers to a tone, word, or group of words used in announcement construction. The term *announcement* refers to a linked set of phrases which form an entire audible announcement.

Each Recorded Announcement Function (RAF) service group is equipped with a TN1053 announcement storage circuit (ASC) containing standard phrases for the specific set of features serviced by the RAF. Each RAF service group has two expansion ports for expanded phrase storage. These expansion ports are controlled by the TN1053 and each can contain a TN1054 expansion announcement storage circuit (EASC). For features requiring a large amount of phrase memory, the EASC also contains standard phrases. Custom phrases can also be stored on an EASC. Each EASC can hold standard phrases or custom phrases, but not both.

Standard phrases are encoded speech which has been digitized and edited. These phrases are provided on microcode controlled circuit packs (TN1053 and TN1054). The phrases have been developed in cooperation with feature developers to provide a set of standard announcements for a particular feature. In most cases, the standard announcements will be adequate.

Certain phrases, usually those referencing a feature by name, can be ordered on a custom basis. This allows the switch owner to specify a limited number of phrases to be voiced back in place of the standard phrases provided. The Custom Announcement capability is provided via custom EASC announcement boards from the Lucent Technologies Customer Support Center (CSC).

8.2.2 Background

Standard announcements used by applications available in the 5E6 software release could not easily be customized. In the 5E6 software release, an improved process for customizing announcements has been put into place.

The switch owner can use custom phrases to replace standard Lucent Technologies feature names with local marketing feature names as well as to reword the standard announcements. Custom phrases can also be used to add further instructions or advertising to standard announcement sets.

For 5E7, additional new announcements have been added. These changes can be customized using the same procedure as in 5E6. Since many customers may already have custom packs that need additional custom phrases, a rotation offer will be made to the customer. Lucent Technologies will purchase seed packs and use them to swing out the existing current custom pack. A letter of the offer will be submitted to the customer. Since the packs will be swung out prior to the retrofit order, a letter of intent is required from the customer indicating the number of offices, packs contact names, etc. to handle the rotation. When the actual order comes through, the billing will be rendered.

The Ballwin NCNE organization will administer the rotations which will be offered for both the standard and custom packs.

8.2.3 Availability

This Custom Announcement capability is available in 5E6 and later software releases.

8.2.4 Feature Application

The Custom Announcement capability is provided on a per-office basis. Changes affect all users of a feature.

8.2.5 User Perspective

Not applicable.

8.2.6 User Operation

Not applicable.

8.2.7 Compatibilities

Not applicable.

8.2.8 Interactions

Not applicable.

8.2.9 Engineering

8.2.9.1 Special Planning Considerations

Prior to the preliminary dump (6 weeks before retrofit), it is recommended that the standard RAF packs be grown. If Integrated Services Digital Network (ISDN) display capability is desired for Local Area Signaling Services — Screen List Editing (LASS — SLE), a PH2 or PH3 must be equipped in the office.

The length of an announcement has an effect on traffic and equipment engineering. However, it is anticipated that most custom phrases will replace existing phrases and will not substantially alter the length of the announcement. For traffic engineering information, refer to 5 DOPS *Engineering Information* (Indexes 21, 22, 24, and 28) for each individual feature.

Even though it is possible to equip an office with a single Digital Service Unit Model 2-RAF (DSU2-RAF), it is suggested that consideration for provisioning some amount of spare capacity and redundancy in the DSU2-RAF equipment be given. This will help maintain the engineered grade of service if a DSU2-RAF circuit pack goes out of service or must be taken out of service for maintenance reasons. The 5 DOPS *Switch Engineering Information* provides formulas for engineering the DSU2-RAF for 100 percent capacity.

Tables 8-1 and 8-2 contain information useful in determining the number of DSU2-RAF service groups needed for a given load. Table 8-1 shows the default holding times for the following features:

- Automatic Customer Station Rearrangement (ACSR)
- Advance Services Platform (ASP)
- Remote Access to Call Forwarding (RACF)

- Screen List Editing (SLE)
- 2 Level Automatic Callback/Customer Originated Trace (AC/COT).

Table 8-1 Per-Call Default Holding Times

FEATURE	HOLDING TIME
ACSR	90 Seconds
ASP	30 Seconds
RACF	90 Seconds
SLE	180 Seconds
AC/COT	30 Seconds

For Operator Services Position System (OSPS) feature holding times, refer to 235-060-120, *5ESS® Switch Engineering Procedures — Operator Services*.

Customization may increase the number of groups needed if the average holding times increase significantly.

The default holding time per call (Table 8-1) can be used for computing the load offered to the DSU2-RAF equipment when no other value is available. Usage is referenced in hundred call seconds (CCS).

USAGE in CCS = (# calls * default per-call holding time)/100

Find the Table 8-2 entry closest to (but greater than) the office load and read in the left column the number of DSU2-RAF service groups required.

Table 8-2 DSU-2 RAF Interactive Announcement Poisson Capacity Table

SERVICE GROUPS PROVIDED	EQUIVALENT CIRCUITS	CCS CAPACITY P0.01
1	20	399.0
2	40	963.6
3	60	1564.5
4	80	2184.1
5	100	2815.6
6	120	3455.7
7	140	4102.1
8	160	4753.7
9	180	5409.4
10	200	6068.6

For example, to determine the number of DSU2-RAF service groups needed for LASS — SLE based on 500 calls, find the default per-call holding time for SLE from Table 8-1 and plug the number of calls and the per-call holding time into the CCS USAGE formula as follows:

USAGE in CCS = (500 calls * 180 seconds)/100 = 900 CCS

Using Table 8-2, locate the next higher entry in the CCS CAPACITY column and determine the number of service groups needed under the SERVICE GROUPS PROVIDED column. In this example, 963.6 is the next higher capacity closest to 900 and corresponds to (2) service groups. The EQUIVALENT CIRCUITS column indicates the number of simultaneous calls supported by the number of service groups selected.

A spare custom pack should not be ordered by comcode. It must be ordered through the Region to assure that CSC programs the pack with the custom firmware.

If 5 DOPS is not utilized, refer to the specific feature documents listed for the standard phrases.

- Remote Access to Call Forwarding (RACF) — 235-190-103, *5ESS® Switch Business and Residence Feature Descriptions*
- Automatic Customer Station Rearrangement (ACSR) — 235-190-104, *5ESS® Switch ISDN Feature*

Descriptions

- Screen List Editing (SLE) — 235-190-130, *5ESS® Switch Local Area Signaling Services*
- Advance Services Platform (ASP) — 235-190-125, *5ESS® Switch Advanced Services Platform, Release 0 And 0.1A* and 235-190-126, *5ESS® Switch Advanced Services Platform, Release 0.1B*
- Operator Services Position System (OSPS) — 250-518-111, *OSPS Recent Change Manual*.

Refer to Table 8-3 for information regarding recorded announcement ordering. Allow the following lead times when ordering custom packs:

- New pack requiring customer identification number (CIN) - 13 weeks.
- Reprogram pack requiring CIN - 8 weeks.
- Reprogram pack only - 6 weeks.

All lead times are based from receipt of the telephone equipment order (TEO).

Table 8-3 5E6 Recorded Announcement Matrix

FEATURE	STD APPLIED DURING RETROFIT ^a	STD ANNC/DIGIT STRINGS ^b	STD MSGS TAPE ^{a c}	CUSTOM ANNC TAPE ^b	CUSTOM MSGS TAPE ^{b c}	BELLCORE	
						ANNC TAPE ^b	MSGS TAPE ^c
SERVICE GROUP A ^d							
RACF (RAS)	Y	L-ME	N/A	Y	N/A	N/A	N/A
ACSR	Y	L-MD	N	Y	N/A	N/A	N
LASS — SLE	Y	L-MF	L-MH	Y	L-MK	L-MG	L-MJ
2LVL AC/COT	e	N/A	N/A	Y	N/A	N/A	N/A
SERVICE GROUP B ^d							
ASP	f	N/A	N/A	N	N/A	N/A	N/A
SERVICE GROUP C ^d							
OSPS T&A ^g	Y	N/A	N/A	N	N/A	N/A	N/A
SERVICE GROUP D ^d							
OSPS DA	Y	N/A	N/A	Y	N/A	N/A	N/A
SERVICE GROUP E ^d							
800 DA	Y	N/A	N/A	Y	N/A	N/A	N/A
Notes:							
a. APPLIED DURING RETRO allows the Lucent Technologies software engineer to fill out the ANNAPL form so that office data administration (ODA) will map the standard announcements and digit strings into the switching module (SM) software. If an ISDN line is assigned in each ISDN SM, ODA will map in the standard ISDN display messages into each of the SMs.							
b. The columns are used based on the designator (Y, N, etc.). The STD ANNC/DIGIT STRINGS column is used for RACF, ACSR, and LASS — SLE when announcement data is not applied during retrofit. The STD MSGS TAPE column is used for LASS — SLE if not applied during retrofit. This information is provided on a tape to the office. The CUSTOM ANNC TAPE column provides a tape to the office linking the custom announcements to the standard announcements. This tape is provided per the specified CIN. The CUSTOM MSGS TAPE provides the RCs for customized ISDN display messages. The BELLCORE ANNC TAPE and BELLCORE MSGS TAPE columns provide the Bellcore phrases for the audible announcements and display messages.							
c. MSGS refers to ISDN display messages.							

- d. Service groups cannot be mixed. Features can only be grouped as shown.
- e. For 5E6 2LEVEL AC/COT is added by software update 91-0014 as a secure feature. A password session is required to make it operational.
- f. Since ASP only has phrases, ODA automatically places the standard phrases into the administrative module (AM) without filling out the *Announcement Application* screen.
- g. T&A refers to Toll and Assist.

8.2.9.2 Hardware

The DSU2 pictorials shown in Figure 8-1 are examples of possible configurations providing firmware which give audible interactive announcements to a user.

<u>LASS — SLE</u>				<u>OSPS</u>			
	STD	STD	CUST		STD	CUST	
T N 8 3 3	T N 1 0 5 3	T N 1 0 5 4	T N 1 0 5 4	T N 8 3 3	T N 1 0 5 3	T N 1 0 5 4	S P A R E

Figure 8-1 DSU2 Unit J5D003EA-1

Standard (STD) packs have Lucent Technologies defined phrases linked by software into announcements. If the customer wants to use custom phrases, the new phrases can be supplied to Lucent Technologies along with the affected announcements by returning a marked form showing these requirements. Lucent Technologies will then provide a custom (CUST) pack and a recent change (RC) tape to implement the customization. In addition, for Local Area Signaling Services — Screen List Editing (LASS — SLE), there is an ISDN display message capability when doing the session on an ISDN display terminal. A form is also available to indicate any changes the customer would like made. An RC tape is then provided to the customer. Both the announcements and display messages can be modified to be consistent with the portion of Bellcore TR-TSY-000220 being implemented in the 5E6 software release. Once a custom set of phrases is created, a CIN is assigned to the pack and display messages which can be used for future ordering purposes. The following J-Drawing lists, along with the matrix shown in Table 8-3, provide information on what can be ordered to manage announcements and messages.

L-MA	Required on a <i>once per switch owner request</i> basis when the customer requires customization of the standard recorded announcements and phrases. Requires a marked form.
L-MB	Required in addition to L-MA; specify one L-MB for each standard phrase to be customized per switch owner request. Requires a marked form.
L-MC	Required in addition to each L-15A to provide customized MC5D155A1 firmware programming. Requires a CIN.
L-MD	Required in addition to L-18 when standard ACSR announcements are to be loaded using a programmed magnetic tape. (5E6 only)
L-ME	Required in addition to L-12 when standard RAS (RACF) announcements are to be loaded using a programmed magnetic tape. (5E6 and later)

L-MF	Required in addition to L-18 when standard LASS — SLE announcements are to be loaded using a programmed magnetic tape. (5E6 only)
L-MG	Required in addition to L-15A when LASS — SLE Bellcore announcements are to be loaded using a programmed magnetic tape. This list provides the Bellcore specified phrases and requires that the custom pack L-15A be ordered or available. (5E6 only)
L-MH	Required in addition to L-18 when standard LASS — SLE ISDN display messages are to be loaded using a programmed magnetic tape. (5E6 only)
L-MJ	Required in addition to L-15A when Bellcore-compatible LASS — SLE ISDN display messages are to be loaded using a programmed magnetic tape. This list modifies L-MH making it compatible with L-MG. (5E6 only)
L-MK	Required in addition to L-15A when custom LASS — SLE ISDN display messages are to be loaded using a programmed magnetic tape and can be used to modify L-MH and/or L-MJ. Requires a marked form or CIN. (5E6 only)

Each L-MD through L-MK ordered will result in the switch owner being billed for a magnetic tape programmed and shipped by the factory. This tape will contain recent change *scripts* which will load standard, Bellcore, and/or custom announcements/ISDN display messages into the 5ESS[®] switch office dependent data (ODD), via the Administrative Module (AM) tape drive, after the office is up on the 5E6 software release. A single magnetic tape can be programmed with any combination of L-MD through L-MK as specified by the switch owner.

For more information on ISDN display messages for LASS — SLE, refer to 235-190-130, 5ESS[®] *Switch Local Area Signaling Services*.

Figures 8-2 , 8-3 , and 8-4 specify the steps required to provide an office with custom announcements. Figure 8-2 diagrams the sequence needed to get customized announcements for a new office. Figure 8-3 diagrams the sequence needed to get customized announcements for a retrofit office. Figure 8-4 diagrams the sequence needed to get customized announcements for a retrofit office when adding a feature after the retrofit.

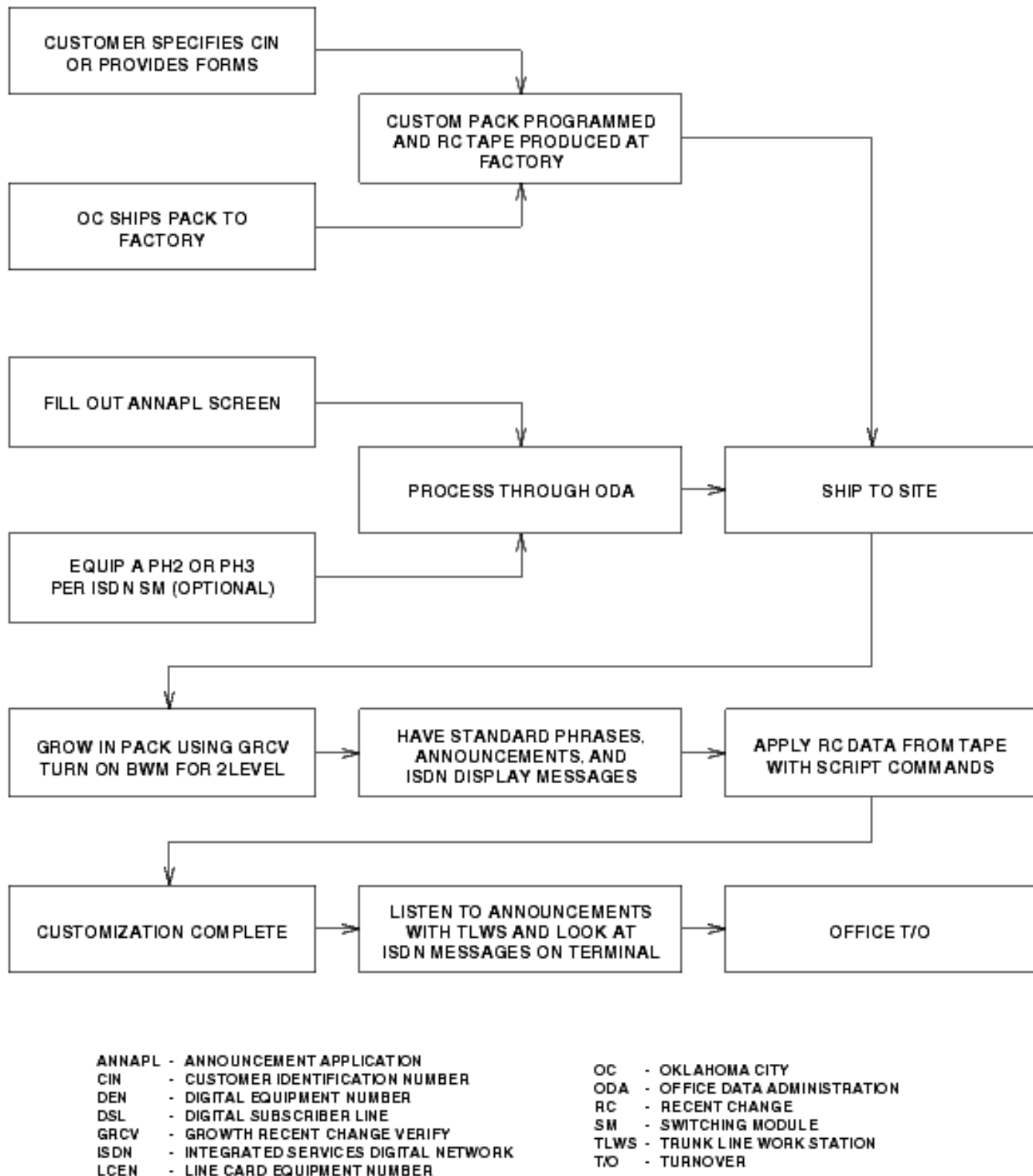


Figure 8-2 Custom Announcement (New Start 5E6)



Figure 8-3 Custom Announcement (Retrofit to 5E6)

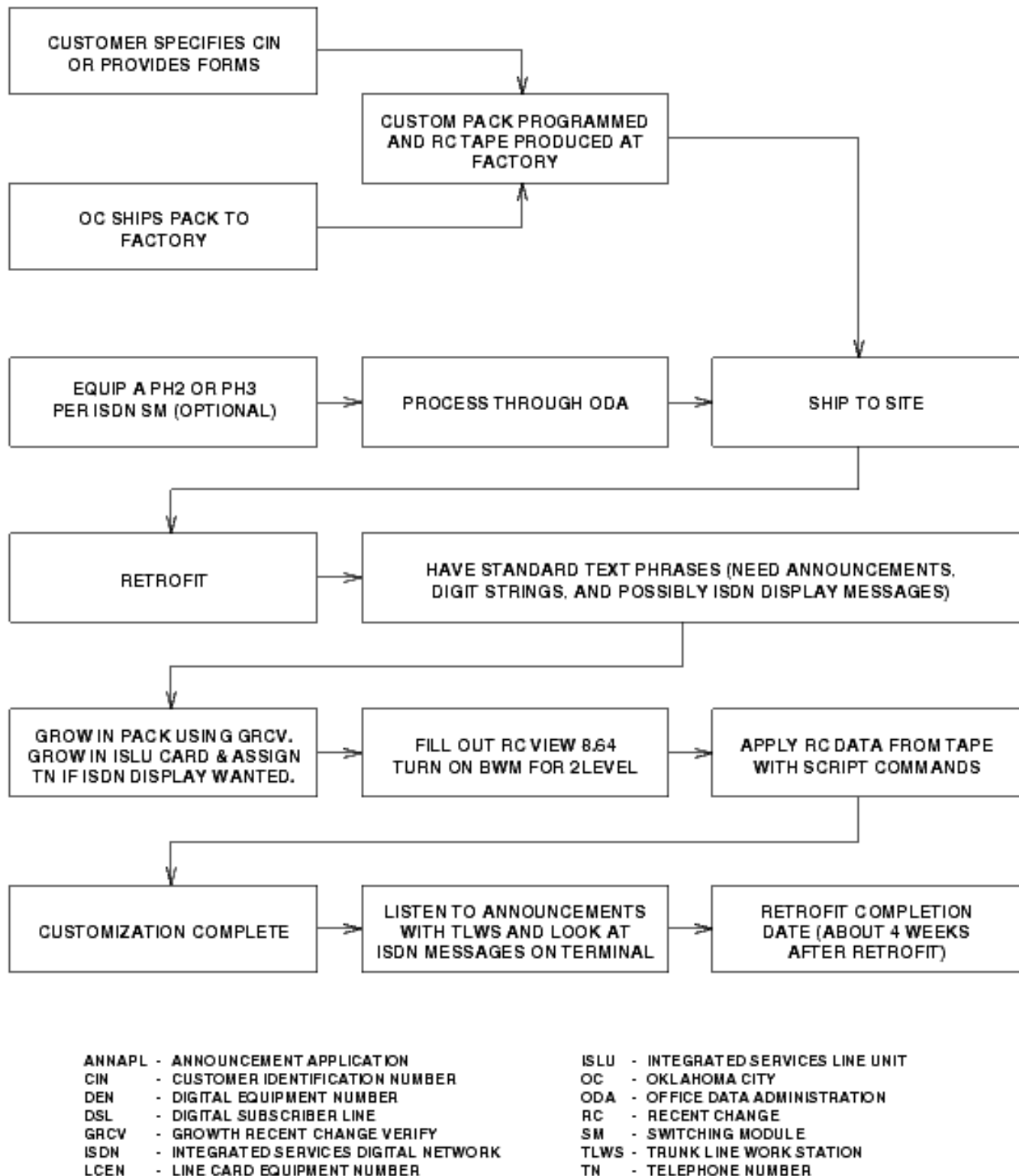


Figure 8-4 Custom Announcement (Add Feature After Retrofit 5E6)

For 5E7, changes have been made to LASS SLE, ACSR, 2LEVEL (AC/COT) and OSPA T&A. A number of lists were added to J5D003EA-1 to manage the new changes. They are as follows:

L-E	Required to reprogram customer-owned MC5D114A1 or A2 microcoded circuit packs to MC5D114A3 via the Billable Rotation Process. MC5D114A3 provides More Efficient Call Handling (MECH) for 5E6 and later, Sub Account Billing for 5E6 and later, and Selected Toll and Assist phrases for 5E6 and later. This list cannot be ordered for new service groups.
L-F	Required to reprogram customer-owned MC5D114A3 microcoded circuit packs to MC5D114A4 via the Billable Rotation Process. MC5D114A4 provides CAS-3 for 5E7 and later, MECH for 5E6 and later, Sub Account Billing for 5E6 and later, and Selected Toll and Assist phrases for 5E6 and later. This list cannot be ordered for new service groups.
L-G	Required to reprogram customer-owned MC5D142A1 microcoded circuit packs to MC5D142A2 via the Billable Rotation Process. MC5D142A2 provides Enhanced 2 Level COT/AC for 5E7 and later, 2 Level COT/AC for 5E6 and later, and RACF for 5E6 and later. This list cannot be ordered for new service groups.
L-H	Required to reprogram customer-owned MC5D143A2 microcoded circuit packs to MC5D143A3 via the Billable Rotation Process. MC5D143A3 provides Standard T.R. 220-compliant LASS-SLE for 5E7 or later, Standard LASS-SLE for 5E6 or later, and ACSR for 5E6 or later. This list cannot be ordered for new service groups.
L-J	Required to reprogram customer-owned MC5D155A1 Custom Announcement packs from one customer identification number (CIN) to another via the Billable Rotation Process. This list is not necessarily software release dependent, nor can it be ordered for new service groups.
L-ML	This list provides audible Standard ACSR announcements for 5E7 via a programmed magnetic tape. (5E7 only)
L-MM	This list provides audible Standard 2 Level/COT announcements for 5E7 via a programmed magnetic tape. (5E7 only)
L-MN	This list provides audible Standard T.R. 220 compliant LASS-SLE announcements for 5E7 via a programmed magnetic tape. (5E7 only)
L-MP	This list provides Standard SLE, AC, COT and INSP ISDN display messages for 5E7 via a programmed magnetic. (5E7 only)
L-MQ	Provides a magnetic tape that customizes T.R. compliant 5E7 LASS-SLE audible announcement header (110-189 only). (5E7 only)
L-MR	Provides a programmed magnetic tape that customizes the 5E7 T.R. compatible SLE ISDN display messages (messages 110-189 only). (5E7 only)
L-MS	Provides a magnetic tape that loads the 5E7 COT, AC, and INSP ISDN display message customizations. (5E7 only)

In order to assist in the selection of these lists, a matrix table for 5E7 is shown in Table 8-4 . The main consideration is what does the office have in it while it is on 5E6. Using that as a basis the new lists provide a way to upgrade the existing announcement packs and to provide new RC changes to incorporate the new standard and/or custom announcement and ISDN display changes. Except for ACSR, the packs can be grown in either before or after the retrofit but the RC changes can not be made until after the office is up on 5E7. For ACSR, the pack must be grown in prior to the retrofit and the RC changes made after the retrofit. Figures 8-5 , 8-6 , and 8-7 flow chart the usual processes to add the new announcements.

Table 8-4 J5D003EA-1 Lists for 5E7 Applications

APPLICATION	LISTS							
	L-MD RACF	L-ML ACSR	L-MM 2-LVL	L-MN SLE	L-MP STD DISP	L-MQ SLE AUD 110-189	L-MR SLE CUST 110-189	L-MS COT, AC INSP
New-start	X ^a	X ^a	X ^a	X ^a	X ^b	X	X ^b	X ^b
Retrofit		X ^c	X ^{c d}	X ^{a c}	X ^b	X	X ^b	X ^b
Growth	X	X	X ^d	X	X ^{b e}	X	X ^b	X ^b
Notes: a. When the Regional Software Engineer completes the ANNAPL form for these features during the retrofit process, or when the engineer builds each feature using ODA (new office), it is not necessary to order these M-lists. Retrofitting offices will have the Standard Lucent Technologies headers populated per each features' ANNAPL form. New-start offices will automatically have the Standard headers populated by ODA. b. To order this list, it is required that at least one PH2 and or PH3 be equipped in the office. If a PH2 and or PH3 is equipped either at the new office for this time frame, or at retrofit, do not order this list. The ISDN display messages will automatically be populated into the office ODD. c. Do not order this list if this feature is equipped on 5E6. d. This list should only be ordered when after consultation with TELCO Engineer, the Regional Engineer determines that the 5E6 2-Level AC/COT announcement set has not been equipped (that is, software update 91-0014 has not been loaded, and a secured feature password session did not take place). e. This list is always required when the LASS-SLE feature is grown in after the retrofit from 5E5 to 5E6, or when the LASS-SLE, ACSR or 2-Level COT/AC features are being grown after the retrofit from 5E6 to 5E7.								

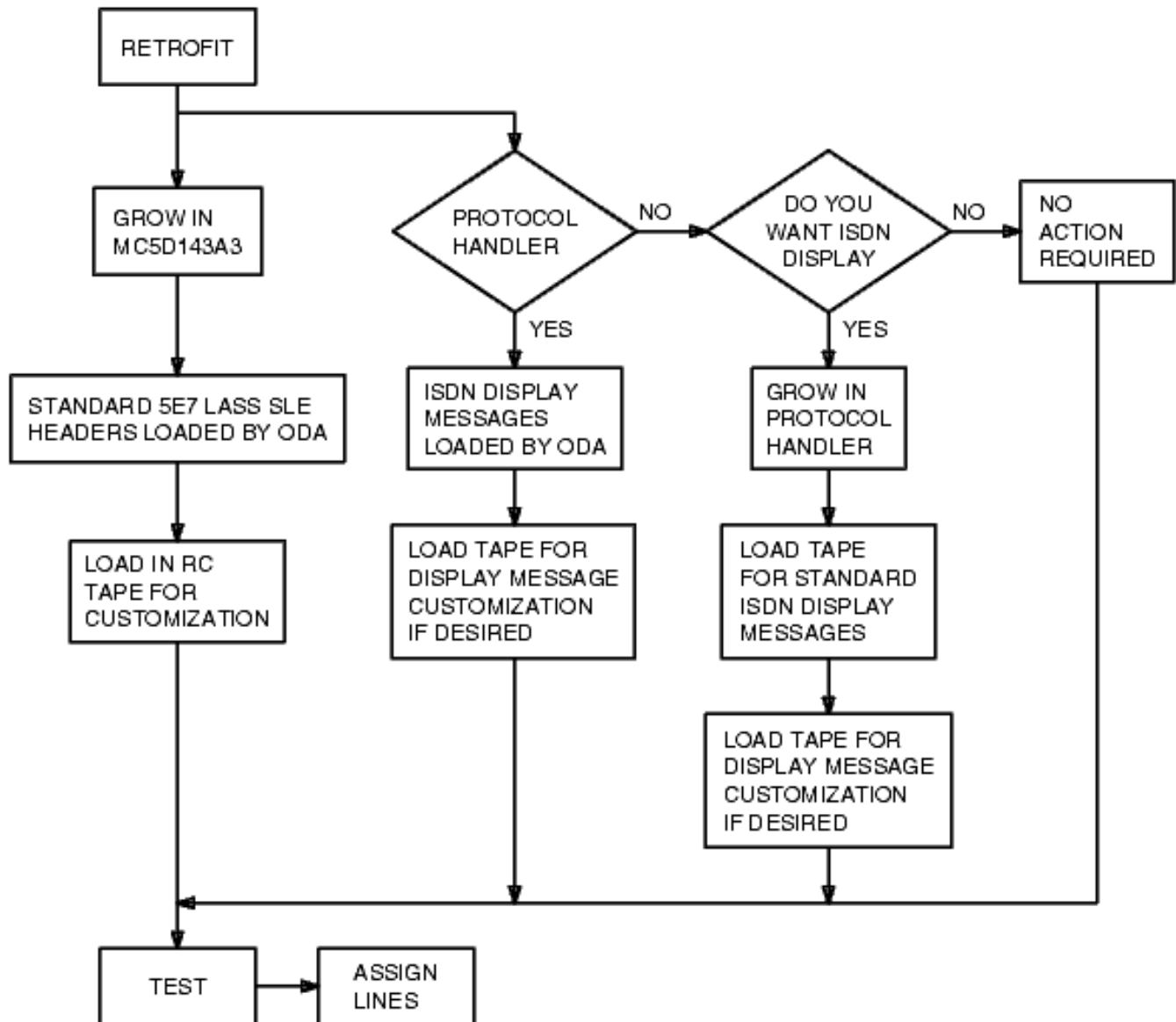


Figure 8-5 5E6 To 5E7 Announcement Flow Chart (LASS Equipped In 5E6)

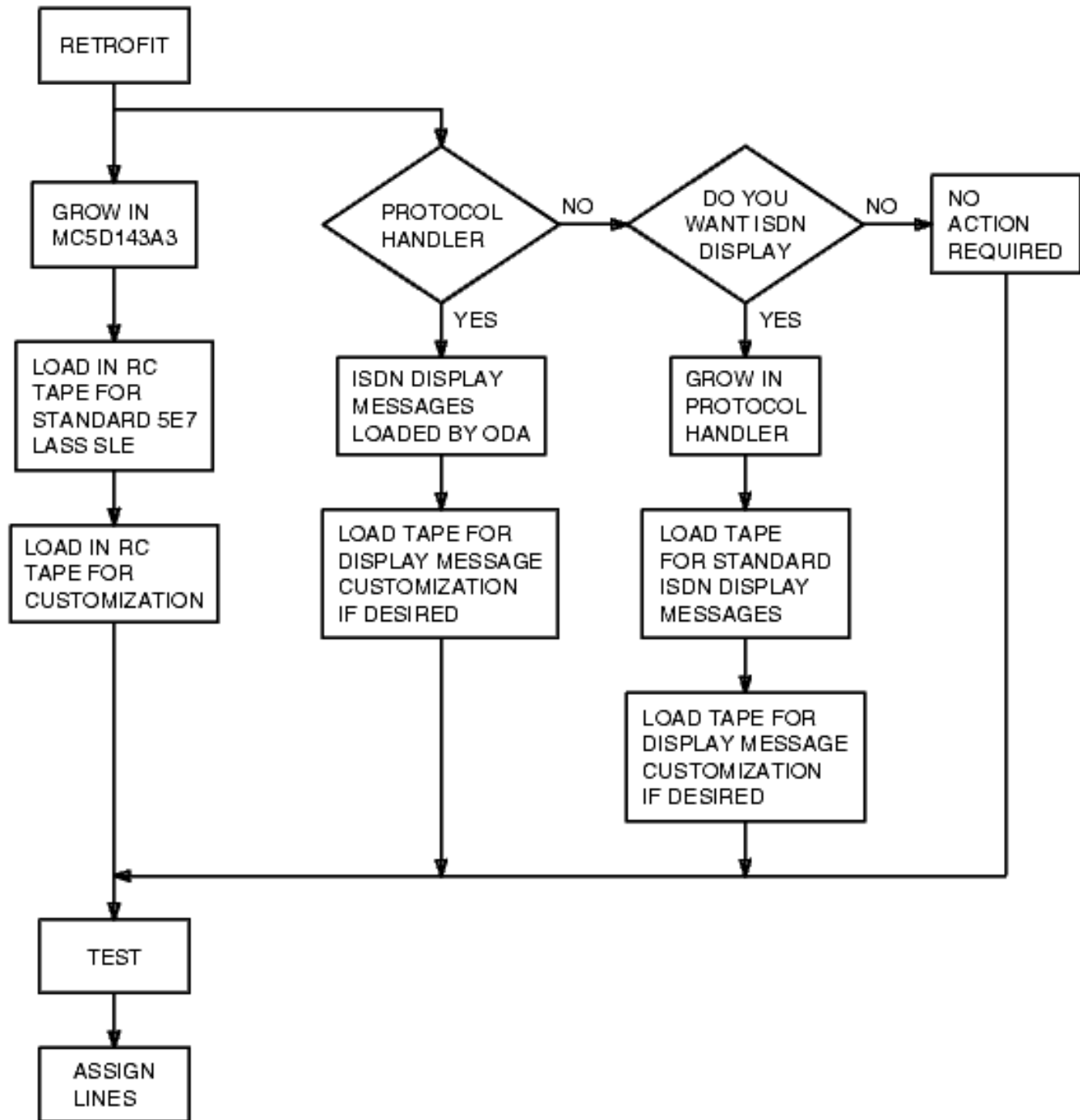


Figure 8-6 5E6 To 5E7 Announcement Flow Chart (LASS Not Equipped In 5E6)

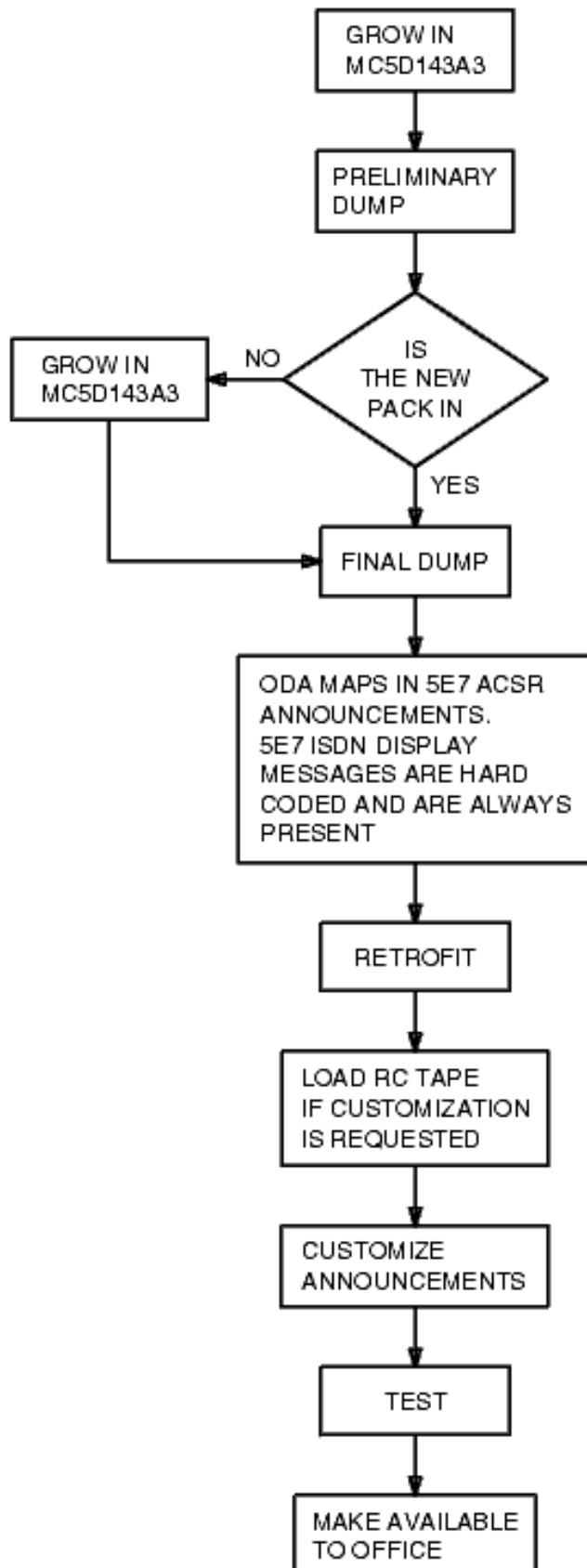


Figure 8-7 5E6 To 5E7 Announcement Flow Chart (ACSR Equipped In 5E6)

The LASS SLE in 5E7 achieves compliance to Bellcore TR/TSY000220. Table 8-5 shows which announcements will be played depending on whether you select the 5E6 or 5E7 versions. When you retrofit, the ODA will continue to show the 5E6 set. When the customer is ready, they can make an RC change to tell the software to use the new 5E7 set.

Table 8-5 5E6 Versus 5E7 Announcement Headers

HEADER NUMBER		HEADER NUMBER		HEADER NUMBER	
5E6	5E7	5E6	5E7	5E6	5E7
1	110,111	39	39	77	77
2	112	40	144	78	78
3	112	41	145,146	79	79
4	113	42	130	80	167,168
5	114	43	43	81	169,170
6	115	44	147	82	171
7	116	45	147	83	172
8	117	46	147	84	173
9	118	47	47	85	174
10	119	48	149	86	175
11	120,121	49	150	87	176
12	122	50	151	88	140,185
13	13	51	152	89	141,186
14	14	52	52	90	178,179
15	15	53	53	91	15
16	16	54	154	92	71
17	123,124	55	155	93	75
18	125	56	156	94	180
19	126	57	157	95	180
20	127,128	58	58	96	181
21	128,183	59	59	97	185,186
22	129,184	60	60	98	187
23	130	61	61	99	99
24	132	62	62	100	188
25	25	63	63	101	189
26	26	64	64	102	189
27	135	65	161		131
28	136	66	162		133
29	137	67	162		134
30	30	68	163		148
31	138,139	69	69		153
32	140,141	70	70		158
33	141	71	71		159
34	140	72	72		160
35	35	73	164		165
36	142	74	74		166
37	143	75	75		177
38	38	76	76		

For those customers using the basic 2LEVEL AC/COT in 5E6, ODA will move the announcements into the 5E7 format and add the enhanced feature announcements. The circuit pack contains all the phrases required for 5E6 and 5E7. The correlation between 5E6 and 5E7 is shown in Table 8-6.

Table 8-6 Basic 2LEVEL AC/COT Announcement Headers

5E6	5E7
249	1
250	3
251	5
252	7
253	9
254	10
255	11
-	2
-	4
-	6

The ACSR immediately uses the new announcements when it comes up on 5E7. Therefore, as shown in Figure 8-7, the pack must be grown in prior to the retrofit.

The OSPS T&A goes through two changes, one in the software release and one in the 5E7 Software Update. Both changes are supported by the customization process and the billable rotation process.

For more information on ISDN display messages for LASS — SLE, refer to 235-190-130, *5ESS® Switch Local Area Signaling Services*.

8.2.9.3 Software

Not applicable.

8.2.10 Assignment Dependencies and Limitations

8.2.10.1 Dependencies

To customize the standard feature announcements, the standard announcements and hardware packs must be in place for that feature.

8.2.10.2 Limitations

Announcements are made by linking one or more phrases together using the specific feature software. Due to the size of the *mailbox* used for communication in the RAF, an announcement can be no more than 50 phrases long due to a software limitation (see Figure 8-8). The ASC is limited to a maximum storage of 248 phrases. Announcement phrase construction is based on a 256 ms segment size. Therefore, items such as pauses, tones, and word boundaries are in 256 ms multiples. This means the minimum phrase and announcement size is 256 ms. The maximum length of any phrase is limited by the size of the ASC on which it resides as well as the software. Currently, the software limits the phrase length for both the TN1053 and TN1054 to 256 seconds, even though the hardware is capable of longer phrase lengths.

Custom phrases will not be added to packs providing standard phrases.

8.2.11 Service Order Perspective

Not applicable.

8.2.12 Feature Implementation

8.2.12.1 Hardware Installation

Install hardware as described in 235-105-231, *5ESS® Switch Hardware Change Procedures — Growth*. For the code of the circuit pack, enter 5D155XXX, where XXX is the value of the customer identification number (CIN).

8.2.12.2 ODA Implementation

The ANNAPL form defines (for the software) the application and switching modules (SMs) having RAF packs and tells the software where to put the announcements and digit strings.

In the 5E6 software release, each SM had to be populated separately. In the 5E6 software release, the software is told which SMs are affected and the office data administration (ODA) automatically maps the information to all specified SMs.

For 5E7, the format of the ISDN display messages change. New types of display messages are available and the format changes from a two parameter to a three parameter configuration to allow the software to distinguish the different types of display messages. The types are as follows:

```
SLE      LASS SLE
AC       2LEVEL AC
COT      2LEVEL COT
INSP     INSPECT KEY ON CPE
```

The ODA will also map 5E6 announcements and ISDN display messages to 5E7 as discussed in Section 8.2.9.2 .

8.2.12.3 Recent Change Procedures

For new offices, a list of the new announcements and phrases are provided with the pack to be added through recent change to the switching module (SM) containing the DSU2-RAF. For retrofitting offices, the announcements and phrases can be added through recent change after the retrofit. Once the new phrases are added, the line assignments can be made for the feature using the new announcements.

When the pack is customized, a recent change tape is created and returned with the pack. The recent change tape affects a combination of Views 8.60, 8.61, 8.62, or 8.63. It can also include View 8.65 if the ISDN display messages are affected.

Tapes built for 5E6 will not work on 5E7.

8.2.12.3.1 Deleting Customer Service

Not applicable.

8.2.12.3.2 Changing Customer Service

Not applicable.

8.2.12.4 Assignment Verification

Verify results with a trunk line work station (TLWS) using 235-105-110 *5ESS® Switch System Maintenance Requirements and Tools* which is organized by software release. Reference 4000p for Task Selection and 5200p for Test Selection.

After selecting 4106,X (where X=SM,RAF,MEM) to seize a RAF trunk, go to 5200,3 (Supervision) to play announcements and/or phrases.

When selecting 5208,W,X,Y,Z or 5210,W,X,Y,Z (where W=APPLICATION, X=HDR ID, Y=TRLR ID, and Z= INFL), refer to the appropriate RC/V views 8.60 through 8.64 to select the correct values.

The application, header ID, trailer ID, and inflection correspond to the information in RC/V views 8.60 through 8.64. For example, to play announcement header 61 for the LASS application, check RC/V view 8.61 (Announcement header phrase list) to see if the key phrase 16385 exists in the announcement header. If key phrase 16385 exists in the announcement header, supply a nonzero value for the inflection. This value indicates the number of digits to be voiced back to the user.

If a nonzero inflection ID is supplied when one is not required (because key phrase 16385 does not appear in the announcement header or announcement trailer) the MCC/STLWS will respond with 'ANNOUNCEMENT DATA BASE PROBLEM'

8.2.13 Feature Operation

8.2.13.1 Speech Storage

In the RAF, speech is stored in erasable programmable read-only memory (EPROM). On the TN1053, up to 36 512K bit EPROMs are used (32 data and 4 parity). On the TN1054, up to 36 1M bit EPROMs are used (32 data and 4 parity). For standard phrase sets, the total number of EPROMs used is based on the total amount needed. The phrase sets are controlled and referenced by a unique microcode number associated with each set.

8.2.13.2 Custom Announcement Hardware

Circuit boards used for custom announcements have a microcode which equips all 36 EPROMs. This allows approximately 260 seconds of speech on the TN1053, and approximately 520 seconds of speech on the TN1054.

For the 5E6 and later software releases, custom announcements are provided on a TN1054 (microcode 5D155) residing in one of the expansion slots in the DSU2-RAF. This pack is programmed with test firmware at the factory and has CIN of A10. CSC will reprogram the pack with the appropriate custom phrases and provide a CIN label which can be used for ordering and tracking purposes. Installation personnel can easily install the reprogrammed circuit pack and will provide information to the customer to complete the Recent Change/Verify (RC/V) activities.

8.2.13.3 Call Processing Software

When the 5ESS[®] switch software needs to play an announcement through the DSU2-RAF, several relations must be accessed. These relations include the following:

- RLannc_hdr — Converts an announcement header ID into a list of phrases (RC/V View 8.61).
- RLannc_trl — Converts an announcement trailer ID into a list of phrases (RC/V View 8.62).
- RLannc_dig — Tells the DSU2-RAF which inflections to use in voicing back digit strings (RC/V View 8.60).
- RLphrases — Lists the text in each phrase (RC/V View 8.63).

The software reads the RLannc_hdr and RLannc_trl relation with a given announcement ID and application. It then takes the list of phrases and expands any replacement phrase. The replacement phrases are currently phrase numbers 16385 and 16386. They indicate that the phrase will be replaced by a variable (for example, a telephone number). To expand the replacement phrase, the software uses the digit count of the variable and the application as the keys to the RLannc_dig relation. This expanded list of phrases is passed to the DSU2-RAF hardware for playback. A pictorial representation of the relations involved when the software requests an announcement to be played is shown in Figure 8-8.

RLannc_hdr

Application	Announcement ID	Duration	Up to 67 Phrases

RLannc_trl

Application	Announcement ID	Duration	Up to 67 Phrases

RLphrases

Application	Phrase ID	Duration	Phrase text (up to 65 characters)

RLannc_dig

Application	Inflection ID	Duration	Up to 50 inflection commands

Figure 8-8 Relations Used During Announcement Playback**8.2.14 Administration****8.2.14.1 Measurements**

Customization does not affect the standard feature measurements.

8.2.14.2 Billing

Not applicable.

8.3 SERVICE ANNOUNCEMENT SYSTEM**8.3.1 Definition**

The Service Announcement System (SAS) feature allows the customer to selectively customize specific phrases which are then linked to form an announcement. In this case, *phrase* refers to a tone, word, or group of words used in announcement construction, and *announcement* refers to a linked set of phrases which form an entire audible announcement.

Certain phrases, usually those referencing a feature by name, can be ordered on a custom basis. This allows the switch owner to specify a limited number of phrases to be voiced back in place of the standard phrases provided. The Custom Announcement capability is provided via custom Flash Cards from the Lucent Technologies Customer Support Center (CSC).

In the 5E11 software release, a SAS Workstation is available which allows telephone company personnel to quickly add, delete, and modify SAS announcements themselves. The workstation provides the ability to enter, record, and edit recorded announcements and to encode the announcements on SAS flash memory cards. The cards can then be shipped to the switch site where the new or updated announcements are needed and installed in the SAS. The SAS Workstation also provides the capability to effectively and conveniently keep track of what announcement data is on each switch and each SAS service group.

For information on the installation and operation of the SAS Workstation, see the *Service Announcement System Workstation User's Guide* (201-526-010).

8.3.2 Background

SAS is a high-capacity replacement for the Recorded Announcement Function (RAF). SAS provides thirty-two channels of coin and Dial-Through Announcement (DTA) capability, where RAF provides only twenty channels. SAS also provides up to 1,000,000 announcement seconds, where RAF only provides 1300.

8.3.3 Availability

The SAS feature is available in 5E9(2) for CSG applications, and in 5E10 and later software releases for all other applications.

8.3.4 Feature Application

The SAS feature is provided on a per-office basis. Changes affect all users of a feature.

8.3.5 User Perspective

Not applicable.

8.3.6 User Operation

Not applicable.

8.3.7 Compatibilities

Not applicable.

8.3.8 Interactions

Not applicable.

8.3.9 Engineering

8.3.9.1 Special Planning Considerations

Even though it is possible to equip an office with a single Digital Service Unit Model 2-SAS (DSU2-SAS), it is suggested that consideration for provisioning some amount of spare capacity and redundancy in the DSU2-SAS equipment be given. This will help maintain the engineered grade of service if a DSU2-SAS circuit pack goes out of service or must be taken out of service for maintenance reasons. The 5 DOPS *Switch Engineering Information* provides formulas for engineering the DSU2-SAS for 100 percent capacity.

Tables 8-7 and 8-8 contain information useful in determining the number of DSU2-SAS service groups needed for a given load. Table 8-7 shows the default holding times for the following features:

- Automatic Customer Station Rearrangement (ACSR)
- Advance Services Platform (ASP)
- Remote Access to Call Forwarding (RACF)
- Screen List Editing (SLE)

- 2 Level Automatic Callback/Customer Originated Trace (AC/COT).

Table 8-7 Per-Call Default Holding Times

FEATURE	HOLDING TIME
ACSR	90 Seconds
ASP	30 Seconds
RACF	90 Seconds
SLE	180 Seconds
AC/COT	30 Seconds

For Operator Services Position System (OSPS) feature holding times, refer to 235-060-120, *5ESS® Switch Engineering Procedures — Operator Services Position System*.

Customization may increase the number of groups needed if the average holding times increase significantly.

The default holding time per call (Table 8-7) can be used for computing the load offered to the DSU2-SAS equipment when no other value is available. Usage is referenced in hundred call seconds (CCS).

USAGE in CCS = (# calls * default per-call holding time)/100

Find the Table 8-8 entry closest to (but greater than) the office load and read in the left column the number of DSU2-SAS service groups required.

For example, to determine the number of DSU2-SAS service groups needed for LASS — SLE based on 500 calls, find the default per-call holding time for SLE from Table 8-7 and plug the number of calls and the per-call holding time into the CCS USAGE formula as follows:

USAGE in CCS = (500 calls * 180 seconds)/100 = 900 CCS

Using Table 8-8, locate the next higher entry in the CCS CAPACITY column and determine the number of service groups needed under the SERVICE GROUPS PROVIDED column. In this example, 963.6 is the next higher capacity closest to 900 and corresponds to (2) service groups. The EQUIVALENT CIRCUITS column indicates the number of simultaneous calls supported by the number of service groups selected.

Table 8-8 DSU-2 SAS Interactive Announcement Poisson Capacity Table

SERVICE GROUPS PROVIDED	EQUIVALENT CIRCUITS	CCS CAPACITY P0.01
1	32	399.0
2	64	963.6
3	96	1564.5
4	128	2184.1
5	160	2815.6
6	192	3455.7
7	224	4102.1
8	256	4753.7
9	288	5409.4
10	320	6068.6

A spare custom pack should not be ordered by comcode. It must be ordered through the Region to assure that CSC programs the pack with the custom firmware.

If 5 DOPS is not utilized, refer to the specific feature documents listed for the standard phrases.

- Remote Access to Call Forwarding (RACF) — 235-190-103, *5ESS® Switch Business And Residence Feature Descriptions*
- Automatic Customer Station Rearrangement (ACSR) — 235-190-104, *5ESS® Switch ISDN Feature Descriptions*

- Screen List Editing (SLE) — 235-190-130, *5ESS® Switch Local Area Signaling Services*
- Advance Services Platform (ASP) — 235-190-125, *5ESS® Switch Advanced Services Platform, Release 0.1 And 0.1A* and 235-190-126, *5ESS® Switch Advanced Services Platform, Release 0.1B*
- Operator Services Position System (OSPS) — 250-518-111, *OSPS Recent Change Manual*.

Refer to Table 8-3 for information regarding recorded announcement ordering. Allow the following lead times when ordering custom packs:

- New pack requiring customer identification number (CIN) 13 weeks
- Reprogram pack requiring CIN 8 weeks
- Reprogram pack only 6 weeks.

All lead times are based from receipt of the telephone equipment order (TEO).

8.3.9.2 Hardware

Each SAS service group is equipped with a controller board (TN1841) and up to four memory boards (TN1842). Each memory board can contain up to eight flash memory cards, each with 4 MB to 64 MB, giving a total maximum memory capacity of 2 GB per SAS unit. The speech storage capacity of the flash memory cards is as follows:

4 MB	422 seconds
10 MB	1200 seconds
20 MB	2500 seconds

Up to eight SAS units can be equipped in a Switching Module (SM). Up to eight SAS units can be equipped in an SM-2000.

Figure 8-9 shows an example of the arrangement of SAS hardware in the DSU2 Unit.

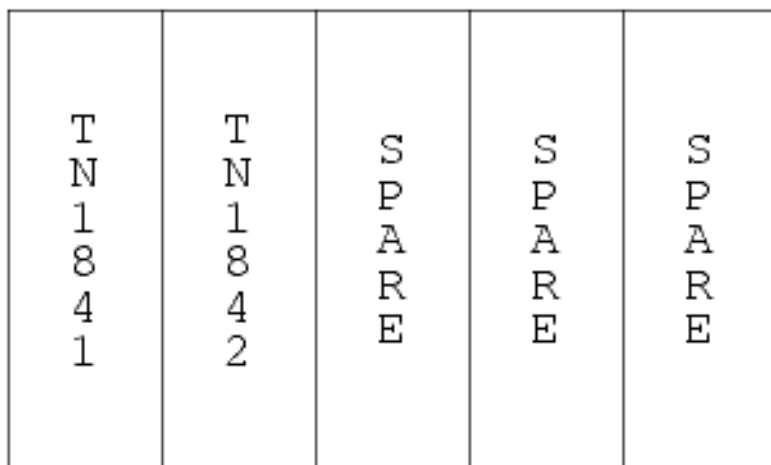


Figure 8-9 SAS Modules In DSU2 Unit J5D003EA-1

Figures 8-10, 8-11, and 8-12 specify the steps required to provide an office with custom announcements. Figure 8-10 diagrams the sequence needed to get customized announcements for a new office. Figure 8-11 diagrams

the sequence needed to get customized announcements for a retrofit office. Figure 8-12 diagrams the sequence needed to get customized announcements for a retrofit office when adding a feature after the retrofit.

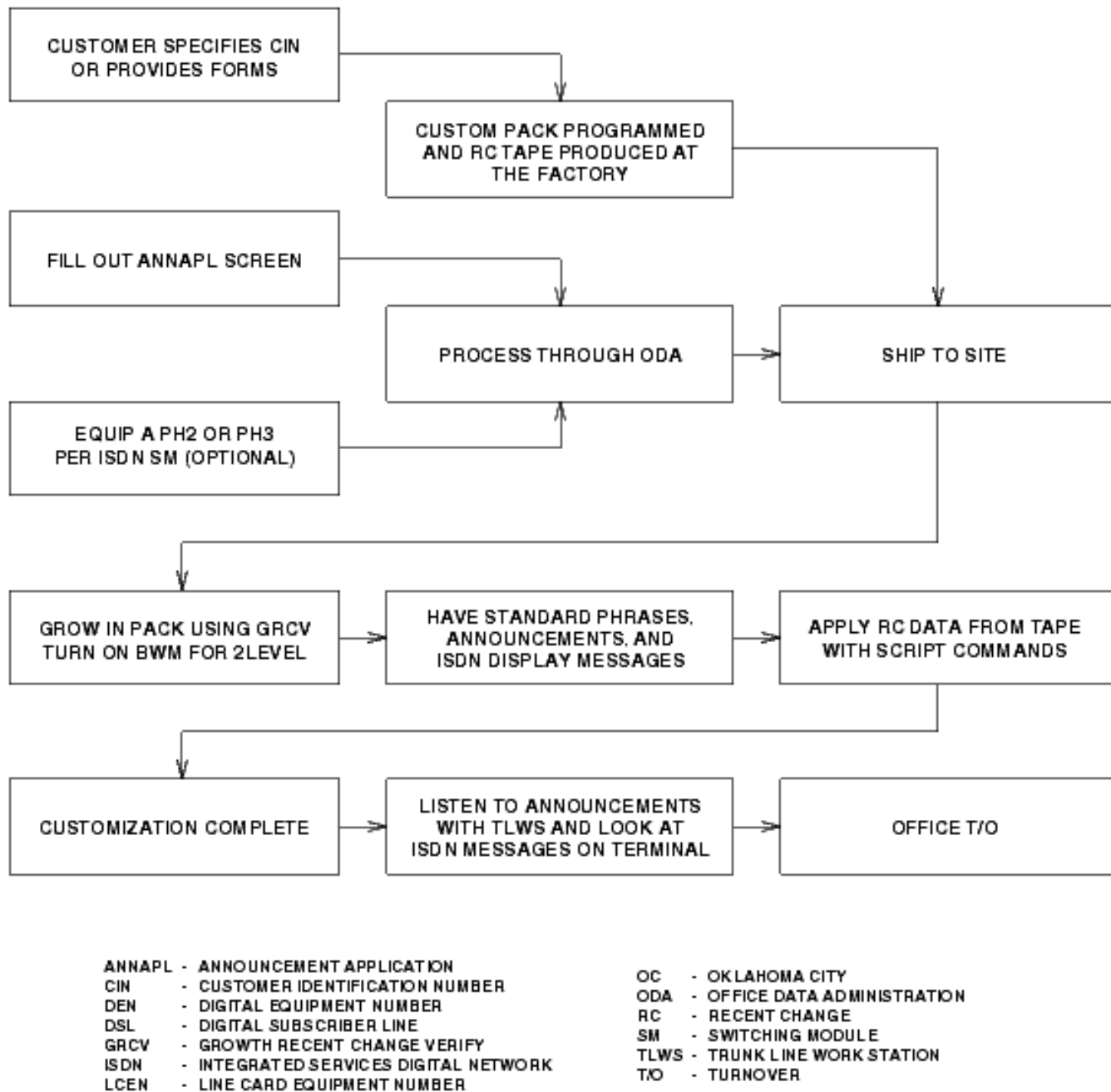
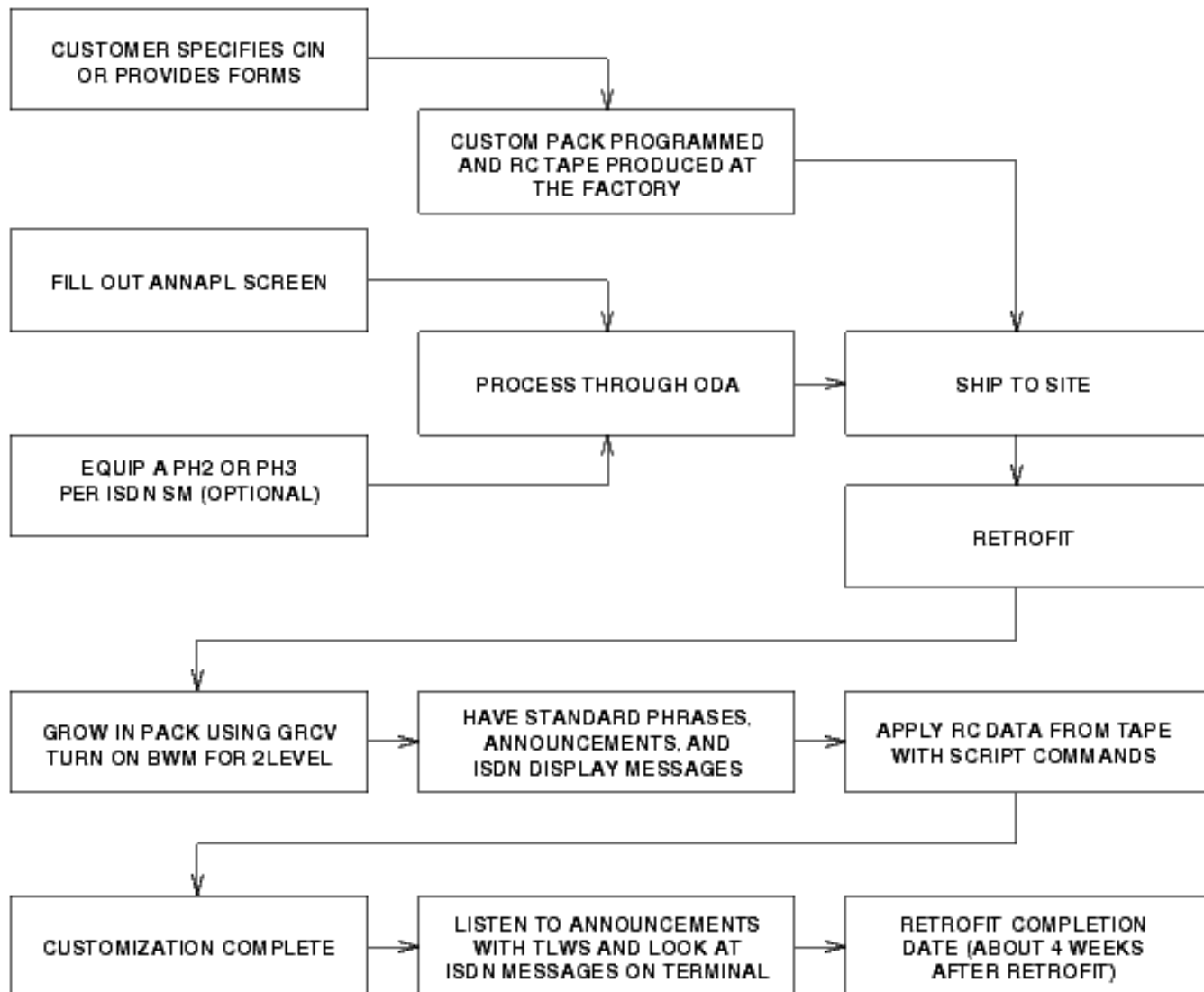


Figure 8-10 Custom Announcement (New Start)



ANNAPL - ANNOUNCEMENT APPLICATION
 CIN - CUSTOMER IDENTIFICATION NUMBER
 DEN - DIGITAL EQUIPMENT NUMBER
 DSL - DIGITAL SUBSCRIBER LINE
 GRCV - GROWTH RECENT CHANGE VERIFY
 ISDN - INTEGRATED SERVICES DIGITAL NETWORK

LCEN - LINE CARD EQUIPMENT NUMBER
 OC - OKLAHOMA CITY
 ODA - OFFICE DATA ADMINISTRATION
 RC - RECENT CHANGE
 SM - SWITCHING MODULE
 TLWS - TRUNK LINE WORK STATION

Figure 8-11 Custom Announcement (Retrofit)

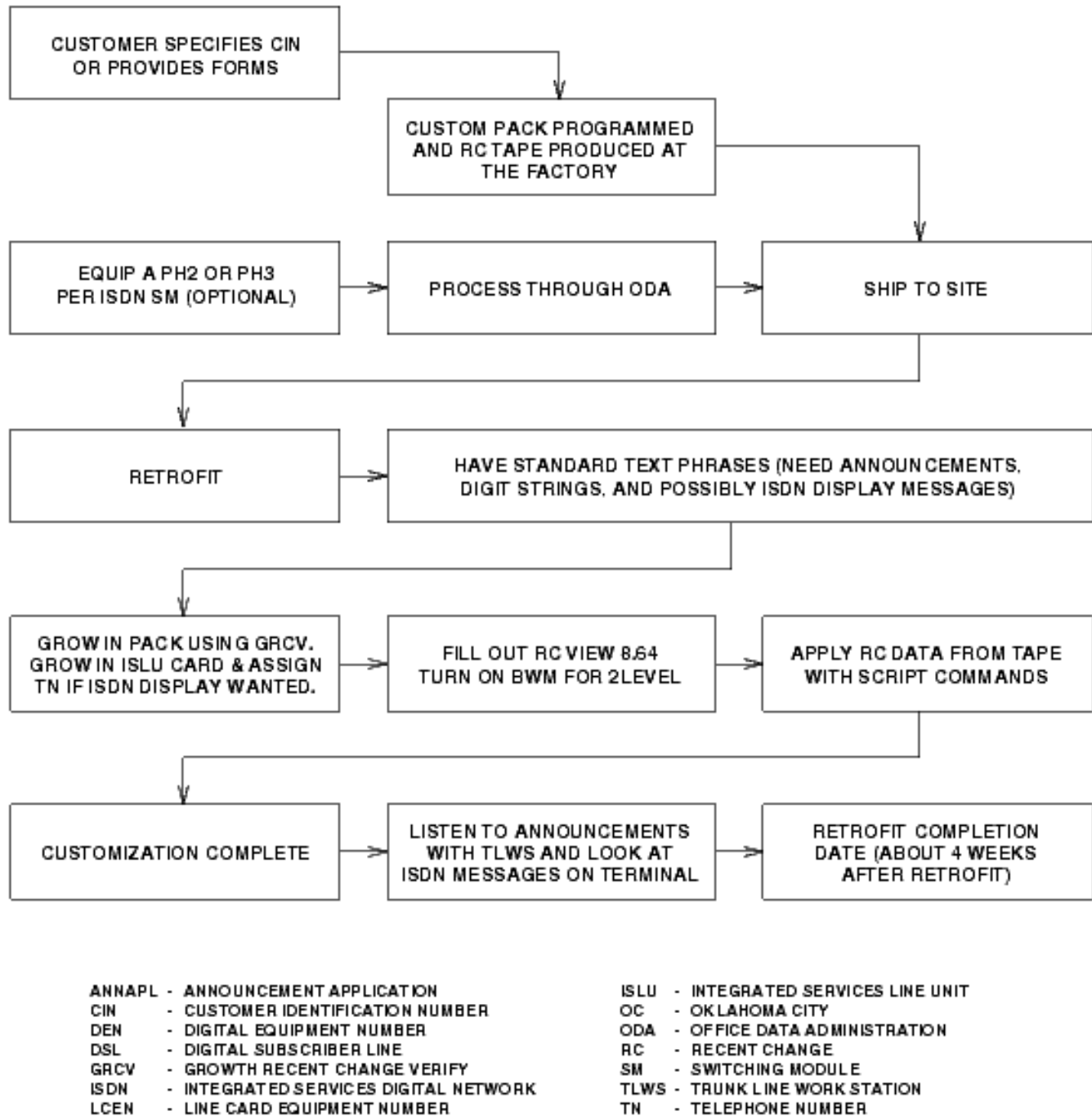


Figure 8-12 Custom Announcement (Add Feature After Retrofit)

Changes have been made to LASS SLE, ACSR, 2LEVEL (AC/COT) and OSPA T&A. A number of lists were added to J5D003EA-1 to manage the new changes. They are as follows:

- L-E Required to reprogram customer-owned MC5D114A1 or A2 microcoded circuit packs to MC5D114A3 via the Billable Rotation Process. MC5D114A3 provides More Efficient Call Handling (MECH) for 5E6 and later, Sub Account Billing for 5E6 and later, and Selected Toll and Assist phrases for 5E6 and later. This list cannot be ordered for new service groups.

L-F	Required to reprogram customer-owned MC5D114A3 microcoded circuit packs to MC5D114A4 via the Billable Rotation Process. MC5D114A4 provides CAS-3 for 5E7 and later, MECH for 5E6 and later, Sub Account Billing for 5E6 and later, and Selected Toll and Assist phrases for 5E6 and later. This list cannot be ordered for new service groups.
L-G	Required to reprogram customer-owned MC5D142A1 microcoded circuit packs to MC5D142A2 via the Billable Rotation Process. MC5D142A2 provides Enhanced 2 Level COT/AC for 5E7 and later, 2 Level COT/AC for 5E6 and later, and RACF for 5E6 and later. This list cannot be ordered for new service groups.
L-H	Required to reprogram customer-owned MC5D143A2 microcoded circuit packs to MC5D143A3 via the Billable Rotation Process. MC5D143A3 provides Standard T.R. 220-compliant LASS-SLE for 5E7 or later, Standard LASS-SLE for 5E6 or later, and ACSR for 5E6 or later. This list cannot be ordered for new service groups.
L-J	Required to reprogram customer-owned MC5D155A1 Custom Announcement packs from one customer identification number (CIN) to another via the Billable Rotation Process. This list is not necessarily software release dependent, nor can it be ordered for new service groups.
L-ML	This list provides audible Standard ACSR announcements for 5E7 via a programmed magnetic tape. (5E7 only)
L-MM	This list provides audible Standard 2 Level/COT announcements for 5E7 via a programmed magnetic tape. (5E7 only)
L-MN	This list provides audible Standard T.R. 220 compliant LASS-SLE announcements for 5E7 via a programmed magnetic tape. (5E7 only)
L-MP	This list provides Standard SLE, AC, COT and INSP ISDN display messages for 5E7 via a programmed magnetic. (5E7 only)
L-MQ	Provides a magnetic tape that customizes T.R. compliant 5E7 LASS-SLE audible announcement header (110-189 only). (5E7 only)
L-MR	Provides a programmed magnetic tape that customizes the 5E7 T.R. compatible SLE ISDN display messages (messages 110-189 only). (5E7 only)
L-MS	Provides a magnetic tape that loads the 5E7 COT, AC, and INSP ISDN display message customizations. (5E7 only)
L-MT	Provides reprogramming of SAS flash memory card.

8.3.9.3 Software

Not applicable.

8.3.10 Assignment Dependencies and Limitations

8.3.10.1 Dependencies

To customize the standard feature announcements, the standard announcements and hardware packs must be in place for that feature.

8.3.10.2 Limitations

Announcements are made by linking one or more phrases together using the specific feature software. Due to the size of the *mailbox* used for communication in the SAS, an announcement can be no more than 67 phrases long due to a software limitation. (See Figure 8-13.) The ASC is limited to a maximum storage of 65,000 phrases. Announcement phrase construction is based on a 92 ms segment size. Therefore, items such as pauses, tones, and word boundaries are in 92 ms multiples. This means the minimum phrase and announcement size is 92 ms. The maximum length of any phrase is limited by the size of the ASC on which it resides as well as the software. Currently, the software limits the phrase length to 256 seconds.

8.3.11 Service Order Perspective

Not applicable.

8.3.12 Feature Implementation

8.3.12.1 Hardware Installation

Hardware is to be installed as described in 235-105-231, *5ESS® Switch Hardware Change Procedures — Growth*. For the code of the flash card, enter 00000XXXX, where XXXX is the value of the Customer Identification Number (CIN).

8.3.12.2 ODA Implementation

The ANNAPL form defines (for the software) the application and switching modules (SMs) having SAS packs and tells the software where to put the announcements and digit strings.

8.3.12.3 Recent Change Procedures

For new offices, a list of the new announcements and phrases are provided with the pack to be added through recent change to the switching module (SM) containing the DSU2-SAS. For retrofitting offices, the announcements and phrases can be added through recent change after the retrofit. Once the new phrases are added, the line assignments can be made for the feature using the new announcements.

8.3.12.3.1 Deleting Customer Service

Not applicable.

8.3.12.3.2 Changing Customer Service

Not applicable.

8.3.12.4 Assignment Verification

Verify results with a trunk line work station (TLWS) using 235-105-110, *5ESS® Switch Maintenance Requirements and Tools* which is organized by software release. Reference 4000p for Task Selection and 5200p for Test Selection.

After selecting 4106,X (where X=SM,RAF,MEM) to seize a SAS trunk, go to 5200,3 (Supervision) to play announcements and/or phrases.

When selecting 5208,W,X,Y,Z or 5210,W,X,Y,Z (where W=APPLICATION, X=HDR ID, Y=TRLR ID, and Z= INFL), refer to the appropriate RC/V views 8.60 through 8.64 to select the correct values.

The application, header ID, trailer ID, and inflection correspond to the information in RC/V views 8.60 through 8.64. For example, to play announcement header 61 for the LASS application, check RC/V view 8.61 (Announcement

header phrase list) to see if the key phrase 16385 exists in the announcement header. If key phrase 16385 exists in the announcement header, supply a nonzero value for the inflection. This value indicates the number of digits to be voiced back to the user.

If a nonzero inflection ID is supplied when one is not required (because key phrase 16385 does not appear in the announcement header or announcement trailer) the MCC/STLWS will respond with 'ANNOUNCEMENT DATA BASE PROBLEM'

8.3.12.5 Customer Premises Equipment

The SAS Workstation, available with the 5E11 software release, includes the following equipment and peripherals:

- a *Pentium*® processor computer with a mouse, full function keyboard, and 16 megabytes of Random Access Memory (RAM),
- an SVGA monitor and video driver circuitry,
- a 1.2 gigabyte hard disk drive on which to store announcement sets, application software, and equipment data base,
- a high density 3.5 inch floppy disk drive,
- a flash memory card drive,
- a Sound Blaster 16 sound card,
- a headset with built-in microphone used to enter and play back phrases,
- a Colorado 1000 tape drive, and
- a printer for printing reports and other information pertaining to announcement update sessions.

8.3.13 Feature Operation

8.3.13.1 Speech Storage

In the SAS, speech is stored in flash cards, up to eight of which can be installed in the TN1842 pack. For standard phrase sets, the total number of flash cards used is based on the total amount needed. The phrase sets are controlled and referenced by a unique CIN associated with each set.

8.3.13.2 Call Processing Software

When the 5ESS® switch software needs to play an announcement through the DSU2-SAS, several relations must be accessed. These relations include the following:

- RLannc_hdr — Converts an announcement header ID into a list of phrases (RC/V View 8.61).
- RLannc_trl — Converts an announcement trailer ID into a list of phrases (RC/V View 8.62).
- RLannc_dig — Tells the DSU2-SAS which inflections to use in voicing back digit strings (RC/V View 8.60).
- RLphrases — Lists the text in each phrase (RC/V View 8.63).

The software reads the RLannc_hdr and RLannc_trl relation with a given announcement ID and application. It then

takes the list of phrases and expands any replacement phrase. The replacement phrases are currently phrase numbers 16385 and 16386. They indicate that the phrase will be replaced by a variable (for example, a telephone number). To expand the replacement phrase, the software uses the digit count of the variable and the application as the keys to the RLannc_dig relation. This expanded list of phrases is passed to the DSU2-SAS hardware for playback. A pictorial representation of the relations involved when the software requests an announcement to be played is shown in Figure 8-13 .

RLannc_hdr

Application	Announcement ID	Duration	Up to 50 Phrases

RLannc_trl

Application	Announcement ID	Duration	Up to 50 Phrases

RLphrases

Application	Phrase ID	Duration	Phrase text (up to 65 characters)

RLannc_dig

Application	Inflection ID	Duration	Up to 50 inflection commands

Figure 8-13 Relations Used During SAS Announcement Playback

8.3.14 Administration

8.3.14.1 Measurements

Customization does not affect the standard feature measurements.

8.3.14.2 Billing

Not applicable.

9. 911 EMERGENCY SERVICE

9.1 BASIC 911 EMERGENCY SERVICE

9.1.1 Definition

The Basic 911 (B911) Emergency Service feature provides a 3-digit universal telephone number (911) or a NANP DN without the NPA (as specified by the telephone company) for public use throughout the United States in reporting an emergency or requesting emergency help. There is no charge to the calling subscriber. The emergency service is one-way only, terminating to the emergency service bureau (ESB) which is usually located within a police department, but may be located in a fire department or in an independent agency serving as a communications center.

If the local switching system in which the B911 call originates serves the ESB directly (referred to as line-originated calls), emergency ringback and visual calling party status monitoring capabilities are provided. If a line-originated call is served by an ESB in another office, Automatic Number Identification (ANI) information can be sent over the outgoing trunk for identification purposes. However, with trunk-originated calls (calls originated from other offices or from customer premises equipment that are switched through the local system to the ESB), emergency ringback, and calling party status monitoring capabilities are not provided. The ESB is provided with the forced disconnect and call transfer capabilities and is denied origination of calls on specified B911 lines.

For 5E7 and later software releases, Recent Change View 8.1 added the field E911 DELAY. This field provides the function for allowing a 1- to 3-second interdigit timing delay when the digits 9-1-1 are dialed.

The Delay Timing feature is provided to distinguish true emergency service calls from calls that are dialed in error. For example, if a caller dialing the 914 area code misdialed and dialed 911-555-1212. Another example is a centrex station with a faulty MF generator that doubled each digit. When the caller attempts to dial 9-1-312-555-1212, the station signaled 9-9-1-1 etc. In each of these examples, the call is not meant to be an emergency service call, but such calls can be detected as emergency service calls, because of caller error or equipment malfunction.

NOTE 1: The Delay Timing function must be used with caution. It is possible for Delay Timing to route legitimate emergency service calls to reorder. For example, when the caller dials 9111 in the anxiety of the moment. With no delay timing the call is immediately recognized as an emergency service call. With delay timing the call is routed to reorder. The Service Provider must carefully consider whether the 911 Delay Timing function is to be used.

NOTE 2: The 911 Delay applies to both Basic 911 and Enhanced 911 calls.

On View 8.1, the value of the E911 DELAY field (0 through 3) controls the office parameter interdigital timing performed after a 911 call (Basic or Enhanced) is detected on an originating line.

The parameter has the following values:

- 0 — Do no timing (Default Value)
- 1 — Time for 1 second
- 2 — Time for 2 seconds
- 3 — Time for 3 seconds.

When the value is set to 0, no timing is done after the digits 911 (or equivalent) are collected. The emergency service call is immediately recognized.

When the value is other than 0, the delay timing is done for the indicated number of seconds (1 to 3). This is the

interdigit timing. If no additional digits are collected and the timing period ends, the emergency service call is recognized. If an additional digit is collected during the timing period, the call is routed to **reorder** tone.

If the value is invalid, then the 911 call is immediately recognized and either the assert 22258 (for Basic 911) or the assert 22289 (for Enhanced 911) is fired.

9.1.2 Availability

The B911 Emergency Service feature is provided with the 5E6 and later software releases.

9.1.3 Feature Application

The B911 feature is provided on a per-office (switch) basis.

9.1.4 User Operation

An ESB may receive emergency B911 calls from any residence, coin, or business customer station. Emergency B911 calls from dial-tone-first coin stations may be made without coin deposit. If coin deposit is required before dial tone, the coin is returned after dialing the 911 digits. On calls from customer premises switching systems, the customer must first dial the network access digit to obtain access to the local telephone network.

The B911 Emergency Service feature is activated when the calling customer originates the call by dialing the 911 digits, or a NANP DN without the NPA as specified by the telephone company. Audible ringing is returned to the calling customer while the attendant at the ESB receives ringing and/or a lamp indication. When the ESB attendant responds, a conversation path is established between the customer and the bureau attendant.

If the calling party goes on-hook before the attendant answers the line-originated call, the attendant hears a reorder tone (120 ipm) indicating the call is lost. Should the calling party go on-hook after the attendant answers the line-originated call, a steady low tone is heard by the attendant, and ringback is applied if the ringback option has been selected for the ESB. If the caller goes off-hook before ringback occurs, the talk connection is reestablished.

The attendant may force a disconnect of the established connection with the calling party, regardless of the action of the calling party. This capability (which applies to both line- and trunk-originated calls) provides a means for preventing a group of callers from busying out the lines to the bureau. Trunk disconnect timing does not delay the release of the B911 line on trunk-originated calls.

An option that is provided by the customer premises equipment (CPE) at the ESB allows the attendant at the ESB to transfer an incoming call to a 2-way line, and then to release the line to which the call was transferred. These transfer and transfer-release functions are done without disconnecting the calling line and impose no requirements on the local switching system.

9.1.5 Interactions

The following interactions occur between B911 and other features:

- (1) The digits 911 are not permitted as a forward-to number for the Call Forwarding Variable feature. The 911 digits cannot be inserted as a forward-to DN.
- (2) The digits 911 are not an acceptable entry as the call forwarding busy line forward-to directory number (DN). The 911 digits cannot be inserted as a forward-to DN.
- (3) Remote Call Forwarding is not allowed with the B911 Emergency Service feature. The 911 digits cannot be inserted as a forward-to DN.
- (4) Series Completion to B911 is not allowed.

- (5) During a B911 call, call waiting is not allowed.
- (6) The ringback capability of B911 is applied to the proper party only for a 2-party line with ANI.
- (7) The ringback capability of B911 is applied to all parties, interleaved, until someone answers for multiparty lines.
- (8) For calls originated from a PBX line, the called party hold, calling party status monitoring, and emergency ringback capabilities of the B911 Emergency Service feature are not provided.
- (9) The Code/Toll Restriction and B911 Emergency Service features interact since B911 cannot be code restricted.
- (10) A B911 call from a line with Hotel/Motel Calls Route to Traffic Service Position System (TSPS) identification is not routed to the TSPS. It is routed directly to the B911 bureau.
- (11) The International Direct Distance Dialing (IDDD) TSPS feature and B911 do interact. Dialing an international prefix followed by B911 does not result in routing the call to a B911 bureau.
- (12) Calls dialed with a carrier access code (that is, 10XXX + 911) are routed as if the 10XXX had not been dialed even if XXX does not represent a valid carrier code.
- (13) A B911 station cannot be assigned the LASS Automatic Callback feature, since it is denied origination. Camp-on requests from any switch toward a terminal with a 911 class of service are denied.
- (14) A B911 station cannot be assigned the LASS Automatic Recall feature since it is denied origination. Camp-on requests from any switch toward a terminal with a 911 class of service are denied and the user receives long-term denial.

The outgoing line history block of the calling station is not updated when the digits 911 to access the emergency service are dialed. Any outgoing call with a 911 destination type does not update the outgoing line history block, even if the 911 destination is known on the originating switch.

9.1.6 Feature Operation

9.1.6.1 Terminating to the B911 Bureau

The B911 lines to the ESB that are provided for emergency calls are dedicated, 1-way terminating-only lines.

9.1.6.2 Bureau Control of Calls

When a call completes to the ESB, the control that the bureau has over the call is dependent on the origin of the call.

If the call to the ESB is a non-TSPS trunk-originated call, and the customer goes on-hook before or after the bureau answers, the bureau is given reorder tone. Since the bureau has no service hold condition on non-TSPS trunk-originated calls, the bureau must go on-hook. This causes the connection to be dropped immediately and leaves no way to reestablish the talk path.

Reorder tone is received by the ESB because of the following user actions:

- (1) A disconnect is received on a line-originated call before an ESB answer is received.
- (2) A disconnect is received on a non-TSPS trunk-originated call, even if an ESB answer is received.

- (3) An origination is attempted from the ESB on a B911 line.

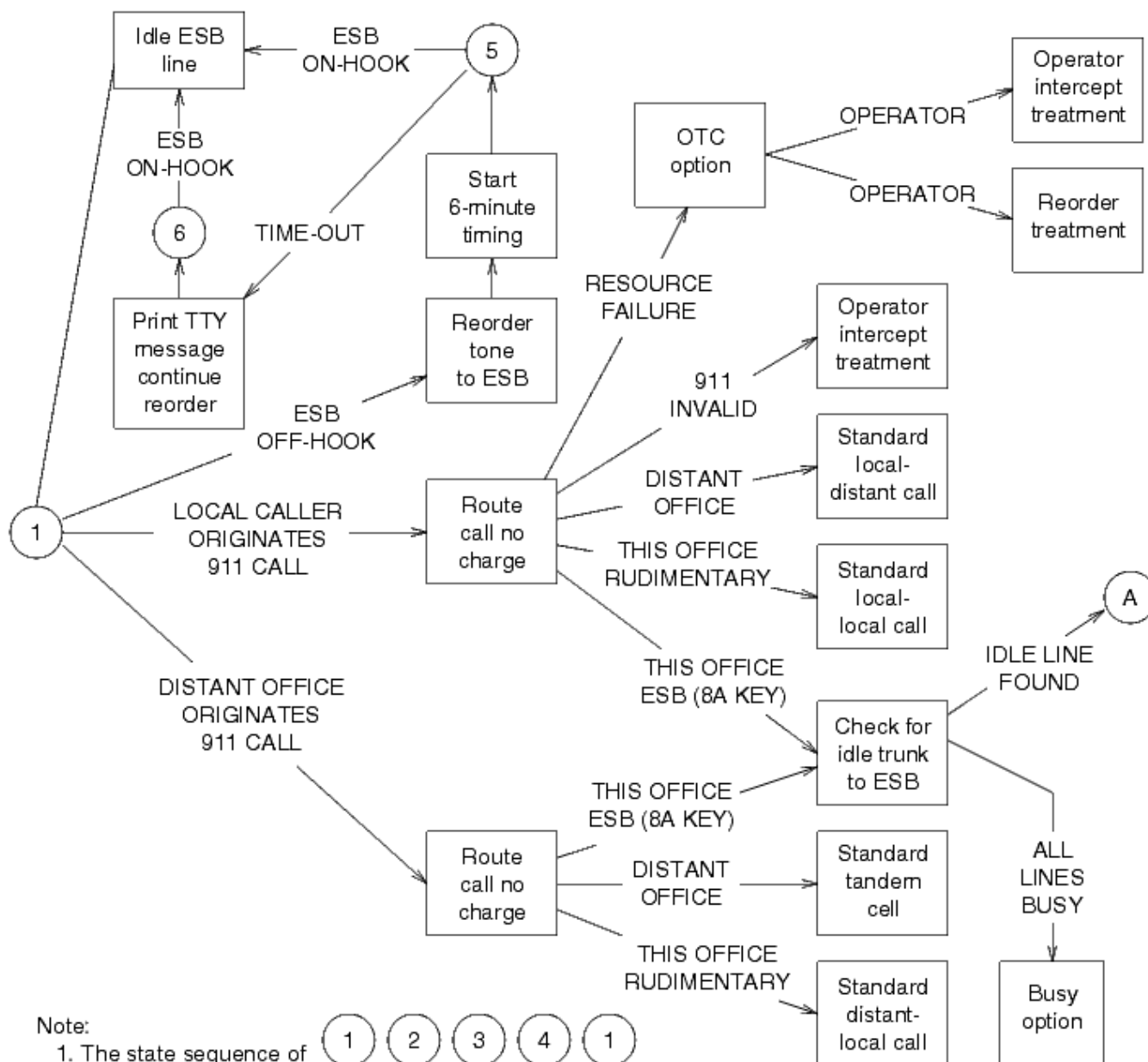
After reorder time-out, the OTC maintenance personnel are informed of the condition by a printed message. Reorder tone is continued until a disconnect is received.

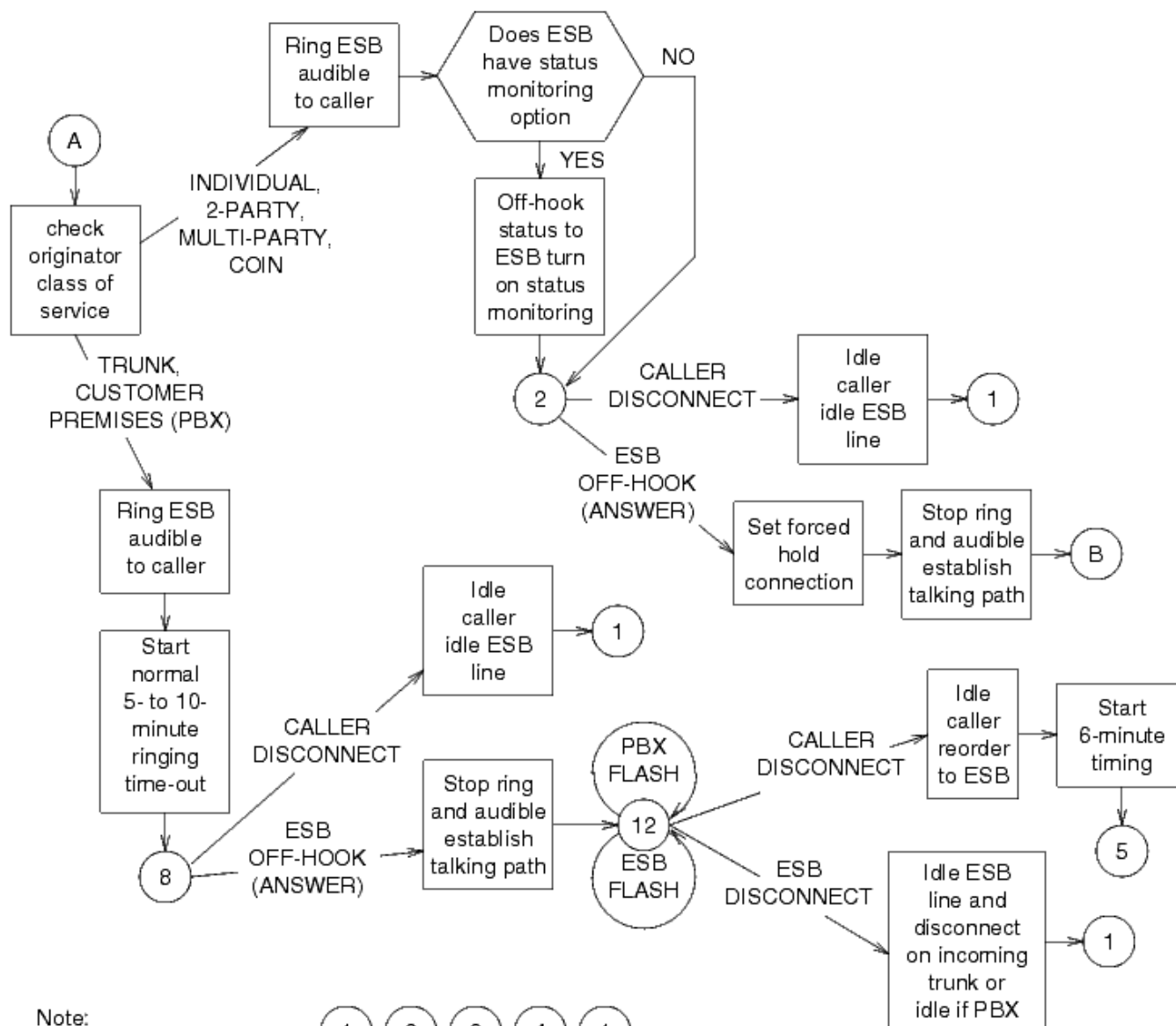
If the calling customer is a line-originated call and goes on-hook after the bureau answers, a service-hold condition is applied. Low tone is then given to the bureau and remains until any one of the following actions occurs:

- (1) The calling party returns to the off-hook status at which time a conversation path is established.
- (2) A disconnect signal is received from the ESB causing the connection to be dropped.
- (3) The time-out occurs. The time-out period begins on receipt of the calling party on-hook, or the receipt of an emergency ringback request. A maximum of two time-outs is allowed. When time-out occurs, the calling line is idled, reorder tone is applied to the ESB, and a message is printed to inform the OTC personnel of the condition.
- (4) A ringback flash signal (a timed on-hook interval from 200 to 1100 ms) is received from the ESB. Detection of ringback flash results in one of the following actions depending on the type of calling line:
 - (a) **Individual Lines, Station On-Hook:** The steady low tone is removed, regular ringing is connected to the calling line, and audible ringing is returned to the attendant. When answer is detected from the calling party, ringing is removed and a conversation path is established. If the calling line status monitoring option is in effect, the local switching system sends an off-hook calling line status monitoring signal to the ESB on detection of an answer. A disconnect signal from the ESB during ringing results in the removal of all signals and idling of all facilities involved in the call.
 - (b) **Individual Line, Station Off-Hook:** The conversation path is interrupted and the line is connected to receiver off-hook (ROH) for 3 to 5 seconds. During this time, audible ringing is returned to the attendant. The calling line is then disconnected from the tone, and the conversation path is reestablished. The ROH tone may not be applied to certain lines assigned by the OTC (for example, lines served by carrier facilities), when this occurs, then steady high tone is substituted.
 - (c) **Two-Party Lines:** The identity of the originating party is maintained when ANI is selected; therefore, ringback may be applied to the correct party. Treatment of 2-party lines is identical to individual lines for both on-hook and off-hook ringback.
 - (d) **Four- and Eight-Party Lines, Station On-Hook:** The originating party cannot be automatically identified. Then neither on-hook nor off-hook ringback can be requested by an operator. However, on-hook or off-hook ringback to multiparty customers may be performed by a B911 ESB attendant. A distinctive ringing code (1 second on, 3 seconds off) is used for multiparty on-hook ringback. It is interleaved to one party at a time on a four-party fully selective line, and to two parties at a time on either a four-party coded or eight-party semiselective line.
 - (e) **Four- and Eight-Party Lines, Station Off-Hook:** The conversation path is interrupted, and the line is connected to ROH tone for 3 to 5 seconds. During this time, audible ringing is returned to the attendant. The calling line is then disconnected from the tone, and the conversation path is reestablished. The conditions for restriction of ROH tone are the same as for individual lines.

9.1.6.3 Feature Call Processing Flow Diagram

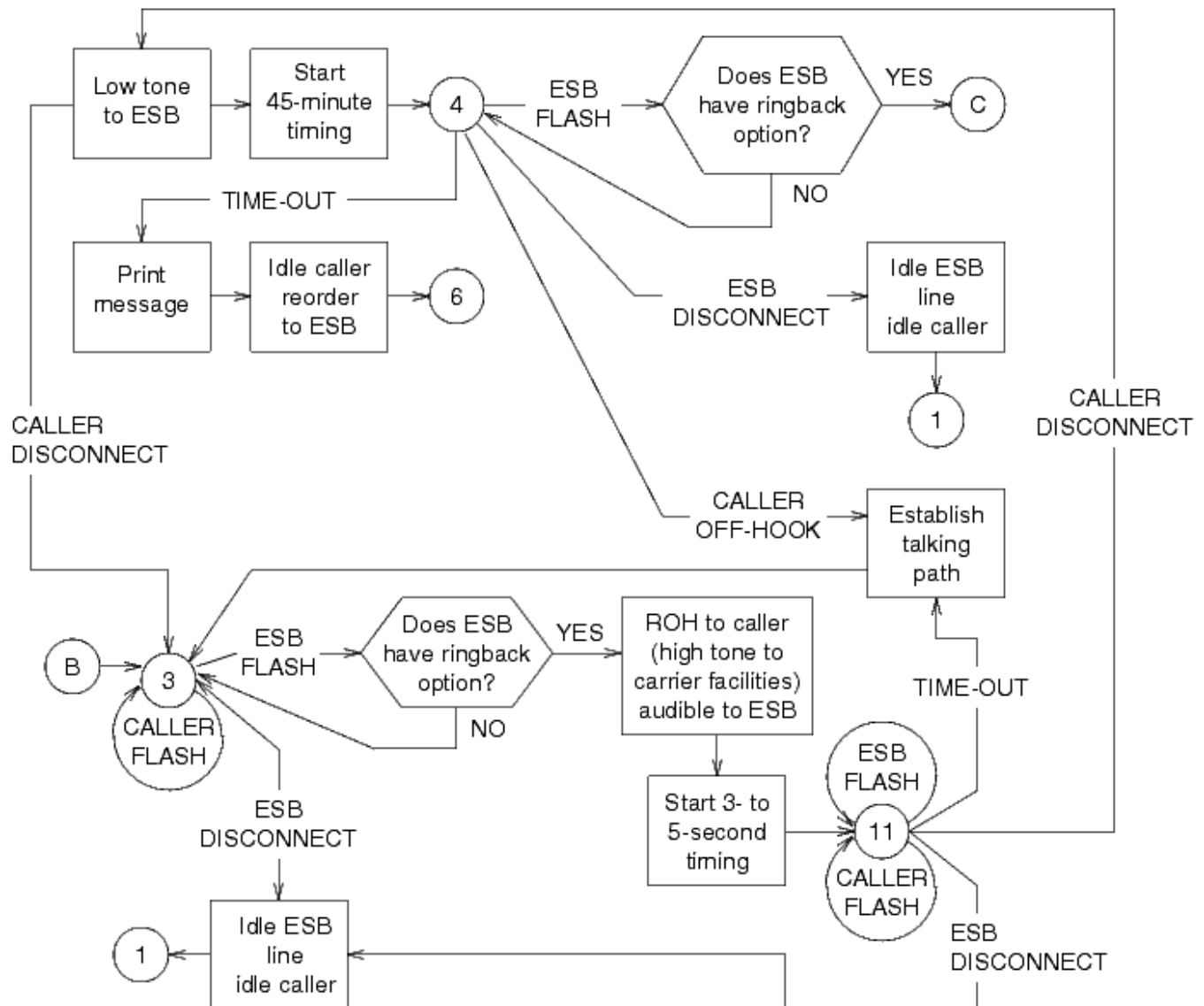
A feature call processing flow diagram giving the functional operation of the B911 feature is shown in Figure 9-1 .





Note:

1. The state sequence of 1 2 3 4 1 is expected to be the high runner sequence.



Note:

1. The state sequence of  is expected to be the high runner sequence.

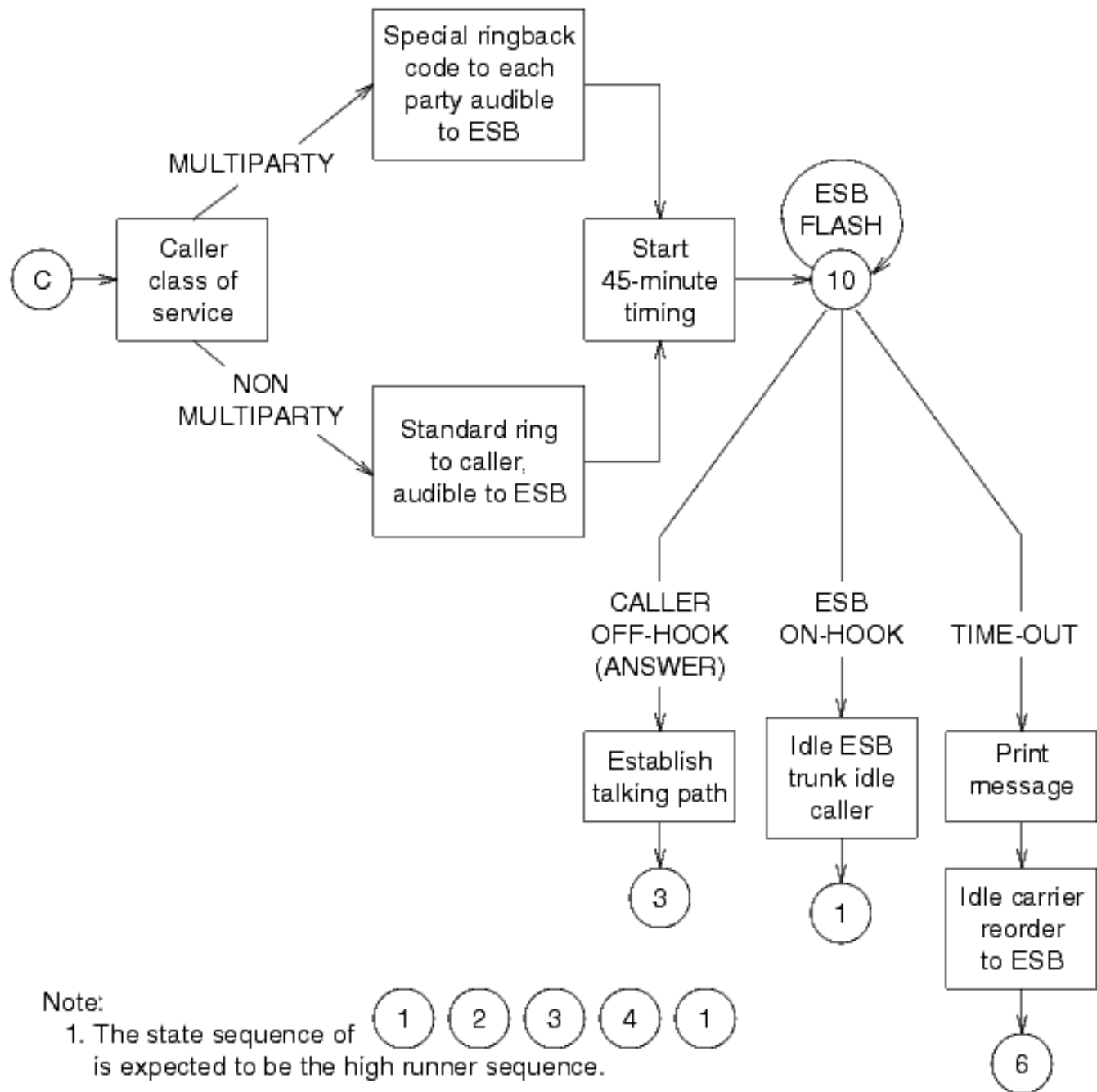


Figure 9-1 Basic 911 Emergency Service Feature Call Processing Flow Diagram

9.1.7 System Resources

9.1.7.1 Hardware

At the attendant position, the 8A Key Telephone System with *CALL DIRECTOR*® telephone, or the equivalent, is required equipment at the ESB for the B911 Emergency Service feature. A single 8A Key Telephone System can accommodate up to 20 lines to the ESB. The system may serve multiple 8A Key Telephone System installations.

9.1.7.2 Other Resource Considerations

To accept other types of telephone service, ordinary 2-way lines can also terminate at the ESB for use in receiving and originating regular (nonemergency) calls. In addition, the 2-way lines may be used to transfer emergency or regular calls from the attendant position to another desired station. Two-way lines may connect the ESB to the central office or to other customer equipment to provide the desired telephone service.

A routing capability is provided as an OTC option to allow B911 calls to be completed to a trunk group, an operator, or an announcement system.

9.1.8 Assignment

The translations necessary to define the B911 Emergency Service feature may be made via the initial Office Data Administration (ODA) System run or by recent change (RC) messages. The translation arrangements for both ODA and RC can be made via video display terminal, using the interactive process provided by the menus and views.

With systems using the man machine language (MML) commands (5E6 and later software releases), use the following to access the RC menus and views. Refer to 235-600-700, *5ESS® Switch Input Messages Manual* for further details.

RCV:MENU:DATA,APPRC [, PRINT] [, DETAIL] [, SUMMARY] ;

NOTE: With systems using program documentation standards (PDS) commands, use the following input message to access the RC menus and views:

RCV:MENU:APPRC ; [PRINT] [DETAIL] [SUMMARY] !

The RC view transition procedures differ, depending on the software release in the office. Refer to the appropriate recent change document for information on RC menus and views.

Any recent change line assignment view may be used to assign the Basic 911 Emergency Service feature.

The following procedures are used to assign B911 service:

- (1) Using View 4.1, define the Line Class Code.

The following fields are required:

- LCC = 911
- RAX = <Variable>
- SERVCL = 911
- TERM = MLHG
- SCR = <Variable>

The value chosen must be unique for the office 911.

- LINESCRN = N
- DAS = <Variable>

The value chosen must be unique for the office 911.

- (2) Using View 3.5, build a circular multiline hunt group.

The following fields are required:

- HML = 911
- MLH FEATURE = /MHCBV
- LISTED TN = the telephone number that 911 calls are routed to.

- (3) Using View 1.6 (for 5E6 and earlier software releases Views 1.2, 2.2, or 3.2 can also be used), assign the members to the multiline hunt group.

The following fields are required:

- MLHG = 911
- MEMB = 1, 2, 3, etc.

The number of members is dependent on the size of the office.

- SUSO = Y
- RINGBACK = Y
- STATMON = Y
- TONDET = Y

- (4) Using View 10.10, define the 911 call as a free call.

The following fields are required:

- SCR = <Variable>

This is the screen index value chosen in Step 1.

- CDI = <Variable>

This is the unique code index value chosen for the office 911.

- PFX = 0+, 1+, and NONE

Assign values to define 911 calls as free calls.

- (5) Using View 9.4, convert the EMER call type to the 911 MLHG telephone number.

The following fields are required:

- DAS = <Variable>

Enter a view for all the office line DASs.

- CALL TYPE = EMER
- CONV TN = <Variable>

The telephone number for the 911 multiline hunt group.

(6) Using View 9.3, define the routing data.

The following fields are required:

- LDIT = <Variable>

The values chosen are based on each line LDIT indexed by each DAS in Step 5.

- INCOMING DIGITS = 911
- CALL TYPE = EMER
- TYP CI CALL = INTRA
- RTI = 0
- OFFCOD = <Variable>

The value is office dependent.

- NBR OF DIGITS = 3
- CODE INDEX = <Variable>

The value must be the same as the CODE INDEX value in Step 4.

9.1.9 Administration

9.1.9.1 Measurements

Plant measurements are printed daily on the local maintenance channel. The data is made available on demand without upsetting the counter contents.

The B911 Emergency Service feature requires no traffic measurements.

9.1.9.2 Automatic Message Accounting

A B911 call should be completed without charge to the calling party.

9.2 ENHANCED 911 EMERGENCY SERVICE

9.2.1 Definition

The Enhanced 911 (E911) Emergency Service feature provides capabilities and optional Public Safety Answering Point (PSAP) customer services for completing and handling E911 calls. With E911 service, a 5ESS[®] switch serves as an E911 tandem office for all E911 calls from other local offices in the E911 service area, and as a local office for 911 dialed calls originated by customers served directly by the E911 tandem office. The E911 feature provides the ability for the E911 tandem office to serve many PSAPs in the E911 service area. The main characteristic of E911 service is the capability of the E911 tandem office to selectively route an E911 call originated from any station in the E911 service area to the correct primary PSAP that is assigned to serve the originating station.

NOTE: The terms primary and secondary PSAP refer to the chronological order in which the E911 call is

connected. These terms do not relate to alternate routing.

The E911 feature is able to query an E911 Service Adjunct (ESA). To provide Selective Routing, an ESA is required.

An E911 PSAP is a PSAP that has customer premises equipment (CPE) that can provide the attendant with the Automatic Number Identification (ANI) of the caller [the ANI is provided via - Centralized Automatic Message Accounting Signaling (CAMA)-like signaling], and the CPE allows the attendant to use E911 features such as Selective Transfer. An E911 PSAP is also referred to as a CAMA PSAP because of the use of CAMA-like signaling.

NOTE: Other E911 CPE (for example, B911 primary PSAPs or analog stations) can also serve as E911 answering points. The differences between E911 PSAPs and E911 answering points are ANI is not delivered and Selective Transfer is not available. Specific differences in E911 feature interactions is covered in Section 9.2.13 .

The following features are available with the E911 feature (5E7 and later software releases):

- Selective Routing
- Alternate Routing
- Default Routing
- Selective Transfer
- Fixed Transfer
- Manual Dial Transfer
- Hand-off
- Forced Disconnect
- Flash Calling Display.

9.2.2 Background

The 911 digits are intended as a nationwide universal number that provides the public with direct access to a PSAP. A PSAP is an agency or facility that is designated and authorized to receive and respond to emergency calls requiring one or more public services such as police, fire, or ambulance services.

The 911 emergency service was originally introduced as Basic 911 (B911) service using the 1/1A ESSTM switches to provide 911 functionality. Basic 911 service is also offered in the 5ESS[®] switch (available in 5E6 and later software releases). In B911 service, all emergency calls originating within B911 dialing plan area are routed via a B911 serving office to one PSAP regardless of incongruities between the central office serving area and the municipal boundaries. The B911 service does not provide the 911 station telephone number and the station address of the caller to the PSAP nor does B911 provide an interface to E911 PSAPs.

The E911 service on the 1A ESSTM switch is industry standard for E911 service. The following subsystems provides E911 service on the 1A ESSTM switch:

- PSAP — An agency or facility authorized to receive emergency calls.
- Automatic Location Identification/Data Base Management System (ALI/DMS) - A system that provides the address of an E911 calling station.

- E911 Service Adjunct (ESA) — An optionally supplied system used to store E911 call information for selective routing.
- CAMA Signaling - Centralized Automatic Message Accounting Signaling. A signaling method used to transmit Automatic Number Identification (ANI) information from a local switch that is not equipped for AMA recording to another switch that is equipped for AMA recording. The signaling is adapted for use in E911 to send the DN of the caller to the PSAP. This is the signaling that is commonly used between the end office and the E911 tandem office.
- CAMA-like Signaling - This is for analog trunks with MF signaling using the CAMA ANI format. This is the signaling that is used between the CAMA PSAP and the E911 serving office.

The 5ESS[®] switch based E911 service architecture provides full 1/1A ESSTM switch E911 *service transparency*. Service transparency means that the 5ESS[®] switch based E911 service provides all the features currently offered in the 1/1A ESSTM switch and enhancements. One of these enhancements allows the 5ESS[®] switch to look for extra digits after a person dials 911. The 1A ESSTM has a timer that allows extra digits to be interpreted if it is set and has not expired. The 5ESS[®] switch does not have a timer, but it examines extra digits outputted.

NOTE: The B911 features, Forced Hold, and Emergency Ringback, are not available in E911.

The following terms are used with the E911 feature:

- **Caller ID:** This term is used to represent the DN, that is used as a key for determining routing and address information for E911. Normally, the Caller ID is also the Billing Number of the 911 caller.
- **Automatic Location Identification (ALI):** The address, of the caller name, and possibly some special information.
- **Emergency Service Number (ESN):** The emergency service number is a number that defines the set of emergency services (for example, police, fire, hospital) within a particular district or zone.
- **Emergency Service Central Office (ESCO):** A number used to identify the originating office of the 911 caller. An ESCO can be assigned to trunk groups and to the dialing plans for local lines. The ESCO also provides a Numbering Plan Digit (NPD) which is part of the Automatic Number Identification (ANI) provided to the PSAP equipment and points to the Numbering Plan Area (NPA) of the 911 originating call on the E911 switch.
- **Numbering Plan Digit (NPD):** The first digit of the ANI outputted to a CAMA PSAP. This digit represents the originating NPA of the call. The value of this digit also determines if flashing of the display at a CAMA PSAP occurs.

9.2.3 Availability

The E911 feature is available in 5E7 and later software releases.

9.2.4 Feature Application

The E911 feature is provided on a per-office (switch) basis.

9.2.5 E911 Features

The features provided by the E911 feature are separated into the following categories: routing features, transfer features, PSAP control features, display features, and provisioning features.

9.2.6 Routing Features

Selective Routing provides the ability to selectively route an E911 call to the primary PSAP associated with the originating station. Selective Routing (or ANI-based routing) routes an E911 call based on the ANI of the caller. Nonselective Routing routes an E911 call based on the dialing plan (for callers served directly by the E911 tandem office) or incoming trunk. The ANI information is provided as follows:

- For lines, the ANI is obtained directly from line translations.
- For CAMA trunks, NANP DN without the NPA is obtained from trunk signaling and the NPA is obtained from trunk group translations.
- For ISUP trunks, the full ANI is obtained from signaling.

9.2.6.1 Selective Routing

This is routing for selecting a PSAP. This feature allows the switch to recognize E911 originations in an E911 office (either line originations or incoming trunk calls), launch a query using the ISDN applications processor interface (API) to the ESA, and interpret the response message received from the ESA. The normal response message from the ESA is an Emergency Service Number (ESN) that the switch translates into a Primary PSAP, two Alternate PSAPs and up to six Selective Transfer numbers plus a flash control digit. If the ESA is not available (that is, Default Routing has been performed or the switch is Nonselective Routing), the switch obtains the ESN using the data base relations.

On the ESA, Selective Routing data may be keyed by either the office code, the number group (thousands group), or the ANI (full NANP DN). The ability to provide Selective Routing requires that each station in the E911 service area be associated with a primary PSAP.

9.2.6.2 Nonselective Routing

This is routing for selecting a PSAP. Nonselective Routing occurs when either the 5ESS[®] switch is not equipped with an ESA, or when the 5ESS[®] switch is equipped with an ESA and the Emergency Services Central Office (ESCO) assigned to a group of lines (or to a trunk group) does not indicate Selective Routing. Line and trunk originations use data assigned to the line dialing plan or to the trunk group to route the E911 call.

9.2.6.3 Default Routing

This is routing for selecting a PSAP. Default Routing provides the ability to automatically route an E911 call to a preassigned PSAP when the primary PSAP cannot be determined through Selective Routing. Examples when default routing is required are; the calling number is unavailable, caller ID information is garbled, the ESA is unavailable, or the ESA returns an invalid ESN value.

A default ESN assignment, which consists of a primary PSAP, up to two alternate PSAPs, and up to six Selective Transfer numbers, can be assigned to each incoming trunk group and, for line originations on the E911 serving switch, each dialing plan. This same data is used by the 5ESS[®] switch for nonselective routing.

9.2.6.4 Alternate Routing

This is routing available at the PSAP. When a route to the primary PSAP is busy because of traffic, maintenance, night service, or a power failure, Alternate Routing is used by the 5ESS[®] switch to redirect 911 calls to an alternate PSAP location. Three types of Alternate Routing are available, Route Advance (optional), Reroute (optional), and Alternate Routing (required).

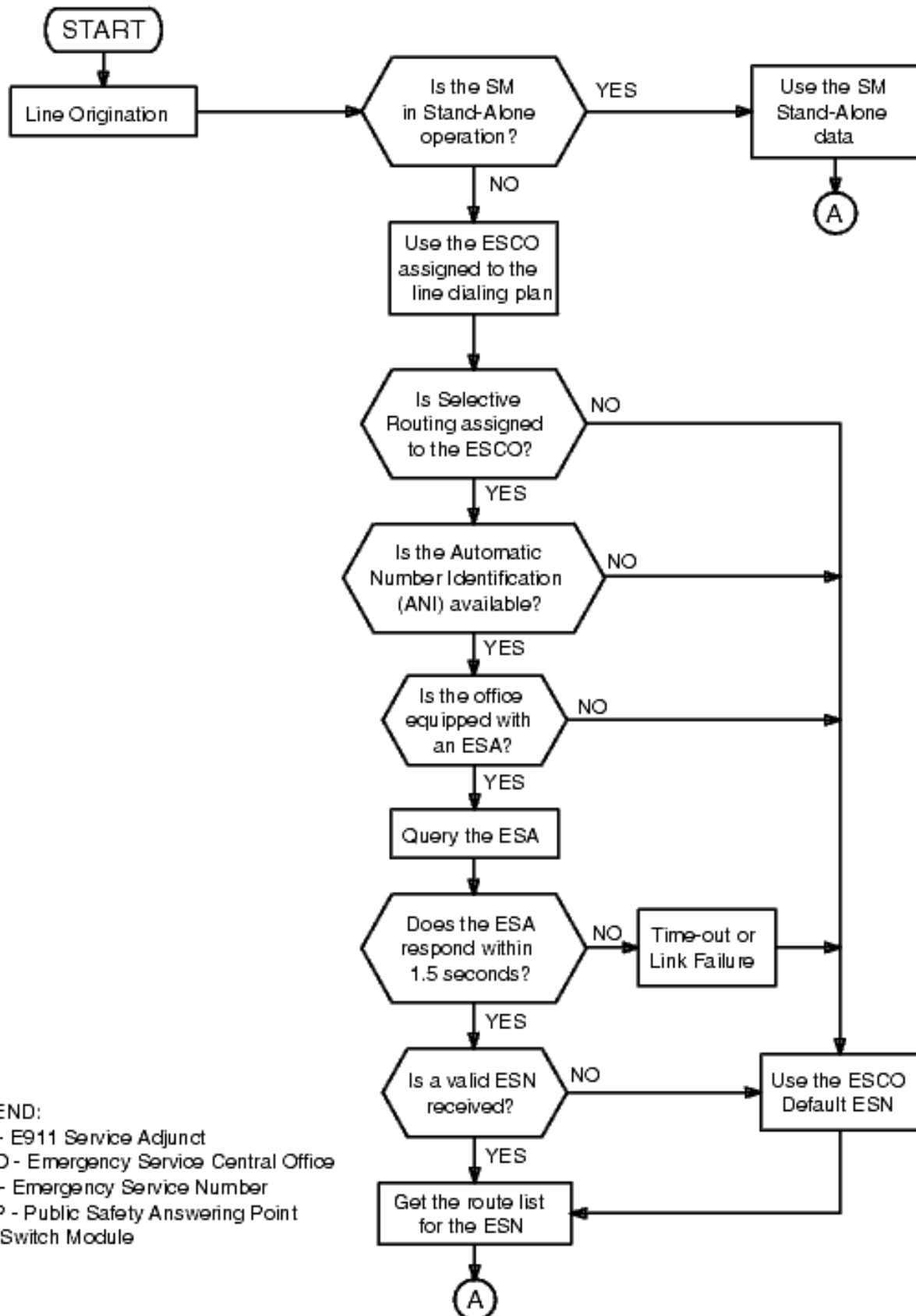
- (1) Route Advance (or next route index) is specified when the trunk group of the PSAP is assigned a Route Index of another trunk group to complete the call (this route index is referred to as the next RI). When the current trunk group is traffic busy, call completion is attempted through a chain of trunk groups by following the Next RIs of each traffic busy trunk group until an idle trunk group member is found or the chain is exhausted.
- (2) Reroute is specified when a telephone number (PSAP RERTE TN) is assigned to the trunk group of each PSAP. When the PSAP is busy because of traffic, maintenance, night service, or a power failure, the value of the field PSAP RERTE TN is used to attempt completion of the call (see Section 9.2.12.2.14).
- (3) Alternate Routing is specified when one or two alternate routing DN(s) are entered in the route list of the ESN. When the PSAP to which the call is being routed is busy (due to traffic, maintenance, night service, or a power failure), the first alternate routing DN is used to attempt to complete the call. If the first alternate route is unsuccessful, the second alternate routing DN, if entered, is used. The alternate routing DN(s) are optional values for the ESN route list.

9.2.6.5 Stand-Alone Routing

This is routing for selecting a PSAP when an SM is in stand-alone operation. When an SM has stand-alone capability, the routing data used is different from Default Routing. In stand-alone mode, when communication with the CMP is unavailable, the SM uses stand-alone routing data defined for that SM to complete the call to a "default" PSAP. In stand-alone mode, the SM is not able to communicate with the ESA to obtain the ESN associated with the originating party. In addition, the ESN routing data is inaccessible since it is stored in the CMP for all SMs. Therefore, the SM uses stand-alone routing data to complete the call to a "default" PSAP defined for that SM. This stand-alone routing data is processed the same as when the routing data is obtained from the CMP. Each SM is required to have default routing data stored on it if the SM goes into stand-alone mode and cannot obtain the proper routing data contained in the CMP. The PSAP "sees" the call as a "Default Routed" call. The stand-alone routing data can be on an SM basis or an SM/DAS basis.

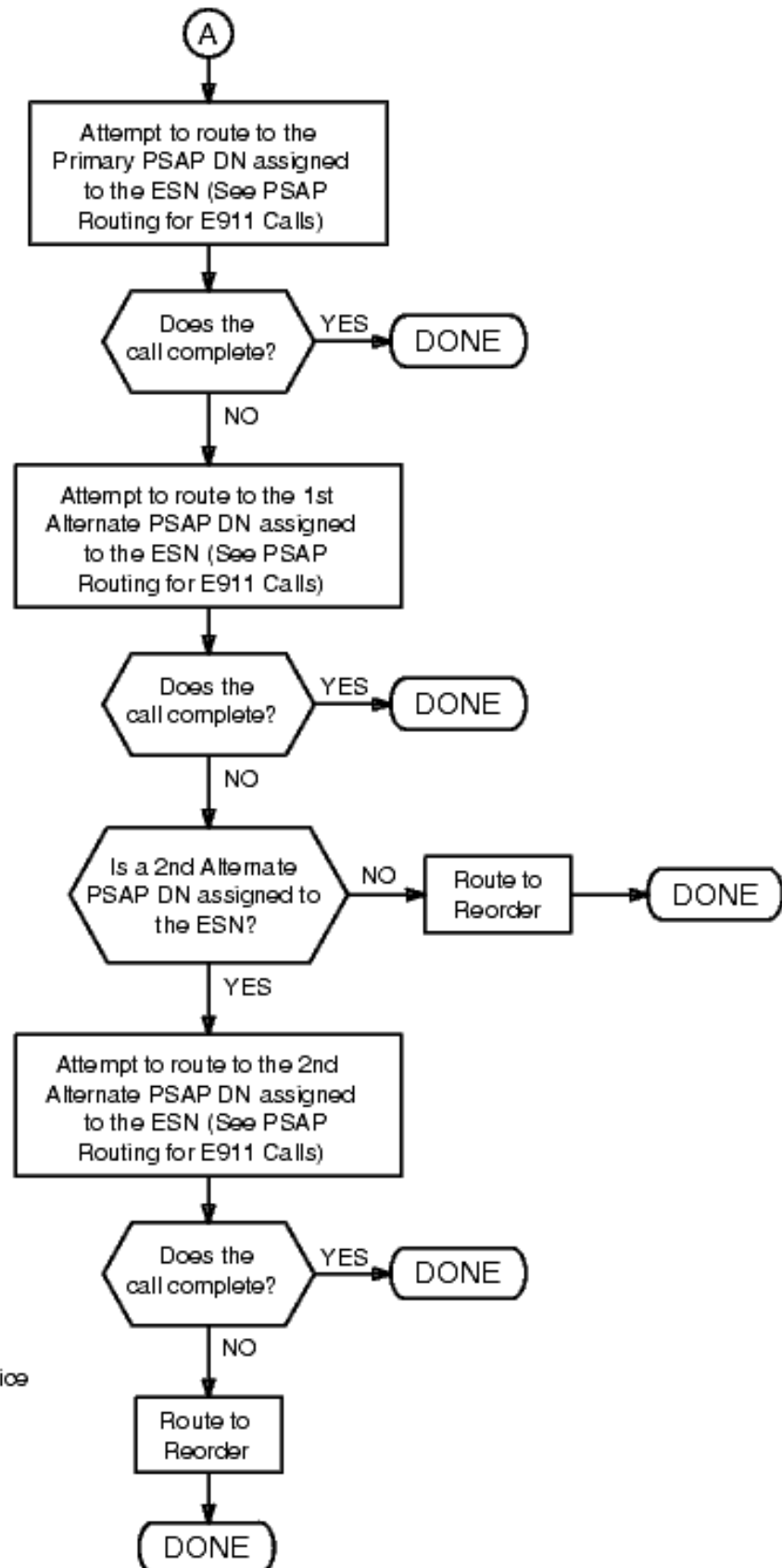
9.2.6.6 Routing Overview

Figures 9-2 , 9-3 , and 9-4 show how Selective Routing, Nonselective Routing, Default Routing, and Alternate Routing are used to attempt the termination of an E911 call. Figures 9-2 and 9-3 are for line and trunk originated calls, respectively. Figure 9-4 shows how PSAP routing is performed.



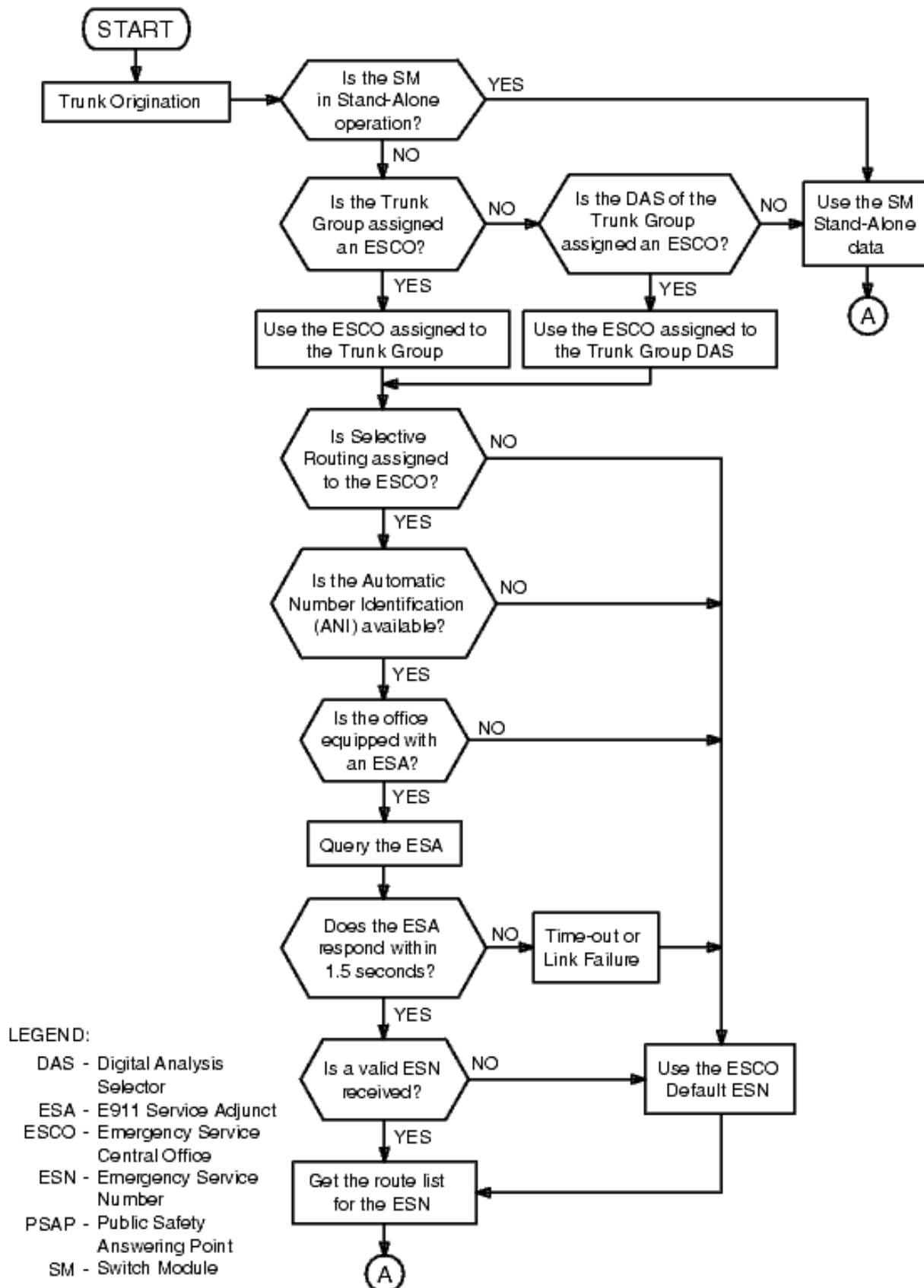
LEGEND:

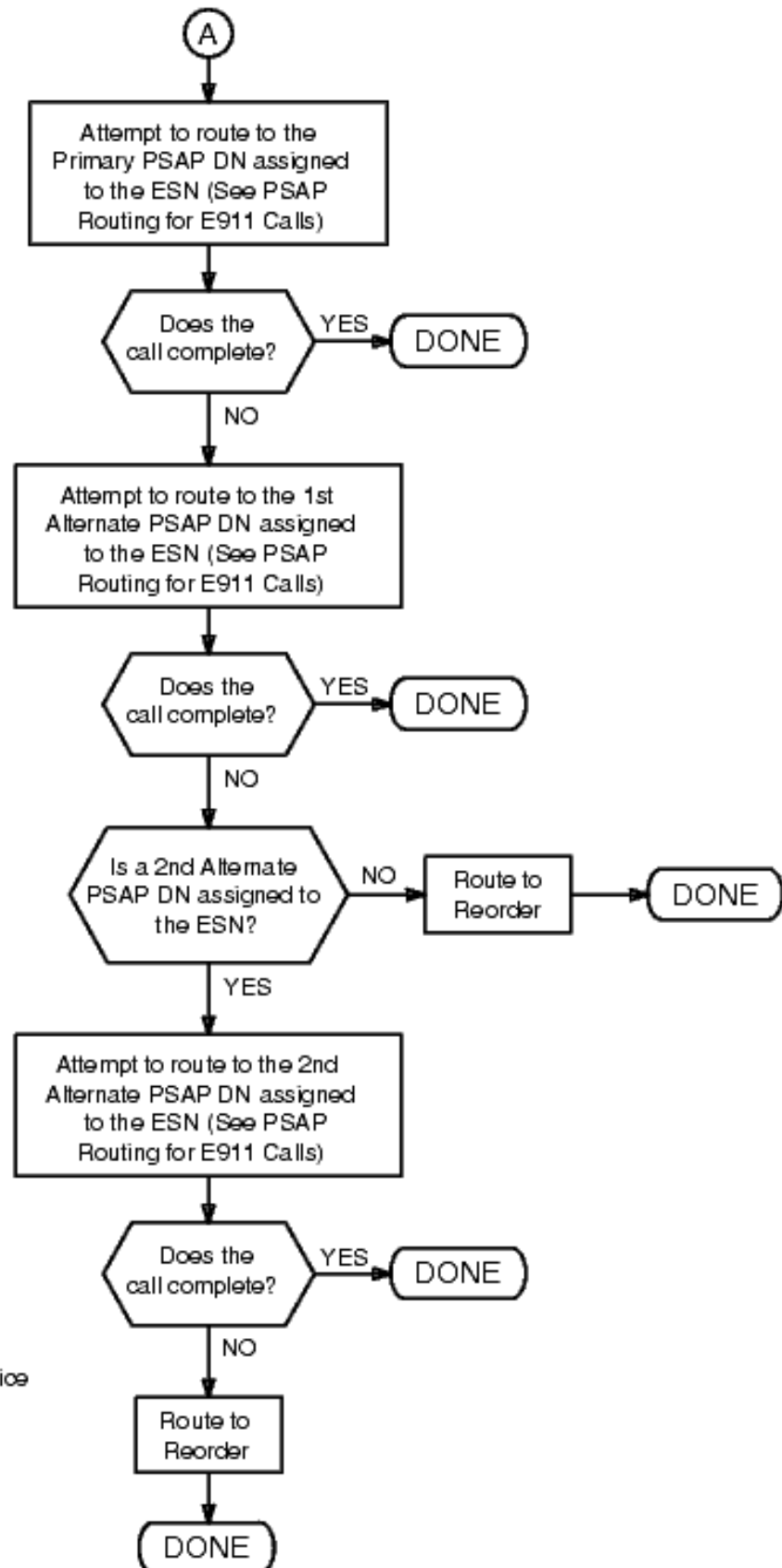
ESA - E911 Service Adjunct
 ESCO - Emergency Service Central Office
 ESN - Emergency Service Number
 PSAP - Public Safety Answering Point
 SM - Switch Module

**LEGEND:**

ESA - E911 Service Adjunct
ESCO - Emergency Service Central Office
ESN - Emergency Service Number
PSAP - Public Safety Answering Point
SM - Switch Module

Figure 9-2 Line Origination Routing for E911 Calls





LEGEND:

ESA - E911 Service Adjunct
 ESCO - Emergency Service Central Office
 ESN - Emergency Service Number
 PSAP - Public Safety Answering Point
 SM - Switch Module

Figure 9-3 Trunk Originating Routing for E911 Calls

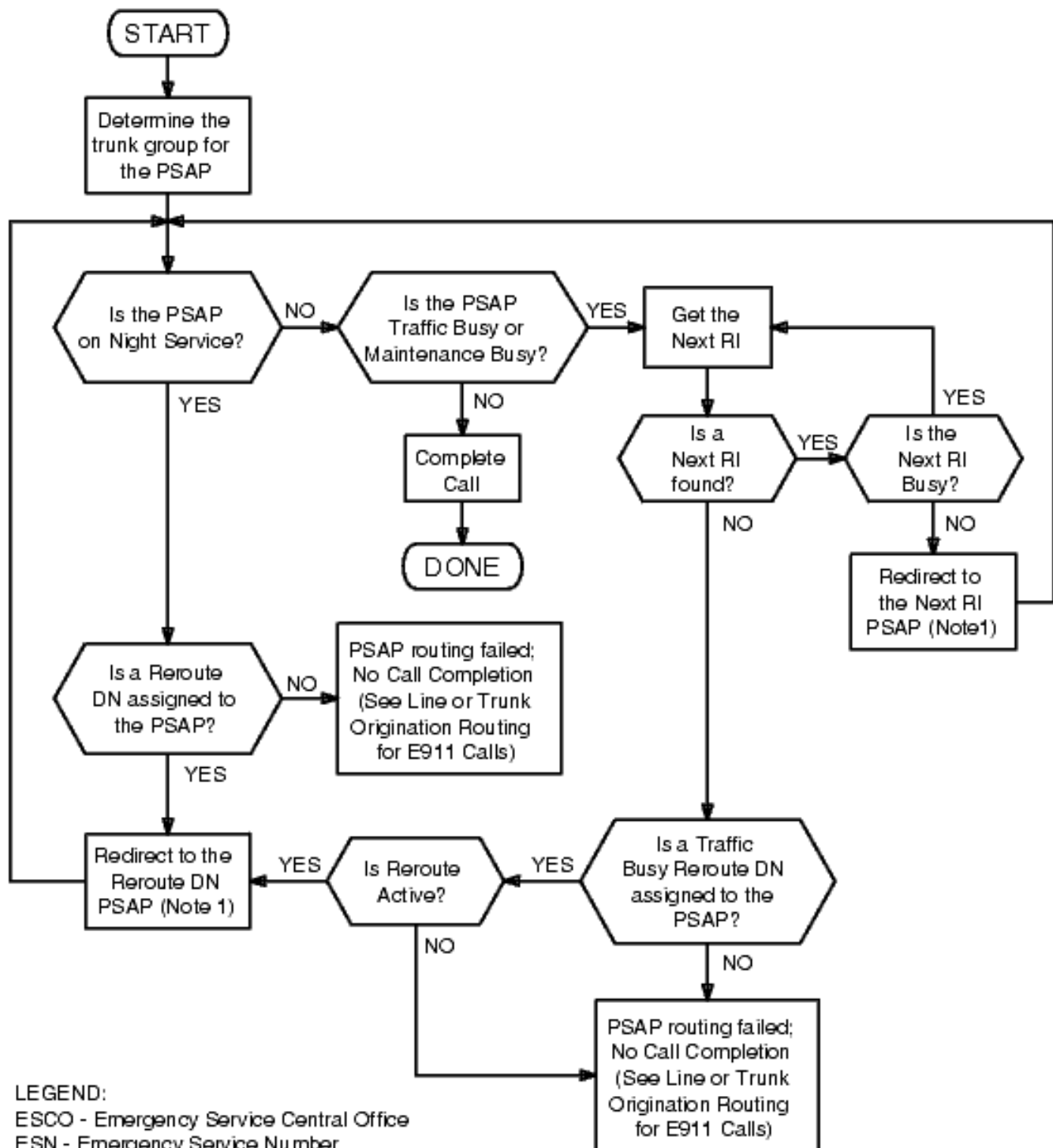


Figure 9-4 PSAP Routing for E911 Calls

9.2.7 Transfer Features

All E911 transfer features can use dialed codes to initiate the transfer function. The definition of dialed codes is a function of the Office Dialing Plan (ODP) or Individualized Dialing Plan (IDP). In addition, a Multiway Calling transfer feature must also be assigned. See 235-190-103, *5ESS® Switch Business And Residence Feature Descriptions* document for information on defining a dialing plan for dialed codes and for the assignment of multiway calling features.

9.2.7.1 Selective Transfer

Selective Transfer is a feature that allows a PSAP attendant to transfer an E911 call to a secondary PSAP. The 5ESS® switch transfers the call to the PSAP location based on an access code sent by the primary PSAP and transfer information associated with the ESN. The ESN may have up to six Selective transfer points (that is, secondary PSAPs) specified.

NOTE: Selective Transfer uses the following dialed code actions to perform the transfer function: SEL1XFER, SEL2XFER, SEL3XFER, SEL4XFER, SEL5XFER, and SEL6XFER; see 235-190-103, *5ESS® Switch Business And Residence Feature Descriptions* for information on how actions are used to define dialed codes.

9.2.7.2 Fixed Transfer

Fixed Transfer is a feature that allows a PSAP attendant to transfer an E911 call to a particular PSAP location. This feature requires that the PSAP attendant determine the PSAP location that can handle the E911 call, and have the PSAP send the appropriate ODP or IDP code to request routing to the desired PSAP. In addition, a Speed Calling feature must also be assigned. See 235-190-103 *5ESS® Switch Business And Residence Feature Descriptions* document for information on defining a dialing plan for dialed codes and for the assignment of speed calling and/or multiway calling features. The Fixed Transfer information is resident on the 5ESS® switch.

9.2.7.3 Manual Transfer

Manual Transfer (also referred to as Manual Dial Transfer) is a feature that allows the PSAP attendant to determine the specific destination desired and manually dial the directory number of the destination. Manual Transfer may also use the Fixed Transfer numbers by using the appropriate *2X codes (or *3X, or *4X, etc.) or Selective Transfer by using the appropriate *1X codes. This feature requires that a Multiway Calling Transfer feature be assigned.

9.2.7.4 Hand-Off

It may be necessary for an office providing E911 service to route an E911 call off the switch so that it appears at another E911 serving switch as a new E911 call. This requires that the switch outpulse the call over an ANI bearing facility (that is, CAMA, TSPS, or CCS7) with the appropriate dialed digits ('911') and the ANI of the original E911 caller.

The 5ESS® switch is able to perform such a "hand-off" of an E911 call for originating and incoming E911 calls that leave the switch because of initial routing and for calls that transfer off the switch from an E911 PSAP.

The following describes the switch setup that allows an E911 hand-off to occur.

For originating and incoming E911 calls that are to be handed off because of initial routing, unique ESN data is defined for each distinct off-switch destination. Each of these ESNs contains a "fictitious" DN as the primary PSAP DN. The DN points to a route index that specifies an ANI-bearing facility and that allows the 5ESS® switch to delete the "fictitious" DN as the called DN and prefix the appropriate digits ('911', '11', etc.) so that the call appears to the destination switch as a new E911 call. The ANI of the original caller is outpulsed to the destination switch.

For calls completed to an E911 PSAP that are handed off via selective, manual, or fixed transfer, the Transfer DN (either in the ESN data, assigned to the fixed transfer key, or dialed by the PSAP attendant) must be a "fictitious" DN as described in the previous paragraph. When a transfer occurs to the DN, the switch executes normal transfer logic causing the switch to form a three-way call with the new destination.

The "fictitious" DN points to a route index that indicates an ANI-bearing facility and that causes the appropriate deleting and prefixing to occur. The switch insures that the ANI of the original caller is sent to the destination switch. The three-way transfer is formed and the PSAP attendant in control of the transfer can verify the success of the transfer before disconnecting from the call and completing the hand-off.

9.2.8 PSAP Control Features

9.2.8.1 Forced Disconnect

The Forced Disconnect feature prevents a calling station that remains off-hook from indefinitely holding a connection to a PSAP. The PSAP attendant is able to terminate an established E911 call at any time regardless of the action of the calling party. After the PSAP attendant releases the E911 call, the dedicated E911 trunk to the PSAP is automatically released and made available for other E911 calls. In addition, the trunks to the originating central office are idled, if the caller was on a subtending office.

9.2.8.2 Busy Redirection (Reroute)

The following lists the order of the redirection options available to the PSAPs for make-busy and traffic busy conditions (make-busy conditions have priority over traffic busy conditions).

When the PSAP make-busy key is active:

- (1) Reroute Telephone Number
- (2) Alternate Routing DN(s).

When the PSAP is traffic busy:

- (1) Next Route Index
- (2) Reroute Telephone Number
- (3) Alternate Routing DN(s).

9.2.9 Delay Timing

The Delay Timing feature is provided to distinguish true emergency service calls from calls which are dialed in error. For example, if a caller dialing the 914 area code misdialed and dialed 911-555-1212. Another example is a centrex station with a faulty MF generator which doubled each digit. When the caller attempts to dial 9-1-312-555-1212, the station signaled 9-9-1-1 etc. In each of these examples, the call is not meant to be an emergency service call, but such calls can be detected as emergency service calls, due to caller error or equipment malfunction.

NOTE 1: The Delay Timing function must be used with caution. It is possible for Delay Timing to route legitimate emergency service calls to reorder. For example, when the caller dials 911 in the anxiety of the moment. With no delay timing, the call is immediately recognized as an emergency service call. With delay timing, the call is routed to reorder. The Service Provider must carefully consider whether the 911 Delay Timing function is to be used.

NOTE 2: The 911 Delay applies to both Enhanced 911 and Basic 911 calls.

On View 8.1, the value of the E911 DELAY field (0 through 3) controls the office parameter interdigital timing performed after a 911 call (Enhanced or Basic) is detected on an originating line.

The parameter has the following values:

- 0 — Do no timing (Default Value)
- 1 — Time for 1 second
- 2 — Time for 2 seconds
- 3 — Time for 3 seconds.

When the value is set to 0, no timing is done after the digits 911 (or equivalent) are collected. The emergency service call is immediately recognized.

When the value is other than 0, the delay timing is done for the indicated number of seconds (1 to 3). This is the interdigit timing. If no additional digits are collected and the timing period ends, the emergency service call is recognized. If another additional digit is collected during the timing period, the call is routed to **reorder** tone.

If the value is invalid, then the 911 call is immediately recognized and either the assert 22289 (for Enhanced 911) or the assert 22258 (for Basic 911) is fired.

9.2.10 Display Features

The name, address, and telephone number of the E911 caller are required to allow the PSAP attendant to take action on the call. The ANI is provided to the attendant as NPD-NANP DN without the NPA. The connection to E911 PSAPs requires multifrequency (MF) outpulsing to send ANI information over E911 PSAP trunks. The ANI information received over a trunk, or the billing number associated with a line, is converted to the ANI value by taking the NPD assigned to the Emergency Services Central Office (ESCO) of the originator and appending the NANP DN without the NPA of the original ANI.

NOTE: The NPD is a single digit. The switch translates the NPA of the ANI (full NANP DN) to an NPD and sends an ANI consisting of NPD-NANP DN without the NPA to the PSAP.

Existing E911 PSAPs use a pair of dedicated private lines from each PSAP location to the Automatic Location Identification (ALI) data base. The ALI data base is an external data base where the calling station locations are stored. The 5ESS[®] switch sends the caller ID information to the PSAP. The ANI can be used by the E911 PSAP (or equivalent CPE) to query an external data base (for example, the CALL-STALKER[®] Automatic Location Identification System) to receive location information.

9.2.10.1 Flash Calling Display

The Flash Calling Display (FCD) is a feature that causes the E911 calling party number to be optionally flashed. This feature is used to give the PSAP attendant an indication that the received E911 call may require special attention and/or handling. Examples of these types of calls are E911 calls from hospitals, chemical plants, or schools.

The FCD feature is applied when the calling party number of the E911 caller is available, but the call is given Default Routing treatment and when the call is given Alternate Routing treatment when the Alternate Routing DN or the Reroute DN are used.

9.2.11 User Perspective

9.2.11.1 User Profile

The principal customers of E911 Service are local government and municipalities, counties and cities. The E911 service users are public agencies responsible for the administration of the local emergency bureaus, and the '911' callers themselves. In this document, the term "end-user" refers to the PSAP attendant.

9.2.11.2 Customer Premises Equipment

To provide complete E911 Service functionality, the end-user requires equipment similar to E911 PSAP equipment supplied by Lucent Technologies, or equivalent, as described in the Epic System Manual. No special equipment is required of the 911 caller.

9.2.12 User Operation

This section provides the Recent Change/Verify (RC/V) procedures for configuring an E911 office and defining the supporting data for selective routing, default routing, and stand-alone routing for 911 calls. These aspects are presented from two office configuration perspectives, an ESA office and an Non-ESA office (Section 9.2.12.2).

The Operating Telephone Company (OTC) can choose what type of E911 service the switch provides. The available options are as follows:

- (1) E911 Inactive
- (2) Selective Routing service
- (3) Nonselective Routing service.

NOTE: If the option is E911 inactive or the feature lock is secured, and the dialing plan of the subscriber indicates E911 service, the call is **denied**. All other options receive E911 treatment as specified by the dialing plan of the caller.

The sections that follow highlight the RC/V views and field names that support the E911 feature and provide step-by-step procedures for provisioning E911 at ESA or Non-ESA offices. This Activation section describes the RC/V views and fields that are essential to E911, therefore this document is only a supplement to 235-080-100, *5ESS® Switch Translations Guide (TG-5)*, 235-118-2xx, *5ESS® Switch Recent Change Procedures*, and 235-118-2xx, *5ESS® Switch Recent Change Reference*. Whenever more detail is required (for example, detailed RC/V cross-checks that apply to the examples in this section), then the Translation Guide and Recent Change manuals should be used. The following procedures reference RC/V views rather than office record numbers. Table 9-1 is a list of the new and changed recent change views that support the E911 feature; the table is also a cross-reference to the equivalent office records.

Table 9-1 New and Changed Recent Change Views for E911

RC/V VIEW	VIEW NAME	STATUS ^a	FIELD NAME	STATUS ^a	ODA FORM NUMBER
5.1	Trunk Group	C	E911 TYPE E911 CPN ESCO CAMA PSAP RERTE ACT PSAP RERTE DN WINK STRT ABND TIMER	N N N N N N N N	5202-6
7.3	PFA Simulated Facility Group	C	SFG TYPE SFG SIZE	A A	5609-3
8.1	Office Parameters (Miscellaneous)	C	E911 APID E911 DAS E911 SCN	N N N	5509-4

			E911 LNE E911 TRK E911 OPTION E911 DELAY	N N N N	
8.6	Tone Type Timing	C	TONE	A	5504
8.22	Secured Feature Upgrade	C	FEATURE ID	A	5713
9.1	Digit Analysis Selector (Office Dialing)	C	ESCO	N	5300-1
9.2	Prefix/Feature Digit (Office Dialing)	C	ACTION	A	5300-2
9.13	IDP Dialed Code Assignment (Individual Dialing)	C	ACTION	A	5601
9.30	Destination to Service Type Pre 5E8	C	SERV TYPE	A	5321
9.35	Network Services Trigger Definition (5E8 and Later)	N	APPLICATION	A	5324
9.40	Selective Routing and Transfer Data for ESN	N	ESN (Key) SM (Key) DAS (Key) FLASH PRIM PSAP ALT1 PSAP ALT2 PSAP TN1 - TN6	N N N N N N N N	5540
9.41	Emergency Service Central Office Identifier	N	ESCO (Key) ESN NPD SEL RT	N N N N	5541
24.7	DSL AP Communications Data	C	E911 SITE	N	5963

Notes:

a. N = New View or Field; C = Changed View; A = Added a Value to an Existing Field.

In the 5E8 and later software release, instead of defining E911 on RC View 9.2 or 9.3 as a call type QUERY, and the code index pointing to RC View 9.30 with the SERV TYPE of E911, the call type is EMER and the TRIG NBR points to RC View 9.35 with the APPLICATION set to E911.

9.2.12.1 Provisioning Checklist

The E911 provisioning checklist (Table 9-2) is furnished as an overall guide to the 5ESS[®] switch owner. This checklist points to the appropriate section that contains the procedures to perform the required item. However, before proceeding with the procedures in Table 9-2, the following questions must be answered. If there is a "NO" answer to any of the following questions, refer to the referenced document or information source noted before proceeding on to the next question.

- (1) Has 533-402-120 5ESS[®] *Switch Enhanced 911 Network Architecture and Service Considerations* been read and understood?
- (2) Is the office equipped with all the components that are required for the 5ESS[®] switch to serve as an E911 Office?

If not, refer to the Switch Engineering Information file available through 5 DOPS.

- (3) Is the current software release for the office 5E7 or later?

If not, contact the local Lucent Technologies account representative.

- (4) Is there a copy available of 235-080-100, 5ESS[®] *Switch Translations Guide (TG-5)* that addresses the 5E7 or later software release?

If not, contact the local Lucent Technologies account representative.

- (5) Is there a copy available of 235-118-2xx, 5ESS[®] *Switch Recent Change Procedures* and 235-118-2xx,

5ESS® Switch Recent Change Reference, that addresses the 5E7 or later software release?

If not, contact the local Lucent Technologies account representative.

If the answer to each question in the previous checklist is "yes," then it is possible to start provisioning E911 in the *5ESS®* switch office. Table 9-2 summarizes the sequence of steps that should be followed in provisioning an ESA and Non-ESA office. Note that some steps only apply to ESA. The *5ESS®* switch office is not fully provisioned for E911 until the answer to each of the listed questions is "yes."

Table 9-2 E911 Provisioning Checklist

CHECKLIST ITEM	ESA	NON-ESA
Has the E911 feature been unlocked?	9.2.12.2.1	9.2.12.2.1
Has the API Link been provisioned?	9.2.12.2.2	NA
Has the ESN-to-Route-List data been defined?	9.2.12.2.4	9.2.12.2.4
Has the Stand-Alone Routing data been defined?	9.2.12.2.5	9.2.12.2.5
Has the ESCO-to-ESN/NPD data been defined?	9.2.12.2.6	9.2.12.2.6
Has the E911 DAS been defined?	9.2.12.2.7	9.2.12.2.7
Has an ESCO been assigned to all DASs that can be used for E911 calls?	9.2.12.2.8	9.2.12.2.8
Have the E911 Line and Trunk SFGs been defined?	9.2.12.2.10	9.2.12.2.10
Has the E911 Screening Index Data been defined?	9.2.12.2.11	9.2.12.2.11
Have Dedicated E911 Incoming Trunks been provisioned?	9.2.12.2.12	9.2.12.2.12
Have Nondedicated E911 Incoming Trunks been provisioned?	9.2.12.2.13	9.2.12.2.13
Have the E911 PSAP Trunks been provisioned?	9.2.12.2.14	9.2.12.2.14
Have the E911 PSAP Routing DNs been provisioned?	9.2.12.2.15	9.2.12.2.15
Has the Dialing Plan for the PSAPs been provisioned?	9.2.12.2.16	9.2.12.2.16
Has the Speed Calling feature been provisioned?	9.2.12.2.17	9.2.12.2.17
For Precutover Testing of E911, associate an alternate digit pattern with E911.	9.2.12.2.18	9.2.12.2.18
Has the E911 OPTION and optional 911 Delay Timing been specified?	9.2.12.2.19	9.2.12.2.19
For Cutover to E911, associate the 9-1-1 digit pattern with E911.	9.2.12.2.20	9.2.12.2.20

9.2.12.2 Activating The Feature

The following sections describe the procedures for implementation of the E911 Feature. There are two types of E911 office configurations available; ESA and Non-ESA. The procedures for each configuration are identical except for the following: Figure 9-5 is a flow diagram of the activation process.

- For the Non-ESA configuration, the procedures in Section 9.2.12.2.2 are **not** performed.
- When assigning the office E911 option using View 8.1 (see Section 9.2.12.2.19) for the ESA configuration, the option is set to ESA, and the Non-ESA configuration, the option is set to NONESA.

NOTE: In the following procedures, the tables referenced use the notation <Variable>, this indicates any valid value in the domain. The notation <Variable A>, <Variable B>, <Variable C>, etc., indicates a particular instance of a variable that might appear elsewhere in a table. The use of this notation does not apply across tables, that is, the value of <Variable A> in one table is not necessarily the same as <Variable A> in another table, even if the domains are the same.

9.2.12.2.1 E911 Feature Lock Procedures

This secured feature, which is provided on a per-office basis, is not activated until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature activation is provided upon ordering. Please contact your Lucent Technologies Account Representative for ordering information and the Right-to-Use (RTU) fee associated with this feature.

Check the activation status of the E911 feature using View 8.22. The value of the FEATURE ID is 61, the value of the MODULE field is OFC.

NOTE: No E911 recent changes are allowed if the feature is locked.

9.2.12.2.1.1 Forms and Views

9.2.12.2.1.1.1 Translation Guide Forms

The translation guide form used in implementing this feature are as follows:

- Form 5713, Secured Feature System Assignment (to activate/deactivate the secured E911 feature).

9.2.12.2.1.1.2 Recent Change Views

The RC view used in implementing this feature are as follows:

- RC View 8.22, Secured Feature Upgrade.

9.2.12.2.1.1.3 Assigning to Customer

To activate this secured feature, contact the Lucent Technologies Secured Feature Administrator (SFA) for assistance. In a new start office or a retrofit, the SFA activates the feature through Office Data Administration (ODA) using Form 5713. In an existing office, the SFA provides instructions, including the necessary password, for using View 8.22 to activate the feature.

9.2.12.2.1.1.4 Deleting Customer Service

To deactivate this secured feature, contact the SFA for assistance. The SFA provides instructions, including the necessary password, for using RC View 8.22 for 5E7 and later software releases.

9.2.12.2.2 Provisioning the E911 API Link to the ESA

Table 9-3 summarizes the essential RC/V views and field names required to provision an E911 API link for an ESA 5ESS[®] switch office. Details are provided in the following paragraphs.

NOTE: For the Non-ESA configuration, the following procedures are *not* performed.

Table 9-3 RC/V Views Essential to Provisioning the E911 API Link

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
24.7	AP SITE ID	API Link Identifier	<Variable>
	SM	Switching Module with API link	<SM Number>
	ALARM	API link alarm	Y
	E911 SITE	E911 Flag	Y
	LCEN, etc.	ISDN 0B+D link #1	<link #1 Variables>
	LCEN, etc.	ISDN 0B+D link #2	<link #2 Variables>
	LCEN, etc.	ISDN 0B+D link #n	<link #n Variables>

Existing procedures for provisioning an API link apply, with exceptions as noted in the following:

- (1) Choosing the value for the E911 APID

When an E911 APID is defined, a check must be done to verify that the E911 APID value is different from any APID currently in service in the office. This is because, at the time of E911 APID assignment, no Recent Change cross-check is done against existing APIDs. However, when other AP-based features are assigned APIDs in an ESA switch, a cross-check is done to ensure that the APID assigned is not identical to the E911

APID.

Since existing API alarms also apply to the E911 APID, office personnel should be aware of the APID that is being used to support E911 service. In addition, there are new office alarms that apply specifically to the E911 API link and E911 APID, as described in Section 9.2.18.3.3.

NOTE: The value used to identify the E911 APID (once it has been chosen, assigned and is being used to provide E911 service) should not be changed unless the intent is to change the office from an ESA office to a Non-ESA office. Changing the value of the E911 APID in an ESA office via RC/V requires that the office status be changed to Non-ESA (see Section 9.2.12.4, Deactivation).

(2) API Alarm

For an API link that is supporting E911, the ALARM field should be set to indicate YES.

NOTE: This field applies to existing API alarm capabilities that are independent of the E911 service. See Section 9.2.18.3.3 for a description of E911-specific alarms.

(3) E911 SITE field

When the value of this field is set to Y, the corresponding AP SITE ID becomes the E911 API link identifier for the ESA E911 office. On View 8.1, the AP SITE ID value from View 24.7 is automatically set (read only) in the E911 APID field.

In an ESA Office, the E911 AP SITE ID cannot be changed or deleted without following the procedures described in Section 9.2.12.4, Deactivation.

(4) BRI Links

It is strongly recommended that an API link supporting E911 consist of a minimum of two BRI links. In addition, each BRI should be on a different Line Group Controller (LGC), so that if one LGC goes out of service the other is still available.

9.2.12.2.3 Defining the E911 PSAP Error Tone

The E911 PSAP Error Tone is provided when a PSAP attendant attempts to perform a selective transfer of a call for which the ESN has not provided a TN. In the event that the selective transfer TN is not available, the switch returns a 120 ipm (interruptions per minute) tone to the PSAP. This tone is also applied to the PSAP when the attendant picks up the handset in an attempt to originate a call (PSAP positions are restricted from originating calls).

Table 9-4 summarizes the recent change steps required to define the E911 PSAP error tone. Defining the E911 PSAP error tone is done by specifying the tone on View 8.6.

Table 9-4 RC/V Views Essential to Defining the E911 Error Tone

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
8.6	TONE TIMED	Tone Type Timed Tone?	HIGH120 N

9.2.12.2.4 Defining ESN-to-Route-List Data

The Emergency Service Number (ESN) defines the PSAP routing DNs and transfer DNs for each PSAP. The ESN is a number that defines the set of emergency services (for example, police, fire, hospital) within a particular district or zone. The ESN routing and transfer data is defined in the following ways:

- First, using View 9.40, the Selective Routing data is defined with ESN values ranging from 1 to 1023. For this

procedure (as described in this section), only the ESN is entered as a key value (the SM and DAS attributes are left blank).

- Second, using View 9.40, the SM stand-alone data is defined on a per SM/DAS basis. This procedure is described in the next section — see Section 9.2.12.2.5.

Table 9-5 summarizes the essential RC/V views and field names required to define E911 Routing data on a per-ESN basis. Details are provided in the following paragraphs.

Table 9-5 RC/V Views Essential to Provisioning per ESN Routing Data

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
9.40	ESN	ESN Identifier	<Variable>
	SM	Switching Module Identifier	<Blank>
	DAS	DAS Identifier	<Blank>
	FLASH	Attendant Flash	<Y or N>
	PRIM PSAP	Primary PSAP TN	<Variable>
	ALT1 PSAP	First Alternate PSAP	<Variable>
	ALT2 PSAP	Second Alternate PSAP	<Variable>
	TN1	First Transfer TN	<Variable>
	TN2	Second Transfer TN	<Variable>
	TN3	Third Transfer TN	<Variable>
	TN4	Fourth Transfer TN	<Variable>
	TN5	Fifth Transfer TN	<Variable>
	TN6	Sixth Transfer TN	<Variable>

Defining E911 routing data on a per ESN basis includes the following:

- (1) Emergency Service Number (ESN)

For entering ESN routing data, only this single key is required.

- (2) Attendant Flash

This field indicates if the E911 attendant always sees flashing when calls are routed. Values are Y/N.

- (3) Primary PSAP

This is a required field, providing the NANP DN without the NPA or full NANP DN of the PSAP to which 911 calls are routed.

- (4) First Alternate PSAP

This is also a required field, providing the NANP DN without the NPA or full NANP DN of an alternate PSAP, to which calls are routed if a 911 call is unable to terminate at the Primary PSAP. If it is intended that no Alternate PSAP be associated with the Primary PSAP, then this field should contain a NANP DN without the NPA or full NANP DN that routes calls to reorder or an appropriate announcement.

- (5) Second Alternate PSAP

This is an optional field providing the NANP DN without the NPA or full NANP DN of a second alternate PSAP, to which calls are routed if a 911 call is unable to terminate at the Primary or First Alternate PSAP.

- (6) Selective Transfer TNs 1 through 6

These are optional fields, which are also populated with NANP DN without the NPA or full NANP DN numbers. It is not required for these fields to be populated consecutively.

9.2.12.2.5 Defining Stand-Alone Routing Data

On View 9.40, the data defined in this section is used for routing E911 calls on an SM that is in stand-alone operation. When defining SM stand-alone routing data using View 9.40, two methods are available; one is required, the other is optional.

Table 9-6 summarizes the essential RC/V views and field names required to define E911 Stand-Alone Routing data. Details are provided in the following paragraphs.

Table 9-6 RC/V Views Essential to Provisioning SM Stand-Alone Routing Data

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
9.40	ESN	ESN Identifier	<Blank>
	SM	Switching Module Identifier	<SM Number>
	DAS	Digit Analysis Selector	<Variable>
	FLASH	Attendant Flash	<Y or N>
	PRIM PSAP	Primary PSAP TN	<Variable>
	ALT1 PSAP	First Alternate PSAP	<Variable>
	ALT2 PSAP	Second Alternate PSAP	<Variable>
	TN1	First Transfer TN	<Variable>
	TN2	Second Transfer TN	<Variable>
	TN3	Third Transfer TN	<Variable>
	TN4	Fourth Transfer TN	<Variable>
	TN5	Fifth Transfer TN	<Variable>
	TN6	Sixth Transfer TN	<Variable>

The first method requires that View 9.40 be used to define stand-alone routing for each SM. The keys for this method are the value of the SM and the value of the DAS is zero (0). The ESN key is not entered.

NOTE: Even though an SM does not have stand-alone capability, this data is required for default routing purposes.

The second method allows View 9.40 to be used to define stand-alone routing on an SM/DAS basis. For each SM, individual DAS values may be entered based on local needs. This optional stand-alone routing data may be used if more than one set of emergency stand-alone numbers is needed for E911 calls on an SM. This option allows for distinctions to be made via the DAS assigned to each caller. When stand-alone routing is required, the 5ESS[®] switch look first for the optional SM/DAS routing data, if no data exists, then the required SM only routing data is used.

The lines and outgoing trunks that are used to route stand-alone calls must be verified as local to the SM or RSM cluster.

When the E911 OPTION is changed from INACTIVE to either ESA or non-ESA, a Recent Change cross-check is performed to check for the existence of stand-alone data with DAS = 0 for each SM on the switch. However, this Recent Change check is **not** done when a new SM is added to an ESA or non-ESA 5ESS[®] switch.

NOTE: The addition and/or removal of DASs on View 9.1, or the growth of new SMs in an existing office, requires addition/removal of the E911 stand-alone routing data. Once an office is configured as ESA or Non-ESA, recent change checks are not made against new or deleted DAS/SM combinations and the corresponding E911 stand-alone routing data.

9.2.12.2.6 Defining ESCO-to-ESN/NPD Data

Before an Emergency Services Central Office (ESCO) value can be assigned to incoming trunk groups and digit analysis selectors that support E911 calls, they must be defined in RC/V View 9.41.

Table 9-7 summarizes the essential RC/V views and field names required to define an ESCO. Details are provided in the following paragraphs.

Table 9-7 RC/V Views Essential to Provisioning ESCO Data

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
9.40	ESN	Emergency Service Number 9.2.12.2.4	<Variable A>
9.41	ESCO	Emergency Service Central Office Identifier 9.2.2	<Variable>
	ESN	ESN Identifier	<Variable A>
	NPD	NPD Identifier	<Variable>
	SEL RT	Selective Routing Indicator	<Y or N>

Defining an ESCO includes the following:

- (1) An ESN value, previously defined in RC/V View 9.40, is required.
- (2) The NPD is an indicator, range 0-3, which maps onto the NPA of the 911 call originator to the PSAP ANI display.
- (3) The value (Yes or No) for the Selective Routing Indicator is entered to indicate if ESA routing is to be used.

For an ESA equipped office, when all E911 call over a trunk group or from a DAS are routed to the same ESN selective routing can be set to No.

9.2.12.2.7 Defining the E911 DAS

All PSAP Routing DN's and Selective Transfer TN's (assigned via View 9.40) and the reroute DN (assigned via View 5.1), undergo digit analysis via the E911 DAS and the associated PDIT and LDIT. Fixed and manual transfer numbers dialed by the PSAP attendant use the DAS assigned on View 5.1 (Trunk Group). The purpose of this is so that no call is rejected because of actions that an Office DAS or other DAS might take based on the NPA-office code of the Calling and Called TN's.

Table 9-8 summarizes the essential RC/V views and field names required to define an E911 DAS. Details are provided in the following paragraphs.

Table 9-8 RC/V Views Essential to Defining the E911 DAS

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
9.25	LDIT PKT SW SM	Local Digit Interpreter Table Packet Switching Indicator Switching Module Indicator	<Variable A> N <Variable>
9.3	LDIT INCOMING DIGITS CALL TYPE TYP CI CALL RTI OFFCOD NBR OF DIGITS	Local Digit Interpreter Table Incoming Digits Call Type Type of Carrier Interconnect Call Route Index Office Code Number of Digits Expected for Collection	<Variable A> <Variable> NORMAL INTRA <Variable> <Variable> <Variable>
9.1	DAS PDIT LDIT PKT SW ESCO	Digit Analysis Selector Identifier (Key) Prefix/Feature Digit Interpreter Table Local Digit Interpreter Packet Switching Indication Emergency Service Central Office Identifier 9.2.2	<Variable C> <Variable B> <Variable A> N <Variable>
9.2	PDIT DIGITS TO INTERPRET CALL TYPE TYP CI CALL	Prefix/Feature Digit Interpreter Table Digits to Interpret Call Type Type of Carrier Interconnect	<Variable B> <Variable> LDIT INTRA

	PREFIX DIGITS TO BE DELETE	Call Prefix Digits Dialed Digits to be Deleted	NONE <Variable>
8.1	OFFICE ID E911 DAS	Office Identification (Key) E911 Digit Analysis Selector	<Variable> <Variable C>

For this step, existing procedures are used to define digit analysis, in which the first 3 or 6 digits of each PSAP Routing DN and Transfer TN must be associated with a Call Type of NORMAL or the call fails. This DAS is then assigned as the E911 DAS on RC/V View 8.1.

NOTE: View 8.1 is used in several steps in this activation procedure. There are different items that must be defined before they can be assigned using View 8.1. The multiple use of View 8.1 is done so that the relationship between the definition and the assignment can be clearly observed. It is optional to perform all the definitions first, and assign all the items last, when View 8.1 is used to set the E911 office option as shown in Section 9.2.12.2.19.

Since the purpose of the E911 DAS is to avoid unwanted actions by an Office DAS or another DAS on 911 calls, an existing DAS can be used if it translates PSAP TNs properly, as described in the previous paragraph. This could possibly occur, for example, in an office that serves one area code.

9.2.12.2.8 Assigning an ESCO to Digit Analysis Selectors

In this step, an ESCO is assigned to each DAS that is capable of originating an E911 call (It is possible that this step may be required for every DAS in the office.) However, there may be instances in which an ESCO and E911 may not apply (for example, in a DAS that only supports packet-switched data calls).

Table 9-9 summarizes the essential RC/V views and field names required to assign an ESCO to a DAS. Details are provided in the following paragraphs.

Assigning an ESCO to a DAS involves the following:

- (1) Each valid ESCO is defined using RC/V View 9.41.
- (2) Each DAS that could possibly be used to originate E911 calls must be assigned a valid ESCO.

Table 9-9 RC/V Views Essential to Assigning an ESCO to Digit Analysis Selectors

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
9.41	ESCO	Emergency Service Central Office Identifier 9.2.2	<Variable A>
9.1	DAS	Digit Analysis Selector	<Variable>
	PDIT	9.2.12.2.14 Identifier (Key) PDIT Identifier	<Variable>
	LDIT	LDIT Identifier	<Variable>
	ESCO	ESCO Identifier	<Variable A>

9.2.12.2.9 Assigning an ESCO to Trunk Groups

In this step, an ESCO is assigned to each trunk group that is dedicated to handling E911 service.

NOTE: For existing trunk groups, the ESCO is assigned during this step. For new trunk groups assign the ESCO the trunk groups are built.

Table 9-10 summarizes the essential RC/V views and field names required to assign an ESCO to a trunk group. Details are provided in the following paragraphs.

Assigning an ESCO to a trunk group involves the following:

- (1) Each valid ESCO is defined using RC/V View 9.41.
- (2) Each trunk group that is dedicated to handle E911 calls must have a valid ESCO assigned.

Table 9-10 RC/V Views Essential to Assigning an ESCO to Trunk Groups

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
9.41	ESCO	Emergency Service Central Office Identifier 9.2.2	<Variable A>
5.1	TGN	Trunk Group Number	<Variable>
	ESCO	Identifier (Key) ESCO Identifier	<Variable A>

9.2.12.2.10 Defining E911 Line and Trunk Simulated Facility Groups (SFGs)

To prevent E911 facilities from being flooded by a large number of calls from one area, call limits are required to control the number of calls accepted from one source. Incoming calls via the dedicated E911 trunk groups are automatically limited (that is, choked) by the size of the trunk group.

Incoming calls via nondedicated trunk groups and calls that originate from lines in the E911 tandem switch must be choked by Simulated Facility Groups (SFGs).

Two choke mechanisms (provisioned as SFGs) apply to the 5ESS[®] switch E911 service.

- The E911 Line SFG limits the number of simultaneous 911 calls that can originate from lines on the E911 tandem switch and for incoming calls via a PBX trunk (that is, the field E911 TYPE is set to PBXNONDED on View 5.1).
- The E911 Trunk SFG limits the number of simultaneous 911 calls incoming to the E911 tandem switch on Nondedicated Trunks.

NOTE: Calls that originate over dedicated trunks do not count against the trunk SFG limits. This is because the number of trunks limits the number of E911 calls.

Provisioning of these SFGs is done using existing procedures, with the following changes: Two SFG types are available (E911 Line and E911 Trunk), and the maximum size for an E911 SFG is 511.

Table 9-11 *summarizes* the recent change steps required to provision the E911 SFGs. Details are provided in the following paragraphs.

Provisioning of the E911 Line SFG involves the following:

- (1) The Line SFG is defined on View 7.3 with SFG Type E911 Line.
- (2) The size of the Line SFG is entered.
- (3) The E911 Line SFG identifier is entered on RC/V View 8.1.

Provisioning of the E911 Trunk SFG involves the following:

- (1) The Trunk SFG is defined on View 7.3 with SFG Type E911 Trunk.
- (2) The size of the Trunk SFG is entered.

- (3) The E911 Trunk SFG identifier is entered on RC/V View 8.1.

Table 9-11 RC/V Views Essential to Provisioning the E911 SFGs

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
7.3	SFG NUM SFG TYPE SFG SIZE	SFG Identifier (Key) Type of SFG SFG Limit	<Variable A> <E911LNE> <Variable>
7.3	SFG NUM SFG TYPE SFG SIZE	SFG Identifier (Key) Type of SFG SFG Limit	<Variable B> <E911TRK> <Variable>
8.1	E911 LNE E911 TRK	E911 Line SFG E911 Trunk SFG	<Variable A> <Variable B>

9.2.12.2.11 Defining the E911 Screening Data

Certain E911 routed calls undergo screening via the E911 screening translations. All calls routed via the PSAP Routing DNs, Selective Transfer TNs (assigned via View 9.40), and the Reroute DN (assigned via View 5.1) are screened using the E911 screening index assigned on View 8.1. The purpose of this is to provide uniform screening rules for all PSAP related calls. The prefix (PFX) field on View 10.10 should be set to "NONE" since no prefixes may be entered as part of the DNs specified in View 9.40.

All calls routed via the fixed and manual transfer numbers dialed by the PSAP attendant are screened using the SCR field on View 5.1 keyed by the PSAP trunk group.

Table 9-12 summarizes the recent change steps required to provision the E911 Screening Data. Details are provided in the following paragraphs.

Defining an E911 Screening Data involves the following:

- (1) Obtain a FREE Charge Index value using View 10.11, and use the value obtained as input for View 10.10.
- (2) Obtain all Code Index values that translate PSAP routing DNs via the LDITs and PDITs assigned in the 911 DAS.
- (3) Define a unique Screen Index and assign it as the E911 SCR on View 8.1.
- (4) On View 10.10, enter the E911 Screen Index as the key for each Code Index obtained in Step 2.

Table 9-12 RC/V Views Essential to Provisioning the E911 Screening Data

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
10.11	CHGIDX AMATYPE	Charge Index Key AMA Call Type	<Variable A> FREE
8.1	E911 SCR	E911 Screen Index	<Variable B>
10.10	SCR CDI PFX CHGI	Screen Index Identifier (Key) Code Index Prefix Charge Index	<Variable B> <Variable C> NONE <Variable A>
10.10	SCR CDI PFX CHGI	Screen Index Identifier (Key) Code Index Prefix Charge Index	<Variable B> <Variable D> 0+ <Variable A>
10.10	SCR CDI PFX CHGI	Screen Index Identifier (Key) Code Index Prefix Charge Index	<Variable B> <Variable E, etc.> 1+ <Variable A>

9.2.12.2.12 Provisioning Incoming Dedicated E911 Trunks

Incoming dedicated trunks that are assigned to handle E911 calls from End Offices are defined using existing procedures, with the following additions. All data for E911 dedicated trunks is included on View 5.1. These trunks are only used for E911 calls.

Table 9-13 *summarizes* the recent change steps required to provision E911 Dedicated Trunks. Details are provided in the following paragraphs.

Assignment of E911 data includes the following:

- (1) Valid ESNs are defined using View 9.40.
- (2) Valid ESCOs are defined using View 9.41.
- (3) On RC/V View 5.1, the Trunk Group is defined as One-Way Incoming.
- (4) The dedicated trunk is defined in the E911 TYPE field of RC/V View 5.1 as E911 Dedicated (DED), E911 Direct Connect With ANI (DIRANI), or E911 Direct Connect Without ANI (DIRNOANI).
 - If E911 Dedicated (DED), the Trunk Class of Service must be CAMAANI for analog trunks; or the Class of Service must be either LTOLLCON or TTOLLCON for SS7 ISUP trunks.
 - If the trunk is defined as either type of Direct Connect (DIRANI or DIRNOANI), the Trunk Class of Service must be CAMAANI.

NOTE: The values DIRANI and DIRNOANI are normally used for incoming trunks from step-by-step (SXS) offices.

For dedicated and nondedicated 911 trunks, if the incoming Trunk Class of Service is CAMAANI, then the Trunk Class of Service for the outgoing end from the subtending office must be a Trunk Class of Service that sends ANI.

When the Trunk Class of Service is set to CAMAANI, then a value must be entered for the fields VALNPA and one of the fields VALNXX1 through VALNXX8. These values are required to satisfy recent change form checks. The VALNPA field is used by E911 call processing when the VALNPA field is sent to the ESA in the query for the ESN.

For additional form check information, see the Recent Change and Translation Guide documents.

- (5) Each dedicated E911 trunk must be assigned a valid ESCO identifier.
- (6) On View 5.5, assign members to the Trunk Group. After members are assigned, they must be restored to service.

Table 9-13 RC/V Views Essential to Provisioning Incoming Dedicated E911 Trunks

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
9.40	ESN	Emergency Service Number	<Variable A>
	SM DAS	9.2.12.2.4 Switching Module number Digit Analysis Selector	<Blank> <Blank>
9.41	ESCO	Emergency Service Central Office identifier 9.2.2	<Variable B>
5.1	E911 TYPE	E911 Trunk Type	<DED or DIRANI or DIRNOANI>
	ESCO	Emergency Service Central Office identifier 9.2.2	<Variable B>
5.5	TGN	Trunk Group Number	<Variable>

	MEMB NBR	Member Number	<Variable>

9.2.12.2.13 Provisioning Incoming Nondedicated E911 Trunks

Nondedicated Trunks that support incoming E911 calls from End Offices are defined using existing procedures, with the following additions. All data for E911 dedicated trunks is included on View 5.1.

Table 9-14 *summarizes* the recent change steps required to provision E911 Nondedicated Trunks. Details are provided in the following paragraphs.

Assignment of E911 data includes the following:

- (1) On View 5.1 when the trunk group is defined as being nondedicated for E911 calls, then E911 TYPE is NONDED or PBXNONDED. The value determines which SFG is used to choke E911 calls.
 - When E911 TYPE is set to NONDED, incoming E911 calls over this trunk group are counted against the E911 trunk SFG (see Section 9.2.12.2.10).
 - When E911 TYPE is set to PBXNONDED, incoming E911 calls over this trunk group are counted against the E911 line SFG (see Section 9.2.12.2.10).
- (2) On View 5.1, the E911 CPN field specifies how the ESN of the call is determined.
 - When E911 CPN is set to Y, the ESN of the call is based on the Calling Party Number (CPN) or the Billing Number (BN) sent with the call. When E911 CPN is set to Y, then the trunk class must be EDSL or EDSLHM.
 - When set to N (default), the ESN is based on the Billing DN of the trunk group.
- (3) On View 5.1, assignment of an ESCO is not mandatory on a nondedicated E911 trunk. If an ESCO is assigned, then an ESN and an ESCO must be defined first.

If an ESCO is not assigned to the trunk group, then the DAS for the trunk group is used (see Section 9.2.12.2.9).

- (4) On View 5.5, assign members to the Trunk Group. After members are assigned, the members must be restored to service.

Table 9-14 RC/V Views Essential to Provisioning Incoming Non-Dedicated E911 Trunks

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
5.1	E911 CPN E911 TYPE ESCO	E911 Calling Party Number E911 Trunk Type Emergency Service Central Office Number 9.2.2	<Y or N> ^a <NONDED or PBXNONDED> <Optional>
5.5	TGN MEMB NBR EN SUPV IDLE STATE IN START DIAL OUT START DIAL	Trunk Group Number Member Number Trunk Equipment Number Type of Supervision Hardware Idle State of Trunk Member Incoming Start Signal Outgoing Start Signal	<Variable> <Variable> <Variable> <Variable> ON WINK NONE
Notes:			
a. This field and value applies only if the trunk class is EDSL or EDSLHM, see 9.2.2 for more information.			

9.2.12.2.14 Provisioning CAMA (E911) PSAP

The CAMA (E911) PSAP Trunks are connected from the E911 tandem to the various PSAP locations. These trunks are analog SN102, 2-wire loop supervision outgoing (TRLLO) or SN112 toll 2-wire loop supervision outgoing (TKLTOL). These trunk groups use a special configuration for E911 that allows the transfer of E911 calls and the forwarding of ANI numbers. The following steps describe fields that are specific to the E911 service. The other fields for assignment of trunks are defined using existing RC/V procedures.

NOTE: The E911 PSAP is also referred to as an CAMA PSAP, the term CAMA PSAP is used because of the similarity between the MF signaling used to send ANI to the PSAP and the CAMA trunk ANI format.

Table 9-15 summarizes the recent change steps required to provision E911 CAMA PSAP Trunks. Details are provided in the following paragraphs.

The assignment of CAMA PSAP trunk data includes the following:

The definition of a CAMA PSAP trunk that is dependent on local needs and meeting cross-check requirements that are listed in Recent Change and Verify documentation (Recent Change documents are software release specific) and in 235-080-100, *5ESS® Switch Translations Guide (TG-5)*. The following fields and values are required for the E911 PSAP:

- (1) On View 5.1, the trunk direction/type of transmission (TRK DIR) is set to TWOWAY.
- (2) The type of trunk member hunting (HUNT TYPE) must be set to 2WF, 2WB, LGBD, LGFD, or FIFO.
- (3) The trunk class of service (TRK CLASS) must be set to PFLASH.
- (4) The ATTTN field should have a value so that the CAMA PSAP trunk is included in the Trunk Automatic Progression Test. The values entered for the test should cause a permanent busy test with the outpulsing of the digit 8.
- (5) The inward pulsing signaling (INPLS) must be set to TT.
- (6) The outward pulsing signaling (OUTPLS) must be set to MF.
- (7) The BRCS field is set to Y, at a minimum, a Multiway Calling BRCS feature is assigned to the PSAP trunk group members.
- (8) The BILLING DN field is required so the calls transferred from the PSAP are billed properly.
- (9) An optional make busy key (MK BUSY KEY) may be assigned to the CAMA PSAP trunk to allow the flexibility of redirecting E911 calls. The use of the fields, MK BUSY KEY, RERTE ACT, and PSAP RERTE TN, allow for the following redirection options:
 - Redirection for night service and/or PSAP power failure. This feature redirects calls to the PSAP RERTE TN only if a scan point specified in the MAKE BUSY KEY is activated due to night service or a PSAP power failure. To assign this option, a NANP DN without the NPA or full NANP DN must be entered in the RERTE TN field, a scan point number must be entered in the MK BUSY KEY field, and RERTE ACT must be set to "N."
 - Redirection for traffic-busy PSAPs. This feature redirects calls to the PSAP RERTE TN only if the PSAP is traffic-busy. To assign this option, a NANP DN without the NPA or full NANP DN must be entered in the RERTE TN field, the MK BUSY KEY field must be blank, and RERTE ACT must be set to "Y."
 - Redirection for both night service/power failure and traffic-busy PSAPs. This feature redirects calls to the RERTE TN if either the scan point specified in the MK BUSY KEY is activated (due to night service or PSAP power failure), or the PSAP is traffic-busy. To assign this option, a NANP DN without the NPA or full NANP DN must be entered in the RERTE TN field, a scan point number must be entered in the MK

BUSY KEY field, and RERTE ACT must be set to "Y."

- (10) The calling party number for E911 (E911 CPN) field does not apply to the CAMA PSAP trunk (default to N).
- (11) The 911 traffic type for the trunk (E911 TYPE) is set to NONDED.
- (12) The value of the ESCO is unspecified (blank).
- (13) The CAMA PSAP field specifies that the trunk group connects to a CAMA Public Safety Answering Point, this is set to Y.
- (14) The optional field, RERTE ACT may be set to Y or N; if it is desired to redirect calls for traffic-busy PSAPs then set to Y. For more information, see Step 9, which describes the use of the MK BUSY KEY field, the PSAP RERTE TN field, and the RERTE ACT field.
- (15) The optional field, PSAP RERTE TN is assigned a NANP DN without the NPA or full NANP DN reroute DN, to redirect calls. This allows for the reroute of calls that attempt to terminate to a busy PSAP. For more information, see Step 9, which describes the use of the MK BUSY KEY field, the PSAP RERTE TN field, and the RERTE ACT field.
- (16) A value for Wink Start (WINK START) is entered, the default value of 16 is recommended. This specifies the number of seconds of the wink start time for the PSAP trunk group.
- (17) The value for the Abandon Timer (ABND TIMER) is entered, otherwise the default value of 18 is recommended. This specifies the number of seconds the PSAP keeps ringing after the caller abandons the call.
- (18) On View 5.5, assign members to the Trunk Group.
- (19) On View 5.11, assign the Multiway feature /MWMFE to each CAMA PSAP trunk group members. View 5.11 is also use to assign any IDP and/or Speed Calling features to the PSAP trunk group members.

Table 9-15 RC/V Views Essential to Provisioning a CAMA PSAP Trunk

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
5.1	TGN	Trunk Group Number	<Variable>
	TRK DIR	Direction and/or Type of Transmission	TWOWAY
	HUNT TYPE	Type of Trunk Member	2WF
	TRK CLASS	Hunting	
	ATTN	Class of Service for Trunk Automatic Trunk Test Table	PFLASH <Variable>
	INPLS	Number Inward Pulsing Address	TT
	OUTPLS	Signaling Type Outward Pulsing Address	MF
	BRCS	Signaling Type Business and Residence	Y
	BILLING DN	Custom Service Billing Directory Number for the Trunk	<Variable>
	MK BUSY KEY	Make-Busy Key ^a	<Variable> ^a
	E911 CPN	E911 Calling Party Number	N
	E911 TYPE	E911 Trunk Traffic Type	NONDED
	ESCO	Emergency Service Central	0
	CAMA PSAP	Office Identifier 9.2.12.2.14 CAMA PSAP Trunk	Y

	PSAP RERTE TN RERTE ACT WINK STRT ADND TIMER	Overflow Reroute TN ^a Reroute Active ^a Wink Start Timer Abandon Timer	<Variable> ^a <Y or N> ^a <Variable> <Variable>
5.5	TGN MEMB NBR EN SUPV IDLE STATE IN START DIAL OUT START DIAL	Trunk Group Number Member Number Trunk Equipment Number Type of Supervision Hardware Idle State of Trunk Member Incoming Start Signal Outgoing Start Signal	<Variable> <Variable> <Variable> <Variable> ON DIALTONE WINK
5.11	TGN MEM FEATURE	Trunk Group Number (Key) Trunk Group Member (Key) Feature Name	<Variable> <Variable> /MWMFE
Notes:			
a. The entry in this field is optional, see 9.2.12.2.14 .			

9.2.12.2.15 Provisioning CAMA (E911) PSAP Routing DNs

The CAMA (E911) PSAP DNs are assigned using existing RC/V procedures.

NOTE: The E911 PSAP is also referred to as an CAMA PSAP. The term CAMA PSAP is used because of the similarity between the MF signaling used to send ANI to the PSAP and the CAMA trunk ANI format.

Table 9-16 summarizes the recent change steps required to provision CAMA PSAP DNs. Details are provided in the following paragraphs.

The line assignment data required for a PSAP DN is as follows:

- (1) On View 4.1, define an PSAP Line Class Code.
- (2) On View 10.2, define an PSAP Route Index with a route type of HUNT and the PSAP trunk group number.
- (3) Use View 1.5 to assign the PSAP TN, the PSAP Line Class Code and the PSAP Route Index.

Table 9-16 RC/V Views Essential to Provisioning CAMA PSAP Routing DNs

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
4.1	LCC RAX SERVCL TERM SCR	Line Class Code (Key) Rate Center Number (Key) Class of Service Terminating Class Treatment Type Screen Index Identifier	<Variable A> <Variable B> INDIV RI <Variable>
10.2	RTI ETYP DIG DLTD NEX RTI SIG PRO ANI IND	Route Index Identifier (Key) Route Type Number of Digits to be Deleted Next or Alternate Route Index Signaling Protocol Type Outpulse Automatic Number Identification	<Variable C> HUNT <Variable> <Variable> TRAD N
1.5	TN RAX LCC RTI	Telephone Number (Key) Rate Center Number Line Class Code Route Index	<Variable> <Variable B> <Variable A> <Variable C>

9.2.12.2.16 Dialing Plan Assignment

This step is performed to assign the dialed codes for the Selective Transfer, Manual Transfer and optional Fixed Transfer features. All the dialed codes used by the PSAP attendant must be defined, either in an Individualized Dialing Plan (IDP) or in the Office Dialing Plan (ODP).

Table 9-17 summarizes the recent change steps required to provision an IDP for the PSAP. Table 9-18 summarizes the recent change steps required to provision an ODP for the PSAP.

NOTE: A Speed Calling feature may also be used to define the 2-digit codes for the Manual and Fixed transfer features (see Section 9.2.12.2.17).

Assignment of IDP codes includes the following:

- (1) On View 9.2, the value of the field PDIT is the E911 PDIT. The value of the field CALL TYPE is FEATURE. The value of TYP CI CALL is NONCI.

On View 9.10, the IDP group for the PSAP attendants is defined. The value of the IDP Group for the PSAP attendants is specified. The value of the IDPACTIVE field is set to Y. The value of the ERRTREAT field is TONE (the value may also be USEOFFC which allows for escape to the ODP).

On View 9.13, the six Selective Transfer dialed codes (*11, *12, *13, *14, *15, and *16), are each, respectively, assigned an ACTION value of SEL1XFER through SEL6XFER. Each selective transfer action points to the corresponding transfer TN that may be specified on View 9.40 (a entry on View 9.40 is optional). For example, the ACTION SEL3XFER points to the third transfer TN entered on View 9.40 (see Section 9.2.12.2.4).

The entry /* in the value of the FEATURE field.

NOTE: Selective Transfer TNs values are optional for the each ESN (View 9.40); therefore, there may not be a TN available to the PSAP attendant when an Selective Transfer code is dialed.

- (2) Use View 5.26 to assign the IDP trunk parameters

Assignment of ODP codes includes the following:

- (1) On View 9.2, the value of the field PDIT is the E911 PDIT. The value of the field CALL TYPE is FEATURE. The value of TYP CI CALL is NONCI. The value of the field FEATURE is /*.

The field DIGITS TO INTERPET has the following values; *11, *12, *13, *14, *15, and *16 (one 9.2 view is inserted for each set of digits). These are the six Selective Transfer dialed codes. Each set of dialed codes are respectively assigned an ACTION value of SEL1XFER through SEL6XFER. For example, *12 is assigned the action SEL2XFER. Each selective transfer action points to the corresponding transfer TN that may be specified on View 9.40 (an entry on View 9.40 is optional). For example, the ACTION SEL3XFER points to the third transfer TN entered on View 9.40 (see Section 9.2.12.2.4).

Table 9-17 RC/V Views Essential to Assign an Individualized Dialing Plan for an E911 PSAP

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
9.10	IDPNAME	Individualized Dialing Plan Group Name (Key)	<Variable A>
	IDPACTIVE ERRTREAT	Active State of IDP Type of Error Treatment Invoked for Dialed Code	Y TONE
9.13	IDP GRP	Individualized Dialing Plan Group Name (Key)	<Variable A>
	INC DIGITS STATE ACTION FEATURE DPAT 1 TO 8	Incoming Digits (Key) Dialing State After Incoming Digits Feature Action BRCS Feature Access Permissions for DPAT Categories One through Eight	<Variable> NORMAL SELnXFER /* YYYYYYYY
5.26	FEATURE	Individualized Dialing Plan	/IDP

TGN MEM	Feature Name Trunk Group Number (Key) Trunk Group Member Number (Key)	<Variable> <Variable>
IDP GROUP NAME	Individualized Dialing Plan for the E911 Trunk Group	<Variable>

Table 9-18 RC/V Views Essential to Assign an Office Dialing Plan for an E911 PSAP

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
9.2	PDIT DIGITS TO INTERPRET CALL TYPE TYP CI CALL FEATURE ACTION PREFIX DIGITS TO BE DELETED	Prefix/Feature Digit Interpreter Table Digits to Interpret Call Type Type of Carrier Interconnect Call BRCS Feature Feature Action Prefix Digits Dialed Digits to be Deleted	<Variable> <Variable> FEATURE NONCI /* SELnXFER NONE 0

9.2.12.2.17 Speed Calling Feature Assignment

This optional step is performed to assign a 2-digit Speed Calling feature for the Fixed Transfer dialed codes at the PSAP. Once assigned, the PSAP equipment may send the appropriate dial codes or the PSAP attendant may manually dial the fixed transfer codes and any additional speed calling codes.

Table 9-19 summarizes the recent change steps required to provision Speed Calling for the PSAP trunk group.

Assignment of Speed Calling includes the following:

- (1) On View 4.2, the value of the LIST NAME field is the name of the shared speed call list for the E911 PSAPs. The value of the SHARED field is Y.

The value of the SC CODE BLOCK field is 20 (this is for *2n codes). Additional values for codes of *3n, *4n, *5n, etc., require the insert of View 4.2 for SC CODE BLOCK entries of 30, 40, 50, etc.

The Speed Calling code is entered (SC CODE) and the desired digit sequence (STORED SEQUENCE) is entered to complete the listing.

When Speed Calling is used with an IDP, the following combinations are useful to allow the PSAP attendants access to the Speed Call codes and the office dialing plan.

- The following assignments require the * plus 2 digits be dialed to access the speed calling (this is an 80-digit maximum speed call list). All other dialed digits use the ODP.

On View 9.10, the ERRTREAT field is set to USEOFFC.

On View 9.13, the STATE field is set to REMAIN, the ACTION field is set to AD2USE, and the FEATURE field is set to /SC*. One 9.13 view is inserted for each of the following values for INC DIGITS; *2, *3, *4, *5, *6, *7, *8, and *9.

On View 4.2, for the STORED SEQUENCE field, a NANP DN without the NPA or full NANP DN is entered for each SC CODE.

- The following assignments require the 2 digits be dialed to access the speed calling (this is a 90-digit maximum speed call list). The digit 9 plus additional digits are used for dialing via the ODP. The digit 9 is used to escape to POTS.

On View 9.10, the ERRTREAT field is set to TONE.

On View 9.13, the STATE field is set to REMAIN, the ACTION field is set to AD2USE, and the FEATURE field is set to /SC*. One 9.13 view is inserted for each of the following values for INC DIGITS; 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0.

On View 9.13, the STATE field is set to NORMAL, the ACTION field is set to DTPOTSA, and the FEATURE field is set to /ID*, the view is inserted for the value of INC DIGITS set to 9.

On View 4.2, for the STORED SEQUENCE field, a 9 plus a NANP DN without the NPA or full NANP DN is entered for each SC CODE.

- The following assignments require 2 digits be dialed to access the speed calling (this is a 100-digit maximum speed call list). The digits * and 9 plus additional digits are used for dialing via the ODP. The digits *9 are used to escape to POTS.

On View 9.10, the ERRTREAT field is set to TONE.

On View 9.13, the STATE field is set to REMAIN, the ACTION field is set to AD2USE, and the FEATURE field is set to /SC*, the view is inserted for the value of INC DIGITS set to 9.

On View 9.13, the STATE field is set to NORMAL, the ACTION field is set to DTPOTSA, and the FEATURE field is set to /ID*, the view is inserted for the value of INC DIGITS set to *9.

On View 4.2, for the STORED SEQUENCE field, a *9 plus a NANP DN without the NPA or full NANP DN is entered for each SC CODE.

Table 9-19 RC/V Views Essential to Assign Speed Calling for an E911 PSAP

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
4.2	SC LIST	Speed Call List Name (Key)	<Variable A>
	SC CODE BLOCK	Speed Call List Code Block Block (Key)	20,30,40
	SC SHARED	Shared Speed Call List Indicator	Y
	TGSR OV	Terminal Group Station Restriction Override Indicator	N
5.51	FEATURE	Speed Calling Feature Name (Key)	/SC2
	TGN	Trunk Group Number (Key)	<Variable>
	MEM	Trunk Group Member Number (Key)	<Variable>
	SC LIST	Speed Calling List Name	<Variable A>
5.11	SC SHARED	Shared Speed Call List Indicator	Y
	TGN	Trunk Group Number (Key)	<Variable>
	MEM	Trunk Group Member (Key)	<Variable>
	FEATURE	Feature Name	/SC2

9.2.12.2.18 Associating an Alternate Digit Pattern with the E911 Feature for Precutover Testing

This step is performed to associate an alternate digit pattern, such as 7-1-1 (or any other sequence of digits), with the E911 feature. This is done to allow for a transition period and for testing procedures to be performed on all line and trunk DASSs.

NOTE: Although this description refers specifically to the dialed digit pattern 9-1-1 during transition and testing procedures, it is sometimes desirable to associate a pattern such as 7-1-1 (or any other sequence of digits), with the E911 feature. The procedures for that would be similar to those described for 9-1-1. For example, assume that the digits 9-1-1 were associated with Call Type = EMER, and 7-1-1 was associated with QUERY and a Code Index that pointed to E911 for offices prior to 5E8. For 5E8 and later offices the Call Type = EMER and the 7-1-1 was associated with the Call Type = EMER and a trigger number (TRIG

NBR) that pointed to E911. Using 7-1-1, the E911 service can be tested.

In general, existing procedures are used to associate a digit pattern with the E911 Service. The only difference between B911 and E911 for offices before 5E8, is in the Call Type that is associated with the 9-1-1 digits. Instead of using a Call Type of EMER which is normally used for B911 Service, the E911 Service must use a Call Type of QUERY. In 5E8 and later offices both B911 and E911 have a Call Type of EMER, the difference is that for E911 the call type is associated with a trigger number (TRIG NBR) that points to the E911 application.

Table 9-20 *summarizes* an example of recent change steps that associate the 7-1-1 dialed digits with the E911 feature for precutover testing. Details are provided in the following paragraphs.

Offices before 5E8 Use a Code Index that points to an entry on RC View 9.30 with the service type of E911. The Code Index used on View 9.30 must match the Code Index used of View 9.3. In 5E8 and later offices a trigger number is used that points to an entry on RC View 9.35 with the Application of E911. The trigger number (TRIG NBR) on View 9.35 must match the trigger number used on View 9.3.

If a dedicated trunk is required to receive E911 calls via the digits "11" or "1," an entry in the trunk dialing plan must be entered in the DAS the same way as the digits 9-1-1 are entered.

The E911 and B911 emergency services may coexist within the same office. The 911 digits in the DAS of the caller determines which 911 service is provided as specified by the call type of QUERY or EMER in offices before 5E8. In 5E8 and later offices the DAS of the caller determines which 911 service is provided as specified by the Call Type of EMER and the existence of an E911 trigger number.

Table 9-20 RC/V Views Essential to Associating Alternate Dialed Digits with the E911 Feature for Pre-Cutover Testing

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
9.30	CDI SERV TYPE	Code Index Service Type	<Variable A> E911
Pre-5E8			
9.35	TRIG NBR APPLICATION	Trigger Number Application	<Variable A> E911
5E8 and Later			
9.1	DAS PDIT	Digit Analysis Selector Prefix/Feature Digit Interpreter Table	<Variable D> <Variable B>
	LDIT	Local Digit Interpreter Table	<Variable C>
9.3	LDIT INCOMING DIGITS	Local Digit Interpreter Table Incoming Digits	<Variable C>
	CALL TYPE	Call Type	711 ^a QUERY pre-5E8
	CALL TYPE	Call Type	EMER 5E8 and later
	CODE INDEX	Code Destination Index	<Variable A>
9.5	INC DIT	Incoming Digit Interpreter Indicator (Key)	1
	INC DIGS	Incoming Digits (Key)	7 ^a
Notes:			
a. Or other test digits.			

9.2.12.2.19 Assigning the E911 Office Options

In this step, the office option for the E911 service is set and the option for E911 digit dialing delay treatment is set.

Table 9-21 *summarizes* the steps required to set the value of the office option E911 OPTION.

The default value for the E911 OPTION field is INACTIVE. A value of ESA or NONESA is entered to specify the type of E911 service available.

When the ESA value is entered for E911 OPTION, the E911 APID field must have a value. When the NONESA

value is entered, the following fields must have a value; E911 DAS, E911 SCR, E911 LN SFG, and E911 TRK SFG.

The value of the E911 DELAY field (0 through 3) controls the office parameter interdigital timing performed after a 911 call (Enhanced or Basic) is detected on an originating line.

The parameter has the following values:

- 0 — Do no timing (Default Value)
- 1 — Time for 1 second
- 2 — Time for 2 seconds
- 3 — Time for 3 seconds.

When the value is set to 0, no timing is done after the digits 911 (or equivalent) are collected. The emergency service call is immediately recognized.

When the value is other than 0, the delay timing is done for the indicated number of seconds (1 to 3). This is the interdigit timing. If no additional digits are collected and the timing period ends, the emergency service call is recognized. If another additional digit is collected during the timing period, the call is routed to **reorder** tone.

Table 9-21 RC/V Views Essential to Setting the E911 Office Option

RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
8.1	E911 OPTION E911 DELAY	E911 Office Option E911 Delay Timing ^a	<ESA or NONESA> <Variable> ^a
Notes:			
a. The entry in this field is optional, see Section 9.2.12.2.19 .			

9.2.12.2.20 Associating the 9-1-1 Digit Pattern with the E911 Feature For Cutover

Table 9-22 *summarizes* an example of recent change steps that associate the 9-1-1 dialed digits with the E911 feature for cutover. Details are provided in the following paragraphs.

The association between the digits 9-1-1 and the E911 feature must be made in every DAS assigned to lines or trunks capable of originating an E911 call. The interpretation of the digits 9-1-1 can be done on **either** the PDIT (View 9.2) or the LDIT (View 9.3), but not both.

On View 9.1, review all the office DASs to obtain all PDIT, LDIT, and INC DIT values.

To cut an individual DAS over to the E911 service, do the following:

- (1) In pre-5E8 offices on View 9.2 (PDIT), associate the 9-1-1 dialed digits with a Code Index that has been assigned the value E911.
- (2) In 5E8 and later offices on View 9.2 (PDIT), associate the 9-1-1 dialed digits with a trigger number that has been assigned the application of E911.
- (3) In pre-5E8 offices on View 9.3 (LDIT), change the Call Type for the 9-1-1 dialed digits from the current value (for example, EMER) to QUERY.
- (4) In 5E8 and later offices on View 9.3 (LDIT), change the Call Type for the 9-1-1 dialed digits from the current value to EMER.
- (5) On View 9.5 (INC DIT), change the incoming trunk digits to associate the 9-1-1 dialed digits to point to the

E911 LDIT.

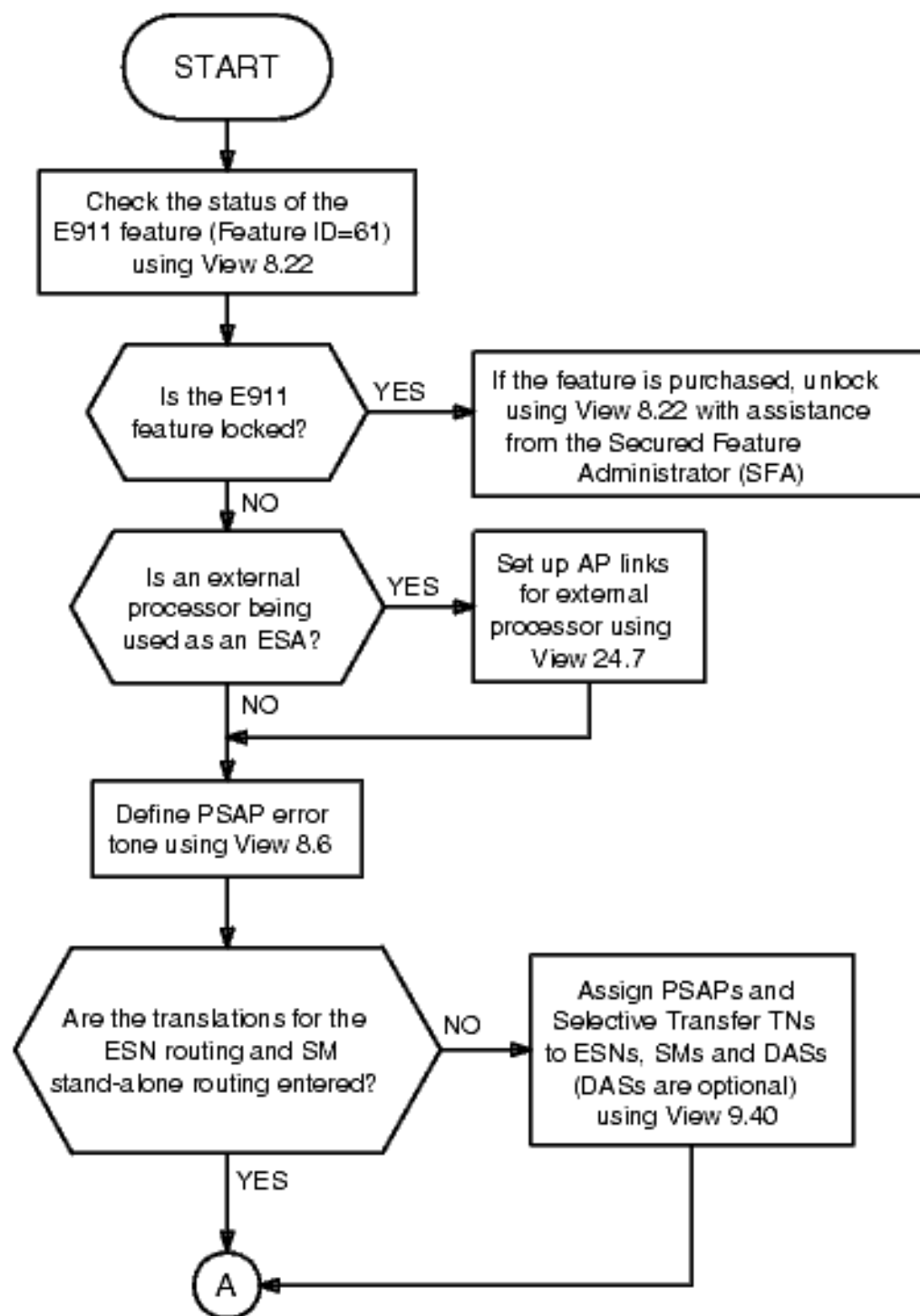
Table 9-22 RC/V Views Essential to Associating the 9-1-1 Digit Pattern with the E911 Feature for Cutover

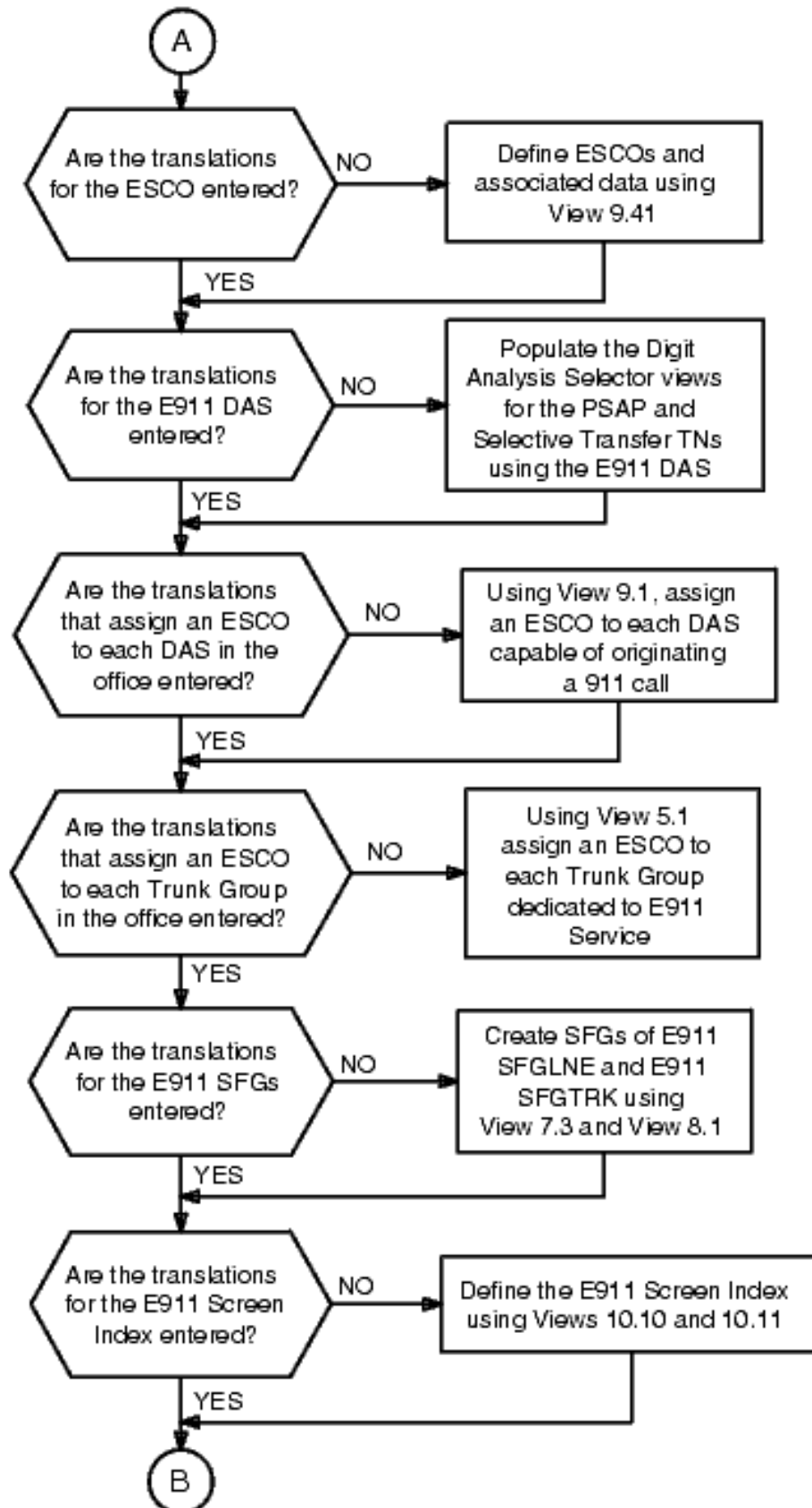
RC/V VIEW	FIELD NAME	FIELD PURPOSE	FIELD VALUE
9.30	CDI SERV TYPE	Code Index Service Type	<Variable A> E911
pre-5E8			
9.35	TRIG NBR APPLICATION	Trigger Number Application	<Variable A> E911
5E8 and later			
9.2	PDIT DIGITS TO INTERPRET CALL TYPE (Pre-5E8) CALL TYPE (5E8 and Later) CODE INDEX (Pre-5E8) TRIG NBR (5E8 and Later) DIGITS TO BE DELETE	Prefix/Feature Digit Interpreter Table Digits to Interpret Call Type Call Type Code Destination Index Trigger Number Digits to be Deleted	<Variable B> 911 QUERY EMER <Variable A> <Variable A> 0
9.3	LDIT INCOMING DIGITS CALL TYPE (Pre-5E8) CALL TYPE (5E8 and Later) CODE INDEX (Pre-5E8) TRIG NBR (5E8 and Later)	Local Digit Interpreter Table Incoming Digits Call Type Call Type Code Destination Index Trigger Number	<Variable C> 911 QUERY EMER <Variable A> <Variable A>
9.1	DAS PDIT LDIT	Digit Analysis Selector Prefix/Feature Digit Interpreter Table Local Digit Interpreter Table	<Variable D> <Variable B> <Variable C>
9.5	INC DIT INC DIGS LDIT	Incoming Digit Interpreter Indicator (Key) Incoming Digits (Key) Local Digit Interpreter Table	<Variable> 9 Y

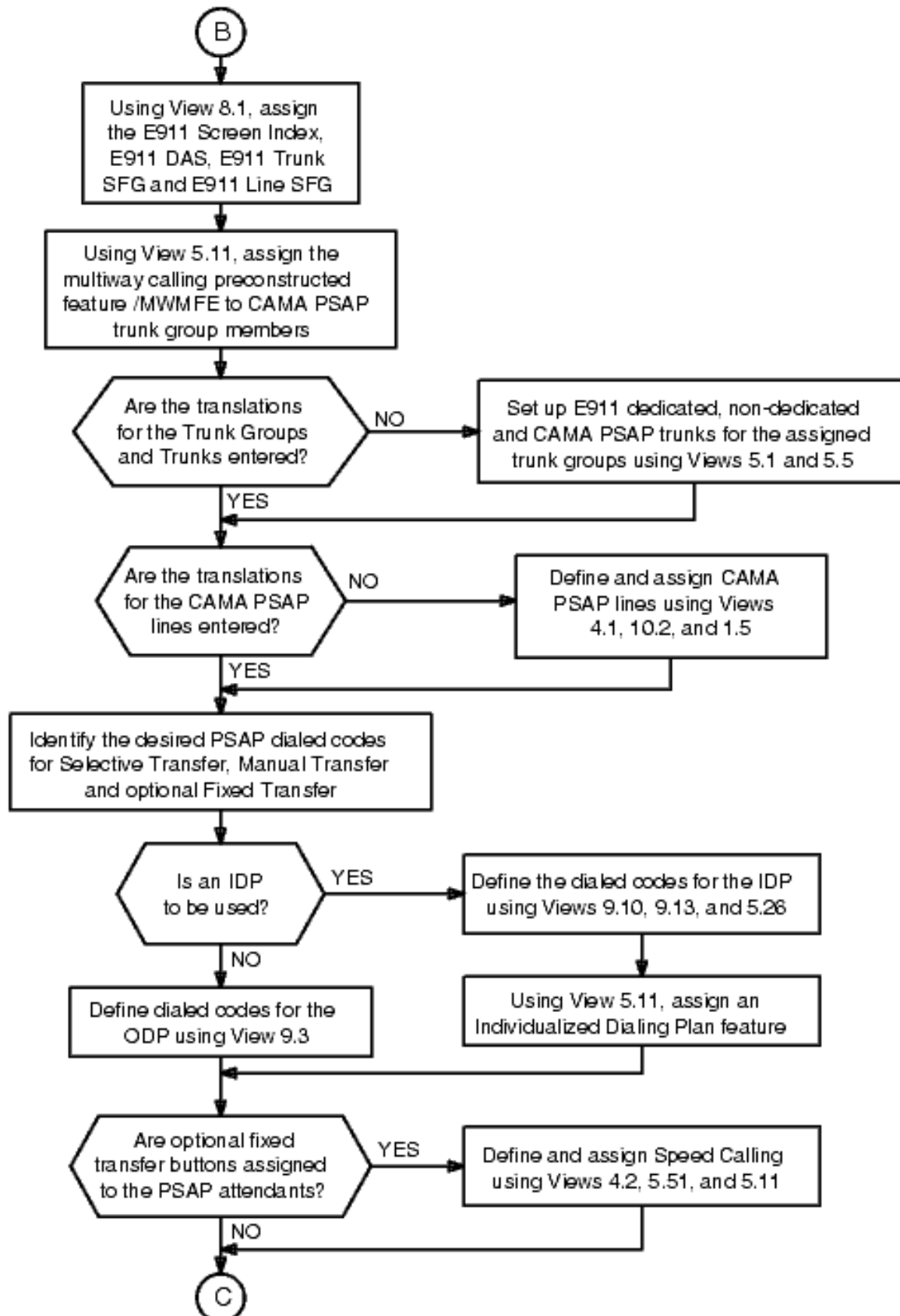
9.2.12.2.21 Summary

These procedures results in a fully configured ESA E911 tandem switch or Non-ESA E911 switch, as long as all other applicable items in the E911 Provisioning Checklist (Table 9-2) have been addressed.

Figure 9-5 is a flow diagram of the activation process.







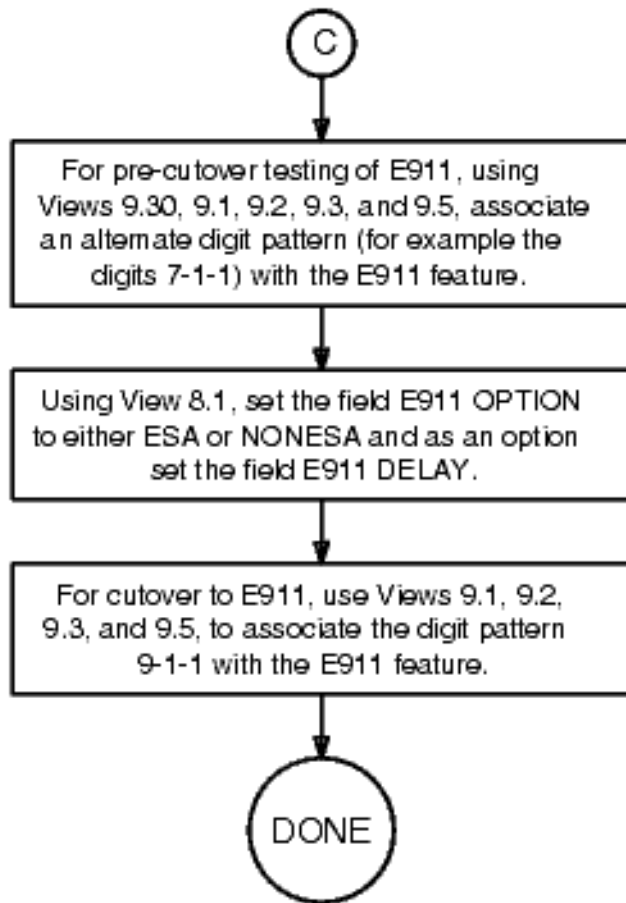


Figure 9-5 Enhanced 911 Emergency Service Feature Activation Flow Diagram

9.2.12.3 Invoking the Feature

An end-user, either from an End Office or the 5ESS[®] switch tandem office, can invoke the E911 feature by dialing 9-1-1 or other digits as defined in Section 9.2.12.2.18.

9.2.12.4 Deactivation

View 8.22 can be used to lock the E911 Feature and thus, deactivate the feature.

Once a 5ESS[®] switch has been configured as an E911 tandem, the office parameter E911 OPTION controls Activation/Deactivation of the feature. If E911 OPTION is changed from ESA to NONESA, selective routing is deactivated and nonselective routing is used for all calls. Changing the value to INACTIVE deactivates the E911 feature, and all E911 calls are **denied**.

If it is essential to change, via RC/V, the value of the E911 APID in an ESA office, the following steps must be done in addition to testing:

- (1) Define the new APID, leaving the E911 SITE field at the value N (View 24.7).
- (2) Update the E911 OPTION office parameter from ESA to NON-ESA (View 8.1).
- (3) Update the E911 SITE of the old APID to the value N (View 24.7).

- (4) Update the E911 SITE of the new APID to the value Y (View 24.7).
- (5) Update the E911 OPTION office parameter from NON-ESA to ESA (View 8.1).

9.2.12.5 Restriction Capability

The E911 feature is a secured feature and requires the purchaser to make necessary arrangements with Lucent Technologies. Information on feature activation is provided when ordering.

9.2.13 Interactions

In this section, an interaction between features is defined as a change in the operation of either feature when the two features are functioning, operating, or assigned at the same time. Features identified in this section that do not interact with the E911 features are indicated as having "No Interaction." Any "feature" not specified in this section is also considered as having no interaction.

The feature interactions described in this section are applicable to voice calls only, and are not applicable to any type of data calls.

This section includes descriptions of features required at E911 PSAPs for E911 feature operation that provides 1A ESSTM switch transparency operation.

NOTE: Other CPE can also serve as E911 answering points. When this section refers to "E911 answering points," then E911 PSAPs are **not** being discussed. No special treatment is provided to the calls that terminate on E911 answering points. The features addressed work just like any other call to that terminating station. Feature interactions for "E911 answering points," when described, are for features that have potential E911 applications at the answering point. The feature interactions described in this section are for E911 terminations to E911 PSAPs.

Terminal group related features are considered as having no interaction because E911 PSAPs, or other E911 answering points should not be arranged in terminal groups.

NOTE: Some of the interactions that currently exist with Basic 911 (B911) also hold true for E911. However, the interactions related to Forced Hold and Emergency Ringback are **never** associated with an E911 call terminated to a PSAP.

To provide consistent service between lines originating from an end office and those directly served by the E911 switch, a limited number of features are allowed to interact with a call terminating to an E911 PSAP. Therefore, no special blocking (for example, Call Waiting) or allowances (for example, Terminal Group Station Restriction Fully Restricted Lines) are made when the caller terminates to a PSAP. This is done so that an E911 call that originated in the E911 tandem office has the same interactions as an E911 call in the end office that terminated to an outgoing (dedicated E911) trunk.

9.2.13.1 No Interactions

The following features have no interaction with E911 Service.

- 900 Services
- Account Codes Modular Feature
- Add-On/Consultation Hold Incoming Only
- Aggregate Work Time/Number of Calls Handled for ISDN Attendants

- Attendant Busy Verification of Lines and Trunks
- Attendant Call Hold
- Attendant Camp-On
- Attendant Conference
- Attendant Control of Facilities
- Attendant Direct Station Selection
- Attendant Emergency Override
- Attendant Incoming Call Identification
- Attendant Make-Busy Key
- Attendant Position
- Attendant Position Busy
- Attendant Selective Customer Control of Facilities
- Attendant Through Dialing
- Attendant Traffic
- Attendant Trunk Identification
- Authorization Codes Modular Feature
- Automatic Intercept System (Remote Intercept System)
- Automatic Voice Network Interface
- Automatic-Hold/Drop Preference
- Call Forwarding Busy Line Incoming Only
- Call Forwarding Don't Answer Incoming Only
- Call Forwarding In A (Within) Group Only
- Call Forwarding Incoming Only
- Call Forwarding Over Private Facilities
- Call Forwarding Variable With 1A Equivalency
- Call Tracing
- Call Waiting Incoming Only
- Calling Party Number/Billing Number Transmittal in 5ESS® Switch Private Network Environment
- Cancel Call Waiting

- Carrier Interconnection
- Code Restriction
- Common Channel Signaling 7 Network Interconnect
- Critical Interdigit Timing
- Customer Access Treatment Code Restrictions
- Customer Premises Equipment Restoral
- Customer Station Rearrangement via *MACSTAR*® Software I and II
- Customer Station Rearrangement via Remote Memory Administration System
- Delayed and Abbreviated Ringing
- Deluxe Display
- Dial Access to ISDN Attendant
- Dial Access to Private Facilities
- Dial Pulsing
- Direct Connect
- Distinctive Ringing Modular Feature
- Distinctive Tones
- Drop
- Dual Call Coverage
- Electronic Directory Service Modular Feature
- Electronic Tandem Network Interworking in *5ESS*® Switch Private Network Environment
- Electronic Tandem Switching on Primary Rate Interface Trunks
- Emergency Access to ISDN Attendant
- Executive Ringer Cutoff
- Flexible ANI
- Generally Available Display
- Group Numbering Plan
- Home Intercom Modular Feature
- ISAT Queuing
- ISDN Intercom Modular Feature

- ISDN Switched Access to Interexchange Carrier Services
- ISDN Time and Date Display
- ISDN Total Number of Calls Handled Display for ISDN Attendants
- Inspect for ISDN Terminals
- LASS Customer-Originated Trace Modular Feature
- LASS Selective Distinctive Alert Modular Feature
- Manual Exclusion
- Message Service System
- Multifrequency Pulsing
- Off-Hook Queuing for SFGs
- Off-Hook Queuing for SFGs With Priority Queue
- Off-Hook Queuing for SFGs With Priority Queue and Delay Announcements
- Queuing for Uniform Call Distribution Data Hunt Groups
- Recall From Subscriber - OSPS
- Remote Activation to Call Forwarding (Remote Access to Call Forwarding)
- Remote Call Forwarding
- Revertive Pulsing
- Ringback Queuing for SFGs
- Ringback Queuing for SFGs With Priority Queue
- Ringback Queuing for Trunks
- Ringback Queuing for Trunks with Priority Queue
- Selective Carrier Denial
- Six-Way Conferencing
- Source Billing for Attendant-Handled Calls
- Three-way Calling
- Time-of-Day Modular Feature
- Toll Restriction
- Two-Party ANI/ONI Capability
- User-Side Primary Rate Interface Implementation

- Wild Card Features.

9.2.13.2 Attendant Control of Voice Terminals Modular Feature

The Attendant Control of Voice Terminals (ACVT) screening is overridden for E911 calls.

9.2.13.3 Automatic Callback-Calling Modular Feature

The Automatic Callback-Calling (ACBC) feature cannot be activated on an E911 call.

9.2.13.4 Automatic Customer Station Rearrangement Modular Feature

During the "default period" after a station has been moved, the station can originate E911 calls. The billing DN associated with the default group of the station is used as ANI for E911 service. If no NPA is included in the billing DN of the default group, then the DAS of the station is used as the NPA.

NOTE: Automatic Customer Station Rearrangement (ACSR) allows the physical location of a station set to be changed without a service order being processed by the 5ESS[®] switch owner. Use of ACSR can introduce moves that are not reflected in the ALI/DMS. This could result in sending emergency services in response to an E911 call to the wrong location.

9.2.13.5 Automatic Route Selection Modular Feature

The 911 digits can be designated as an escape from auto-Automatic Route Selection (ARS). The 911 digits can also be designated as an escape if dialed after an ARS access code. (that is, translate to "USE OFC").

9.2.13.6 Call Forwarding

9.2.13.6.1 Call Forwarding Variable/Call Forwarding Variable Feature Button

Stations with the Call Forwarding Variable (CFV) feature cannot forward calls to E911. The CFV feature cannot be assigned to E911 PSAPs. The reroute option furnishes an alternate way to forward calls to another E911 PSAP, see Section 9.2.16.4.1.2.4 .

9.2.13.6.2 Call Forwarding Busy Line/Call Forwarding Busy Line Feature Button

The Call Forwarding Busy Line (CFBL) feature cannot be assigned to E911 PSAPs.

NOTE: The CFBL feature is used by E911 in the 1A ESSTM switch to implement Alternate Routing. The CFBL forward-to DN, specified in the 1A ESSTM switch for a PSAP, is the same DN used to route Night Service calls. In the 1A ESSTM switch, CFBL (and E911 Night Service) is used to implement E911 Alternate Routing. In addition, E911 Alternate Routing is a function of the PSAP.

Alternate Routing in the 5ESS[®] switch is a function of the ESN of the caller and is described in Section 9.2.16.6 . See Section 9.2.16.4.1.2.4 for a description of the "reroute" option provided for E911 PSAPs.

NOTE: It not recommended that a secondary route index be assigned to a PSAP since normal route advance takes precedence over E911 alternate routing. If a secondary route index is assigned, there is no guarantee that E911 Alternate Routing can take place.

9.2.13.6.3 Call Forwarding Don't Answer/Call Forwarding Don't Answer Feature Button

The Call Forwarding Don't Answer (CFDA) feature cannot be assigned to E911 PSAPs.

9.2.13.6.4 Night Service (Fixed)

The 5ESS[®] Switch Fixed Night Service feature is not assignable to E911 PSAPs. The E911 Night Service feature is **not** the same as the 5ESS[®] Switch Fixed Night Service feature. The E911 Night Service feature is available to an E911 PSAP, and is invoked by the make-busy key on the E911 PSAP console. When the make-busy key is used to busy out the E911 PSAP trunks, the alternate route (or reroute DN) is used to route calls to an alternate PSAP. The 5ESS[®] Switch Night Service feature is also activated at the attendant console via a make-busy key.

NOTE: As described in Section 9.2.13.6.2, E911 Night Service in the 1A ESSTM switch uses the same forwarding route as CFBL.

9.2.13.6.5 Power Failure Transfer

The 5ESS[®] Switch Power Failure Transfer feature is not assignable to E911 PSAPs. The 5ESS[®] Switch Power Failure Transfer feature uses the same options as the Fixed Night Service feature, except that the feature is activated via a scan point instead of a key at the attendant console.

9.2.13.7 Call Pickup Modular Feature

Call Pickup features are not assignable to E911 PSAPs.

9.2.13.8 Call Waiting Modular Feature

To ensure consistent treatment of end office E911 originations, Call Waiting of an E911 call at the origination is not blocked.

9.2.13.8.1 Call Waiting Originating (Originating Priority Calling)

A caller with Call Waiting Originating (CWO) cannot call wait an E911 call at an E911 PSAP. The CWO feature is not assignable to E911 PSAPs.

9.2.13.8.2 Call Waiting Terminating

The Call Waiting Terminating (CWT) feature is not assignable to E911 PSAPs.

9.2.13.8.3 Dial Call Waiting (Initiated Priority Calling)

The Dial Call Waiting (DCW) feature cannot be invoked on an E911 call. If a DCW code is dialed before dialing '911' the call is allowed to route, however, call waiting is not enabled for the call.

9.2.13.8.4 TN Privacy Per-Call

The TN Privacy Per-Call feature is not effected by E911 features. The ANI is always delivered to an E911 PSAP. The E911 answering point with the Individual Calling Line Identification (ICLID) feature "sees" the call as private if the calling station is marked as private.

9.2.13.9 Individualized Dialing Plan Modular Feature

9.2.13.9.1 Intercom Dialing

Intercom Dialing can be used to define the mapping of Selective Transfer Codes, Fixed Transfer Codes, and Manual Transfer Codes to the Selective Transfer or Speed Calling dialed code actions.

9.2.13.9.2 Overriding Dialing Plan

The 911 digits can be defined as an escape from the IDP, via Intercom.

9.2.13.9.3 Feature Code Definition

Feature codes can be defined to map to Selective and Fixed Transfer functions.

9.2.13.10 LASS Automatic Callback Modular Feature

Call origination is not allowed for E911 PSAPs, therefore Automatic Callback is not involved unless a PSAP transfers an E911 call to a line with Automatic Callback. When the transfer occurs, the DN of the PSAP is placed in the Outgoing Line History Block (OLHB) of the transfer-to line, but if Automatic Callback is invoked by the transfer-to party, the call is blocked.

If the terminating switch determines that a call made via Automatic Callback has an E911 termination, the terminating switch denies the activation by providing long term denial treatment.

9.2.13.11 LASS Automatic Recall Modular Feature

If a line with Automatic Recall calls 911, an invalid entry is indicated in the caller's OLHB. Attempts to activate Automatic Recall after an E911 call results in long term denial treatment being provided to the end-user.

If a line with AR calls a PSAP DN, the PSAP DN appears in the Line History Block of the calling line, but AR to that DN is not allowed.

9.2.13.12 LASS Selective Call Acceptance/Computer Access Restriction Modular Feature

Because E911 PSAPs cannot originate calls, a PSAP attendant must use a normal line appearance to dial an outgoing call. Therefore, there is no way to override Selective Call Acceptance (SCA) for such a call.

9.2.13.13 LASS Selective Call Forwarding Modular Feature

The digits '911' cannot be entered into the Selective Call Forwarding List. The PSAP DN cannot be entered into the Selective Call Forwarding List.

9.2.13.14 LASS Selective Call Rejection Modular Feature

Although it is not recommended, Selective Call Rejection can be assigned to a line serving as an E911 Answering Point. If the DN of a line is on the Selective Call Rejection list of the E911 Answering Point, the call is rejected.

9.2.13.15 Line Identification Modular Feature

9.2.13.15.1 Individual Calling Line Identification Calling Number Delivery Primary and/or All

The Individual Calling Line Identification (ICLID) feature cannot be assigned to E911 PSAPs. Ability of ICLID delivery to E911 answering points is not affected.

9.2.13.15.2 Outgoing Called Line Identification

The Outgoing Called Line Identification (OCLID) feature does not display the true routing number to E911 callers.

9.2.13.15.3 Calling Number Delivery Primary Terminal Only Feature Activation and Deactivation

See Section 9.2.13.15.1 .

9.2.13.15.4 Calling Number Delivery All Terminals Feature Activation and Deactivation

See Section 9.2.13.15.1 .

9.2.13.15.5 ICLID Primary Terminal Only and OCLID Feature Activation and Deactivation

See Section 9.2.13.15.1 .

9.2.13.15.6 ICLID All Terminals and OCLID Feature Activation and Deactivation

See Section 9.2.13.15.1 .

9.2.13.16 Message Detail Recording to Customer Location Modular Feature

If an end-user subscribes to Message Detail Recording (MDR), then E911 calls are recorded.

9.2.13.17 Multiline Hunt Group Modular Feature

An E911 PSAP cannot subscribe to Multiline Hunt Group (MLHG). Originations for E911 from MLHGs use the billing ANI of the hunt group if the individual billing DN is unavailable.

See Section 9.2.13.19 (Queuing) for additional MLHG interactions.

9.2.13.18 Multiway Calling Modular Feature

Multiway Calling features can be used by E911 PSAPs to transfer E911 calls. After flashing to enter MWC, and dialing the speed call/intercom code of the transfer-to station, a second flash is not needed to set up a 3-way call. A 3-way conference call is established immediately. The E911 PSAPs must have a MWC feature (using auto-three-way) assigned for the conference call to work (for example, /MWMFE).

The ANI of the E911 originator is delivered to the transfer-to point (rather than the conference controller's ANI for non-911 calls) when the controller is an E911 PSAP. This special feature operation is invoked because the call is an E911 call.

If "911" is dialed as the added leg of a multiway call, and the caller attempts to transfer, the E911 PSAP receives the ANI of the controller. The PSAP continues to display the ANI of the controller, even if the controller drops off from the call to complete the transfer.

9.2.13.18.1 Call Hold

The originator can place an E911 calls on hold.

9.2.13.18.2 Call Transfer

The E911 PSAPs have several special call transfer functions:

- (1) An auto-three-way connection is established between the caller, the controller, and the transfer-to station.
- (2) The ANI of the caller is provided to the transfer-to station.
- (3) Special disconnect timing is performed.

Detailed transfer information is in Section 9.2.16.9 . Assignment of an MWC transfer feature that does not apply terminal group restrictions is recommended (so that PSAP transfers are not blocked). It is possible to call E911 using call transfer. It is also possible for the originator to transfer a stable E911 call.

In addition, assignment of the Call Transfer Individual All Calls feature to a PSAP insures that MWC terminal group restrictions do not block PSAP transfers.

9.2.13.19 Modular Queuing Modular Feature

9.2.13.19.1 Queuing for Lines

Queuing cannot be assigned to E911 PSAPs.

9.2.13.19.2 Queuing for Lines with Call Waiting Lamps

Queuing cannot be assigned to E911 PSAPs.

9.2.13.19.3 Queuing for Lines with Delay Announcements

Queuing cannot be assigned to E911 PSAPs.

9.2.13.19.4 Off-Hook Queuing for Outgoing Trunks

Queuing cannot be assigned to E911 PSAP trunks.

9.2.13.19.5 Off-Hook Queuing for Outgoing Trunks With Priority Queue

Queuing cannot be assigned to E911 PSAP trunks.

9.2.13.19.6 Off-Hook Queuing for Outgoing Trunks with Priority Queue and Delay Announcements

Queuing cannot be assigned to E911 PSAP trunks.

9.2.13.20 Precedence and Preemption Modular Feature

Not assignable to a PSAP.

9.2.13.21 Private Facility Access Modular Feature

Not assignable to a PSAP.

9.2.13.22 Speed Calling Modular Feature

Abbreviated dialing codes are used by the E911 PSAPs to dial transfer-to stations. The codes generated by E911 PSAPs do not conform to *current* 5ESS[®] switch speed calling code formats. The Office Dialing Plan (ODP) or the Individualized Dialing Plan (IDP) is used to interpret the E911 PSAP codes and translate them to the proper 5ESS[®] switch speed call codes.

9.2.13.22.1 One-Digit Speed Calling

Because of the limited number of available codes (0-9), 1-Digit Speed Calling is not used by E911 PSAPs for Fixed or Manual Transfer. For E911 PSAPs, assignment of 2-digit speed calling is recommended; however, assignment of 1-digit speed calling is not blocked.

9.2.13.22.2 Two-Digit Speed Calling

Two-Digit Speed Calling can be used to define Fixed and Manual Transfer numbers.

9.2.13.22.3 Customer-Changeable (1-Digit or 2-Digit) Speed Calling

Customer-Changeable 1-Digit Speed Calling and Customer-Changeable 2-Digit Speed Calling is available to E911 PSAPs. However, because of the limited number of available codes (0-9), Customer-Changeable 1-Digit Speed Calling is **not** recommended. Since a PSAP cannot originate a call, changing of a speed calling list entry must be performed from another line that shares the speed calling list.

9.2.13.23 Terminal Group and Station Restriction Modular Feature

Stations within a fully restricted terminal group are not allowed to place E911 calls that complete to DN outside the terminal group. Therefore, TGSR restrictions are not overridden for E911 calls. This arrangement maintains transparency with 1A ESSTM centrex restrictions which prohibit restricted stations from placing E911 calls.

NOTE: This is necessary to provide equivalent service at End Offices and the E911 Tandem Office. An End Office cannot determine that an E911 call is in progress, and therefore cannot override restrictions. Callers homed on the E911 Tandem Office cannot be provided better service because of being homed on the tandem.

The 1/1A ESSTM switch arranges PSAPs within a terminal group; the 5ESS[®] switch does not arrange PSAPs in a terminal group; however, this difference has no effect on operation transparency of the E911 feature.

9.2.13.24 ISDN Multibutton Key System Services

9.2.13.24.1 Bridging

The originating end of an E911 call cannot be bridged.

9.2.13.24.2 Multiple Call Appearances

An E911 call can be directed to a DN with Multiple Call Appearances (MCA).

9.2.13.24.3 Multiple DNs

An E911 origination from a terminal with multiple DNs uses the ANI of the primary DN as caller identification. The primary DN uniquely identifies the station from which the call is being made. If an E911 call is placed on hold, the call cannot be remotely retrieved from a shared appearance on another terminal.

9.2.13.24.4 Shared Call Appearances of a Directory Number

An E911 origination from a terminal with Shared Call Appearances uses the ANI of the primary DN as caller identification. The primary DN uniquely identifies the station from which the call is being made.

9.2.13.25 Attendant Features

9.2.13.25.1 Attendant Call Splitting

This feature is not recommended for use with E911, as this feature prevents a constant talk path from being held with the E911 caller.

9.2.13.25.2 Attendant Night Service

The 5ESS[®] Switch Attendant Night Service (also known as Flexible Night Service) feature is not assignable to E911 PSAPs. The E911 Night Service feature is **not** the same as the 5ESS[®] Switch Attendant Night Service feature.

9.2.13.26 MultiPoint

A MultiPoint DSL (MDSL) origination is identified by the ANI of the primary DN.

9.2.13.27 Networking Features

9.2.13.27.1 ISDN PBX Access to Public Network Services

The ANI associated with PRI trunk groups is used as the caller ID for E911 calls. The Operating Telephone Company (OTC) can also choose to use the CgPN information element in the setup message as the caller ID for 911 calls over PRI trunks. This option is available on a per-trunk group basis (see Section 9.2.12.2.13).

9.2.13.27.2 Intraswitch/Interswitch Calling Party Number/Billing Number Optioning to Terminating User

This feature is not assignable to E911 PSAPs.

9.2.13.28 Advanced Services Platform

The dialed code '911' is assignable as a trigger for an Advanced Services Platform (ASP) Transaction Capabilities Application Part (TCAP) query.

The code 911 (with pseudo carrier specified) can be returned by the Service Control Point (SCP). The call is routed and handled as if the call originator dialed '911' to the public dialing plan directly. The call fails if the SCP returns an OUTWATS route that eventually translates to E911.

The PSAPs do not support access to ASP.

If translation of a DN being used to complete an E911 call determines that the DN is a DN Trigger, completion to that DN fails. If the attempt is for E911 Routing, the next Alternate Routing possibility is tried (that is, if using the Reroute DN, then attempt Alternate Routing DN1; if using Alternate Route DN1, then attempt Alternate Route DN2). If the attempt is for a transfer, the transfer fails and reorder is returned to the controlling PSAP.

9.2.13.29 Emergency Services

9.2.13.29.1 Basic Emergency Service

The B911 and E911 features are mutually exclusive within a dialing plan. The E911 feature does not replace the B911 feature, both features are options in 5E7 and later software releases.

An E911 call can be routed to terminations with the B911 terminating class of service (COS). Once the call is routed to a B911 answering point, E911 features are unavailable.

9.2.13.29.2 Emergency Ringback

Intra-office Emergency Ringback (ER) is invocable from E911 answering points that use the B911 class of service. Interoffice ER is not supported for E911 calls.

9.2.13.29.3 Forced Hold

Forced Hold works on E911 calls routed to B911 terminations provided the caller originated on the same switch.

9.2.13.30 Operations, Administration, and Maintenance Features

Trunks cannot be assigned to a BRCS Feature Group (BFG); therefore, BFGs cannot be used by E911 PSAPs.

9.2.13.31 Miscellaneous Features

9.2.13.31.1 Series Completion

Series Completion cannot be used by E911 PSAPs.

9.2.13.31.2 Two-Party Line

Two-party lines are allowed to dial E911. The E911 calls dialed from a Two-Party Line are able to receive selective routing treatment if the two-party ANI office option is used.

9.2.13.31.3 Multiparty Lines

Multiparty (four- and eight-party) lines are allowed to dial E911. Multiparty dialed E911 calls are not able to receive selective routing treatment since the ANI is not available.

9.2.13.31.4 Line Time Slot Bridging

When one party originates an E911 call, the other party cannot bridge onto the call.

9.2.13.31.5 Make-Busy Key

The E911 PSAPs can make use of a trunk group Make-Busy Key to invoke E911 Night Service.

9.2.13.31.6 Stop Hunt Key

The E911 PSAPs are not equipped with 'stop hunt keys'.

9.2.13.31.7 Multidistinctive Ringing

The ANI of a Multiple Distinctive Ringing subscriber is used as E911 caller identification. (Multiple Distinctive Ringing is also referred to as Multiple DNs per Line with Distinctive Ringing.)

9.2.13.31.8 Service Evaluation System

The Service Evaluation System (SES) cannot be used for E911 calls at the E911 tandem.

9.2.13.31.9 Source Billing for Attendant Calls

If a caller (the source party) dials the attendant, and the attendant in turn calls E911, the attendant can replace the billing DN of the attendant position with the billing DN of the source party, and the billing DN of the source party is forwarded to the PSAP.

9.2.13.31.10 Circuit-Switched Data

An ISDN line with Circuit-Switched Data feature assigned may not place a data call by dialing '911' or other digits that normally invoke the E911 feature.

9.2.14 Engineering

9.2.14.1 Feature Installation and Growth

Growing or degrowing lines or trunks serving a PSAP does not disrupt calls over the existing facilities.

9.2.14.2 Software Release Retrofit and Cutover

For offices currently providing the B911 feature, service disruption should occur only as long as is required to retrofit to the software release supporting E911. The E911 service resumes when plain old telephone service (POTS) call processing is available, and all stable E911 calls are preserved over a software release retrofit.

9.2.15 Assignment Dependencies And Limitations

The following features are required:

- A Multiway Calling feature that performs transfer functions, is required at the PSAP. (for example, /MWMFE).
- A Speed Calling feature to perform the dialing of PSAP transfer codes.
- An Individualized Dialing feature to define the dialing plan.

9.2.16 Feature Operation

9.2.16.1 Overview

This section describes the operation of the various features used for E911 on the 5ESS[®] switch. The subjects covered are as follows:

- Access via Dedicated E911 Trunks
- Access via Line and Nondedicated Trunk E911 Originations
- E911 PSAP Interface
- Selective Routing Feature
- Alternate Routing Feature
- Default Routing Feature
- Nonselective Routing Feature
- Transfer Features (Selective Transfer, Fixed Transfer, Manual Transfer)
- Forced Disconnect Feature
- Flash Calling Display Feature
- 911 Choking Mechanism
- Applications Processor Interface.

9.2.16.2 Access via Dedicated E911 Trunks

9.2.16.2.1 Call Processing Treatment

This feature allows the switch to recognize E911 originations in an E911 tandem office over dedicated trunks from a subtending office. If a trunk is dedicated, the trunk must be able to deliver ANI to the E911 tandem to allow the Selective Routing feature to be used.

When an SM is in an overload condition, E911 calls are not given priority over other calls.

9.2.16.2.1.1 Incoming Treatment

Several different signaling combinations are possible, depending on the type of incoming trunk and the type of subtending office. The possible signaling types and digit sequences received over dedicated E911 trunks are as follows:

- (1) Multifrequency (MF) digits + MF ANI
 - Key Pulse (KP) - 911 - Start-Pulse (ST) + ANI
 - KP - 11 - ST + ANI
 - KP - 1 - ST + ANI
- (2) Intra-LATA ISDN user part (ISUP) where the called party number parameter contains the digits 911
- (3) Dial Pulse (DP) immediate dial digits + MF ANI (this combination comes only from step-by-step offices)
 - 911 + ANI
 - 11 + ANI
 - 1 + ANI
- (4) Direct Seizure + MF ANI
- (5) Direct Seizure (No ANI).

The types of trunks used as dedicated E911 outgoing trunks from subtending offices are the same as those used for outgoing CAMA, Intra-LATA ISUP (SS7), and Traffic Service Position System (TSPS) trunks.

The format of the ANI for CAMA trunks is the same as that used for an outgoing call to a TSPS. Primed start pulses are accepted in the digit sequence (but are not required) since primed start pulses are allowed for outgoing calls to a TSPS. For MF trunks, the primed start digits (ST', ST'', ST''') are only valid in the first stage containing the dialed digits. For DP trunks, the primed start digits are received in the second stage containing the ANI.

The ANI for E911 calls incoming over Intra-LATA ISUP (SS7) trunks is obtained from the Initial Address Message as follows:

- (1) If the Charge Number parameter is present and populated with an full NANP DN, and the Calling Party Number is populated with an full NANP DN, the Charge Number parameter is used as the ANI of the caller for E911. An full NANP DN Calling Party number indicates that the originator is not multiparty.
- (2) If the Charge Number parameter is present and populated with an full NANP DN, and the Calling Party Number is not present, the Charge Number Parameter value is used as the ANI of the caller for E911.
- (3) If the Charge Number is not present, or not populated, the Calling Party DN is used as the ANI for E911 if the number is full NANP DN and the Screening Indicator field is either "Network Provided" or "User Provided - Validation Passed."

NOTE: ISUP trunks that do not conform to TR-TSY-000444 do not contain the Screening Indicator, therefore the Calling Party Number on non-conforming trunks are not considered valid for E911 use.

If the criteria in items 1 through 3 are not satisfied, then neither the Charge Number nor the Calling Party Number are usable as E911 ANI, and Default Routing treatment is be given. In addition, if both the Charge Number and the Calling Party Number are not present or unpopulated, then Default Routing treatment is given and an MDII message is printed.

Terminal maintenance test calls are the only other calls allowed to be received over a dedicated trunk other than E911. All other call types receive call failure treatment (for example, reorder) and an output message (an MDII) is sent to the craft. The dialing plan assigned to the originating trunk determines the acceptable dialed digit sequences.

When screening incoming digits, the way that the E911 call is routed is based on whether Selective Routing is assigned to the ESCO associated with the trunk.

If Selective Routing is assigned then routing is performed as described in Section 9.2.16.5 . If Selective Routing is not assigned, then the default ESN associated with the trunk ESCO is used to determine the DN of the PSAP. If the trunk ESCO is unavailable, then the dialing plan (DAS) ESCO is used to determine the DN of the PSAP. Digit analysis and routing are then done on the primary PSAP specified in the ESN routing data.

If the Billing Number (also referred to as the Charge Number parameter) is available as an full NANP DN number, and the Calling Party Number is available as an full NANP DN number, the Billing Number is used as the E911 ANI for the caller. An full NANP DN Calling Party number indicates that the originator is not multiparty.

If the Billing Number is not available, the Calling Party Number is used as the E911 ANI if it is of the format full NANP DN and is marked as either "Network Provided" or "User Provided - Validation Passed."

If the Calling Party Number/Billing Number criteria in the previous paragraph is not satisfied, then neither the Calling Party Number nor the Billing Number are usable as E911 ANI, and Default Routing treatment is given.

9.2.16.2.2 Operation on Remotes

9.2.16.2.2.1 Normal

Dialed and calling number data for an E911 call are provided to the host office via normal call processing.

When Selective Routing is used, under normal operation, for an RSM-originated "911" dialed call, the host office queries the ESA and provides the route list corresponding to the ESN returned from the ESA in the response message to the originating RSM.

When non-Selective Routing is used, under normal operation, for an RSM-originated "911" dialed call, the directory numbers normally associated with an ESN are determined based on data associated with the dialing plan of the incoming line (for line originations), or dialing plan of the trunk group (for trunk originations).

9.2.16.2.2.2 Standalone

In standalone, when communication with the CMP is unavailable, the SM uses stand-alone routing data defined for that SM to complete the call to a "default" PSAP. In standalone, the SM is not able to communicate with the ESA to obtain the ESN associated with the originating party. In addition, the ESN routing data is inaccessible since it is stored in the CMP for all SMs. Therefore, the SM uses stand-alone routing data to complete the call to a "default" PSAP defined for that SM. This stand-alone routing data is processed the same as when the routing data is obtained from the CMP. The PSAP "sees" the call as a "Default Routed" call.

9.2.16.2.3 Internal Call Processing Controls

9.2.16.2.3.1 Connections

Trunks between the originating office and the E911 serving office can use either CAMA or intra-LATA ISUP signaling. When using CAMA signaling, outgoing trunks from the end office can also be marked as TSPS, but must be CAMA ANI at the E911 serving office.

When equipped with an ESA, the 5ESS[®] switch providing E911 service uses API data links to connect to an ESA. Additional information on the switch to ESA interface is in Section 9.2.16.13 .

9.2.16.2.3.2 Class of Service

The trunk classes of service (COS) that can be dedicated to E911 are CAMAANI and LTOLLCON (ISUP signaling only). The trunk forms associated with these COSs include default ESCO assignments.

9.2.16.2.3.3 Code Interpretation

The following digit sequences for E911 service are recognized:

- Direct seizure trunks
- Incoming calls with the digits 911, 11, or 1 received at the 911 serving switch
- On intra-LATA ISUP trunks with the digits 911 in the called party address field.

9.2.16.2.3.4 Routing

Routing is determined by the POTS translation of the routing number found in the ESN data. The OTC can specify a DAS to identify the office dialing plan (that is, LDIT) used to interpret E911 routing numbers.

9.2.16.2.3.5 Release

When the E911 caller disconnects first, the local office sends either an on-hook signal or the release message to the E911 serving office. The E911 serving office can respond with either an on-hook message or the release complete message to the local office, and release the incoming link or trunk connection. In addition, the E911 serving office sends an on-hook message to the E911 PSAP and idles the trunk after receiving the on-hook message from the E911 PSAP.

For E911 calls originated on the E911 serving switch, when the E911 caller disconnects first, the switch idles the E911 caller line.

9.2.16.2.4 Signaling and Protocol Requirements - Intersystem Address Signaling

Incoming E911 calls use trunk groups with the following signaling:

- CAMA (with optional primed starts)
- Intra-LATA ISUP.

Dedicated trunks between the originating offices and the E911 serving switch are allowed. This allows recognition of E911 calls when either the digits, 911, 11, or 1 are received at the switch. Support of direct seizure trunks is also provided. This allows the E911 tandem office to recognize an E911 call without receiving any digits (911, 11, or 1).

9.2.16.3 Access via Line and Nondedicated Trunk E911 Originations

9.2.16.3.1 Call Processing Treatment

This feature supports E911 originations on lines and non-dedicated trunks. For the non-ESA configuration, any ANI received over a trunk is not used for routing, but is forwarded to the PSAP. For the ESA configuration, E911 calls originating over nondedicated trunks, with ANI available, are routed as if made via a dedicated trunk (see Section 9.2.16.2). For calls originating over PRI trunks, the trunk billing DN is used as ANI. On a per-trunk group basis, the OTC can choose to use the CgPN information element in the setup message instead of the billing DN for calls originating over PRI.

9.2.16.3.1.1 Originating/Incoming Treatment

The following cases indicate that a E911 call has been requested:

- Line originations with "911" dialed (or any other digit sequence assigned the 911 call type in the dialing plan).
- PBX or private facility originations on the switch with "911" received.
- E911 calls as routed from a service control point (SCP).

When screening incoming digits, the way that the E911 call is routed is based on whether Selective Routing is assigned to the ESCO associated with the originator.

For lines, the ESCO of the originator is associated with the dialing plan. For nondedicated trunks, the ESCO of the originator can be assigned to the trunk group, or if no ESCO is assigned to (or available from) the trunk group, the ESCO associated with the dialing plan (DAS) is used.

If Selective Routing is assigned then routing is done as described in Section 9.2.16.5 . If Selective Routing is not assigned, the default ESN associated with the ESCO is used to determine the DN of the PSAP. Digit analysis and routing is done on the primary PSAP specified in the ESN routing data.

Any ANI failures on nondedicated trunks that are marked to require ANI delivery result in default routing.

9.2.16.3.2 Operation on Remotes

9.2.16.3.2.1 Normal

Dialed and calling number data for an E911 call are provided to the host office via normal call processing.

When a call requires Selective Routing, under normal circumstances, for an RSM-originated "911" dialed call, the host office queries the ESA and provides the route list corresponding to the ESN returned from the ESA in the response message to the originating RSM.

When non-Selective Routing is used, under normal circumstances, for an RSM-originated "911" dialed call, the directory numbers normally associated with an ESN are determined based on data associated with the incoming line (for line originations), or the trunk group (for trunk originations) dialing plan.

9.2.16.3.2.2 Standalone

In standalone, when communication with the CMP is unavailable, the SM uses stand-alone routing data defined for that SM to complete the call to a "default" PSAP. In standalone, the SM is not able to communicate with the ESA to obtain the ESN associated with the originating party. In addition, the ESN routing data is inaccessible since it is stored in the CMP for all SMs. Therefore, the SM uses stand-alone routing data to complete the call to a "default" PSAP defined for that SM. This stand-alone routing data is processed the same as when the routing data is obtained from the CMP. The PSAP "sees" the call as a "Default Routed" call.

9.2.16.3.3 Internal Call Processing Controls

9.2.16.3.3.1 Connections

Trunks between the originating office and the E911 serving office can use either CAMA or intra-LATA ISUP signaling. Outgoing trunks from the end office can also be marked as TSPS, but must be CAMA ANI at the E911 serving office.

When equipped with an ESA, the 5ESS[®] switch providing E911 service is connected to API data links that connect to an ESA. Additional information on the switch to ESA interface is in Section 9.2.16.13 .

9.2.16.3.3.2 Class of Service

9.2.16.3.3.2.1 Lines

The following line COSs can originate E911 calls:

INDIV	Individual
2PTY	2-Party Multifrequency Ringing
TWOPTY	Two Party
4PSS	4-Party Semiselective
4PFS	4-Party Full Selective
5PTY	5-Party Multifrequency Ringing
10PTY	10-Party Multifrequency Ringing
8PSS	8-Party Semiselective
HOTPBX	Hotel-Motel PBX - Provides ANI6 to TSPS; checks for Toll Diversion; Message Register Capabilities; Prevents Fabric Exercise Test
COIN	Coin
CHGCALL	Charge a call. Provide ANI7 to TSPS
PBX	Checks for Toll Diversion; Prevents Fabric Exercise Test
HOTMOTL	Hotel-Motel - Message Register Capabilities (No toll diversion)
TEST	Test Lines
ATND	Attendant DN
SATSTLN	Stand-Alone Test line, for RSM and Local SM use
4WINDIV	4-Wire Individual Line or 4-Wire Manual PBX
ISDN	Digital Subscriber Line
ISATND	Integrated Services Digital Network (ISDN) Attendant Terminal.

9.2.16.3.3.2.2 Trunks

In addition, nondedicated trunks can originate E911 calls. Often, these nondedicated trunks are private facilities and trunks to a PBX. If no ANI is available, then Default Routing is used. The following is a list of classes of service for trunks that can carry E911 traffic, the trunk forms associated with these COSs include default ESCO assignments:

LTOLLCON	Local Office End of a Toll Connecting Trunk Incoming, Outgoing or Two-Way
TOLLOPER	Incoming from A 3CL Type Toll Switchboard Operator
PF	Private Facility Trunks
PFITT	Private Facility Intertandem Trunks
PFLASH	Private Facility Trunks with Flash repeating capability
EDSL	Extended Digital Subscriber Line trunk
EDSLHM	Extended Digital Subscriber Line trunk for Hotel/Motel for TSPS service.

The classes of service for trunks that carry toll office traffic are as follows:

CAMAONI	Incoming CAMA - Operator Number Identification
CAMAANI	Incoming CAMA - Automatic Number Identification.

9.2.16.3.3.3 Code Interpretation

The following digit sequences for E911 service are recognized:

- Line origination with "911" dialed
- Incoming calls with the digits 911, or 11, or 1 received at the 911 serving switch
- On intra-LATA ISUP trunks with the digits 911 in the called party address field
- On PRIs with the digits 911 in the Called Party Number information element.

9.2.16.3.3.4 Routing

Routing is determined by the POTS translation of the routing number found in the ESN data. The OTC can specify a DAS to identify the office dialing plan (that is, LDIT) used to interpret E911 routing numbers.

9.2.16.3.4 Signaling and Protocol Requirements - Intersystem Address Signaling

Any E911 calls originating via nondedicated trunks are detected as normal seizures with the digits 911, or 11, or 1 being received at the 911 serving switch.

9.2.16.4 E911 PSAP Interface

9.2.16.4.1 Call Processing Treatment

This feature provides E911 call terminations to the E911 PSAP. The PSAP is also referred to as an E911 PSAP.

Individual lines can be used in place of E911 PSAPs; however, this does not allow for E911 PSAP functionality. These individual lines can use the features currently assignable to lines on the switch. No special consideration is

given to these lines when an E911 call terminates to the line. For example, the ICLID feature continues to display the CgPN of the caller (subject to normal privacy considerations), and does not display ANI. In addition, special E911 PSAP transfer abilities are lost.

9.2.16.4.1.1 Incoming Treatment

The E911 PSAPs are marked as 2-way trunks so the switch can detect a flash; however, originations are denied.

9.2.16.4.1.2 Terminating/Outgoing Treatment

9.2.16.4.1.2.1 Normal Calls

The terminating/outgoing treatment of an E911 call is the same whether the switch is using the ESA or non-ESA configuration.

When routing to E911 PSAPs, the calling identification (of the form NPD-NANP DN without the NPA where the NPD digit is determined by the switch, see Section 9.2.16.11) is outputpulsed using the format specified in Bellcore TR-TSY-000350, specifically "E911 Public Safety Answering Point: Interface Between a 1/1A ESSTM Switch and Customer Premises Equipment," Bell Communications Research, Technical Reference TR-TSY-000350, Issue 1, November 1987.

Outputpulsing begins after the PSAP winks, if no wink is received within the time specified by the wink start timer (wink start timing is set in View 5.1), the call is rerouted to the next PSAP trunk group member.

When routing to an ISDN facility, if the caller ID is available, the switch sends the caller ID to the ISDN terminal using ICLID; however, normal privacy considerations are applied. When routing to a line that is able to display the caller ID (and the caller ID is available), the switch sends the caller ID to the terminal; however, normal privacy considerations are applied. The caller ID outputpulsed to a PSAP is dependent on the information available to the switch.

In addition to the PSAPs with "CAMA-type" interfaces, a line interface with the switch providing power ringing and audible ringing (to the caller) is required. This type of PSAP is not able to receive CAMA ANI. This simpler type of PSAP interface is sometimes found at secondary PSAPs. Primary PSAPs are normally the CAMA type.

For calls in which the caller ID is not available (such as trunk originations without ANI delivered or the ANI is garbled), a fictitious number is sent as ANI to the PSAP in the form "0-911-0TTT," where TTT is the ESCO associated with the originating call.

9.2.16.4.1.2.2 Abandoned Calls

If the E911 caller abandons the call before the PSAP answers, normally no special treatment is done. The call is torn down to the PSAP.

However, the PSAP equipment has an option on it (via a dip-switch) that specifies to keep ringing the PSAP station for up to 15 seconds after the caller has abandoned. This allows the attendant to go off-hook and determines the ANI and either tries to call the person back or records the number (primarily used for nuisance/prank calls).

This can also be used with the *CALL-STALKER*[®] Automatic Number Identification System abandoned call trap.

9.2.16.4.1.2.3 Anonymous Calls

Anonymous calls are identified by sending the fictitious number "0-911-0000" as ANI to the PSAP. An anonymous call to a PSAP is a NANP DN without the NPA or full NANP DN direct dialed call (not 911) to the DN of the PSAP. This is only done when the termination point is marked as a PSAP trunk group.

9.2.16.4.1.2.4 Calls that Terminate to Busy PSAPs

Because the BRCS Call Forwarding Busy Line feature is not assignable for trunks, "PSAP-busy reroute service" is provided for PSAP trunk groups. This allows the assignment of a DN that is used as an alternate route if the specified PSAP trunk group is busy when a termination is attempted. This DN is used before the next alternate PSAP DN specified in the ESN routing data is tried. This feature provides transparency with the 1A ESSTM Switch Call Forwarding feature available for E911 PSAPs. This feature only provides a reroute function and does not possess the other options of CFBL (for example, billing of the forwarded leg).

NOTE: The "forwarding" DN of the PSAP is only assignable, if no advanced route index is provided for the PSAP. If an advanced route is specified, then no forwarding takes place from that point; however, ESN alternate routing can occur after the entire routing chain is exhausted. Office Data Administration (ODA) provides a warning that specifies a "forwarding" DN and a route advance is mutually exclusive for a given route index to a E911 PSAP trunk group.

The PSAP-busy service reroute is not a "Customer Recent Changeable" feature, and does not interact with Remote Access to Call Forwarding.

A maximum of five chained call legs is allowed, if the maximum is exceeded, then alternate routing is provided (if available) for an E911 origination. If alternate routing is not available then reorder is returned. This prevents errors if two busy PSAPs are forwarded to each other.

9.2.16.4.2 Operation on Remotes

9.2.16.4.2.1 Normal

No special treatment is performed for E911 PSAPs connected to an RSM.

9.2.16.4.2.2 Standalone

Once the call is established between the originator and the PSAP, stand-alone operation has minimal effect. Transfers are not allowed during standalone, since conference circuits are not available on the SM.

9.2.16.4.3 Internal Call Processing Controls

9.2.16.4.3.1 Connections

The PSAP side of the interface is 2-wire loop start trunk. The PSAP trunks are marked as 2-way to allow flashes to be detected from the PSAP. The switch side may be marked as a digital trunk, if the appropriate D4 channel bank conversion circuit is used between the switch and the PSAP.

9.2.16.4.3.2 Class of Service

The class of service (COS) for the E911 PSAP is FC_PFLASH. In addition, on View 5.1, the CAMA PSAP fields should be set to Y.

9.2.16.4.3.3 Code Interpretation

Any digits received from the PSAP are interpreted by the IDP or ODP assigned to the PSAP.

9.2.16.4.4 Signaling and Protocol Requirements

9.2.16.4.4.1 Subscriber Loop-Analog

The switch is able to support any type of PSAP with valid DN. The same PSAP trunk group cannot consist of ringing and non-ringing type PSAPs. The switch is able to support regular lines for ringing type PSAPs.

9.2.16.4.4.2 Subscriber Signaling

The interface for the Subscriber to Exchange and Exchange to Subscriber is provided as specified in Bellcore TR-TSY-000350.

9.2.16.5 Selective Routing Feature

9.2.16.5.1 Call Processing Treatment

This feature allows the switch to recognize E911 originations in a E911 office (either line originations or incoming trunk calls), launch a query using the ISDN applications processor interface (API) to the ESA, and interpret the response message received from the ESA. The normal response message from the ESA is an ESN that the switch translates into a Primary PSAP, two Alternate PSAPs and up to six Selective Transfer numbers plus a flash control digit (FCD). If the ESA is not available (that is, Default Routing has been performed or the switch is non-Selective Routing), the switch obtains the ESN using the data base relations.

Normal call setup and POTS translation procedures are followed to complete the E911 Selective Routing feature processing. If the terminating line or trunk group to the PSAP, determined by routing number translation, is busy, then Alternate Routing treatment is applied. For more information on Alternate Routing, see Section 9.2.16.6 .

9.2.16.5.1.1 Originating/Incoming Treatment

Selective Routing can be assigned on a per-ESCO basis. The OTC has the option to have all callers from a particular ESCO routed based on the default ESN associated with the ESCO and not receive Selective Routing.

See also Sections 9.2.16.2.1.1 and 9.2.16.3.1.1 for additional information on Originating/Incoming Treatment.

9.2.16.5.1.2 Terminating/Outgoing Treatment

The terminating/outgoing treatment of an E911 call is the same if the call is routed using selective or default routing. When the switch is using an ESA for Selective Routing, route the call based on POTS routing translation of the primary PSAP DN contained in the ESN data maintained at the switch. The appropriate ESN is provided by the ESA, or by default. When the switch is operating without the ESA, route the call based on POTS routing translation of the primary PSAP DN provided by the default ESN associated with the ESCO of the originator, or by relations maintained for use during stand-alone operation.

For E911 service, the caller identification outpulsed to a PSAP is the billing DN of the caller.

9.2.16.5.2 Operation on Remotes

9.2.16.5.2.1 Normal

Dialed and calling number data for an E911 call are provided to the host office via normal call processing.

When a call requires ESA Selective Routing, under normal circumstances, for an RSM-originated "911" dialed call, the host office queries the ESA and provides the route list corresponding to the ESN returned from the ESA in the response message to the originating RSM.

When non-ESA routing is used, under normal circumstances, for an RSM-originated "911" dialed call, the directory numbers normally associated with an ESN are determined based on data associated with the incoming line (for line originations), or the trunk group (for trunk originations) dialing plan.

9.2.16.5.2.2 Standalone

In full stand-alone mode, when communication with the CMP is unavailable, the originating RSM uses stand-alone routing data defined for that SM to complete the call to a "default" PSAP. In standalone, the RSM is not able to communicate with the ESA to obtain the ESN associated with the originating party. In addition, the ESN routing data is inaccessible since it is stored in the CMP for all SMs. Therefore, the RSM uses stand-alone routing data to complete the call to a "default" PSAP defined for that RSM. This stand-alone routing data is processed the same as when the routing data is obtained from the CMP. The PSAP "sees" the call as a "Default Routed" call. If the ESA links are on a stand-alone SM, then the originator receives default treatment.

9.2.16.5.3 Internal Call Processing Controls

9.2.16.5.3.1 Connections

When operating under the ESA configuration, the 5ESS[®] switch providing E911 service is connected to API data links that connect to an ESA. See Section 9.2.16.13 for more detailed information on the switch to ESA interface.

9.2.16.5.3.2 Code Interpretation

Code Interpretation for the Selective Routing Feature is not applicable.

9.2.16.5.3.3 Routing

Routing is determined by the POTS translation of the routing number found in the ESN data. The office 911 DAS is used to interpret E911 routing numbers.

If the DN being used to route the call is a DN trigger, the E911 call cannot complete to that DN. Alternate Routing Treatment is attempted as described in Section 9.2.16.6 .

9.2.16.6 Alternate Routing Feature

9.2.16.6.1 Call Processing Treatment

When attempting to complete to a PSAP that is Traffic or Maintenance Busy, the switch attempts Alternate Routing as follows:

- (1) Follow the chain of Route Advance Next RIs until an idle member of a trunk group is found.
- (2) If no idle trunk group member is found and the chain is exhausted, and the Traffic Busy Reroute option is assigned to the PSAP, use the Reroute DN to complete the call.
- (3) If the Traffic Busy Reroute option is not assigned, or if it is assigned and the destination indicated by the Reroute DN is also busy, use the first Alternate Routing DN.
- (4) If the destination indicated by the first Alternate Routing DN is also busy, use the second (backup) Alternate Routing DN if entered in the ESN data.
- (5) If all attempts fail, route to reorder.

The backup alternate routing DN is an optional parameter in the ESN data. It is recommended that the ESN data for 911 should contain an alternate and backup alternate routing DN for the call.

When attempting to complete to a PSAP that has the Make-Busy key operated, the switch attempts Alternate Routing as follows:

- (1) If the Make-Busy Reroute option is assigned to the PSAP, attempt to use the Reroute DN to complete the call.
- (2) If the Make-Busy Reroute option is not assigned, or if it is assigned and the destination indicated by the Reroute DN is also busy, use the first Alternate Routing DN.
- (3) If the destination indicated by the first Alternate Routing DN is also busy, use the second (backup) Alternate Routing DN if populated in the ESN data.
- (4) If all attempts fail, route to reorder.

NOTE: There is a difference in the treatment of Traffic and Maintenance Busy versus Make-Busy. Traffic and Maintenance Busy attempt to use route advance before using the Reroute DN. Make-Busy accesses the Reroute DN if appropriate and does not attempt route advance. This flexibility allows different alternate routing depending on the condition encountered.

9.2.16.6.1.1 Originating/Incoming Treatment

Not Applicable

9.2.16.6.1.2 Terminating/Outgoing Treatment

For "911" calls, unsuccessful attempts to route to terminating or outgoing terminals because of traffic or maintenance busy conditions results in the operation of the alternate routing feature.

9.2.16.6.1.3 Release Treatment

Not applicable.

9.2.16.6.2 Operation on Remotes

Alternate Routing feature operation functions on an RSM that serves one or more PSAPs in normal and stand-alone modes.

9.2.16.6.3 Internal Call Processing Controls

9.2.16.6.3.1 Connections

Not Applicable.

9.2.16.6.3.2 Class of Service

Not Applicable.

9.2.16.6.3.3 Code Interpretation

Not Applicable.

9.2.16.6.3.4 Routing

Routing for this feature is based on POTS translation of alternate routing or backup alternate routing DN's specified in the ESN data. The OTC can specify a DAS to identify the office dialing plan (that is, the LDIT) used to interpret E911 routing numbers.

If the DN being used for Alternate Routing is a DN trigger, the E911 call cannot complete to that DN. The next Alternate Routing option is attempted as described in Section 9.2.16.6 .

9.2.16.6.4 Signaling and Protocol Requirements

9.2.16.6.4.1 Subscriber Signaling

Not applicable for Alternate Routing.

9.2.16.6.4.2 Exchange to Subscriber

When an E911 call is Alternate Routed, the switch sends the high-end NPD digits to the Alternate PSAP. The Flash Calling Display feature (see Section 9.2.16.11) is invoked when E911 calls are alternate routed.

9.2.16.7 Default Routing Feature

9.2.16.7.1 Call Processing Treatment

Default Routing allows an E911 call to be routed when the switch cannot map the ID of the caller to a particular ESN. In general, a default ESN is associated with the ESCO value used for the originating line or trunk. This default ESN is also used when selective routing is not assigned for that ESCO. The term *Default Routing* implies that selective routing was attempted, but had failed because of some problem, and the default ESN is used to route the call. When such an error condition occurs, the default ESN assigned to the ESCO of the ESCO incoming trunk group or the DAS, the calling line is used by the switch to complete the E911 call.

Default Routing treatment of an E911 call at the E911 serving switch, which is equipped with an ESA, is keyed by the following error conditions:

- Caller ID unavailable
- Caller ID garbled
- API link failure
- ESA unavailable
- Invalid ESN received from ESA
- Switch time-out (waiting for ESA response message)
- Switch/ESA communication failure.

The OTC must assign appropriate default ESNs per ESCO for any incoming trunk group that is used for E911 service to the E911 serving switch. The OTC must also specify a default ESN for the ESCO associated with each DAS for the lines terminating on the E911 serving switch.

9.2.16.7.1.1 Terminating/Outgoing Treatment

The switch routes an E911 call using the Default Routing data because of the error conditions described in the previous call processing section (see Section 9.2.16.7.1). The Default Routing data is assigned using the ESCO of the caller.

9.2.16.7.1.1.1 Normal Calls

See Section 9.2.16.4.1.2.1 .

9.2.16.7.1.1.2 Abandoned Calls

See Section 9.2.16.4.1.2.2 .

9.2.16.7.1.1.3 Anonymous Calls

See Section 9.2.16.4.1.2.3 .

9.2.16.7.1.1.4 Calls That Terminate to Busy PSAPs

See Section 9.2.16.4.1.2.4 .

9.2.16.7.2 Operation on Remotes

9.2.16.7.2.1 Normal

No special operation to Default Routing occurs when a remote is operating in normal mode.

9.2.16.7.2.2 Standalone

When an E911 call originates from an RSM that is in stand-alone mode, all line and trunk originations use the same Stand-alone Routing information. Each SM has Default Routing data stored on that SM if that the SM goes into standalone and cannot obtain the proper routing data stored in the CMP, which contains the routing numbers for all the ESNs on the switch. For additional information, see Section 9.2.16.2.2.2 .

9.2.16.7.3 Internal Call Processing Controls

9.2.16.7.3.1 Connections

See Section 9.2.16.5.3.1 .

9.2.16.7.3.2 Code Interpretation

Not applicable for Default Routing.

The switch routes the E911 call as specified by the POTS translation of the OTC specified NANP DN without the NPA or full NANP DN routing specified in the default ESN data using the office 911 DAS.

If the DN being used to default route the call is a DN trigger, then the E911 call cannot complete to that DN. Alternate Routing is used as described in Section 9.2.16.6 .

9.2.16.7.4 Signaling and Protocol Requirements

9.2.16.7.4.1 Subscriber Signaling

Not applicable for Default Routing.

9.2.16.7.4.2 Exchange to Subscriber

When an E911 caller is given Default Routing treatment because of error conditions, the switch sends the high-end NPD digits to the default PSAP to invoke the Flash Calling Display (see Section 9.2.16.11).

9.2.16.7.5 Intersystem Address Signaling

Not applicable for Default Routing.

9.2.16.8 ESA Unavailable or Non-ESA Configuration

When the ESA is unavailable or the non-ESA configuration is in effect, the following occurs:

- (1) When an E911 trunk origination appears on a trunk not assigned an ESCO, the ESCO of the trunk dialing plan is used to obtain a default ESN to route the call and Default Routing is performed.
- (2) When an E911 call is Default Routed and the caller ID is available, then the caller ID is outpulsed as ANI to the PSAP with the flash control digit (FCD) set. If the caller ID is unavailable, then "0-911-0TTT" is outpulsed as ANI to the PSAP and the display is not flashed.

9.2.16.9 Transfer Features

9.2.16.9.1 Common Transfer Feature Operations

9.2.16.9.1.1 Terminating/Outgoing Treatment

9.2.16.9.1.1.1 Completed as Requested

If the call is transferred to an E911 PSAP, the caller ID of the E911 caller is forwarded by outpulsing the 8 digits using MF signaling as follows:

KP+(NPD)+NANP DN without the NPA+ST

Caller ID is preserved on all transfers until a transfer is made to a non-E911 PSAP.

When an E911 PSAP transfers an E911 call to a station with B911 Class of Service, and the transfer is completed leaving the original caller connected only to the B911 station, then the B911 Emergency Ringback and B911 Forced hold capabilities are available if the call originated from a line on the E911 serving switch. These B911 features are not available when the call originates in a subtending End Office.

9.2.16.9.1.1.2 Cannot Be Completed as Requested

If any transfer attempt fails, the switch restores the E911 call to the original PSAP. If the transferred-to location is busy, or if there is no answer, the transfer originator can release the destination by operating the CANCEL key on the PSAP. Operation of the CANCEL key generates a timed on-hook flash and sends the signal to the switch. The switch interprets the flash signal as a request to disconnect the transferred-to location. The switch releases the transferred-to location and restores the initial 2-party E911 call connection. If a Selective Transfer request is made and the request is not valid (that is, one for which there is no DN in the ESN data), the switch sends an interrupted high tone (120 ipm) to the PSAP attendant requesting the transfer. The tone continues until the attendant flashes again.

If no conference circuit is available when routing of the added leg is completed, then the added leg is dropped and the PSAP is reconnected to the originator. The PSAP has no priority over other subscribers when a conference circuit is requested.

9.2.16.9.1.2 Release Treatment

This section describes the release treatment when a 3-way connection has been established between the E911 caller, transfer originator, and the transferred-to PSAP.

9.2.16.9.1.2.1 Originating PSAP Disconnects First

When an on-hook signal is received from the controlling PSAP, the switch begins flash timing (approximately 1.2

seconds). If the controlling PSAP returns off-hook before flash timing ends, then the switch recognizes this as a request to release the transferred-to PSAP. If the controlling PSAP remains on-hook (beyond the flash timing period), the controlling PSAP is dropped and the E911 caller and transferred-to PSAP are connected.

9.2.16.9.1.2.2 Transferred-to PSAP Disconnects First

When the transferred-to PSAP disconnects first (goes on-hook), the connection to the transferred-to PSAP is dropped and the E911 caller and controlling PSAP remain connected.

9.2.16.9.2 Operation on Remotes

9.2.16.9.2.1 Normal

Not Applicable.

9.2.16.9.2.2 Standalone

Selective, Fixed, or Manual Transfer is not allowed while in standalone because the required conference circuits are not available.

If a PSAP resides on an SM that is in standalone, a three-way call cannot be made. If the PSAP operator (the controlling party) attempts to do a transfer operation using auto-3-way, the attempt to form the conference call fails and reorder is returned to the PSAP operator.

9.2.16.9.3 Internal Call Processing Controls

9.2.16.9.3.1 Connections

The facility requires an appropriate Multiway Calling feature (for example, /MWMFE) be assigned to allow the E911 PSAPs to invoke an E911 Transfer.

9.2.16.9.3.2 Code Interpretation

The PSAP can have up to six "Selective Transfer" buttons. The PSAP attendant is able to Selective Transfer the E911 call to an appropriate PSAP by using the transfer keys on the console to initiate a Selective Transfer. The PSAP automatically generates an on-hook flash signal to the switch and sends a transfer code of the form *1X. The 'X' specifies one of the six selective transfer DNs to route. The transfer codes are defined in the ODP or IDP.

The PSAP attendant can use a Fixed Transfer button to transfer the E911 caller to another emergency service location. The PSAP automatically generates an on-hook flash signal to the switch and sends a transfer code of the form *YX where Y=2, 3, or 4. The same code types used for Fixed Transfer are used for manually dialed speed calling codes.

These codes must be defined in the IDP for the PSAP or in the ODP.

9.2.16.9.3.3 Routing

Routing of selective transfers the Selective Transfer DNs extracted from the ESN data for the E911 DAS. Fixed and Manual Transfer routes calls using the DAS or IDP assigned to the PSAP trunk group.

If the DN that is the target of the transfer is a DN trigger, the Transfer operation fails and reorder is returned to the transferring PSAP. At this point, the attendant should then cancel the transfer attempt.

9.2.16.9.4 Signaling and Protocol Requirements - Subscriber Loop-Analog

See Section 9.2.16.4.4.1 .

9.2.16.9.5 Selective Transfer Feature

9.2.16.9.5.1 Call Processing Treatment

The Selective Transfer feature allows the switch to transfer an established call from a primary PSAP to a secondary PSAP based on the transfer information specified in the ESN data. The switch maintains a 3-way connection until either PSAP disconnects.

The PSAP attendant can have up to six possible Selective Transfer buttons. The attendant selects one of the six PSAPs as the "Selective Transfer PSAP."

Selective Transfer is applicable when an E911 call has been routed to a PSAP using Selective, Nonselective, Alternate or Default Routing. Selective Transfer, in addition to Fixed Transfer and Manual Transfer, is available when an E911 call has been Default Routed.

Anonymous calls are not processed by the E911 feature software. No ESN information is available; therefore, the Selective Transfer feature is unavailable to anonymous calls to the PSAP.

9.2.16.9.5.2 Originating/Incoming Treatment

Selective Transfer is keyed from E911 PSAPs.

If E911 feature operation is to be maintained for the call, transfer(s) can only be on an intraswitch basis. When the transferred-to PSAP is on the same switch as the PSAP initiating the transfer, the switch stores the caller ID and ESN data for the remainder of the call. The transfer information associated with the ESN is accessible by all PSAPs on that switch.

When the transferred-to PSAP is on another switch, and the Handoff feature is used with the transfer, the receiving switch treats the transferred E911 call as a "new" E911 call, with dialed digits of 911 and the ANI of original caller. The receiving switch is then responsible for determining correct routing of the E911 call.

9.2.16.9.5.2.1 Originating/Incoming Treatment For PSAPs

The Primary PSAP attendant initiates "Selective Transfer" by using the transfer keys on the selector console. When this is done, the PSAP automatically generates and sends an on-hook flash signal (duration of 500 milliseconds) to the switch. The request for transfer is recognized when a flash signal (500 +/- 50ms on-hook signal) is received from the PSAP. The PSAP generates and sends a prefixed 2-digit transfer code of the form *YX (where Y=1 for Selective Transfer) to the switch. The switch associates the 2-digit code with a particular DN. Once the switch acknowledges a transfer is to be performed by providing dial tone, the PSAP automatically generates and sends a Selective Transfer code that is associated with the appropriate Selective Transfer PSAP DN. The transfer code received is of the form *YX, where Y=1 and X=1, 2, 3, 4, 5, or 6. The switch associates the value of X with one of the six possible Selective Transfer PSAP DNs that are contained in the ESN data (for example, X=1 is associated with DN1, and X=2 is associated with DN2). Once a valid X to DN association is made, the switch routes the call based on the NANP DN without the NPA or full NANP DN using the office 911 DAS.

If an attendant initiates a Selective Transfer and there is no answer, the destination is busy or is no longer desired, the attendant can release the call by pressing a CANCEL key. The switch receives a timed on-hook flash signal (approximately 500 ms). This is interpreted as a request to disconnect the transferred-to location and restore the initial 2-party E911 call connection.

9.2.16.9.6 Fixed Transfer

9.2.16.9.6.1 Call Processing Treatment

With Fixed Transfer, the PSAP attendant is required to determine the specific transferred-to PSAP (Police A, Police B, Fire A, Fire B, etc.) based on the caller ID and the cause of the emergency.

9.2.16.9.6.2 Originating/Incoming Treatment

The Fixed Transfer feature is initiated when the PSAP attendant operates a transfer key on the selector console. When a PSAP attendant operates the transfer key, the PSAP sends an on-hook signal to the switch. The switch recognizes a flash signal of 500 +/- 50 ms as a transfer request. The PSAP generates and sends a prefixed 2-digit transfer code of the form *YX (where Y=2, 3, or 4 for Fixed Transfer) to the switch. The switch associates the 2-digit code with a particular DN (for example, the 2-digit code 21 is associated with the DN of Police location A, and code 22 is associated with the DN of Police location B). After the switch associates the 2-digit dialed code with a specific DN, an attempt is made to add the transferred-to PSAP. The *2X code is a speed dialing function that can be dialed manually.

The OTC must assign the *2X transfer code to the correct Fixed Transfer DN.

9.2.16.9.7 Manual Transfer Feature

9.2.16.9.7.1 Call Processing Treatment

Manual Transfer allows the PSAP attendant to transfer a 911 caller to another PSAP attendant by dialing a valid number or use speed calling codes. The transferred-to PSAP can be within the same LATA or a different LATA. The speed dialing codes are of the form *YX (where Y=2, 3, or 4). The same code types used for Fixed Transfer are used for manually dialed speed calling codes.

The Manual Transfer feature is initiated by the PSAP attendant when the attendant determines there is a need to transfer an E911 call to the secondary PSAP.

9.2.16.9.7.2 Originating/Incoming Treatment

The Manual Transfer feature is activated when the PSAP attendant operates the ADD key and generates a timed on-hook flash that is sent to the switch. The switch detecting the flash signal provides a dial tone to the PSAP attendant originating the transfer. After receiving dial tone, the PSAP attendant can manually dial the directory number for the transfer-to location. The attendant can also use the speed calling codes *2X, *3X, *4X for Manual Transfer.

9.2.16.10 Forced Disconnect Feature

This feature applies to E911 PSAPs only.

9.2.16.10.1 Release Treatment

9.2.16.10.1.1 Disconnect for E911 Calls from a Local Office

The established E911 call disconnect supervision is maintained at the E911 serving office. The disconnect actions depend on whether disconnect is received from the PSAP or from the local office.

When the PSAP attendant disconnects first, the PSAP sends an on-hook signal to the E911 serving office. The on-hook signal duration is greater than the flash timing period (1.2 seconds) so that the signal can be interpreted as a disconnect signal. If the connection between the E911 serving office and the local office is over a CCS7 link, the switch sends a "Release Message" to the local office. Otherwise, the E911 serving office passes the on-hook message to the local office over the CAMA trunk. In either case, the E911 serving office uses existing trunk idling procedures. When either the local office responds, or time-out occurs, the E911 serving office disconnects the call connection, sends an on-hook signal to the PSAP, and idles the trunk to the PSAP.

When the E911 caller disconnects first, the switch idles the E911 caller line using normal procedures.

9.2.16.10.1.2 PSAP-Initiated Disconnect from E911 Serving Switch

When the PSAP attendant disconnects first, the PSAP sends an on-hook signal to the switch. The on-hook signal duration is greater than the flash timing period (1.2 seconds) so that the signal can be interpreted as a disconnect signal. The switch returns an on-hook signal to the PSAP and immediately idles the E911 trunk to the PSAP. In addition, the E911 serving office restores the E911 caller line using normal procedures.

When the E911 caller disconnects first, the switch idles the E911 caller line using normal procedures.

9.2.16.10.1.3 Class of Service

For E911 PSAPs, an internal distinction of a CAMA PSAP indicator on the trunk view (View 5.1) is used by the E911 serving switch to identify terminations to receive special release treatment. If the terminating PSAP is marked as a B911 terminating point, then the E911 call can be held by the B911 Forced Hold feature, if the caller originated on the same switch.

9.2.16.11 Flash Calling Display Feature

9.2.16.11.1 Call Processing Treatment

The Flash Calling Display feature is an indicator that is interpreted by the PSAP as a flashing display.

The switch is responsible for sending the PSAP an NPD based on the NPA of the caller. End offices that trunk to the E911 serving switch sends the usual I digit and the E911 serving switch derives the NPD from the trunk data, or by using a mapping of NPAs to NPDs. The switch translates the NPA to NPD for the callers that are homed on the E911 serving switch. The NPD is a single-digit number that the switch sends to the PSAP. The PSAP display is flashed based on the high-end NPD digit (4, 5, 6, 7) that is received from the switch.

The interface between the switch and the CPE is supported over CAMA-like trunks for the E911 PSAP.

9.2.16.11.1.1 Originating/Incoming Treatment

Not Applicable.

9.2.16.11.1.2 Terminating/Outgoing Treatment

9.2.16.11.1.2.1 Completed as Requested

The first digit of the sequence, NPD+NANP DN without the NPA, sent to the PSAP is the flash indicator for the E911 PSAPs. If the first digit sent to the PSAP is a 0, 1, 2, or 3 (corresponding to NPA 0, 1, 2, and 3), the ANI display is not flashed. If the first digit is 4, 5, 6, or 7 (corresponding to NPA 0, 1, 2, and 3), the ANI display is flashed.

9.2.16.11.1.2.2 Cannot be Completed as Requested

Not Applicable.

9.2.16.11.2 Operation on Remotes

9.2.16.11.2.1 Normal

Not applicable.

9.2.16.11.2.2 Standalone

Whenever an E911 call is routed using stand-alone data, the switch sends the appropriate NPD value (4,5,6,7) to the PSAP enabling the Flash Display Feature.

9.2.16.11.3 Internal Call Processing Controls

9.2.16.11.3.1 Connections

The E911 PSAPs use MF signaling to receive the first digit (the NPD) and caller ID (ANI) from the switch.

9.2.16.11.3.2 Class of Service

This feature is only supported on terminations to E911 PSAPs.

9.2.16.11.3.3 Code Interpretation

Only the first digit in the caller ID sequence received from the switch indicates if the ANI display is to be flashed for E911 PSAPs. The values of 4, 5, 6, and 7, when received as the first digit from the switch, are used to activate the Flash Calling Display feature at the PSAP.

The Flash Calling Display feature is automatically activated when the following occurs:

- When the switch uses Default Routing (see Section 9.2.16.7). When Default Routing occurs, the low-end NPD digits 0 to 3 are changed to the upper-end NPD digits 4 to 7.
- When the switch uses Alternate Routing (see Section 9.2.16.6), and the call is redirected using either the Alternate Routing DN or the Reroute DN (not the Route Advance Next Route Index). When Alternate Routing occurs, the low-end NPD digits 0 to 3, are changed to the upper-end NPD digits 4 to 7.

9.2.16.11.3.4 Routing

Not Applicable.

9.2.16.11.4 Signaling and Protocol Requirements

9.2.16.11.4.1 Subscriber Signaling

9.2.16.11.4.1.1 Subscriber to Exchange

Not Applicable.

9.2.16.11.4.1.2 Exchange to Subscriber

To activate the Flash Calling Display feature at the PSAPs, the switch changes the low-end NPD digits to the upper-end NPD digits before sending the caller ID to the PSAP. The NPD indicates from which NPA the call originated.

9.2.16.11.4.2 Intersystem Signaling

When an E911 caller with ANI flash is be transferred to another PSAP location (on the same switch), the switch sends the same digit value of 4, 5, 6, or 7 to the transferred-to PSAP.

9.2.16.12 911 Choking Mechanism

9.2.16.12.1 Intraswitch Choking Mechanism

To prevent the switch from being saturated with E911 calls, a choking mechanism is provided. The OTC is able to specify the maximum number of simultaneous E911 line originations allowed for the E911 serving office. Trunks that are designated as incoming from a PBX (E911 Trunk Type specified as E9 PBXNONDED) have their E911 calls throttled by the intraswitch choking mechanism. If an E911 call exceeds the maximum number of simultaneous calls, the switch returns reorder to the E911 caller.

9.2.16.12.2 Interswitch Choking Mechanism

The switch provides an E911 choking mechanism for calls originating on nondedicated incoming trunk group(s) when the "911" digits are received. The OTC is able to specify the maximum number of simultaneous calls over all nondedicated incoming trunks (as one total value). This prevents E911 facilities from being tied up because of a large influx of E911 calls originating from any particular office.

Dedicated E911 trunks are self-choked by limiting the number of calls that can be originated over the trunk group members.

9.2.16.13 Applications Processor Interface

To support the E911 ESA configuration, a 5ESS[®] switch must be equipped with an ISDN SM that supports the ISDN applications processor interface as specified in 235-900-303, *5ESS[®] Switch ISDN Applications Processor Interface Specification*). It is recommended that the ISDN SM supporting the interface to the E911 ESA **not** be an RSM, TRM, or ORM. If the ESA interface is assigned to an RSM, TRM, or ORM then, if the remoted SM goes into stand-alone operation, the ESA is isolated from all other SMs on the switch. The chosen ESA also supports the adjunct processor end of the ESA interface. The 5ESS[®] switch supports only one ESA for E911 service, unless the Dual Emergency Services Adjunct (ESA) for E911 feature (99-5E-1401) is active. [See "Dual Emergency Services Adjunct (ESA) for E911," Section 9.3.] The interface to the ESA consists of two data links for reliability and for load sharing.

The switch "client value" used for E911 messages is the originating terminal process ID on the 5ESS[®] switch. This value serves to identify the particular switch process that is sending and receiving E911 messages from the ESA. The switch client value is sent to the ESA in the query and is reflected back to the switch in the response. In addition, a feature ID is assigned in the ESA. This feature ID is defined as a real-time response (RTR) capability. The feature ID value is included in the query and serves to indicate the appropriate receiving application on the ESA.

See 235-900-303, *5ESS[®] Switch ISDN Applications Processor Interface Specification*, for details describing the physical and protocol aspects of the ISDN applications processor interface. The following specifies the capability messages that the 5ESS[®] switch sends to, and receives from, the ESA.

9.2.16.13.1 E911 Capability Messages

In the ESA configuration, after an E911 call is recognized, the ESA is queried with the ANI, and returns an ESN that the switch uses to derive routing information to correctly complete the E911 call to the appropriate PSAP. The query contains the ANI of the caller. The content and format of the query message are shown in Table 9-23.

Table 9-23 E911 Query Components

PARAMETER	OCTETS	COMMENTS
Switch Client	4	OTPID
Business Customer ID	2	Always 0
Feature ID	1	New (7)
Length	1	7d (octets)
Message Type	1	01h
ANI Length	1	10d (digits)

ANI	5	in BCD

The response message returned from the ESA specifies a valid ESN that is used to complete the call. The response message contains the same ESN, a validity code to indicate success or various error conditions associated with the query, and contains the ANI from the query. The content and format of the response are shown in Table 9-24.

Table 9-24 E911 Response Components

PARAMETER	OCTETS	COMMENTS
Switch Client	4	Reflected
Business Customer ID	2	Always 0
Feature ID	1	New (7)
Length	1	10d (octets)
Message Type	1	02h
ANI Length	1	10d (digits)
ANI	5	in BCD
Validity Code	1	
ESN	2	

The Test Query and Test Query Response messages are used to provide a craft test function. The message contents of these two messages are identical to the normal Query and Response, the only differences are the Message Type values and that there can only be one Test Query at a time. The content and format of the Test Query message is shown in Table 9-25. The content and format of the Test Query Response message is shown in Table 9-26.

Table 9-25 E911 Test Query Components

PARAMETER	OCTETS	COMMENTS
Switch Client	4	AM System Process
Business Customer ID	2	Always 0
Feature ID	1	New (7)
Length	1	7d (octets)
Message Type	1	05h
ANI Length	1	10d (digits)
ANI	5	in BCD

Table 9-26 E911 Test Query Response Components

PARAMETER	OCTETS	COMMENTS
Switch Client	4	Reflected
Business Customer ID	2	Always 0
Feature ID	1	New (7)
Length	1	10d (octets)
Message Type	1	06h
ANI Length	1	10d (digits)
ANI	5	in BCD
Validity Code	1	
ESN	2	

If the 5ESS[®] switch is unable to send a query to the ESA because of a failure of the interface, the 5ESS[®] switch completes the call using Default Routing and pegs the default routing peg count.

The ESA can respond to a query with an indication that the ESN associated with the ANI is invalid. In this case, an ESA valid ESN audit is triggered, the invalid ESN peg count is incremented, and the switch attempts to complete the call with the returned ESN (if present) despite the invalid indication. Default routing is used if the ESN is marked as unassigned on the 5ESS[®] switch, or the ESN is not present (returned ESN value is 0) in the response. The default routing count is pegged whenever the 5ESS[®] switch uses Default Routing.

If the 5ESS[®] switch receives an ESN from the ESA, which the ESA has marked as valid, but the 5ESS[®] switch determines that the ESN is invalid, the switch sends the valid ESN table to the ESA. The switch pegs the invalid ESN and Default Routing counts and completes the call using Default Routing.

The ESA can respond to the query with an indication that the ANI information in the query is somehow invalid. This is indicated by returning invalid NPA, invalid office code, invalid number group, or invalid DN in the validity field of the response message. The invalid query data count is pegged, the call is completed using default routing, and the E911 default routing count is pegged.

If the ESA does not respond to the 5ESS[®] switch within the prescribed time-out period (1.5 seconds), the 5ESS[®] switch routes the call using Default Routing and pegs the ESA time-out peg count and the E911 default routing peg count. A response to a query that arrives after the time-out period expires is ignored.

If the switch has sent query and expects a response, or has sent a test query and expects a test query response, and the ESA responds with a message containing an unexpected message type, or if the ESA responds with the correct message type, but one or more message parameters are in error (that is, malformed), the switch pegs the default routing count and the invalid message received count and completes the call using Default Routing. If the switch receives an unsolicited message from the ESA, the invalid message received count is pegged, and the message ignored.

NOTE: The valid ESN table request is the only message that the ESA can send to the switch with solicitation from the switch.

The ESA depends on the switch to provide a table of valid ESNs that are referenced to when responding to a poll. This table is provided to the ESA by the switch at startup of E911 service, when a recent change on the switch changes the state of an ESN from assigned to unassigned, or from unassigned to assigned. Then the processor, where this data is stored, performs an initialization, or an initialization is performed at the demand of the ESA when the ESA has concluded that its copy of the table is inaccurate. The ESA requests this table when API link initialization is performed.

A transfer mechanism is provided so that the 5ESS[®] switch can send valid ESN information to the ESA whenever recent change or initialization causes the ESN information to change. The valid ESN message contains the switch client value, a business customer ID of 0, and the real-time response (RTR) capability, as well as a bitmap of the valid ESNs. The bitmap is 128 octets in length. Octet 0, bit 0 corresponds to ESN 0, and is defined as an invalid ESN. Octet 0, bit 1 corresponds to ESN 1, and so on. Each bit position on the bitmap reflects the corresponding ESN is either valid (the bit is 1) or invalid (the bit is 0). The 128 octets allow for the status of all 1023 ESNs to be relayed to the ESA. The content and format of the valid ESN message is shown in Table 9-27.

Table 9-27 E911 Valid ESN Message Components

PARAMETER	OCTETS	COMMENTS
Switch Client	4	Don't Care
Business Customer ID	2	Always 0
Feature ID	1	New (7)
Length	1	130d or 2d
Message Type	1	03h
Error Code	1	0=success, 1=bitmap unavail
Bitmap	128	

If the switch is unable to respond to the request of the ESA for the ESN bitmap, the Error Code field should contain 1, and the bitmap omitted from the message.

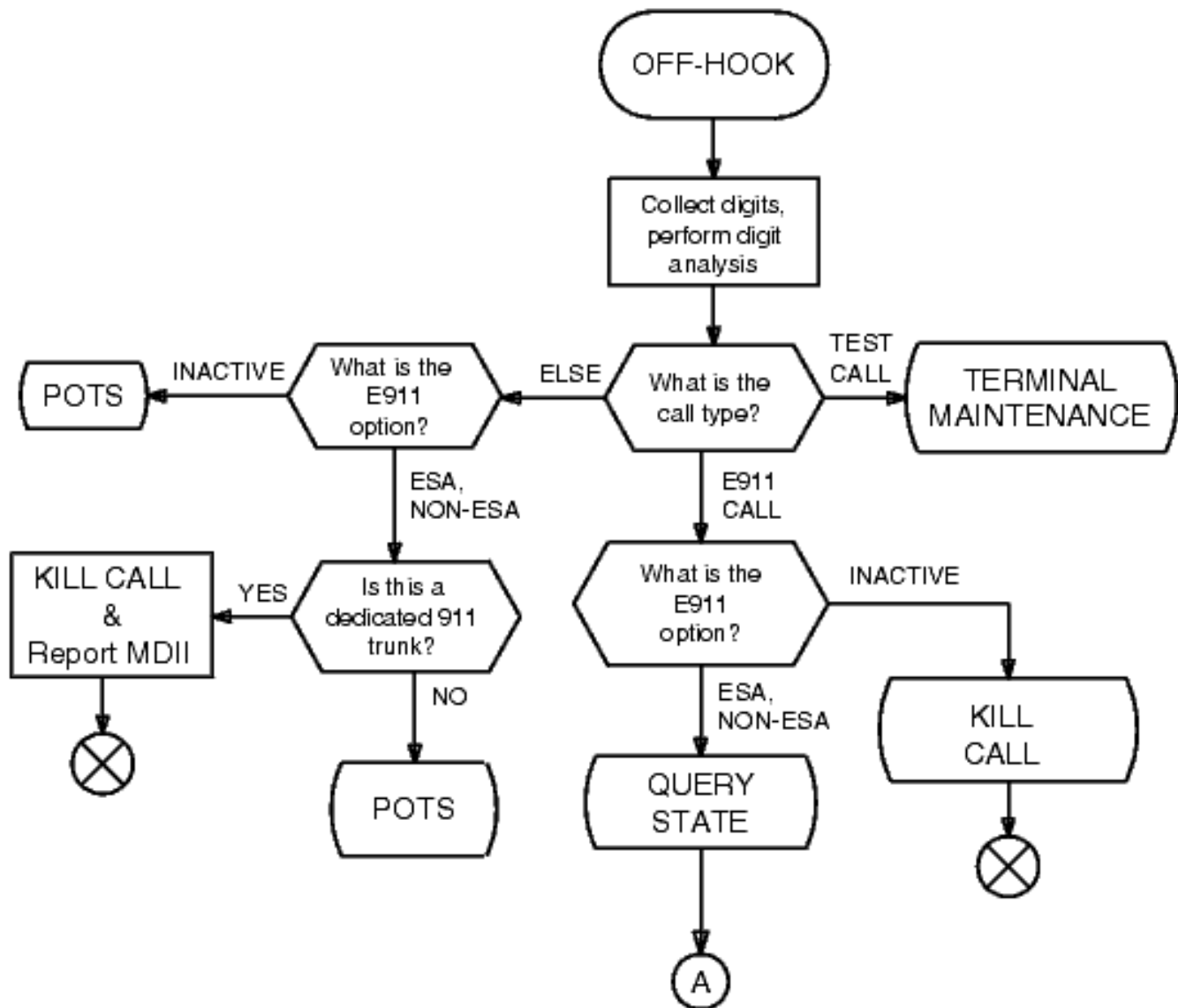
The ESA is capable of sending a request for the valid ESN information table to the 5ESS[®] switch when the ESA feels it necessary, and is able to accept a message containing the information. This request message contains business customer ID, and feature ID values as described previously. In addition, the message type serves to indicate to the switch that the request is for a valid ESN bitmap. The switch client ID is unimportant in this message, and is coded as 0. The switch is able to properly route the request to the appropriate process based on the message type. The content and format of the valid ESN request message is shown in Table 9-28.

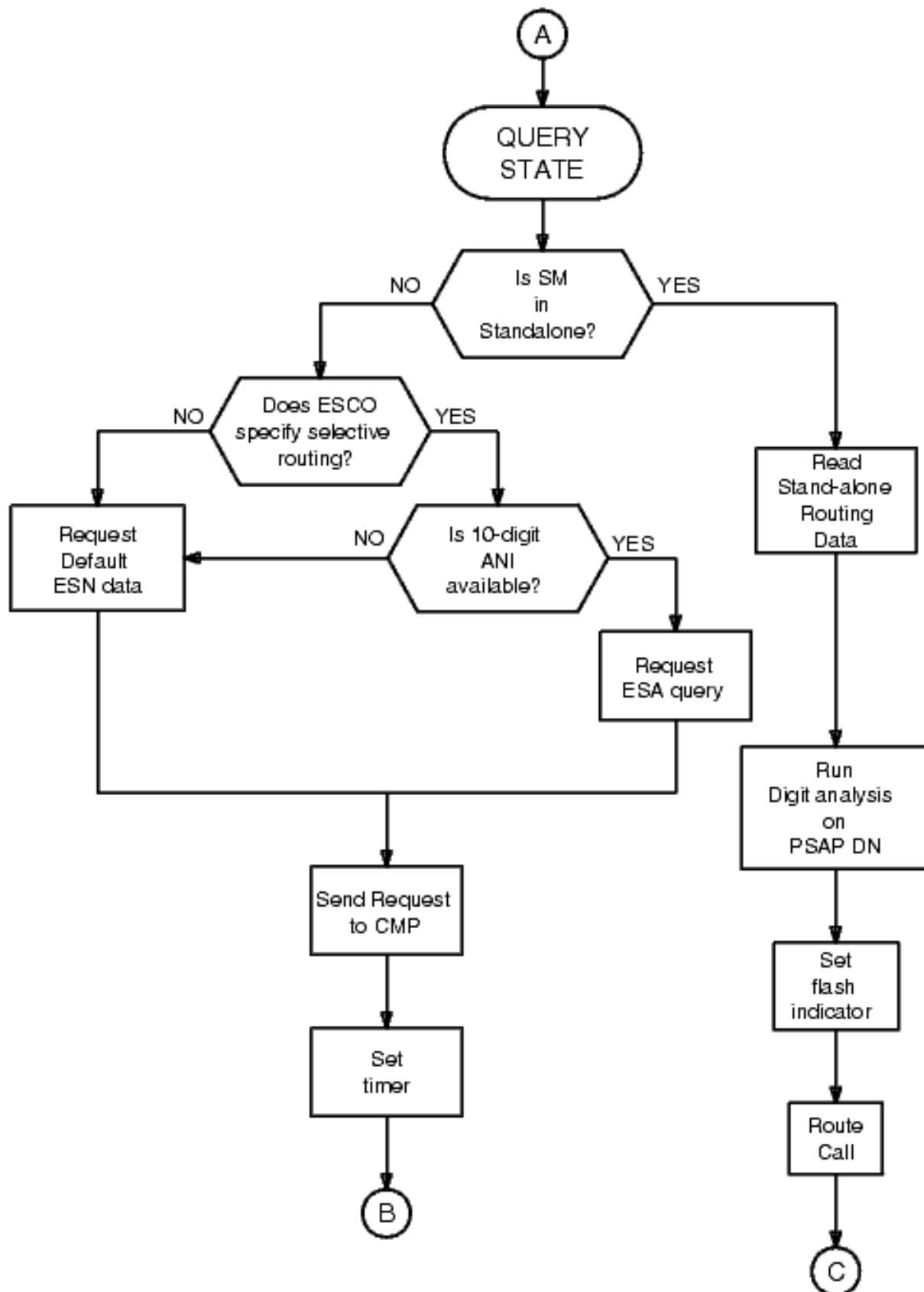
Table 9-28 E911 Valid ESN Request Components

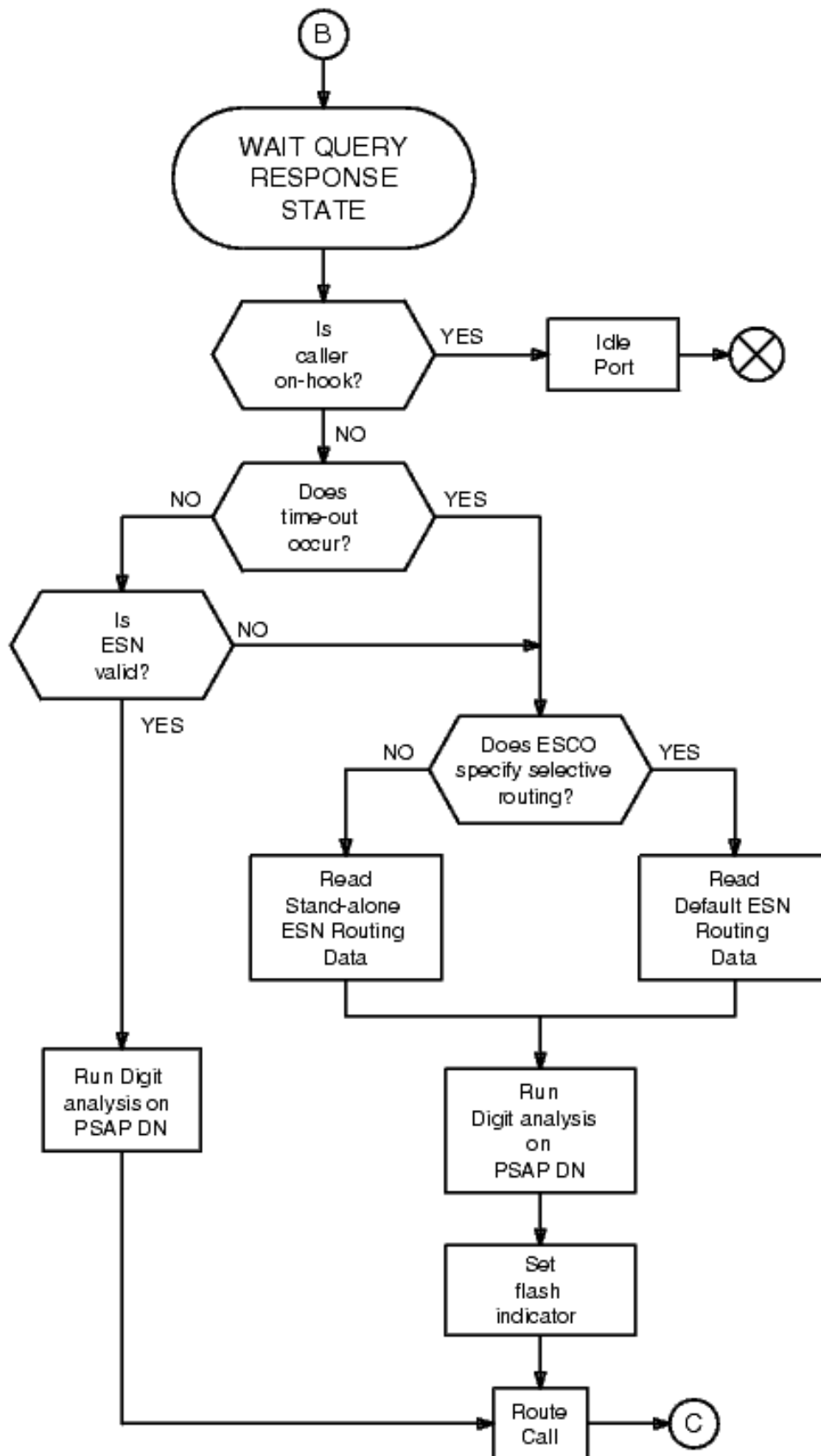
PARAMETER	OCTETS	COMMENTS
Switch Client	4	Don't Care
Business Customer ID	2	Always 0
Feature ID	1	New (7)
Length	1	1d
Message Type	1	04h

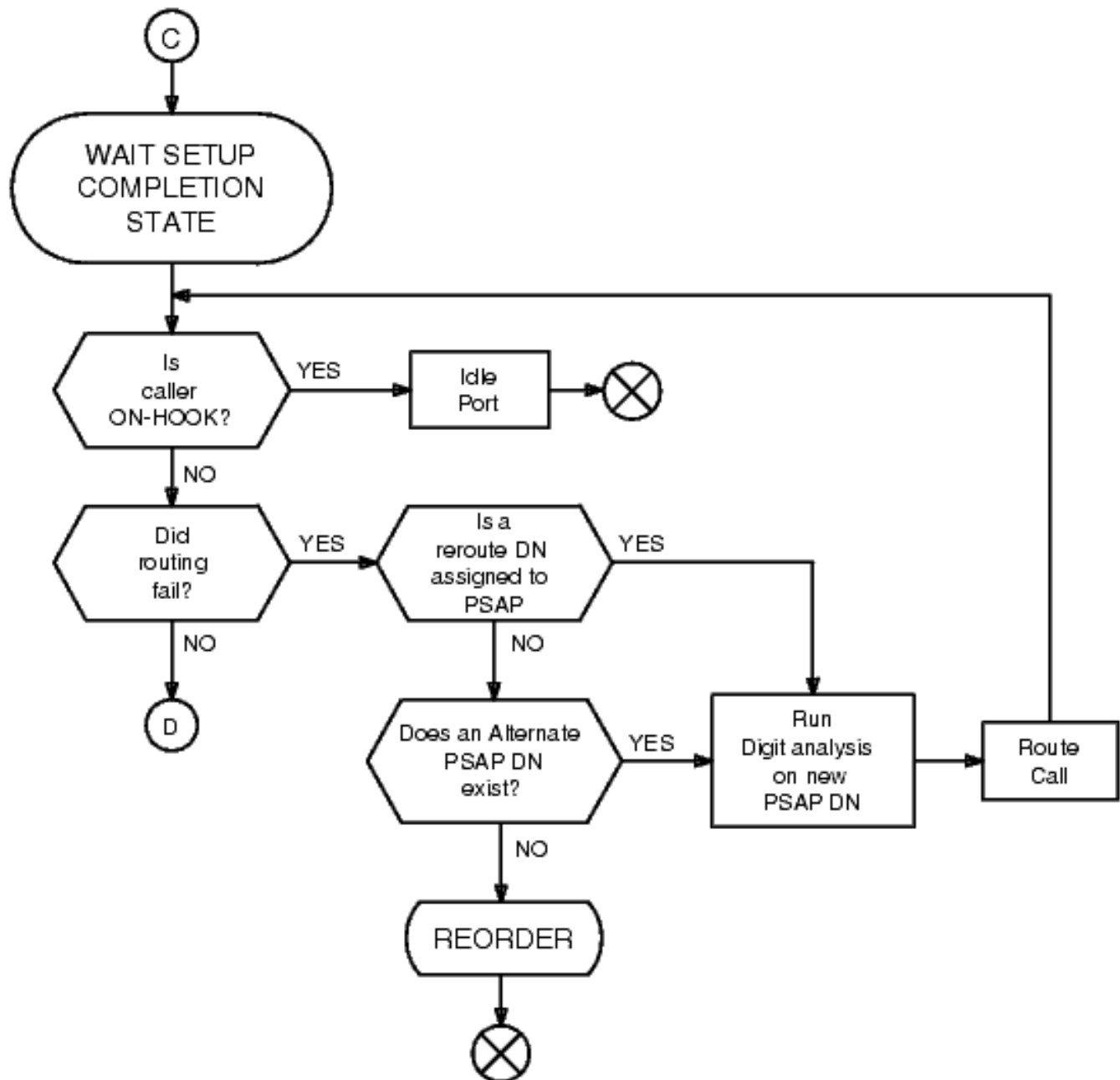
9.2.16.14 Feature Call Processing Flow Diagram

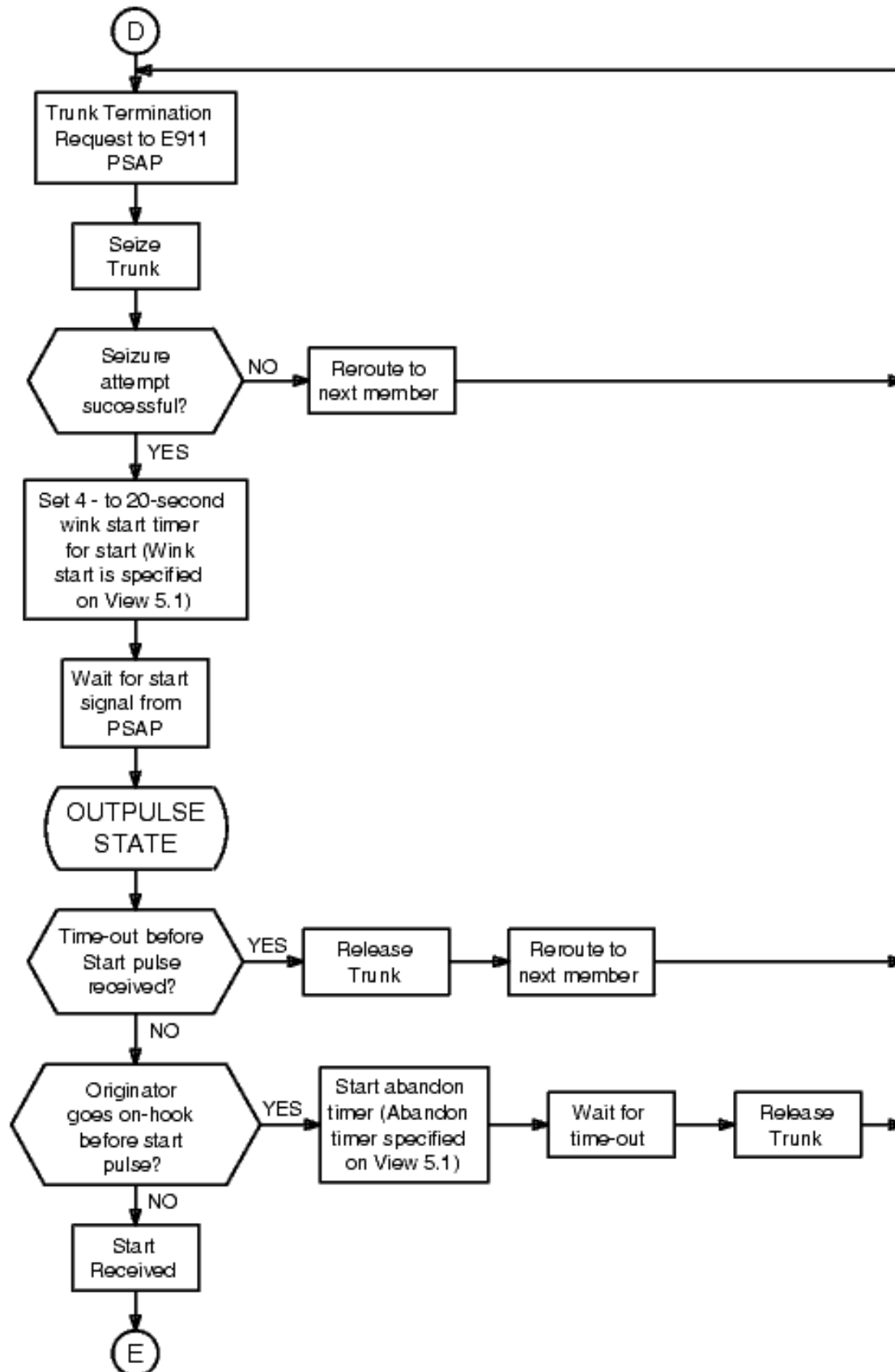
A feature call processing flow diagram giving the functional operation of the E911 feature is shown in Figure 9-6 .

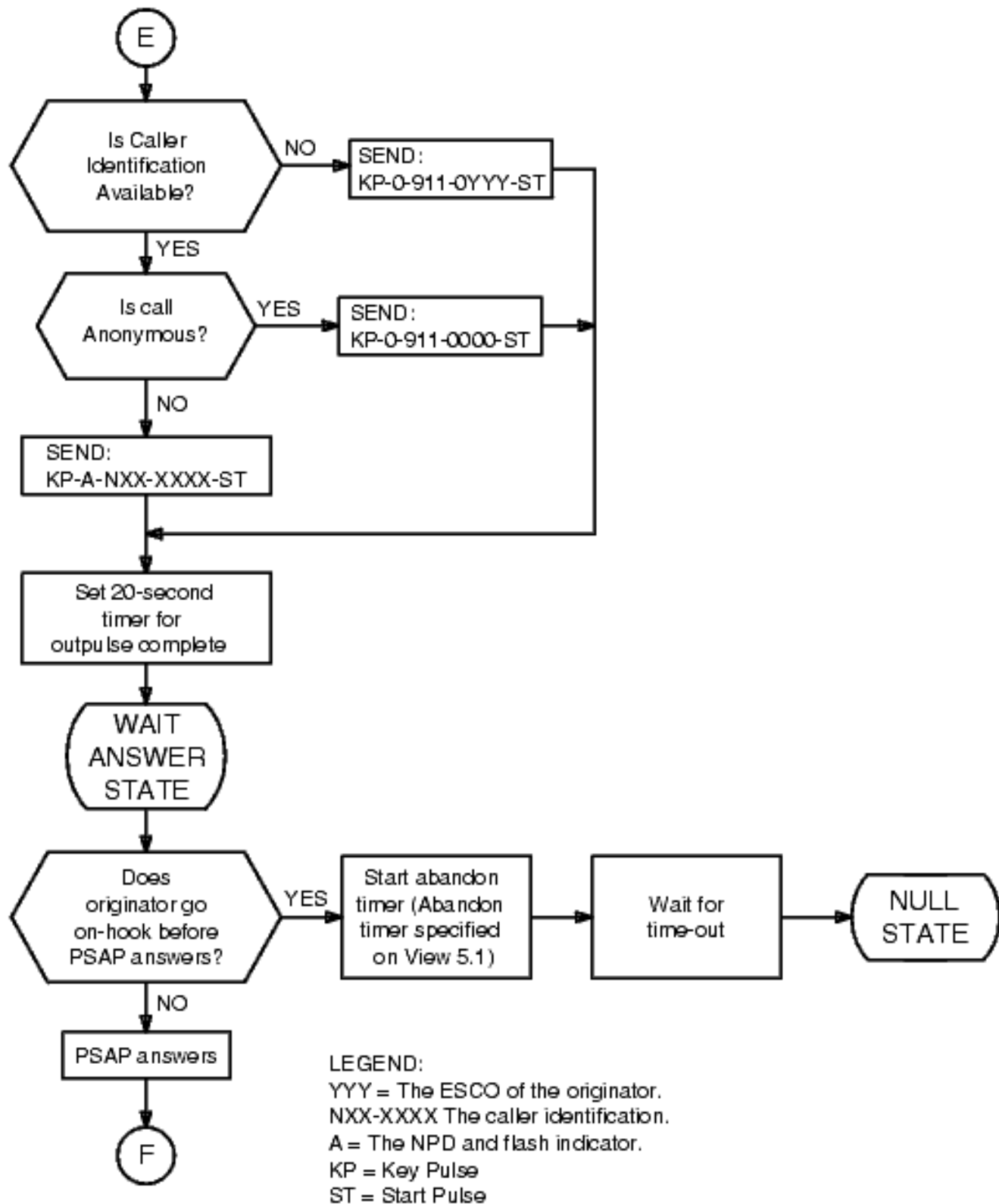


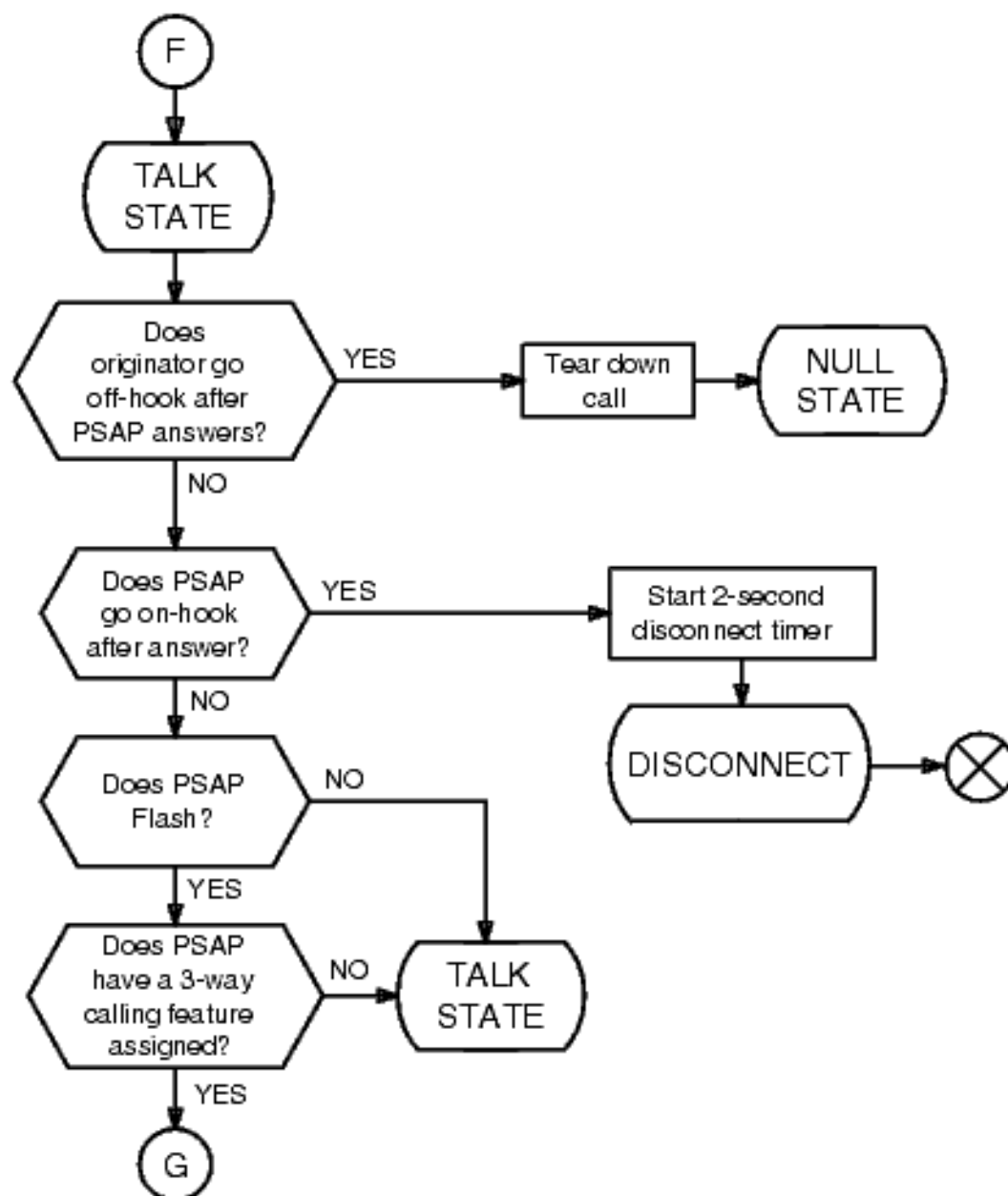


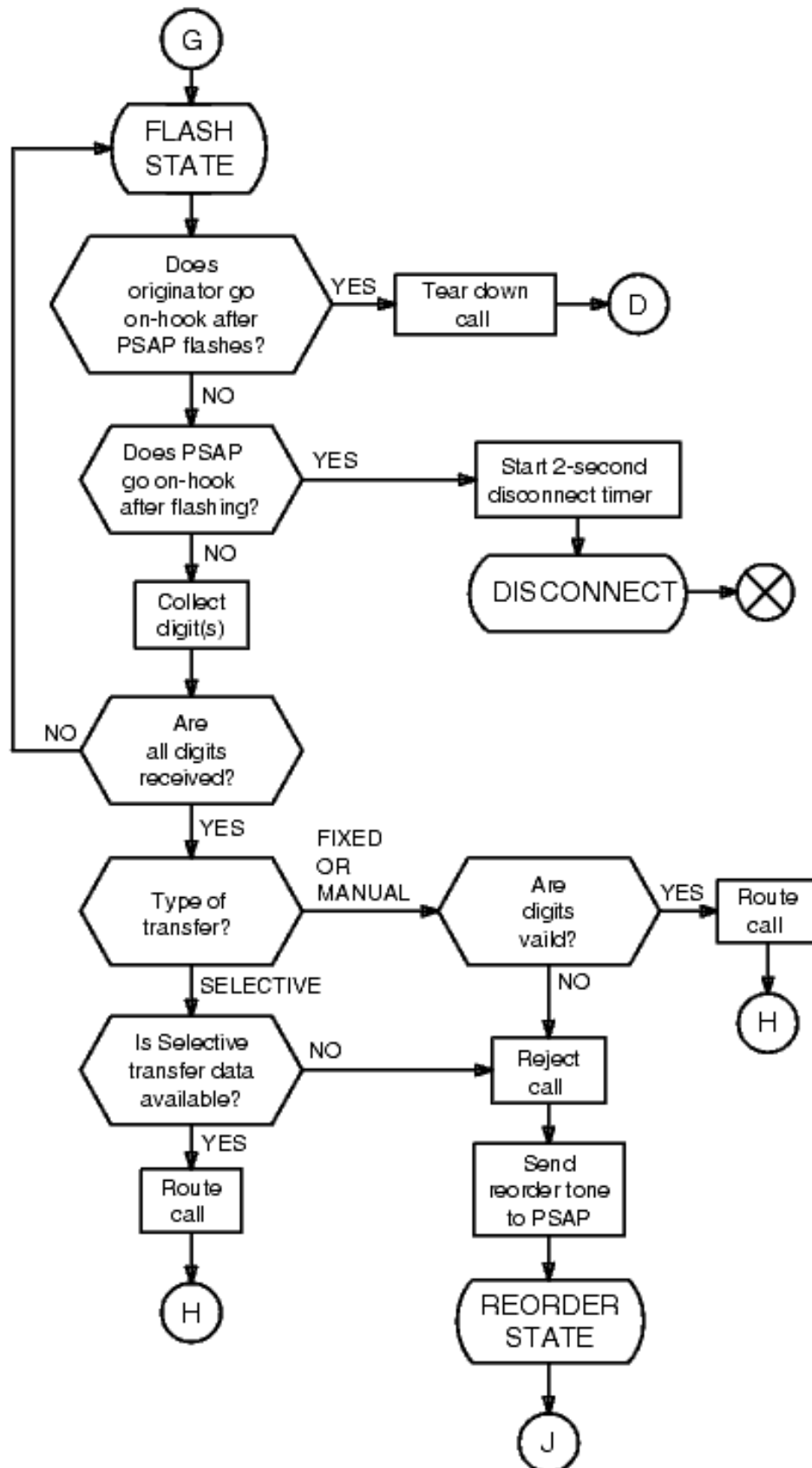


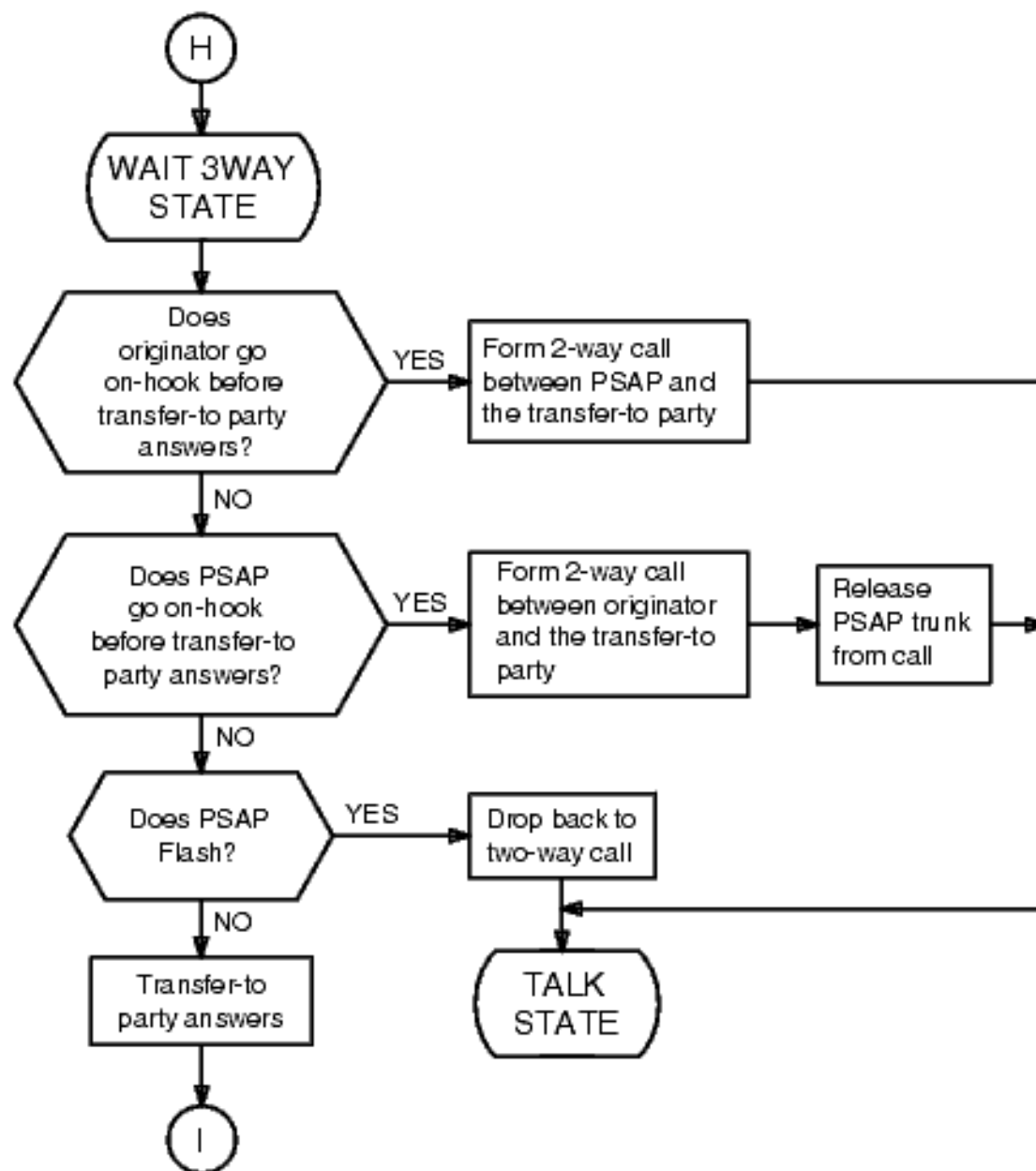


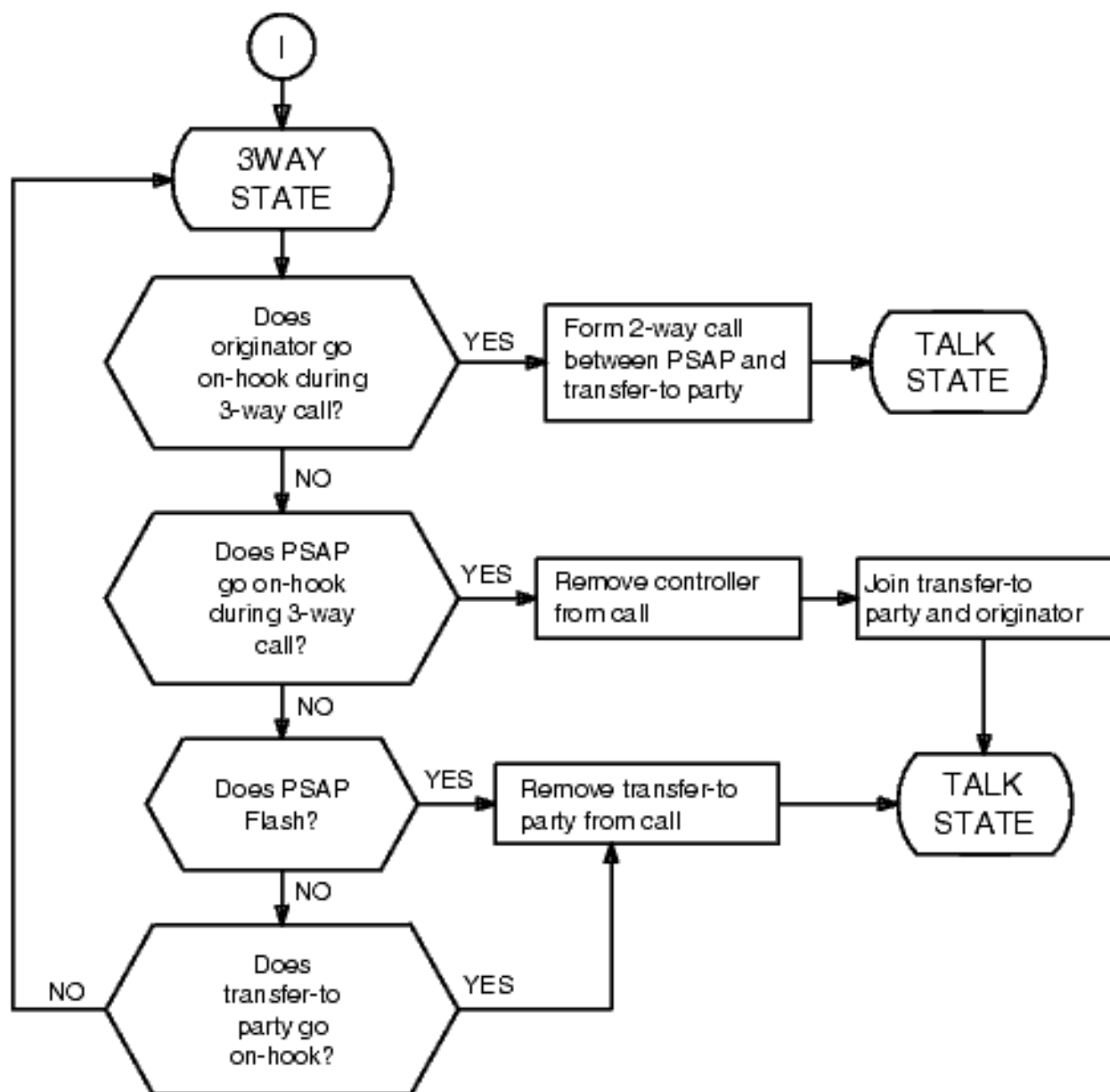












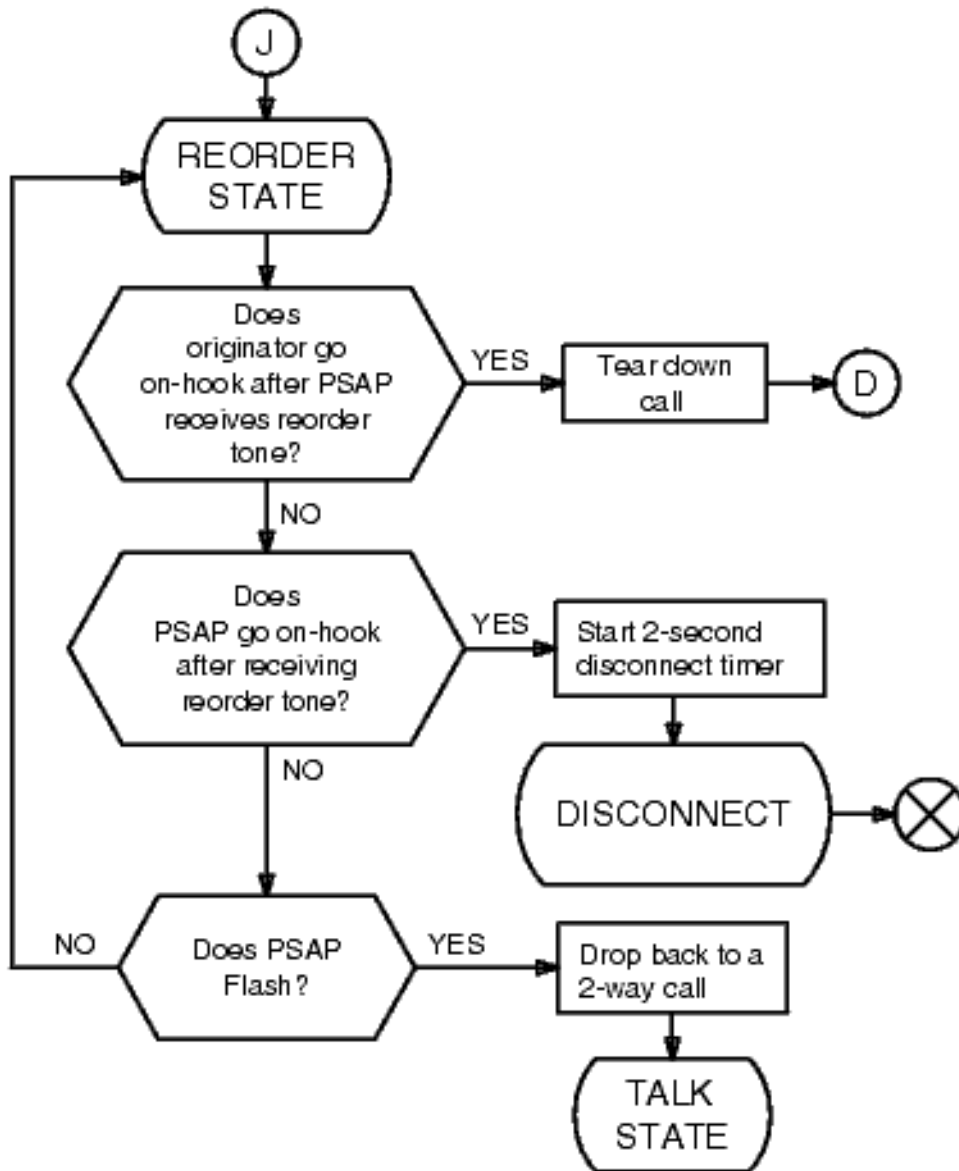


Figure 9-6 Enhanced 911 Emergency Service Feature Call Processing Flow Diagram

9.2.17 Administration

9.2.17.1 Measurements

The following sections describe all the measurements performed for the E911 feature. All the E911 measurements are generated only by the 5ESS® switch.

9.2.17.2 Traffic Measurements

The 5ESS® switch provides standard (dedicated) trunk group measurements and office measurements for E911 service. The trunk group measurements are reported on a per-trunk group basis, and the office measurements are reported on a per-office basis. In addition, the 5ESS® switch provides E911 measurements for nondedicated SFGs on a per-office basis. Measurements specific to the ESA are also provided on a per-office basis. The following sections describe the E911 measurement specifications.

9.2.17.2.1 E911 Standard Trunk Group Measurements

The existing standard trunk group measurements are used for the dedicated trunk groups using E911 service, these measurements are described in 235-070-100, Appendix 1, *5ESS® Switch Administration And Engineering Guidelines — Appendix 1, Traffic and Plant Measurements*, Section 12 of the 30-Minute Traffic Report. Peg and usage measurements are generated for each dedicated E911 incoming trunk group on a per-trunk group basis. Peg, usage, and overflow counts are generated for each E911 outgoing trunk group on a per-trunk group basis.

9.2.17.2.2 E911 Office Measurements

Twelve office measurement counts for E911 are generated in the SM. One office measurement count is generated in the CMP and SM (the invalid ESA message count). These office measurement counts are collected and reported on the 30-Minute Traffic Report. See 235-070-100, Appendix 1, *5ESS® Switch Administration And Engineering Guidelines — Appendix 1, Traffic and Plant Measurements*, Section 148 of the 30-Minute Traffic report for the E911 measurements.

The E911 measurements indicate various types of ANI failures on E911 incoming dedicated and nondedicated trunks. Section 148 of the 30-Minute Traffic Report also includes measurements specific to the ESA. The per-office measurements are detailed in the following sections.

9.2.17.2.2.1 Intraswitch

The following are the intraswitch measurements:

- E911 intraoffice peg count - the number of E911 calls that are originated locally at the E911 office.
- E911 intraoffice overflow - the number of local E911 calls that were blocked because the maximum number of local originations (choke count) has been exceeded (no SFG available).

9.2.17.2.2.2 Interswitch for Both Dedicated and Nondedicated Trunks

The following are the dedicated and nondedicated trunk interswitch measurements:

- E911 ANI failure digit peg count - the number of calls in which the ANI information digit is received indicating an ANI failure (CAMA trunks only). For CAMA originations, the I digit has a value of 2 for ANI failures.
- E911 ANI time-out peg count for dedicated trunks - the number of calls in which time-out occurs before the reception of complete ANI information (CAMA trunks only). For example, ANI digit collection times out before an ST digit is received.
- E911 ANI format failure peg count for dedicated trunks - the number of calls in which the received ANI information does not satisfy ANI format requirements. For CAMA trunks, this implies that an incorrect number of digits were received between the KP and ST digits. For Common Channel Signaling (CCS) originations, no CHG or CPN parameters were populated in the incoming Initial Address Message.

9.2.17.2.2.3 Interswitch for Nondedicated Trunks Only

The following are the nondedicated trunk interswitch measurements:

- E911 peg count for nondedicated trunks - the number of E911 calls that are originated at the E911 office over a nondedicated trunk.

- E911 interoffice overflow - the number of E911 calls originated at the E911 office over a nondedicated trunk that have been blocked because the maximum number of nondedicated trunk originations (choke count) has been exceeded (no SFG available).

9.2.17.2.2.4 E911 Service Adjunct

The following are measurements that are specific to the E911 Service Adjunct (ESA) for the E911 feature. These measurements are generated by the 5ESS[®] switch in the communication module processor (CMP). The ESA invalid ESN failure, ESA time-out, and ESA invalid data measurements are only pegged for the ESA-equipped configuration.

- ESA query sent peg count - the number of E911 query messages that have been sent to the ESA for E911 call originations. The E911 test query messages are not included in this count.
- ESA invalid ESN failure peg count - the number of E911 response messages received from the ESA with the *validity code* parameter set to "INVALID ESN."
- ESA time-out peg count - the number of time-outs while waiting for a response from the ESA for an E911 call origination (1.5 seconds).
- ESA invalid data peg count - the number of E911 response messages received from the ESA with the *validity code* parameter set to any value other than "OK" or "INVALID ESN."
- Invalid ESA message received peg count - the number of messages that the switch receives from the ESA with an incorrect message type, which are unexpected, or are malformed.
- E911 default routing peg count - the number of calls that are default routed. For the "ESA" configuration, this count reflects calls that use the default ESN for routing when the ESA does not respond. Stand-alone routing does apply to this count. For the "NON-ESA" switch configuration, this count is not used.

9.2.17.3 Plant Measurements

There are no new hardware or changes to existing 5ESS[®] switch hardware; the existing plant measurements can be used.

9.2.18 Maintenance

9.2.18.1 E911 Test Calls

Existing 5ESS[®] switch maintenance functionality is supported for the E911 feature. Test calls made are similar to the 1A ESSTM test calls, incoming and outgoing test calls may be made to verify the E911 trunks from local offices to the E911 serving office and to verify the E911 trunks from the serving office to the PSAPs. For the Permanent Busy test, the test pattern of KP-8-ST is outputted to the PSAP.

NOTE: Other tests appear to the PSAP as a seizure.

9.2.18.2 E911 Test Query and API Link

Existing maintenance capabilities for API facilities also apply to the E911 feature. See Section 9.2.16.13.1 for details of the E911 Test Query capability.

9.2.18.3 Notifications and Alarms

The following Notifications and Alarms are specific for the E911 feature.

9.2.18.3.1 E911 Machine-Detected Interoffice Irregularities

The following MDII messages are specific to the E911 feature:

- E911 — Counts: TGMDINC, INCST, INMDII

Description: E911 dedicated trunk call collision occurred for the following condition: A non-E911 call has attempted to terminate to an E911 dedicated facility. This is the result of the incoming digits translating to an incorrect destination type.

- E9ANF — Counts: TGMDINC, INCST, INMDII

Description: Automatic number identification failure reported under one or more of the following conditions: During ANI digit collection and analysis for an E911 call, the "I" (information) digit within the ANI digit sequence received from the far-end indicated an identification failure (I = 2 or I = 5) in the originating end office. In this case, operator identification of the calling number was required.

- E9ANI — Counts: TGMDINC, INCST, INMDII

Description: Automatic number identification failure during ISUP signaling because of the charge parameter digit count not equaling 10 for a CCS7 dedicated E911 trunk; or Automatic number identification failure detected on an E911 call over a trunk using CAMA-ANI signaling protocol occurred for one of the following conditions:

- (1) Too many digits were received.
- (2) Extra pulse detected.
- (3) No I digit present.
- (4) Digit count less than 10
- (5) No CHG parameter available on dedicated E911 ISUP trunk.

- E9ATO — Counts: INMDII, INCST, TGMDINC

Description: E911 ANI Time-Out - For E911 calls over a trunk that uses CAMA-ANI like signaling protocol, E9ATO MDII occurs for one of the following reasons:

- (1) Time-out occurred while waiting for an ANI digit during ANI collection.
- (2) Missing ST.

- E9KPST — Counts: TGMDINC, INCST, INMDII

Description: Automatic number identification failure reported under the following condition:

- (1) An extra KP digit detected.
- (2) No KP sent.

- E9MTD — Counts: TGMDINC, INCST, INMDII

Description: Mutilated digit-reported under the following condition: For an incoming call over an E911 trunk that uses CAMA-ANI address signaling, an invalid tone combination was detected during digit collection.

9.2.18.3.2 E911 Asserts

Assert descriptions based on the assert number or the assert mnemonic code are provided in 235-600-500, *5ESS® Switch Asserts Manual*.

9.2.18.3.3 E911 Link Alarms

E911 AP (ESA) link alarms are reported using the existing AP link alarm mechanism, though E911 AP link alarms are elevated one level higher than non-E911 AP link alarms (that is, MINOR and MAJOR alarms are used for non-E911 AP links, whereas MAJOR and CRITICAL alarms are used for the E911 AP links). Alarm status for an SM that hosts the AP links is reported using the SM status phrase (displayed on all SM related MCC pages) and reflects the combined status of all AP links hosted by the SM. The combined status is determined by first analyzing the status of each site, and then reporting the most severe status. The following rules apply when determining site status:

NOTE: If an E911 SM status phrase has lower priority than another, simultaneously active SM alarm, the E911 SM phrase can be masked.

- Alarm reporting is enabled/disabled on a per AP site basis using RC View 24.7. When alarm reporting is disabled for a given site, the status of the links associated with that site is ignored, and is not included in the combined SM status.
- If all links for a given site are OOS, and the AP is an E911 AP, the status of the site is E911_CRIT.
- If all links for a given site are OOS, and the AP is not an E911 AP, the status of the site is DSL_MAJOR.
- If at least one of the links for a given site are OOS, and the AP is an E911 AP, the status of the site is DSL_MAJOR.
- If at least one of the links for a given site are OOS, and the AP is not an E911 AP, the status of the site is DSL_MINOR.
- If all the links for a given AP are in-service (IS), then the status of the sites is normal.

The SM status always represents the most severe alarm status of the AP sites (which have alarm reporting allowed) which are hosted by the SM:

- An E911_CRIT status is reported when a E911_CRIT and a DSL_MAJOR and/or DSL_MINOR condition exist.
- A DSL_MAJOR status is reported when a DSL_MAJOR and a DSL_MINOR condition exist.
- A DSL_MINOR status is reported when a DSL_MINOR condition exists.

9.2.18.3.4 REPT:E911 Output Message

When an E911-related assert or MDII occurs, the REPT:E911 Output Message is sent to indicate that an E911 error has occurred; check the output at the receive-only printer (ROP) for additional details. The REPT:E911 is associated with a minor alarm, and provides additional information depending on whether an MDII or assert message is expected at the ROP.

9.3 DUAL EMERGENCY SERVICES ADJUNCT (ESA) FOR E911

9.3.1 Definition

The Dual Emergency Services Adjunct (ESA) for E911 feature improves the reliability of E911 service by allowing the use of a second pair of E911 AP links to a backup or secondary ESA. The secondary link pair need not be on the same ISDN switching module (SM) as the primary pair. If communication with the primary ESA fails, the 5ESS[®] switch will attempt to communicate with the secondary ESA via the second AP link pair. This prevents a failure with a single ESA (or its AP link pair) from interrupting E911 selective routing.

Although there are no explicit requirements to have the two sets of AP links connected to two physically different ISDN SM it is recommended that this be done whenever possible. This could help to increase the reliability of the links to the ESA(s).

The RC/V allows the backup ESA and backup ESA links to be defined, and the AP Communications Package residing on the 5ESS[®] switch route messages to the backup ESA when the primary ESA is unavailable. For 5E9(1), the TST:E911 message accepts a new parameter to send test queries to the backup ESA instead of the primary.

9.3.2 Cross-References

The following cross-references are applicable to the Dual ESA for E911 feature:

- Feature number: 99-5E-1401
- NSEP/5SEP code: Not available.

9.3.3 Availability

This is a secured restricted feature available with the 5E8 software update and later software releases. Contact your Lucent Technologies Account Representative for ordering information and Right-to-Use (RTU) fee associated with this feature.

9.3.4 Feature Application

This feature is provided on a per-office (switch) basis.

9.3.5 User Perspective

When the feature is active in an office, E911 query messages will be sent to the primary ESA if it is available; otherwise, the backup ESA will be used. The only change for E911 calls will be the availability of selective routing when the primary ESA is not communicating with the 5ESS[®] switch. The backup ESA handles the query, and default routing is not needed. If both ESAs are not communicating, then default routing is used.

9.3.6 User Operation

9.3.6.1 End-User

This feature is transparent to the end-user.

9.3.6.2 Activation

The following steps need to be done to use Dual ESA for E911 (assuming the E911 feature is set up and active):

- (1) Connect the primary ESA to the 5ESS[®] switch.

- (2) Define the primary ESA applications processor identification (APID) on the 5ESS[®] switch. Using RC/V View 24.7, insert a tuple keyed by the site identifier assigned to the primary ESA. For 5E8(1), set PRIM E911 SITE to "Y." For 5E9(1), set E911 SITE to "P."
- (3) Activate Dual ESA for E911 activating SFID 108 on RC/V View 8.22.
- (4) Connect the backup ESA to the 5ESS[®] switch.
- (5) Define the backup ESA APID on the 5ESS[®] switch. Using RC/V View 24.7, insert a tuple keyed by the site identifier assigned to the backup ESA. For 5E8(1), set SEC E911 SITE to "Y." For 5E9(1), set E911 SITE to "S."

Also, in 5E9(1), the TST:E911 message accepts a new parameter. The alternate-routed traffic (ALT) parameter is used to send test queries to the backup ESA. Test query messages will not use alternate routing if the alternate site ID is specified. For example, if the TST:E911 message is entered with the ALT parameter [or with the SITE parameter in 5E8 and 5E9(1)] and the backup ESA is not communicating with the 5ESS[®] switch, then the query will fail. The primary ESA will not be used.

9.3.7 Interactions

This feature has interactions with the E911 feature, as it impacts the way E911 messages are routed to the ESA(s).

This feature also has interactions with the AP Link Diversification special feature, as it removes RC/V checks that prevent E911 APIDs from having secondary APIDs.

9.3.8 Engineering - Hardware

To use this feature, AP data links must be added to the same or a second SM on the same 5ESS[®] switch. The procedures for installing and growing secondary AP data links are the same as those for adding primary AP data links.

9.3.9 Assignment Dependencies And Limitations

The E911 feature must be set up and active.

9.3.10 Recent Change

The RC/V View 24.7 has two 5E8 fields combined into one 5E9(1) field. The two 5E8 fields are booleans: one is "Y" if the APID is for the primary E911 ESA; the other is "Y" if the APID is for the backup E911 ESA. The new field will take three values: "P" if the APID is for the primary E911 ESA; "S" if the APID is for the backup E911 ESA, and "N" if it is for neither the primary nor backup E911 ESA.

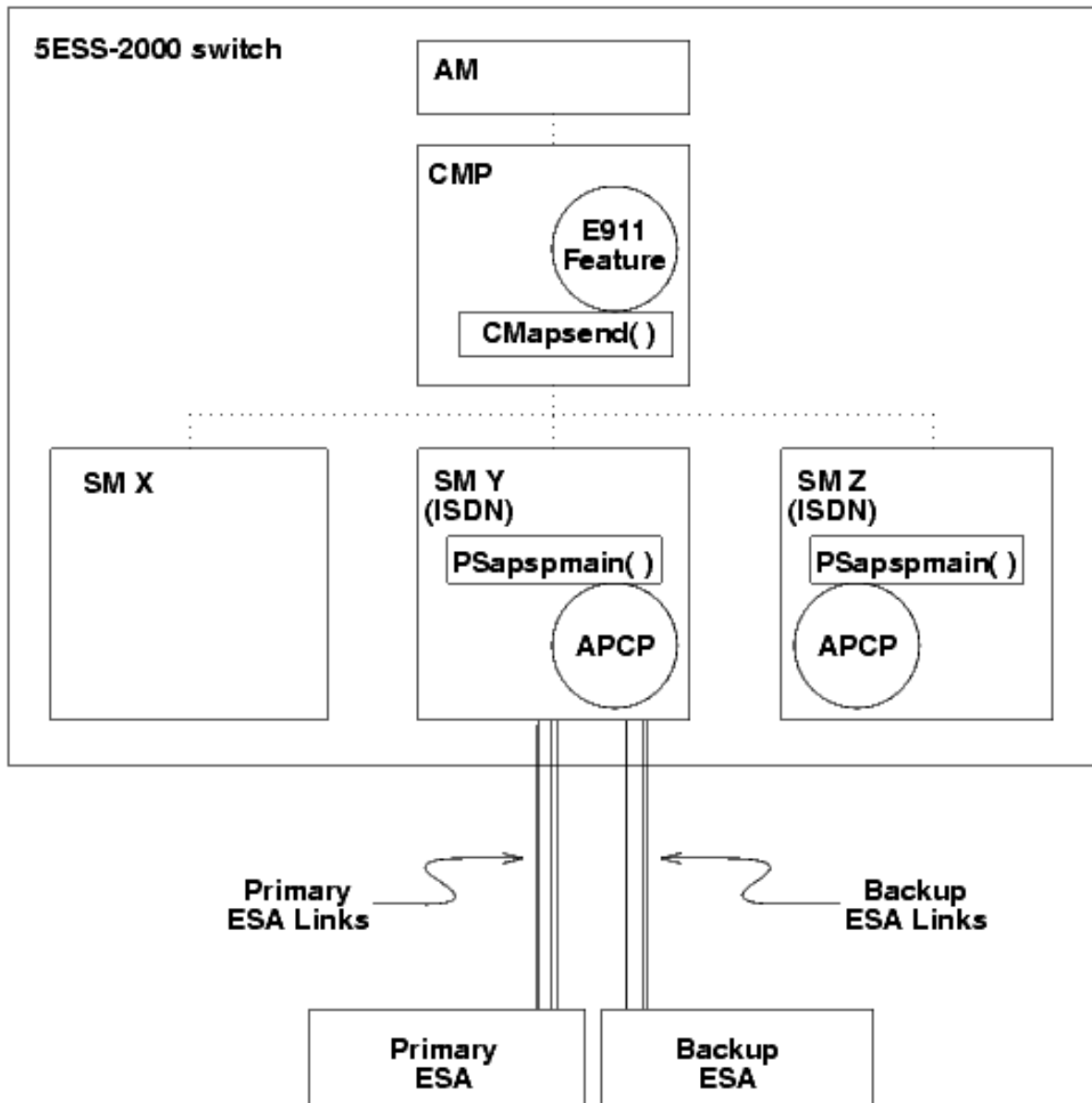
Switch personnel activate the Dual Emergency Services Adjunct (ESA) for E911 feature by activating SFID 108 on RC/V View 8.22

Refer to 235-118-2xx, 5ESS[®] Switch Recent Change Procedures and 235-118-2xx, 5ESS[®] Switch Recent Change Reference for more information.

9.3.11 Feature Operation

Figure 9-7 shows the setup allowed with Dual ESA for E911. (Note: The ESAs are not confined to being connected to the same SM.) Without this feature, only the primary ESA would be allowed to be connected to the 5ESS[®] switch.

The backup ESA could be connected, but the 5ESS® switch would not recognize it as an ESA - the craft personnel would have to remove the primary ESA from service and make the backup ESA the primary ESA using RC/V. With Dual ESA for E911, the 5ESS® switch will recognize both ESAs and automatically route messages to the backup ESA when the primary is unavailable.



NOTE: The ESAs are not confined to being connected to the same SM. The primary ESA could be connected to SM Y and the backup ESA to SM Z.

Figure 9-7 Dual ESA for E911 Configuration

The backup ESA is defined on RC/V View 24.7. A new field was added (SEC E911 SITE) and is set to "Y" if the APID is for the backup ESA. The existing field (E911 SITE) was renamed (PRIM E911 SITE) and is set to "Y" if the APID is for the primary ESA. An APID cannot be both a primary and secondary E911 site, and only one primary E911 site and one secondary E911 site are allowed.

The RC/V View 8.1 has a new review-only field to display the value of the secondary E911 APID. The RC/V Views 3.5, 4.38, 4.47, 4.62, 8.1, 24.2, 24.3, 24.4, 24.5, and 24.33 have checks added that prevent existing AP site identifier fields from using a secondary E911 APID.

In 5E9(1), the TST:E911 input/output message has a new optional parameter added (ALT). If this new parameter is present, the test query message will be routed to the backup ESA instead of the primary.

9.3.12 Administration - Input/Output Messages

This section describes the IM/OM manual page updates for the TST:E911 command. For more information refer to the 235-600-700 *5ESS® Switch Input Messages Manual*, and 235-600-750 *5ESS® Switch Output Message Manual*.

9.4 DUAL EMERGENCY SERVICES ADJUNCT ENHANCEMENTS

9.4.1 Overview

9.4.1.1 Description

The 5ESS® switch utilizes emergency service adjuncts (ESA) for selective routing of E911 calls to the public safety answering point (PSAP) serving the originating station. Each ESA interfaces to a 5ESS® switch via a pair of applications processor (AP) 0B + D basic rate interface (BRI) data links to provide redundancy if a communications link failure should occur.

The Dual ESA Enhancements feature (number 99-5E-1626) is an extension of the Dual ESA for E911 feature, developed in a previous software release. (See "Background," Section 9.4.1.2 .) It adds the ability to switch the active ESA (where E911 queries are directed) based on:

- the relative health of the two ESAs
- the status of the communications links
- a predetermined time
- a manual ESA switch request

The Dual ESA Enhancements feature is operational in both analog and digital environments.

The Dual ESA Enhancements feature is a special secured feature (SFID=141) requiring that necessary arrangements be made between the service provider and Lucent Technologies. These arrangements include paying a right-to-use (RTU) fee before Lucent Technologies provides enabling information.

9.4.1.2 Background

In the 5E8 software release, the Dual ESA for E911 feature was introduced. That feature allowed a second pair of E911 AP data links to be connected to another ESA. The two ESAs were designated as *primary* and *secondary* in the office database and if both primary links went out of service, 911 calls were automatically routed to the secondary ESA until one of the primary links came back into service.

9.4.1.3 Availability

The Dual ESA Enhancements feature is available as a software update for the 5E9(1) software release and is targeted for deployment in the 5E9(2) software release.

9.4.1.4 Feature Environment

The Dual ESA Enhancements feature is provided on a per-office (switch) basis.

9.4.2 Feature Operation

The Dual ESA Enhancements feature introduces the concept of *active* and *inactive* ESAs. When the feature is first activated, the *health status* for both ESAs is "UNKNOWN" and the primary ESA is marked as *active*. The primary ESA is initially considered to be the *healthier* of the two ESAs and is allowed to process queries.

When the switch receives a health message from one of the ESAs, it replaces that ESA's health status with the new value if the original value has changed. To determine which ESA is actually healthier, a comparison of health status is taken.

If the active ESA has a health status that indicates it is less healthy than the inactive ESA, the active and inactive designations are switched automatically. An ESA's health status is defined in terms of six alarm levels similar to the 5ESS[®] switch hardware. (See "Maintenance Considerations," Section 9.4.8 , for detailed descriptions of the various alarms.) The Dual ESA Enhancements feature provides three ways to change the status of the ESAs:

- (1) **Automated Health-Based Switch** - Each ESA sends its current health status to the 5ESS[®] switch every two minutes or whenever its health changes. The relative health of the two ESAs is compared by the 5ESS[®] switch which automatically directs E911 queries to the *healthier* processor regardless of the primary/secondary designation.
- (2) **Automated Time-Based Switch** - If both ESAs are equally healthy, the active ESA (the ESA currently selected by the switch to receive queries) can be automatically switched to inactive status, and the inactive ESA to active status, at a customer-specified time (activated by Recent Change).
- (3) **Manual Switch** - An ESA can be manually switched from active to inactive using manual input commands with the following conditions:

for a non-forced switch - the ESAs must be equally healthy

for a forced switch - the ESAs do not have to be equally healthy

9.4.3 User Operation

9.4.3.1 For Subscribers

This feature is transparent to subscribers.

9.4.3.2 For Switch Personnel

Although there are no alarm messages [or read-only-printer (ROP) messages] to show that feature activation/deactivation has occurred, ESA health status messages will help switch personnel oversee the operation of this feature. Service provider switch personnel implement the Dual ESA Enhancements feature using Recent Change procedures. (See "Recent Change Provisioning", Section 9.4.7.2 , for detailed procedures.)

Switch personnel oversee the operation of this feature by observing alarm conditions and taking appropriate action, when possible, to correct problems. (See "Maintenance Considerations," Section 9.4.8 , for details on alarm levels and input/output messages.) Most actions, based on the information provided by the six alarm levels, are automatic and require no manual intervention. Those that do are outlined in the scenarios described in "Scenario 1: Manual Switch Request," Section 9.4.3.2.1 , and "Scenario 2: Forced Switch," 9.4.3.2.2 .

9.4.3.2.1 Scenario 1: Manual Switch Request

In this scenario the forced active state is assumed *not* to be in effect.

Switch personnel may request a conditional switch of ESA designations via a new 5ESS[®] switch manual switch input message. Typically, the switch personnel first use the new status query input message defined by this feature to determine which ESA is active; status information is displayed on the maintenance control center (MCC) display.

If the switch personnel still wish to perform the conditional switch, they will apply the new switch request message, specifying which ESA is to be active by applications processor identification (APID).

If that ESA is currently inactive and its health status is equal to that of the active ESA, the switch occurs and an unalarmed output message informs the switch personnel that a switch occurred.

If the health of the currently inactive ESA is worse than that of the active ESA, the switch request is rejected and the switch personnel are informed of the denial. In that case a forced switch is required to change designations.

If the ESA specified by the switch personnel is already active, no switch occurs and the switch personnel are notified by an unalarmed output message of the reason. Automatic health-based and time-based switching are not affected.

9.4.3.2.2 Scenario 2: Forced Switch

Switch personnel may initiate a forced switch by entering the new input message for the forced switch. The active and inactive designations are exchanged regardless of the health status of the two ESAs. The switch personnel receive an unalarmed output message noting the switch and indicating that the new active ESA is in the forced active state. *Optionally*, at the customer's switching control center (SCC), a critical indicator lamp controlled by the customer's total network management (TNM) system notifies switch personnel that the forced active state is in effect. All switching is inhibited until the forced active state is manually removed.

The ESA remains in the forced active state until the condition is manually removed by the switch personnel. To eliminate the force, the switch personnel enters another 5ESS[®] switch input message that clears the forced active state and re-enables the automated switch capabilities. An unalarmed switch personnel output message verifies the removal of the forced active condition. If, after the force is removed, the inactive ESA is healthier than the active ESA, a designation switch occurs and the switch personnel receives an unalarmed output message noting the switch.

9.4.4 Engineering

9.4.4.1 Hardware Resources

No hardware considerations are associated with this feature.

9.4.4.2 Software Resources

No software considerations are associated with this feature.

9.4.4.3 Transition Considerations

There are no transition considerations associated with this feature.

9.4.5 Interactions And Incompatibilities

9.4.5.1 Interactions

There are no interactions associated with this feature.

9.4.5.2 Incompatibilities

There are no incompatibilities associated with this feature.

9.4.6 Dependencies And Limitations

9.4.6.1 Dependencies

The Dual ESA for E911 feature (number 99-5E-0166) (SFID=108) must be operational on the 5ESS[®] switch before the Dual ESA Enhancements feature can be activated.

9.4.6.2 Limitations

The 5ESS[®] switch read-only-printer (ROP) messages generated by this feature may be lost or out of order due to existing brevity and throttle controls imposed by the switch. ROP messages may not be a reliable source of information for monitoring applications such as a total network management (TNM) system.

9.4.6.3 Isolation Constraints

Not applicable.

9.4.7 Feature Implementation

9.4.7.1 Office Data Administration Provisioning

ODA form 5509 (ofcpt) should reflect the state of the *automated time-based switch* option. Field "ESA TIMER" should indicate the hour of the day (1-24) that automated time-based switching occurs. If set to "0", automated time-based switching is not active.

Refer to 235-080-100, 5ESS[®] *Switch Translations Guide (TG-5)* for details on translations forms.

9.4.7.2 Recent Change Provisioning

Enable the Dual ESA Enhancements feature using RC/V View 8.22. Previous arrangements must have been made between the service provider and Lucent Technologies for enabling information.

Because it directly interacts with the Dual ESA Enhancements feature, RC/V view 24.7 (DSL AP COMMUNICATIONS DATA) is used to define primary and secondary ESAs. Existing restrictions require that a primary ESA exist before a secondary ESA can be defined and correspondingly, that *no* secondary ESA exist before a primary ESA can be removed. Recent Change does not allow the deletion of a primary ESA that has a secondary assigned; this must be resolved by removing the secondary ESA before a primary ESA can be removed. New ESAs can be added using this view, but the assignment of primary/secondary status is influenced by this cross-check.

Following these rules, the **PRIM E911 SITE** field that defines the *primary* ESA and the **SEC E911 SITE** field that defines the *secondary* ESA have allowable values of Y[ES] or N[O].

RC/V view 8.1 (OFFICE PARAMETERS (MISCELLANEOUS)) is used to activate the *automated time-based switch*. (The *field number* will be different between software releases 5E9(1) and 5E9(2) but because of changing requirements can not be identified in this document.) Using RC/V view 8.1, set the **ESA SW TIME** field to a value of 1 to 24, inclusive. 1 - 24 corresponds to the 24 hour clock and indicates the hour of the day automated time-based switching occurs. If the value is set to "0" (the default), automated time-based switching is *not* active.

9.4.7.3 Customer Premises Equipment

Not applicable.

9.4.8 Maintenance Considerations

Six alarm levels indicate the status and health of the ESAs:

- **COMM LOST** - This state, determined by the 5ESS[®] switch, indicates that the switch cannot transmit queries to the ESA.
- **UNKNOWN** - This state indicates that the 5ESS[®] switch cannot determine the health status of the ESA. This is typically a transient state between the time a communication module processor (CMP) initialization takes place and the processing of the next health message from the ESA. A health status can also be set to **UNKNOWN** if the ESA has just been removed from the **COMM LOST** state or if an invalid health status is received from the ESA.
- **CRITICAL** - This state indicates that the ESA can communicate with the 5ESS[®] switch, but a failure has been detected that severely impacts the ESA's ability to process queries.
- **MAJOR** - This state indicates that the ESA has detected a failure in a major hardware subsystem or ESA software process. The ESA can process queries, but the switch personnel should be aware of the existence of a serious problem.
- **MINOR** - This state indicates that the ESA has detected a problem in a minor or non-service affecting area. The ESA can process queries normally.
- **NORMAL** - This state indicates that the ESA has reported no hardware or software problems.

Four new manual operations have been introduced with the Dual ESA Enhancements feature and are initiated by four new input messages:

- Conditional switch: *SET:ESA,ACTIVE=apid*
- Forced switch: *SET:ESA,ACTIVE=apid,FRC*
- Clear the force and restore normal operation: *CLR:ESA,FRC*
- Status query: *OP:ESA,STATUS*

Refer to 235-600-700, 5ESS[®] Switch Input Messages and 235-600-750, 5ESS[®] Switch Output Messages for details on these messages and the resulting output.

If the ESA's health status changes, the switch personnel receive an alarmed output message acknowledging the change. This message contains the application processor identification (APID), current state (ACTIVE, INACTIVE, or FORCED), and health value for both ESAs. The alarm level of the message corresponds to the new health status of the ESA whose health status changed as shown in the following table.

HEALTH VALUE	ALARM LEVEL
NORMAL	Automatic
MINOR	Minor
MAJOR	Major
CRITICAL	Critical
UNKNOWN	Critical
COMM LOST	Critical

If a switch has occurred, the message also indicates the change of active and inactive designations. The 5ESS[®]

switch will set an ESA's health to COMM LOST when the switch is unable to send queries to that ESA. This can happen if the communication links fail or if the switch module (SM) connecting the ESA to the switch is abnormal. The health status will be set to UNKNOWN under the following conditions:

- when the ESA is coming out of the COMM LOST state,
- on initialization,
- if the switch receives a health message containing an invalid health value,
- or if the stored health values are corrupted.

For all of these conditions, an output message with alarm level set to CRITICAL is generated.

When an ESA is inserted or deleted, an alarmed output message will be printed. This message will contain the APID, current state (ACTIVE, INACTIVE, or FORCED), and health value for any ESAs defined in the ODD. The health status of an inserted ESA is set to UNKNOWN and the alarm level of the message becomes CRITICAL.

9.4.9 Administration

9.4.9.1 Measurements

This feature does not introduce any new measurements.

9.4.9.2 Billing

This feature does not impact billing.

9.5 ISDN PUBLIC SAFETY ANSWERING POINT SUPPORT

9.5.1 General

9.5.1.1 Definition

Integrated Services Digital Network (ISDN) Public Safety Answering Point (PSAP) Support (99-5E-1505) is a 5ESS[®] switch special feature that assigns an ISDN Basic Rate Interface (BRI) as a connection to an Enhanced 911 (E911) PSAP. Using this feature with a personal computer (PC) provides the functionality of Centralized Automatic Message Accounting (CAMA) PSAP.

The Calling Party Number (CPN) Delivery on E911 Calls feature (99-5E-2202) specifies that either the billing directory number (DN) or the calling party DN be used for the E911 Service Adjunct (ESA) query, PSAP display and Automatic Location Identification (ALI) look-up on a per office basis.

ISDN PSAP Support is a separate secured feature with a Special Feature ID (SFID) of 114. The CPN Delivery on E911 Calls secured feature is also a separate secured feature with an SFID of 116. The E911 feature (SFID=61) must be available and active before either of these features can be turned on.

9.5.1.2 Cross-References

The following cross-references are applicable to the ISDN PSAP Support Special feature:

- Integrated Services Digital Network (ISDN) Public Safety Answering Point (PSAP) Support feature number: 99-5E-1505

- Calling Party Number (CPN) Delivery on E911 Calls feature number: 99-5E-2202

9.5.1.3 Availability

The ISDN PSAP Support feature will be part of the 5E9(2) software release. It will also be available as a software update to the 5E8 and 5E9(1) software releases.

This feature is available only on Custom ISDN BRI.

9.5.1.4 Feature Application

This feature is provided on a per office basis.

9.5.2 User Perspective

9.5.2.1 User Profile

The customers who purchase 911 emergency service are local governments and municipalities. These geo-political jurisdictions may be operating under the guidance of a 911 task force, created by order of the state governor. The number of emergency public service agencies depends on the specific geographic area. Service users are the public agencies responsible for the administration of the local emergency bureaus and the 911 callers.

9.5.2.2 Customer Premises Equipment

The ISDN PSAP hardware consists of a PC or intelligent terminal connected to an 7506 or 7507 (or equivalent) phone via an RS-232D interface. The PC will abide by the protocol specified by the ISDN Asynchronous Data Module 2 Feature Package 3.2 Applications Processor Interface (API) over an RS-232D interface between the PC and the ISDN phone. The ISDN PSAP PC software is a separate deliverable.

Lucent Technologies offers the *Palladium*® Total Digital Public Safety Answering Point (TDP), which is an ISDN PSAP.

9.5.3 User Operation

9.5.3.1 General

The setting for this scenario is an ISDN PSAP receiving E911 calls from end offices as well as callers served by the E911 serving office. This PSAP coexists with CAMA PSAPs on the same switch.

The participants in this scenario are the "911 caller," the ISDN PSAP attendant and a CAMA PSAP attendant.

For this scenario, the "911 caller" is calling from an analog phone at an end office, the Primary PSAP attendant receiving the call has an ISDN 7506 phone with a PC, and the CAMA PSAP attendant receiving the transferred E911 call has display and control equipment connected to CAMA like trunks.

The ISDN PSAP attendant's terminal is a member of a MLHG and has a multiway feature with transfer capability.

Emergency E911 calls typically are routed to the Primary PSAP associated with the caller's phone number. If the caller requires the services of another PSAP (such as the fire department) the Primary PSAP attendant transfers the call using the selective transfer button for fire department.

To route an E911 call, the Customer Emergency Services Identification (CESID) used for the ESA query and subsequent ALI look-up is obtained as follows:

- For calls delivered over CAMA trunks, ANI is used as the CESID.
- For calls delivered over SS7 trunks or local lines:

If CPN Delivery on E911 Calls has been activated, the CESID is the calling party number or billing number, depending on the option set.

If CPN Delivery on E911 Calls has not been activated, the billing number is used as the CESID.

- For calls delivered over PRI trunks, the CESID depends on the option set for the trunk group—either calling party number or billing number.

Note: CPN delivery over CAMA trunks from an end office to an E911 serving switch is not supported. For an end office to take advantage of the CPN Delivery on E911 Calls, SS7 trunks must be used.

The following is a typical E911 call scenario:

- A caller from an end office dials 911 to report a fire.
- The call is routed to the E911 serving switch over a CAMA or SS7 trunk.
- The E911 serving switch determines that the call is an E911 call and launches a query with the CESID to the E911 Service Adjunct (ESA).
- The ESA returns the appropriate Emergency Service Number (ESN) based on the CESID.
- The switch retrieves the routing data associated with the ESN (Primary PSAP, a maximum of 2 alternate PSAPs, up to 6 selective transfer numbers, and a flash control indicator) and routes to the Primary PSAP. For this scenario, the Primary PSAP is an ISDN PSAP with a MLHG DN. The switch hunts and routes the call to member 3 of the MLHG and passes the CESID and the flash control information along with the call.
- The PC connected to the receiving attendant's phone launches a query to the ALI/DMS data base with the CESID.
- The ALI/DMS system returns Location information that the PC displays on the screen for the attendant to use as the attendant interrogates the caller (if the flash control information indicates, the CESID will be flashed on the screen).
- Once the attendant determines that the caller is reporting a fire, the attendant presses the appropriate selective transfer function key.
- The 5ESS[®] switch uses the selective transfer number for fire associated with the caller's ESN and sets up a 3-way call between that number and the "911 caller." The CESID along with the ESN data of the "911 caller" is passed to the fire department PSAP.
- When the fire department answers, the transferring PSAP may disconnect to complete the transfer.
- If the fire department is another ISDN or CAMA PSAP it can do another ALI/DMS look-up to get the caller's location.

9.5.3.2 Typical Error Scenario

"Default Routing" will be used under the following circumstances:

- CESID unavailable

- API link failure
- ESA failure or timeout
- invalid ESN returned by the ESA

An Emergency Service Central Office (ESCO) number is assignable to trunks which can originate 911 calls and to the dialing plan for lines. ESCO translation data determines whether selective routing will be done for that originator. If selective routing is not assigned or if it fails in some way, a default ESN associated with the ESCO is used. When Default Routing is used, the switch displays the message "DEFAULT ROUTED CALL" for the ISDN PSAP attendant.

9.5.3.3 Activation

9.5.3.3.1 Activating the Feature

Following the Secured Feature procedures to activate E911, perform Secured Feature procedures to activate the ISDN PSAP Support Feature. ISDN PSAPs cannot be defined unless the ISDN PSAP Support feature is unlocked.

If a Shared DN will be used for supervisory monitoring, perform Secured Feature procedures to activate Shared DN Bridging onto Conference feature. This feature allows a Shared DN member to bridge onto a conference as well as allowing multiple bridgers on a call. Without this feature, an attempt to create a conference would fail when a call is monitored on a shared call appearance.

9.5.3.3.2 Invoking the Feature

This feature is automatically invoked when activated.

9.5.3.4 Deactivation

The Service Provider can deactivate the ISDN PSAP feature on the 5ESS[®] switch by turning off the Special Feature ID number.

An ISDN User can be deactivated as an E911 PSAP on either RC View 23.2 DIGITAL SUBSCRIBER LINE or RC View 23.8 DSL/BRCS ASSIGNMENT by setting:

E911 PSAP = N

(For secondary PSAP DN, use RC/V View 23.20)

9.5.3.5 Restriction Capability

When E911 PSAP is Y, the following restrictions apply:

- (1) The user must have Circuit Switched Voice capabilities (CSV must be greater than 0).
- (2) The user cannot use Series Completion - to or from (SERHLN must be blank and BCKLNK must be N).
- (3) The user cannot have suspended origination (SUSO) or termination (SUST).
- (4) The user must be on a TYPEB or TYPED terminal (TERMTYP).
- (5) The user must be on a custom BRI (DSLCLS).
- (6) If the user is on a point-to-point DSL, an ACSR Group must not be specified to prevent "bumping" the ISDN PSAP into "limbo."

- (7) Global RC is not supported for ISDN PSAP.
- (8) Assignment of the following features to an ISDN PSAP is blocked:

Account Codes

Advanced Services Platform (ASP)

Automatic Customer Station Rearrangement (ACSR)

Automatic Route Selection (ARS)

Authorization Codes

Call Forwarding over Private Facilities (CFPF)

Call Pickup (including Call Park) on non-ACD ISDN PSAP lines

NOTE: Call Park can only be invoked on ACD ISDN PSAP lines for non-emergency calls—that is, those calls where the subscriber dialed direct with a seven-digit or ten-digit number. Call Park cannot be invoked for emergency calls where the subscriber dialed 911.

ISDN Intercom

Message Detail Recording (MDR)

Message Service System (MSS)

Modem Pooling

Precedence and Preemption (PP)

Private Facility Access (PFA)

Queuing

Series Completion (both series completing to and from an ISDN PSAP)

Suspend Origination (block setting to "YES" if ISDN PSAP)

Suspend Termination (block setting to "YES" if ISDN PSAP)

Terminal Group Station Restriction (TGSR)

Time of Day (TOD)

Most of the above features are terminal features and thus would be blocked from secondary (administrative) DNs as well as the PSAP DNs. TGSR, Series Completion, PP, and Call Pickup Terminating are assigned to DNs and, if desired, could be assigned to the non-PSAP secondary DNs.

If any of the above blocked features are assigned to an ISDN user, it cannot be marked as a PSAP.

- (9) PSAP cannot be assigned to an ACD Position DN, unless the *Pinnacle*® ACD ISDN PSAP feature is active. (See "*Pinnacle*® ACD ISDN PSAP," Section 9.6 .)
- (10) E911 PSAP cannot be set to Y for Shared Analog. However, this does not prevent a Shared Analog DN from being an administrative DN on an ISDN PSAP terminal.

- (11) If a Shared DN is a PSAP DN, the Primary DNs of all terminals that share that DN must be PSAP.
- (12) Any potentially ambiguous dialing strings that are assigned on the PC's "Voice Transfer Buttons" or "Voice Transfer List" windows should append the "#" character. This will avoid the delay of waiting to see if additional digits are to be sent from the PSAP.

For example, if a PSAP has 2-digit speed calling and the Voice Transfer Buttons menu on the PC has a corresponding entry using "Dialed Digits" in its Method field, the digits should end with the "#" character. That is, the Number field on the window should contain the string "21#" to reach a line whose DN corresponds to the "21" speed-calling digit string.

9.5.4 Compatibilities

"Restriction Capability," Section 9.5.3.5, addresses compatibility issues.

9.5.5 Interactions

The ISDN PSAP Support feature and the CPN Delivery on E911 Calls feature have impact on RMAS, such as changes to existing recent change masks to add new fields for the introduction of new parameters.

9.5.6 Engineering

9.5.6.1 Special Planning Considerations

There are no special planning considerations for this feature.

9.5.6.2 Hardware

The ISDN PSAP hardware consists of a PC or intelligent terminal connected to an 7506 or 7507 (or equivalent) phone via an RS-232 interface. The PC will abide by the protocol specified by the ISDN Asynchronous Data Module 2 Feature Package 3.2 API over an RS-232D interface between the PC and the ISDN phone. The PC will have an additional interface to the ALI/DMS data base or will use B-channel circuit switched data or D-channel packet (if the ALI/DMS has these capabilities) for ALI lookup requests.

9.5.6.3 Software

The ISDN PSAP Support special feature is dependent on the availability of the PSAP PC software.

There are no external interactions or dependencies with any other new 5ESS[®] switch features in the affected software releases.

The PSAP software needs about four to five Megabytes of hard drive storage on the PC.

9.5.7 Assignment Dependencies And Limitations

9.5.7.1 Dependencies

Because ISDN PSAP Support is a separate secured feature, the E911 secured feature (SFID=61) must be available and active before either the ISDN PSAP Support feature or the CPN Delivery on E911 Calls feature can be turned on. This is enforced by an off-the-switch tool.

9.5.7.2 Limitations

The 5ESS[®] switch will not allow PSAP to be set to "Y" for Shared Analog. However, this does not prevent a Shared

Analog DN from being an administrative DN on an ISDN PSAP terminal.

If a Shared DN is a PSAP DN, the Primary DN's of all terminals that share that DN must be PSAP.

An ISDN PSAP is only allowed on Type B or D terminals.

If an ISDN PSAP operator makes a call that is routed over a Traffic Service Position System (TSPS) trunk, the call cannot be put on "service hold." Service hold causes the ISDN line to be held by the TSPS trunk, which means that the ISDN line cannot make or receive new calls. This limitation allows an ISDN PSAP to disconnect from a TSPS trunk even though the TSPS trunk is still off-hook.

9.5.8 Service Order Perspective

The end-user would have to specify to the Service Provider:

- if 3-way or 6-way calling is desired
- primary and alternate PSAP information
- if the E911 translations for prerequisite feature are correct

9.5.9 Feature Implementation

9.5.9.1 Recent Change Procedures and Assignment Verification

Specify the ISDN User as a PSAP via Recent Change (RC). To guarantee that the PSAP DSLs are initialized as quickly as possible during a retrofit or full initialization of an SM, it is recommended that the PSAP DSLs and the ESA DSL links belong to the lowest numbered DSL groups (in particular, group 0). This takes advantage of the current implementation on the switch that initializes DSL groups sequentially starting at DSL group 0. Note that this ordering is NOT a switch requirement -- it is the current implementation and is, therefore, subject to change.

An ISDN User can be specified as an E911 PSAP on either RC View 23.2 DIGITAL SUBSCRIBER LINE or RC View 23.8 DSL/BRCS ASSIGNMENT. To make a user an ISDN PSAP, set:

E911 PSAP = Y

The following is recommended:

AUTO HOLD = Y

ONE TOUCH = Y

Also, a Calling Party Number display feature and a Multi-Way Calling feature are required (but not enforced) for 911 functionality and should be assigned on RC View 23.8.

When ISDN PSAP is assigned to a MLHG, the following applies:

- (1) On RC View 3.5 MULTILINE HUNT GROUP (LINE ASSIGNMENT), the MLHG must be marked as a PSAP (E911 PSA must be "Y").

If an ISDN PSAP is a member of a MLHG, the MLHG must be marked as a PSAP group. When assigning a PSAP MLHG, the MLHG must be marked as an E911 PSAP group before members can be added.

All members of the MLHG must be ISDN PSAPs.

Once members have been added to a MLHG, the "E911 PSAP" field cannot be updated. The E911 PSAP field can be updated only after all members of the MLHG have been removed.

- (2) On RC View 3.5, the MLHG cannot be marked as a Message Service Center.
MSC must be N.

- (3) On RC View 3.5, the MLHG cannot be marked for Modem Pooling.
MPTYPE must be blank.
- (4) On RC View 3.5, MLHG queuing is not allowed for an ISDN PSAP MLHG.
QFEATURE must be blank.
- (5) On RC View 12.18 MULTI-LINE HUNT (FEATURE DEFINITION), the bearer type must be circuit switched voice (VOICE).
- (6) On RC View 12.18, HUNTYP must be one of the following types:
Uniform Call Distribution

Circular Hunt

Regular Hunt
- (7) Secondary-only DN/MLHG-members are supported as PSAPs (within existing restrictions) on terminals where the Primary DN is PSAP.
- (8) To do supervisory monitoring, Shared DN can be assigned with MLHG. Each member to be supervised would need an Individual DN. The supervisory position would have shared call appearances that would correspond to the first call appearance of each of the members to be monitored.
- (9) On RC View 23.2 or RC View 23.8, if the DSL is a member of a MLHG, the member cannot be outdial.
CKT MEMB must be less than or equal to 2015.
- (10) Associate feature buttons with Selective Transfer action via Recent Change. Feature buttons are associated to selective buttons via a Configuration Group on RC View 12.5. The following entries would populate buttons X through X+5 as the feature buttons for the 6 selective transfer numbers associated with the ESN.

```

BUTTONLIST[n].BUTTON = X
BUTTONLIST[n].FEATURE = /*
BUTTONLIST[n].ACTION = SEL1XFER
BUTTONLIST[n].PARAM = <blank>

BUTTONLIST[n+1].BUTTON = X+1
BUTTONLIST[n+1].FEATURE = /*
BUTTONLIST[n+1].ACTION = SEL2XFER
BUTTONLIST[n+1].PARAM = <blank>

BUTTONLIST[n+2].BUTTON = X+2
BUTTONLIST[n+2].FEATURE = /*
BUTTONLIST[n+2].ACTION = SEL3XFER
BUTTONLIST[n+2].PARAM = <blank>

BUTTONLIST[n+3].BUTTON = X+3
BUTTONLIST[n+3].FEATURE = /*
BUTTONLIST[n+3].ACTION = SEL4XFER
BUTTONLIST[n+3].PARAM = <blank>

BUTTONLIST[n+4].BUTTON = X+4
BUTTONLIST[n+4].FEATURE = /*
BUTTONLIST[n+4].ACTION = SEL5XFER
BUTTONLIST[n+4].PARAM = <blank>

```

```

BUTTONLIST[n+5].BUTTON = X+5
BUTTONLIST[n+5].FEATURE = /*
BUTTONLIST[n+5].ACTION = SEL6XFER
BUTTONLIST[n+5].PARAM = <blank>

```

In addition:

GRP TYPE must be CUSTOM.

To associate the feature buttons defined in the configuration group with the ISDN PSAP, specify the configuration group name in the CONFIG GRP field on RC View 23.2 or RC View 23.8.

After these selective transfer actions have been assigned to a DSL, they can be verified on RC View 23.22 (Call Appearances and Feature Buttons).

- (11) Assign Incoming Calling Line Identification (ICLID) to the PSAP (for example /LICNDA and /LIDLXA; however, /DIDLX does NOT provide the desired results).
- (12) Assign additional features.
 - (a) If Shared DN is assigned, the display feature, /LICNDA or /LIDLXA is required to ensure that the Display Information Element (IE) is delivered to all members of the Shared DN group.
 - (b) Multi-Way Call Transfer Individual All Calls for ISDN, /MWICTIA, is required to set up 3-way conferences and allow transfer.
 - (c) Multi-Line Hunt Group, if desired.
 - (d) ISDN Six-Way Conference Calling /MWI6WC, if desired, should be assigned to an ISDN PSAP terminal. The PC "Phone Buttons" configuration needs to be coordinated with the feature.
 - (e) Essential Service Protection (ESP) provides priority service to subscriber lines designated by the administrative personnel as "essential." It is recommended that ESP be assigned to ISDN PSAPs.
 - (f) Call Forwarding Don't Answer (CFDA), Call Forwarding Busy Line (CFBL), Call Forwarding Busy Line - Inhibit Make Busy (CFBL-IMB), Call Forwarding Variable (CFV), if desired.
 - (g) It is suggested that ISDN PSAPs use the CFBL feature to provide the "PSAP-busy reroute" capability. This will allow the assignment of a DN that will be used if all members of the MLHG are busy when a termination is attempted.
 - (h) The assignment of CFBL also allows calls to busy individual ISDN PSAPs to be rerouted.
- (13) The options selected on the PC must be consistent with the features assigned to the line. See 533-401-313, *CALL-STALKER® ISDN PSAP Installation Guide*, for details on configuring the ISDN PSAP PC software.
- (14) It is recommended that an originate-only call appearance be assigned to the PSAP DN to be used for conference and transfer.

If desired, the customer may configure the E911 call appearances as denied origination. This would provide a service similar to that of the existing CAMA PSAPs. If provisioned in this way, it would be necessary to provision secondary PSAP call appearances to be used to set up conference or transfer.

9.5.9.2 Deleting Customer Service

To remove the E911 PSAP feature from a user's line, set E911 PSAP = "N" on either RC View 23.2 DIGITAL SUBSCRIBER LINE or RC View 23.8 DSL/BRCS ASSIGNMENT or RC View 23.20 for a PSAP secondary DN.

9.5.9.3 Changing a Subscriber's Service

This feature can not be changed on a per-line basis.

9.5.10 Feature Operation

The ISDN PSAP Support Special Feature will provide the ability to assign a BRI as a voice connection to a PSAP and have it, together with a Personal Computer (PC), provide all the functionality that currently exists with a CAMA PSAP.

The E911 secured feature must be available and active before ISDN PSAP Support can be used. The Calling Party Number Delivery on Enhanced 911 Calls secured feature can be used in conjunction with the ISDN PSAP Support feature.

E911 provides switch functionality to recognize E911 originations in an E911 office, launch a query to the E911 ESA and interpret the response message received from the ESA. The normal response message from the ESA will be an ESN that the switch will translate into a Primary PSAP, two Alternate PSAPs, up to six Selective Transfer numbers and a Flash Control Digit (FCD). The 911 Caller's Customer Emergency Services Identifier (E911 CESID) is delivered to the PSAP and is used for access to the Automatic Location Information Data Management System (ALI/DMS) data base to retrieve the caller's information (such as address). With the ISDN PSAP Support Feature, the Primary and/or Alternate PSAPs and any of the Selective Transfer numbers can be ISDN PSAPs that have full E911 functionality.

9.5.11 Administration

9.5.11.1 Measurements

For ISDN PSAPs that are configured as Multiline Hunt Groups, the Multiline Hunt Group Measurements can be used. There are no new measurements for ISDN PSAPs.

9.5.11.2 Billing

There are no changes for the treatment of an E911 call. The charge index of a PSAP DN should be marked as a "free call." This will not affect the billing for calls to the secondary DNs used for administrative calls.

9.6 *PINNACLE*® ACD ISDN PSAP

9.6.1 Overview

9.6.1.1 Description

The *Pinnacle*® ACD ISDN PSAP feature (number 99-5E-2207) integrates the following *5ESS*® switch features:

- Enhanced 911 (E9-1-1)
- Calling party number delivery (CPN)
- ISDN public safety answering point (PSAP)
- *Pinnacle*® automatic call distribution/business & residential customer services (ACD/BRCS)
- *Pinnacle*® automatic call distribution/management information system (ACD/MIS)

This integration provides major improvements in call handling at emergency centers.

Originally ACD services could not be used in conjunction with E9-1-1 services. This feature allows an Automatic Call Distribution (ACD) Directory Number (DN) to be used as a primary or alternate PSAP DN for E9-1-1 dialed calls and allows the transfer of non-emergency calls to a variety of ACD call centers based on a caller's telephone number.

ACD/BRCS call processing capabilities at PSAP locations allow PSAP agents to use many of the BRCS features such as automatic call back, call waiting, speed calling as well as features provided by the ACD.

ACD capabilities also provide ACD/MIS statistical information such as call status, historical reports and administration data. PSAP administrators can use this data to improve the engineering of ACD call processing capabilities such as:

- Call queuing - with announcements
- Vectoring - Conditional routing based upon switch conditions
- Intraflow - Changing the serving team size based upon caller volumes
- Interflow - Call transfer using selective routing

In addition, this feature allows the ACD/MIS sub-system to interact with the automatic location identification (ALI) data base to improve the transfer of calling party information to the agent selected to handle the call.

This is a secured feature (SFID 143) that requires arrangements be made between the service provider and Lucent Technologies. These arrangements include paying a right-to-use (RTU) fee before Lucent Technologies provides enabling information.

9.6.1.2 Background

In the Basic 911 (B911) service, on the 5ESS[®] switch, all emergency calls originating within the B911 dialing plan are routed to the same public safety answering point (PSAP) regardless of incongruities between central office service area and municipal boundaries. The B911 service does not provide caller location information of the 911 caller.

The Enhanced 911 (E9-1-1) service provides caller location information and consists of E9-1-1 serving offices (5ESS[®] switches), PSAPs, a E9-1-1 selective routing system (SR) and automatic location identification (ALI) data base.

In the traditional E9-1-1 environment, emergency calls are routed to E9-1-1 tandem switches that in turn route the calls over centralized automatic message accounting (CAMA) facilities to an appropriate PSAP. These PSAPs provide the necessary trunk termination equipment to accept the calls. They also provide line interface equipment to deliver the calls to agent positions.

The ISDN PSAP feature allows the 5ESS[®] switch to route the E9-1-1 calls to an ISDN PSAP position over a basic rate interface (BRI). This eliminates the need for trunk termination and line equipment at the PSAP location. These ISDN PSAPs could not be ACD positions.

The addition of *Pinnacle*[®] ACD/BRCS features provides ACD capabilities at the PSAP location and the associated MIS provides significant functional improvements for all PSAP ACDs in a geographic area.

9.6.1.3 Availability

The *Pinnacle*[®] ACD ISDN PSAP feature is offered as a software update (SU) to the 5E9(1) and the 5E9(2) software releases.

9.6.1.4 Feature Environment

This feature is provided on a per-switch basis to customers using the E9-1-1, ISDN/PSAP and *Pinnacle*® ACD/BRCS features.

9.6.2 Feature Operation

9.6.2.1 Typical Scenario

The following scenario depicts a typical 911 call using the *Pinnacle*® ACD ISDN PSAP integrated features.

A PSAP DN can be reached by either direct dialing or by E9-1-1 dialing. If the DN has not been defined as PSAP DN, it is considered to be an ACD DN.

- (1) A person experiencing an emergency condition dials 911.
- (2) The call is routed to the E9-1-1 serving switch, over a CAMA or SS7 trunk.
- (3) The E9-1-1 serving switch determines the call is an E9-1-1 call and launches a query with the customer emergency services ID (CESID) to the emergency service adjunct (ESA). If the ESA is not available or not equipped, the switch obtains the emergency service number (ESN) using its data base relations.
- (4) The E9-1-1 serving switch retrieves the routing data associated with the emergency service number (ESN) and routes the call to the primary PSAP. (For this scenario the primary PSAP is an ISDN PSAP with an ACD DN.)
- (5) The *Pinnacle*® ACD receives the call and routing data. The routing data consists of a primary PSAP, a maximum of two alternate PSAPs, up to six selective transfer numbers and a flash control indicator.

All call activity associated with the *Pinnacle*® ACD is sent to the MIS via event links.

As calls are queued, answered or disconnected the *5ESS*® switch sends event messages to the MIS computer. These messages describe the progress of each call and track 911 call activity from "Entering the ACD" until "Disconnect to an agent."

At the entering message the MIS passes the automatic number identification (ANI) information and informs the automatic location information (ALI) data base of a 911 call. The ALI data base does a data lookup to extract the location information. However, the call has not been delivered to an agent position and the ALI information cannot be distributed.

- (6) The *Pinnacle*® ACD attempts to find an available agent to service the call, but if no agents are available the call is queued and delay treatment is applied. The *Pinnacle*® ACD system may present an announcement to the caller informing them that they have reached the emergency center and that their call will be answered as soon as someone becomes available.
- (7) When an agent is available, the *Pinnacle*® ACD routes the call to the agent position along with ANI information. Almost simultaneously, the ACD informs the MIS of the call delivery. The MIS immediately informs the ALI that an agent has been selected and the ALI information is routed to the available agent.

The ALI data base location information appears on the PC display to use while the caller is interviewed. The call type is displayed in the information element of the phone as "Emr."

If the ALI information fails to appear in two seconds the PC connected to the receiving agent's phone launches a query to the ALI data base with the CESID and agent position number.

- (8) If the caller is reporting a fire, the agent presses the selective transfer function key for fire.
- (9) The switch uses the selective transfer number for fire associated with the caller's ESN and sets up a 3-way call between that number and the 911 caller. The caller's CESID is passed to the fire department PSAP along with the ESN data.

If the fire department is another ISDN or CAMA PSAP, it can do another ALI/DMS to get the caller's location information.

When the fire department answers, the transferring PSAP agent may disconnect.

- (10) The MIS tracks call data (such as, number of E9-1-1 calls, number of abandoned calls and other statistics) until final disposition. The information is forwarded via the Link II interface for further processing.

Supervisors can access the MIS data to review call center statistics and control call queuing, vectoring, intraflow and interflow features.

9.6.2.2 Queuing

A call delivered to the *Pinnacle*® ACD ISDN PSAP may be eligible for queuing if there are no available agents who are assigned, and logged-in, to handle that type of call. Each call is assigned a type of service based on dialed digit translation. The call type determines which queue will handle the call and which serving team and agent will service that call.

Calls that are candidates for queuing are:

- (1) E9-1-1 (emergency) calls that are delivered to the appropriate queue based upon the emergency service number (ESN) number. The ESN number will then map to the particular *Pinnacle*® 911 ACD DN and its associated queue.
- (2) Direct dialed (Anonymous) calls that are delivered to the queue based upon the dialed digits, which correspond to the DN associated with the queue.
- (3) Queue dialed calls (PSAP internal) originated by an agent who dials an access code followed by the queue number.
- (4) Service assist (SA) and emergency assist (EA) calls originated by agents who need assistance with a call. The queue is pre-selected based upon the serving team of the originator.
- (5) Any calls delivered from a queue to an available agent, who does not answer the call within a designated interval will be call forwarded, using the "Call Forwarding Don't Answer Return to Queue" feature. This call may be any of the previous types and will retain its call type when it exits the queue for distribution to another available agent.

If vectoring is not active, a call that has been sent to the queue will remain in that queue until answered or until the caller abandons. If vectoring is active, the call can be removed from the queue and be moved into another queue or have other vectoring treatment applied.

9.6.2.3 Vectoring

Vectoring is an optional feature that provides specialized call treatment based on conditions at the switch. Arriving calls are assigned a type of service associated with a vector. If there is no vector assigned and there is no agent available, the call receives standard queuing and delay treatment. If there is a vector assigned, the call receives vectoring treatment, consisting of a series of vector steps which check for conditions and take action based on those

conditions. For instance, when the queue is full or no agents are available the call could be automatically transferred to an alternate PSAP or connected to an audible announcement.

9.6.2.4 Standard Delay Treatment

Standard delay treatment allows the PSAP to alert the caller as to the length of delay to expect when the call is queued. The delay treatment is based on a customer-defined set of thresholds.

9.6.2.5 Intraflow

Intraflow allows a PSAP to increase the numbers of agents who could handle calls due to the delay that the callers are experiencing in the queue. *Pinnacle*® ACD ISDN PSAP minimizes any delay that exceeds level 3's threshold. For vectoring, delay intervals as well as re-routes are customer controlled. Intraflow serving team assignments cannot be made up of PSAP and non-PSAP teams.

9.6.2.6 Interflow

Interflow allows the rerouting of calls to another destination. If vectoring is used, the feature allows alternate PSAP routing in cases of:

- (1) Queue Full,
- (2) Queue Closed,
- (3) Queue Status (age of call at head of queue),
- (4) Serving Team Status,
- (5) No PSAP agents logged in,
- (6) and no PSAP agents available,
- (7) Time of Day,
- (8) Day of Week.

NOTE: Calls are first routed to PSAP DNs. In the event of a route failure, Interflow sequences through the alternate PSAP DNs, ending with the DN specified by vector routing, until the call is successfully routed or the list of available DNs is exhausted.

Pinnacle® ACD ISDN PSAP is not changing how the ACD call distribution works, but is using ACD capabilities to trigger "Alternate Routing." Alternate Routing requires special treatment.

9.6.2.7 Typical Error Scenario

"Default Routing" will be used under the following circumstances:

- (1) CESID unavailable
- (2) API link failure
- (3) ESA failure or timeout
- (4) invalid ESN returned by the ESA

An emergency service central office (ESCO) number is assigned to trunks which can originate 911 calls and to the dialing plan for lines. ESCO translation data determines whether selective routing will be done for that originator. If selective routing is not assigned or if it fails in some manner, a default ESN associated with the ESCO is used. When Default Routing is used, the switch sends a display of "Emr," which alerts the PSAP CPE to flash the CESID on the screen.

9.6.3 User Operation

9.6.3.1 For Subscribers

Service users are the public agencies responsible for the administration of the local emergency bureaus and the "911 callers" themselves. In addition, poison control or other civil emergency response groups may benefit from this service. However, throughout this document, the term "user" refers to PSAP agents who handle 911 calls.

This 5ESS[®] switch *Pinnacle*[®] ACD ISDN PSAP feature provides sophisticated call distribution to agent-users and a rich set of agent activities. In addition to those user actions typically associated with BRCS users, (such as originating, terminating, conferencing, and transferring), agents interact with the ACD feature to use these features.

- Login/Logout procedures with exclusive agent IDs and DN assignments allow agents to be pre-assigned to either a PSAP or non PSAP serving team and exist at either an ACD or ISDN PSAP position, but not at both simultaneously.
- Direct agent access (DAA) calls can be made directly to the agent wherever the agent is logged in. The DN is associated with the agent. This is useful for agents who change positions frequently.
- Service Assistance (SA) allows the agent to use a feature button to bring supervisory assistance in on a call.
- Emergency Assistance (EA) allows the agent to use an emergency button to request supervisory assistance. This causes a bright red "EMERGENCY" to be displayed on the supervising agent's PC display. This is useful for bomb threats, obscene phone calls or other problems that require immediate attention.
- Agent Intercom provides a way for agents to reach each other by dialing an access code and agent ID.
- Agent-to-Queue provides a means of transferring calls to or conferencing with another team of agents.

The *Pinnacle*[®] ACD ISDN PSAP feature also allows supervising personnel to access the *Pinnacle*[®] ACD MIS sub-system for control of resources and call handling. They can use the MIS to:

- set up queue sizes,
- assign team mappings,
- set up interflow destinations,
- set up reporting schedules,
- review the status of their call center,
- provision ACD resources (such as agent IDs, serving teams, call queues, call vectors, route destinations), and
- perform other control activities.

9.6.3.2 For Switch Personnel

Service providers install, enable and activate this feature on the 5ESS® switch.

9.6.4 Engineering

9.6.4.1 Hardware Resources

No additional hardware resources are required.

9.6.4.2 Software Resources

No additional software resources are required

9.6.4.3 Transition Considerations

There are no transition considerations associated with this feature.

9.6.5 Interactions And Incompatibilities

9.6.5.1 Interactions

This feature allows the service provider to provide E9-1-1 services for a 5ESS® switch without using an ESA.

Pinnacle® ACD ISDN PSAP is an environment which permits ISDN PSAP and ACD/BRCS features to be provided to the same station set (position) with some feature differences. BRCS terminating and originating treatment is provided on secondary DNs on the ACD position which are independent of the ACD (not the position DN) at all times. In every case, the specific treatment is dependent on the features assigned to the DN and terminal used.

There are six ACD/BRCS features required and ten optional. Many other features are restricted and will be blocked by recent change procedures.

Table 9-29 offers a more complete picture of the differences between ISDN PSAP, ACD/BRCS, and *Pinnacle*® ACD ISDN PSAP.

Table 9-29 BRCS Features For *Pinnacle*® ACD ISDN PSAP

BRCS feature	feature summary <i>Pinnacle</i> ® 911	RC Blocked ACD- BRCS	Recom- mended for ACD	RC Blocked ISDN PSAP	Recom- mended ISDN PSAP	RC Blocked <i>Pinnacle</i> ® 911
Acct. codes	not allowed			X		X
ACVT	not allowed			X		X
Auth. Codes	not allowed			X		X
Auto Call back	allowed					
ACBC	allowed					
ACSR	not allowed	X		X		X
Auto Recall	allowed					
ARS	not allowed			X		X
ASP	not allowed			X		X
Call Fwrd.	allowed ^a		X ^a			
Call Park	not allowed			X		X
CFPF	not allowed			X		X
Call Pickup	not allowed	X			X	X
Call Waiting	allowed					
COT	allowed					
Display+ICLID	required				X	
Dist. Ring	allowed					
EDS	allowed					
IDP	required		X			
ISDN Intercom	not allowed			X		X

MDR	not allowed			X		X
MODEM POOLING	not allowed			X		X
MSS	not allowed			X		X
MLHG	not allowed	X			X	X
Multiway	required		X			
PP	not allowed	X		X		X
PFA	not allowed			X		X
Selective LASS ^b	allowed					
Speed Call	allowed					
Series Comp.	not allowed			X		X
Shared DN	not allowed	X			X	X
TGSR	required		X	X		
Time of Day	not allowed			X		X

Notes:

- a. CF DARQ is the only Call Forwarding feature that is required for ACD.
- b. All selective LASS include: SCA-SCF-SCR-SDA.

9.6.5.1.1 Required Features

These are the BRCS features required for ACD PSAP positions.

- (1) Display.
The display feature consists of two modular features: 1) Display and privacy and 2) Line identification. If the display feature is not assigned, no display capability for position DN and non-ACD calls is possible. A call delivered to an ACD DN that has not been defined as a PSAP DN will be considered to be an ACD call and ACD display criteria will be used.
- (2) Incoming call line identification (ICLID).
Incoming call identification will only be provided if ICLID is assigned to the PSAP. There are no switch requirements to enforce ICLID assignment.
- (3) Individualized dialing plan (IDP) modular feature.
Individualized dialing is used for several BRCS features such as speed calling and intercom dialing, as well as new ACD BRCS features such as agent intercom. Access codes are used to activate and deactivate certain features. For example, Call Forwarding, *72 + DN to activate and *73 to deactivate.
- (4) Multiway calling modular feature.
Conference and transfer can be performed by agents in a variety of ways. Through the use of conference, transfer, and call appearance buttons, agents can conference and transfer calls to a specific agent, a queue, a supervisor or to a DN with or without ACD service assigned. The assigned multiway calling modular feature is always available for usage regardless of whether an agent is logged in at the position. If the assigned feature requires activation, the user is required to activate it.

The following Multiway features can be assigned to an ACD agent terminal:

- ISDN three-way calling
- ISDN add-on / consultation hold incoming only
- ISDN call transfer internal only
- ISDN call transfer outside
- ISDN call transfer individual incoming only 1, 2, & 3
- ISDN flash repeating

The following Multiway features cannot be assigned to an ACD agent terminal because they can only be assigned to an attendant:

- Attendant conference (ATCONF - 6 Way)
- Trunk dial transfer (TDT)
- Attendant call transfer (ACT)
- Attendant recall from satellite (ARFS)

No analog Multiway feature may be assigned to a position DN.

- (5) Terminal group station restrictions (TGSR) interactions.
The TGSR feature active on the position DN at the time the original call attempts to terminate is the feature that will be used for TGSR restrictions. For example, an agent with an unrestricted TGSR feature when logged in, can activate call forwarding to a DN outside of the terminal group. When that agent logs off, if the logged off TGSR is restricted, the forwarded calls will fail. If an agent with an active call forward don't answer (CFDA) feature logs out/in while a call is alerting, the TGSR restrictions which were in effect when the call first began alerting will be used. TGSR restrictions must be set to fully UNRESTRICTED for origination and termination at agent positions, regardless if agent is logged in or not.
- (6) Call forwarding don't answer return to queue (CFDARQ).
The call forwarding don't answer return to queue is a preconstructed CFDA feature that returns an ACD hunted call to the front of the queue from which it was delivered if the call is delivered as a manual answer call and is not answered by the available agent after ringing a specified number of seconds. At the don't answer timeout, the agent position is made busy and the make busy lamp is lit (provided the agent is still logged in and the call is then returned to the queue. This feature applies only to hunted calls, that is, calls delivered to the agent position from the ACD queues (including SA and Emergency).

9.6.5.1.2 Optional Features

The following BRCS features can be assigned to ACD PSAP positions.

- (1) Automatic call back (AC).
This LASS feature allows the user to automatically call back the last incoming calling DN currently associated with the users terminal. This feature also allows the user to camp-on to a line.
- (2) Automatic call back calling (ACBC).
The ACBC feature provides the means for a station to "camp-on" to a busy DN. When the requesting station receives busy tone during an intraoffice call, it can activate ACBC. For calls to ISDN stations, busy means no terminating CAs of the DN are idle (available). When the network determines that there is an available terminating CA at both the requesting and "camped-on" DNs, the requesting station is alerted.

The ACBC feature may be assigned with the following limitation: If a busy non-CAMA PSAP is encountered on an E9-1-1 call, ACBC camp-on is not allowed.

- (3) Automatic Recall (AR).
The LASS automatic recall feature allows a user to automatically place a call to the last dialed number. If a call cannot be completed because the called DN is busy, the automatic recall user is camped on to the called DN. When both the calling DN at the calling ISDN terminal and the called DN are idle, the calling ISDN terminal is given ring back alerting. If the ring back is answered, the called DN is alerted.
- (4) Call Forwarding (CF).

The call forwarding feature allows the subscriber to re-route calls that normally terminate to the called directory number (DN) to another DN. Note: Not logged in treatment of DAA calls is not BRCS call forwarding treatment.

Certain call types terminate to an agent's position based on an agent ID associated with the agent who is logged on at that position (ACD hunted, DAA, and Agent Intercom), while other call types are routed directly to a DN associated with the position (Position DN).

The call forwarding features are assigned to the position DN and apply to DAA calls, position DN calls, and agent intercom calls terminating to that position. The same forward-to DN is used for all three call types. In other words, for a single call forwarding feature, there cannot be different forward-to DNs for each call type.

In addition to the current restrictions, the forward-to DN cannot be an agent intercom access code + agent ID, a queue dialing access code + queue number, a service assist call, or an emergency call.

The call forwarding don't answer return to queue is the only call forwarding feature that applies to ACD hunted calls terminating to the agent position.

Table 9-30 is a summation showing the forwarding to ACD and DAA DNs specifying which types of forwarding is allowed.

Table 9-30 Call Forwarding To ACD And DAA DNs

FEATURE	ACD DN	DAA DN	pos.DN
all CF features (FWDTO DN)	yes	yes	yes
SCF (FWDTO DN)-non acceptance	yes	yes	yes
SCA (FWDTO DN)-non acceptance	yes	yes	yes
TGSR error (FWDTO DN)	no	no	yes
DAA - (not logged in) ^a	yes	yes	yes
Interflow DN	yes	yes	yes
RACF (FWD to DN)	yes	yes	yes
Notes:			
a. Reroute DN.			

- (5) Call Waiting (CW).
The call waiting (CW) feature is used to provide the call waiting call processing features.
- (6) Customer Originated Trace (COT).
COT is not recommended (and not enforced) for *Pinnacle*® ACD ISDN PSAP service.
- (7) Distinctive Ringing (DR).
The distinctive ringing feature provides distinctive ringing cycles to the subscriber line. Distinctive ringing indicates the origin of calls terminating to the subscriber. The distinctive ringing features can be assigned to the PSAP position.
- (8) Electronic Directory Service (EDS).
The EDS feature provides business customers the ability to electronically query a directory for call and personnel information without attendant assistance. An attached processor (AP) is required for the software and directory data base. Each directory data base is associated with a business customer and is accessible by other features such as message service system (MSS) and message detail recording to customer location (MDRTOCL).
- (9) Selective LASS features.
 - The selective call acceptance (SCA) feature allows the user to preselect incoming calls that will be accepted. A user can create a list of DNs that will define the calling parties that can complete calls. Incoming calls that are not on this list will either receive denial announcement or be forwarded.

- The selective call forwarding (SCF) feature provides the capability to preselect incoming calls that will be forwarded. A user can create a list of DNs defining which calling parties will have their calls forwarded to a specified DN.
- The selective call rejection (SCR) feature provides the capability of not being alerted by calls from a preselected DN list and allows the user to create a list of DNs that define the calling parties for whom calls will be rejected.
- The selective distinctive alert (SDA) feature provides the capability to preselect calls that will receive distinctive alerting. A user can create a list of DNs that define the calling parties that will receive distinctive alerting.

(10) Speed calling.

Speed calling permits the user to dial selected numbers using fewer digits than normally required by assigning abbreviated codes to those numbers.

(11) Call park.

Call park is allowed but can only be used on calls that are direct dialed, non-emergency calls.

Other services that may interact with this feature include the following:

- Essential service protection (ESP).
This feature assures that a small number of lines, designated by the telephone company as "essential," receive priority originating service during periods of extreme overloads. ESP provides priority service to subscriber lines designated by administrative personnel as "essential." It is a desirable feature for the ISDN PSAP requirement; however, this ability can also be controlled from the MIS.
- Advanced service platform (ASP) services.
The advanced services platform provides service-independent capabilities at a 5ESS[®] switch which allows it to interact with an external network element [a service control point (SCP)] via common channel signaling system 7 (CCS7) transaction capabilities application part (TCAP) messages to help determine appropriate call handling treatment in the implementation of A-I-Net[®].

This feature will be blocked in recent change.

- Emergency Service Feature.
The number 911 is the 3 digit telephone number designated for public use to report or request emergency assistance. Originally ACD services could not be used in conjunction with E9-1-1 services. This feature negates that restriction.
- Operator Services Features (OSPS).
ACD PSAP agents will have occasion to access operator services. A common call center use is access of directory assistance for outbound telemarketing applications. Intercept in the 5ESS[®] switch is implemented in the operator services position system (OSPS), will also be accessed by agents performing outbound dialing. This requires interaction with the NTI TOPS operator services system and (OSPS) features. In either case, access is just as if the operator services were accessed from a "regular" (non-ACD-equipped) Centrex service position.

Operator services systems will verify busy on ACD PSAP agent lines using the Position DN in the same way that busy lines are verified on ISDN BRCS stations. Previously such verification was impossible since there was no DN associated with an agent position.

- Call Tracing.

This feature allows central office personnel to determine the source of annoying or threatening calls or identify the line in an emergency situations. One end of the network path must be known. The known terminal is identified by a DN if it is a line, by group and member number if it is a trunk, or by multiline hunt group line.

- Group Alerting.

This feature permits the controller (or alerting party), upon dialing a code, to signal a preselected number of telephones simultaneously. One-way communication is established from the controller to all members of the group that responded to the signal. There may be a maximum of three different control telephones associated with the customer group alerting service, and only one may be used at a time.

Group alerting service is generally used by volunteer fire departments, civil defense groups or others requiring quick and simultaneous dispatch of oral or recorded messages. During nonalert periods, subscriber telephones are connected to normal service lines at the switch.

9.6.5.2 Incompatibilities

Pinnacle® ACD ISDN PSAP requirements differ from those specified for the ISDN PSAP as follows:

- Positions cannot be a member of a multi-line hunt group (MLHG).
- Positions cannot share a (ACD) position telephone number (TN).
- Must have call forwarding don't answer return to queue assigned.
- Terminal group station restriction (TGSR) must be assigned and be fully unrestricted.
- Multiway is required.
- Individual dialing plan is required.

The *5ESS*® switch will block the assignment of the following features to a *Pinnacle*® ACD ISDN PSAP position:

- Account code
- Automatic Customer Station Rearrangement (ACSR)
- Automatic route selection (ARS)
- Authorization code
- Call Forward over Private Facilities (CFPF)
- Multi-line hunt group (MLHG)
- Shared directory number (DN)
- ISDN intercom
- Message detail recording (MDR)
- Modem pooling
- Modular queuing
- Message service system (MSS)

- Precedence and preemption
- Private facilities access (PFA)
- Time of day (TOD)
- Series completion
- Suspend origination (block setting=yes)
- Suspend termination origination (block setting=yes)

If any of the above features are assigned to an ISDN user, it cannot be marked as a *Pinnacle*® ACD ISDN PSAP position.

ISDN key system services provide access to multiple DNs, shared DNs and special station services. Shared DN services are not available on ACD call appearances (CA). This precludes the following ISDN key system services features on the primary DN of an ACD position:

- Shared CA
- Bridging with shared CA
- Hold with shared CA
- Manual exclusion

9.6.6 Dependencies And Limitations

9.6.6.1 Dependencies

The service provider must purchase and activate the following features in order to install the *Pinnacle*® ACD ISDN PSAP secured feature (SFID 143):

- ACD/BRCS base feature and all three levels of security (SFID=121, SFID=122, and SFID=123).
- Enhanced 9-1-1 (SFID=61).
- ISDN PSAP support (SFID=114).

9.6.6.2 Limitations

E9-1-1 calls originating at one 911 serving switch cannot be terminated by another office without losing some E9-1-1 feature functions (such as ANI delivery, selective transfer, and alternate routing). All PSAPs must be directly connected to the E9-1-1 serving *5ESS*® switch in order to use such features as selective transfer and alternate routing (except with "Handoff").

This feature uses special display requirements for conference and transfer.

- The switch will allow two calls that are both on PSAP call appearances to be merged for conference/transfer, except two incoming calls with different CESIDs. When attempting to merge two incoming calls with different CESIDs, the switch will send a Conference Reject message and will keep the first call on soft hold and the second call in the talking state. The switch will not allow a call on a PSAP call appearance to be merged with a

call on a non-PSAP call appearance.

- When conference (or transfer) is invoked while active on a PSAP call appearance, the switch will check to see if there is a soft-held call on a non-PSAP call appearance. If there is, the conference on the non-PSAP call appearance will be negated and the PSAP conference will be allowed. The non-PSAP call will be put on hard-hold. This is a 1A ESSTM transparency.

The terminal group station restriction (TGSR) feature assigned to an ACD PSAP position must be fully unrestricted regardless of whether the PSAP agent is logged in or not.

The feature is only available on Custom ISDN basic rate interface (BRI).

Message detail recording (MDR) is not allowed on the *Pinnacle*® ACD ISDN PSAP feature.

9.6.6.3 Isolation Constraints

Not applicable.

9.6.7 Feature Implementation

9.6.7.1 Office Data Administration Provisioning

There is no ODA provisioning associated with this feature.

9.6.7.2 Recent Change Provisioning

The E9-1-1 translations to emergency answering points and the recent change/verify (RC/V) support system that maintains this data will not change with the introduction of the *Pinnacle*® ACD ISDN PSAP feature.

The changes required for the ISDN PSAP support feature and the CPN delivery on E9-1-1 calls in the recent memory administration system (RMAS) should be sufficient to support *Pinnacle*® ACD ISDN PSAP.

The existing ISDN PSAP feature and the ACD/BRCS base feature provides most of the RC/V capability needed to allow/block assignment of the BRCS features required by *Pinnacle*® ACD ISDN PSAP.

This feature is a secured feature. To unlock this feature the E9-1-1, ISDN PSAP support and ACD/BRCS features must be unlocked first.

The following describes the provisioning required to provide this service.

- (1) Follow secured feature procedures to activate the three levels of security for the ACD/BRCS feature.
 - ACD/BRCS Interworking (SFID=121).
 - ACD/BRCS Position Provisioning (SFID=122).
 - ACD/BRCS Agent Login (SFID=123).

The existing ACD/BRCS base feature provides assignment of terminal group station restriction (TGSR) to ACD position DNs because it is required. It also blocks assignment of multi-line hunt groups (MLHGs) to an ACD position and does not allow ACD position DNs to be shared.

- (2) Follow secured feature procedures to activate the E9-1-1 feature with CPN delivery (SFID=61).

If CPN delivery on E9-1-1 calls is activated, specify calling party number or billing number via global parameter for E9-1-1 calls from lines on the serving switch and E9-1-1 calls incoming over SS7 trunks.

- (3) Follow secured feature procedures to activate the ISDN PSAP feature (SFID=114) and any of its dependent secured features.

The existing ISDN PSAP feature currently blocks/allows many of the BRCS features. It blocks the terminal group station restriction feature (TGSF) feature. The TGSF feature must be assigned to a ACD E9-1-1 position with the active and default, originating and termination restrictions set to "UNRESTRICTED."

- (4) Use secured feature procedures to activate the *Pinnacle*® ACD ISDN PSAP feature (SFID=143).
- (5) Identify the ACD positions as E9-1-1 PSAP terminals using view 23.2, *Digital Subscriber Line* and view 23.8, *DSL/BRCS Assignments*.

RC view 23.8 is used to provision an ACD position as an E9-1-1 PSAP terminal. The "E911 PSAP" field is used in conjunction with the "POS NUM" field to make an ISDN terminal an ACD E9-1-1 PSAP position.

The mapping code changes for views 23.2 and 23.8 will provide the necessary relation updates and the required checks when assigning BRCS features.

- (6) Mark the serving team as an ACD E9-1-1 PSAP using the Serving Team view (view 21.2 in 5E10, view 6.1 in 5E11 and later).

FIELD	VALUE
E911 PSAP	Y or N

"Y" - Turns on (enables) the ACD ISDN PSAP feature.

"N" - Turns off (disables) the feature (the default).

- (7) Add call types that must be served by a serving team using the Call Type view (view 21.22 in 5E10, view 6.4 in 5E11 and later).

If the primary serving team is marked as an ACD E9-1-1 PSAP, this call type must always be associated with ACD E9-1-1 PSAP serving teams. Any supporting serving teams assigned must be provisioned as ACD E9-1-1 PSAPs if the primary serving team is an ACD E9-1-1 PSAP.

An existing serving team could be updated to an ACD E9-1-1 PSAP, however, any call types that are served by other serving teams must be an ACD E9-1-1 PSAP. That is, these call types must be served by serving teams that are already marked as ACD E9-1-1 PSAPs.

- (8) The ACD DN or direct agent access directory number (DAA DN) is provisioned as an ACD E9-1-1 PSAP using the ACD and DAA TN Assignment view (view 4.15 in 5E10, view 6.10 in 5E11 and later)..

FIELD	VALUE
E911 PSAP	Y or N

"Y" - Turns on (enables) the ACD ISDN PSAP feature.

"N" - Turns off (disables) the feature (the default).

Any call types listed on this view must be served by ACD E9-1-1 PSAP serving teams, either primary or supporting.

- (9) Associate feature buttons with selective transfer action via recent change.

- (10) Assign ICLID to the PSAP BRIs.
- (11) Assign additional features, as needed.

9.6.7.3 Customer Premises Equipment

No additional hardware is required. This feature uses the personal computer, PC software and telephone equipment normally provided as part of the ISDN PSAP and ACD/BRCS features.

9.6.8 Maintenance Considerations

Not applicable.

9.6.8.1 Measurements

This feature does not introduce any new measurements.

9.6.8.2 Billing

This feature does not introduce any new billing considerations.

9.7 SCREENING OF E911 CALLS

9.7.1 General

9.7.1.1 Definition

The Screening of E911 Calls is a special transparency feature that is dependent on the Enhanced 911 (E911) secured feature. The E911 secured feature must first be enabled for the Screening of E911 Calls special feature to work.

The Screening of E911 Calls feature allows screening of certain lines and trunks at E911 Tandem offices thus preventing completion of calls to Public Safety Answering Points (PSAP) when 911 is dialed. Such restricted calls (like reorder or announcement) are routed elsewhere via a route index designation.

This feature supports both line and trunk (dedicated and non-dedicated) originations. However, trunk originations from E911 direct connect trunks are not screened by this feature. Line Class Codes (LCC) designate a specific screening index for line originations and the trunk group screening index determines screening for trunk originations.

This feature is available only with the 5ESS[®] switch.

9.7.1.2 Cross-References

The following cross-references are applicable to the Screening of E911 Calls feature,

- Feature number: 96-5E-2620

9.7.1.3 Background

911 service is a Telephone Company basic exchange service that provides access to emergency bureaus when callers dial the three digits - "911" - from any telephone. The number "911" has been reserved for public use throughout the United States to request emergency assistance.

In the Basic 911 (B911) service currently available on the 5ESS[®] switch, all emergency 911 calls originating within the B911 dialing plan are routed to the same Public Safety Answering Point (PSAP) regardless of incongruities between the central office service area and municipal boundaries. The B911 service, however, does not provide location identification of the 911 caller or an interface to E911 PSAPs.

9.7.1.4 Availability

The Screening of E911 Calls feature will be deployed on the 5ESS[®] switch in a software update to the 5E9(1) Software Release and for the 5E9(2) Software Release.

9.7.1.5 Feature Application

This feature supports both line and trunk (dedicated and non-dedicated) originations. However, trunk originations from E911 direct connect trunks are not screened by this feature. Line Class Codes (LCC) designate a specific screening index for line originations and the trunk group screening index determines screening for trunk originations.

9.7.2 User Perspective

9.7.2.1 User Profile

Customers of E911 Service are local government and municipalities.

9.7.2.2 Customer Premises Equipment

This feature requires no additional customer premise equipment.

9.7.3 User Operation

9.7.3.1 Activation

9.7.3.1.1 Activating the Feature

Use Recent Change View (RC/V) 8.31 to activate this feature. The key field "FEATURE ID" must be set to the correct feature ID number and the "MODULE" field must be set to determine if a particular Switch Module or the entire telephone office is to be activated. Setting the "ACTIVE" field to "Y" completes the activation.

9.7.3.1.2 Invoking the Feature

This feature is automatically invoked once it has been activated and no subscriber action is involved.

9.7.3.2 Deactivation

Using RC/V 8.31, set the "ACTIVE" field to "N."

9.7.3.3 Restriction Capability

The end-user (subscriber) cannot restrict or change the operation of this feature.

9.7.4 Compatibilities

There are no compatibility issues with this feature.

9.7.5 Interactions

The Screening of E911 Calls feature interacts with the E911 secured feature and if not set up correctly will screen some E911 calls from transferring to a PSAP. It is imperative that this feature is properly activated using the correct Recent Change Views; otherwise, blockage of E911 calls will result.

9.7.6 Engineering

9.7.6.1 Special Planning Considerations

No training issues exist for this feature.

9.7.6.2 Hardware

No hardware issues exist for this feature.

9.7.6.3 Software

No software issues exist for this feature.

9.7.7 Assignment Dependencies And Limitations

9.7.7.1 Dependencies

The Screening of E911 Calls is dependent on the Enhanced 911 (E911) secured feature. The E911 secured feature must first be enabled for the Screening of E911 Calls special feature to work.

9.7.7.2 Limitations

There are no limitations associated with this feature.

9.7.8 Feature Implementation

9.7.8.1 ODA Implementation

The ODA (form 5301) must be set up correctly for all lines and trunks associated with the Emergency Dialing Plan that have an appearance in RC/V View 10.10.

9.7.8.2 Recent Change Procedures

Use Recent Change View 8.31 to activate this feature. The key field "FEATURE ID" must be set to the correct feature ID number and the "MODULE" field must be set to either "SM" (plus number) or "OFC" depending if a particular Switch Module or the entire telephone office is to be activated for E911 screening. Setting the "ACTIVE" field to "Y" completes the activation.

RC/V View 10.10 sets up the type of screening. If this view is not populated, no screening occurs. This view may be set so that E911 calls are screened and routed to one of the following,

- a PSAP
- an announcement trunk
- another directory number (DN)
- reorder

9.7.9 Feature Operation

9.7.9.1 Line Treatment

The 5ESS® switch performs normal digit analysis screening for 911 calls from line originations at the E911 serving office before routing the call. Screening is based on the Line Class Code information that designates a specific screening index.

Normal screening enables the Service Provider to prevent certain lines at the E911 serving office from passing the E911 request to the E911 Service Adjunct (ESA) if selective routing is applicable. If selective routing is not applicable, the Emergency Service Number (ESN) will not be used.

Such calls could be routed elsewhere via a Route Index associated with the screening index of the trunk group. This type of screening does not pertain to terminal group station restriction screening functionality.

9.7.9.2 Trunk Treatment

The 5ESS® switch performs normal digit analysis screening for 911 calls originating over dedicated trunks to the E911 serving office before routing the call. Screening is based on the trunk group screening index.

Normal screening enables the Service Provider to prevent certain trunks from passing the E911 request to the E911 Service Adjunct (ESA) if selective routing is applicable. If selective routing is not applicable, the Emergency Service Number (ESN) will not be used.

Such calls could be routed elsewhere via a Route Index associated with the screening index of the trunk group. This type of screening does not pertain to terminal group station restriction screening functionality.

9.7.10 Administration

9.7.10.1 Measurements

This feature relies on existing traffic measurements for the E911 feature.

9.7.10.2 Billing

No Automatic Message Accounting (AMA) records have been modified or newly created.

9.8 DELETE WARNING DISPLAY FOR ESSENTIAL SERVICES

9.8.1 Description

The Delete Warning Display For Essential Services feature (99-5E-3900) displays a unique error message when an attempt is made to remove lines and trunks from service that would affect emergency service numbers such as fire, police, hospital, or E911 Public Safety Answering Points (PSAPs).

9.8.2 Availability

The Delete Warning Display For Essential Services feature (99-5E-3900) is available as a software update for the 5E11 and 5E12 software releases and is included in the 5E13 and later releases.

9.8.3 Environment

This feature is provided on a per-office basis.

9.8.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-3900

9.8.5 Background

Not applicable.

9.8.6 Feature Operation

The Delete Warning Display For Essential Services feature requires the switch to check the status of the Essential Line (EL) field on RC/V View 1.6 (for analog lines) or View 23.2 [for Digital Subscriber Lines (DSLs)], or the CAMA PSAP field on View 5.1 (for trunks), before allowing a line or trunk deletion. If the EL field on Views 1.6 or on 23.2 is set to Y, or the CAMA PSAP field on View 5.1 is set to Y, the deletion is blocked, and an error message is sent indicating which field has caused the crosscheck failure. If the EL field for the line in question is set to N or the CAMA PSAP field for the trunk in question is set to N, the deletion is allowed.

9.8.7 User Operation

9.8.7.1 For Subscribers

No subscriber actions are associated with this feature.

9.8.7.2 For Switch Personnel

For all analog lines to be protected by the Delete Warning Display For Essential Services feature, switch personnel must make sure that the EL field on RC/V View 1.6 for the line is set to Y. For all DSLs to be protected by this feature, switch personnel must make sure that the EL field on RC/V View 23.2 for the line is set to Y. For all trunks to be protected by this feature, switch personnel must make sure that the CAMA PSAP field on RC/V View 5.1 for the trunk is set to Y.

9.8.8 Engineering

9.8.8.1 Hardware Resources

No hardware considerations are associated with this feature.

9.8.8.2 Software Resources

No software considerations are associated with this feature.

9.8.8.3 Transition Considerations

No transition considerations are associated with this feature.

9.8.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

9.8.10 Incompatibilities

No incompatibilities are associated with this feature.

9.8.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

9.8.12 Isolation Constraints

No isolation constraints are associated with this feature.

9.8.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the Delete Warning Display For Essential Services feature by populating the following fields in recent change and verify (RC/V) view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	296
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

9.8.14 Customer Premises Equipment (CPE)

Not applicable.

9.8.15 Maintenance Considerations

Not applicable.

9.8.16 Administration

9.8.16.1 Measurements

This feature does not impact measurements.

9.8.16.2 Billing

This feature does not impact billing.

9.9 E911 CALL ERROR DETECTION AND ALARM

9.9.1 Description

Service providers frequently experience extended 911 service outages because they are unaware of the outage until end users or dispatch office personnel report the problem. The E911 Call Error Detection And Alarm feature (99-5E-4621.A) detects E911 call errors and generates an appropriate alarm, notifying the service provider that there is an E911 service problem.

9.9.2 Availability

The E911 Call Error Detection And Alarm feature (99-5E-4621.A) is available as a software update for the 5E11 and 5E12 software releases and is included in the 5E13 and later releases.

9.9.3 Environment

This feature is provided on a per-office basis.

9.9.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-4621.A

9.9.5 Background

Not applicable.

9.9.6 Feature Operation

Any E911 call with 911 as the first three dialed digits that encounters errors will cause an alarm, even if the call completes. Errors may be reported even if the error does not cause the E911 call to fail so that switch personnel are alerted to the problem before E911 service deteriorates to the point where all E911 calls fail.

Independent of E911 calls, trunk group 100% out of service errors are reported through Terminal Maintenance as soon as detected. The new OUTAGE RPT field on RC/V 5.1 allows the service provider to designate specific trunk groups to be monitored. Switch personnel are notified via a critical alarm output message, REPT AML REACHED AND THE ENTIRE TRUNK GROUP IS OUT-OF-SERVICE, when these selected trunk groups are 100% out of service. This capability has a separate Secured Feature ID (SFID) from the E911 Call Error Detection and Alarm feature (SFID 294) and may be purchased separately.

During E911 calls, the following errors are reported when detected:

- *911 Call Type*—The digits "911" have been dialed but are not translated to the emergency call type, FC911.
- *Partial Dial*—Digit analysis data is set up so that more than the three digits "911" are expected. In other words, "911" is the beginning of a longer expected string of digits. If this is the case, the user does not enter any more digits, and the interdigital timer expires, this causes an E911 call to fail.
- *Vacant Code*—Result of digit analysis on the 911 digit string is vacant code treatment.
- *Invalid PSAP DNs*—Primary, first alternate, or second alternate PSAP DNs fail digit analysis.
- *PSAP DNs, Reroute DNs, and Selective Transfer DNs Not Provisioned*—No hundreds group data or DN data has been defined for the primary, first alternate PSAP DN, second alternate PSAP DN, reroute DNs, or selective transfer DNs.
- *Invalid Global E911 Digit Analysis Selector (DAS)*—The Global E911 Digit Analysis Selector (DAS) points to a digit tree used in analyzing all the PSAP DNs, reroute DNs, and selective transfer DNs. An invalid E911 Global Digit Analysis Selector will cause all E911 routing using those DNs to fail, and the originator will receive reorder.
- *100% Out of Service E911 Interoffice Trunk Group*—An E911 interoffice trunk group is totally out of service. This error detection is not available for 911 calls originating from offices that do not have the E911 feature activated. For these originating offices, use the new OUTAGE RPT field on RC/V 5.1 to monitor the interoffice trunk groups for 100% out of service error conditions.
- *100% Out-of-Service CAMA PSAP Trunk Group*—A CAMA PSAP trunk group is totally out of service.

For errors detected during E911 calls, a minor alarm output message, "REPT E911", and an appropriate assert with detailed error information (for Office Dependent Data errors) are provided so that switch personnel may take

corrective action immediately. A critical alarm output message , REPT EMERGENCY 911 CALL ERROR, summarizes all the originating SMs or the selective transferring PSAP SMs of the E911 calls with errors detected within the past ten minutes.

This feature will detect some of the errors described above on Basic 911 calls and generate alarms, though this feature is designed to work with E911 calls.

Errors in non-911 dialed emergency calls can also be detected and alarmed if the call type is marked as an emergency call type.

The E911 Call Error Detection And Alarm feature will not report E911 failure due to a total switch outage and cannot track errors on some types of low-runner 911 service, such as when the digits "911" are formulated out of other digits. The feature cannot track E911 call errors if switch translations are corrupted to the extent that the switch can no longer recognize the "9" and "1" digits.

9.9.7 User Operation

9.9.7.1 For Subscribers

No subscriber actions are associated with this feature.

9.9.7.2 For Switch Personnel

Switch personnel need to take the appropriate corrective actions needed to correct the E911 error messages received.

9.9.8 Engineering

9.9.8.1 Hardware Resources

No hardware considerations are associated with this feature.

9.9.8.2 Software Resources

No software considerations are associated with this feature.

9.9.8.3 Transition Considerations

No transition considerations are associated with this feature.

9.9.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

9.9.10 Incompatibilities

No incompatibilities are associated with this feature.

9.9.11 Dependencies

Some functions of this feature require that the E911 feature be active. (For more information on E911, see Section 9.2 .)

9.9.12 Isolation Constraints

If the Switching Module (SM) is isolated, the REPT EMERGENCY 911 CALL ERROR output message may not be issued.

9.9.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the E911 Call Error Detection And Alarm feature by populating the following fields in recent change and verify (RC/V) view 8.22 (SECURED FEATURE UPGRADE) for the main feature:

FIELD	VALUES
FEATURE ID	293
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

The service provider can separately enable the Report Trunk Group 100% Out of Service capability by populating the following fields in recent change and verify (RC/V) view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	294
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

The service provider must populate the following field on RC/V view 8.31, OPTIONED FEATURES, to inhibit checks being made on 911 digits in case the digits "911" are used as part of a non-emergency call:

RC/V VIEW	VIEW NAME	FIELD	VALUES
8.31	OPTIONED FEATURES	FEATURE ID ACTIVE	716 Y

The service provider must populate the following field on RC/V view 5.1, TRUNK GROUP, to allow reporting of 100% out-of-service trunk conditions:

RC/V VIEW	VIEW NAME	FIELD	VALUES
5.1	TRUNK GROUP	OUTAGE RPT	Y

9.9.14 Customer Premises Equipment (CPE)

Not applicable.

9.9.15 Maintenance Considerations

Not applicable.

9.9.16 Administration

9.9.16.1 Measurements

This feature does not impact measurements.

9.9.16.2 Billing

This feature does not impact billing.

9.10 5ESS® SWITCH ACCEPTANCE OF A 1A ESS™ SWITCH WINK NPD AND ANI FOR 911 ROUTING CALLS

9.10.1 Description

The 5ESS[®] Switch Acceptance of A 1A ESSTM Switch Wink NPD And ANI For 911 Routing Calls feature (99-5E-4657) allows the 5ESS[®] switch to send a wink and accept Numbering Plan Digit (NPD) and Automatic Number Identification (ANI) signals from a 1A ESSTM switch for 911 routed calls.

9.10.2 Availability

The 5ESS[®] Switch Acceptance of A 1A ESSTM Switch Wink NPD And ANI For 911 Routing Calls feature (99-5E-4657) is available as a software update for the 5E12 software release and is included in the 5E13 and later releases.

9.10.3 Environment

This feature is provided on a per-office basis but is provisioned on a per-trunk-group basis.

9.10.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-4657

9.10.5 Background

Some 1A ESSTM switches use non-standard signaling to hand off 911 calls between 1A ESSTM switch offices. In the 1A ESSTM switch where a 911 call originates, the terminating trunk is defined as a Public Safety Answering Point (PSAP), which is really another 1A ESSTM switch functioning as a 911 Serving Switch. The terminating 1A ESSTM switch responds with a wink after seizure from the originating 1A ESSTM switch. If a 1A ESSTM switch functioning as a 911 Serving Switch is replaced with a 5ESS[®] switch, the 5ESS[®] switch must support this non-standard signaling.

When a call terminates to a CAMA PSAP, it sends an NPD to identify the area code. NPDs 0 - 3 represent four distinct area codes. NPDs 4 - 7 represent the same four area codes and convey the additional meaning that the call was default routed. However, the terminating 1A ESSTM switch expects an Information (I) digit, so for the call to complete with ANI, the digit received must be 0, which indicates automatic identification.

9.10.6 Feature Operation

When seized by another office, the 5ESS[®] switch responds with a wink. An originating 1A ESSTM switch sends the KP-NPD-ANI-ST over the trunk, and the 5ESS[®] switch maps the NPD to the appropriate I digit as listed in Table 9-31.

Table 9-31 NPD To I Digit Mapping

1A ESS TM Switch NPD Digit	5ESS [®] Switch I Digit
0	0
1	2 (identification failure)
2	2 (identification failure)
3	2 (identification failure)
4	0
5	2 (identification failure)
6	2 (identification failure)
7	2 (identification failure)

Once the 5ESS[®] switch converts the NPD to an I digit, the call proceeds normally. The 5ESS[®] switch obtains the

area code from Recent Change and Verify (RC/V) view 5.1, and uses this NPD to route the call to the appropriate PSAP.

NOTE: The outgoing NPD has no connection to the NPD received from the 1A ESSTM switch.

When a call on a 1ANPD trunk is made to a CAMA PSAP, no answer supervision will be returned unless freeans is activated on RC/V view 5.1 for the 1ANPD trunk group.

When activated, this feature handles 911 calls in the same way as for the DIRANI case, except that it sends a wink when the trunk is seized and an off-hook only when 911 answers.

9.10.7 User Operation

9.10.7.1 For Subscribers

No subscriber actions are associated with this feature.

9.10.7.2 For Switch Personnel

Switch personnel need to provision affected trunks as explained in Section 9.10.13 .

9.10.8 Engineering

9.10.8.1 Hardware Resources

No hardware considerations are associated with this feature.

9.10.8.2 Software Resources

This feature requires that the switch be equipped with E911 Service (SFID 61).

9.10.8.3 Transition Considerations

No transition considerations are associated with this feature.

9.10.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

9.10.10 Incompatibilities

No incompatibilities are associated with this feature.

9.10.11 Dependencies

Enhanced 911 must be activated (SFID 61) for the 5ESS[®] Switch Acceptance of A 1A ESSTM Switch Wink NPD And ANI For 911 Routing Calls feature to work.

9.10.12 Isolation Constraints

No isolation constraints are associated with this feature.

9.10.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the 5ESS® Switch Acceptance of A 1A ESS™ Switch Wink NPD And ANI For 911 Routing Calls feature by populating the following fields in RC/V view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	314
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

Switch personnel need to provision affected trunks to respond with a wink when seized by another office by setting the E911TYPE field on RC/V view 5.1 to 1ANPD.

To make sure that answer supervision is returned when calls to a CAMA PSAP are made on a 1ANPD trunk, FREEANS must be set to Y on the RC/V view 5.1 for the 1ANPD trunk group.

9.10.14 Customer Premises Equipment (CPE)

Not applicable.

9.10.15 Maintenance Considerations

Not applicable.

9.10.16 Administration

9.10.16.1 Measurements

This feature does not impact measurements.

9.10.16.2 Billing

This feature does not impact billing.

9.11 FGD INTERFACE TO E911

9.11.1 Description

The FGD Interface To E911 feature (99-5E-4484) modifies the Centralized Automatic Message Accounting (CAMA) Public Safety Answering Point (PSAP) interface to use signaling like Feature Group D (FGD). In conjunction with Wireless E911, this feature allows the 5ESS® switch E911 serving switch to outpulse the wireless 911 caller's 10-digit Mobile Directory Number (MDN) and the 10-digit Pseudo Automatic Number Identification (pANI) together to the Enhanced CAMA PSAP handling the wireless 911 call. The pANI is not available for any wireline calls.

This feature also allows one 10-digit number to be sent to the Enhanced CAMA PSAP. For wireline calls, the 10 digits sent will continue to be the ANI. For a wireless call, the 10 digits will be the MDN or, when the MDN is unavailable, the Automatic Number Identification (ANI).

9.11.2 Availability

The FGD Interface To E911 feature (99-5E-4484) is available as a software update for the 5E12 software release and is included in the 5E13 and later releases.

9.11.3 Environment

This feature is provided on a per-office basis.

9.11.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-4484, FGD Interface To E911
- Feature Number: 99-CP-4543, Wireless 911
- This feature is in compliance with the following Bellcore Technical References (TRs) and General References (GRs):

— TR-TSY-000350

— GR-2953-CORE

NOTE: The FGD Interface To E911 feature does not support the provisioning of the Information Digits (II) specified in GR-2953-CORE, but it is compliant with the remainder of this GR.

9.11.5 Background

Current wireless growth has pushed analog signaling beyond the existing four Numbering Plan Digit (NPD) limitation. Support for the full 10-digit Calling Party Number (CPN) delivery is now required for analog product continuity. In addition, Federal Communications Commission (FCC) Docket 94-102 (Phase I) requires that two 10-digit numbers be delivered to the PSAP, one set providing the MDN and the other providing the cell site/sector information or pANI. This new Enhanced Multi-Frequency (EMF) analog signaling platform is defined in Bellcore GR-2953-CORE and is an addition to the existing standards defined in Bellcore TR-TSY-000350.

This new protocol is a variation of FGD.

9.11.6 Feature Operation

With the FGD Interface To E911 feature, a 10-digit interface is supported for wireline calls, and a 20-digit interface is allowed for wireless calls. The caller's Numbering Plan Area code (NPA) is sent to the PSAP instead of the NPD.

New II digits are also sent in the EMF message. There are only three valid values for the II digits:

40	=	normal display
44	=	flashing display
48	=	test calls

When the cell site/sector information is available, the protocol for wireless calls is KP-II-NPA-NXX-YYYY-ST-KP-NPA-NXX-YYYY-ST where the first NPA-NXX-YYYY denotes the MDN of the caller and the second NPA-NXX-YYYY denotes the pANI.

If the Multi-Frequency (MF) string does not contain an STP, this indicates two stage signaling. The second signaling stage provides the cell site/sector information in the pANI. When cell site/sector information is not available for a wireless call, the format used is KP-II-NPA-NXX-YYYY-ST-KP-000-911-0TTT-ST, where NPA-NXX-YYYY contains the MDN and the KP-000-911-0TTT indicates the absence of pANI information but identifies the call as wireless. TTT is the Emergency Service Central Office (ESCO) of the incoming trunk group

For E911 trunk maintenance test calls, the format used is KP-II-STP, where II is 48. No CPN is sent to the PSAP, and the STP denotes the omission of the second 10-digit number in the protocol. After seizing the selected idle trunk

and receiving the wink start signal on a test call, the switch outputs the test call digit sequence. When the PSAP recognizes a test call, it connects the trunk under test to a busy line termination and does not return answer supervision.

When the CPN is unavailable or the digits have been garbled in a 911 call using EMF, 000-911-0TTT is substituted for the CPN, where TTT is the ESCO of the incoming trunk group. When a PSAP trunk group is arranged for EMF, the switch always uses a full 10-digit CPN for Emergency or direct dialed calls. For direct dialed calls using EMF, 000-911-0000 is substituted for the CPN.

For wireline calls, EMF Signaling uses the format KP-II-NPA-NXX-YYYY-STP. The second 10-digit number capability is not used. STP denotes the omission of the second 10-digit number.

When the service provider specifies that only one 10-digit number is to be sent to the Public Safety Answering Point (PSAP) over an EMF interface, the MDN is sent. The format of the 10-digit EMF interface is KP-II-NPA-NXX-YYYY-STP, where NPA-NXX-YYYY is the MDN.

If the MDN is not available to the switch because of garbled digits, Automatic Number Identification (ANI) failure, or call origination from an unregistered mobile, the switch sends the 10-digit pANI to the PSAP, which allows the PSAP to identify the cell sector location for the call. If neither the MDN or pANI are available, the switch treats the call as an ANI failure and sends the pattern 000-911-0TTT to the PSAP, where TTT is the ESCO and the II digits are 40.

9.11.7 User Operation

9.11.7.1 For Subscribers

No subscriber actions are associated with this feature.

9.11.7.2 For Switch Personnel

Switch personnel designate the signaling type to be used on each type of analog PSAP termination, NPD+7 digit MF (existing CAMA) or EMF, on Recent Change and Verify (RC/V) View 5.1 by setting the ENH PSAP SIG and CAMA PSAP fields.

To configure MDN + pANI (20-digit) signaling, switch personnel enter the following in RC/V View 5.1:

FIELD	VALUE
CAMA PSAP	Y
ENH PSAP SIG	Y
TEN DIG ONLY	N

To set 10-digit-only signaling, switch personnel enter the following in RC/V View 5.1:

FIELD	VALUE
CAMA PSAP	Y
ENH PSAP SIG	Y
TEN DIG ONLY	Y

9.11.8 Engineering

9.11.8.1 Hardware Resources

No hardware considerations are associated with this feature.

9.11.8.2 Software Resources

This feature operates on switches equipped with E911 Service.

9.11.8.3 Transition Considerations

No transition considerations are associated with this feature.

9.11.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

9.11.10 Incompatibilities

No incompatibilities are associated with this feature.

9.11.11 Dependencies

E911 (SFID 61) must be activated before the FGD Interface To E911 feature can be activated.

9.11.12 Isolation Constraints

No isolation constraints are associated with this feature.

9.11.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the FGD Interface To E911 feature by populating the following fields in recent change and verify (RC/V) view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	299
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

9.11.14 Customer Premises Equipment (CPE)

The FGD Interface To E911 feature has the following Customer Premises Equipment (CPE) requirements.

- Automatic Location Identification (ALI) Multiplexers:
 - ALI Multiplexer IIs must have version 7.2 or later firmware.
 - ALI Multiplexer IIIs must have version 3.2 or later firmware.
- Engineering Purchased Integrated Circuits (EPIC) Inband Systems:
 - Central Processors (CPs) must have version CPEF2.01 or later firmware.
 - Dual Central Processors (DCPs) must have version DCPF2.E0 or later firmware.
 - 911 trunk equipment must have version RLCE4.00 or later firmware and must have the daughterboard replacement.
 - ANI display equipment must have version DSPX01.00 or later firmware and must have the daughterboard replacement.
 - Peripheral Controller (PC) ANI-link cards must have version PCA1.08 or later firmware.

- 1A2 Systems:

- CPs must have version CPA03.00 or later firmware.
- 911 trunk equipment must have version RLCA3.01 or later firmware and must have the daughterboard replacement.
- ANI display equipment must have version DSPX1.01 or later firmware and must have the daughterboard replacement.

NOTE: Dual CPs are not available for 1A2 Systems.

9.11.15 Maintenance Considerations

Not applicable.

9.11.16 Administration

9.11.16.1 Measurements

This feature does not impact measurements.

9.11.16.2 Billing

This feature does not impact billing.

9.12 WIRELESS 911

9.12.1 Description

The Wireless 911 feature (99-CP-4543), an enhancement to the E911 feature, allows the 5ESS® switch to estimate the location of a wireless 911 caller in accordance with Federal Communications Commission (FCC) regulations. The feature uses location information transmitted by the wireless service provider to route E911 calls to the appropriate Public Safety Answering Point (PSAP).

9.12.2 Availability

The Wireless 911 feature (99-CP-4543) is available as a software update for the 5E12 software release and is included in the 5E13 and later releases.

9.12.3 Environment

This feature is provided on a per-office basis.

9.12.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-CP-4543

9.12.5 Background

Not applicable.

9.12.6 Feature Operation

When a wireless 911 call is made, the wireless Mobile Switching Center (MSC) uses Integrated Services Digital Network User Part (ISUP) signaling messages, sent via Common Channel Signaling (CCS) over a direct trunk from an MSC to the E911 serving switch, to identify the call. These signaling messages include the originating Mobile Directory Number (MDN) as well as cell site and sector information specified by a 10-digit pseudo Automatic Number Identification (pANI). Each cell site/sector is uniquely identified by a pANI that provides the approximate location of the caller. The location information is normally sent in the Generic Digits Parameter (GDP) of the Initial Address Message (IAM) but can also be sent in the Called Party Number (CdPN) parameter of the IAM.

When the Wireless 911 feature is active, the 5ESS[®] switch acting as an E911 serving switch sends a query containing the MDN and the pANI of the wireless caller to the Emergency Service Adjunct (ESA). The ESA uses this location information in the ISUP signaling to determine the correct Emergency Service Number (ESN) for the call, and returns this ESN to the E911 serving switch. The switch then uses that ESN to determine the appropriate PSAP routing.

NOTE: For Wireline calls, the switch still sends a Message Type 1 query to the ESA.

The switch then uses the ESN to route the call to the appropriate PSAP.

A typical wireless 911 call scenario is:

- (1) A mobile caller dials 911.
- (2) The MSC populates the location information in the ISUP IAM. This is then transmitted using Signaling System 7 (SS7).
- (3) The 5ESS[®] switch determines that the call is a wireless 911 call based on the Calling Party Category (CPcat) and Originating Line Identity (OLI) parameters received via SS7.
- (4) If the Enhanced ESA is available, the switch uses the ESA timeout value for wireless (6.5 seconds). If the ESA is not available, the normal timeout value is used (1.5 seconds).
- (5) If the Enhanced ESA is available, the switch queries the ESA using new message type 8 to obtain the ESN. This message type supports transmission of the MDN and pANI. If the Enhanced ESA is not available, message type 1 is used, and only the MDN is populated in the ANI field of that message. (See Table 9-32 and Table 9-33 .
- (6) The ESA sends the ESN to the switch, and traditional 911 call processing continues.

Table 9-32 Message Type 8 - Query

field name	bytes	format
Switch_Client	4	as defined in 235-900-303, <i>Applications Processor Interface Specification</i>
BCID	2	value = 0x0 for e911
Feature ID	1	value = 0x7 (7) for e911
Length	1	value = 0xd (13)
Message Type	1	value = 0x8 (8)
MDN Length (digits)	1	value = 0xa (10)
MDN	5	BCD digits (0-9)
pANI Length (digits)	1	value = 0xa (10)
pANI	5	BCD digits (0-9)

Table 9-33 Message Type 1 - Query

field name	bytes	format
Switch_Client	4	as defined in 235-900-303, <i>Applications Processor Interface Specification</i>
BCID	2	value = 0x0 for e911
Feature ID	1	value = 0x7 (7) for e911
Length	1	value = 0x7 (7)
Message Type	1	value = 0x1 (1)
ANI Length (digits)	1	value = 0xa (10)
ANI	5	BCD digits (0-9)

Office Option Feature ID (OFID) 733 allows a wireless E911 call's pANI to be sent to an eight-digit Centralized Automatic Message Accounting (CAMA) PSAP facility. When OFID 733 is activated, all CAMA eight-digit PSAP facilities receive a pANI that consists of a Numbering Plan Digit (NPD) and the last seven digits of the normal ten-digit pANI.

9.12.7 User Operation

9.12.7.1 For Subscribers

No subscriber actions are associated with this feature.

9.12.7.2 For Switch Personnel

No switch personnel action is associated with this feature.

9.12.8 Engineering

9.12.8.1 Hardware Resources

No hardware considerations are associated with this feature.

9.12.8.2 Software Resources

No software considerations are associated with this feature.

9.12.8.3 Transition Considerations

No transition considerations are associated with this feature.

9.12.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

9.12.10 Incompatibilities

No incompatibilities are associated with this feature.

9.12.11 Dependencies

The Wireless 911 feature requires that the switch have Enhanced 911.

9.12.12 Isolation Constraints

No isolation constraints are associated with this feature.

9.12.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the Wireless 911 feature by populating the following fields in recent change and verify (RC/V) view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	298
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

The service provider enables the option to send pANIs to eight-digit CAMA PSAPs by populating the following fields on RC/V view 8.31 (OPTIONED FEATURES):

FIELD	VALUES
FEATURE ID	733
MODULE	OFC
ACTIVE	Y

9.12.14 Customer Premises Equipment (CPE)

Not applicable.

9.12.15 Maintenance Considerations

Not applicable.

9.12.16 Administration

9.12.16.1 Measurements

This feature does not impact measurements.

9.12.16.2 Billing

This feature does not impact billing.

9.13 911 BILLING FOR TOLL TRANSFERRED CALLS

9.13.1 Description

When a call to 911, which terminates on a Public Safety Answering Point (PSAP), is subsequently transferred by the PSAP to a number requiring a toll connection, the call is normally billed to the originating number. The 911 Billing For Toll Transferred Calls feature (99-5E-4414) allows the operating company to make the PSAP the billing number for such transferred calls.

9.13.2 Availability

The 911 Billing For Toll Transferred Calls feature (99-5E-4414) is available as a software update for the 5E10 and 5E11 software releases and is included in the 5E12 and later releases.

9.13.3 Environment

This feature is provided on a per-office basis.

9.13.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-4414

9.13.5 Background

Not applicable.

9.13.6 Feature Operation

When this feature is activated, calls that terminate to a PSAP but are then subsequently transferred to a number requiring Toll service are billed to the PSAP billing number, as indicated on Recent Change and Verify (RC/V) view 5.1. If the PSAP billing number is not populated on RC/V view 5.1, then the billing number is recorded as NULL.

9.13.7 User Operation

9.13.7.1 For Subscribers

No subscriber actions are associated with this feature.

9.13.7.2 For Switch Personnel

No switch personnel action is associated with this feature.

9.13.8 Engineering

9.13.8.1 Hardware Resources

No hardware considerations are associated with this feature.

9.13.8.2 Software Resources

No software considerations are associated with this feature.

9.13.8.3 Transition Considerations

No transition considerations are associated with this feature.

9.13.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

9.13.10 Incompatibilities

No incompatibilities are associated with this feature.

9.13.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

9.13.12 Isolation Constraints

No isolation constraints are associated with this feature.

9.13.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the 911 Billing For Toll Transferred Calls feature by setting Feature ID 696 to active on RC/V view 8.31 (OFFICE OPTION ID).

The service provider can specify the billing number of the PSAP on RC/V view 5.1 (TRUNK GROUP), in the BILLING DN field.

9.13.14 Customer Premises Equipment (CPE)

Not applicable.

9.13.15 Maintenance Considerations

Not applicable.

9.13.16 Administration

9.13.16.1 Measurements

This feature does not impact measurements.

9.13.16.2 Billing

The purpose of this feature is to change the billing number for certain types of 911 calls.

9.14 INHIBIT FLASH AND HOLD ON E911 CALLS

9.14.1 Description

The Inhibit Flash And Hold On E911 Calls feature (99-5E-0598) allows the service provider to control whether or not a 911 caller can put their 911 call on hold or "flash" to invoke a feature.

9.14.2 Availability

The Inhibit Flash And Hold On E911 Calls feature (99-5E-0598) is available as a software update for the 5E11, 5E12, and 5E13 software releases and is included in the 5E14 and later releases.

9.14.3 Environment

This feature is provided on a per-office basis.

9.14.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-0598

9.14.5 Background

Not applicable.

9.14.6 Feature Operation

When activated, this feature modifies the hold/flash interface to prevent an E911 caller from placing the 911 call on hold or using a hook flash to invoke other features.

9.14.7 User Operation

9.14.7.1 For Subscribers

No subscriber actions are associated with this feature.

9.14.7.2 For Switch Personnel

No switch personnel action is associated with this feature.

9.14.8 Engineering

9.14.8.1 Hardware Resources

No hardware considerations are associated with this feature.

9.14.8.2 Software Resources

No software considerations are associated with this feature.

9.14.8.3 Transition Considerations

No transition considerations are associated with this feature.

9.14.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

9.14.10 Incompatibilities

No incompatibilities are associated with this feature.

9.14.11 Dependencies

The E911 feature needs to be installed and activated in order for this feature to work.

9.14.12 Isolation Constraints

No isolation constraints are associated with this feature.

9.14.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the Inhibit Flash And Hold On E911 Calls feature by setting Feature ID 736 to active on RC/V view 8.31 (OFFICE OPTION ID).

9.14.14 Customer Premises Equipment (CPE)

Not applicable.

9.14.15 Maintenance Considerations

Not applicable.

9.14.16 Administration

9.14.16.1 Measurements

This feature does not impact measurements.

9.14.16.2 Billing

This feature does not impact billing.

9.15 NPA TO NPD TRANSLATION TABLE FOR E911 CALLS

9.15.1 Description

The NPA To NPD Translation Table for E911 Calls feature (99-5E-7124) allows full use of Signaling System 7 (SS7) to interface with Centralized Automatic Message Accounting (CAMA) Public Safety Answering Points (PSAPs) that can only receive eight-digits. The feature translates three-digit Numbering Plan Area (NPA) numbers to a one-digit Numbering Plan Digit (NPD) based on the NPA of the incoming call rather than having a single NPD assigned to an entire trunk group. This allows emergency calls from multiple NPAs to use the same trunk group.

9.15.2 Availability

The NPA To NPD Translation Table for E911 Calls feature (99-5E-7124) is available as a software update for the 5E12 and 5E13 software releases and is included in the 5E14 and later releases.

9.15.3 Environment

This feature is provided on a per-office basis.

9.15.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-7124

9.15.5 Background

SS7 signaling allows for calls from multiple NPAs to use the same trunk group. Without the NPA To NPD Translation Table for E911 Calls feature, the NPD used to signal the NPA to an eight-digit CAMA PSAP is translated on a trunk group basis, meaning that the same NPD would be sent to the PSAP for all calls on the trunk group, regardless of the originating NPA of the call received over the SS7 trunk group.

9.15.6 Feature Operation

The NPA To NPD Translation Table for E911 Calls feature provides a translation table to convert the three-digit NPA of an emergency call to a single-digit NPD based on the NPA in the Customer Emergency Services

Identification (CESID)—also referred to as the Automatic Number Identification (ANI). This new translation table is only used for incoming SS7 trunks that carry emergency calls (whether the trunks are dedicated or not). The number of NPDs that can be assigned per switch is still four, corresponding to the designation of NPDs 0, 1, 2, and 3, though more than one NPA can be assigned to an NPD.

The NPA To NPD Translation Table for E911 Calls feature can be used in conjunction with the Wireless E911 feature (99-CP-4543) for Wireless call originations. If the eight-digit CAMA PSAP normally receives the Mobile Directory Number (MDN) as the CESID, then the NPA from the MDN is used to translate the NPA to an NPD. If the MDN is not available, or if the eight-digit CAMA PSAP normally receives the pseudo ANI (pANI), then the NPA from the pANI is used to determine the NPD.

NOTE: The pANI is also referred to as the Cell Site/Sector.

9.15.7 User Operation

9.15.7.1 For Subscribers

No subscriber actions are associated with this feature.

9.15.7.2 For Switch Personnel

Switch personnel populate each of the NPA To NPD translations using Recent Change view 9.42 (NPA TO NPD TRANSLATION), then activate the NPA To NPD Translation Table for E911 Calls feature by entering Secured Feature Identification (SFID) 337 on Recent Change view 8.22 (SECURED FEATURE UPGRADE).

It is *strongly* recommended that the Translation Table be populated prior to activating the feature. If the SFID is activated first, then an assert ("missing NPA to NPD tuple") and a minor alarm will be produced for every processed call with an NPA that has not populated in the translation table.

NOTE: The assert and a minor alarm can be disabled by entering Optioned Feature Identification (OFID) 742 in the FEATURE ID field of Recent Change view 8.31 (OPTIONED FEATURES).

9.15.8 Engineering

9.15.8.1 Hardware Resources

No hardware considerations are associated with this feature.

9.15.8.2 Software Resources

No software considerations are associated with this feature.

9.15.8.3 Transition Considerations

No transition considerations are associated with this feature.

9.15.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

9.15.10 Incompatibilities

When the NPA To NPD Translation Table for E911 Calls feature is active, OFID 740, which uses the NPD populated on Recent Change view 9.41 (EMERGENCY SERVICE CENTRAL OFFICE), no longer operates.

9.15.11 Dependencies

The Enhanced 911 feature (99-5E-0598) must be installed for the NPA To NPD Translation Table for E911 Calls feature to work. The Wireless E911 feature (99-CP-4543) is required for the NPA To NPD Translation Table for E911 Calls feature to operate correctly with wireless calls.

9.15.12 Isolation Constraints

No isolation constraints are associated with this feature.

9.15.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

Switch personnel set up the NPA To NPD translation table by populating the following fields in recent change view 9.42 (NPA TO NPD TRANSLATION) for each NPA to NPD translation to be performed by the switch:

RC/V VIEW	VIEW NAME	FIELD	ALLOWED VALUES
9.42	NPA TO NPD TRANSLATION	NPA	(the NPA to be translated: [2-9][0-9][0-9])
9.42	NPA TO NPD TRANSLATION	NPD	(the NPD that the NPA is to be translated to: 0-3)

Switch personnel then enable the NPA To NPD Translation Table for E911 Calls feature by populating the following fields in recent change view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	337
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

Switch personnel can disable the assert and a minor alarm using Recent Change view 8.31 (OPTIONED FEATURES):

FIELD	VALUES
FEATURE ID	742

9.15.14 Customer Premises Equipment (CPE)

Not applicable.

9.15.15 Maintenance Considerations

Not applicable.

9.15.16 Administration

9.15.16.1 Measurements

This feature does not impact measurements.

9.15.16.2 Billing

This feature does not impact billing.

9.16 TANDEM TO TANDEM E911

9.16.1 Description

The Tandem to Tandem E911 feature (99-5E-4732) allows Public Safety Answering Points (PSAPs) to receive the same information on incoming calls from another switch, regardless of whether that PSAP is the initial call termination point or a subsequent termination.

The Tandem to Tandem E911 feature allows originating information for an E911 call or for a direct-dialed PSAP call to be retained when that call is transferred from one E911 tandem switch to another E911 tandem switch. The originating information is contained in the Initial Address Message (IAM), including a parameter indicating that the call is an emergency call, and is sent via Signaling System 7 (SS7). The IAM can also include the Directory Number (DN), specified by the PSAP operator, that the call is to be routed to and the originator's call information.

There are only two ways that a call over a tandem to tandem trunk will complete. The calling party category (CPC) parameter of the IAM can be marked EMER or the called party number can translate to EMER. If neither the CPC says EMER nor the called party number translates to EMER, the call generates a E911 MDII and the call fails.

The transfers covered by this feature include:

- emergency calls that originated in a wireline network,
- direct (anonymous) calls that originated in a wireline network,
- emergency calls that originated in a wireless network, and
- direct (anonymous) calls that originated in a wireless network.

NOTE: The term "transfer" when applied to E911 call handling usually means that a three-way conference is formed. The first PSAP may then choose to drop off the call after verifying that the caller and the second PSAP are connected.

The Tandem to Tandem E911 feature also applies to call forwarding of emergency or direct-dialed calls from an ISDN PSAP on one E911 tandem switch to a DN on a second E911 tandem switch.

9.16.2 Availability

The Tandem To Tandem E911 feature (99-5E-4732) is available as a software update for the 5E12 and 5E13 software releases and is included in the 5E14 and later releases.

9.16.3 Environment

This feature is provided on a per-office basis.

9.16.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-4732
- This feature is in compliance with the following Bellcore Technical Reference:
 - GR-2956-CORE: CCS/SS7/Generic Requirements in Support of E9-1-1 Service

9.16.5 Background

The current E911 Feature allows the Customer Emergency Service Identification (CESID), also referred to as the Automatic Number Identification (ANI), to be passed from one PSAP to another PSAP only if they are served by the same switch.

Without the Tandem To Tandem E911 feature, it is not possible for a call to be transferred to another E911 switch, to a particular PSAP, and still maintain its identity as an emergency call.

9.16.6 Feature Operation

This feature allows information pertinent to an E911 call or to a direct-dialed PSAP call to be transferred from one E911 tandem switch to another E911 tandem switch via SS7 signaling, including:

- Emergency Calls that originate in a wireline network,
- Direct (Anonymous) Calls that originate in a wireline network,
- Emergency Calls that originate in a wireless network, and
- Direct (Anonymous) Calls that originate in a wireless network.

The Tandem To Tandem E911 feature passes this information when:

- a call is transferred by a PSAP to a PSAP served by another E911 tandem switch
- a call is forwarded by the means of Call Forwarding to another E911 tandem switch, or
- a call is routed to another E911 tandem switch by default routing, alternate routing, or certain cases of selective routing or transfer.

Dedicated tandem to tandem trunk groups are used for emergency call traffic between two E911 tandem switches, which allows for proper processing of the transferred emergency calls.

Different IAM parameters are used for direct-dialed calls where the call is transferred by the PSAP to another switch, depending on the originator's Calling Party Number. If the originator's Calling Party Number is seven or ten digits, then the Calling Party Number is used for the Calling Party Number parameter (CgPN) of the IAM. If the originator's Calling Party Number is not seven or ten digits, then the Billing Number (BN) associated with the call is sent in the Charge parameter (CHG) of the IAM, and the CgPN parameter is not used. Direct-dialed calls require non-dedicated trunk groups to be used when the call is transferred from one E911 tandem switch to another.

This feature only works for SS7 trunks, which are required to pass all the required parameters.

This feature does not affect the way handoff is currently supported.

9.16.7 User Operation

9.16.7.1 For Subscribers

No subscriber actions are associated with this feature.

9.16.7.2 For Switch Personnel

The Tandem To Tandem E911 feature requires a direct connection between the E911 tandem switches, and the signaling used on the trunk group connecting them must be SS7.

Switch personnel enable the Tandem To Tandem E911 feature by activating SFID 330 on Recent Change view 8.22 (SECURED FEATURE UPGRADE). On the first E911 tandem switch, switch personnel need to make sure the class of service set for the outgoing trunk group in the TRK CLASS field on Recent Change view 5.1 (TRUNK GROUP) is either LTOLLCON or TTOLLCON. On the second E911 tandem switch, switch personnel need to set the following values for the incoming trunk group on Recent Change view 5.1 (TRUNK GROUP):

- the E911 TYPE field for the incoming trunk group to TNDM_TNDM.
- the TRK CLASS field to LTOLLCON or TTOLLCON,
- the INPLS field to ISUP7, and
- the TRK DIR field to INCOM.

9.16.8 Engineering

9.16.8.1 Hardware Resources

No hardware considerations are associated with this feature.

9.16.8.2 Software Resources

No software considerations are associated with this feature.

9.16.8.3 Transition Considerations

No transition considerations are associated with this feature.

9.16.9 Interactions and Limitations

For emergency calls received over dedicated tandem to tandem trunk groups, the Calling Party Number Delivery On E911 Calls feature (99-5E-2202) is affected when the Tandem To Tandem E911 feature is active. Bellcore specifications require that the calling party number be populated in the Calling Party Number parameter, so the Tandem To Tandem E911 feature always looks for the CESID in the Calling Party Number parameter in the IAM first, before checking the Charge (CHG) parameter.

9.16.10 Incompatibilities

No incompatibilities are associated with this feature.

9.16.11 Dependencies

The Tandem To Tandem E911 feature requires that the E911 feature (99-5E-0598) be active (SFID 61). The Wireless 911 feature (99-CP-4543) is also required (SFID 298) to allow the service provider to use the Generic Digits Parameter (GDP) to send the pANI information for wireless callers.

9.16.12 Isolation Constraints

No isolation constraints are associated with this feature.

9.16.13 Recent Change Provisioning

See 235-118-2xx, *5ESS® Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables the Tandem To Tandem E911 feature by populating the following fields in recent change and verify (RC/V) view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	330
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

Make sure that the TRK CLASS field on RC/V view 5.1 (TRUNK GROUP) for the outgoing trunk group on the first E911 tandem switch is set as follows:

RC/V VIEW	VIEW NAME	FIELD	ALLOWED VALUES
5.1	TRUNK GROUP	TRK CLASS	LTOLLCON or TTOLLCON

Make sure that the following values are set for the incoming trunk group on the second E911 tandem switch on RC/V view 5.1 (TRUNK GROUP):

RC/V VIEW	VIEW NAME	FIELD	VALUES
5.1	TRUNK GROUP	E911 TYPE	TNDM TNDM
5.1	TRUNK GROUP	TRK CLASS	LTOLLCON or TTOLLCON
5.1	TRUNK GROUP	INPLS	ISUP7
5.1	TRUNK GROUP	TRK DIR	INCOM

9.16.14 Customer Premises Equipment (CPE)

Not applicable.

9.16.15 Maintenance Considerations

Not applicable.

9.16.16 Administration

9.16.16.1 Measurements

This feature does not impact measurements.

9.16.16.2 Billing

This feature does not impact billing.

10. LEASED NETWORK FEATURES

10.1 LEASED NETWORK 100-SECOND SCAN

10.1.1 Feature Description

10.1.1.1 Feature Definition

The Leased Network 100-Second Scan feature scans customer-dedicated trunk groups every 100 seconds, and counts the number of busy trunks in the trunk group. This information is sent over an applications processor (AP) interface to an operational support system (OSS). This was developed for the 5ESS[®] switch Enhanced Private Switched Communications Service (EPSCS) network.

10.1.1.2 Feature Operation

10.1.1.2.1 User Perspective

The EPSCS feature is an NCS leased network service, providing large business customers with a variety of call processing and network management features. This feature, the leased network 100-second scan feature allows customers to monitor their network call load. This network consists of 5ESS[®] switches interconnected by customer-dedicated trunks, together with the EPSCS operation support systems.

The AP interface software transports the leased 100-second scan data messages to the EPSCS operating support system via ISDN SMs using basic rate interface.

10.1.1.2.2 System Perspective

Every 100 seconds, each SM in the 5ESS[®] switch uses existing trunk group usage counts to generate 100-second scan messages. These messages contain usage information for every EPSCS trunk group on that SM.

Trunks groups activated with the 100-second scan feature are scanned from a list sorted by business customer ID and applications processor ID. Therefore trunk groups owned by the same customer and assigned the same AP ID., are scanned consecutively.

The usage counts obtained for the trunk groups scanned are put into common 100-second scan messages. These messages are of a variable length and contain usage counts for up to 57 trunk groups that belong to the same customer. Messages are sent directly from the SMs containing EPSCS trunks to the ISDN SMs hosting the respective AP interface.

The AP interface communications package is used to send the 100-second scan messages from the SM containing EPSCS trunk group to EPSCS operating subsystem via the appropriate ISDN-SMs hosting the EPSCS data links.

Messages received by the AP interface are combined into larger group messages, commonly referred to as "super messages", for efficient transmission. Each "super message" contains either all real-time sensitive messages or all essential messages. The number of messages placed in a super message is limited to a maximum of 240 bytes.

The EPSCS support system collects the 100-second scan messages and computes the total usage for each trunk group by adding the individual usage counts received from each SM. The EPSCS operating system distributes the total usage counts to the Customer Network Control Center (CNCC) via the Customer Service Administration and Control Center (CSACC). This data is used to drive customer network management displays.

10.1.1.3 Availability

The Leased Network 100-Second Scan feature is available with 5E6 and later software releases.

10.1.2 Hardware Resources

The interface between the 5ESS[®] switch and the EPIC operating support system is the AP interface. The basic rate interface (BRI) data links connect the 5ESS[®] switch and the EPIC operating system from an ISDN-SM. These data links interface with the 5ESS[®] switch at an integrated services line unit (ISLU). A BRI 2B +D format is used leaving the ISLU terminating on a synchronous terminal adaptor (STA). The STA converts between an ISDN BRI to a standard RS232C data link (9600 b/s) as well as supplying the LAPD to LAPB protocol conversion. The STA interface with an EPIC operating support system is a front end controller (FEC). Both the STA and the FECs are co-located with the EPSCS 5ESS[®] switch.

10.2 LEASED NETWORK MDR FOR RELEASED LINK TRUNK

10.2.1 Definition

This feature provides message detail recording (MDR) records for calls assisted by an attendant when the switch serving the assisted caller is connected to the switch serving the attendant by a release link trunk (RLT). An MDR record written for the initial call to the attendant must indicate the call terminated to an RLT. If the call is transferred by the attendant from the RLT, this MDR record must also indicate the call transfer. An MDR record written for a call extended by the attendant from the RLT must specify the calling number and incoming facility identification associated with the initial call to the attendant, and further specify that an attendant assisted the call.

10.2.2 Availability

This feature is available with the 5E6 and all subsequent software releases for the 5ESS[®] switch.

10.2.3 Feature Operation

A list of call scenarios involving the generation of MDR records involving RLTs follows:

- (1) The MDR for RLT capability modifies the contents of an MDR record that is created for a call originating on a private facility that is routed to a network attendant over an RLT. This MDR record indicates that the calling party terminated on an RLT. This is accomplished by setting the Outgoing Facility Type information field in the MDR record to a new value of 4 that corresponds to an RLT facility type.

If the calling party is transferred by the attendant, the Feature Interaction Code information field in this MDR is set to a new value of 6 corresponding to Attendant Call Transfer.

- (2) An MDR record that is created for a multiway call originating on an RLT by an attendant contains the necessary information specifying the assisted caller as the originator of the multiway call and indicates that an attendant assisted the call.

This capability provides content changes to the following information fields in this second MDR record:

- (a) The Incoming Facility Type, Incoming Facility Group Number, Incoming Facility Group Member, and the Calling Number information fields are set to values that are associated with the originating callers facility and not the attendants.

The Calling Number will either be the caller's billing DN or the caller's private NANP DN without the NPA. If there is no associated DN, the Calling Number field will be filled with the standard fill characters.

- (b) The Feature Interaction Code information field is set to 1 to indicate Attendant Source Billing.

10.2.4 Implementation

This feature is implemented as part of switch MDR to CL feature. The MDR for RLTs operation is to modify MDR records written for calls originated on or terminated to trunks marked as RLTs. The MDR to CL feature determines when MDR records are written.

10.3 LEASED NETWORK ACTION POINT ROUTING AND BILLING

10.3.1 Overview

10.3.1.1 Definition

This feature (99-5E-0557) provides for enhancements in the routing and billing of calls in leased networks. This 5ESS[®] switch feature interacts with a network data base to determine the appropriate call handling needed for leased network calls.

The access to the leased network services that this feature covers includes the following:

- Single-line telephone sets
- Multiline key telephone systems
- PBXs
- Centrexes
- Central offices with feature group D access
- T1 digital terminating equipment
- ISDN primary rate interface
- ISDN basic rate interface
- CCS7 ISUP
- Dedicated CAMA
- Interfaces to other networks.

Class of service for a call is determined by the network data base from automatic number identification (ANI), authorization code, traveling class mark, or trunk group. The network data base then imposes time of day, day of week, and day of year restrictions, implemented on a per-station, per-location, and per-authorization code basis.

The network data base translates data associated with access to the leased network to determine how the call is to be routed. Routing data is provided to the 5ESS[®] switch including the method of routing the call and egress destination number. It is possible to route the call on-net utilizing the capabilities of the 5ESS[®] switch automatic route selection (ARS) feature or off-net using the public switched network.

It is possible for each intra-network 5ESS[®] switching node to signal using encrypted CCS7 signaling. Inter-network signaling supports CCS7 network interconnect, multifrequency, dual tone multifrequency, and dial pulse signaling for the purpose of receiving and sending digits between networks at network interconnection points.

This feature allows the leased network customer to have AMA recording performed. These AMA records are generated by the switching system under the direction of the data base system. The 5ESS[®] switching system uses

ANI as the billing number in the AMA record. In addition, it provides other AMA related data such as call origination and disconnect times.

10.3.1.2 Availability

This feature is available with the 5E6 and subsequent software releases of the 5ESS[®] switch.

10.3.1.3 Feature Provision Basis

This feature is provided per 5ESS[®] switch.

10.3.2 User Perspective

10.3.2.1 User Profile

This feature was primarily designed to provide the ability of an NCS 5ESS[®] switch to serve as an action point (ACP) for FTS2000 service, and software defined network (SDN) service, in an NCS leased network.

10.3.2.2 User Operations

There is no major impact on the subscriber or the office personnel as a result of this feature. The customers might get recall dial tone for the authorization code.

Administration personnel are affected by the new recent change data required for the new access/egress types, new call code/structure code assignments, etc. Also new measurements, and network management counts are added by the Leased Network ACP service feature.

New input/output (I/O) messages for craft are affected by the additions/modifications to I/O messages for traps and different tests.

Billing centers are affected by the new AMA records and message detail recording (MDR) tables for the Leased Network.

10.3.2.3 Interactions

No interactions with other features have been defined.

10.3.3 System Resources

No new hardware or modification of existing hardware is required for this feature. However, use of this feature does require that the office be equipped with the common network interface (CNI) ring hardware. The CNI ring must be equipped with System 7 (56 kb/s) link nodes. The CNI ring may also be optionally equipped with the Direct Link Node if the office is also equipped with communication module 2 (CM2).

10.3.4 Assignment Guidelines

This feature does not require assignment to subscribers as it is available to users of the leased network upon subscription to the 5E6 software release of a 5ESS[®] switch.

10.3.5 System Operation

10.3.5.1 Routing at Leased Network Action Point Access Switch

The ARS feature is a business and residence custom services (BRCS) feature and is used for circuit-switched data

calls as well as for voice calls.

After receiving the dialed digits, the leased network ACP formulates the query and sends it to the leased network network control point (NCP). If a traveling class mark (TCM) is received, which may occur only for non-switched access trunks using traditional MF signaling, that is EA MF or CAMA ANI, then it also passes the TCM in the query as a station group designator (SGD).

The leased network NCP screens the call and asks the leased network ACP to prompt for the authorization code on finding insufficient privileges to route the call. The leased network ACP prompts for the authorization code and sends it back to the leased network NCP. After screening, if the leased network NCP finds the proper privileges associated with the call, it sends a message back to the leased network ACP containing the following information to route the call:

- Data Rate
- Automatic route selection group identifier (ARSID)
- Routing Number
- Call facility restriction level (FRL).

The ARSID that is received from the leased network NCP is a network wide numerical identifier for the ARS group and not the actual ARS group ID which is used internally in the leased network ACP and associated with an ARS group name. The ARS group name and call FRL that may be assigned to the incoming trunk are ignored, and the NCP supplied ARS group ID (as derived from the ARSID) and call FRL are used.

The ARSID is mapped at the ACP to the corresponding ARS group ID, which is then used internally to perform the ARS routing function.

The routing number received from the NCP is translated using the office dialing plan (ODP). The digit analysis selector (DAS) assigned to the incoming access facility is used for this purpose.

The leased network ACP uses the results of translating the routing number to get an ARS Index. The type of office (that is, access or via) that is handling this particular call is used to obtain the ARS screening index (SI). The ARS group ID, ARS index, and ARS SI are then used to determine the first routing index (RI) in the route list.

For each RI in the route list, the route FRL associated with it is checked against the call FRL to make sure that there is sufficient FRL to route the call. On unavailability of a route in the route list, the call is queued if BRCS off-hook trunk queuing is enabled.

If the call FRL (that is, the FRL received from the NCP) is greater than or equal to the route FRL and there is an idle route available, the call is routed. If the call FRL is less than the route FRL, the call is killed, unless the associated outgoing trunk group has the BRCS off-hook trunk queuing feature and the RI is not the first one in the route list. It is expected that the leased network NCP will send the leased network ACP a call FRL which is sufficient to route. If all routes, for which the call FRL is greater than or equal to the route FRL, are busy, the call is queued for the first route in the ARS route list by using BRCS off-hook trunk queuing. If queuing is not possible, the call is given final treatment, for example, reorder.

If the outgoing trunk is a leased network CCS7 ISUP intermachine trunk, the following information is passed in the ISUP initial address message (IAM) to the next switch, in order to route the call:

- Data rate
- The network-wide ARS group identifier (ARSID). (The ARSID is first obtained by mapping it from the internal ARS group ID.)

- Routing number
- Call FRL
- Leased network service identifier.

10.3.5.2 Routing at Leased Network Via Switch

At the leased network via switch (or egress switch), the digits received in the ISUP IAM are translated using the ODP.

The dialing plan is set up administratively and is set to the ODP for dedicated FTS2000 leased network intermachine trunks. The leased network via switch tries to route the call using ARS routing based on the ARS information received in the ISUP IAM, which overrides ODD that may be assigned to the incoming trunk.

As noted previously, the CCS7 ISUP IAM which is sent from the leased network ACP to the leased network via (or egress) office in the case of CCS7 intermachine trunks, contains the ARSID. At the via office, the ARSID is converted back to an internal value of the ARS group ID.

The ARS feature supports the option to crank back a leased network call from a leased network via switch to the leased network access switch up to a limit of 6 times. Crankback is restricted to calls incoming to a leased network switch on CCS7 ISUP leased network intermachine trunks. The last route in an ARS list may be a crankback route. When the crankback route is used for a call, an ISUP crankback message is sent to the previous leased network switch and the originating facility is idled. The crankback message indicates that the leased network switch could not route a call which originated on an ISUP trunk. The message is sent back to the leased network that forwarded the call. When the leased network switch which forwarded the call receives the ISUP crankback message, the outgoing facility is idled and ARS proceeds as though the corresponding route is unavailable. As long as a route is available in the ARS list, the leased network attempts to route. The leased network switch may, therefore, receive more than one crankback message as it goes through the list trying to route the call.

In software release 5E6, the leased network also supports existing software release 5E6 MF intermachine trunks. In this case, at the via office, the ARS group and FRL assigned to the incoming MF intermachine trunk are used for routing to an egress office, and the ARS group ID is converted to an ARSID before an ISUP IAM is sent out over a CCS7 intermachine trunk.

10.3.5.3 Routing at Leased Network Egress Switch

As in the case of a leased network via switch, a leased network egress switch tries to route the call using ARS routing based on the ARS information received in the ISUP IAM, which overrides ODD that may be assigned to the incoming trunk. Final treatment at the egress switch is either to route the call off-net or to kill the call.

Tail-end hop off, whereby an FTS2000 off-net call traverses the leased network up to the egress switch and "hops off," is supported administratively such that the last ARS route at the egress switch is assigned a public route list and the call is routed off-net.

At the terminating (egress) switch, the call FRL is converted to the TCM and is outpulsed, only if required by the facility; for example, in the case of non-switched access MF signaling egress facilities. There are no new requirements in this regard. Existing TCM capabilities are used.

10.3.5.4 Initiating Billing

Billing for calls is initiated when the NCP sends a CHARGING-BILL CALL operation to the ACP. The ACP makes an AMA record for every call for which a CHARGING-BILL CALL operation is received regardless of the eventual disposition of the call.

The AMA billing records for all calls are created in the ACP and (using a single entry format) are either written on magnetic tape for processing at some remote location or written to disk and later teleprocessed to a regional processing center (RPC).

10.3.6 Measurements

Measurements requirements for leased network ACP are virtually identical to those for the 5E6 software release ACP for SDN capability. Since there exists a possibility that in the future the NCS leased network and public switched network may share some switches, leased network ACP counts are kept separate from SDN counts.

10.4 LEASED NETWORK ACTION POINT SCREENING

10.4.1 Overview

10.4.1.1 Definition

Call screening comprises a set of capabilities that determine a call's eligibility to be completed as dialed, based on class-of-service information with the user, the station, or the trunk group for leased network. The representative access to the leased network services includes the following:

- Single-line telephone sets
- Multiline key telephone systems
- PBXs
- Centrexes
- Central offices with feature group D access
- T1 digital terminating equipment
- ISDN primary rate interface
- ISDN basic rate interface
- CCS7 ISUP
- Dedicated CAMA
- Interfaces to other networks.

Class of service is determined by the network data base from the ANI, authorization code, traveling class mark, or trunk group. The network data base can impose time of day, day of week, and day of year restrictions, implemented on a per-station, per-location, and per-authorization code basis.

The network data base contains data associated with determining a call's eligibility. The data base causes the caller to be prompted on originating on- and off-net calls if identification cannot be made by other means for billing and class-of-service purposes, or when override capabilities are possible.

Override capabilities are made available by the caller dialing a predetermined code along with the destination number, identifying to the network data base that authorization code screening is required. The caller is prompted for an authorization code when it is not provided in the dialing sequence.

Repeated attempts that are closely spaced in time from one or more locations using the same or different invalid

authorization codes, or other identifiable patterns, might represent effort to perpetrate fraud. These cases are reported as possible fraud attempts.

It is possible for the caller to enter an authorization code from any station device that is an acceptable call origination device. An attendant may enter the authorization code for the caller and the call proceeds as if the caller had entered the authorization code.

10.4.1.2 Availability

This feature is available with the 5E6 and subsequent software releases of the 5ESS[®] switch.

10.4.1.3 Feature Provision Basis

This feature is provided per 5ESS[®] switch.

10.4.2 User Perspective

10.4.2.1 User Profile

This feature was primarily designed to provide the ability of an NCS 5ESS[®] switch to serve as an ACP for FTS2000 service, software defined network service, and Custom Network Option/Multimode Digital Switched Network (CNO/MDSN) service in an NCS leased network.

10.4.2.2 User Operations

There is no major impact on the subscriber or the office personnel as a result of this feature. The customers might get recall dial tone for the authorization code.

Administration personnel are affected by the new recent change data required for the new access/egress types, new call code/structure code assignments, etc. Also new measurements, and network management counts are added by the Leased Network ACP service feature.

New I/O messages for craft are affected by the additions/modifications to I/O messages for traps and different tests.

Billing centers are affected by the new AMA records and MDR tables for the Leased Network.

10.4.2.3 Interactions

No interactions with other features have been defined.

10.4.3 System Resources

No new hardware or modification of existing hardware is required for this feature. However, use of this feature does require that the office be equipped with the CNI ring hardware. The CNI ring must be equipped with System 7 (56 kb/s) link nodes. The CNI ring may also be optionally equipped with the Direct Link Node if the office is also equipped with CM2.

10.4.4 Assignment Guidelines

This feature does not require assignment to subscribers as it is available to users of the leased network upon subscription to the 5E6 software release of a 5ESS[®] switch.

10.4.5 System Operation - Authorization Codes

In some cases, an authorization code is received by the leased network ACP along with the dialed number. This code is included in the query to the leased network NCP. In other cases, when no authorization code is received with the dialed digits, the leased network may request that one be collected.

When the leased network ACP receives the message back from the leased network NCP telling it to collect an authorization code, it sends a recall dial tone to the caller to prompt for the authorization code, then collects it, and sends it to the leased network NCP. Critical interdigit timing of 4 seconds and permanent signal of 20 seconds (10 seconds when in overload) is used when collecting the authorization code digits. The authorization code may be prompted for several times, whether or not the dialer included it in the initial query.

10.4.6 Measurements

Measurement requirements for the leased network ACP are virtually identical to those for the 5E6 software release ACP for SDN capability. Since there exists a possibility that in the future the NCS leased network and public switched network may share some switches, leased network ACP counts are kept separate from SDN counts.

10.5 LEASED NETWORK ACTION POINT ATTENDANT

10.5.1 Overview

10.5.1.1 Definition

This feature (99-5E-0559) provides for enhancements in the capabilities provided by the 5ESS[®] switch to an attendant system in leased networks.

The following services are provided by leased network attendants:

- (1) The attendant has the capability to set up conferences and connect all conferees.
- (2) An attendant is able to verify authorization codes given verbally by callers from off-net and on-net locations by querying the NCP.
- (3) The attendant has the capability to initiate the following:
 - Reports of a stolen or lost authorization code
 - Credit adjustments for completed calls to wrong numbers, interruption of calls, or unsatisfactory transmission.

The attendant services are provided on a stand-alone system. The interface between the call processing 5ESS[®] switch and attendant system are Release Link and Tie Link trunks. Release Link trunks link the two systems for purposes of call completion setup by the attendant or assisting customers on matters requiring short holding times. The Release Link trunk is released whenever the attendant leaves the call.

Caller access to teleconferencing attendants, or attendants providing services requiring long holding times, is accomplished with a Tie Link trunk interface between the attendant and the 5ESS[®] switch.

When a caller accesses an attendant by means of a Release Link trunk interface, transfer to a second attendant is accomplished by means of a Tie Link trunk between the attendant and 5ESS[®] switch. The Release Link trunk is released whenever the first attendant leaves the call.

When an attendant is extending a call through the 5ESS[®] switch for a caller, the call data associated with the caller is used in place of the call data of the attendant.

Teleconference calls are extended by means of a stand-alone bridge interfacing to a leased network 5ESS[®] switch. These calls appear to the switch as if the bridge were the accessing station.

Attendant entry of the authorization code by means of a Release Link trunk is treated and recorded as if the caller entered the authorization code.

The leased network attendant interacts with an external system (other than the switching system) for the purpose of initiating credit adjustments and reports of stolen or lost authorization codes. The credit adjustments are linked with the AMA records of the leased network customer by a stand-alone billing system.

10.5.1.2 Availability

This feature is provided with the 5E6 and subsequent software releases of the 5ESS[®] switch.

10.5.1.3 Feature Provision Basis

This feature is provided per 5ESS[®] switch.

10.5.2 User Perspective

10.5.2.1 User Profile

This feature was primarily designed to provide the ability of an NCS 5ESS[®] switch to serve as an ACP for FTS2000 service, software defined network service, and CNO/MDSN service in an NCS leased network.

10.5.2.2 User Operations

There is no major impact on the subscriber or the office personnel as a result of this feature. The customers might get recall dial tone for the authorization code.

Administration personnel are affected by the new recent change data required for the new access/egress types, new call code/structure code assignments, etc. Also new measurements, and network management counts are added by the Leased Network ACP service feature.

New I/O messages for craft are affected by the additions/modifications to I/O messages for traps and different tests.

Billing centers are affected by the new AMA records and MDR tables for the Leased Network.

10.5.2.3 Interactions

No interactions with other features have been defined.

10.5.3 System Resources

No new hardware or modification of existing hardware is required for this feature. However, use of this feature does require that the office be equipped with the CNI ring hardware. The CNI ring must be equipped with System 7 (56 kb/s) link nodes. The CNI ring may also be optionally equipped with the Direct Link Node if the office is also equipped with CM2.

10.5.4 Assignment Guidelines

This feature does not require assignment to subscribers as it is available to users of the leased network upon subscription to the 5E6 software release of a 5ESS[®] switch.

10.5.5 System Operation - Attendant Feature

Access to attendant services is available for leased network customers from both on-net and off-net locations, by dialing on-net numbers. The attendant console is served by the Centralized Attendant Service (CAS) feature of a System 85. The CAS/RLT feature implemented in the 5ESS[®] switch in the 5E6 software release, interfaces with the System 85 CAS feature to provide attendant services to the leased network customer. The leased network ACP capability makes use of the CAS/RLT feature to provide a leased network caller with access to an attendant and extend the call to a third party. Three-way calling is used to achieve this and no N-way features are used. A leased network ACP can route to an attendant via RLTs or tie trunks. Calls to an attendant use RLTs for the following services:

- Call Completion Assistance - The attendant assists with dialing difficulties and completion of such calls, remaining on the line until the call is completed.
- Locator Service - The attendants provide locator service numbers via a data base lookup. The caller can dial these directly, or the attendant may complete the call to the retrieved number.
- Authorization Code Verification - The attendant collects an authorization code given verbally by the caller, and completes the call to the required destination if the authorization code privileges allow the call to be completed.

For calls to attendants, the leased network ACP initiates a leased network NCP query if the call requires a query; that is, FTS2000 calls to an attendant cause queries, CNO calls to an attendant do not cause queries.

For extended calls from an RLT attendant, the leased network initiates a query to the leased network NCP if a query is required. When attendant assistance requires the call to be extended, the extended call appears to the leased network ACP as a second call origination. Since the leased network ACP capability is required to send a query to the leased network NCP when an attendant extends a call for a caller, CAS/RLT processing is suspended as the leased network ACP waits for and processes the response from the leased network NCP. The leased network NCP query (if required) for the extended call contains data as if the caller, not the attendant, originated the call.

The specific data from the assisted party that is to be contained in the NCP query for an attendant extended call, includes the ANI billing number, calling party number/station ID, data rate, and station group designator. Also, the attendant assumes the call FRL returned by the NCP.

Release Link trunks link the leased network ACP and the attendant system for purposes of call completion setup by the attendant or assisting customers on matters requiring short holding times. The attendant remains on the call only as long as necessary to assist in completion of the call. The disposition of the 3-party setup between the attendant and the calling and called parties depends on which party disconnects first.

If the leased network ACP is instructed to route a leased network call to an attendant on an RLT, then the following occurs:

- If the originating party disconnects during call setup, the call is idled.
- If the originating party disconnects after the call to an RLT attendant has been established, the ACP releases all legs of the call.
- If the originating party disconnects after the extended call has been established, but before the attendant disconnects, the ACP releases all legs of the 3-way call.
- If an extended call has been established and the RLT attendant has not yet disconnected, then if the terminating party is disconnected (by the terminating party hanging up or the attendant flashing), the attendant may make another extended call to the same or a different number. The new extended call will proceed just as in the case of the first extended call. An initial TCAP query is made for each extended call.

- The RLT is released whenever the attendant disconnects from the call.
- If the attendant has disconnected from the call after the extended call has been established, the RLT is released. The call between the originating and terminating party is idled on disconnect of either party.

Tie trunks are treated as outgoing trunks by the leased network ACP. Tie trunks are used for attendant services that require long interaction with the caller and do not require call completion service by the attendant. An attendant system that attempts to complete or transfer calls from tie trunks is not supported by this capability. The services provided over tie trunks are as follows:

- Audio Teleconferencing - A caller may request an attendant to reserve audio teleconferencing calls as well as set up the calls and connect all conferees.
- Trouble/credit - The caller reaches an attendant to report any variety of troubles such as lost or stolen authorization codes, or requests for credit adjustments due to completion to a wrong number, call interruption, or unsatisfactory transmission.

If a call which originated on an RLT to an attendant requires transfer to a second attendant to perform one of these services, the call is transferred to the second attendant via a tie trunk. The RLT is released when the first attendant leaves the call.

Calls made by means of the network audio teleconference bridge appear to the leased network ACP as if the bridge were the accessing station. The leased network ACP initiates a leased network NCP query for calls when required.

10.5.6 Measurements

Measurement requirements for leased network ACP are virtually identical to those for the 5E6 software release ACP for SDN capability. Since there exists a possibility that in the future the NCS leased network and public switched network may share some switches, leased network ACP counts are kept separate from SDN counts.

10.6 ISDN ACCESS TO LEASED NETWORK FEATURES

10.6.1 Overview

10.6.1.1 Definition

This feature (99-5E-0560) provides access to the functionality and features of the leased networks for the ISDN PRI and BRI interfaces. This includes serving arrangements that allow a leased network customer access via CCS7 Network Interconnect on dedicated trunks. Access to the following capabilities are provided on the 5ESS[®] switch:

- BRCS Automatic Route Selection (ARS) - This capability allows ISDN access to the BRCS ARS feature. This feature enables the 5ESS[®] switch to meet the leased network numbering plan and routing requirements.
- Authorization Codes - This capability allows leased network customers with ISDN access functionality to have authorization code screening. Authorization code screening applies to data as well as to voice.
- Calling party number (CPN) to Network - The CPN to network capability allows the CPN for a station to be available at the 5ESS[®] switch.
- CPN/Billing Number (BN) to terminating user - This capability allows the 5ESS[®] switch to deliver CPN/BN to a terminating user over ISDN interface.
- Off-Hook Queuing On PRI - The ACP customer is given critical user queuing which allows the 5ESS[®] switch to

limit queuing for outgoing facilities to those leased network customers with maximum facility restriction level.

Operations, administration, and maintenance capabilities to support this feature are provided (for example, provisioning, billing data, MDRs) for circuit switched voice and data and for CPN/BN delivery.

This feature includes the recent change work and trunk maintenance procedures needed to provide for these new capabilities.

10.6.1.2 Availability

This feature is available with the 5E6 and subsequent software releases of the 5ESS[®] switch.

10.6.1.3 Feature Provision Basis

This feature is provided per 5ESS[®] switch.

10.6.2 User Perspective

This feature was primarily designed for the leased network on-net customer base.

10.6.2.1 User Operations

Customers who have a BRI or PRI access facility are able to make voice and circuit switched data calls over a single access line.

All voice and circuit switched data calls are routed through the leased network using routing information provided by the subscriber (that is, the population of the ARS data is driven by the customers' needs).

The customer can assign authorization codes to their employees and associate certain calling privileges with each authorization code. The employee can then enter their authorization code to have their calls charged to themselves as well as to obtain the calling privileges to which they are entitled. A recall dial tone is used to prompt the user for their authorization code.

The customer must subscribe to the CPN/BN delivery feature if they want the CPN or BN delivered on incoming calls. Each customer access line must also be identified as a leased network ACP, leased network non-ACP, or public facility.

The operating company personnel must mark each customer's access line to indicate whether or not they have subscribed to the CPN/BN delivery feature.

10.6.2.2 Interactions

This capability relies on timing parameters and trunk member attributes defined by the leased network ACP capability.

10.6.3 Interfacing Hardware

No new hardware is required on the 5ESS[®] switch; however, the Q.931 originating terminal process (OTP) has to connect a universal tone generator (UTG) to the incoming B-channel to send a recall dial tone to prompt the user for an authorization code. When the first authorization code digit arrives, the UTG can be removed from the connection.

The Q.931 PRI OTP also has to attach a universal tone decoder (UTD) to the B-channel to detect the DTMF authorization code digits sent by the CPE. The UTD can be removed after the last authorization code digit has been received.

New hardware for non-5ESS[®] switch leased network switches is needed for the O&M loopback tests. The loopback test for BRI and PRI B-channels require a special unit (ISTF) to generate the bit stream. A special BRI CPE is required to loop back the bit stream.

10.6.4 Assignment Guidelines

This feature does not require assignment to subscribers as it is available to users of the leased network upon subscription to the 5E6 software release of a 5ESS[®] switch.

10.6.5 System Operation

10.6.5.1 Authorization Codes

The authorization codes (ATH) can be used by leased network customers to override the billing number for a call and/or to allow the caller to override the call privileges associated with the access line being used. To support these requirements, three types of ATH modes are supported:

- (1) Network prompt
- (2) Forced ATH entry
- (3) Forced ATH prompt (ACP only).

Each mode is discussed separately for both the ACP and non-ACP architectures, as appropriate.

10.6.5.2 Network Prompt (Non-ACP Case)

In this scenario, the non-ACP customer dials the called number. The ARS software chooses a route for the call and compares the FRL associated with that route (that is, the route FRL) to the FRL associated with the port (that is, the call FRL).

If the route FRL is higher than the call FRL, the ARS software checks to see if the BRCS ATH feature is assigned to the access circuit. If not, the call is killed because the user does not have sufficient privileges to use the route selected. If the ATH feature is assigned, the switch applies a recall dial tone to the B-channel associated with the call, and collects the ATH as a string of DTMF digits over a PRI B-channel or as INFO messages over a BRI D-channel.

When the switch receives the ATH, a new call FRL is assigned based on the ATH. The ARS is then accessed with the new call FRL. If the new call FRL is still lower than the route FRL, the call is killed. If the new call FRL is equal to or higher than the route FRL, the call proceeds.

10.6.5.3 Network Prompt (ACP Case)

In this scenario, the ACP customer dials the called number, and the switch sends a query to the NCP. The NCP performs its screening functions and decides that the user must enter an ATH before the call can continue. The switch is instructed to prompt for and collect an ATH. The switch uses the same ATH prompting and collection scheme previously described.

When the ATH has been received, another query is sent to the NCP. This query contains the ATH entered by the customer. If NCP screening fails, the NCP can instruct the switch to prompt for and collect the ATH again. If NCP screening fails repeatedly (current NCP specification is a maximum of two failures), the NCP tells the switch to kill the call.

After the ATH has been received and NCP screening has passed, the NCP instructs the switch to route the call. The

ARS software is now invoked to choose an outgoing route. In this case, the switch uses the call FRL obtained from the NCP. If the route FRL is higher than the call FRL, the call is killed. The BRCS ATH feature is not assigned to access circuits for customers using the ACP architecture. If the call FRL is greater than or equal to the route FRL, the call is completed.

10.6.5.4 Forced ATH Entry (Non-ACP Case)

In this scenario, the user dials the called number and an ATH, and both pieces of information are sent to the switch in the Q.931 SETUP message. It is expected that this scenario will be used for data calls, since no customer interaction is required to obtain the ATH. The User Code Information Element in Codeset 6 will be used to carry the ATH.

When the switch receives the ATH in the SETUP message and the BRCS ATH feature is assigned, it uses the ATH to update the call FRL. The ARS software is then invoked to route the call using the call FRL associated with the ATH that was entered.

If the route FRL is greater than the call FRL, the call is killed; otherwise, the call is completed. Note that the ARS software does not have to check to see if the BRCS ATH feature is assigned to the access circuit, because a non-ACP based customer is only allowed one chance to enter an ATH.

10.6.5.5 Forced ATH Entry (ACP Case)

In this scenario, the user dials the called number and an ATH, and both pieces of information are sent to the switch in the Q.931 SETUP message. It is expected that this scenario will be used for data calls, since no customer interactive signaling is required to obtain the ATH. The User Code Information Element in Codeset 6 will be used to carry the ATH.

When the switch receives the SETUP message, it passes the ATH, the called number, and other pertinent data to the NCP in the query message. The NCP performs its screening and instructs the switch to do one of the following:

- (1) Route the call
- (2) Kill the call
- (3) Prompt the user for ATH.

If the switch has been instructed to prompt the user for an ATH, the same prompting and collecting method described earlier is used. In the forced ATH entry case, the NCP instructs the switch to prompt for the ATH (the maximum times to prompt is determined by the NCP) even if an ATH has already been received once. Each time the switch collects another ATH, a query is sent to the NCP with the new ATH. When interfacing with the NCP, the switch prompts if so directed by the NCP response; therefore, it is the NCP which controls the limit on the number of prompts for ATH.

When the switch is instructed to route the call, the ARS software is invoked. If the call FRL obtained from the NCP is less than the route FRL, the call is killed. Remember that the BRCS ATH feature is not assigned to access circuits for customers using the ACP architecture. If the call FRL is greater than or equal to the route FRL, the call is routed.

10.6.5.6 Forced ATH Prompt (ACP Only)

This scenario will not be used by CNO customers in the 5E6 time frame; therefore, it is only being provided for customers using the ACP architecture.

This ATH entry method requires the user to initiate a call by dialing a special dialed number. The switch passes this number to the NCP in the query message. When the NCP sees this special number, it always instructs the switch to collect the dialed digits.

The switch sends recall dial tone to the user. The user hears recall dial tone and dials the number he/she is trying to reach (that is, the real called number). The switch receives the called number, and sends a query to the NCP. The NCP recognizes the ANI as an access facility requiring ATH and tells the switch to collect an ATH. The switch then sends recall dial tone to tell the user to enter their ATH. The switch collects the ATH and sends another query containing the ATH to the NCP. The NCP performs its screening functions and instructs the switch to route the call, kill the call, or reprompt for the ATH.

When the switch is instructed to prompt for an ATH, the same prompting and collection method described earlier is used. Remember that the NCP can instruct the switch to prompt for the ATH. If NCP screening still fails after the maximum attempts set by the NCP, the NCP tells the switch to kill the call. Each time the switch collects another ATH, a query is sent to the NCP with the new ATH.

If the call is to be routed, the ARS software is invoked to select the outgoing circuit. As was discussed before, the call FRL used by the ARS software is the FRL obtained from the NCP query. If the call FRL is less than the route FRL, the call is killed; otherwise, the call is routed.

10.6.6 Measurements

Measurements are not applicable to this feature.

10.7 CCS7 LEASED NETWORK INTEROFFICE SIGNALING

10.7.1 Overview

10.7.1.1 Definition

The Leased Network Interoffice Signaling feature provides end-to-end out-of-band signaling to a leased network. This capability permits the operation of NCS's leased network features with CCS7 signaling between leased network switching nodes. This feature also allows ARS to take advantage of and interwork with Common Channel Signaling facilities.

This feature also provides the capability to do CCS7 crankback. This capability permits a switch node which can not complete a call to crank back the call to the originating switch. When an originating 5ESS[®] switch encounters a cranked back call, the call is then routed to the next route in the ARS list.

10.7.1.2 Availability

This feature is available with the 5E6 and subsequent software releases of the 5ESS[®] switch.

10.7.1.3 Feature Provision Basis

This feature is provided per 5ESS[®] switch.

10.7.2 User Perspective

10.7.2.1 User Profile

This feature was primarily designed to provide the ability of an NCS 5ESS[®] switch to serve as an ACP for FTS2000 service, SDN service, and CNO/MDSN service in an NCS leased network.

10.7.2.2 User Operations

There is no major impact on the subscriber or the office personnel as a result of this feature. The customers might

get recall dial tone for the authorization code.

Administration personnel are affected by the new recent change data required for the new access/egress types, new call code/structure code assignments, etc. Also new measurements, and network management counts are added by the Leased Network ACP service feature.

New I/O messages for craft are affected by the additions/modifications to I/O messages for traps and different tests.

Billing centers are affected by the new AMA records and MDR tables for the Leased Network.

10.7.2.3 Interactions

No interactions with other features have been defined.

10.7.3 System Resources

No new hardware or modification of existing hardware is required for this feature. However, use of this feature does require that the office be equipped with the CNI ring hardware. The CNI ring must be equipped with System 7 (56 kb/s) link nodes. The CNI ring may also be optionally equipped with the Direct Link Node if the office is also equipped with communication module 2 (CM2).

10.7.4 Assignment Guidelines

This feature does not require assignment to subscribers as it is available to users of the leased network upon subscription to the 5E6 software release of a 5ESS[®] switch.

10.7.5 CCS7 ISUP Signaling

Traffic between 5ESS[®] switches in the leased network are carried on CCS7 ISUP trunks. The routing information indicator (RII) in the IAM used between leased network 5ESS[®] switches has been modified to contain additional information including a service identification field and a service parameter field.

The CCS7 ISUP IAM service identification field is used to identify the call as a leased network call. The binary value 11111110 is used to populate this field for any leased network call.

The CCS7 ISUP IAM service parameter field contains the binary value of the ARSID.

The FRL, which is received in the NCP reply to the query, is populated in the OLI parameter of the leased network ISUP IAM. The originating and subsequent leased network switches use the FRL for FRL screening.

The data rate is passed in the user service indicator parameter of the leased network ISUP IAM, and the routing number is passed in the called party number parameter.

The key difference in the terminating traffic is the terminating switch recognition of the dedicated egress indicator on the IAM, which allows the terminating switch to terminate on-net numbers via dedicated egress domains. This type of routing is used when the call is using SDN toll-like routing. The ARS routing is used for a typical leased network call. For leased network ARS calls, the dedicated egress indicator in the IAM is not set, and an ARS group (derived from the network ARSID) is used for routing.

For routes terminating to the public network on CCS7 ISUP trunks, the IAM sent for the routed call must conform to public network standards. The following changes have been made for the IAM going off the leased network into the long distance or LEC public networks:

- The service identification field is populated to the value for long distance service.

- The service parameter field is removed.
- The calling party number parameter is replicated in the charge number parameter before sending the ISUP IAM out to the public network.
- The originating line information parameter containing the FRL is removed.

This capability implements the ISUP crankback (CRB) message. When a leased network via switch using ARS routing cannot route the call, and the last route in the route list is a crankback route, the leased network switch sends the ISUP CRB message to the previous leased network switch. The standard ISUP CRB message in Q.763 is used.

For calls incoming to a leased network ACP access switch on a CCS7 network interconnect trunk, a CCS7 address complete message (ACM) with an indication of "interworking encountered" is sent backward in the following cases:

- For calls completing to a leased network attendant
- For calls requiring interactive authorization code collection at the leased network ACP
- For calls placed on an outgoing trunk queue.

Once the leased network ACP sends an IAM for a CCS7 outgoing trunk, standard ACM timing at the leased ACP applies. Afterward, if the leased network ACP receives an ACM for the CCS7 outgoing trunk and an ACM has previously been sent back for the CCS7 network interconnect incoming trunk, then it does not retransmit the ACM for the incoming trunk, but only uses this event to satisfy its outgoing trunk ACM timer.

If, instead of an ACM, a release message is received for the CCS7 outgoing trunk and an ACM has previously been sent back for the incoming trunk, then the leased network ACP stops the ACM timer and connects the CCS7 network interconnect incoming trunk to the appropriate tone/announcement in preparation to follow standard disconnect procedures. Also, if the leased network ACP outgoing trunk ACM timer expires and an ACM has previously been sent back for the incoming trunk, then the leased network ACP plays the appropriate tone/announcement and follows standard disconnect procedures.

10.7.6 Measurements

Leased network calls blocked due to CCS problems are pegged and reported on the 5-minute surveillance data report. The count of leased network calls blocked due to CCS problems are the sum of the following two numbers:

- The number of leased network calls canceled, because a leased network begin message TCAP message associated with that call, was denied access to some portion of the CCS network.
- The number of leased network calls canceled by automatic controls taken in response to leased network begin message TCAP message failures.

10.8 NETWORK MANAGEMENT ENHANCEMENTS FOR LEASED NETWORKS

10.8.1 Overview

10.8.1.1 Definition

This feature (99-5E-0566) ensures that existing network management controls function properly in the leased network environment. This includes ensuring that the existing network management functions are called during call

setup and providing a mechanism to exempt critical user calls from network management control. Critical users are exempt from cancel-from (CANF), cancel-to (CANT), cancel rerouted overflow (CRO), trunk reservation (TR), manual call gap (MCG), and automatic congestion control (ACC) levels 1 and 2. Critical users are not exempt from SKIP, reroute (RR), or ACC level 3.

10.8.1.2 Availability

This feature is provided with the 5E6 and subsequent software releases of the 5ESS[®] switch.

10.8.1.3 Feature Provision Basis

This feature is provided per leased network 5ESS[®] switch.

10.8.2 User Perspective

10.8.2.1 User Profile

This feature was primarily designed for users of the 5ESS[®] switch in a leased network application.

10.8.2.2 User Operations

10.8.2.2.1 Subscriber

There are no changes required in the subscriber interface.

10.8.2.2.2 Operating Company Personnel

All network management capabilities in the public network are enabled in the leased network.

10.8.2.3 Interactions

The feature's abilities are not restricted by the presence of other features in the office.

10.8.2.4 System Resources - Hardware

There is no new or changed hardware associated with this feature.

10.8.3 Assignment Guidelines

This feature does not require assignment to subscribers as it is available to users of the leased network upon subscription to the 5E6 software release of a 5ESS[®] switch.

10.8.4 System Operation

The code changes required for this capability have been integrated into the existing system and have not created any new processes. All interfaces are the same as those previously existing in the plain old telephone service (POTS) network management scenario.

10.8.5 Measurements

There are no new measurement reports required for this capability.

10.9 LEASED NETWORK SERVICE SELECTIVE TRUNK RESERVATION (SSTR) (5E7)

10.9.1 Overview

10.9.1.1 Definition

The Leased Network Service Selective Trunk Reservation (SSTR) feature (99-5E-0685) allows up to 15 trunks in a trunk group to be reserved for critical users. When the control is triggered on a noncritical user, the call is skipped to the next trunk group in the route list.

To administer the SSTR control, the 5ESS[®] switch collects 5-minute node-to-node [originating (access) switch to terminating (egress) switch] data and passes it to the Regional Network Management System (RNMS). The RNMS then calculates the node-to-node blocking rate according to the received data. Based on node-to-node blocking rate, the RNMS can turn SSTR on or off on appropriate trunk groups. The RNMS has the ability to instruct the 5ESS[®] switch for which nodes to send data.

The node-to-node data collection in SSTR is based on the routing structure currently being used in the FTS2000 network. In that routing structure, a unique automatic route selection (ARS) index is used to route calls to a particular destination switch. The 5ESS[®] switch actually collects the data on the basis of the ARS index, which has a one-to-one relationship with the destination switch.

A method is required to identify and communicate node identifications (IDs) between the 5ESS[®] switch and the RNMS. Recent Change View 10.28 has been created to map the external switch identifier (*CLLI*[™] code) used for reporting the data to the internal switch identifier (ARS index) used for collecting the data. Counts for voice calls and data calls are collected separately.

10.9.1.2 Background

The SSTR feature is a new network management trunk group control that provides the ability for the network manager to reserve up to 15 trunks in a trunk group for critical users. Critical users are defined as callers whose facility restriction level is at least 14.

10.9.1.3 Availability

This feature is available with the 5E7 and subsequent software releases of the 5ESS[®] switch.

10.9.1.4 Feature Application

This feature is provided per 5ESS[®] switch.

10.9.2 User Profile

The SSTR feature was primarily designed for critical users of the leased network utilizing the 5ESS[®] switch.

10.9.3 User Operation

10.9.3.1 Subscriber

When calls are controlled by SSTR, the noncritical subscriber is skipped to the next trunk group on the route list and call treatment is given as determined by the new trunk group. Overall, the network performance for the critical user is improved at the potential expense of the noncritical traffic.

10.9.3.2 Operating Company Personnel

Normally, SSTR is administered by RNMS based on the node-to-node blocking rate. The network manager at RNMS and the on-site craft personnel are able to manually assign, clear, allow, and inhibit SSTR for any trunk group.

regardless of the blocking rate.

10.9.3.3 Activation

The following input messages are used on-site to activate SSTR:

- (1) **ASGN:SSTR,TG=a[,RL=b][,INH=c]**
This command is used to assign an SSTR control to a trunk group.
- (2) **ALW:SSTR,TG=a**
This command is used to allow a single SSTR control which has been assigned and inhibited.
- (3) **ASGN:NMNODES,NODES=a-b[-a-b][-a-b][-a-b]**
This command is used to assign the node list to the 5-minute node schedule.
- (4) **SET:SSTROVRD**
This command is used to override all per-trunk group SSTR inhibits.
- (5) **SET:M5,PKG=a**
This command has been updated to include the new packages. It allows for collection of the 5-minute data.
- (6) **OP:M5,PKG=b**
This command has been updated to include the new packages. It allows for retrieval of the 5-minute data.

Refer to 235-600-700, *5ESS® Switch Input Messages Manual*, for an explanation of the input message variables.

10.9.3.4 Deactivation

The following input messages are used on-site to deactivate SSTR:

- (1) **CLR:SSTR,TG=a**
This command is used to remove a single SSTR control.
- (2) **CLR:NMNODES[,NODES=a-b[-a-b][-a-b][-a-b]]**
This command is used to remove the node list from the 5-minute node schedule.
- (3) **INH:SSTR,TG=a**
This command is used to inhibit a single SSTR control.
- (4) **CLR:SSTROVRD**
This command is used to clear the inhibit override set as a result of a **SET:SSTROVRD**.
- (5) **CLR:M5,PKG=b**
This command has been updated to include the new packages. It allows a package to be deleted from the 5-minute data packages.

Refer to 235-600-700, *5ESS® Switch Input Messages Manual*, for an explanation of the input message variables.

10.9.3.5 Information Requests

The following input messages are used on-site to request information pertaining to SSTR controls assigned or to obtain a list of all node identifiers on the 5-minute node schedule:

- (1) **OP:SSTR[,TG=a]**

This command is used to list either a single SSTR control or all currently assigned SSTR controls.

(2) **OP:NMNODES**

This command is used to request a list of all node identifiers on the 5-minute node schedule.

Refer to 235-600-700, *5ESS[®] Switch Input Messages Manual*, for an explanation of the input message variables.

10.9.3.6 Restriction Capability

There are no controls to restrict or change the operation of SSTR.

10.9.4 Compatibilities

The SSTR feature is compatible with all other features and hardware items assignable to the *5ESS[®]* switch.

10.9.5 Interactions

The only control which is impacted by SSTR is Trunk Reservation (TR). When both SSTR and TR are turned on for a trunk group, SSTR causes the switch to reserve the last one or more trunks for critical users, while TR causes the switch to reserve the last few trunks (except those trunks reserved by SSTR) for first routed calls (that is, the calls using the first route in the route list) and critical user calls. Critical users are exempted from TR. To make TR actually work, the reservation level for TR must always be higher than the reservation level for SSTR when both TR and SSTR are turned on for the same trunk group.

10.9.6 Engineering

10.9.6.1 Special Planning Considerations

The one-to-one relationship between the ARS index used for routing and the destination switches *CLLI[™]* codes is the basis for node-to-node measurements.

10.9.6.2 Hardware

There is no new or changed hardware associated with the SSTR feature.

10.9.7 Assignment Dependencies and Limitations

10.9.7.1 Dependencies

No other features and/or services must be operational in the switch before the Leased Network SSTR feature can be implemented.

10.9.7.2 Limitations

The maximum number of trunk groups for which Trunk Group Controls can be applied is 384. Therefore, there can be up to 384 SSTR controls applied, depending on the number of trunk groups with other types of controls applied.

10.9.8 Feature Implementation Procedures

10.9.8.1 Office Data Administration (ODA) Implementation

Not applicable.

10.9.8.2 Recent Change Procedures

There is a new relation and Recent Change View 10.28 (Exhibit 10-1) used to map the external switch IDs (*CLLI*TM code) to the internal switch IDs (ARS index) in the switch. Data can be reported only for destination switches entered in this view. The corresponding new relation contains the *CLLI*TM code and ARS index for each destination switch in the Leased Network.

```

5ESS(R) SWITCH
RECENT CHANGE 10.28
LEASED NETWORK NODE MAPPING

```

```

* 1. DEST CLLI _____
# 2. LN ARS IDX _____

```

Exhibit 10-1 RC View for Leased Network Node Mapping

The *CLLI*TM code is required to be unique by its use as a key to the relation. Uniqueness of the LN ARS IDX is enforced by RC/ODA systems such that no two tuples have the same LN ARS IDX. No other validity checking is practical.

The ARS index used for leased network routes to be included in the node-to-node measurements is restricted to values not greater than 1000. This is higher than any expected use and saves 5ESS[®] switch resources when indexing the counters.

10.9.8.3 Assignment Verification

Not applicable.

10.9.9 Feature Operation

10.9.9.1 SSTR Control

The switch accepts the instruction from the RNMS (or on-site) to assign, clear, allow, and inhibit SSTR and sends back an acknowledgment. The instruction includes an outgoing or 2-way Leased Network trunk group (that is, LN TYPE on RC View 5.1 must not be NONE) ID and two optional parameters: reservation level (RL) and SSTR inhibit option (INH). If the trunk group is not outgoing or 2-way Leased Network, then an error is returned. The reservation level must satisfy $1 \leq RL < RL2(max) < RL1(max) \leq 15$. If the inequality is not met, an error message is returned. The default values for the on-site interface are RL = 1 and INH = NO. The RNMS must specify all values.

When TR with the Automatic Reservation Adjustment (ARA) option is assigned, if the requirement that $1 \leq RL < RL2(max) < RL1(max) \leq 15$ is not fulfilled, the switch sends an error message. When TR without ARA is assigned, if $RL1 \neq 0$ and $RL \geq RL1$ or $RL2 \neq 0$ and $RL \geq RL2$, the switch returns an error message. The switch performs the ARA logic for TR as shown in the modified ARA algorithm in Figure 10-1 .

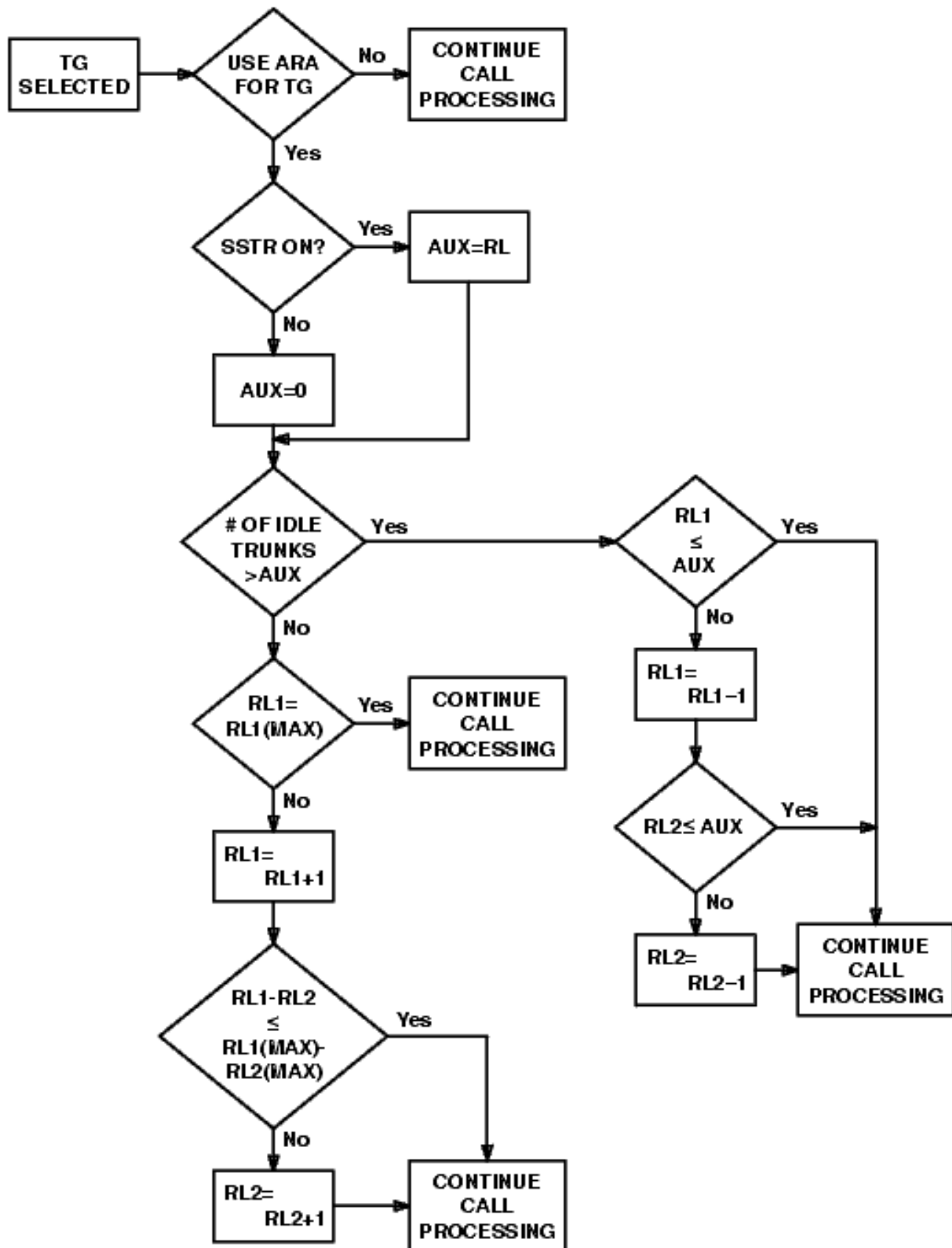


Figure 10-1 Automatic Reservation Adjustment Logic

The SSTR is triggered when all the following occur:

- SSTR is assigned and not inhibited
- The number of idle trunks in the group falls to or below RL
- A noncritical user (FRL < 14) attempts to hunt that trunk group.

When SSTR is triggered, the noncritical user calls are skipped to the next entry in the route list. Notice that the next entry is a trunk group or any final treatment for the originating switches; the next entry for the via switches is a crankback order.

Critical users (FRL of 14 or more) are not affected by SSTR. A noncritical user call is subject to the prehunt controls in the following order:

- CANT
- SKIP
- SSTR
- TR
- ACC.

The switch supports the SSTR Demand Audit Request/Response to allow the network manager at the RNMS to verify the SSTR settings. The audit response contains the following information:

- On which trunk groups are SSTR controls assigned?
- What is the RL value for each of these trunk groups?
- Is the SSTR inhibit option ON or OFF?

The switch is able to accept commands from the RNMS (or on-site) to override all SSTR inhibits (that is, allow all inhibited SSTR controls) and to restore all SSTR inhibits to the values prior to the receipt of the inhibit override command. The switch is able to accept commands from on-site to inhibit SSTR messages from the RNMS from printing on-site, and to accept commands from on-site to restore on-site printing of SSTR messages from the RNMS.

10.9.9.2 5-Minute Measurements

The switch collects a new leased network node-to-node (LNNODE) 5-minute package containing node-to-node attempt counts and overflow counts for up to 124 nodes on the node schedule and sends them to the RNMS. The switch collects a new leased network critical user (LNCU) 5-minute package containing office-wide counts of critical-user originating calls, total critical-user call load, critical-user calls blocked, and calls affected by SSTR and sends them to the RNMS or on-site craftsperson as requested.

The switch accepts the NM node schedule command and sends back a confirmation response to the RNMS or on-site craftsperson as requested, which contains the node list in the command request. The switch protects the NM node schedule up through a level 7 initialization. The switch supports the node schedule Demand Audit Request/Response to allow the network manager at the RNMS to verify the node schedule.

10.9.9.3 30-Second Discretes

The following discretes are used for SSTR:

- (1) SSTR-On Discrete - This is a flag indicating that SSTR has been turned on by RNMS or on-site for at least one trunk group. The discrete is cleared when no SSTR controls remain.
- (2) SSTR-Triggered Discrete - This is a flag indicating that SSTR has been triggered on at least one trunk group. This discrete is cleared after a 30-second discrete audit is sent to RNMS.
- (3) SSTR Control Change Discrete - This is a flag indicating that an SSTR control has been changed on-site. This discrete is cleared when an SSTR demand audit response is sent to RNMS.
- (4) Office-Wide SSTR Inhibit Override - This is a flag indicating that the office-wide SSTR inhibit override has been turned on. This discrete is reset when Office-Wide SSTR inhibit override is turned off.
- (5) Node Schedule Change Discrete - This is a flag indicating the node schedule has been changed by either on-site or RNMS. It is reset after a node schedule demand audit is sent to RNMS.
- (6) Node Schedule Compromised Discrete - This is a flag indicating that some event (such as a switch initialization) has caused the schedule to be lost. It is reset after a node schedule update request is received from RNMS.

The switch sets the 30-second discretes (SSTR assigned, SSTR triggered, SSTR control change, office-wide SSTR inhibit override, node schedule change, and node schedule compromised) and sends them to the RNMS. The switch also sends the SSTR assigned, SSTR triggered, and office-wide SSTR inhibit override discretes to the NM Exception Page.

10.9.9.4 Recent Change

The switch provides recent change support for the new static Office Dependent Data relation that maps the external destination switch ID (*CLL*TM code) to the internal destination switch ID (ARS index).

10.9.10 Administration

10.9.10.1 Measurements

10.9.10.1.1 Traffic and Plant Measurements

A related feature added a new 30-minute section 146 containing node-to-node attempts, usage, and overflow counts to the 30-minute traffic report. The attempts and overflow are the same as those defined in the following section for 5-minute measurements.

10.9.10.1.2 5-Minute Measurements

10.9.10.1.2.1 5-Minute Node-to-Node Data

The new leased network node-to-node (LNNODE) package contains node-to-node attempt and overflow counts. The RNMS supplies a schedule of nodes for which 5-minute node-to-node data is collected. The 5ESS[®] switch sends the data in the same order as requested on the node schedule, including zero counts.

A leased network destination node is identified by specifying a switch and a voice/data route indicator. For example, the Seattle switch comprises two leased network nodes, "Seattle voice" and "Seattle data". A Leased Network

access switch collects data for calls to each destination node.

There is a method to identify nodes for external communication with RNMS and the craft personnel, and there is a method to identify nodes internally in the switch to collect the counts. The external node ID consists of a *CLLI*TM code and a voice/data flag. The *CLLI*TM code is a universal code used to identify switches.

This external node ID does not facilitate data collection in the switch because the *CLLI*TM code is not available during call processing. The internal node ID is based on the routing structure currently being used in the Leased Network. In this routing structure, an ARS index corresponds to a destination switch. The measurements are collected by ARS index. The data rate returned in the NCP query is used to distinguish voice and data calls.

There is a new relation and Recent Change View 10.28 used to map the external switch IDs (*CLLI*TM code) to the internal switch IDs (ARS index) in the switch. Data can be reported only for destination switches entered in this view. The corresponding new relation contains the *CLLI*TM code and ARS index for each destination switch in the Leased Network.

The *CLLI*TM code is required to be unique by its use as a key to the relation. Uniqueness of the LN ARS IDX is enforced by RC/ODA systems such that no two tuples have the same LN ARS IDX. No other validity checking is practical.

The ARS index used for leased network routes to be included in the node-to-node measurements is restricted to values not greater than 1000. This is higher than any expected use and saves 5ESS[®] switch resources when indexing the counters.

10.9.10.1.2.2 5-Minute Critical User Office Data

The new leased network critical user (LNCU) package contains the following office-wide counts:

- (1) Count of critical user originating calls
- (2) Total critical user call load - This count indicates the total number of originating calls and incoming calls
- (3) Count of critical user calls blocked
- (4) Count of calls affected by SSTR.

10.9.10.2 Billing

Billing is not applicable to the Leased Network SSTR feature.

11. COIN AND CHARGE-A-CALL FEATURES

This section provides information for the Coin Line and Charge-A-Call features available with the 5ESS[®] switch. Also included is information covering the Expanded Inband Signaling feature, which supplements the Coin Line feature. In this document, the term TSPS is used to indicate a Traffic Service Position System (TSPS) or any other equivalent operator service system.

11.1 COIN LINE FEATURE DESCRIPTION

The following Coin Line features are available with the 5E6 and subsequent software releases:

- (a) Coin-First (CF) Service: The CF service is a feature that requires the deposit of a coin or coins before dial tone is returned and a call can be initiated. The initial deposit is always returned on all free calls (for example, 911), all non-sent-paid 0+ and 0- calls, and is optionally returned on 1+ calls.
- (b) Dial-Tone-First (DTF) Service: The DTF service is a feature that provides dial tone without an initial coin deposit. Local calls require deposit of the initial rate before the completion of dialing. All other calls may be dialed without a coin deposit.
- (c) Semi-Postpay (SPP) Coin Service: The SPP coin service is a feature that provides coin telephone service without requiring an initial coin deposit before dialing. The SPP coin subscriber only makes a deposit when the called party answers. Local and toll calls may be originated from SPP coin stations. Free calls, such as operator assistance calls and 3-digit service code calls, are completed from SPP coin stations without a coin deposit.

NOTE: The SPP coin stations are not equipped with a coin hopper; coins deposited cannot be returned.

Inter-LATA sent-paid and non-sent-paid calls are allowed from coin stations. Customers are able to access any interconnect carrier. In addition, 950-1XXX calls may also be allowed from coin stations.

Most interconnect carriers arrange to receive only non-sent-paid coin traffic. In this arrangement, the interconnect carrier needs to use either a second dial tone arrangement for these types of calls or have these calls routed to an operator services facility. When the second dial tone arrangement is used, it is not necessary for the operating telephone company (OTC) office to have any special screening or routing for coin calls; the calls are distinguishable at the office of the interconnect carrier by the automatic number identification (ANI) information digits. When the arrangement for routing to an operator services facility is used, the interconnect carrier must be provided with a unique code index so that class-of-service routing can be done.

For interconnect carriers that arrange to receive sent-paid coin traffic, an arrangement must be made with the OTC so that the money deposited into the coin box is actually paid to the interconnect carrier. It is also necessary that the interconnect carrier have direct trunk groups to the offices to which this type of service arrangement is provided. This is required because coin control signals cannot be passed through an access tandem.

The following features are not allowed with coin telephone service:

- Call Forwarding Variable
- Call Forwarding Busy Line
- Remote Call Forwarding
- Speed Calling
- Three-Way Calling

- Series Completion
- Call Waiting
- Multiline Hunt Group
- 2-Party Line
- 4- and 8-Party Line
- Private Branch Exchange (PBX) Line
- Make-Busy Key
- Denied Originating Service
- Hotel/Motel Calls Route to TSPS.

11.1.1 Cross-References

The following cross-references are applicable to this feature:

- LSSGR or Feature Numbers: Coin First - 10-01-0000
Dial Tone First - 10-02-0000
- NSEP Number: BASE (For both Coin First and Dial Tone First).

11.2 COIN COLLECT AND RETURN SIGNALING

Coins are collected or returned by the application of coin collect or coin return battery by the central office or TSPS.

For CF or DTF service, coins are collected at the end of all sent-paid calls and may also be collected by an operator signal while an operator-monitored call is in progress. The option of returning coins initially or on disconnect is provided for operator calls. Coin return is provided as soon as it is determined that the call is a free call, except when the call is routed to an announcement. For this case, coin return is provided at disconnect.

For SPP coin service, coins are deposited and automatically collected when the called party answers. A coin deposit is not required for free calls.

11.2.1 Cross-References

The following cross-references are applicable to this feature:

- LSSGR or Feature Number: 10-03-0000
- NSEP Number: BASE.

11.3 COIN SERVICE WITH AND WITHOUT LOCAL OVERTIME

Coin service with and without local overtime applies only to CF and DTF stations. There is no local overtime option with SPP coin service.

Coin service without local overtime permits unlimited conversation time on local calls after the initial coin deposit.

Coin service with local overtime divides the coin call into two distinct periods: initial and overtime. Coins are collected approximately 25 to 30 seconds before the end of each period. At the end of each period, an overtime coin test is made by applying positive voltage to the tip conductor. If a coin is present, timing for the next period commences. If no coin is present, an announcement is connected to instruct the customer to make an overtime deposit.

Another coin test is performed approximately 25 to 30 seconds after the announcement, and if no coin is present, the call is disconnected.

Local coin distance overtime charges are limited to five cents, since only the presence of a coin (not the denomination) can be detected.

11.3.1 Cross-References

The following cross-references are applicable to this feature:

- LSSGR or Feature Number: 10-04-0000
- NSEP Number: BASE.

11.4 COIN DISTANCE DIALING WITH TRAFFIC SERVICE POSITION SYSTEM

For CF and DTF service, coin distance dialing with TSPS provides customer dialing of toll calls. The TSPS operator or Automated Coin Toll Service (ACTS) equipment is connected to:

- (a) Request and monitor the initial deposit
- (b) To notify the customer of the end of the initial period
- (c) To request and monitor overtime deposits. The TSPS operator also provides assistance on 0+ calls (for example, collect, credit card, person-to-person).

Completion of toll calls from an SPP coin station requires operator control. The following options exist for operator control:

- Coin distance dialing via cord switchboard
- Coin distance dialing via TSPS for station-to-station calls.

With the coin distance dialing via cord switchboard option, the call is handled entirely by the operator. The operator performs dialing, requests the initial rate once answer has been detected, verifies the deposit, allows the call to complete once the deposit is made, times the call, and handles any overtime charges.

With the coin distance dialing via TSPS for station-to-station calls option, the call is entirely controlled by the central office and TSPS. Once the customer completes dialing, the operator requests the initial rate, verifies the deposit via coin tones, and then outpulses and releases the call. The TSPS times the call and signals the central office to disconnect. If an overtime charge is involved, a TSPS operator is reconnected.

11.4.1 Cross-References

The following cross-references are applicable to this feature:

- LSSGR or Feature Number: 10-05-0000

- NSEP Number: BASE.

11.4.2 User Operation

11.4.2.1 Coin-First Service

To obtain dial tone, CF service requires the customer to deposit, at the coin telephone set, a coin or coins in the amount equal to or greater than the local initial period rate. Thereafter, the customer may dial any local or toll call depending on the charge options selected. The local initial rate is preset in the coin station set.

11.4.2.2 Dial-Tone-First Service

A DTF coin station receives dial tone immediately after a customer goes off-hook. When dialing a number that requires no initial deposit, the number can be dialed immediately after obtaining dial tone. When dialing a number that requires an initial coin deposit, the deposit must be made before dialing is completed. Otherwise, the customer receives a recording instructing the customer to reinitiate the call with the proper deposit.

The DTF Coin feature enables customers to dial certain operator-assisted calls, free calls (for example, emergency service bureau calls), and calls via inter-LATA carriers that are dialed, 10XX+ or 950-WXXX, without making an initial coin deposit. Operator-assisted calls (0- and 0+) include person-to-person calls, collect calls, credit card calls, and toll information calls. Station-to-station toll calls (1+ or no prefix) can also be placed without an initial deposit, and an operator or ACTS equipment requests and monitors the deposit for the initial talk period before allowing the call to complete.

Three-digit service code (N11) calls [such as, directory assistance (411) or universal emergency service bureau (911)] are allowed without an initial deposit, as are any other calls so designated by the OTC. Toll-free Service Access Code (SAC) calls, such as 800 or 888 calls, may also be placed without an initial deposit.

11.4.2.3 Semi-Postpay Coin Service

An SPP coin station receives dial tone immediately after a customer goes off-hook. When dialing a number that is a free call, no coin deposit is required. For local calls that require a deposit, the customer dials the number, and the call proceeds until the called party answers. Once the called party answers, the coin station transmitter is disabled causing the calling party to be able to hear the called party, but the called party cannot hear the calling party. To establish a talking connection, the calling party must make the initial deposit which is immediately collected.

There is no minimum charge duration for SPP coin stations. Also, there is no local coin overtime option available with SPP coin service. This option is applicable to CF and DTF service only.

In offices where overtime charging for local coin telephone calls is used, a local coin call with overtime is divided into two distinct periods: initial and overtime. Both periods are defined by the operating company for specific dialable codes for a given central office, and each may be from 1 to 7 minutes in 1-minute increments.

The operating company can assign different timing periods for calls to different destinations based on the central office codes dialed.

The initial period, which need not equal the overtime period, begins after the called party answers. If the call terminates with more than 25 to 30 seconds remaining in the initial period, all coins are collected and the call connections released. The initial deposit is automatically collected 25 to 30 seconds before expiration of the initial period. The sound of coins being collected indicates to the coin customer that the period is near completion, and the customer must either disconnect or deposit the overtime rate to continue the call without interruptions. If it is not possible to obtain a circuit to collect the coin at the end of the initial period, the call should be permitted to continue with repeated attempts to collect the coin at approximately 30-second intervals.

Twenty-five to thirty seconds after collection of the initial deposit (that is, at the end of the initial period), if no disconnect has been detected, a check is made for the overtime coin deposit. The presence of a coin results in the start of an overtime timing period. If a coin is not present, both the calling and the called customers should be connected via a three-way bridge to an overtime announcement on a non-barge-in basis without audible ringing.

The customer is connected for one cycle of the announcement. If a disconnect is detected during the 25- to 30-second period after the coin collect, a coin return action is performed. If it is not possible to obtain a circuit to make a coin-present test at the end of the initial period, the call should be permitted to continue with repeated attempts to make a coin-present test at approximately 30-second intervals.

If a deposit is not made within 25 to 30 seconds, the call is disconnected. If a customer disconnect is detected during the 25- to 30-second period, a coin return action is performed.

If it is not possible to connect the parties to an overtime announcement at this time, the call is permitted to continue with repeated attempts to connect the announcement at 30-second intervals.

At the completion of the announcement, the original connection is established, and a 25- to 30-second interval is timed to allow the customer to deposit the overtime rate. Another coin test is made after the 25- to 30-second interval has elapsed. If this test detects a deposit, the call continues in overtime. If no deposit is detected, the call is terminated. Timing for the overtime period starts at the conclusion of the announcement. If a disconnect is detected after the conclusion of the announcement, a coin collect action is performed. If the customer hangs up before the end of the announcement, any coins deposited after the coin-present test should be returned. If it is not possible to obtain a circuit to make a coin-present test at the end of the overtime period, the call should be permitted to continue with repeated attempts to make a coin-present test at approximately 30-second intervals.

A local coin call may continue through an unlimited number of overtime periods. A coin-collect action is performed 25 to 30 seconds before the expiration of each overtime period. Each collect action is followed after 25 to 30 seconds by a coin-present test. If a coin is present, the call is allowed to continue uninterrupted. If the test indicates no coin, the overtime announcement should be reconnected to request the overtime coin deposit. This process is repeated for each overtime period. After disconnect is recognized, any coins that are present should be collected, and the connection released unless the disconnect occurs during the last 25 seconds on an overtime period or before the end of the overtime announcement. In these cases, any coins that are present should be returned.

11.4.2.4 Local Coin Call Without Overtime

This option is applicable to CF and DTF service only.

A local coin call is a call within the coin-customer local calling area. The local coin call without overtime is the only coin call type with the charge not dependent on the call duration. A deposit equal to or greater than the local initial rate must be made before the call is allowed to be completed. With CF service, the coin(s) must be deposited to obtain dial tone. With DTF service, the coin(s) must be deposited before completion of dialing. If the coin test (performed on completion of dialing on dial-tone-first lines) finds no money deposited after dialing, a non-barge-in recording requests that the money be deposited and the caller must reinitiate the call. Two complete cycles of the announcement are furnished. If the customer does not hang up, any coin(s) deposited are returned and the line idled. If the announcement is not available, reorder tone is connected. No coin-present test is required in coin-first offices at completion of dialing.

When the called line answers and the talking path is established, the standard minimum charge duration of 2 seconds is timed before the call is considered chargeable. On disconnect, all coins are collected. If the call is not answered, a coin-return action is performed on disconnect.

11.4.2.5 Coin Distance Dialing With TSPS

Coin distance dialing with TSPS for station-to-station calls is entirely controlled by the central office and TSPS. The operator or ACTS equipment monitors for answer (SPP coin service only), requests the initial rate, monitors the coin

tone signals for correct deposit, and then releases from the call. The TSPS times the call and signals the central office to disconnect (SPP coin service) or to collect or return the deposit (CF and DTF service). A TSPS operator or ACTS equipment is only reconnected if an overtime charge is involved. Person-to-person and coin sent-paid calls require slightly more service by the operator, but still less than is required with a cord switchboard.

If the coin customer flashes the switchhook while connected to TSPS, the flash is relayed to the TSPS.

11.4.3 System Operation

11.4.3.1 System Operation Introduction

Call origination from a coin station begins with a request for service from a loop-start, DTF line; a loop-start, SPP line; or from a ground-start, CF line. Request for service occurs on a loop-start line when the coin station goes off-hook; request for service occurs on a ground-start line when the local initial rate is deposited at the coin station.

A coin-present test is required to verify the initial deposit for local coin calls from DTF stations. With CF stations, the presence of the initial coin deposit initiates the service request; therefore, no initial coin test is required. No coin-present test is required for calls from SPP coin stations.

Coin lines are assigned a line class code that provides a service class indicating coin.

The required screening is based on the types of coin line, the screening index of the line class code, and the dialed telephone number or service code. Digit analysis of the dialed digits determines the routing of the call.

Calls terminating to coin lines are treated as calls terminating to non-coin lines. However, the operator does not allow collect calls from a coin line to terminate to another coin line.

The central office signals the coin station as follows:

- To collect coins (CF and DTF stations)
- To return coins (CF and DTF stations)
- To check for initial deposit (DTF stations)
- To check for overtime deposits (CF and DTF stations with local coin overtime)
- To check for stuck coins after performing coin collect and return actions at the end of a call (CF and DTF stations)
- To home the coin station totalizer before returning coins when connecting to operator or TSPS trunks (DTF stations)
- To send a reverse battery signal (SPP coin stations).

11.4.3.2 Coin-First Stations

The CF telephone lines require ground-start treatment. Deposit of the local initial rate results in the application of a ground at the coin station. The central office detects this as an origination request, and dial tone is connected.

11.4.3.3 Dial-Tone-First Stations

The DTF telephone lines require loop-start treatment. With DTF service, an off-hook condition at the coin station provides loop-start toward the central office resulting in audible dial tone before the initial deposit is made. Therefore, at the end of dialing a local call on a DTF coin line, a polarity sensitive initial deposit test is performed to

ensure that the deposit is equal to or greater than the initial rate. This is a negative voltage test that consists of -48 V applied to the tip conductor with the ring conductor open.

If the test is successful, the call is allowed to proceed. If the test indicates no initial deposit, the call is routed to an insufficient deposit, non-barge-in announcement, and the customer receives two cycles of the announcement if the station remains off-hook. A coin return is performed, and the connection is then released.

If a coin line abandons during dial tone, dialing, or ringing, the system initiates a coin-return action. If no coin is present with a DTF line, the abandoned line is restored and verified.

Positive voltage is applied to the station while connected to operators or ACTS equipment so the coin station can transmit coin deposit signals.

11.4.3.4 Semi-Postpay Coin Stations

The SPP coin telephone lines require loop-start treatment. With SPP coin service, an off-hook condition at the coin station provides loop-start toward the central office resulting in audible dial tone. The dialed digits are collected, and the call is routed. Audible ringing (or busy tone) is returned to the talking party, and the call is monitored for an off-hook condition at the terminating end. If an off-hook occurs and the call is not a free call, a reverse battery signal is sent to the coin station disabling the coin station transmitter.

The initial coin deposit is required following battery reversal to enable the coin station transmitter and to establish the talking connection between the two parties.

11.4.3.5 Coin Collect and Return Signaling

Coin collect and return signaling applies to CF and DTF stations only.

Coin disposal voltages are ± 130 V, one polarity for collect and the other for return. The respective polarities are to be specified by the OTC on an office basis. The voltage is applied to the tip conductor for a minimum of 350 milliseconds with the ring conductor open. The maximum external circuit resistance to ground, including the tip conductor, is 2725 ohms. The minimum current required to operate the coin relay is 41 mA.

Upon removing the coin disposal voltage, current drain is provided to protect circuit components and to protect against false indications that may be caused by line transients. The time allowed for current drain for coin-return or coin-collect is 50 milliseconds. The time allowed for current drain for the initial deposit is 30 milliseconds.

The OTC has the option to either return or retain the initial deposit for operator-assistance calls, calls to 411, 611, or 811, and 555-XXXX calls. Generally, the initial deposit (always present in CF and sometimes present in DTF coin stations) is returned as soon as it is determined that the call is a free call. If an operator does not answer, all money that has been deposited is returned on disconnect to the coin customer. An office with CF lines must specify the coin-retain option on TSPS trunks so that the customer can use the touch-tone dialing pad for 0+ calls. In DTF offices, if the initial deposit is to be returned on 0- calls, reverse polarity is connected to the loop for 650 milliseconds before the coin-return action.

A coin-return action is performed after the application of receiver off-hook tone during permanent signal/partial dial treatment. After the treatment has been completed, 18 mA of loop current is provided on the line, either continuously or for periods of at least 600 milliseconds duration, until an on-hook condition is detected. This is required to restore the coin station totalizer to its normal position if a coin is deposited. Otherwise, the station would be out of service.

The TSPS operators can handle 0-, 0+, and 1+ calls from coin stations. Depending on local options, the initial deposit is either returned or retained on connection to a TSPS operator. The recommended arrangement in offices having any CF lines is to retain the initial deposit. This is required to enable the touch-tone dialing pad for use with Auto Bill Calling (ABC) since the touch-tone dialing pad on coin-first stations is only enabled if the local initial rate is in the hopper. On calls requiring a coin deposit, TSPS sends a coin-return signal to the local office so that the proper

rate can be quoted to the customer.

In offices serving only DTF lines, the recommended arrangement is to have the local office return any deposit after all outpulsing to the TSPS is complete. Immediately before the coin-return action, reverse polarity should be connected to the loop for 650 milliseconds.

11.5 STUCK-COIN ADMINISTRATION

Stuck-coin administration applies to CF and DTF stations only. When a coin action is required at the termination of a call, stuck-coin administration is implemented. Stuck-coin administration should not be implemented on coin actions that take place during the course of a call. For a CF telephone, the requirements for the stuck-coin test are identical to those of the test for 5-cent local overtime deposit. (See "Coin Service With Local Overtime," Section 11.5.2 .) For a DTF telephone, the requirements for the stuck-coin test are identical to those for the initial deposit except that positive voltage (+48 V) is used instead of negative voltage (-48 V). (See "Dial-Tone-First Stations," Section 11.4.3.3 .) For both CF and DTF stations, it may take as long as 700 milliseconds from the initial application of coin disposal voltage until the coin ground is removed from the station on a successful coin disposal.

If the stuck-coin test fails, a second attempt is made to dispose of the coin, followed by a second stuck-coin test. If the second test indicates that the coin is still present, the line should be idled. In either case, the line is entered on a list with an indication as to whether the coin action failed on both attempts or on the first attempt only. The number of these failures should be accumulated up to a maximum of 15 per line. The list is transmitted, to a repair service bureau (RSB) for output, optionally every quarter-hour or every hour on the half-hour. If a combination of first trial and second trial failures should occur on a given line, the printout should indicate the second trial failures. Stuck-coin printouts should also be available on a demand basis. When printouts are made on a demand basis, the counts should not be zeroed.

11.5.1 Cross-References

The following cross-references are applicable to this feature:

- LSSGR or Feature Number: 10-11-0000
- NSEP Number: BASE.

11.5.2 Coin Service With Local Overtime

Coin service with local overtime applies to CF and DTF stations only.

Coin service with local overtime provides timed initial and overtime periods. The cost for local overtime may be set at multiples of five-cents per overtime period. The length of the overtime period is an OTC option within the range of 1 minute to 7 minutes in increments of 1 minute.

The test for a 5-cent local coin overtime deposit is the same as described for the initial deposit on a DTF telephone except that positive battery is used instead of negative. (See "Dial-Tone-First Stations," Section 11.4.3.3 .)

11.5.3 Coin Service Without Local Overtime

Coin service without local overtime permits unlimited conversation time on local calls after the initial coin deposit.

11.5.4 Coin Distance Dialing With TSPS

Except when the TSPS operator or ACTS equipment is attached, normal battery (with negative polarity toward the ring conductor) is applied toward the station set.

While the TSPS operator is attached, the battery toward the station set is reversed by making the ring lead positive with respect to the tip lead.

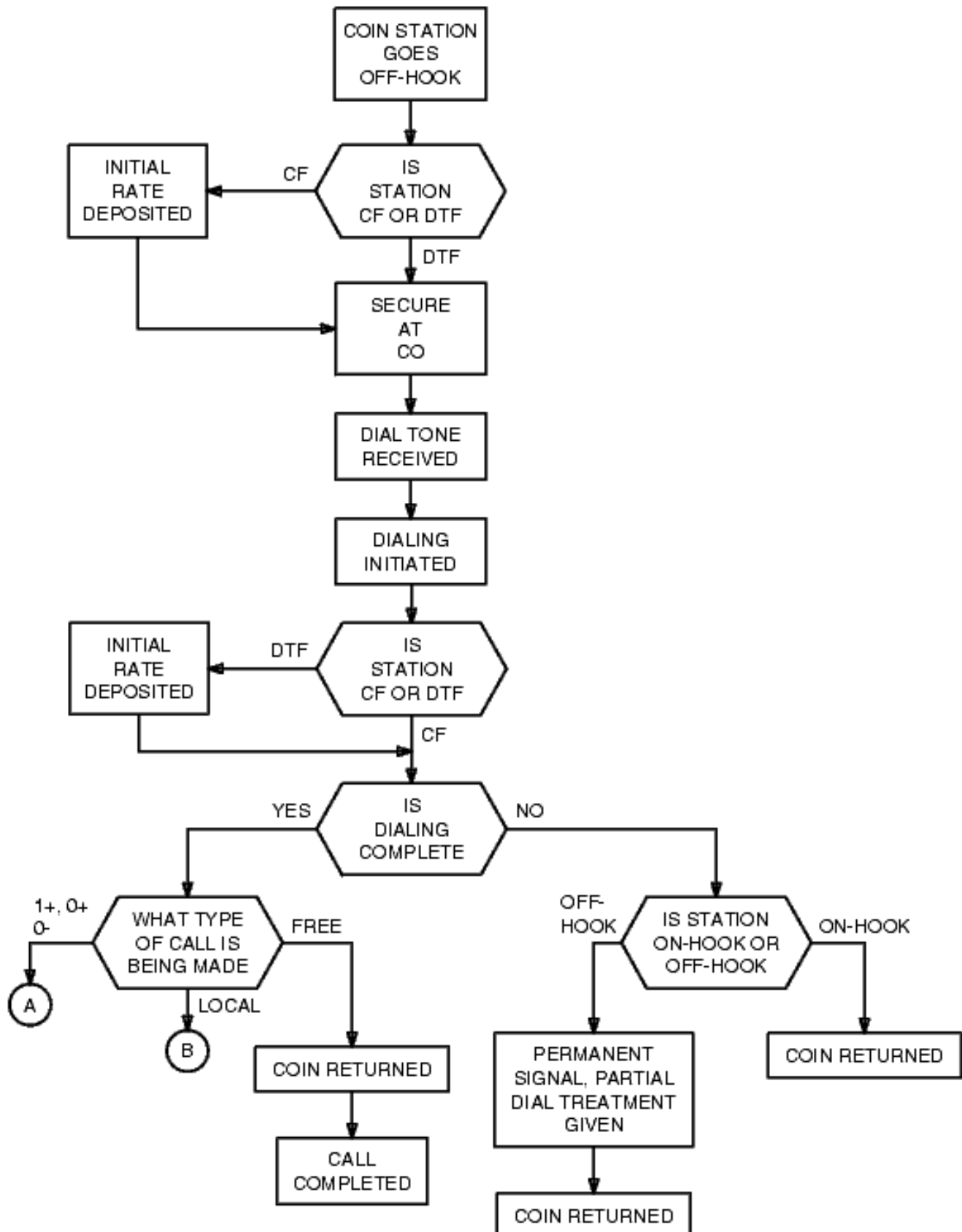
For coin calls requiring TSPS routing, an information digit pair (27), the called number and start signals (ST) are outpulsed to the TSPS. The information digit pair, 27, is used to indicate that the calling station is a coin station.

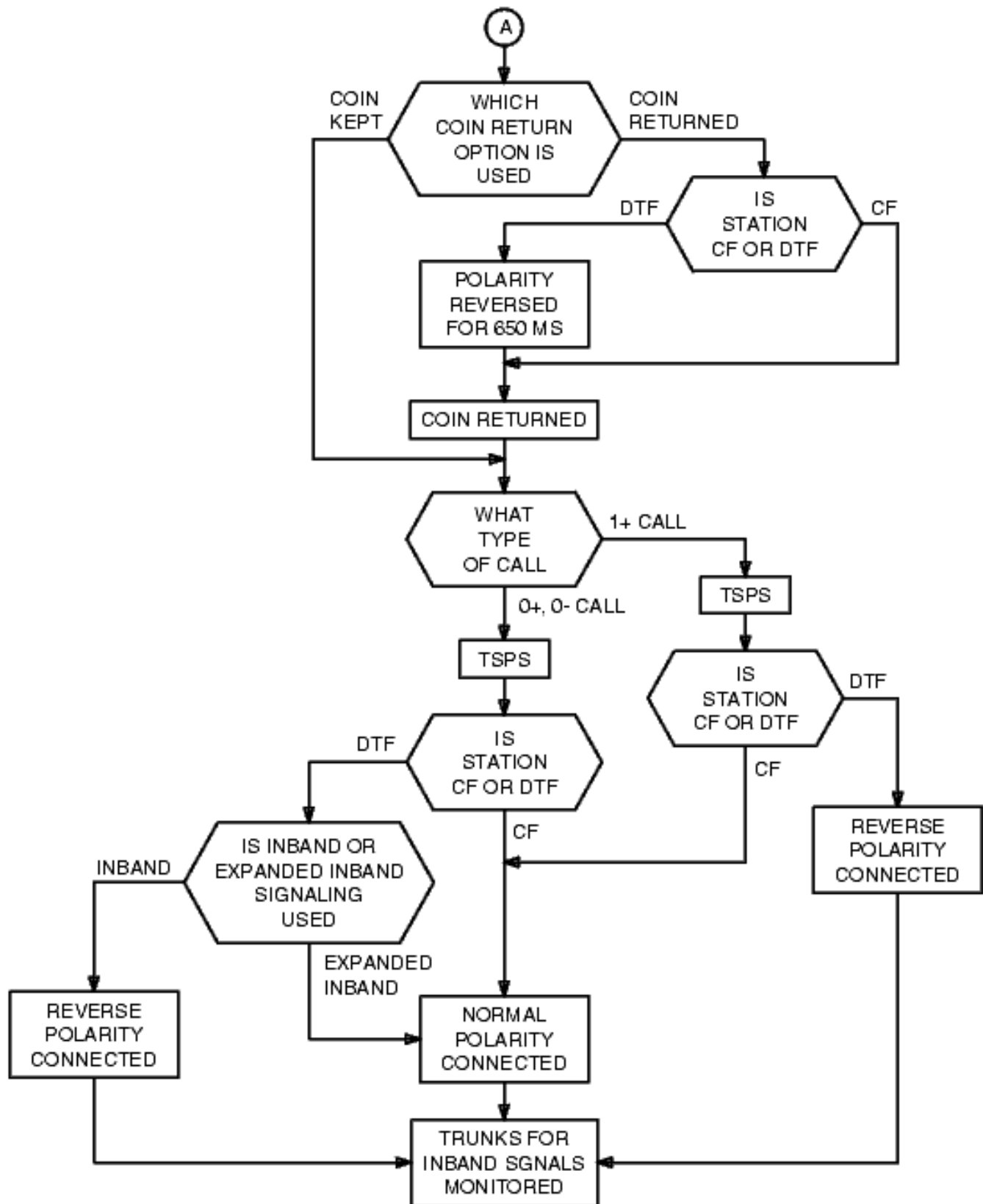
Inband signaling is required for use on trunks to TSPS offices not yet modified for expanded inband signaling. Three inband signals are sent from TSPS: coin-collect, coin-return, and ringback. On receipt of one of these signals, the local office performs the requested function on the associated coin line. Coin-collect and coin-return signals are not required for SPP coin stations. When inband signaling is used, reverse polarity is connected to the station in SPP coin or DTF offices when connected to these trunks. (See "Dial-Tone-First Stations," Section 11.4.3.3 .) Normal polarity is used in CF offices. (See "Coin-First Stations," Section 11.4.3.2 .)

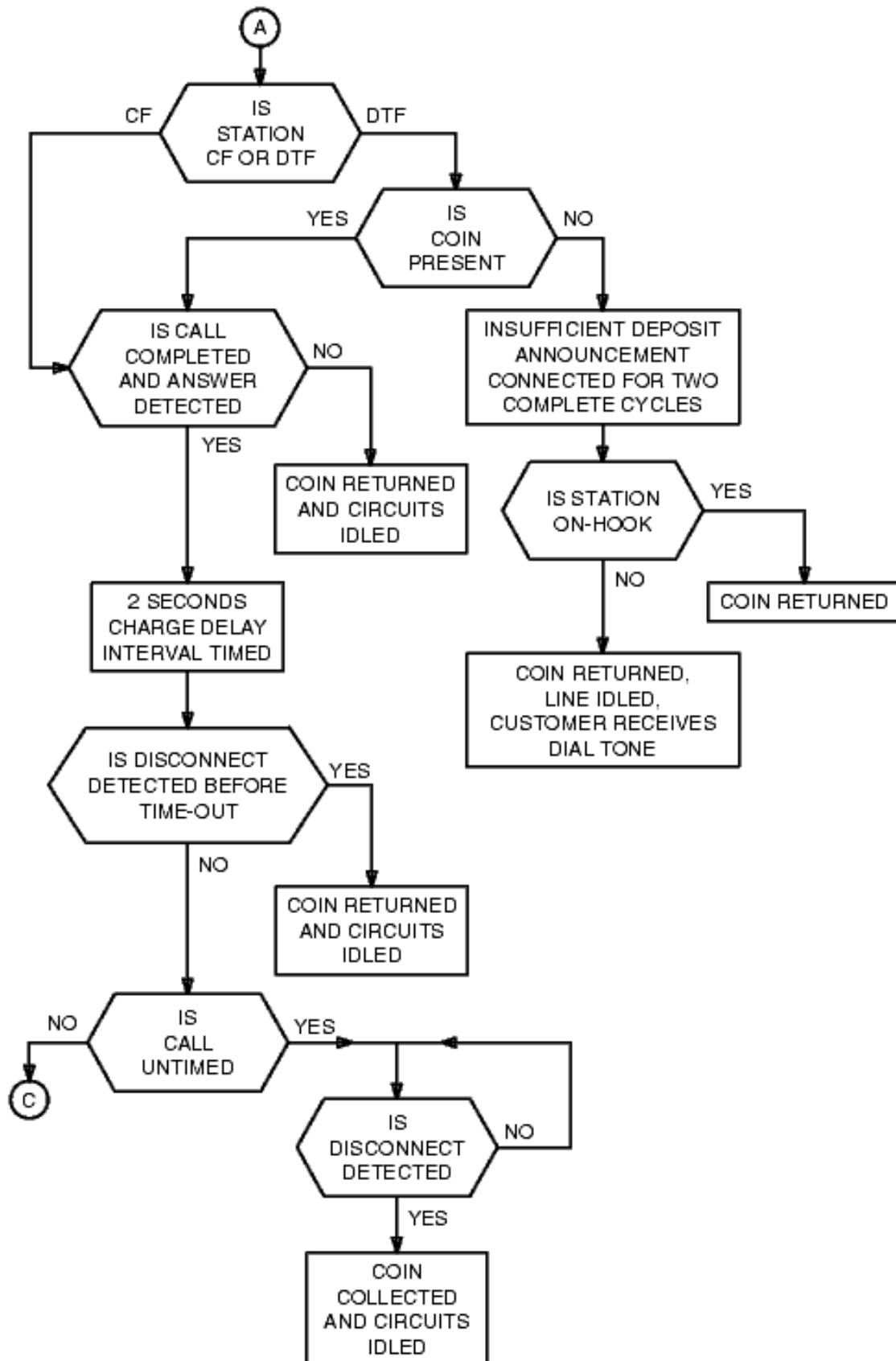
Expanded inband signaling is required in DTF offices on trunks to TSPS offices to enable coin station touch-tone dialing pads for ABC and other services requiring end-to-end, touch-tone telephone signaling. Six inband signals are sent from TSPS: coin-collect, coin-return, ringback, operator-attached, operator-released, and coin-collect/operator-released. On receipt of the operator-attached signal, the local office connects reverse polarity to the coin station in DTF offices. In CF offices, this signal is ignored. On receipt of the operator-released signal, normal polarity is connected to the coin station. In DTF offices, the initial connection to a TSPS trunk is made with normal polarity to the station on 0+ and 0- calls, and with reverse polarity on 1+ calls. In CF offices, normal polarity is always connected to the station. In SPP coin offices, treatment is the same as for DTF offices.

11.5.5 Feature Flow Diagram

A feature flow diagram giving the functional operation of the CF and DTF Coin Line features is shown in Figure 11-1 . A feature flow diagram of the functional operation of the SPP Coin feature is given in Figure 11-2 .







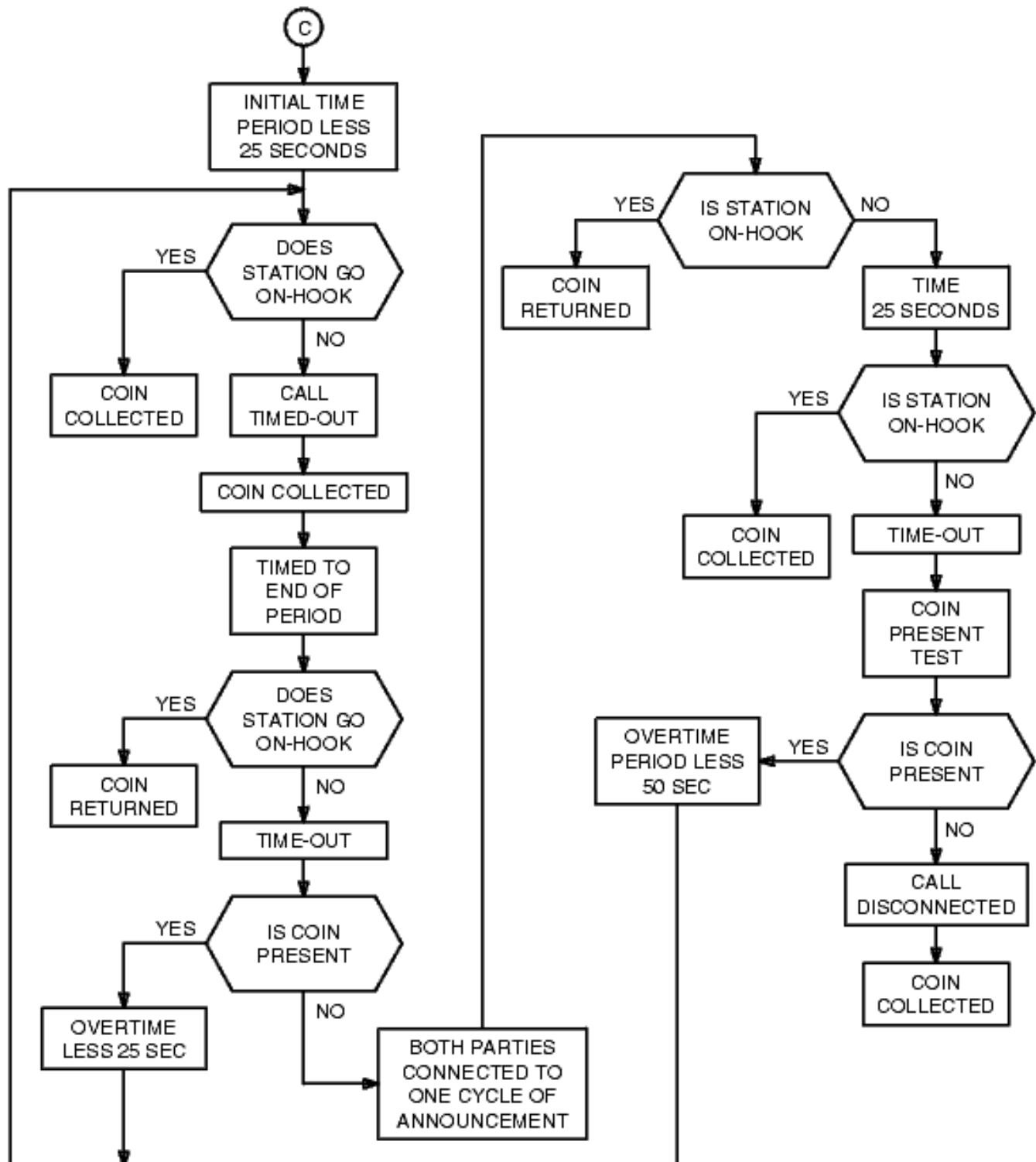
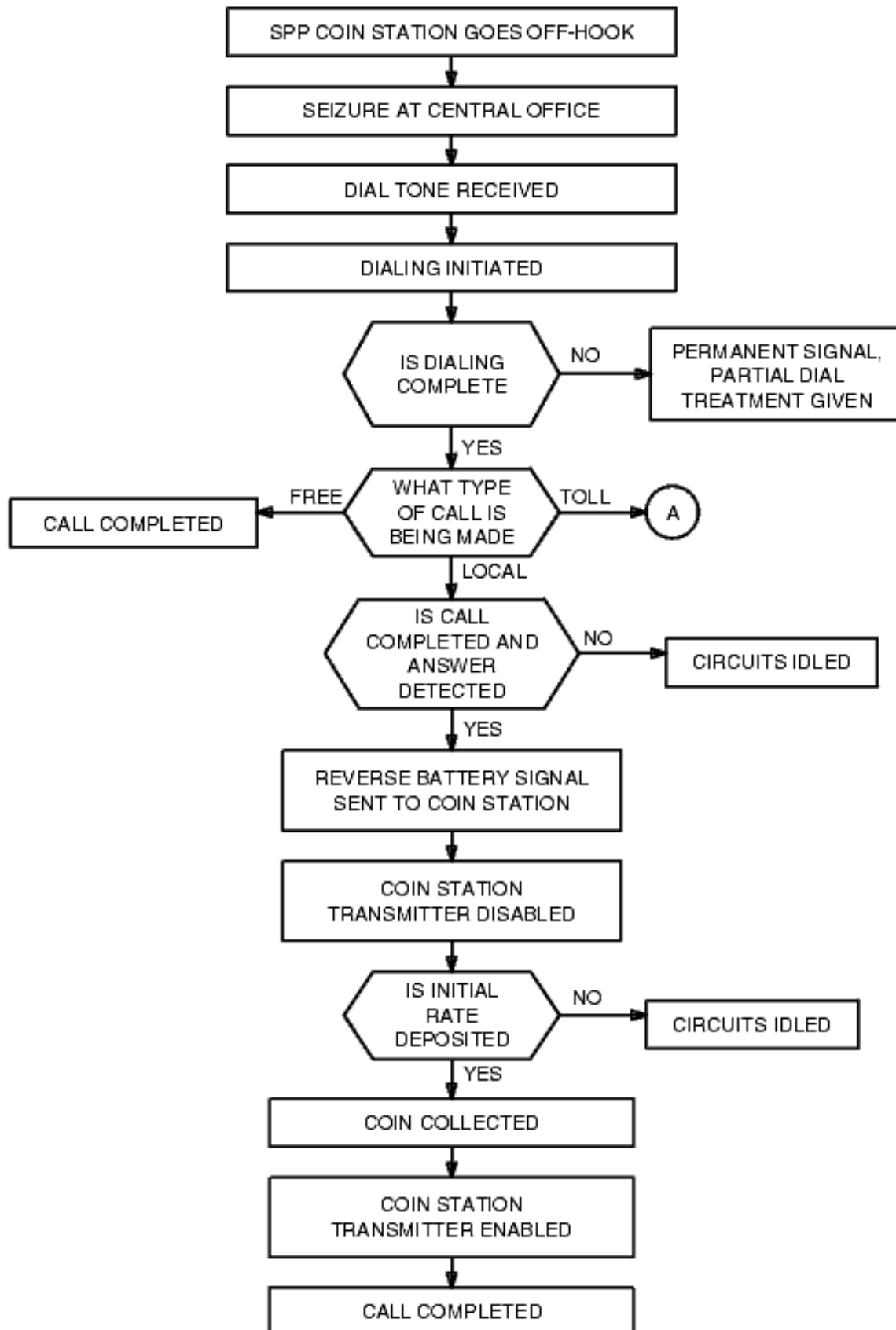


Figure 11-1 Coin-First and Dial-Tone-First Coin Service Feature Flow Diagram



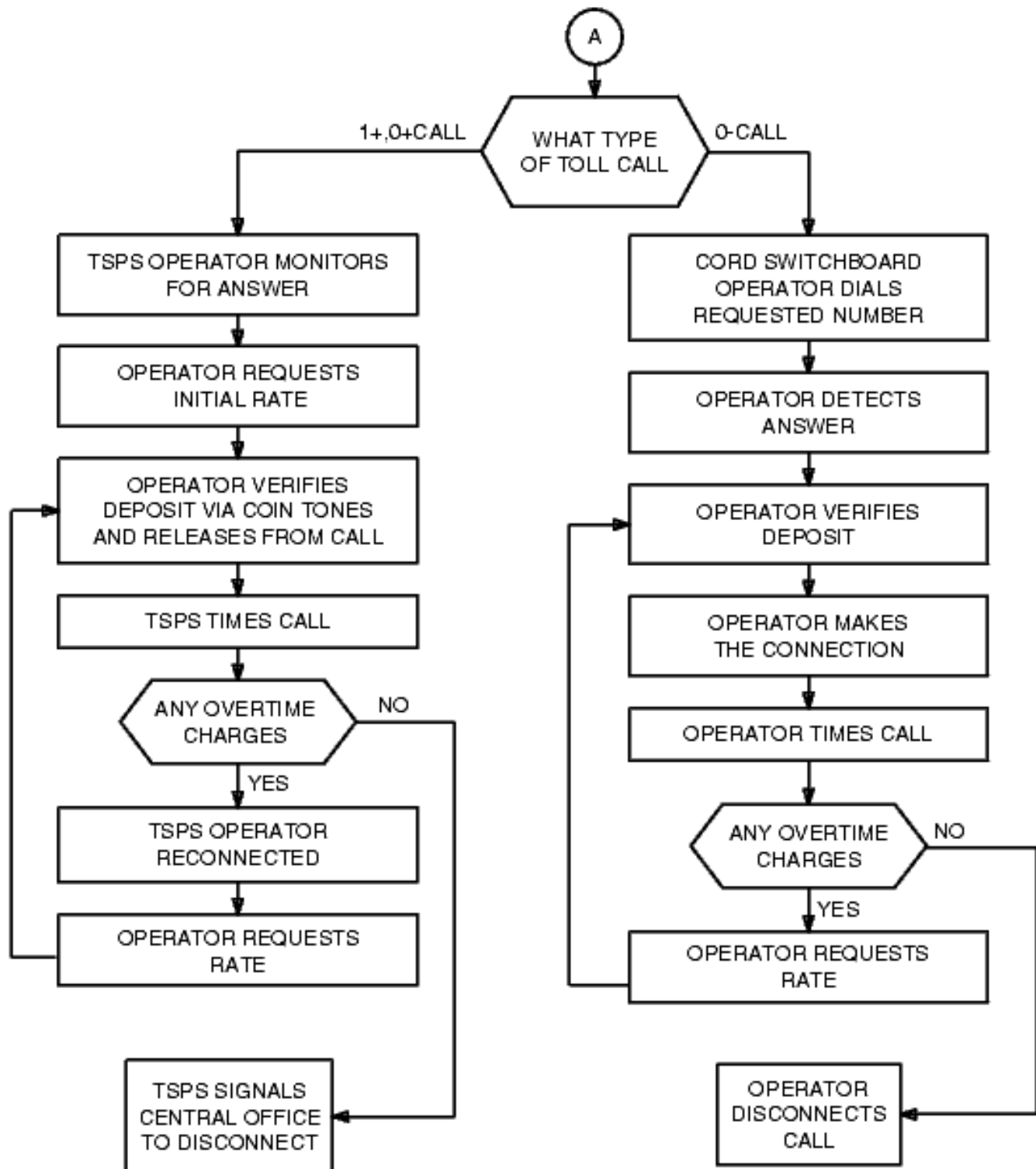


Figure 11-2 Semi-Postpay Coin Service Feature Flow Diagram

11.5.6 Resource Utilization

Coin service is provided on a per-line basis to business and nonbusiness areas where public telephone service is

desired or deemed necessary.

The number of coin stations and the associated announcements and high-level service circuits is based on local studies. The expected traffic from these stations should be considered in order to determine the number of TSPS trunks required for the office.

The Operator Services feature interacts with CF and DTF coin telephone service. Coin service for Operator Services features requires special coin-collection and coin-return actions.

Custom Calling features cannot be assigned to coin lines.

11.5.7 Implementation And Administration

Coin Line features are inherent features within the 5E6 and subsequent software releases.

11.5.7.1 Implementation

Hardware items that must be considered when providing this feature are as follows:

- High-level service circuits (LU-TN844)
- Announcement equipment.

11.5.7.2 Administration

The translations necessary to define the Coin Line feature may be made via the initial office data administration (ODA) run or by recent change (RC) methods. The translation arrangements for both ODA and RC/V can be made via a terminal using the interactive process provided by the menus and views. Refer to 235-118-2xx, *5ESS® Switch Recent Change Reference*.

The RC/V view required to assign the Coin Line feature is as follows:

Lines — Coin Line (Line Assignment) (RC-Line 9) (View 1.4 or 2.4): This view assigns the telephone number and the coin feature to a line.

The following RC/V views are required to set up the office, in general, and the operation of coin line service:

- (a) **Line Misc & Groups — Line Class Code View (View 4.1):** This view assigns the service class, the screen class, the terminating class, etc., to the line class code.
- (b) **Misc — Timing View (View 8.5):** This view sets the critical timing, the partial dial timing, the permanent signal timing, etc., for all lines.
- (c) **Routing & Charging — Fixed Route View (View 10.1):** This view assigns the treatment, the route index, and the charge index to the line.
- (d) **Routing & Charging — Charge Index Expansion View (View 10.11):** This view specifies the charge index, the AMA call type, and the message billing index for a coin line.
- (e) **Routing & Charging — AMA Call Type (View 10.12):** This view specifies the AMA call type.
- (f) **Routing & Charging — Coin Charging View (View 10.13):** This view assigns the message billing index, the charge type, the local coin initial time period, and the local coin overtime period to the coin line.

The following office records are required for the Coin Line feature:

- (a) **ESS 5109-1, Telephone Number Record:** Defines the office equipment and features for each TN in a switch. Identifies a particular line with the Coin Line feature.
- (b) **ESS 5109-2, Supplementary Telephone Number Record:** Defines additional line information that is not included on the TN record.
- (c) **ESS 5109-3, Supplementary Telephone Number Record:** Defines additional line information that is not included on the TN record.
- (d) **ESS 5171-1, Office Equipment Record:** Defines the office equipment number assignments for telephone numbers.

The following office records are required for the office trunks:

- (a) **ESS 5202, Trunk Group Record:** Defines each trunk group in a switch. Specifies the features assigned to operator trunks, specifically coin or TSPS.
- (b) **ESS 5204, Trunk Features and Assignments Record:** Defines each member of a trunk group in a switch.

The following office records are required for the office in general:

- (a) **ESS 5301-1, Fixed-Route Type Record:** Defines routing and charging treatment of fixed route types; such as, routing for calls when an insufficient initial coin deposit is received or routing for the local coin overtime prompts.
- (b) **ESS 5302-1, Charge Index Record:** Defines the charge index information required for the Coin Line feature.
- (c) **ESS 5302-2, Message Register Time and Charge Record:** Defines message billing index numbers assigned to message registers.
- (d) **ESS 5303, Route Index Record:** Defines each route index in a switch.
- (e) **ESS 5306, Line Class Code Record:** Defines the line class code, routing, and service information for the coin line.

11.5.7.2.1 Measurements

Peg count, usage, overflow, and maintenance busy traffic measurements are available for all circuits and registers provided for coin service. Two specific peg counts for the Coin Line features occur on the 24-hour plant report. These counts are as follows:

- (a) **Coin-Control Attempts:** This count provides the number of times the coin-control function is performed on a coin line to collect or return coins. This measurement is taken on a per-office basis.
- (b) **Stuck-Coin Conditions:** This count provides the number of times the switching system detects a stuck-coin condition on a final trial coin control attempt. This measurement is taken on a per-office basis.

Refer to 235-070-100, Appendix 1 *5ESS® Switch Administration And Engineering Guidelines — Appendix 1, Traffic And Plant Measurements* for more detailed information on traffic and plant measurements.

11.5.7.2.2 Charging

Charging for local coin calls is accomplished by the deposit of coins on local calls. All other chargeable calls are handled at an operator services facility that an inter-LATA carrier may own. The capability to make AMA records on local calls is provided for study purposes. To obtain an AMA record of local calls, the line must be identified as subscriber line usage study (SLUS) on the line form.

11.5.7.2.3 Testing

The following tests are made on the CF and DTF stations using the coin station test line:

- Coin presence and ground removal (single-slot sets)
- Ground and loop resistance
- Loop leakage
- Coin-collect
- Coin-return
- Coin relay operating time.

11.6 EXPANDED INBAND SIGNALING FEATURE DESCRIPTION

The Expanded Inband Signaling (EIS) feature provides the switch with the ability to recognize three additional multifrequency (MF) signals from the TSPS (or equivalent operator service system). In this document, the term TSPS is used to indicate a TSPS or any other equivalent operator service system. Regular inband signaling consists of the coin-collect, coin-return, and ringback signals. The three additional signals are the operator-released (900-Hz and 1500-Hz), operator-attached (1300-Hz and 1500-Hz), and the operator-released/coin-collect (1500-Hz and 1700-Hz.). These signals allow the implementation of services from coin stations that require the use of the touch-tone telephone pad after connection to a TSPS. The operator-attached signal also prevents simulation of coin deposit tones by activating a slot filter at the coin station.

The EIS feature is available in any switch. The TSPS must be operating with generic 1T10 to provide the three additional signals to the switch.

11.6.1 Definition

The EIS feature allows the TSPS operator to signal the switch with the operator-attached (+48 V), operator-released (-48 V), and operator-released/coin-collect signals. The operator-attached signal disables the touch-tone telephone pad from dialing and places the coin totalizer in the toll mode to accept coins for a toll call. The operator-released signal enables the touch-tone telephone pad for dialing and places the coin totalizer in the local mode. The ability to enable the touch-tone telephone pad, after the connection to a TSPS, makes available new services such as ABC. The ABC service allows a customer to charge calls to some number other than the calling number, normally without the aid of an operator. To use the ABC service, the customer is required to enter a 14-digit number after connection to the TSPS. The 14-digit number consists of a 10-digit billing number, plus a 4-digit personal identification number (PIN).

The operator-released/coin-collect signal combines the operator-released and coin-collect signals into one signal. Normally, when an automated overtime seizure is made, the TSPS must send the operator-released and coin-collect signals separately. Transmission of these back-to-back signals would cause a voice-path interruption that is unacceptable. The combined operator-released/coin-collect signal prevents the voice-path interruption by representing the two signals with one signal.

11.6.2 Cross-References

The following cross-references are applicable to this feature:

- LSSGR or Feature Number: 10-08-0000
- NSEP Number: BASE.

11.6.3 Operation

No special actions are required by the customer to utilize the EIS feature. The customer simply initiates a call from a coin station in the normal manner.

When a call is initiated from a coin station requiring TSPS handling, the switch connects the coin station to a TSPS. The TSPS can then apply the expanded inband signals to the coin station, as required, to process the call.

When a customer goes off-hook at a DTF coin station, the local office applies negative battery to the line. Negative battery enables the touch-tone telephone pad at the coin station and places the totalizer in the local mode. If a customer dials a 0+ or 0- call, the local office continues to apply negative battery to the line. This represents the operator-released condition and allows the customer to enter the additional touch-tone telephone digits required for the new services mentioned previously (0+ calls). Both 0+ and 0- calls are connected to an operator (except those 0+ calls that access automated services such as ABC). If the operator determines that no coin deposit is required for the call, negative battery is maintained, and the call is supervised for disconnect. If the operator determines that the customer wishes to make a sent-paid call, the operator-attached signal is returned to the local office.

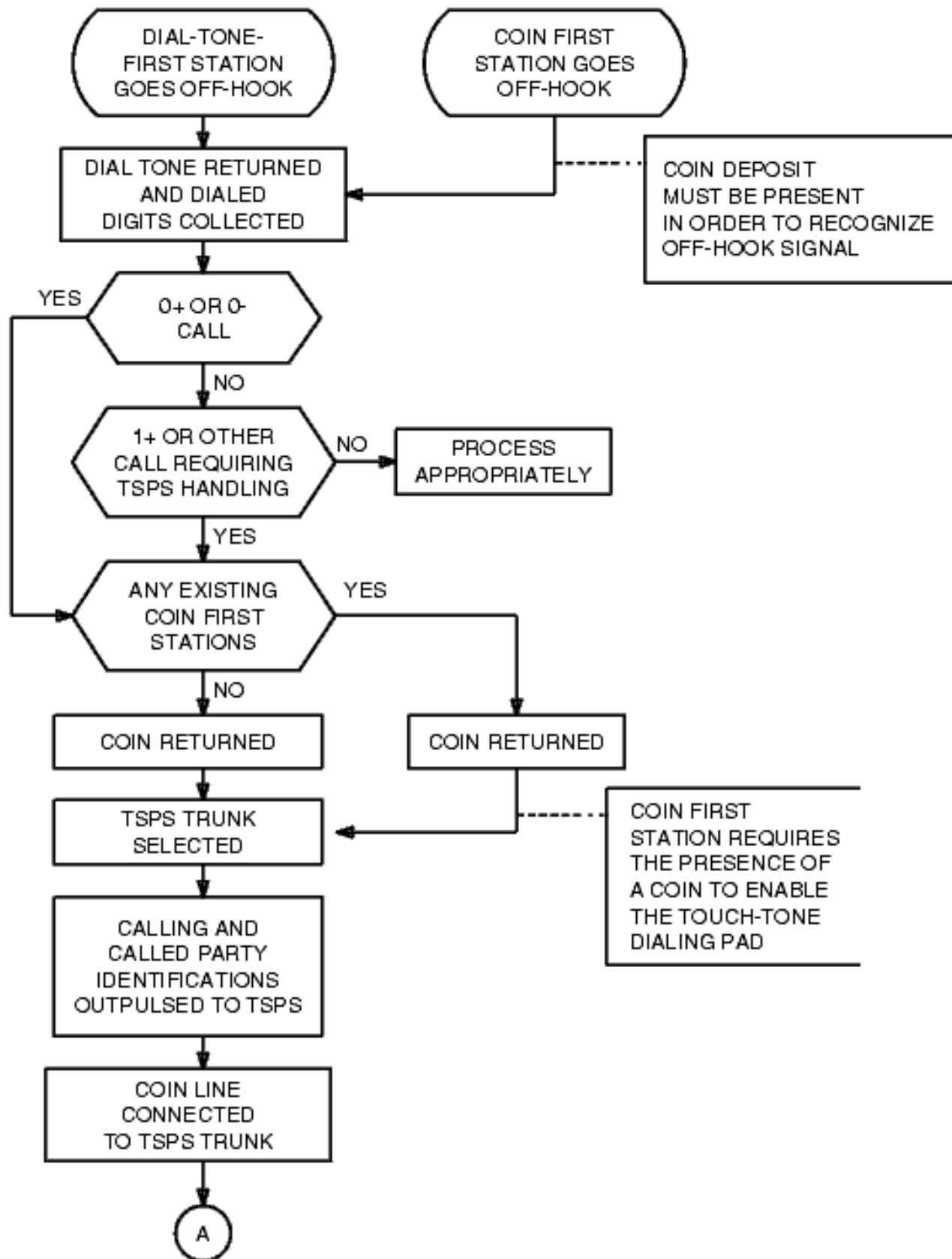
To send the operator-attached signal, the TSPS signals the switch with a lengthened on-hook wink (called a flash) of 325 to 425 milliseconds. The flash signals to the local office to connect a universal tone decoder (UTD) to the trunk to receive an inband or expanded inband signal from the TSPS. The lengthened flash also eliminates missed inband flashes and screens out hits that result in the unnecessary connection of UTDs. With the UTD connected, the TSPS sends the operator-attached signal (1300-Hz and 1500-Hz). The local office receives the operator-attached signal and applies +48 V to the coin station. With +48 V applied, the touch-tone telephone pad is disabled and the coin totalizer is placed in the toll mode. The operator can then verify the coin deposits for the initial period of the call.

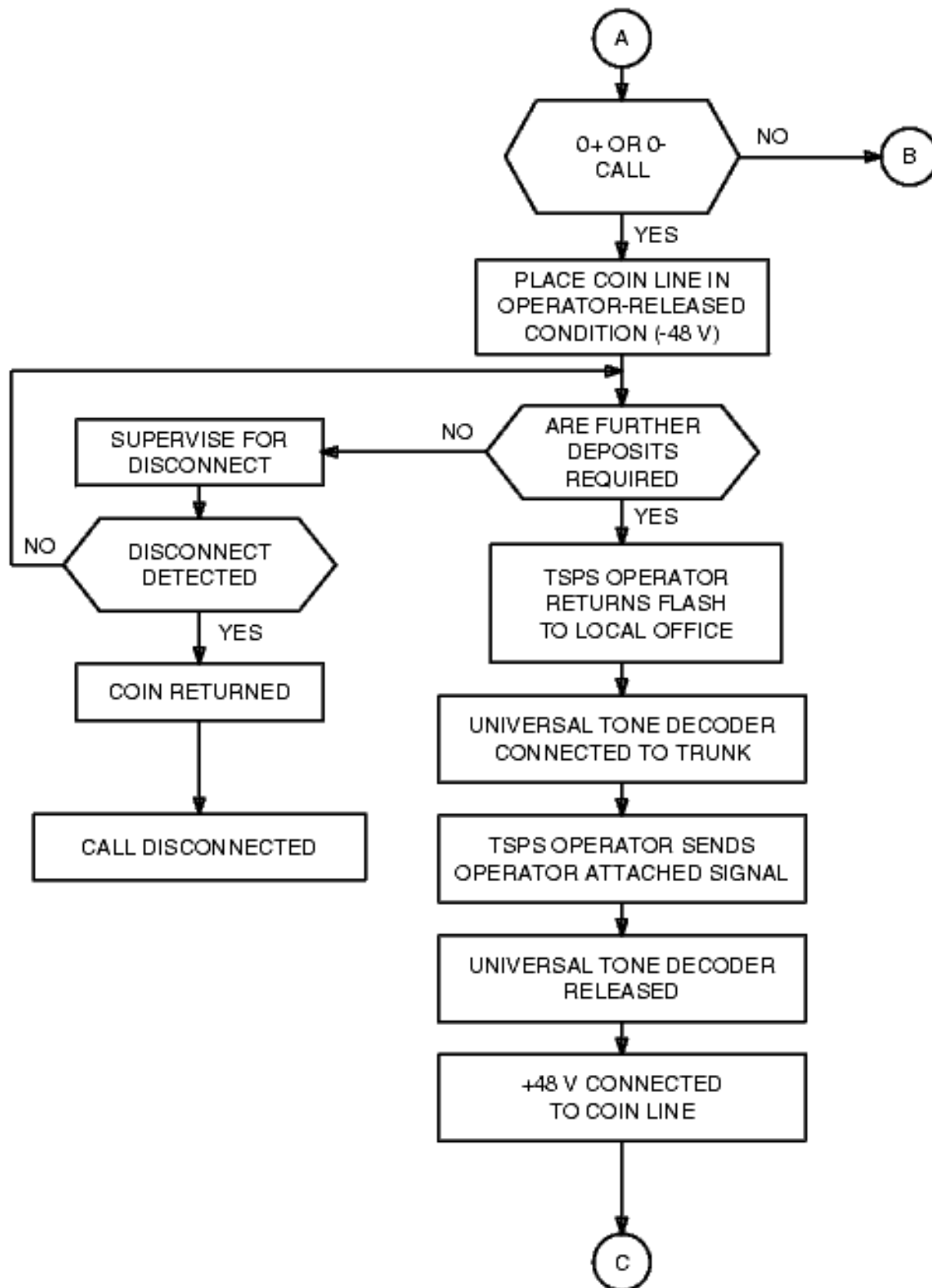
Most 1+ calls from DTF coin stations require coin deposits (INWATS calls are an exception). The local office places the call in the operator-attached condition on connection to the TSPS. This places the coin station totalizer in the toll mode and disables the touch-tone telephone pad. After the TSPS has verified the deposit for the initial period, the TSPS generates an operator-released signal. This enables the touch-tone telephone pad and places the totalizer in the local mode. The coin station remains in this condition until an overtime or end-of-call seizure occurs.

The touch-tone telephone pad on a CF station is disabled when the hopper in the set contains less than the initial deposit required to obtain dial tone. To utilize the touch-tone telephone pad after connection to a TSPS, the coin deposit must be retained in the coin station hopper. Normally, the local office performs the function of returning the coin. With EIS, the TSPS assumes the coin-return function. However, local offices serving only DTF stations should provide the coin-return operation before making the connection to the TSPS. In local offices serving DTF and CF stations, the time at which the TSPS initiates the coin return is determined by the type of call.

On 1+ calls from offices serving both DTF and CF stations, the TSPS provides the coin-return signal when the TSPS trunk has been connected to the coin line. Coin-return for 0+ and 0- calls is provided after disconnect occurs.

A functional flow diagram describing the operations performed for EIS is shown in Figure 11-3, and the timing requirements for EIS are shown in Figure 11-4.





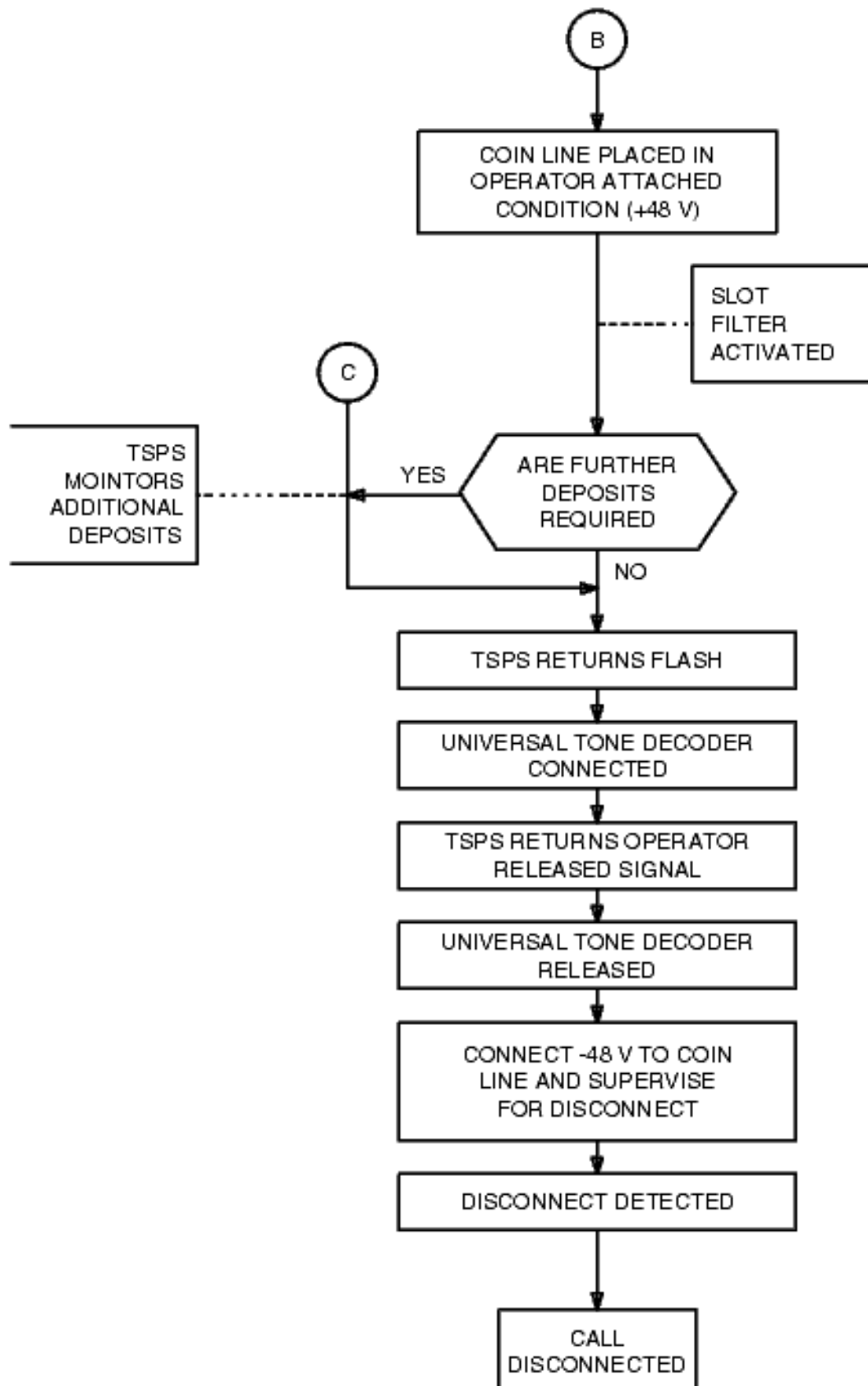
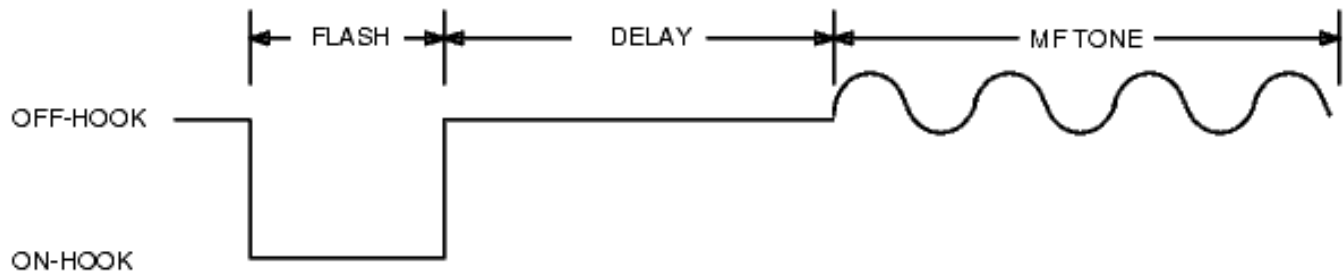


Figure 11-3 Expanded Inband Signaling Feature Flow Diagram



TIMING REQUIREMENTS IN MS

	MINIMUM	NOMINAL	MAXIMUM
FLASH	325	325	425
DELAY	770	810	850
TONE	480	590	700

NOTE 1: IN ORDER TO ALLOW FOR SIGNAL DISTORTION, THE LOCAL OFFICE MUST RESPOND TO FLASHES OF 300-450 MS.

Figure 11-4 Timing Requirements for Expanded Inband Signaling

11.6.4 Resource Utilization

If services are to be provided which require customer signaling after dialing of the called number, the coin station must be assigned touch-tone dialing.

When a DTF office is served by more than one TSPS over the same trunk group, all TSPSs must be able to employ EIS. If the feature is implemented on a per-trunk group basis, the switch can operate with TSPSs using inband and expanded inband signaling.

Local offices serving both DTF and CF stations must have the ability to utilize coin retention. The TSPS offices providing EIS are capable of recognizing trunk groups that require the coin-return signal to be provided from the TSPS.

11.6.5 Implementation And Administration

11.6.5.1 Implementation

The procedures for incorporating the EIS feature in a switch are as follows:

- The switch must be arranged to operate in a DTF mode. Adequate hardware units (UTDs, trunk circuits, etc.) must be provided. Procedures for determining the required quantities may be found in the engineering guide (NSEP-5) for the switch.

- Provide the TSPS with generic program 1T10 or later.
- Make the necessary trunk group assignments and mark by trunk group the kind of signaling to be used (inband or expanded inband). These assignments can be made with RC/V messages. Refer to 235-118-2xx, *5ESS® Switch Recent Change Procedures* and 235-118-2xx, *5ESS® Switch Recent Change Reference* for detailed information concerning RC/V procedures.
- Convert all 1A coin stations to 1C stations. The 1A stations do not operate properly when positive battery is applied. Procedures for converting 1A coin stations to 1C stations are provided in 506-410-400, *Telset 1C, D, E, 2C & 2D Type Coin Telsets Identification, Installation & Maintenance*.

11.6.5.1.1 Hardware Requirements

The coin control and ringback circuit (SD-1B013-01) at the TSPS must be provided with option V to be compatible with EIS. Option V adds four relays (CT1, E, F, and G), one timer (TM1), two resistors (R18, R19), and three signal distributor points to control the expanded inband signals.

Converting 1A coin stations to 1C stations requires a chute-totalizer (20A1A), coin chassis (31A), and coin dial unit (60 or 61 type).

11.6.5.1.2 Software Requirements

All the necessary software (approximately 500 bytes) for the EIS feature is provided in the feature control subsystem of the 5E1(1A) software release. The mode of operation (inband or expanded inband) is determined by the capability of the TSPS and the features of the switch trunk group. The TSPS must be operating with generic program 1T10 or later to supply the expanded inband signals.

11.6.5.1.3 Modifications

The translations necessary to provide the EIS feature can be made via the initial ODA run or by RC/V messages. The translation arrangements for both the ODA and RC/V can be made via a terminal, using the interactive process provided by the menus and views.

The RC/V view procedures differ depending on the software release in the office. Refer to the following recent change manuals for further details concerning the RC/V menus and views:

- 235-118-2xx, *5ESS® Switch Recent Change Procedures*
- 235-118-2xx, *5ESS® Switch Recent Change Reference*

The following RC/V views are required to assign EIS feature:

- Trunks-Trunk Group and Member View (RC-TRK1) (View 5.5):** Defines a member of a trunk group in a switch.
- Misc-Office Parameters View (RC-PARAM) (View 8.1):** Indicates EIS to the switch.

Office records for the switch are tabular listings of the actual inventories and assignments of the data base and serve as a means for administering the switch. Copies or variations of the office record forms may be used as worksheets to aid administrative and maintenance personnel in translation inputting and data entry into the ODA process. The following office record forms are applicable to the EIS feature:

- ESSTM 5202 Trunk Group Record
- ESSTM 5507 Office Parameters Record.

There are no standard procedures for testing the expanded inband signals in a switch.

The TSPS and the switch must both be engineered to incorporate EIS.

11.6.5.2 Administration

11.6.5.2.1 Traffic Measurements

No specific measurements are available for the EIS feature. However, the standard peg count, usage, overflow, and maintenance busy measurements are required for trunks and service circuits associated with this feature.

11.6.5.2.2 Plant Measurements

A peg count is required to record each time a UTD cannot be selected. Another peg count records the occurrences of invalid or nonexistent MF tones following the reception of a flash. For detailed information on traffic and plant measurements, refer to 235-070-100, Appendix 1, *5ESS[®] Switch Administration And Engineering Guidelines — Appendix 1, Traffic And Plant Measurements*.

11.7 CHARGE-A-CALL FEATURE DESCRIPTION

The Charge-A-Call Service feature provides telephone service to public locations for calls not requiring the deposit of coins. Such locations are airports, train terminals, truck stops, bus terminals, ski lodges, and highway telephone booths. In this document, the term TSPS is used to indicate a TSPS or any other equivalent operator service system.

11.7.1 Cross-References

The following cross-references are applicable to this feature:

- LSSGR or Feature Number: 10-10-0000
- NSEP Number: BASE.

11.7.2 Operation

The charge-a-call customer goes off-hook, receives dial tone, and dials the desired code or number. If the call does not require a coin deposit, the call proceeds to completion or busy. If a deposit is required, the customer receives a tone or announcement or, in the case of calls routed via the TSPS, the TSPS operator (or an announcement from the TSPS) instructs the customer to hang up and originate the call from a coin station.

All calls not requiring a coin deposit are accepted from a charge-a-call station. These calls are of the following types:

- 0- (standard operator)
- 0+ (toll calls requiring TSPS operator assistance)
- 01+ (international calls requiring TSPS operator assistance)
- 010 (overseas operator)

- 1+SAC+XXX+XXXX [toll-free Service Access Code (SAC) calls, such as 800 or 888 calls]
- 1+555+XXXX (local directory assistance)
- 1+NPA+555+XXXX (long distance directory assistance)
- N11 (special codes)
- 10XXX+ and 950-WXXX (calls via inter-LATA carriers — per-carrier choice).

Calls from charge-a-call stations are processed in a manner similar to non-coin telephones. When dialing is complete, automatic call screening within the switch allows or disallows the call based on the originating line class of service and the destination of the call and, if applicable, the inter-LATA carrier used on the call.

For calls requiring TSPS handling (0+, 0-), an ST is outpulsed to the TSPS to indicate that the calling station is a non-coin station and that the first dialed digit was a zero. The ST is used if the trunk group is of the type "supercombined." When the supercombined formats are used on combined non-coin trunks, the combined trunks must be marked as supercombined at the operator system. If a stored program control system uses different formats on combined trunks than on supercombined trunks, different STs must be used wherever they occur in the called number. On dedicated trunks, any ST is valid for following the called number.

An information digit pair (07) is outpulsed preceding the telephone number of the calling station to inform the TSPS that the call is originating from a station that requires further screening. The TSPS then determines from its translations that the calling station is a charge-a-call station and automatically informs the TSPS operator. If the call does not require a coin deposit, the call is accepted for further processing.

The operating telephone company may optionally allow or disallow calls to terminate to charge-a-call stations on a per-line basis. The denied-terminating class of service would assure use of the line as an outgoing facility and automatically inhibit the placement of collect calls to the charge-a-call station.

If a charge-a-call station has a denied-terminating class of service or originates a call that normally requires a deposit, the calling party is given special treatment, where routing to intercept occurs.

Intercept allows customers to be alerted to the reason why a call cannot be completed as dialed.

The operating company has the flexibility to specify the tone or announcement to be given to each distinct special treatment (for example, a trouble busy state, a changed destination code, or misdialing). In general, tones (busy or reorder) or recorded announcements are used to inform the customer of a busy line or busy equipment. If the call normally requires a deposit and is routed via TSPS, the TSPS operator (or an announcement from the TSPS) explains that the call must be placed from a coin telephone.

11.7.3 Feature Flow Diagram

A flow diagram giving the functional operation of the Charge-A-Call Service feature is shown in Figure 11-5 .

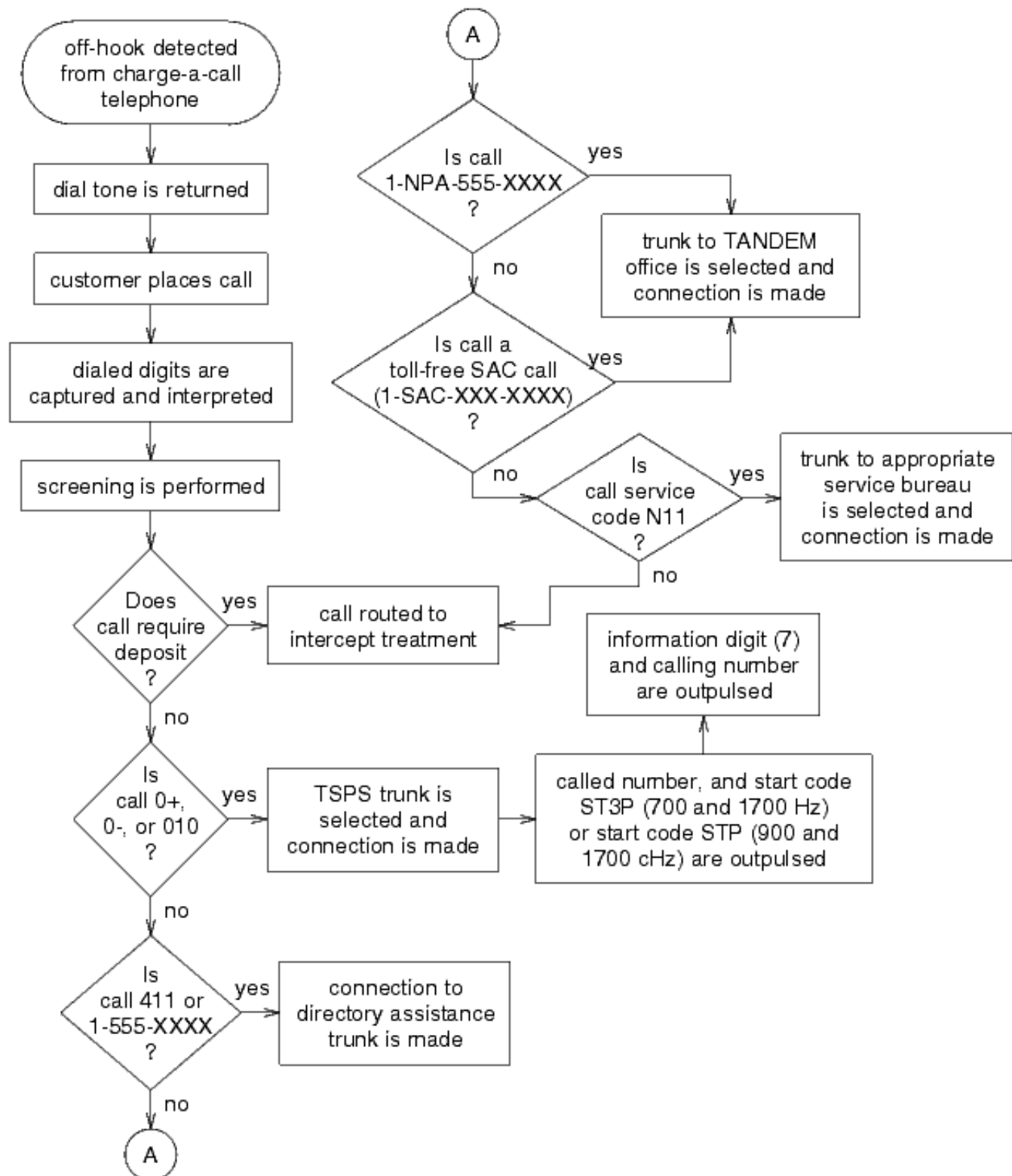


Figure 11-5 Charge-A-Call Service Feature Flow Diagram

11.7.4 Resource Utilization

Charge-A-Call Service is implemented on a per-line basis and is an inherent feature in the software releases of the switch.

11.7.4.1 Limitations

The following limitations exist:

- Calls allowed to originate from charge-a-call telephones are normally limited to the types as shown in "Operation," Section 11.7.2 .
- Charge-a-call stations are not allowed to utilize custom calling features.

The number of charge-a-call stations and associated announcements installed are based on local studies. The expected traffic from these stations is considered in determining the number of TSPS trunks required for the office.

The customer is not allowed to alter this feature in any way. Service changes are made to this feature by the OTC via recent change.

11.7.5 Implementation And Administration

When the charge-a-call stations have been installed, the line assignments are made to associate the necessary line class code — charge-a-call and denied-terminating. The screening tables are then constructed to provide the necessary screening. Announcements are assigned, and the necessary routing to those announcements is made for the handling of invalid calls.

The installation of the Charge-A-Call Service feature must be coordinated with the TSPS to ensure that the TSPS has the capability to interpret the ANI information digit information.

11.7.5.1 Implementation

Recorded announcements, charge-a-call stations, and TSPS trunks are the necessary hardware for the Charge-A-Call Service feature.

Approximately 680 bytes of memory are required to support the Charge-A-Call Service feature.

11.7.5.2 Administration

The translations necessary to define the Charge-A-Call Service feature may be made via the initial ODA run or by RC/V methods. The translations arrangements for both ODA and RC/V can be made via a terminal using the interactive process provided by the menus and views. Use the appropriate input message to access the RC/V menus and views:

```
RCV:MENU:APPRC, [PRINT] [DETAIL] [SUMMARY];
```

The RC/V view procedures differ depending on the software release in the office. Refer to 235-118-2xx, 5ESS[®] *Switch Recent Change Procedures* and 235-118-2xx, 5ESS[®] *Switch Recent Change Reference* for further details concerning the RC/V menus and views.

The following RC/V views are required to assign the Charge-A-Call Service feature to a line:

- Lines—Non-Multiline Hunt Telephone Number View (View 1.1 or 2.1):** Assigns the line class code to the line.
- Line Misc—Line Class Code View (View 4.1):** Assigns the class of service as charge-a-call to the line class code.

The following office records are required for the Charge-A-Call Service feature:

- (a) **ESS 5109-1, Telephone Number Record:** Defines the office equipment and features for each TN in a switch. Identifies a particular line with the Coin Line feature.
- (b) **ESS 5109-2, Supplementary Telephone Number Record:** Defines additional line information that is not included on the TN record.
- (c) **ESS 5109-3, Supplementary Telephone Number Record:** Defines additional line information that is not included on the TN record.
- (d) **ESS 5301-1, Fixed Route Type Record:** Used to define the routing and charging of special treatment. In particular, routing is specified for calls not permitted from a charge-a-call line.
- (e) **ESS 5306, Line Class Code Record:** Used to define each line class code in a switch. In particular, the service class is assigned for the Charge-A-Call Service feature.

Recent change methods are required to add, delete, and verify the Charge-A-Call Service feature. No customer testing is required.

11.7.5.2.1 Measurements

The standard peg count, usage, overflow, and maintenance busy measurements are required for the TSPS trunks and recorded announcements associated with the Charge-A-Call Service feature. No other measurements are required.

11.7.5.2.2 Charging

Calls placed from a charge-a-call line do not receive any charge treatment from the switch. The only chargeable calls made from charge-a-call stations are handled by TSPS (for example, credit card, bill-to-a-third-number, collect, etc.). The operator is responsible for obtaining the billing information, and the TSPS records the necessary charges.

11.8 ASSIGN ANI7 TO ANY ORIGINATING CLASS OF SERVICE

11.8.1 Feature Definition

The ANI7 capability allows the service providers to monitor individual lines on 0- and 0+ type of calls.

For customer-owned coin phones with ANI7 assigned, this feature gives the customer the ability to make 1+ calls and also allows the service provider to keep AMA billing records of these calls because of the Charge-A-Call class of service (COS).

11.8.2 Cross-References

The following cross-references are applicable to this feature:

- LSSGR or Feature Number: Not available at date of publication.
- NSEP Number: Not available at date of publication.

11.8.3 Feature Operation

11.8.3.1 System

The call processing code checks if the ANI7 bit is set, and if so, the ANI digit 7 is outputted to the TSPS operator on 0- and 0+ calls. In cases of customer-owned coin phones, this capability allows the service providers the ability to keep AMA billing records on 1+ calls, by allowing a Charge-A-Call COS and the ability to ANI the digit 7 to the TSPS operator on 0- and 0+ calls to indicate that this is a customer-owned pay station.

Assignment of ANI7 to any individual line independent of the COS provides the TSPS operator the ability to determine the actions to be taken to handle the call.

11.8.3.2 User

The user does not have any indications of this capability on their line. The feature is strictly for the use of the service providers to have a way of monitoring individual lines.

Customer-owned coin stations with the ANI7 feature is able to make 1+ phone calls, and the service providers are able to keep AMA billing records.

11.8.4 Feature Assignment

In the 5E6 and subsequent software releases, ANI7 is able to be assigned via recent change on any of the line views.

11.8.5 Availability

This feature is provided with the 5E6 and subsequent software releases.

11.9 COIN LINE AUTOMATIC MESSAGE ACCOUNTING

11.9.1 Definition

The Coin Line Automatic Message Accounting feature provides the service providers the ability to obtain, on an optional and per-office basis, detailed Automatic Message Accounting (AMA) records at the local switch for each coin telephone originated, answered, chargeable call that is sent-paid and processed at the end-office with a Call Code of 041. (See 235-190-300, *5ESS[®] Switch Billing Features and Specifications*.) This feature provides records for coin sent-paid calls from lines with the COIN class of service, either Coin First (CF) or Dial Tone First (DTF). The Coin Line AMA records use existing Local Switching System General Requirements (LSSGR) AMA record formats and do not include coin collected information.

11.9.2 Cross-References

The following cross-references are applicable to this feature:

- LSSGR or Feature Number: Not available at date of publication.
- NSEP Number: Not available at date of publication.

11.9.2.1 Economic Worth

The advantages provided by this feature are as follows:

- (1) The Coin Line AMA records are available on a per-office basis.
- (2) When Coin Line AMA records are combined with AMA information from all associated operator services, detailed billing data will exist for chargeable sent-paid calls from non-smart coin telephones processed at the end-office.

- (3) Studies can be made of sent-paid calls originated from non-smart coin telephones.
- (4) The Coin Line AMA records can be used as an alternative to Improved Public Telephone Service (IPTS) Coin Box Accounting for Collecting Scheduling. Local call detail will provide accurate accounting of local messages, which will result in significant improvement in predicting collection dates due to the variation in the usage of the coin stations and reducing the full box rate. Reduction of the full box rate and improvements in predicting collection dates will reduce the total number of annual coin collections.

11.9.2.2 Availability

This feature is available with 5E7 and later software releases.

NOTE: Consult your Lucent Technologies Account Executive for availability.

11.9.2.3 Feature Provision Basis

This secured feature, which is provided on a per-office basis, is not activated until the purchaser has made the necessary arrangements with Lucent Technologies. Information on feature activation is provided upon ordering. Please contact your Lucent Technologies Account Representative for ordering information and the Right-to-Use (RTU) fee associated with this feature.

11.9.3 User Perspective

11.9.3.1 User Profile

This feature has no impact on the end-user (coin-phone).

The Coin Line AMA feature allows the service provider to obtain, when desired and on an office-wide basis, AMA records for locally handled coin calls on a per-office basis.

11.9.3.2 User Operation

The service provider enables/disables the generation of AMA records for local coin sent-paid calls via recent change (RC).

11.9.3.3 Operational Limitations

The switch does not support coin zone calls or OSPS Call Code 025 except in Operator Services Position System (OSPS) offices. (See 235-190-300, *5ESS[®] Switch Billing Features and Specifications*.) This results in an inconsistency between the 1A ESSTM switch and switch versions of Coin Line AMA.

Coin Line AMA records are made only for lines with the COIN class of service, either CF or DTF.

The Coin Line AMA feature is not compatible with A-type coin stations, Electronic Coin Public Telephones, or semi-postpay coin service.

If Coin Line AMA is active and requested for the office and traffic sampling is requested for the line originating the coin sent-paid call, only one AMA record is made with the traffic sampling indicator set and without the study indicator bit set in the AMA record.

11.9.3.4 Interactions

Coin Line AMA records are made for calls to a non-forwarded directory number (DN) and to a forwarded DN.

If a parameter for unanswered calls indicates that AMA records are to be made for local unanswered calls processed at the origination end-office and the office also has Coin Line AMA, then the switch must make a Coin Line AMA record for each unanswered coin sent-paid call processed at the originating office.

11.9.4 Engineering

11.9.4.1 Special Planning Considerations

The Screening and Charging views (Views 10.10 and 10.11, respectively) must be used to set up the office data such that Call Code 041 is associated with coin lines for which AMA records are desired. (See 235-190-300, *5ESS® Switch Billing Features and Specifications*.)

11.9.4.2 System Resources

Not applicable.

11.9.5 Assignment Guidelines

11.9.5.1 Forms and Views

11.9.5.1.1 Translation Guide Forms

The translation guide forms used in implementing this feature are as follows:

- Form 5713, Secured Feature System Assignment (to activate/deactivate the secured Coin Line AMA feature). The corresponding RC/V view is View 8.22.
- Form 5509, Office Options (to control the generation of AMA records for local coin sent-paid calls). The corresponding RC/V view is View 8.1.

11.9.5.1.2 Recent Change Views

The RC/V views used in implementing this feature are as follows:

- RC/V View 8.22, Secured Feature Upgrade
- RC/V View 8.1, Office Parameters (Miscellaneous).

11.9.5.2 Assigning to Customer

To activate this secured feature, contact the Lucent Technologies Secured Feature Administrator (SFA) for assistance. In a new start office, the SFA activates the feature through ODA. In an existing office, the SFA provides instructions, including the necessary password, for using RC/V View 8.22 for 5E7 and later software releases.

When the Coin Line AMA feature has been activated, the generation of AMA records for local coin sent-paid calls is enabled by setting the LOCAL COIN field on RC/V View 8.1 to **Y** (yes).

NOTE: LOCAL COIN is a required field with a default value of **N** (no).

11.9.5.3 Deleting Customer Service

To deactivate this secured feature, contact the SFA for assistance. The SFA provides instructions, including the necessary password, for using RC/V View 8.22 for 5E7 and later software releases.

To disable the generation of AMA records for local coin sent-paid calls, set the LOCAL COIN field on RC/V View 8.1 to **N** (no).

11.9.6 System Operation

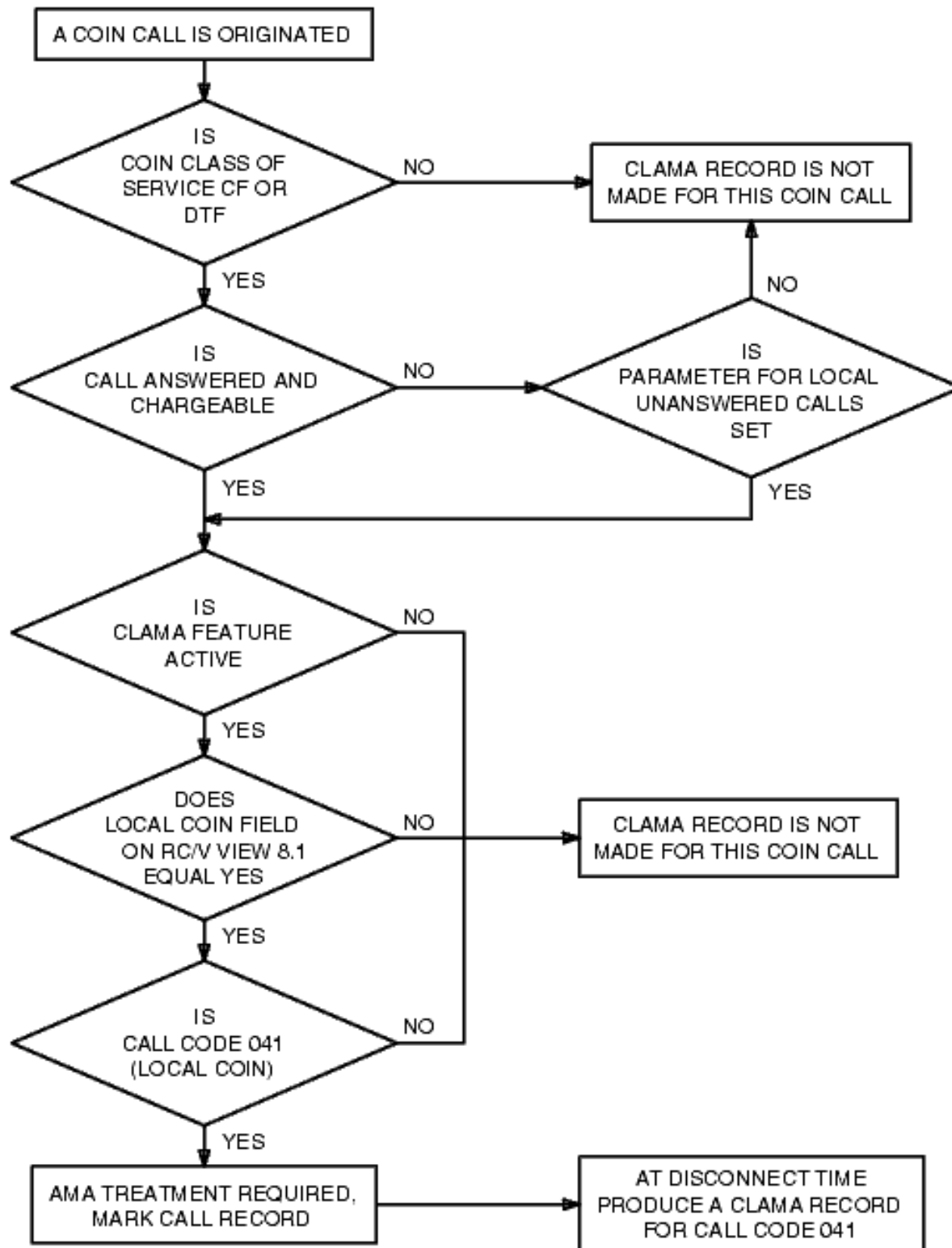
A Coin Line AMA feature flow diagram is shown in Figure 11-6. Each CF or DTF coin telephone originated, answered, chargeable call is checked to determine if it is a legitimate Coin Line AMA call. A coin line call is a legitimate Coin Line AMA call if the following are true:

- The Coin Line AMA feature has been activated on RC/V View 8.22 (Field 4)
- The LOCAL COIN field on RC/V View 8.1 is set to **Y** (yes) (For the 5E7 Software Release - Field 46, for the 5E8 Software Release - Field 41)
- The Call Code is 041. (See 235-190-300, *5ESS[®] Switch Billing Features and Specifications*.)

If the call is a legitimate Coin Line AMA call, the call record is marked as requiring AMA treatment. At disconnect time, an AMA record is produced for Call Code 041. (See 235-190-300, *5ESS[®] Switch Billing Features and Specifications*.)

11.9.7 Administration

Not applicable.



AUTOMATIC MESSAGE ACCOUNTING (AMA)
 COIN LINE AUTOMATIC MESSAGE ACCOUNTING (CLAMA)
 COIN FIRST (CF)
 DIAL TONE FIRST (DTF)

Figure 11-6 Coin Line Automatic Message Accounting Feature Flow Diagram**11.10 PAY PHONE COMPENSATION FOR TOLL FREE CALLS****11.10.1 Description**

The Pay Phone Compensation for Toll Free Calls feature (99-5E-4868) gives service providers the capability to identify a translated toll free call made from a pay phone and the type of pay phone originating the toll free call, following a Service Control Point (SCP) query that translated the toll free number to a Plain Old Telephone Service (POTS) number. The Toll Free Calling Enhancement for Flexible ANI feature (99-CP-4847) is also included with the same Secured Feature Identification (SFID). This feature provides the ability to restrict or allow forwarding of original flexible Automatic Number Identification (ANI) Information Digits (II) following SCP queries on a per-carrier basis for non-translated toll free calls.

These features help service providers support pay phone compensation and flexible ANI II screening as mandated by the Federal Communications Commission (FCC).

11.10.2 Availability

The Pay Phone Compensation for Toll Free Calls feature (99-5E-4868) and the Toll Free Calling Enhancement for Flexible ANI feature (99-CP-4847) are available as software updates for the 5E11, 5E12, and 5E13 software releases and are included in the 5E14 and later releases.

11.10.3 Environment

These features are provided on a per-office basis.

11.10.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-4868
- Feature Number: 99-CP-4847

11.10.5 Background

Without these features, any toll free call from any type of phone that is translated to a Plain Old Telephone Service (POTS) number is sent to the carrier with Information Digits (II) of 24 overriding the original II digits. Therefore, the carrier cannot determine the identity of the originating phone. Also, an access tandem does not have the flexible ANI II screening capability for a carrier that does not accept flexible ANI II digits.

11.10.6 Feature Operation**11.10.6.1 Feature Operation of Pay Phone Compensation for Toll Free Calls**

When the Pay Phone Compensation for Toll Free Calls feature is subscribed to by a carrier, the switch can assign a set of Tollfree II digits to a toll free call made by a pay phone for that carrier. These Tollfree II digits identify the type of pay phone. For a toll free call for which an SCP has returned a POTS number (translated number) and a carrier, if the Tollfree II subscription for the carrier has been set to "Y," the switch maps the original II digits to Tollfree II digits and signals them to the carrier.

If the Tollfree II subscription for the carrier has been set to "N," then the switch forwards II digits of 24.

The Tollfree II conversions are specified by the service provider in recent change. Table 11-1 shows an example of how these II conversions can be set up.

Table 11-1 Example of Original II To Tollfree II Conversions

Original II	Tollfree II	Type of Phone
27	25	network-controlled (dumb) pay phone
70	25	Customer-Owned Coin-Operated Telephone (COCOT) (smart pay phone)
29	25	inmate phone

11.10.6.2 Feature Operation of Toll Free Calling Enhancement For Flexible ANI

When the Toll Free Calling Enhancement for Flexible ANI feature is assigned to a carrier, the switch checks the Default II Subscription for the carrier of a call for which an SCP has returned a carrier identification and a non-translated toll free number. If the Default II Subscription for the carrier has been set to "N," then the switch forwards the Original II digits as received from the End Office (EO). If the Default II Subscription for the carrier has been set to "Y," then the switch checks the Original II digits received from the EO to determine which Default II values to forward.

Switch personnel define the Original II to Default II mapping in recent change. Table 11-2 shows an example of Original II to Default II mapping:

Table 11-2 Example of Original II To Default II Conversions

Original II	Default II	Type of Phone
27	27	network-controlled (dumb) pay phone
70	00	COCOT (smart pay phone)
29	07	inmate phone

11.10.7 User Operation

11.10.7.1 For Subscribers

No subscriber actions are associated with this feature.

11.10.7.2 For Switch Personnel

After enabling the Pay Phone Compensation for Toll Free Calls and the Toll Free Calling Enhancement for Flexible ANI features, switch personnel activate these features on Recent Change view 10.3 (CARRIER ADMINISTRATION) and set the II substitutions on Recent Change view 8.74 (ORIGINAL II TO TOLLFREE AND DEFAULT II MAPPING TABLE).

11.10.8 Engineering

11.10.8.1 Hardware Resources

No hardware considerations are associated with this feature.

11.10.8.2 Software Resources

No software considerations are associated with this feature.

11.10.8.3 Transition Considerations

No transition considerations are associated with this feature.

11.10.9 Interactions and Limitations

For trunk-originated calls, the original II digits are the II digits received in the signaling message. For line-originated calls, the original II digits are the II digits as determined by call processing that include flexible II digits.

The Pay Phone Compensation for Toll Free Calls and Toll Free Calling Enhancement for Flexible ANI features apply to Service Switching Point 800 Service (SSP/800) toll free calls only. They do not apply to *A-I-Net*® toll free calls.

For Serial/Multiple triggers on toll free calls, the II digits are mapped for the carrier that actually routes the call, not for the intermediate carriers that the switch has attempted to use to route the call.

If an Advanced Services Platform (ASP) query precedes an SSP/800 query and the call is routed via the carrier returned by the SCP in response to the SSP/800 query, then the II digits returned by the ASP are treated as the Original II digits. These Original II digits are then mapped to Default/Tollfree II digits which are sent to the carrier.

If an ASP query is the last query and the call is routed with the carrier returned by the ASP, then the II digits returned by the ASP are not mapped and are sent to the carrier.

11.10.10 Incompatibilities

No incompatibilities are associated with this feature.

11.10.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

11.10.12 Isolation Constraints

No isolation constraints are associated with this feature.

11.10.13 Recent Change Provisioning

See 235-118-2xx, *5ESS*® *Switch Recent Change Reference*, for detailed information on allowed values.

The service provider enables both the Pay Phone Compensation for Toll Free Calls feature and the Toll Free Calling Enhancement for Flexible ANI feature by populating the following fields in recent change and verify (RC/V) view 8.22 (SECURED FEATURE UPGRADE):

FIELD	VALUES
FEATURE ID	332
MODULE	OFC
PASSWD	(Obtain from Lucent Technologies SFID Administrator)
ACTIVE	Y

Switch personnel activate these features by setting the following fields on Recent Change view 10.3 (CARRIER ADMINISTRATION), using the Carrier Identification Code as the key:

RC/V VIEW	VIEW NAME	FIELD	ALLOWED VALUES
10.3	CARRIER ADMINISTRATION	DEFAULT II SUBSCRIPTION	Y or N
10.3	CARRIER ADMINISTRATION	TOLLFREE II SUBSCRIPTION	Y or N

Switch personnel set the II substitutions on Recent Change view 8.74 (ORIGINAL II TO TOLLFREE AND DEFAULT II MAPPING TABLE).

RC/V VIEW	VIEW NAME	FIELD	ALLOWED VALUES
8.74	ORIGINAL II TO TOLLFREE AND DEFAULT II MAPPING	ORIGINAL II	00-99

	TABLE		
8.74	ORIGINAL II TO TOLLFREE AND DEFAULT II MAPPING TABLE	TOLLFREE II	00-99
8.74	ORIGINAL II TO TOLLFREE AND DEFAULT II MAPPING TABLE	DEFAULT II	00-99
8.74	ORIGINAL II TO TOLLFREE AND DEFAULT II MAPPING TABLE	REMARKS	COIN, INMATE/PRISON, COCOT

11.10.14 Customer Premises Equipment (CPE)

Not applicable.

11.10.15 Maintenance Considerations

Not applicable.

11.10.16 Administration

11.10.16.1 Measurements

This feature does not impact measurements.

11.10.16.2 Billing

This feature does not impact billing.

12. DATA SERVICES

This section provides information on data services features available with the 5ESS[®] switch.

12.1 MULTISERVICE MODULE

12.1.1 Description

The MultiService Module (MSM) feature (99-5E-7011), also referred to as Quick Modem Pooling, allows a call from an analog line to connect to a data network service provider via a modem in a remote access concentrator integrated into the 5ESS[®] switch.

The MSM feature incorporates into the 5ESS[®] switch the functionality of the PortMaster 4 (PM4), which provides a Remote Access Concentrator (RAC) function.

Internet Service Providers (ISP) have had to supply their own modems and the associated authentication and billing equipment, collectively referred to as a Remote Access Server (RAS), while purchasing their network access from network service providers. The MSM feature provides network service providers with Remote Access Concentrator capability, allowing them to offer RAS services to their customer ISPs with greater efficiency and flexibility than the ISPs could provide for themselves.

For complete documentation on the MSM feature, refer to the PortMaster 4 documentation, which is available on the World Wide Web at:

<http://www.livingston.com>

The following PortMaster 4 documents are available:

- Software Manuals:
 - *RADIUS ABM Administrator's Guide*
 - *RADIUS Administrator's Guide*
 - *RADIUS for Windows NT Admin Guide*
 - *ChoiceNet Administrator's Guide*
 - *PMconsole for Windows Administrator's Guide*
- PortMaster Manuals:
 - *Command Line Reference*
 - *PortMaster Configuration Guide*
 - *PortMaster Troubleshooting Guide*
 - *PortMaster Routing Guide*
 - *ComOS 3.9 Release Note for PortMaster 3*
 - *ComOS 4.0 Release Note for PortMaster 4*
- Hardware Installation Guides:

- *PortMaster 4 Installation Guide*
- *Communications Server Hardware Installation Guide*
- *Internetwork Router Hardware Installation Guide*
- *PortMaster Office Router Hardware Installation Guide*
- *PortMaster Office Router Wizard Release Note*

12.1.2 Availability

The MSM feature (99-5E-7011) is available as a software update for the 5E13 software release and is included in the 5E14 and later releases.

12.1.3 Environment

This feature is provided on a per-office basis.

12.1.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-7011

12.1.5 Background

Not applicable.

12.1.6 Feature Operation

Refer to the PortMaster 4 documentation, which is available on the World Wide Web at:
<http://www.livingston.com>

12.1.7 User Operation

12.1.7.1 For Subscribers

No subscriber actions are associated with this feature.

12.1.7.2 For Switch Personnel

Switch personnel can perform the following operations from the Maintenance Control Center (MCC) of the 5ESS[®] switch:

- diagnosis of all hardware from the line interface through the output of the Digital Network Unit - Synchronous Optical Network (DNU-S) [namely, the Synchronous Transport Signal (STS)-1E];
- provisioning of STS-1E links on the DNU-S;
- provisioning of Ear and Mouth (E&M) Wink Start trunks, Primary Rate Interface/Primary Rate Access (PRI/PRA) interfaces, etc. on an SM-2000 to which a RAC is connected; and

- assignment of routing tables so that calls destined for Enhanced Service Providers (ESPs) are routed to the appropriate trunk within an STS-1E link.

For information on switch personnel activities on the PortMaster 4, refer to the PortMaster 4 documentation, which is available on the World Wide Web at:

<http://www.livingston.com>

12.1.8 Engineering

12.1.8.1 Hardware Resources

No hardware considerations are associated with this feature.

12.1.8.2 Software Resources

No software considerations are associated with this feature.

12.1.8.3 Transition Considerations

No transition considerations are associated with this feature.

12.1.9 Interactions and Limitations

For the MSM feature to work on the 5ESS[®] switch, the SM-2000 must have DNU-S support, which has been available since the 5E9(2) software release.

12.1.10 Incompatibilities

No incompatibilities are associated with this feature.

12.1.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

12.1.12 Isolation Constraints

No isolation constraints are associated with this feature.

12.1.13 Recent Change Provisioning

Refer to the PortMaster 4 documentation, which is available on the World Wide Web at:

<http://www.livingston.com>

12.1.14 Customer Premises Equipment (CPE)

Refer to the PortMaster 4 documentation, which is available on the World Wide Web at:

<http://www.livingston.com>

12.1.15 Maintenance Considerations

Refer to the PortMaster 4 documentation, which is available on the World Wide Web at:

<http://www.livingston.com>

12.1.16 Administration

12.1.16.1 Measurements

With the MSM feature, the 5ESS[®] switch provides standard traffic measurements on the usage of each trunk group provisioned for the ESP.

12.1.16.2 Billing

This feature does not impact billing.

12.1.17 End-to-End Provisioning of The MSM RAC

Following are procedures for provisioning the MSM RAC.

To simplify installation, the RAC is usually shipped with the latest release of ComOS already installed, though, in some cases, switch personnel may have to reload ComOS. Most of the provisioning of the RAC is done using PMVision, though some commands must be entered via the Command Line Interface.

The PortMaster 4 documentation referred to in these procedures is available on the World Wide Web at:
<http://www.livingston.com>

12.1.17.1 Provisioning Requirements

The following are procedures and activities that must be performed *before* provisioning the RAC:

- The MSM-RAC hardware must already be installed and cabled. See *PortMaster 4 Installation Guide* for further details on connecting the cables.
- A console or Personal Computer (PC) must already be connected to the RAC manager module (SMM pack) via an RS-232 interface. Any needed terminal emulation software must already be installed.
- The recommended platform for the Element Manager System (EMS) is a Sun Ultra 60 with:
 - Solaris 2.5.1,
 - a minimum of 256 MB RAM,
 - two Ethernet ports, and
 - external SW mirrored 9 GB Small Computer System Interface (SCSI) disks.

Otherwise, additional information on minimum system requirements can be found on the World Wide Web at:
<http://chorus.livingston.com/marketing/products/pmvision-datasheet.html>

- PMVision requires that the EMS platform be running Java JDK or JRE version 1.1.4 or later. This software must be installed prior to the installation and use of PMVision.
- The EMS and the RAC must have physical layer connectivity.
- For each RAC, the following IP addresses must be determined prior to installation:
 - the IP address and netmask to be assigned to the Ether0 (10BaseT) port (the port that connects to the EMS),

- the IP address and netmask to be assigned to the Ether1 (100BaseT) port (the port used for egress from the RAC),
 - the IP address of the default Gateway router (the destination to which the RAC sends packets when it has no other routing information),
 - the IP address of the EMS (the PMVision platform), and
 - the IP address of the RADIUS server.
- The following RAC parameters must be determined prior to installation:
 - the System Name, which is the name by which the RAC will be known for (CHAP) authentication and
 - the administrative password for the RAC, which is used to control access to the administrative features.
 - The technician must know the test Directory Number (DN) or DNs that can be used to direct test calls to the RAC.
 - The technician performing these procedures must have access to the PortMaster 4 documentation, which is available on the World Wide Web at:
<http://www.livingston.com>
 - The technician performing these procedures must already have taken Remote Access Business Unit PortMaster training. Information on PortMaster training can be found on the World Wide Web at:
<http://www.livingston.com>

12.1.17.2 Provisioning The RAC

Following is the procedure for provisioning the RAC.

- (1) Load PMVision and ComOS:
 - (a) Load PMVision onto the EMS from the CD-ROM provided by Lucent Technologies.
 - (b) Copy ComOS from the CD-ROM, in preparation for downloading it to the RAC should that become necessary. Periodic updates to PMVision and ComOS will be made available by Lucent Technologies.
- (2) Set RAC parameters:
 - (a) At the console, log in to the RAC.
 - (b) Set the system name.
 - (c) Set the administrative password.
 - (d) Set the default route gateway address.
 - (e) Set the network address and netmask for the 10BaseT and 100BaseT Ethernet ports on the SMM pack.
 - (f) Test the basic setup using the "ping" command, to determine if IP connectivity has been established.

NOTE: See the *PortMaster 4 Installation Guide* for more information on performing these tasks.

(3) Install PMVision on the EMS platform:

- (a) Download the tar file for PMVision (assuming that the recommended Sun Ultra 60 platform is being used).
- (b) Uncompress the tar file. The uncompressed file is a self-installing executable.
- (c) Run the executable file.
- (d) Start PMVision.
- (e) Enter the IP address for the RAC, and select it.

For questions on PMVision commands and procedures, consult the on-line help that is part of the PMVision application.

(4) Install ComOS.

NOTE: If the version of ComOS that came pre-installed on the SMM card is a different version than that shipped on the CD-ROM, then the RAC should be upgraded.

- (a) Determine which version of ComOS is running on the RAC.
- (b) Upgrade the ComOS using the upgrade procedures of PMVision.

NOTE: See the PMVision on-line help pages for more information on performing these tasks.

(5) Set up the STS-1E link.

NOTE: Provisioning the STS-1E link between a 5ESS[®] switch Switching Module (SM) and an RAC involves steps on both the 5ESS[®] switch SM and the RAC.

- (a) Set up the STS-1E ingress on the 5ESS[®] switch, using normal 5ESS[®] switch provisioning. See 235-105-210, *5ESS[®] Switch Routine Operations and Maintenance Procedures* for more information.
- (b) Provision the STS-1E interface on the RAC using PMVision.
- (c) Set up routing in the 5ESS[®] switch to direct calls destined for the data provider's DN (the DN of the ESP) to the correct tributary of the STS-1E link.

(6) Set up Frame Relay Egress, if used. (See the *PortMaster 4 Configuration Guide* for more information on provisioning this link.)

(7) Set up Data Network IP routing according to customer needs. (See the *PortMaster Routing Guide* for more information on setting up routing.)

(8) Configure the RAC as a RADIUS Client. (See the *PortMaster 4 Command Line Reference* for more information.)

- (a) Using the ComOS command line interface, enable port security on all ports of the RAC.
- (b) Enter the IP address of the primary RADIUS server.

NOTE: You can also specify an alternate RADIUS server. The primary RADIUS server is consulted first. If the server does not respond, it is queried a second time; then both servers are queried up to eight additional times at three-second intervals.

- (c) To log activity using RADIUS accounting, enter the IP address of the primary accounting server.

NOTE: You can also specify an alternate accounting server.

- (d) Enter the "shared secret" shared by the RAC client and the RADIUS server.

NOTE: The shared secret is a character string specified on both the RADIUS server and another device or server (in this case, the RAC) that establishes mutual identification. An authorized user uses the shared secret as an encryption key to encrypt a random sixteen-octet number, which is passed to the RADIUS server. The RADIUS server decrypts the number with the same secret word, thereby authenticating the communication.

- (9) Configure Layer 2 Tunneling Protocol (L2TP) in RAC and RADIUS CMS.

To set up L2TP, the following three components are required:

- an L2TP Access Concentrator (LAC),
- an L2TP Network Server, and
- a RADIUS server.

NOTE: ComOS release 4.0 supports the LAC functionality in the RAC, with LNS support in the PM4 planned for ComOS 4.1. Prior to the release of ComOS 4.1, a PortMaster 3 can be used as an L2TP Network Server. This procedure only addresses the RAC and RADIUS server. See *ComOS 3.9 Release Note for PortMaster 3* (Open Beta) for details on setting up the PM3 as a LNS. Note that the same RADIUS server can be used by both the LAC and LNS.

- (a) Set up the L2TP on the RAC.

NOTE: This is the LAC-side of the protocol. You may also need to set up the LNS side of the protocol, if that server (perhaps a PortMaster 4) is also in the customer's network.

- (b) Provision the L2TP in the RADIUS server.

NOTE: Both of these procedures are described in *ComOS 4.0 Release Note for PortMaster 4*.

12.2 ADSL NETWORK SERVICES

12.2.1 Description

Asymmetric Digital Subscriber Line (ADSL) Network Services provide the ability to handle many times more data bandwidth over existing copper loop equipment, which provides more efficient transport of data traffic. It allows subscribers to send and receive data on their analog telephone line without interfering with their voice telephone service.

ADSL provides subscribers with high-speed data access to Internet Service Providers (ISPs) or to corporate networks that use Discrete Multi-Tone (DMT) encoding by putting data traffic on the local loop at frequencies above

the voice band. ADSL automatically adapts to the quality of the line. Depending on line quality, downstream rates (from the network to the subscriber) are typically between 1 and 6 Mbps. Upstream rates (from the end user to the network) are typically between 100 kbps and 1 Mbps. Data transmission is via Asynchronous Transfer Mode (ATM).

At the subscriber's site, a splitter/combiner isolates the existing Plain Old Telephone Service (POTS) signals from the high frequency data signals on the line. An ADSL Transceiver Unit - Remote (ATU-R), which connects to a Personal Computer (PC), performs the modulation/demodulation, the ATM formatting, and the signal conversion needed to send the data signal across the line at frequencies above the voice signal.

ADSL Network Services on the 5ESS[®] switch includes two features:

- The ADSL On The AIU (DMT) feature (99-5E-3847) provides the 5ESS[®] switch support for ADSL Application Packs (APs) on the Access Interface Unit (AIU).
- The Broadband Backplane For AIU feature (99-5E-4473) allows ADSL APs in the AIU to exchange information with the ATM Feeder Multiplexer (AFM) over a broadband backplane interconnection.

12.2.2 Availability

Both the ADSL On The AIU (DMT) feature (99-5E-3847) and the Broadband Backplane For AIU feature (99-5E-4473) are available as software updates to the 5E11, 5E12, and 5E13 software releases and are included in the 5E14 and later releases.

12.2.3 Environment

This feature is provided on a per-office basis.

12.2.4 Cross References

The following cross references apply to this feature:

- Feature Number: 99-5E-4473
- Feature Number: 99-5E-3847
- ADSL Element Manager documentation:
 - 363-211-300, *AnyMediaTM ADSL Element Manager System: Administrator's Guide*
 - 363-211-301, *AnyMediaTM ADSL Element Manager System: User's Guide*

12.2.5 Background

Not applicable.

12.2.6 Feature Operation

At the customer premises, a telephone and a PC are connected to the same line via a splitter, with the PC connected to the splitter via an ATU-R that handles the ATM protocol, frequency shift, and modulation/demodulation. The line interfaces with the 5ESS[®] switch through an ADSL AP in the *AnyMediaTM* Access Interface Unit (AIU).

The ADSL AP sends the POTS signal to a POTS AP and then the POTS signal is handled like any other POTS line

signal: it is sent to a Data and Control (DAC) 100 pack and then through the switch out into the Public Switched Telephone Network (PSTN).

The ADSL AP passes the broadband signal to the AFM over the broadband backplane. The AFM statistically multiplexes all the broadband signals from the ADSL APs in the *AnyMedia*TM AIU and sends the multiplexed signal to an ATM switch in the operating company's network, which routes the data to the appropriate ISP or corporate network.

Figure 12-1 illustrates this architecture.

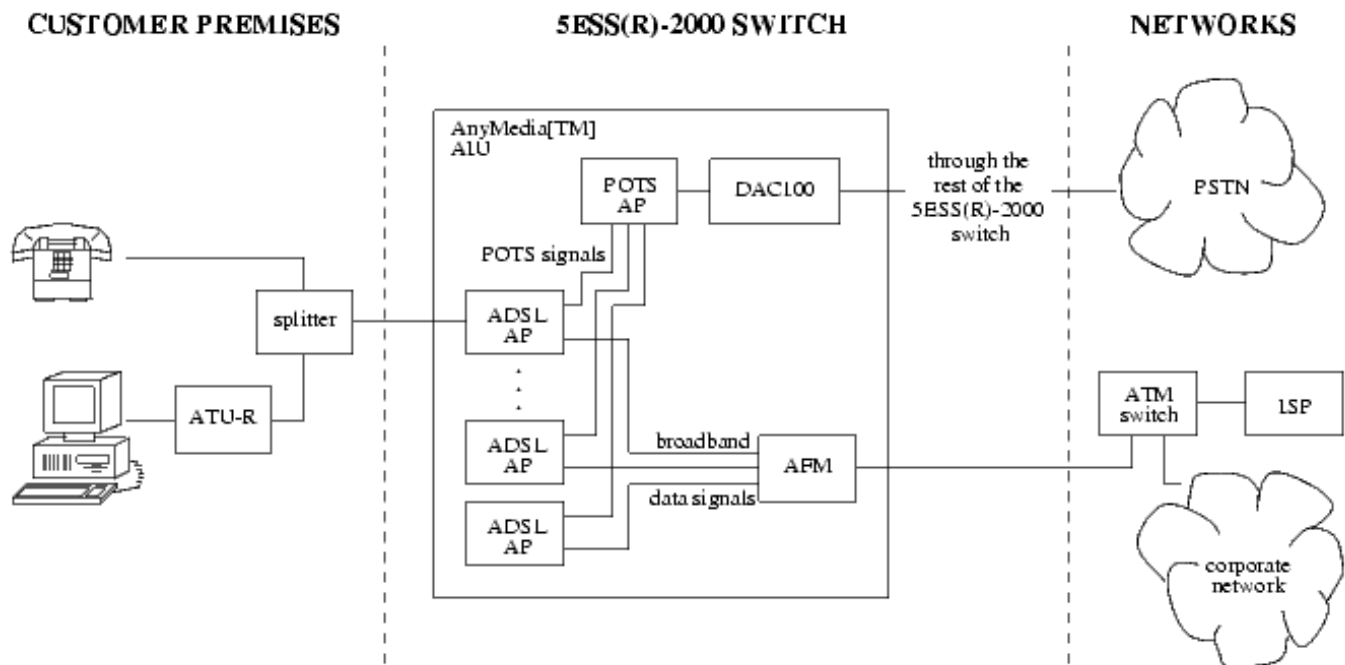


Figure 12-1 ADSL Overview.

12.2.7 User Operation

12.2.7.1 For Subscribers

No subscriber actions are associated with this feature.

12.2.7.2 For Switch Personnel

Most switch personnel activities associated with ADSL will be performed on the ADSL Element Manager. For information on the ADSL Element Manager and its operation, see 363-211-300, *AnyMedia*TM ADSL Element Manager System: Administrator's Guide and 363-211-301, *AnyMedia*TM ADSL Element Manager System: User's Guide.

The ADSL activities that switch personnel will have to perform on the 5ESS[®] switch are:

- performing Recent Change operations to record the presence of the ADSL AP in the AIU and
- checking MCC pages to see that they reflect the presence of the ADSL and AFM APs.

The status of a broadband-enabled AIU can be verified on Master Control Center (MCC) page 1320. If an AIU

display reads "BROADBAND ENABLED," the AIU can accept ADSL APs. The display also indicates the type of circuit pack in each slot.

12.2.8 Engineering

12.2.8.1 Hardware Resources

To provide ADSL to a subscriber, the switch must be equipped with an *AnyMedia*TM AIU, the *AnyMedia*TM AIU must be equipped with an AFM, and the subscriber's line must be connected to an ADSL AP on an *AnyMedia*TM AIU.

12.2.8.2 Software Resources

No software considerations are associated with this feature.

12.2.8.3 Transition Considerations

No transition considerations are associated with this feature.

12.2.9 Interactions and Limitations

No interactions or limitations are associated with this feature.

12.2.10 Incompatibilities

No incompatibilities are associated with this feature.

12.2.11 Dependencies

No other features need to be installed or activated in order for this feature to work.

12.2.12 Isolation Constraints

No isolation constraints are associated with this feature.

12.2.13 Recent Change Provisioning

See 235-118-2xx, *5ESS[®] Switch Recent Change Reference*, for detailed information on allowed values.

The service provider provision ADSL service for a group of customers on an AIU by first calling up Recent Change and Verify (RC/V) view 19.16 (ACCESS INTERFACE UNIT) for the intended AIU, checking that the AIU is equipped with a Broadband Backplane by verifying that the BROADBAND field reads "Y."

The service provider then provisions the AFM on RC/V view 20.16 (ACCESS INTERFACE UNIT PACK) by entering the SM number, the AIU number, and the Pack number:

RC/V VIEW	VIEW NAME	FIELD	VALUES
20.16	ACCESS INTERFACE UNIT PACK	SM	(as appropriate)
20.16	ACCESS INTERFACE UNIT PACK	AIU	(as appropriate)
20.16	ACCESS INTERFACE UNIT PACK	APPL PACK NUM	(0 or 1)

The service provider then provisions the ADSL APs on RC/V view 20.16 (ACCESS INTERFACE UNIT PACK) by entering the SM number, the AIU number, and the Pack number of an available slot in the AIU:

RC/V VIEW	VIEW NAME	FIELD	VALUES
20.16	ACCESS INTERFACE UNIT PACK	SM	(as appropriate)
20.16	ACCESS INTERFACE UNIT PACK	AIU	(as appropriate)
20.16	ACCESS INTERFACE UNIT PACK	APPL PACK NUM	(available slot in the

			AIU)

The service provider then inputs the appropriate Office Equipment (OE) number—the number of the POTS port that the ADSL line is connected to—on RC/V view 1.6 [COMPOSITE LINE (LINE ASSIGNMENT)].

RC/V VIEW	VIEW NAME	FIELD	VALUES
1.6	COMPOSITE LINE (LINE ASSIGNMENT)	OE	(as appropriate)

12.2.14 Customer Premises Equipment (CPE)

A splitter/combiner (also known as a diplex filter) is needed to isolate the existing POTS phone from the high frequency data signals on the line. The ATU-R connects a PC to the line, taking a 10BaseT Ethernet signal from the PC and converting it to the ADSL format, performing modulation/demodulation, and handling the ATM protocol.

12.2.15 Maintenance Considerations

See the ADSL Element Manager documentation for information on ADSL maintenance.

12.2.16 Administration

12.2.16.1 Measurements

All measurements of ADSL traffic activity are reported through the ADSL Element Manager. See the ADSL Element Manager documentation for information on ADSL measurements.

12.2.16.2 Billing

All billing of ADSL traffic is done by the ADSL Element Manager. See the ADSL Element Manager documentation for information on ADSL billing.

GLOSSARY

This section provides acronyms, terms, and abbreviations used in this manual.

-- GLOSSARY --

0+ Call

A customer-dialed call consisting of the digit 0 plus 7 or 10 digits.

0- Call

A customer-dialed call consisting of the digit 0 which obtains operator assistance.

1+ Call

A customer dialed call consisting of the digit 1 plus 7 or 10 digits.

2W

2-Wire

3BI

3B computer Interface

4PFS

4-Party Full Selective

4PSS

4-Party SemiSelective

4W

4-Wire

Abbreviated Dialing 1 (AD1)

This refers to 1-digit speed calling.

Abbreviated Dialing 2 (AD2)

This refers to 2-digit speed calling.

ABC

Auto Bill Calling

ABC

ABandon Call check

ABND

ABaNDon

AC

Automatic Callback

AC

Alternating Current

ACBC

Automatic CallBack Calling

ACC

Automatic Congestion Control

Access Tandem (AT)

An *ESSTM* switch used to provide carrier access to end offices (and possibly to collocated stations).

ACCT

ACCounT code

ACD

Automatic Call Distribution

ACD/MIS

Automatic Call Distributor/Management Information System

ACDS

Automatic Call Distributor System

ACG

Automatic Code Gapping

ACK

ACKnowledge

ACM

Address Complete Message

ACOF

Attendant Control Of Facilities

ACP

ACtion Point

ACSR

Automatic Customer Station Rearrangement

ACT

ACTive

ACT

Alternative Code Treatment

ACT

Attendant Call Transfer

ACTS

Automated Coin Toll Service

ACVT

Attendant Control of Voice Terminals

AD1

Abbreviated Dialing 1

AD2

Abbreviated Dialing 2

ADDR

ADDRess digits

Administration

Administration is a number of related functions with the objective of ensuring the overall provision of service by the 5ESS[®] switch. Administration includes the assignment of lines and trunks to the system, memory management, collection of traffic and plant data, provisions for additions and modifications to the switch, service evaluation, and capabilities to control and manage the 5ESS[®] switch. The primary objective of administration is to assure that the 5ESS[®] switch delivers a high level of quality service to the subscribing customers. This is accomplished by monitoring and evaluating of system performance. Potential problems that could cause service deterioration are identified.

Administrative Module (AM)

The AM is that part of the 5ESS[®] switch which performs the part of call processing, administration, and maintenance which cannot be economically distributed to the switching modules. The AM consists of the processor, disk storage, and tape backup units. The AM processor performs the centralized processing functions, high-speed tape, and controls the flow of data between the other dedicated processors distributed throughout the remaining units. The processor functions are fully duplicated (except for the port switch) in order to assure continued processing capability.

AFT

Application recent change text interface Forward Translation

AIF

Automatic number Identification local office Failure

AIM

Application Integrity Monitor

AIN

Advanced Intelligent Network

AIS

Alarm Indication Signal

AIS

Automatic Intercept System

ALCB

Access Link Control Block

ALI

Automatic Location Identification

ALIC5

Analog Line to Integrated SLC[®] Carrier at 5ESS[®] switch cut

ALIT

Automatic Line Insulation Test

ALM

ALarM

ALT

ALternate

ALT

ALternate routed Traffic

Alternative Code Treatment (ACT)

A capability that allows customers to give alternative treatments to specified IDP codes at certain times. This is done by associating a valid ID code with an alternative code treatment set (ACT set). The ACT set is associated with an on/off indicator and alternative treatment instructions. When the indicator is off, normal treatment is given when a line dials a code in the ACT set, when the indicator is on, alternative treatment is given when a line dials a code in the ACT set.

ALTRKBSY

ALI TRunKs BuSY

ALW

ALloW

AM

Administrative Module

AMA

Automatic Message Accounting

AMATPS

Automatic Message Accounting TeleProcessing System

AML

Automatic Maintenance Limit

AMPS

Advanced Mobile Phone Services

ANF

Automatic Number identification Failure

ANI

Automatic Number Identification

ANI6

Automatic Number Identification information digit 6

ANI7

Automatic Number Identification information digit 7

ANI II

Automatic Number Identification II

ANIIND

Automatic Number Identification INDicator

ANNAPL

ANNouncement APpLication

ANNC

ANNounCement

ANSTO

ANSwer Time Out

AOF

Automatic number identification Office Failure

AP

Application Processor

AP

Attached Processor

API

Applications Processor Interface

APID

Applications Processor IDentification

APN

Action Point Number

APPTEXT

APPLication recent change TEXT interface

APS

Adjunct Processor System

APT

Automatic Progression Testing

AR

Automatic Recall

ARA

Automatic Reservation Adjustment

ARFS

Attendant Recall From Satellite

ARS

Automatic Route Selection

ARSID

Automatic Route Selection group IDentifier

Assignments

Assignments are the association of logical identifiers (in the areas of line/telephone numbers, trunks and hardware) to physical units of equipment (circuits and ports) and the provision of feature permissions.

ARU

Automatic Response Unit

ASC

Alarm Status Circuit

ASC

Announcement Storage Circuit

ASCII

American Standard Code for Information Interchange

ASN

Advanced Services Network

ASP

Advanced Services Platform

AT

Access Tandem

ATCONF

ATtendant CONFerence

ATH

AuTHorization code

ATND

ATteNdant Directory number

Attribute

Columns in a data table having unique names.

ATTS

Automatic Trunk Test Scheduler

AU

AUdit subsystem

AUG10

AUGmented 10-digit dialed number

AUG7

AUGmented 7-digit dialed number

Auto Bill Calling (ABC)

A service that allows a customer to charge calls to some number other than the calling number.

Automated Coin Toll Service (ACTS)

The feature that automatically computes charges on coin toll calls, announces charges to the customer, counts coin deposits, and sets up coin calls—all without need of an operator.

Automatic Message Accounting (AMA)

The automatic accumulation of call data such as calling number, called number, date, time, duration, etc., which will subsequently be processed by the RAO to render a customer telephone bill. Disks are used to store the information pertinent to local and toll calls for billing purposes.

Automatic Message Accounting TeleProcessing System (AMATPS)

A billing system feature where the 5ESS[®] switch forwards billing information over a data link to a centralized AMA data collection system. The AMA data collection system interfaces with an RAO.

Automatic Number Identification (ANI)

A feature of a local switching office that automatically identifies the calling party without operator intervention.

AUTOMatic VOice Network (AUTOVON)

The AUTOVON network is a 4-wire telecommunication network used by authorized agencies of the government. This network provides its subscribers with services similar to the public network plus unique features specific to the government application.

AUTOVON

AUTOMatic VOice Network

AVT

Access Via Tandem

B&I

Busy AND Idle

B911

Basic 911 service

BCD

Binary Coded Decimal

BCI

Blocked Call Indication

BCR

Bell Communications Research (aka Bellcore)

BES

Bursty Errored Seconds

Bellcore

BELL COmmunications REsearch

BFG

Business and residence custom services Feature Group

BI

Batch Input

BIP

Base Initializing Protocol

Bits Per Second (bps)

A measure of the speed with which data communications can move over a line. Also abbreviated BPS, b/s, and B/S.

BLDG

BuiLDinG

BLO

BLOcking

BMI

Batch Mode Input

BMR

Batch Mode Release

BN

Billing Number

BOC

Bell Operating Company

bps

Bits Per Second

BPV

BiPolar Violations

Broadcast Warning Message (BWM)

Now referred to as a Software Update (SU).

BRCS

Business and Residence Custom Services

BRG

BaRGe-in tone

BRI

Basic Rate Interface

Business and Residence Custom Services (BRCS)

The software of the 5ESS[®] switch that allows the creation of business/residence central office services. The Centrex II and custom calling services are included in this package.

BWM

Broadcast Warning Message

CA

Call Appearance

CAC

Charge-A-Call

CAC

Carrier Access Code

Call Forwarding (CF)

The 5ESS[®] switch allows its customers to subscribe to call forwarding. When a call comes in for a call-forwarded number, it is rerouted to another destination code specified by the customer.

Call Gapping

Call gapping is a control which regulates the maximum rate at which calls are released towards a destination code. Call-gapping control performs the function of limiting access attempts during mass-call situations to specific destination codes.

CAMA

Centralized Automatic Message Accounting

CANF

CANcel-From

CANT

CANcel-To

CAR

Computer Access Restriction

CAROT

Centralized Automatic Reporting On Trunks

CARR

CARRier

Carrier

This term refers to inter-LATA, international carriers, or combined carriers.

CARRID

CARRier IDentification

Carrier Interconnect (CI)

The Carrier Interconnect feature provides the local exchange network interconnection for carriers.

CAS

Centralized Attendant Service

CC

Country Code

CC

Common Control

CCC

Commercial Credit Card

CCIDDDTC

Country Code/International Direct Distance Dialing/Trunk Code

CCIS6

Common Channel Interoffice Signaling system number 6

CCITT

Comite Consultatif International Telegraphe et Telephone

CCOL

Coin COLlect

CCS

Common Channel Signaling

CCS

100 Call Seconds

CCS7

Common Channel Signaling system 7

CCSA

Common Channel Signaling Availability

CDBM

Circular Data Base Manager

CDI

CoDe Index

CDIM

Carrier Destination Mapping form

CDO

Community Dial Office

Centralized Automatic Message Accounting (CAMA)

This feature permits a 5ESS[®] switch office to collect and store toll information and message unit billing on the CAMA calls originated by local offices served by the CAMA office.

CdPN

CalleD Party Number

CDX

Compact Digital eXchange

Centralized Trunk Test Unit (CTTU)

An OSS providing centralized trunk maintenance through a data link. This allows the switching control center maintenance personnel to perform remote trunk testing from a work station on a local switching office.

CESID

Customer Emergency Services IDentification

CF

Call Forwarding

CF

Coin First

CF/SC

Call Forward/Speed Call

CFBL

Call Forwarding Busy Line

CFDA

Call Forwarding Don't Answer

CFDARQ

Call Forwarding Don't Answer Return to Queue

CFDN

Call Forwarding Directory Number

CFPF

Call Forwarding over Private Facilities

CFT INIT

CraFT INITialization

CFV

Call Forwarding Variable

CG

Concentrator Group

CGA

Carrier Group Alarm

CHGACALL

CHarGe-A-CALL

CHGI

CHarGe Index

CHGIDX

CHarGe InDeX

CI

Corrupt Indicator

CI

Carrier Interconnect

CI-AMA

Carrier Interconnect Automatic Message Accounting

CI-II

Computer Inquiry II

CIC

Carrier Identification Code

CICR

Cancel In-Chain Return

CIDIAL

Carrier Interconnect DIALing

CIN

Customer Identification Number

CL

Customer Location

CLAMA

Coin Line Automatic Message Accounting

CLCIGRPID

*CLC*TM GRouP IDentification

CLI

Change Level Indicators

CLID

Calling Line IDentification

CLCT

CalL CounT

CLSS

Calling Line Side Supervision

Cluster

A group of BRCS features packaged under a unique name.

CM

Communication Module

CMC

Cellular Mobile Carrier

CMD

CoMmanD

CMDS

CoMmanDS

CMP

Communication Module Processor

CNCC

Customer Network Control Center

CNI

Common Network Interface

CNIINIT

Common Network Interface INITialization

CNO

Custom Network Option

CNT

CoiN Test

CO

Central Office

COCOT

Customer Owned Coin Operated Terminals

COD

CODe

Code Controls

Manual code controls block traffic to destination codes that are hard or impossible to reach. This conserves network resources for other traffic. Code controls are most effective for controlling focused overload, a condition characterized by a surge of traffic from many parts of the network to a single office or destination code.

COFA

Change Of Frame Alignment

Coin First (CF)

A type of coin station which requires the presence of a coin in order to provide an off-hook indication to the local office.

Comite Consultatif International Telegraphe et Telephone (CCITT)

The Comite Consultatif International Telegraphe et Telephone (International Telegraph and Telephone Consultative Committee) (CCITT) was an international advisory committee under United Nations sponsorship that composed and recommended for adoption worldwide standards for international communications. It has largely been replaced by the International Telecommunication Union - Telecommunication Standardization sector (ITU-TS).

Computer Inquiry II (CI-II)

The US Federal court decision, which took effect 1 January, 1984, that required AT&T to divest itself of its Bell Operating Companies (BOCs).

Consolidated Carrier

Type of carrier that handles all traffic. Often referred to as an Inter-LATA Carrier and INternational Carrier (IC/INC).

CONV

CONVersion

CORC

Customer Originated Recent Change

COS

Class Of Service

COT

COnTinuity

COT

Central Office Terminal

COT

Customer-Originated Trace

CPDI

Calling Party Disconnect Indication

CPE

Customer Premises Equipment

CPN

Calling Party Number

CPU

Central Processing Unit

CRA

Circuit Reservation Acknowledgement

CRB

CRankBack

CRC

Cyclic Redundancy Check

CRC-6

Cycle Redundancy Check-6

CRET

Coin RETurn

CRO

Cancel Rerouted Overflow

CRT

Cathode Ray Tube

CSACC

Customer Service Administration Control Center

CSC

Customer Support Center

CSCANS

Customer Service Computer Access Network System

CSD

Circuit Switched Data

CSG

Communications Services Group

CSI

Carrier Selection Information

CSOP

Controlling Spooler Output Process

CSR

Customer Station Rearrangement

CSS

Controlled Slip Seconds

CST

Circuit-Switched Trunk

CSTE

Circuit-Switched Trunk Enhancement

CSV

Circuit Switched Voice

CT

Confirmation Tone

CTIAC

Call Transfer Individual-All Call

CTIIO

Call Transfer Individual-Incoming Only

CTO

Call Transfer Outside

CTRF

Customer TRaFfic

CTTU

Centralized Trunk Test Unit

CU

Channel Unit

CU

Control Unit

CUST

CUSTom

Customer Station Rearrangement (CSR)

A feature that allows business customers to change, display, and verify data affecting their telephone service from an on-premises terminal.

Customization

Modification of a preconstructed BRCS feature resulting in a unique (customized) feature that can be assigned to lines or trunks.

CV

Code Violations

CW

Call Waiting

CW

Call Waiting tone

CWO

Call Waiting Origination

CWT

Call Waiting Terminating

DA

Directory Assistance

DA

Discontinued Availability

DAA

Direct Agent Access

DAS

Digit Analysis Selector

DBU

Dial Backup Unit

DC

Delayed Call trunk

DC

Direct Current

DCCB

D Channel Control Block

DCIS6

Destination Common channel Interoffice Signaling 6

DCLU

Digital Carrier Line Unit

DCOFHK

Direct trunk from inter-LATA Carrier OFF Hook

DCT

Dispatch Control Table

DCTU

Directly Connected Test Unit

DCW

Dial Call Waiting

DD

Delay Dial

DD

Data Delivery

DDD

Direct Distance Dialing

DDS

Digital Data System

DDT

Delay Disconnect Timer

DED

DEDicated

DEM

DEMAND

DEN

Digital Equipment Number

DES

DESignation

DESEP

DEstination traffic SEParation class

DEV

Direct Egress Voice

DEV

Dedicated Egress Voice

DFC

Disk File Controller

DFI

Digital Facility Interface

DFTAC

Distributing Frame Test Access Circuit

DI

Destination Indices

Dial Service Attendant (DSA)

Dial service attendants are attendants at the AUTOVON network level that provide directory assistance and other global network services. These attendants are not to be confused with the local attendants on the AUTOVON interface switch.

Dial-Tone-First (DTF)

A type of coin service which allows the customer to dial certain types of calls (that is, N11 and other local free calls, 0-, 0+, etc.) without making an initial deposit.

Dial-Tone-First (DTF) Office

An office containing DTF (1C or 1D) stations. Intentions are to modify the 1C stations to DTF operation.

Dial-Tone-First (DTF) Station

A type of coin station which does not require the presence of a coin in order to provide an off-hook indication to

the local office.

DIC

Direct Inter-LATA Connecting

DID

Direct Inward Dialing

DIG

DIGit or DIGits

Digital Signal level 0 (DS0)

A digital communications channel at 64 kbps.

Digital Signal level 1 (DS1)

A digital communications channel at 1.544 Mbps.

DIOP

Disk Independent Operation

DIRANI

DIRect connect with Automatic Number Identification

Direct Distance Dialing (DDD)

A feature that permits eligible customers to place calls without operator assistance by dialing a set of digits in accordance with the numbering plan.

DIRNOANI

DIRect connect with NO Automatic Number Identification

DISP

DISPlay

DLC

Digital Loop Carrier

DLI

Dual Link Interface

DLM

Disk Limp Mode

DLN

Direct Link Node

DLSE

Dial Line Service Evaluation

DLTU

Digital Line Trunk Unit

DMA

Direct Memory Access

DMDN

DoMain Directory Number

DMERT

Duplex Multi-Environment Real-Time

DMS

Data base Management System

DMS

Northern Telecom's competing digital switch.

DN

Directory Number

DNM

Directory Number Measurements

DNU-S

Digital Networking Unit - Synchronous Optical NETwork

DOC

Dynamic Overload Control

DOMES

DOMESTic

DOPS

Digital Ordering and Planning System

DP

Dial Pulsing

DPCF

Dual Point Codes Feature

DR

Distinctive Ringing

DRF

Double Ring Forward

DS-0

Digital Signal level 0

DS-1

Digital Signal level 1

DS0

Digital Signal level 0

DS1

Digital Signal level 1

DSA

Dial Service Attendant

DSA

Defensed Switched network Alert signal sent

DSC

Defensed Switched network Clear wink sent

DSCH

Dual Serial CHannel

DSL

Digital Subscriber Line

DSN

Defensed Switched Network

DSR

Defensed Switched network Reuse wink sent

DST

Defensed Switched network Test signal sent

DSU

Digital Service Unit

DSU2

Digital Service Unit - model 2

DT

Dial-Tone

DTA

Dial-Through Announcement

DTF

Dial-Tone-First

DTG

Direct Trunk Group

DTGOFL

Direct Trunk Group OverFlow

DTMF

Dual Tone MultiFrequency

DTU

Digital Test Unit

E&M

Ear AND Mouth

E911

Enhanced 911 service

EA

Equal Access

EA

Emergency Action

EA

Emergency Announcement

EA

Emergency Assistance

EA DISP

Emergency Action DISPlay

EA1

Emergency Announcement 1

EA2

Emergency Announcement 2

EADAS

Engineering and Administrative Data Acquisition System

EAEO

Equal Access End Office

EAI

Emergency Action Interface

EAMF

Equal Access MultiFrequency

EAOSS

Exchange Access for Operator Services Signaling

EAP

Elevated Audit Process

EAS

Equal Access Signaling

EAS

Extended Area Service

EASC

Expansion Announcement Storage Circuit

EC

Electronic Console

ECD

Equipment Configuration Data base

ECPC

Executive Cellular Processor Complex

ECS

Equipment configuration data base Configuration System

EDS

Electronic Directory Service

EDSL

Extended Digital Subscriber Line

EIA

Electronics Industry Association

EIS

Expanded Inband Signaling

EMER

EMERgency

EMRR

EMergency ReRoute

ENFIA

Exchange Network Facilities for Interstate Access

Engineering and Administrative Data Acquisition System (EADAS)

A mechanized system that is a near real-time data collection and surveillance system. Data transmitted over the data link interface of the 5ESS[®] switch is collected and summarized by a data processor system.

Enhanced Private Switched Communications Service (EPSCS)

A private switched network of dedicated facilities providing full duplex communication on all connections. It provides a center from which the customer can exercise, monitor, and control functions relative to the performance of the network.

EO

End Office

EO

Executive Override

EPROM

Erasable Programmable Read Only Memory

EPSCS

Enhanced Private Switched Communications Service

Equal Access End Office (EAE0)

An ESSTM switch used to provide carrier access to collocated stations.

ER

Emergency Ringback

ERW

Expensive Rate Warning

ERWT

Expensive Route Warning Tone

ES

Errored Seconds

ESA

Enhanced 911 Service Adjunct

ESA

Emergency Services Adjunct

ESA

Emergency Service Application

ESB

Emergency Service Bureau

ESCO

Emergency Service Central Office

ESF

Extended Super Frame

ESN

Emergency Service Number

ESP

Essential Service Protection

ESP

Enhanced Service Provider

ETS

Electronic Tandem Switching

F

Flash

FAST

Facility Administrative surveillance SysTem

FAST

Form ASsembly Translator

FBAT

Forward BATtery

FC

Feature Control

FCA

Fully Coded Addressing

FCC

Federal Communications Commission

FCD

Flash Calling Display

FCD

Flash Control Digit

Feature Control (FC)

A software subsystem which sequences call processing actions at a hardware independent level.

FCI

Forward Call Indicator

FE

Far End

FEBE

Far End Block Error

FEC

Front End Controller

FER

Framing bit ERror

FETL

Far-End Test Line

FGA

Feature Group A

FGAOL

Feature Group A Originating Local access and transport area

FGASO

Feature Group A Switch Office

FGATL

Feature Group A Terminating Local access and transport area

FGB

Feature Group B

FGBEO

Feature Group B End Office

FGBOL

Feature Group B Originating Local access and transport area

FGBT

Feature Group B Tandem

FGBTL

Feature Group B Terminating Local access and transport area

FGD

Feature Group D

FGDOL

Feature Group D Originating Local access and transport area

FGDTL

Feature Group D Terminating Local access and transport area

FGDWBL

Feature Group D Wide area telephone service BiLling number

FIFO

First-In, First-Out

FLSH

FLaSH

FNPA

Far Numbering Plan Area

FNPA

Foreign Numbering Plan Area

FO

Flash Override

FOA

First Office Application

Foreign eXchange (FX)

A service that provides customer access to a distant central office by private (foreign exchange) trunks.

Incoming foreign exchange calls are placed to the listed directory number and are answered by the attendant.

Outgoing calls may be made on an attendant basis and/or on a station user direct-dial basis.

FRL

Facility Restriction Level

FS

Failed Seconds

FX

Foreign eXchange

GDSU

Global Digital Service Unit

GDX

Gated Diode CROSSpoints

GENANN

GENeral ANNouncement

GPIC

Group Primary Inter-local access and transport area Carrier

GRASP

GeneRic AcceSs Program

GRC

Global Recent Change

GRCV

Growth Recent Change and Verify

Group Primary Inter-local access and transport area Carrier (GPIC)

A single carrier to which a centrex group can presubscribe.

Growth

Growth is the systematic modification of central office equipment to provide increased call-handling capacity and improved service. Growth is required to make a 5ESS[®] switch evolve economically over a wide range of services and traffic needs.

HC

Head Cell

Hertz (Hz)

A term used to denote frequency or cycles per second.

HM

Human Machine

HML

Human Machine Language

HNPA

Home Numbering Plan Area

HOC

HOst Collector

HSM

Host Switching Module

HSS

Hundred Second Scan

HTOT

Home TOTalizer

Hz

Hertz

I

Immediate

I/O

Input/Output

IAM

Initial Address Message

IC

Inter-LATA Carrier

IC

Incoming Call

ICF

Inter-LATA Carrier Feature

IC/INC

Inter-LATA Carrier and International Carrier

ICCF

Industry Carriers Compatibility Forum

ICLID

Individual Calling Line IDentification

ICR

Intercom Call Restriction

ICRSTRCT

Inter-LATA Carrier ReSTRiCTion

ID

IDentifier

IDB

Inward wide area telecommunications service Data Base

IDCU

Integrated Digital Carrier Unit

IDDD

International Direct Distance Dialing

IDP

Individualized Dialing Plan

IDX

InDeX

IE

Information Element

IEC

Inter-Exchange Carrier

IECFail

Inter-Exchange Carrier general termination FAILure

IECSTG

Inter-Exchange Carrier Shared Trunk Group

IECSST

Inter-Exchange Carrier Start Signal Time-out

IFAC

Integrated digital carrier unit FACility

II

Information digits

Information digits (II)

The 2 Information Digits Sent With ANI In An EA Call.

ILA

Individual Line Assignment

ILHB

Incoming Line History Block

IM

Input Message

Immediate diversion Network Inward Dialing (INID)

Immediate diversion network inward dialing (INID) access lines connect the AUTOVON interface switch and the private branch exchanges (PBXs). The AUTOVON interface switch completes incoming precedence calls that are directed to customer stations served by another switching system such as a PBX. With INID, after a precedence call has been received and routed to a preassigned number, it is treated as if the preassigned number has been dialed originally. The preassigned number may be the user station or an attendant position.

IMPU

Interface Module Processor Unit

IMS

Interprocess Message Switch

IMT

Inter-Module Trunking

INC

International Carrier

INCM

International Carrier Modified

IND

INDication

INDIT

INcoming Digits Interpreter Table

INH

INHibit

INID

Immediate diversion Network Inward Dialing

INPA

Interchangeable Numbering Plan Area

INSEP

INcoming traffic SEParation class

Inter-LATA Carrier (IC)

A carrier designed to serve traffic which crosses a LATA boundary.

Inter-LATA Carrier and International Carrier (IC/INC)

A carrier that handles both kinds of traffic. Also referred to as a "Consolidated Carrier."

International Carrier (INC)

Type of carrier that handles only non-continental U.S. traffic.

INTL

INTernational

INward Wide Area Telecommunications Service (INWATS)

A feature that allows a customer a form of distance dialing in consideration of a monthly charge. The customer may receive calls from a specific geographical area with no charge to the originating caller.

INWATS

INward Wide Area Telecommunications Service

INV10XXX

INValid 10XXX prefix

INVNODIG

INValid Number Of DIGits

INVPIC

INValid Primary Inter-LATA Carrier

I/O

Input/Output

IOP

Input/Output Processor

IPCT

In-Progress Call Trace

IPM

Interruptions Per Minute

IPR

Incoming Private Record

IPT

Intelligent Public Telephone

IPTS

Improved Public Telephone Service

IS

In Service

ISAT

Integrated Services digital network ATtendant

ISC

International Switching Center

ISDN

Integrated Services Digital Network

ISDN-UP

Integrated Services Digital Network User Part

ISDS

Incremental Software Development System

ISLC

Integrated Subscriber Loop Carrier

ISLU

Integrated Services Line Unit

ISO

International Standards Organization

ISP

Intermediate Switch Point

ISTF

Integrated Services Test Facility

ISUP

Integrated Services digital network User Part

ISUP7

Integrated Services digital network User Part 7

IT

InterToll

ITSE

Incoming Trunk Service Evaluation

ITU

International Telecommunication Union

ITU-T

International Telecommunication Union - Telecommunication standard

ITU-TS

International Telecommunication Union - Telecommunication standardization Sector

IUN

Interprocess message switch User Node

KP

Key Pulse

LAMA

Local Automatic Message Accounting

LAPB

Link Access Protocol B

LAPD

Link Access Protocol D

LASS

Local Area Signaling System

LATA

Local Access and Transport Area

LCAP

Loop Carrier Analysis Program

LCC

Line Class Code

LCCB

Logical Channel Control Block

LCEN

Liner Card Equipment Number

LCN

Line Card Number

LCN

Logical Channel Number

LCO

Landline Cellular Option

LDFT

Load Disk From Tape

LDIT

Local Digit Interpreter Table

LDS

Long Distance Service

LDSU

Local Digital Service Unit

LDSU1

Local Digital Service Unit - model 1

LDSU2

Local Digital Service Unit - model 2

LEC

Local Exchange Carrier

LED

Light-Emitting Diode

LEN

Line Equipment Number

LFRAP

Long Feeder Route Analysis Program

LGC

Line Group Controller

LHT

Long Holding Time

LI

Line terminal process

LI
Line Interface

LI
Link Interface

Line Equipment Number (LEN)

Identifies a line termination using the convention "AAABCDEF" where "AAA" identifies the Switching Module (SM) number, "B" identifies the Concentrator Group (CG), "C" identifies the concentrator, "D" identifies the Switch Group (SG), "E" identifies the switch, and "F" identifies the level.

LINESCRN
LINE class special SCReeNing

LIT
Line Insulation Test

LIU
Line Interface Unit

LLCB
Logical Link Control Block

LN
Link Node

LNCU
Leased Network Critical User

LNE
Loss-Noise-Echo

LNNODE
Leased Network NODE-to-node

Local Access and Transport Area (LATA)
A defined geographical area where equal access end offices and/or access tandem offices can provide carrier access to the local exchange.

Local Automatic Message Accounting (LAMA)
The transfer of billing data from disk to tape.

Locked Option
An attribute whose value cannot be changed during customization.

LOF
Loss Of Frame

LOFA
Loss Of Frame Alignment

LOS
Loss Of Signal

LP
Logical Port

LSN

Logical Sequence member Number

LSSGR

Local Switching System General Requirements

LSV

Line Status Verifier

LT

Local Toll

LTOLLCON

Local TOLL CONnect

LTOLL_CONN

Local end of TOLL CONNect trunk

LTP

Logical Test Port

LTRM

Long TeRM

LTS

Loop Testing System

LTSB

Line Time Slot Bridging

LU

Line Unit

LUCUM

Line Unit Concentrator Utilization Measurements

LUTS

Locked-Up TrunkS

LW

Leave-Word

MAC-OSS

Machine Administration Center-Operations Support System

Master Control Center (MCC)

Provides craft interface to a 5ESS[®] switch office. Consists of a video display terminal with keyboard, ROP, and a key telephone set. The TLWS is also part of the MCC.

MAJ

Metallic Access Junctors

MBDN

Master Billing Directory Number

MBI

Message Billing Index

MC

Module Controller

MCA

Multiple Call Appearances

MCC

Master Control Center

MCG

Manual Call Gapping

MCLD

Modified Calling Line Disconnect

MCLDFP-E

Modified Calling Line Disconnect procedure for Fraud Protection Enhancement

MCRI

Modular Communications Route Index

MCTSI

Module Control and Time Slot Interchanger

MCTU

Module Controller and Time slot interchange Unit

MDF

Main Distributing Frame

MDII

Machine-Detected Interoffice Irregularities

MDR

Message Detail Recording

MDRTOCL

Message Detail Recording TO Customer Location

MDSL

Multipoint Digital Subscriber Line

MDSN

Multimode Digital Switched Network

MEA

Modified Equal Access

MECCA

Mechanized Evaluation of Call Completion Anomalies

MECH

More Efficient Call Handling

MEMB

MEMBer

MET

Multibutton Electronic Telephone

MF

MultiFrequency

MFJ

Modification of Final Judgement

MFOS

MultiFunction Operations System

MHAAS

Multiline Hunting Additions and Attendant Services

MHD

Moving Head Disk

MilliSecond (ms)

One one-thousandth (.001) of a second.

MIS

Management Information System

MLDIT

Multiple Local Digit Interpreter Table

MLH

Multi-Line Hunt

MLHG

Multi-Line Hunt Group

MLHLN

Multi-Line Hunt LiNe

MLPP

Multi-Level Precedence and Preemption

MLT

Mechanized Loop Test

MLT-1

Mechanized Loop Test system generation 1

MLT-2

Mechanized Loop Test system generation 2

MML

Man-Machine Language

MMRSM

MultiModule Remote Switch Module

MMSU

Modular Metallic Service Unit

MNTR

MoNiToR

Modification of Final Judgement (MFJ)

See Computer Inquiry II (CI-II).

Modular Queuing

A BRCS feature that provides the queuing service for the multiline hunting additions [with the exception of MULTiple Position Hunt (MUPH)] of the Multiline Hunting Additions and Attendant Services (MHAAS).

Module Controller (MC)

Part of the module controller and time slot interchanger unit; it consists of the module processor (with its memory), the signal processor, the 512 time slot interchanger unit, and control interface.

Module Processor (MP)

Part of the module controller consisting of a microprocessor and its associated memory.

MP

Module Processor

MRA

Maintenance Request Administrator

ms

MilliSeconds

MS

Message Switch

MSCU

Message Switch Control Unit

MSG

MeSsaGe

MSGs

MeSsaGe Switch

MSS

Message Service System

MSU

Metallic Service Unit

MTB

Metallic Test Bus

MTP

Message Transfer Part

MTTY

Maintenance TeleTYpewriter

mul-dem

MULTiplexer-moDEM

MultiFrequency (MF)

A method of sending numerical address information between telephone offices by sending simultaneously a combination of two tones out of a group of six frequencies.

Multi-Level Precedence and Preemption (MLPP)

There are two authorized precedence levels: one for users assigned the local PP feature and another for users who can make AUTOVON precedence calls. The AUTOVON interface switch accommodates five levels (FO, F, I, P, and EO) of precedence above routine with preemption for local AUTOVON interface calls. The AUTOVON interface switch accommodates four levels (FO, F, I, and P) above routine for AUTOVON calls. Intraswitch precedence calls can utilize an additional precedence level, the EO level which is less than "P" and greater than routine.

MUPH

MULTiple Position Hunt

MUX

MULTipleXer

MWC

Multi-Way Calling

NA

Not Available

NAC

Network Administration Center

NAI

Network Access Interface

NANP

North American Numbering Plan

NAP

Network Access Point

NARTAC

North American Regional Technical Assistance Center

NBR

NumBeR

NC

Not a Carrier call

NCA

No Call Announcement

NCA

No Circuit Available

NCP

Network Control Point

NCS

Network and Computing Services

NCT

Network Control and Timing

NCT

Nuisance Call Trace

NDE

Number of Digits Expected

NDRC

Network control and timing to DS3 Rate Converter

NE

Near End

Network Management (NM)

Network Management is a set of real-time procedures aimed at optimizing network performance when the network is under stress due to adverse conditions. The NM provides and operates control and surveillance features that aid in maintaining the network integrity and security during overloads and failures.

NI

Network Interconnect

NM

Network Management

NMFAIL

Network Management FAILure

NN

National Number

NOACK

NO ACKnowledgement

NOC

Normalized Office Code

NONCI

NON-Carrier Interconnect

NORM

NORMal

NOSSD

NO Second Start Dial

NP

Node Processor

NPA

Numbering Plan Area

NPD

Numbering Plan Digit

NRTI

Next RouTe Index

NRZ

Non-Return-to-Zero

NSC

Network Services Complex

NSEP

Network Switching Engineering Procedures

NSF

Network Specific Facilities

NTF

No Trouble Found

NTI

Northern Telecom Incorporated

NTM

Network Traffic Management

NU

Not Used

NUTS

Non-Used TrunkS

NXX

The first three digits (D1, D2, and D3) in a 7-digit Telephone Number (TN). The office code.

OA

Operator Assistance

OA&M

Operations, Administration, AND Maintenance

OAM&P

Operation, Administration, Maintenance, AND Provisioning

OC

Oklahoma City

OCLID

Outgoing Called Line IDentification

OCTL

Open Circuit Test Line

ODA

Office Data Administration

ODA

Office Data Assembler

ODBE

Office Data Base Editor

ODD

Office Dependent Data

ODIN

On-line Data INtegrity system

ODP

Office Dialing Plan

OFC

OFFiCe

OFF

OFFice

OFFCOD

OFFice CODE

Office Data Administration (ODA)

The mechanism by which initial translation information may be assembled for a 5ESS[®] switch. Information from the 5ESS[®] switch is entered via a video terminal and transferred into an ODA computer, assembled, then sent to the 5ESS[®] switch.

Office Records

Office records for the 5ESS[®] switch are tabular listings of the actual inventories and assignments of the data base and serve as a means for administering the 5ESS[®] switch office. These records are part of the Translation Guide (TG-5). An explanation of the form entries is included in the TG-5.

OFL

OFF-Line

OFLBOOT

Off-Line BOOT

OFS

Optioning of Feature System

OIT

Operator Intrusion Tone

OLHB

Outgoing Line History Block

OLI

Optical Line Interface

OM

Output Message

ONH

ON-Hook sent

ONI

Operator Number Identification

ONTC

Office Network and Timing Complex

OOF

Out Of Frame

OOS

Out Of Service

OPA

OPerator Attached

Open Option

An attribute whose value can be changed to any allowed value during customization.

Operating Telephone Company (OTC)

A service organization using telephone equipment to provide communications for its customers.

Operations Support Systems (OSS)

Services that provide the routine operations needed to maintain and engineer the telephone network.

Operator Number Identification (ONI)

A means of obtaining billing information by connecting the calling party to an operator position.

OPN

OPeN interval

OPR

Originating Private Record

OPR

OPerator Release

ORB

Office Repeater Bay

ORCC

Operator Release Coin Collect

ORM

Optically-integrated Remote switching Module

OS

Operator Services

OS

Operations System

OSANITO

Operator Services Automatic Number Identification Time Out

OSDS

Operating System for Distributed Switching

OSO

Originating Screening Office

OSPS

Operator Service Position System

OSS

Operations Support System

OTC

Operating Telephone Company

OTP

Originating Terminal Process

OTO

Office-To-Office

OTP

Originating Terminal Process

OUTWATS

OUTward Wide Area Telecommunications Service

P

Priority

PAW

Post Address Wink

PB

Proportionate Bidding

PBX

Private Branch eXchange

PC

Peripheral Controller

PCBLA

Process Control Block Link Area

PCC

Pseudo Country Code

PCM

Pulse Code Modulation

PD

Plain old telephone service versus Direct egress voice routing indicator

PDD

Post Dial Delay

PDDT

Prohibit Delay Disconnect Timing

PDIT

Primary Digit Interpreter Table

PDS

Program Documentation Standards

PDT

Partial Dial Time-out

PDT

Party Departure Tone

PEC

Protocol Error Code

PER

Protocol Error Record

Peripheral Control (PC)

A software subsystem of the 5ESS[®] switch. Peripheral control manages and controls the switching peripherals in such a way as to present a high-level abstraction of the switching machine to the feature control and terminal maintenance subsystem.

Permanent Signal/Partial Dial (PSPD)

Permanent signal and partial dial treatment is a means of treating lines and trunks which fail to disconnect after a call or to transmit a digit within a prescribed time period after receiving dial tone. The type of treatment is an operating company option and depends on the type of line or trunk involved.

Personal Identification Number (PIN)

A number used to identify the customer using the ABC service.

PF

Private Facility

PFA

Private Facilities Access

PFX

PreFiX

PGTC

Pair Gain Test Controller

PH

Packet Handler

PH

Protocol Handler

PI

Packet Interface

PIC

Primary Inter-LATA Carrier

PICB

Peripheral Interface Control Bus

PID

Precedence In Dialing

PID

Process IDentification

PIDB

Peripheral Interface Data Bus

PIN

Personal Identification Number

PIN

PIN type diode

PKT

PacKeT

PKTDN

PacKeT switch service Directory Number

PLNT24

PLaNT report, 24-hour

PLNTMO

PLaNT report, MOnthly

PM

Performance Monitoring

PM

Protocol Monitoring

PMU

Precision Measurement Unit

PNDP

Private Network Dialing Plan

PNID

Precedence Network In Dialing

PNOD

Precedence Network Outward Dialing

POP

Point Of Presence

POTS

Plain Old Telephone Service

PP

Precedence and Preemption

Precedence and Preemption (PP)

Customers on the AUTOVON interface switch may be assigned the local PP feature. This feature provides 6 levels of precedence calling: flash override (FO); flash (F); immediate (I); priority (P); executive override (EO); and routine (R). An FO precedence level call has the highest precedence and an R call has the lowest

precedence. The local PP feature is used for intraoffice call on the local AUTOVON interface switch. Precedence and preemption is also used for AUTOVON calls (calls involving the AUTOVON tandem switch). In the AUTOVON network, 5 levels of precedence calling are used. The precedence levels in the AUTOVON network are the same as the local PP calling precedence levels with the exception of the EO level. Preemption refers to the act of interrupting (and terminating) an existing call to establish a higher level precedence call.

Precedence In Dialing (PID)

Precedence In Dialing (PID) access lines connect the AUTOVON interface switch and the private branch exchanges (PBXs). The PID service allows priority calls to complete to a satellite switching system. If a priority call routed to a satellite switching system is not answered within a specified period of time, the call is rerouted to the AUTOVON interface switch to a customer specified number. This number can be the number of the AUTOVON subscriber group attendant.

Precedence Network In Dialing (PNID)

The PNID trunks are 4-wire tie trunks that provide the local AUTOVON interface switch access to the AUTOVON tandem switch. The PNID trunks can be preempted for reuse or to clear. Outgoing and incoming priority calls are completed only over PNID trunks. Incoming priority calls to the 5ESS[®] switch are recognized and treated as priority only when incoming over PNID trunks.

PREF

PREFix

PRI

Primary Rate Interface

PRIM

PRIMary

Primary Inter-LATA Carrier (PIC)

A single carrier to which the customer can presubscribe.

Private Branch eXchange (PBX)

Provides business customers service that allows a group of lines to make intragroup calls on an extension dialed basis plus allowing direct inward dialed calls from regular telephone network.

PRM

Processor Recovery Message

PRO

office-to-office PROcesses

PROPBID

PROPortionate BIDding

PSA

Port Status Administrator

PSAP

Public Safety Answering Point

PSD

Packet-Switched Data

PSIU

Packet Switch Interface Unit

PSN

Public Switched Network

PSPD

Permanent Signal/Partial Dial

PST

Permanent Signal Time-out

PSTN

Public Switched Telephone Network

PSU

Packet Switch Unit

PVN

Private Virtual Network

PT

Preemption Tone

PTC

Presubscribed intra-LATA Toll Carrier

PTY

ParTY

PubR

PUBlic Record

PWR

PoWeR

R

Recording indicator

R

Routine

RACF

Remote Access to Call Forwarding

RAF

Recorded Announcement Function

RAM

Random Access Memory

RAR

Return Address Register

RAS

Remote Access Service

RAU

Recorded Announcement Unit

RAX

Rate Area eXception

RB

Reverse Battery

RBAK

RingBAck

RBAT

Reverse BATtery

RBOC

Regional Bell Operating Company

RC

Recent Change

RC/V

Recent Change/Verify

RCDM

Recent Change Delayed Message

RCMAC

Recent Change Memory Administration Center

RCOS

Recent Change Operations System

RDIT

Remaining Digit Interpreter Table

Receive-Only Printer (ROP)

The ROP is the printer terminal used only for receiving messages at the Master Control Center.

Receiver Off-Hook (ROH)

Receiver off-hook tone is an audible steady signal sent over the customer line to attract attention when there is a continuing off-hook condition but the station is not in use.

Recent Change (RC)

The ability to change certain translations within the 5ESS[®] switch via video terminal input.

Recent Change/Verify (RC/V)

A stand-alone subsystem provided at the 5ESS[®] switch office which provides maintenance personnel with the ability to change or verify the data base using CRTs and menu selection. This subsystem includes the capability for backing out of selected recent change messages and restoring the data base to a previous condition.

REG

Range Extenders with Gain

Relation

A rectangular data table (matrix) that has rows that are called tuples and columns that are called attributes.

REL

RELease

Remote Memory Administration System (RMAS)

A system used for centralization and mechanization of the recent change input function for remote switches.

Remote Switching Module (RSM)

A stand-alone 5ESS[®] switching module that supports all line features, and routes intra-RSM calls. The RSM can be located up to 105 miles from the 5ESS[®] switch host.

Replication

Method of inserting new lines by copying all of the features and parameters of a working line.

REQ

REQuest

RERTE

RERouTE

RI

Ring Interface

RI

Route Index

RII

Routing Information Indicator

RINGMON

RING MONitor

RISLU

Remote Integrated Services Line Unit

RL

Reservation Level

RLS

Release Link Service

RLS

ReLeaSe

RLSD

ReLeaSeD

RLT

Release Link Trunk

RMAS

Remote Memory Administration System

RMAS

Recent change Memory Administration System

RMS

Remote Monitoring System

RNID

Routine Network In Dialing

RNMC

Remote Network Management Center

RNMS

Regional Network Management System

ROH

Receiver Off-Hook

ROP

Receive-Only Printer

ROTL

Remote Office Test Line

Route

A code used in selecting the route a call is to take through an office.

RouTe Index (RTI)

A code used in selecting the route a call is to take through an office.

RouTe Index TRaCking (RTITRC)

RTITRC is the abbreviation associated with the Verify Complete Routing Pattern of Route Index feature.

Routine Network In Dialing (RNID)

The RNID trunks are 4-wire tie trunk that provide the local AUTOVON interface switch access to the AUTOVON tandem switch. The RNID trunk can only be preempted to clear. If a priority call is completed over a RNID to the AUTOVON interface switch, the call is not given priority treatment (see PNID trunks).

Routing and Terminal Allocation (RTA)

The RTA subsystem determines whether a call can be made between a given source and destination. The appropriate detailed routing information required to allocate system resources for a call is required from the data base manager.

RPC

Ring Peripheral Controller

RPC

Regional Processing Center

RR

Rate and Route

RR

ReRoute

RS

ReSidual

RSM

Remote Switching Module

RT

RaTe

RT

RouTe

RT

Remote Terminal

RT

Reorder Tone

RTA

Report Test Access

RTA

Routing and Terminal Allocation

RTAG

Return TAG

RTI

RouTe Index

RTITRC

RouTe Index TRaCking

RTR

Real Time Reliable

RTR

Real Time Response

RTTU

Remote Trunk Test Unit

RTU

Right To Use

RTX

Real-Time eXecutive

SA

Service Assist

SAC

Service Access Code

SAM

Stand-Alone Monitor

SARTS

Switched Access Remote Test System

SAS

Service Announcement System

SATSTLN

Stand-Alone TeST LiNe

SAW

Surface Acoustic Wave

SC

Speed Call

SC/SD

SCanner and Signal Distributor

SCA

Selective Call Acceptance

SCANS

Software Change And Notification System

SCC

Switching Control Center

SCCP

Signaling Connection Control Part

SCCS

Switching Control Center System

SCD

Selective Carrier Denial

SCDBLK

Selective Carrier Denial BLocked

SCDCNT

Selective Carrier Denial CouNT

SCF

Selective Call Forwarding

SCN

Service Circuit Node

SCOF

Selective Control Of Facilities

SCP

Service Control Point

SCR

SCReening index

SCR

Selective Call Rejection

Screening

A translation process to determine what type of treatment a line should be given. Screening information is used in the routing process.

SCSD

SCanner and Signal Distributor

SD

Schematic Drawing

SDA

Selective Distinctive Alert

SDFI

Subscriber Digital Facility Interface

SDN

Software Defined Network

SDS

Software Development System

SEF

Severely Errored Framing

SEFS

Severely Errored Framing Seconds

SEL

SElective

SEP

Signal End Point

Series Completion

Series completion is just like call forwarding, except the call is only forwarded to a second code if the first destination is busy.

SERVCL

SERvice CLass

Service Access Code (SAC)

The 5ESS[®] switch recognizes certain digit patterns as special service access codes. The 800 toll free service, and 900 mass announcement system are examples of service access codes. In the 5E2(1) generic program, the 5ESS[®] switch routes such calls to another office capable of determining the corresponding direct distance dialing number.

SES

Severely Errored Seconds

SES

Service Evaluation System

SES II

Service Evaluation System II

SF

Super Frame

SFA

Secured Feature Administrator

SFG

Simulated Facilities Group

SFID

Secured Feature IDentification

SG

Switch Group

SGD

Station Group Designator

SHDN

SHared Directory Number

SHT

Short Holding Time

SI

Screening Index

SIC

Service Indicator Code

SIG

SIGnal

SIGPRO

SIGnaling PROtocol

SILC

Selective Incoming overLoad Control

SIM

System Integrity Monitor

SIP

Spooler Input Process

SIT

Special Information Tones

SLB

Subscriber Line Busy

SLE

Screen List Editing

SLH

Session Layer Handler

SM

Switching Module

SM-2000

Switching Module-2000

SMC

Switching Module Cabinet

SMIM

Switch Maintenance Interface Module

SMKP

Switch Maintenance Kernel Process

SMP

Switching Module Processor

SMS

Service Management System

SOA

Service Order Administration

SODD

Static Office-Dependent Data

Software Update (SU)

Formerly referred to as a Broadcast Warning Message (BWM).

SONET

Synchronous Optical NETwork

SOST

Special Operator Service Traffic

SPC

Stored Program Control

SPCS

Stored Program Control System

SPE

Synchronous Payload Envelope

Speed Calling

The 5ESS[®] switch allows its customers to subscribe to speed calling. This feature allows the customer to associate some digit string with a 1- or 2-digit code. The 5ESS[®] switch looks up the corresponding digit string and routes the call according to it.

SR

Selective Routing

SS

Slip Seconds

SS7

Signaling System 7

SSD

Second Start Dial

SSDOFHK

Second Start Dial not received, OFF HOOK instead

SSP

Service Switching Point

SSS

Stop Sending Signals message

SST

Short Supervisory Transition

sstind

Short Supervisory Transition INDicator

SSTR

Service Selective Trunk Reservation

ST

Start Pulse

STA

Synchronous Terminal Adaptor

STATMON

STATus MONitoring

STBY

STand-BY

STD

STanDard

STE

Synchronous optical network Terminating Equipment

STG

Shared Trunk Group

STGOFL

Shared Trunk Group OverFLOW

STI

Switching Transmission Interface

STLWS

Supplementary Trunk and Line Work Station

STP

Signal Transfer Point

STRT

STaRT

STS

Subscriber Test Station

STS

Synchronous Transport Signal

SU

Software Update

SUSO

SUSpended Origination

SVC

Switched Virtual Circuits

SW

SWitching

Switching Control Center System (SCCS)

A centralized system that controls the switching operations of many switches.

Switching Module (SM)

Equipment consisting of the module controller unit, time slot interchange unit, local digital service unit, and analog and digital interface units. The SM performs 95 percent of all switching performed in the 5ESS[®] switch. When an SM is remotely located, it is referred to as a Remote Switching Module (RSM). When an SM is used to support an RSM, it is referred to as a Host SM (HSM).

SXS

Step-BY-Step

SYS

SYStem

T&A

Toll AND Assist

T/M

Talk and Monitor

T/O

TurnOver

T1

A Digital Signal level 1 (DS1) digital carrier with 24 Digital Signal level 0 (DS0) channels.

TAISP

Tandem Access for Inter-LATA Sent-Paid coin calls

TALLOW

Test ALLOW

TASC

Telephone company Administrative Support Capability

TAT

Test Access Trunk

TAU

Test Access Unit

TC

Toll Completing

TC

Tandem Connecting

TC

Trunk Code

TCA

Threshold Crossing Alert

TCAP

Transaction CAPabilities

TCM

Traveling Class Mark

TDAC

Timing Delay on All Calls

TDENY

Test DENY

TDLC

Timing Delay on Local Calls

TDT

Trunk Dial Transfer

TEI

Terminal Endpoint Identifier

TeleTYpewriter (TTY)

An electromechanical typewriter device that generates from a keyboard a coded signal corresponding to the typed character. This electrical signal may be passed over appropriate transmission facilities and used to control a similar teletypewriter at a distance. More commonly referred to as a terminal.

TEO

Telephone Equipment Order

TEN

Trunk Equipment Number

TERA

Trunk Error Report Analysis

TERM

TERMinating

TFI

Transmission Facility Interface

TG

Translation Guide

TG

Trunk Group

TG-5

Translation Guide for the 5ESS® switch

TGC

Trunk Group Control

TGN

Trunk Group Number

TGSR

Terminal Group Station Restriction

TIC

Tandem Inter-LATA Connecting

TK

TrunK terminal process

TKGMN

TrunK Group Member Number

TKGRP

TrunK GRouP

TLP

Trouble Locating Procedure

TLPIC

Transitional Line Primary Inter-LATA Carrier

TLTM

Test line Long TerM

TLPIC

Transitional Line Primary Inter-LATA Carrier

TLWS

Trunk and Line Work Station

TM

Terminal Maintenance

TMS

Time Multiplexed Switch

TMTN

Talk and Monitor Telephone Number

TMUX

Transmission MULTipleXer

TN

Telephone Number

TN

Terminating Number

TNS

Transit Network Selection

TO

Toll Office

TOD

Time Of Day

TONDET

TONe DETection

TOPAS

Testing Operations, Provisioning and Administration System

TOPS

The operating system for the DMS, Northern Telecom's competing digital switch.

TOS

Trunk-Out-of-Service

TP

Test Position

TPS

TeleProcessing System

TR

Trunk Reservation

Traffic Service Position System (TSPS)

A type of Traffic Service System having stored program control that provides for the processing and recording of special calls requiring operator assistance.

TRAD

TRADitional

TRCU

Transmission Rate Converter Unit

TRD

Timed Release Disconnect

TREQ

Test REQuest

TRFC30

TRaFfiC, 30 minute report

TRFCH

TRaFfic CHannel

TRIG

TRIGger

TRK

TRunK

TRM

Two-mile Remote switching Module

TRU

Transmit/Receive Unit

Trunk Equipment Number (TEN)

Identifies a trunk termination using the convention "AAABCDE" where "AAA" identifies the SM, "B" identifies the trunk unit (TU), "C" identifies the SG, "D" identifies the circuit pack position, and "E" identifies the individual trunk circuit.

Trunk Group Control (TGC)

Trunk group controls are used in the 5ESS[®] switch to inhibit the spread of congestion in the network by restricting normal trunk group access and overflow.

TSI

Time Slot Interchange

TSIU

Time Slot Interchange Unit

TSIU3

Time Slot Interchange Unit model 3

TSN

Test Sequence member Number

TSPS

Traffic Service Position System

TT

Toll Tandem

TTF

Transmission Test Function

TTP

Terminating Terminal Process

TTT

Tandem Tie Trunk

TTY

TeleTYpewriter

TU

Trunk Unit

TUT

Trunk Under Test

TYP

TYPe

UAS

UnAvailable Seconds

UBS

Unsuccessful Backward Setup

UCD

Uniform Call Distribution

UCT

Utility Call Trace

UCT

Universal Coordinated Time

ULARPUNIX[®] Level Automatic Restart Process**Universal Tone Decoder (UTD)**

Performs tone decoding and digit collection for touch-tone calling tone, MF signaling, and trunk verification for common channel signaling voice-path continuity check tests.

UNCFAIL

UNConditional termination FAILure

UNEQIP

UNEQuIPped

UNP

Uniform Numbering Plan

UTD

Universal Tone Decoder

UTG

Universal Tone Generator

VAT

Valid Answer Timing

VCA

VaCAnt code

VCDX

Very Compact Digital eXchange

VF

Voice-Frequency

VFY

VeriFY

VIRGOS

Video Interactive Regional Generation Of Specifications

VPA

Voice Path Assurance

VPATH

View PATH

VT

Virtual Terminal

WATS

Wide Area Telephone Service

WATISB

Wide Area Telephone service Intra-local access and transport area Station Billed

WATSB

Wide Area Telephone Service Billing number (for intra-LATA calls)

WATSBL

Wide Area Telephone service Station BiLled (for inter-LATA calls)

WLD

Wholesale Long Distance

List of Figures

Figure 2-1 : Toll Trunk Applications

Figure 2-2 : Basic Local/Toll Trunk Types

Figure 2-3 : Interfaces From Non-LAMA Offices to a Local/Toll Office for CAMA Function

Figure 2-4 : Performing the CAMA Function for Local ONI and ANI Offices - Feature Flow Diagram

Figure 2-5 : Multiple-LATA SSP/800 Queries

Figure 2-6 : Small Carrier IXC Traffic Over Single Trunk Group

Figure 2-7 : Carrier Network Interface

Figure 2-8 : Common Channel Signaling Architecture

Figure 2-9 : CNI/IMS Architecture

Figure 2-10 : Circuit-Switched Trunk Data Flow

Figure 2-11 : How the TR-303 On DNU-S Interface Provides Semi-Permanent PSU Connections

Figure 3-1 : IC/INC Interconnection

Figure 3-2 : INC Interconnection - Direct Interface

Figure 3-3 : INC Interconnection - Indirect Interface

Figure 3-4 : Feature Group A

Figure 3-5 : Feature Group B

Figure 3-6 : Originating Signaling Sequence - Via Direct Connection

Figure 3-7 : Originating Signaling Sequence - Via AT

Figure 3-8 : Terminating Signaling Sequence - Via AT

Figure 3-9 : Signaling - Direct Connection to INC

Figure 3-10 : Signaling - AT Connection to INC

Figure 3-11 : Pre-compliant FGB CIC Call Sequence at Originating Office

Figure 3-12 : Pre-compliant FGB CIC Call Sequence at Terminating End Office

Figure 3-13 : TAISP Routing and Trunking

Figure 3-14 : Modified EA Inter-LATA Signaling for Direct Connect Domestic Calls

Figure 3-15 : Modified EA Inter-LATA Signaling for Direct Connect International Calls

Figure 3-16 : Modified EA Inter-LATA Signaling for Tandem Connect Domestic Calls

Figure 3-17 : Modified EA Inter-LATA Signaling for Tandem Connect International Calls

Figure 3-18 : Intra-LATA PIC Direct, 0+, Or 0- Operator Call

Figure 4-1 : ALIC5 OTO Configuration

Figure 4-2 : Equal Access MF Signaling Sequence (Feature Activated)

Figure 4-3 : Typical Office Configuration

Figure 4-4 : EA/SSP 800 MF Signaling With Feature Not Activated

Figure 4-5 : PDD Reduction

Figure 4-6 : Equal Access MF Signaling Sequence for SSP 800

Figure 4-7 : MF Signaling EO to AT with Feature Not Active

Figure 4-8 : PDD Transmission for EO-AT Connection

Figure 4-9 : Other Office Configuration I

Figure 4-10 : Other Office Configuration II

Figure 4-11 : MF Signaling to IC with Feature Active

Figure 4-12 : MF Signaling for Direct EA Connections with Feature Active

Figure 5-1 : Optional 7-Digit Outpulsing Feature Flow Diagram

Figure 5-2 : Flow Diagram for In-Progress Call Trace

Figure 5-3 : Flow Diagram for Terminating Call Tracing

Figure 5-4 : Flow Diagram for End-to-End Call Trace

Figure 5-5 : Flow Diagram for Interoffice Call Tracing

Figure 5-6 : Flow Diagram for Tandem Call Tracing

Figure 5-7 : Flow Diagram for Circuit-Switched Utility Call Trace

Figure 5-8 : Flow Diagram for Packet-Switched Utility Call Trace

Figure 5-9 : Group Alerting Service Block Diagram

Figure 5-10 : Group Alerting Service Feature Flow Diagram

Figure 5-11 : Call Setup With Calling Line Side Supervision

Figure 5-12 : Call to a Terminating Line with Call Pickup Feature from an Originator with CLSS

Figure 5-13 : Call to a 911 Line from an Originator with CLSS

Figure 5-14 : Calling Party Disconnect Indication Flow Diagram

Figure 5-15 : Transfer to ACD from ARU Network Overview

Figure 5-16 : Flow Diagram for Routing of Intra-LATA/Interstate Calls

Figure 5-17 : Provisioning sequence <SAC in Conflict - Insert>.

Figure 5-18 : Provisioning sequence <SAC in Conflict - Update>.

Figure 5-19 : DID Answer Supervision Call Flow

Figure 5-20 : Number Portability - Local Routing Number Call Scenario

Figure 6-1 : Intermodule Trunks Used During Stand-Alone

Figure 6-2 : Transmission Rate Converter Unit 2 (DS3 Connect Option)

Figure 6-3 : Transmission Rate Converter Unit 2 (Fiber Connect Option)

Figure 6-4 : Networks (DS3 Connect Option)

Figure 6-5 : Optical Line Interface (Fiber Connect Option)

Figure 6-6 : NCT to DS3 Rate Converter

Figure 6-7 : Local Network for ITSE and DLSE

Figure 6-8 : Processing Flow Diagram for ITSE Traffic Data Reporting

Figure 6-9 : Processing Flow Diagram for ITSE Call Evaluation

Figure 6-10 : Verify Complete Routing Pattern of Route Index Flow Diagram

Figure 6-11 : MCLD Feature Flow Diagram

Figure 6-12 : Recent Change Delayed Message Feature Flow Diagram

Figure 6-13 : Proportionate Bidding Office Configuration Example

Figure 7-1 : OP:ALM,ALL Feature Data Flow

Figure 8-1 : DSU2 Unit J5D003EA-1

Figure 8-2 : Custom Announcement (New Start 5E6)

Figure 8-3 : Custom Announcement (Retrofit to 5E6)

Figure 8-4 : Custom Announcement (Add Feature After Retrofit 5E6)

Figure 8-5 : 5E6 To 5E7 Announcement Flow Chart (LASS Equipped In 5E6)

Figure 8-6 : 5E6 To 5E7 Announcement Flow Chart (LASS Not Equipped In 5E6)

Figure 8-7 : 5E6 To 5E7 Announcement Flow Chart (ACSR Equipped In 5E6)

Figure 8-8 : Relations Used During Announcement Playback

Figure 8-9 : SAS Modules In DSU2 Unit J5D003EA-1

Figure 8-10 : Custom Announcement (New Start)

Figure 8-11 : Custom Announcement (Retrofit)

Figure 8-12 : Custom Announcement (Add Feature After Retrofit)

Figure 8-13 : Relations Used During SAS Announcement Playback

Figure 9-1 : Basic 911 Emergency Service Feature Call Processing Flow Diagram

Figure 9-2 : Line Origination Routing for E911 Calls

Figure 9-3 : Trunk Originating Routing for E911 Calls

Figure 9-4 : PSAP Routing for E911 Calls

Figure 9-5 : Enhanced 911 Emergency Service Feature Activation Flow Diagram

Figure 9-6 : Enhanced 911 Emergency Service Feature Call Processing Flow Diagram

Figure 9-7 : Dual ESA for E911 Configuration

Figure 10-1 : Automatic Reservation Adjustment Logic

Figure 11-1 : Coin-First and Dial-Tone-First Coin Service Feature Flow Diagram

Figure 11-2 : Semi-Postpay Coin Service Feature Flow Diagram

Figure 11-3 : Expanded Inband Signaling Feature Flow Diagram

Figure 11-4 : Timing Requirements for Expanded Inband Signaling

Figure 11-5 : Charge-A-Call Service Feature Flow Diagram

Figure 11-6 : Coin Line Automatic Message Accounting Feature Flow Diagram

Figure 12-1 : ADSL Overview.

List of Tables

Table 2-1 : Basic Local/Toll Incoming Trunk Types

Table 2-2 : Basic Local/Toll Outgoing Trunk Types

Table 2-3 : Basic Local/Toll 2-Way Trunk Types

Table 2-4 : Trunks Not Supported in Basic Local/Toll

Table 2-5 : Call Processing Features for Local/Toll Service

Table 2-6 : Additional Features Available for Local/Toll Service

Table 2-7 : Circuit Packs Required for Toll Service

Table 2-8 : Information Digits, II, Assignment Table

Table 2-9 : Traditional Multifrequency Signaling Digit Sequences

Table 2-10 : Initial EAS Digit Sequences

Table 2-11 : International EAS Signaling Format

Table 2-12 : Single Entry Data Fields for the 060 Call Type

Table 2-13 : Single Entry Data Fields for the 306 Call Type

Table 2-14 : Single Entry Data Fields for the 007 Call Type

Table 2-15 : Single Entry Data Fields for the 068 Call Type

Table 2-16 : Single Entry Data Fields for the 008 Call Type

Table 3-1 : Information Digits, II Assignment Table

Table 3-2 : IC Equal Access Plan Outpulsing

Table 3-3 : IC Operator Service Signaling - Inter-LATA Calls

Table 3-4 : IC Operator Service Signaling - Intra-LATA Calls

Table 3-5 : AM and SM Real-Time Usage

Table 3-6 : Data Configurations Supported by Pre-Compliant FGB CIC Expansion

Table 3-7 : Multifrequency Signaling Supported by TAISP

Table 3-8 : TAISP ODA AND RC REQUIRED CHANGES

Table 3-9 : 5E8 FGB and FGD CIC Created for Each 5E6/5E7 CIC

Table 3-10 : ODA Provisioning Information For Intra-LATA PIC

Table 3-11 : RCV Provisioning Information For Intra-LATA PIC

Table 3-12 : Intra-LATA PIC Conflict Resolution

Table 4-1 : SLC [®] 96 Carrier Derived Data Link Fields
Table 4-2 : MF Signaling Response Reduction
Table 4-3 : MF Signaling Transmission Reduction to AT
Table 4-4 : MF Signaling Transmission Reduction to IC
Table 4-5 : Delay Before KP for Speed Options
Table 5-1 : Ordering Information For The Group Alerting System Hardware
Table 5-2 : RC View 7.1 Affected Fields
Table 5-3 : RC Setup Using Prefix Analysis
Table 5-4 : New SLE Entry Rules
Table 5-5 : Bellcore Established Dialing Plans
Table 6-1 : Previous ESP MCC Displays
Table 6-2 : New ESP MCC Displays
Table 6-3 : Blocked Record A-Link Status Codes
Table 6-4 : RC/V Views That Include The INHIBIT DEL field.
Table 7-1 : Ranges and Defaults for DS1 Threshold Crossing Alerts
Table 7-2 : PM Threshold Crossing Alerts Inhibit/Allow Request
Table 7-3 : PM Count Inhibit Interactions
Table 7-4 : CGA Levels For DNU-S
Table 7-5 : Output Message Format
Table 7-6 : Output Messages for Tones/Signals Sent by Switch
Table 7-7 : Output Messages for Tones/Signals Received by Switch
Table 8-1 : Per-Call Default Holding Times
Table 8-2 : DSU-2 RAF Interactive Announcement Poisson Capacity Table
Table 8-3 : 5E6 Recorded Announcement Matrix
Table 8-4 : J5D003EA-1 Lists for 5E7 Applications
Table 8-5 : 5E6 Versus 5E7 Announcement Headers
Table 8-6 : Basic 2LEVEL AC/COT Announcement Headers
Table 8-7 : Per-Call Default Holding Times
Table 8-8 : DSU-2 SAS Interactive Announcement Poisson Capacity Table

Table 9-1 : New and Changed Recent Change Views for E911

Table 9-2 : E911 Provisioning Checklist

Table 9-3 : RC/V Views Essential to Provisioning the E911 API Link

Table 9-4 : RC/V Views Essential to Defining the E911 Error Tone

Table 9-5 : RC/V Views Essential to Provisioning per ESN Routing Data

Table 9-6 : RC/V Views Essential to Provisioning SM Stand-Alone Routing Data

Table 9-7 : RC/V Views Essential to Provisioning ESCO Data

Table 9-8 : RC/V Views Essential to Defining the E911 DAS

Table 9-9 : RC/V Views Essential to Assigning an ESCO to Digit Analysis Selectors

Table 9-10 : RC/V Views Essential to Assigning an ESCO to Trunk Groups

Table 9-11 : RC/V Views Essential to Provisioning the E911 SFGs

Table 9-12 : RC/V Views Essential to Provisioning the E911 Screening Data

Table 9-13 : RC/V Views Essential to Provisioning Incoming Dedicated E911 Trunks

Table 9-14 : RC/V Views Essential to Provisioning Incoming Non-Dedicated E911 Trunks

Table 9-15 : RC/V Views Essential to Provisioning a CAMA PSAP Trunk

Table 9-16 : RC/V Views Essential to Provisioning CAMA PSAP Routing DN's

Table 9-17 : RC/V Views Essential to Assign an Individualized Dialing Plan for an E911 PSAP

Table 9-18 : RC/V Views Essential to Assign an Office Dialing Plan for an E911 PSAP

Table 9-19 : RC/V Views Essential to Assign Speed Calling for an E911 PSAP

Table 9-20 : RC/V Views Essential to Associating Alternate Dialed Digits with the E911 Feature for Pre-Cutover Testing

Table 9-21 : RC/V Views Essential to Setting the E911 Office Option

Table 9-22 : RC/V Views Essential to Associating the 9-1-1 Digit Pattern with the E911 Feature for Cutover

Table 9-23 : E911 Query Components

Table 9-24 : E911 Response Components

Table 9-25 : E911 Test Query Components

Table 9-26 : E911 Test Query Response Components

Table 9-27 : E911 Valid ESN Message Components

Table 9-28 : E911 Valid ESN Request Components

Table 9-29 : BRCS Features For *Pinnacle*® ACD ISDN PSAP

Table 9-30 : Call Forwarding To ACD And DAA DNs

Table 9-31 : NPD To I Digit Mapping

Table 9-32 : Message Type 8 - Query

Table 9-33 : Message Type 1 - Query

Table 11-1 : Example of Original II To Tollfree II Conversions

Table 11-2 : Example of Original II To Default II Conversions

List of Exhibits

Exhibit 6-1 : View 13.4, Analog LU Concentrator Utilization Measurements

Exhibit 6-2 : View 13.5, Analog LU Individual Line Utilization Measurements

Exhibit 7-1 : Recent Change View2.15

Exhibit 7-2 : ODA Form EQDUP

Exhibit 10-1 : RC View for Leased Network Node Mapping