Lucent Technologies
Bell Labs Innovations

4ESS™ Switch
Product Release Document

4E23 Release 2 Generic

234-090-232AC
Issue 1
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About This Document

1. Purpose

1.01 The purpose of the Product Release Document (PRD) is to provide customers with information pertaining to the new features that are introduced in the *4ESS*™ switch. A PRD is written to cover the features introduced in full generic releases and quarterly generic releases. This particular PRD provides information pertaining to the new features included in the 4E23 Release 2 Generic.

2. Scope

2.01 The Product Release Document provides customers with information not covered in other *4ESS* switch documentation. It is not a replacement for other documentation such as Standard Lucent Technologies Practices, Task Oriented Practices (TOP), Maintenance Reference Handbooks, etc., that support the *4ESS* switch. The information in this document is intended only for the introduction of the new 4E23 Release 2 features. Since other documentation is used for the operation and maintenance of features after their introduction into the *4ESS* switch, this PRD will not be reissued.

3. Intended Audience

3.01 This document is intended for people involved in testing, provisioning, maintenance, administration, and technical support of the *4ESS* switch. Technology Managers, Integrated Test Network (ITN) personnel, field support, Network

Control Center (NCC), and National Electronic Switching Assistance Center (NESAC) personnel are examples of some of the people who will use the PRD.

4. How to Use This Document

4.01 The PRD for 4E23 Release 2 Generic documents 5 new features. Each chapter in this document provides information about one of these features. The chapters are in numerical order by feature number.

4.02 The following is a list of the chapters contained in this document with a brief description of the feature covered in that chapter:

Chapter 1: *Segmentation Directory Phase 2 Package 2 Feature (4880a)*

This feature continues with the Segmentation Directory Phase 2, concentrating on migrating customers out of the *4ESS* Switch Automatic Numbering Identification (ANI) Trigger Tables. This feature migrates calls identified by the Software Defined Network (SDN) and Switched Digital Services (SDS) Transition Types.

Chapter 2: *End Office Local Nodal Phase 1/AT&T Digital Link Phase IV Feature (5538)*

The End Office Local Nodal Phase 1 feature provides capabilities to support a subset of nodal services on AT&T End Office switches to provide capacity relief for *4ESS* switches.

To facilitate the entry of AT&T's Business Markets Division (BMD) into the local service market, AT&T is offering integrated local and nodal service to existing nodal service customers homed on a *4ESS* switch.

While *4ESS* Local Nodal provides capability to support local services on a *4ESS* switch, the increased traffic load due to handling local calls in the *4ESS* switch toll network requires rapid growth of the toll network.

There is, therefore, a need to deploy an infrastructure for integrated local and nodal services which relieves this capacity exhaust in the toll network. The EOLN architecture achieves this by homing customers on an AT&T end office switch. The end office switch supports local services and processes local calls, and delivers nodal calls to an AT&T *4ESS* switch for appropriate processing.

Chapter 3: *Inband/Q.931 Signaling for Carrier Solution Nodal Customers Feature (5918)*

This feature allows AT&T to offer long-distance transport services to

resellers that require a nodal access arrangement. This feature builds on existing capabilities available on nodal trunk groups, which are obtained over the following trunk types: Private Branch Exchange (PBX) using Q.931 signaling, DTMF, MF or DP signaling.

Chapter 4: *Modification Request to DECOS—New Remote Link Interface and Route Control Feature (6137)*

This feature is a Modification Request (MR) to Feature 4904, *Domestic End to End Class of Service (DECOS)*. This MR changes the DECOS feature as follows:

- Allows the *4ESS* switch to identify DECOS routing list based on Routing Data Block Index (RDBI) derived in number translation
- Introduces a new Network Management (NM) control, Route Cancel From option for NM Route Control, which cancels calls after a trunk could not be hunted to a particular route
- Prevents non-DECOS traffic from taking trunks by introducing proper bandwidth management on the DECOS routes
- Allows Alternate Signaling Transport Network-Network Interconnect (ASTN NI) and DECOS to work together when ASTN NI is available
- Enhances DECOS to follow the existing rules created by Local Number Portability (LNP) and currently used during hierarchical routing. These rules specify which digits (ported number vs. called number) should be sent to the LEC and which prefix/delete rules should be followed.

Chapter 5: *4ESS*™ Switch AT&T Digital Link Location Routing Number Capability Feature (6330)

This feature improves the call processing time of local calls to Digital Link customers in a Location Routing Number (LRN) environment. It does so by enabling the *4ESS* switch to recognize and route on LRNs, thus eliminating the need to do a Local Number Portability database dip on every call received from a Local Service Provider on local trunks. This feature creates an LRN module for billing of Interexchange Carriers and Local Service Providers for Number Portability processing on default routed calls.

Chapter 6: *Release Summary—4E23 Release 2 Generic*

This chapter summarizes several aspects of the features in this document. This chapter identifies Growth and Retrofit documents (if any) resulting from features in the current release; new, changed, or deleted input and output messages; Operation Support Systems impacts of the release; and new or changed alarms. The final section tells how each feature is turned on and off.

4.03 A list of abbreviations and acronyms, and their definitions, is included at the end of this document.

5. Product Safety Labels

5.01 There are three types of safety labels used in Lucent Technologies documentation: DANGER, WARNING, and CAUTION. This document contains safety labels in the form of CAUTIONS. A CAUTION safety label indicates the presence of a hazard that will or can cause minor personal injury, property damage, and/or service interruption if the hazard is not avoided.

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Segmentation Directory Phase 2 — Release 2 Feature (4880a)

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Segmentation Directory Phase 2 — Release 2 Feature (4880a)

1

1. Feature Description

1.01 This feature continues with the Segmentation Directory, Phase 2, Release 2, concentrating on migrating customers out of the *4ESS*™ Switch Automatic Numbering Identification (ANI) Trigger Tables. For the 4E23 Release 2 Generic, this feature migrates calls identified by the Software Defined Network (SDN) and Switched Digital Services (SDS) Transition Types.

2. Call Flow

2.01 The call flows for SDN and SDS were described in the Call Flow section of Feature 4880 in the Product Release Document for the 4E23 Release 1 Generic (234-090-231AC).

3. Provisioning

Transition Plan

3.01 SDN and SDS capabilities are transitioned in the same fashion as in SD Phase 1. An SD Transition Type is defined for each service, and the associated SDN Transition Status is set to PMO in each *4ESS* switch. In the SD, the SD Transition Status associated with the Precedence Index for each ANI being transitioned is also set to PMO. Each service is transitioned to SMO on a switch-by-switch basis, by setting

both the SD Transition Status in the switch and the SD Transition Status associated with that switch in all SDs to SMO at approximately the same time. Capabilities supporting new methods of operation for Software Defined Data Network (SDDN)-700 Number Outdialing and for Switched Digital International Carrier Specific Routing (SDI-CSR) are supported in SDN Phase 2 to remove the dependence of these capabilities on Universal Global Title Translation (UGTT).

4. Recording (Not Affected)

5. Network Management

New Input Commands

5.01 The *4ESS* switch will accept a command from NEMOS to override the setting of the SD Transition Status of any of the new individual SD Transition Types (SDN and SDS) in the SD Transition Status Table. The command instructs the *4ESS* switch to either override the value of the Transition Status to PMO or to revert to the provisioned value.

New Measurements

5.02 The SD feature, Phase 2, introduces several new measurements. In each case, a 5-minute count and an hourly count are involved. The 5-minute counts are sent to Network Management Operations System (NEMOS), while the hourly counts are generated for access by Dynamic Engineering Mechanized System/Data Acquisition Reports and Integrated Communications System (DEMS/DARICS).

5.03 Table 1-A shows the measurements for the number of calls for which the SD Query is blocked because of the *4ESS* Pre-SDQuery control and which will receive final handling treatment.

Table 1-A. SD Query Blocked Measurements

Measurement	Description
PreSDQ_Blocked_FHT	The SDQuery is blocked because of the Pre-SDQuery control and which will receive final handling treatment.
PreSDQ_Blocked_Def	Counts the number of calls for which the SDQuery is blocked because the switch Pre-SDQuery control and which are default-handled.

5.04 Table 1-B shows the measurements and service indicators of calls which the switch default handles due to the receipt of a Proceed message with a Reason Code indicating "Manual Control", on a per-Service Indicator basis.

Table 1-B. Manual Control Measurements

Measurement	Service Indicator
PCP_MC	PCP
NISGen_MC	NIS-general
SPx_MC	Spares 1-10

5.05 Table 1-C shows the measurements and service indicators of calls which the switch default handles due to receipt of a Proceed message with a Reason Code indicating "Application Overload Control", on a per-Service Indicator basis.

Table 1-C. Application Overload Control Measurements

Measurement	Service Indicator
PCP_AOC	PCP
NISGen_AOC	NIS-general
SPx_AOC	Spares 1-10

5.06 Table 1-D shows the measurements and service indicators of calls directed to a service processor by SD.

Table 1-D. Calls Directed to a Service Processor Measurements

Measurement	Service Indicator
Calls_Directed_To_NISGen	NIS-general
Calls_Directed_To_SPx	Spares 1-10

5.07 Table 1-E shows the measurements and service indicators of calls for which the *4ESS* switch is instructed to query a service processor, on a per-Service Indicator basis.

Table 1-E. Service Processor Query Measurements

Measurement	Service Indicator
Calls_Queried_For_PCP	PCP
Calls_Queried_For_PCP	NIS-general
Calls_Queried_For_SPx	Spares 1-10

5.08 Table 1-F shows the measurements and service indicators of calls for which the SP Response Timer expires.

Table 1-F. Response Timer Measurements

Measurement	Service Indicator
SPR_PCP_Timeout	PCP
SPR_NISGen_Timeout	NIS-general
SPR_SPx_Timeout	Spares 1-10

5.09 Table 1-G shows the measurements and service indicators of calls for which the incoming call is cleared while waiting for an SPResponse message, on a per-Service Indicator basis.

Table 1-G. Abandon Measurements

Measurement	Service Indicator
SPR_PCP_Abandon	PCP
SPR_NISGen_Abandon	NIS-general
SPR_SPx_Abandon	Spares 1-10

5.10 Table 1-H shows the measurements and service indicators of calls for which the SP Query Timer expires, on a per-Service Indicator basis.

Table 1-H. Query Timeout Measurements

Measurement	Service Indicator
SPQ_PCP_Timeout	PCP
SPQ_NISGen_Timeout	NIS-general
SPR_SPx_Timeout	Spares 1-10

5.11 Table 1-I shows the measurement and service indicators of calls default-handled due to an abnormal condition.

Table 1-I. Default-Handled Measurements

Measurement	Service Indicator
PCP_Calls_Default_Handled	PCP
NISGen_Calls_Default-Handled	NIS-general
SPx_Calls_Default-Handled	Spares 1-10

NOTE:
The following measurements from the SD Phase 1 are no longer supported:

- SPR_abandon
- SPQ_timeout
- SDR_query.

A. New Discretes and Audits

5.12 The *4ESS* switch sends NEMOS a change discrete indicating whether, during the past 30 seconds, any NEMOS-provided overrides have been removed per a maintenance channel. This discrete will remain set until the *4ESS* switch has responded to a NEMOS request (audit) for the override information.

6. Maintenance/Troubleshooting (Not Affected)

7. Transition Considerations

Requirements

7.01 If a call with an Originating Line Information (OLI) of 41 arrives on a Trunk Sub-Group (TSG) parameter set to "Y", and all other conditions of the SDN SDTT are met, the call has an SDTT of SDN.

Deployment Requirements

7.02 It is not necessary for all *4ESS* switches in the network to be running the 4E23 Release 2 Generic for this feature to be fully operational.

Feature Activation

A. RC Form 810

7.03 SDTRS02 (SDN) and SDTRS03 (SDS) must be manually provisioned to SMO via RC 810 in order to receive SD treatment.

7.04 Entries can only be populated if this is an AT&T office (that is, OD4OPTSD in word OD4OPT is 4ODOPT_YES).

8. Input/Output Manual Pages (Not Affected)

End Office Local Nodal Phase 1 Feature (5538)

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End Office Local Nodal Phase 1 Feature (5538)

2

1. Feature Description

1.01 The End Office Local Nodal (EOLN) Phase 1/AT&T Digital Link Phase IV (ADL4) feature provides capabilities to support a subset of nodal services on AT&T End Office switches to provide capacity relief for *4ESS*™ switches.

NOTE:
EOLN Phase 1 is being renamed to AT&T Digital Link Phase IV (ADL4) and will be referred to as ADL4 beginning with 4E23 Release 4 Generic.

1.02 To facilitate the entry of AT&T's Business Markets Division (BMD) into the local service market, AT&T is offering integrated local and nodal service to existing nodal service customers homed on a *4ESS* switch.

1.03 While *4ESS* Local Nodal provides capability to support local services on a *4ESS* switch, the increased traffic load due to handling local calls in the *4ESS* switch toll network requires rapid growth of the toll network.

1.04 There is, therefore, a need to deploy an infrastructure for integrated local and nodal services which relieves this capacity exhaust in the toll network. The EOLN architecture achieves this by homing customers on an AT&T end office switch. The end office switch supports local services and processes local calls, and delivers nodal calls to an AT&T *4ESS* switch for appropriate processing.

2. Call Flow

2.01 The following six call flows are associated with this feature:

- SDN On-Net (Voice)
- SDDN (Data)
- SDN Off-Net
- Originating MEGACOM® Nodal Access
- Terminating MEGACOM 800 Nodal Egress
- Terminating TSAA/AVA Egress

* MEGACOM is a registered trademark of AT&T

SDN On-Net (Voice)

2.02 For this call flow, calls are originated from a Private Branch Exchange (PBX) location which uses the End Office Local Nodal Architecture to provide Software Defined Network (SDN) nodal service. The call terminates to an SDN On-Net location which can be either a *4ESS* switch nodal architecture or End Office Local Nodal architecture; each option is discussed in the call flow. Virtual On-Net calls (which terminate to switched egress locations) are included in the SDN Off-Net call flow. Calls which can be completed by the AT&T Local Nodal (ALN) end office to an On-Net location must be sent to a *4ESS* switch in order to be treated as an On-Net call. A customer that has "local" On-Net locations would have routing provisioning which would send all calls to the *4ESS* switch.

2.03 The SDN On-Net (VOICE) call flow is as follows:

1. The ALN end office receives a 7D, 10D, 1+10D, or 011+CC+NN from the PBX. A 7D call is an SDN private number and all 10D, 1+10D and 011+CC+NN calls are from public numbering plan numbers.
2. Based on the dialed digits, the Automatic Route Selection (ARS) associated with the PBX trunk selects a Modular Capability Route Index (MCRI) which routes the call to the customer-specific/location-specific Simulated Facility Group (SFG).
3. Using the capabilities of the MCRI and SFG, the ALN end office performs the following functions for nodal calls:
   - Prefix 700 to all 7D calls, using existing prefix/delete capabilities
   - Associate the following information, if provisioned, with the call:
     - — Originating Line Information (OLI) = 41
     - — Preferred Interexchange Carrier (PIC) = (0)732
     - — Bearer Capability = not provisioned
     - — Billing Number = SDN Automatic Number Identification (ANI). This is a mandatory parameter in the appropriate Recent Change (RC) view.
   - Trigger creation of a new Automatic Message Accounting (AMA) module to record OLI and PBX trunk directory numbers.

   After this processing, the Calling Party Number (CDN) for the call is the Directory Number (DN) provisioned on the customer trunk group, and the Charge Number for the call is the Billing Number retrieved from the MCRI/SFG.
4. The call is routed to the AT&T Switched Network (ASN), as it is an On-Net SDN call. The ALN end office generates an access charge AMA record.

5. The ALN end office sends the ISDN User Part (ISUP) Initial Address Message (IAM) to the *4ESS* switch, sending the following information:
   - Called party number (CdPN) = dialed digits (prefixed 700 for 7D calls)
   - CPN = PBX trunk DN. This CPN should have an NPA-NXX that is assigned to the rate center in which the PBX is located
   - OLI = 41 (End Office Nodal SDN)
   - Charge Number = SDN ANI which is the billing number associated with the SFG. The Charge Number is an North American Numbering Plan (NANP) number, but may be non-dialable
   - Carrier Identification Code Parameter (CIP) = (O)732 (three or four digit CIC)
   - User Service Information (USI) = 3.1 kHz audio.

6. The *4ESS* switch receives the ISUP IAM. An SDQuery message is sent by the *4ESS* switch to the SD per existing requirements. This SDQuery message includes the following information:
   - Digits (CdPN) = CdPN, mapped from ISUP CdPN
   - Digits (CDN) = PBX trunk DN, mapped from ISUP CPN
   - Digits (ANI) = SDN ANI, mapped from ISUP charged number. The digits (ANI) are an NANP number, but may be non-dialable
   - Originating Station Type (OST) = 41, mapped from ISUP OLI
   - Bearer Capability Requested (BCR) = 3.1 kHz audio, mapped from ISUP USI
   - TSG Service Type in the SDQ information parameter = LDS.

7. The SD searches for matches per existing requirements as follows:
   - If SDN customer ANIs have not yet been loaded into the SD, no match is found. The SD returns an SDResponse message with operation "Proceed" to the *4ESS* switch.
   - If SDN customer ANIs have been loaded into the SD, and SDN is still in PMO at the SD for the *4ESS* switch from which the SDQuery message was received, the SD finds a match on the SDN ANI.

     Based on the ARS in the ALN end office, the only calls sent to the *4ESS* switch on these interconnection facilities with OLI = 41 have POTS or 700 Service Access Code (SAC) DNs; the ANI match should have a higher precedence in SD than any match on these DNs. The SD Transition Status associated with the Precedence Index of the ANI record is PMO, and the SD returns an SDResponse message with operation "Revert to PMO" to the *4ESS* switch.

- If SDN customer ANIs have been loaded into the SD, and SDN is in SMO at the SD for the *4ESS* switch from which the SDQuery message was received, the SD finds a match on the SDN ANI. The ANI match points to 2DSA/2NCP.

  Based on the ARS in the ALN end office, the only calls sent to the *4ESS* switch on these network interconnection facilities with OLI = 41 have POTS or 700 SAC DNs; the ANI match should have a higher precedence in SD than any match on these DNs. The SD Transition Status associated with the Preference Index of the ANI record is SMO. The SD sends:

  — an SDResponse message with operation "Wait for Instructions" to the *4ESS* switch, and

  — an SPQuery message to the 2DSA/2NCP, with the following information of significance:

    a. Digits (ANI) = SDN ANI

    b. Digits (DN) = CdPN, mapped from Digits (CdPN)

    c. Origination Station Type (OST) = 41 (End Office Nodal SDN)

    d. Digits (Calling DN) = PBX trunk DN

8. The *4ESS* switch does not launch an Network Access Interrupt (NAI) query for the incoming call based on the call arriving with an OLI = 41 over a TSG with the Far End AT&T Local Network (FELN) characteristic = Yes.
9. The *4ESS* switch performs FEN/SC screening on the call in the same way as currently done for 732 switched access SDN. Based on the ARS in the ALN end office, the only calls sent to the *4ESS* switch on this network interconnection facilities have POTS or 700 SAC DNs; these calls should have a FEN/SC outcome of "do not query, record", and has an SDN AMA record generated by receipt of a Bill Call operation from the SDN NCP.
10. The *4ESS* switch searches the ANI Trigger Table. No match should be found. End Office SDN ANIs are not provisioned in the ANI Trigger Table.
11. The *4ESS* switch attempts to derive an SD Transition Type as follows:

    - If the *4ESS* switch does not yet support SD Phase 2 capabilities in 4E23R2 (which includes the definition of the SDN SD Transition Type), no SD Transition Type is derived for the call and the *4ESS* switch uses an SD Transition Type Status of PMO. *Proceed to Step 14*.
    - If the *4ESS* switch supports SD Phase 2 capabilities in 4E23R2 (which includes the definition of the SDN SD Transition Type), the *4ESS* switch derives an SD Transition Type of "SDN" based on the call arriving with an OLI = 41 over a Trunk Sub-Group (TSG) with the FELN characteristic = Yes. *Proceed to Step 12*.

12. The *4ESS* switch looks up the SD Transition Status of the call based on the derived SD Transition Type of SDN as follows:

    - If the SD Transition Status is SMO, the switch waits for an SDResponse message. *Proceed to Step 13*.
    - If the SD Transition Status is PMO, the switch does not wait for an SDResponse message. *Proceed to Step 14*.

13. The switch (which is operating with an SD Transition Status of SMO for this call) receives an SDResponse message as follows:

    - If the SDN customer ANIs have not yet been loaded into the SD, the operation value of the SDResponse message is "Proceed". This is an abnormal condition; the *4ESS* switch default-handles the call (routing and recording is as a POTS call). **End of Call Flow**.
    - If SDN customer ANIs have been loaded into the SD and the customer subscribes to SDN, but the SDN precedence index has an SD Transition Status provisioned to "PMO" in the SD, the operation value of the SDResponse message is "Revert to PMO". (This is an abnormal condition, but results in the call being processed correctly). *Proceed to Step 14*.
    - If SDN customer ANIs have been loaded into the SD and the customer subscribes to SDN, and the SDN precedence index has an SD Transition Status provisioned to "SMO" in the SD, the operation value of the SDResponse message is "Wait for Instructions". The switch waits for an SPResponse message from the 2DSA/2NCP. *Proceed to Step 15*.

14. The switch performs PMO processing for the call. Based on the receipt of OLI = 41 over a TSG with Far End AT&T Local Network (FELN) characteristic = Yes, the call is processed as an SDN call, resulting in the *4ESS* switch launching an SDN NCP query and waiting for a response. The SDN NCP query is identical to existing SDN NCP queries, except that it also contains the OST parameter = 41 (End Office Nodal SDN). The Digits (Calling DN) is included, mapped from the ISUP Calling Party Number parameter.

15. The 2DSA/2NCP receives the SPQuery message (from SD in SMO) or the NCP query (from the *4ESS* switch in PMO) and retrieves the customer record and provides appropriate SDN per-call features (such as, Authorization Code collection).

16. The SDN NCP translates the Digits (CdPN) to an Action Point Number Plan (APN) routing number, to be routed in the Dedicated Egress - Voice (DEV) domain, as this is an on-net SDN call.

    If the customer subscribes to Advanced SDN Off-net Overflow, the 2DSA/2NCP, the 2DSA/2NCP also determines an overflow routing number and

performs Local/Toll Differentiation (LTD) on the overflow routing number. The LTD of the primary routing number is "Route Toll, Record Toll".

17. The NCP sends a response message to the *4ESS* switch which includes the following:

    - A Connect operation with a Digits (Routing Number) parameter with an APN routing number and a Generic Routing Information parameter indicating "Dedicated Egress"
    - A Bill Call Operation with an ANI Services Billing Data parameter indicating "Dedicated Egress".

    If the customer subscribes to Advanced SDN Off-net Overflow, an overflowing routing number and an LTD parameter is included in the connect operation. The LTD indicators for the primary routing number is "Route Toll, Record Toll"; the LTD indicators for the overflow routing number is determined by the NCP.

18. The originating *4ESS* switch, upon receipt of the response message with a Bill Call operation and a Connect operation, generates an SDN AMA record and routes the call to the terminating *4ESS* switch based on the APN number routing in the DEV domain per existing requirements. No Local Number Portability (LNP) Network Control Point (NCP) query is done based on the call being routed in the DEV domain. The APN number contains an SSS code assigned to the terminating *4ESS* switch. (The ALN end office is not assigned an SSS code). The AMA record is identical to existing SDN AMA. The *4ESS* switch has to set TT/USFI Character 3 to indicate "dedicated access" based on an OLI = 41 being received on a TSG with the FELN character = Yes.

    If the original dialed number is different from the routing number, the *4ESS* switch maps the original dialed number into the ISUP Dialed Number parameter.

19. The call is routed through the ASN as is currently done using the APN number. At the terminating *4ESS* switch there are two options as follows:

    - If the terminating *4ESS* switch is connected directly to the PBX, the terminating switch completes the call in the same manner as is currently done. **End of Call Flow**.
    - If the terminating *4ESS* switch is connected to the PBX through an ALN end office, *proceed to Step 20*.

20. The terminating *4ESS* switch routes the call (based on the APN number) to a TSG to the ALN end office. This TSG is the "732" voice TSG; it need not be the same TSG as the 732 TSG used for incoming SDN calls, but must be separate from the TSG used for sending calls with NANP destination numbers to the ALN end office as follows:

    - If the trunks from the *4ESS* switch to the ALN end office are busy, the *4ESS* switch returns a RELEASE message to the Originating ASN switch (OAS) with a cause value = 34 (no circuit available).

- If the customer subscribes to Advanced SDN Off-net Overflow, the OAS receives the RELEASE message and routes the call using the overflow routing number. The OAS performs an LNP NCP query if the destination NPA-NXX of the overflow routing number is open to portability, generates an SDN AMA record and routes the call in the POTS domain based on the NANP destination number (that is, overflow routing number) or Location Routing Number (LRN), per existing requirements, using the LTD parameter for the overflow routing number. **End of Call Flow**.
- If the trunks from the *4ESS* switch to the ALN end office are not busy, *proceed to Step 21*.

21. The terminating *4ESS* switch sends an IAM to the ALN with the following significance:
    - CdPN = digits of incoming CdPN parameter, coded as "National/ISDN" (NANP) per existing INPA requirements
    - CPN = incoming calling party number parameter, if received
    - Generic Address Parameter (GAP) (Type of Digits = Dialed Number) = mapped from incoming Dialed Number parameter (based on TSG FELN characteristic = Yes)
    - GAP (Ported Number) = not sent (due to DEV domain resulting in no LNP query)
    - OLI = not sent (per existing provisioning)
    - CHG = not sent (per existing provisioning).
22. The terminating ALN end office receives the ISUP IAM and routes the call, based on the CdPN digits, using a Digit Analysis Selector (DAS) provisioned with APN numbers. The DAS points to a Route Index which directs the call to a specific PBX Trunk and provides delete/prefix capability.
23. If a GAP parameter is received from the *4ESS* switch, the ALN end office uses the Dialed Number Preferred indicator to determine whether the CdPN or GAP (Dialed Number) should be used for outpulsing to the PBX.
24. The PBX trunk is associated with a Terminal Group which may route a call through an SFG to provide service measurements, engineerable capacity, and service-specific terminating access charge AMA. The Terminal Group determines whether to route the call through an SFG based on a DN-specific SFG index as follows:
    - If the trunks from the ALN end office to the PBX are busy, the ALN end office returns a RELEASE message, to the OAS, with a cause value = 17 (user busy).

      If the customer subscribes to Advanced SDN Off-net Overflow, the originating *4ESS* switch receives the RELEASE message and routes the

call using the overflow routing number. The originating *4ESS* switch performs an LNP NCP query if the destination NPA+NXX of the overflow routing number is open to portability, generates an SDN AMA record, and routes the call in the POTS domain based on the NANP destination number (that is, overflow routing number) or LRN, per existing requirements, using the Local Toll Differentiation (LTD) parameter for the overflow routing number. **End of Call Flow**.

- If the trunks from the ALN end office to the PBX are not busy, *proceed to Step 25*.

25. The terminating ALN end office delivers the call to the customer PBX and generates a terminating access charge record. **End of Call Flow**.

SDDN (Data)

2.04 This call flow is for data calls only; with inband signaling as in End Office Local Nodal Phase 1, only 56kb/s data calls are supported. This call flow includes SDDN 115+7D and 700 Outdialing. For this call flow, calls are originated from a PBX location which uses the End Office Local Nodal Architecture to provide SDN nodal service. The call terminates to an SDN On-net location, which can be either a *4ESS* switch nodal architecture or End Office Local Nodal architecture; each option is discussed in the call flow. Calls which could be completed by the ALN end office to an On-Net location must be sent to the *4ESS* switch in order to be treated as an On-Net call. A customer that has "local" On-Net locations would have routing provisioning which would send all calls to the *4ESS* switch.

2.05 The SDDN (Data) call flow is as follows:

1. The ALN end office receives a 115+7D or 700+56X-XXXX from the PBX.
2. Based on the dialed digits, the ARS associated with the PBX trunk selects a MCRI which routes the call to the customer-specific/location-specific SFG.
3. Using the capabilities of the MCRI and SFG, the ALN end office performs the following functions for nodal calls:
   - Delete 115 and prefix 700 to all 7D calls, using existing prefix/delete capabilities.
   - Associate the following information, if provisioned, with the call:
     - — OLI = 41
     - — PIC = (0)732
     - — Bearer Capability = 56kb/s
     - — Billing Number = SDN ANI. This is a mandatory parameter in the appropriate RC view.
   - Trigger creation of a new AMA module to record OLI and PBX trunk directory number.

   After this processing, the CPN for the call is the DN provisioned on the customer trunk group and the Charge Number for the call is the Billing Number retrieved from the MCRI/SFG.
4. The call is routed to the ASN, as it is an On-Net SDN call. The ALN end office generates an access charge AMA record including the new AMA module triggered in Step 3. The call is routed on the "new" 732 data TSG between the ALN switch and the ASN.

5. The ALN end office sends the ISUP IAM to the *4ESS* switch, sending the following information:
   - CdPN = dialed digits
   - CPN = PBX trunk DN. This CPN should have an NPA-NXX that is assigned to the rate center in which the PBX is located.
   - OLI = 41 (End Office Nodal SDN)
   - Charge Number = SDN ANI which is the billing number associated with the SFG. The Charge Number is an NANP number, but may be non-dialable.
   - Carrier Identification Code Parameter (CIP) = (O)732 (three or four digit CIC)
   - User Service Information (USI) = 56kb/s data.
6. The *4ESS* switch receives the ISUP IAM. An SDQuery message is sent by the *4ESS* switch to the SD per existing requirements; this SDQuery message includes the following information:
   - Digits (CdPN) = CdPN, mapped from ISUP CdPN
   - Digits (CDN) = PBX trunk DN, mapped from ISUP CPN
   - Digits (ANI) = SDN ANI, mapped from ISUP charged number. The digits (ANI) are an NANP number, but may be non-dialable
   - OST = 41, mapped from ISUP OLI
   - BCR = 56kb/s data, mapped from ISUP USI
   - TSG Service Type in the SDQ information parameter = LDS.
7. The SD searches for matches per the existing requirements:
   - If SDN customer ANIs have not yet been loaded into the SD, no match is found. The SD returns an SDResponse message with operation "Proceed" to the *4ESS* switch.
   - If SDN customer ANIs have been loaded into the SD, and SDN is still in PMO at the SD for the *4ESS* switch from which the SDQuery message was received, the SD finds a match on the SDN ANI.

     Based on the ARS in the ALN end office, the only calls sent to the *4ESS* switch on these interconnection facilities with OLI = 41 have POTS or 700 SAC DNs; the ANI match should have a higher precedence in SD than any match on these DNs. The SD Transition Status associated with the Precedence Index of the ANI record is PMO, and the SD returns an SDResponse message with operation "Revert to PMO" to the *4ESS* switch.

- IF SDN customer ANIs have been loaded into the SD, and SDN is in SMO at the SD for the *4ESS* switch from which the SDQuery message was received, the SD finds a match on the SDN ANI. The ANI match points to 2DSA/2NCP.

  Based on the ARS in the ALN end office, the only calls sent to the *4ESS* switch on these network interconnection facilities with OLI = 41 have POTS or 700 SAC DNs; the ANI match should have a higher precedence in SD than any match on these DNs. The SD Transition Status associated with the Preference Index of the ANI record is SMO. The SD does the following:

  — An SDResponse message with operation "Wait for Instructions" to the *4ESS* switch

  — An SPQuery message to the 2DSA/2NCP, with the following information of significance:

  a. Digits (ANI) = SDN ANI

  b. Digits (DN) = CdPN, mapped from Digits (CdPN)

  c. OST = 41 (End Office Nodal SDN)

  d. Digits (Calling DN) = PBX trunk DN.

  e. Data Rate = 56kb/s data, mapped from Bearer Capability requested.

8. The *4ESS* switch does not launch an NAI query for the incoming call based on the call arriving with an OLI = 41 over a TSG with the FELN characteristic = Yes.
9. The *4ESS* switch performs FEN/SC screening on the call in the same way as currently done for 732 switched access SDN. Based on the ARS in the ALN end office, the only calls sent to the *4ESS* switch on this network interconnection facilities have POTS or 700 SAC DNs; these calls should have a FEN/SC outcome of "do not query, record", and have an SDN AMA record generated by receipt of a Bill Call operation from the SDN NCP.
10. The *4ESS* switch searches the ANI Trigger Table. No match should be found. End Office SDN ANIs are not provisioned in the ANI Trigger Table.
11. The *4ESS* switch attempts to derive an SD Transition Type as follows:

    - If the *4ESS* switch does not yet support SD Phase 2 capabilities in 4E23 Release 2 Generic (which includes the definition of the SDN SD Transition Type), no SD Transition Type is derived for the call and the *4ESS* switch uses an SD Transition Type Status of PMO. *Proceed to Step 14*.

- If the *4ESS* switch supports SD Phase 2 capabilities in 4E23 Release 2 Generic (which includes the definition of the SDN SD Transition Type), the *4ESS* switch derives an SD Transition Type of "SDN" based on the call arriving with an OLI = 41 over a TSG with the FELN characteristic = Yes. *Proceed to Step 12*.

12. The *4ESS* switch looks up the SD Transition Status of the call based on the derived SD Transition Type of SDN as follows:
    - If the SD Transition Status is SMO, the switch waits for an SDResponse message. *Proceed to Step 13*
    - If the SD Transition Status is PMO, the switch does not wait for an SDResponse message. *Proceed to Step 14*.
13. The switch (which is operating with an SD Transition Status of SMO for this call) receives an SDResponse message as follows:
    - If the SDN customer ANIs have not yet been loaded into the SD, the operation value of the SDResponse message is "Proceed". This is an abnormal condition; the *4ESS* switch default-handles the call (routing and recording as a POTS call). **End of Call Flow**.
    - If SDN customer ANIs have been loaded into the SD and the customer subscribes to SDN, but the SDN precedence index has an SD Transition Status provisioned to "PMO" in the SD, the operation value of the SDResponse message is "Revert to PMO". (This is an abnormal condition, but results in the call being processed correctly). *Proceed to Step 14*.
    - If SDN customer ANIs have been loaded into the SD and the customer subscribes to SDN, and the SDN precedence index has an SD Transition Status provisioned to "SMO" in the SD, the operation value of the SDResponse message is "Wait for Instructions". The switch waits for an SPResponse message from the 2DSA/2NCP. *Proceed to Step 15*.
14. The switch performs PMO processing for the call. Based on the receipt of OLI = 41 over a TSG with FELN characteristic = Yes, the call is processed as an SDN call, resulting in the *4ESS* switch launching an SDN NCP query and waiting for a response. The SDN NCP query is identical to existing SDN NCP queries, except that it also contains the OST parameter = 41 (End Office Nodal SDN). The Digits (Calling DN) is included, mapped from the ISUP Calling Party Number parameter.
15. The 2DSA/2NCP receives the SPQuery message (from SD in SMO) or the NCP query (from the *4ESS* switch in PMO) and retrieves the customer record and provides appropriate SDN per-call features (such as Authorization Code collection).

16. The SDN NCP translates the Digits (CdPN) to an APN routing number, to be routed in the Dedicated Egress - Data (DED) domain. The 700-56X dialed number may be untranslated by the SDN 2DSA/2NCP; in this case, the SDN 2DSA/2NCP either:

    - Returns the 700-56X number to the *4ESS* switch, which queries the SDS 2DSA/2NCP per existing requirements for SDDN 700 outdialing, or
    - Directly queries the SDS 2DSA/2NCP per requirements in the SD Phase 2 2DSA/2NCP.

    If the customer subscribes to Advanced SDN Off-net Overflow, the 2DSA/2NCP, the 2DSA/2NCP also determines an overflow routing number and performs Local/Toll differentiation on the overflow routing number. The LTD of the primary routing number is "Route Toll, Record Toll".

17. The NCP sends a response message to the *4ESS* switch which includes the following:

    - A Connect operation with a Digits (Routing Number) parameter with an APN routing number and a Generic Routing Information parameter indicating "Dedicated Egress", or
    - The originally-dialed 700-56X number, and
    - A Bill Call Operation with an ANI Services Billing Data parameter indicating "Dedicated Egress".

    If the customer subscribes to Advanced SDN Off-net Overflow, an overflowing routing number and an LTD parameter is included in the connect operation. The LTD indicators for the primary routing number is "Route Toll, Record Toll"; the LTD indicators for the overflow routing number is determined by the NCP.

    Per existing requirements, both the Connect and Bill Call operations include a Data rate parameter indicating "56kb/s data".

18. The originating *4ESS* switch, upon receipt of the response message with a Bill Call operation and a Connect operation, does one of the following:

    - Generate an SDN AMA record and routes the call to the terminating *4ESS* switch based on the APN number routing in the DED domain per existing requirements. No LNP NCP query is done based on the call being routed in the DED domain. The APN number contains an SSS code assigned to the terminating *4ESS* switch. The ALN end office is not assigned an SSS code. The AMA record is identical to existing SDN AMA. The *4ESS* switch sets TT/USFI Character 3 to indicate "dedicated access" based on OLI = 41 being received on a TSG with the FELN Characteristic = Yes.
    - Generate an SDS 2DSA/2NCP query per existing requirements for SDDN 700 Outdialing, sends the query, and routes and records the call per existing requirements for SDDN 700 Outdialing. (Note that an SDDN 700

Outdialing call does not terminate to an End Office Local Nodal location in EOLN Phase 1, as SDS is not supported on EOLN in Phase 1. When SDS is supported in the End Office Local Nodal architecture, appropriate requirements are provided to enable this call to be routed and recorded properly when sent to an End Office Local Nodal location).

If the original dialed number is different from the routing number, the *4ESS* switch maps the original dialed number into the ISUP Dialed Number parameter.

19. The call is routed through the ASN as is currently done using the APN number. At the terminating *4ESS* switch there are two options as follows:
    - If the terminating *4ESS* switch is connected directly to the PBX, the terminating switch completes the call in the same manner as is currently done. **End of Call Flow**.
    - If the terminating *4ESS* switch is connected to the PBX through an ALN end office, *proceed to Step 20*.

20. The terminating *4ESS* switch routes the call (based on the APN number) to a trunk TSG to the ALN end office. This TSG is the "732" voice TSG; it need not be the same TSG as the 732 TSG used for incoming SDN calls, but it must be separate from the TSG used for sending calls with NANP destination numbers to the ALN end office. as follows:
    - If the trunks from the *4ESS* switch to the ALN end office are busy, the *4ESS* switch returns a RELEASE message to the OAS with a cause value = 34 (no circuit available).

      If the customer subscribes to Advanced SDDN Off-net Overflow, the origination *4ESS* switch receives the RELEASE message and routes the call using the overflow routing number. The originating *4ESS* switch performs an LNP NCP query if the destination NPA-NXX of the overflow routing number is open to portability, generates an SDN AMA record and routes the call in the POTS domain based on the NANP destination number (that is, overflow routing number) or LRN, per existing requirements, using the LTD parameter for the overflow routing number. **End of Call Flow**.
    - If the trunks from the *4ESS* switch to the ALN end office are not busy, *proceed to Step 21*.

21. The terminating *4ESS* switch sends an IAM to the ALN end office with the following:
    - CdPN = digits of incoming CdPN parameter, coded as "National/ISDN" (NANP) per existing INPA requirements

- CPN = incoming calling party number parameter, if received
- GAP (Type of Digits = Dialed Number) = mapped from incoming Dialed Number parameter (based on TSG FELN characteristic = Yes)
- GAP (Ported Number) = not sent (due to DED domain resulting in no LNP query)
- OLI = not sent (per existing provisioning)
- CHG = not sent (per existing provisioning)
- User Service Information (USI) = 56kb/s data.

22. The terminating ALN end office receives the ISUP IAM and routes the call, based on the CdPN digits, using a DAS provisioned with APN numbers. The DAS points to a Route Index which directs the call to a specific PBX Trunk and provides delete/prefix capability.
23. If a GAP parameter is received from the *4ESS* switch, the ALN end office uses the Dialed Number Preferred indicator to determine whether the CdPN or GAP (Dialed Number) should be used for outpulsing to the PBX. Digits may be prefixed to indicate to the PBX that this is a data call; the specific digits to be outpulsed are customer-defined.
24. The PBX trunk is associated with a Terminal Group which may route a call through an SFG to provide service measurements, engineerable capacity, and service-specific terminating access charge AMA. The Terminal Group determines whether to route the call through an SFG based on a DN-specific SFG index as follows:
    - If the trunks from the ALN end office to the PBX are busy, the ALN end office returns a RELEASE message, to the OAS, with a cause value = 17 (user busy).

      If the customer subscribes to Advanced SDN Off-net Overflow, the originating *4ESS* switch receives the RELEASE message and routes the call using the overflow routing number. The originating *4ESS* switch performs an LNP NCP query if the destination NPA+NXX of the overflow routing number is open to portability, generates an SDN AMA record and routes the call in the POTS domain based on the NANP destination number (that is, overflow routing number) or LRN, per existing requirements, using the LTD parameter for the overflow routing number. **End of Call Flow**.
    - If the trunks from the ALN end office to the PBX are not busy, *proceed to Step 25*.
25. The terminating ALN end office delivers the call to the customer PBX and generates a terminating access charge record. **End of Call Flow**.

SDN Off-Net

2.06 For this call flow, calls are originated from a PBX location which uses the End Office Local Nodal Architecture to provide SDN nodal service. The call terminates to a switched egress location. This call flow includes Virtual on-net calls, which are processed in a manner similar to off-net calls. This call flow also includes local calls from End Office SDN customers.

2.07 The SDN Off-Net call flow is as follows:

1. The ALN end office receives a 7D, 10D or 011+CC+NN from the PBX. A 7D call is an SDN private number (for virtual on-net calls) and all 10D, 1+10D and 011+CC+NN calls are public numbering plan numbers.
2. Based on the dialed digits, the ARS associated with the PBX trunk selects a MCRI which routes the call to the customer-specific/location-specific SFG.
3. Using the capabilities of the MCRI and SFG, the ALN end office performs the following functions for nodal calls:
   - Prefix 700 to all 7D calls, using existing prefix/delete capabilities.
   - Associate the following information, if provisioned, with the call:
     - — OLI = 41
     - — PIC = (0)732
     - — Bearer Capability = not provisioned
     - — Billing Number = SDN ANI. This is a mandatory parameter in the appropriate RC view.
   - Trigger creation of a new AMA module to record OLI and PBX trunk directory number.

   After this processing, the CPN for the call is the DN provisioned on the customer trunk group and the Charge Number for the call is the Billing Number retrieved from the MCRI/SFG.
4. The call is either routed to the ASN or routed using existing end office local routing based on per-customer provisioning as follows:
   - If the customer wants to receive per-SDN features (including number translation) on all calls including local calls, their routing is provisioned to route all calls to the ASN, and generate an access charge AMA record including the new AMA module triggered above. *Proceed to Step 5.*

- If the customer wants to receive per-call SDN features (including number translation) only on toll calls, their routing is provisioned to:
  - — Route toll calls to the ASN, and generate an access charge AMA record including the new AMA module triggered above. *Proceed to Step 5*.
  - — Route local calls using existing and office local routing, which includes LNP processing if the destination NPA-NXX is opened to portability, and generate a POTS-type customer AMA record including the new AMA module triggered above. **End of Call Flow**.

5. The ALN end office sends the ISUP IAM to the *4ESS* switch, sending the following information:
   - CdPN = dialed digits (prefixed 700 for 7D calls)
   - CPN = PBX trunk DN. This CPN should have an NPA-NXX that is assigned to the rate center in which the PBX is located
   - OLI = 41 (End Office Nodal SDN)
   - Charge Number = SDN ANI which is the billing number associated with the SFG. The Charge Number is an NANP number, but may be non-dialable
   - CIP = (O)732 (three or four digit CIC)
   - USI = 3.1kHz audio.
6. The *4ESS* switch receives the ISUP IAM. An SDQuery message is sent by the *4ESS* switch to the SD per existing requirements; this SDQuery message includes the following information:
   - Digits (CdPN) = CdPN, mapped from ISUP CdPN
   - Digits (CDN) = PBX trunk DN, mapped from ISUP CPN
   - Digits (ANI) = SDN ANI, mapped from ISUP charged number. The digits (ANI) are an NANP number, but may be non-dialable
   - OST = 41, mapped from ISUP OLI
   - BCR = 3.1kHz audio, mapped from ISUP USI
   - TSG Service Type in the SDQ information parameter = LDS.
7. The SD searches for matches per existing requirements as follows:
   - If SDN customer ANIs have not yet been loaded into the SD, no match is found. The SD returns an SDResponse message with operation "Proceed" to the *4ESS* switch.
   - If SDN customer ANIs have been loaded into the SD, and SDN is still in PMO at the SD for the *4ESS* switch from which the SDQuery message was received, the SD finds a match on the SDN ANI.

Based on the ARS in the ALN end office, the only calls sent to the *4ESS* switch on these interconnection facilities with OLI = 41 have POTS or 700 SAC DNs; the ANI match should have a higher precedence in SD than any match on these DNs. The SD Transition Status associated with the Precedence Index of the ANI record is PMO, and the SD returns an SDResponse message with operation "Revert to PMO" to the *4ESS* switch.

- If SDN customer ANIs have been loaded into the SD, and SDN is in SMO at the SD for the *4ESS* switch from which the SDQuery message was received, the SD finds a match on the SDN ANI. The ANI match points to 2DSA/2NCP.

  Based on the ARS in the ALN end office, the only calls sent to the *4ESS* switch on these network interconnection facilities with OLI = 41 have POTS or 700 SAC DNs; the ANI match should have a higher precedence in SD than any match on these DNs. The SD Transition Status associated with the Preference Index of the ANI record is SMO. The SD does the following:

  - Sends an SDResponse message with operation "Wait for Instructions" to the *4ESS* switch
  - Sends an SPQuery message to the 2DSA/2NCP, with the following information:
    - Digits (ANI) = SDN ANI
    - Digits (DN) = CdPN, mapped from Digits (CdPN)
    - OST = 41 (End Office Nodal SDN)
    - Digits (Calling DN) = PBX trunk DN.

8. The *4ESS* switch does not launch an NAI query for the incoming call based on the call arriving with an OLI = 41 over a TSG with the FELN characteristic = Yes.
9. The *4ESS* switch performs FEN/SC screening on the call in the same way as currently done for 732 switched access SDN. Based on the ARS in the ALN end office, the only calls sent to the *4ESS* switch on this network interconnection facilities have POTS or 700 SAC DNs; these calls should have a FEN/SC outcome of "do not query, record", and has an SDN AMA record generated by receipt of a Bill Call operation from the SDN NCP.
10. The *4ESS* switch searches the ANI Trigger Table. No match should be found. End Office SDN ANIs are not provisioned in the ANI Trigger Table.

11. The *4ESS* switch attempts to derive an SD Transition Type as follows:

    - If the *4ESS* switch does not yet support SD Phase 2 capabilities in 4E23 Release 2 Generic (which includes the definition of the SDN SD Transition Type), no SD Transition Type is derived for the call and the *4ESS* switch uses an SD Transition Type Status of PMO. *Proceed to Step 14*.
    - If the *4ESS* switch supports SD Phase 2 capabilities in 4E23 Release 2 Generic (which includes the definition of the SDN SD Transition Type), the *4ESS* switch derives an SD Transition Type of "SDN" based on the call arriving with an OLI = 41 over a TSG with the FELN characteristic = Yes. *Proceed to Step 12*.

12. The *4ESS* switch looks up the SD Transition Status of the call based on the derived SD Transition Type of SDN as follows:

    - If the SD Transition Status is SMO, the switch waits for an SDResponse message. *Proceed to Step 13*.
    - If the SD Transition Status is PMO, the switch does not wait for an SDResponse message. *Proceed to Step 14*.

13. The switch (which is operating with an SD Transition Status of SMO for this call) receives an SDResponse message as follows:

    - If the SDN customer ANIs have not yet been loaded into the SD, the operation value of the SDResponse message is "Proceed". This is an abnormal condition; the *4ESS* switch default-handles the call (routing and recording is as a POTS call). **End of Call Flow**.
    - If SDN customer ANIs have been loaded into the SD and the customer subscribes to SDN, but the SDN precedence index has an SD Transition Status provisioned to "PMO" in the SD, the operation value of the SDResponse message is "Revert to PMO". (This is an abnormal condition, but results in the call being processed correctly). *Proceed to Step 14*.
    - If SDN customer ANIs have been loaded into the SD and the customer subscribes to SDN, and the SDN precedence index has an SD Transition Status provisioned to "SMO" in the SD, the operation value of the SDResponse message is "Wait for Instructions". The switch waits for an SPResponse message from the 2DSA/2NCP. Proceed to Step 15.

14. The switch performs PMO processing for the call. Based on the receipt of OLI = 41 over a TSG with FELN characteristic = Yes, the call is processed as an SDN call, resulting in the *4ESS* switch launching an SDN NCP query and waiting for a response. The SDN NCP query is identical to existing SDN NCP queries, except that it also contains the OST parameter = 41 (End Office Nodal SDN). The Digits (Calling DN) are included, mapped from the ISUP Calling Party Number parameter.

15. The 2DSA/2NCP receives the SPQuery message (from SD in SMO) or the NCP query (from the *4ESS* switch in PMO) and retrieves the customer record and provides appropriate SDN per-call features (such as, Authorization Code collection).

16. The SDN NCP either translates the Digits (CdPN) to an NANP routing number, or finds no translation for a public numbering plan number, to be routed in the POTS domain. Based on the receipt of the OST = 41, the SDN 2DSA/2NCP performs Local/Toll Differentiation using the content of the Digits (CdPN) as the Local ANI.

17. The NCP sends a response message to the *4ESS* switch which includes the following:

    - A Connect operation with a Digits (Routing number) parameter with an NANP routing number, a Generic Routing Information parameter indicating "No Dedicated Egress", and a Local/Toll Differentiation parameter
    - A Bill Call Operation with an ANI Services Billing Data parameter indicating "No Dedicated Egress".

18. The Originating *4ESS* switch, upon receipt of the message with a Bill Call operation and a Connect operation, performs an LNP NCP query if the destination NPA-NXX is opened to portability, generates an SDN AMA record and routes the call in the POTS domain based on the parameter sent from the 2DSA/2NCP as defined in 4E Local for Nodal Customers. The AMA record is identical to existing SDN AMA. The *4ESS* switch sets TT/USFI Character 3 to indicate "dedicated access" based on OLI = 41 being received on a TSG with the FELN characteristic = Yes.

    If the original dialed number is different from the routing number, the *4ESS* switch maps the original dialed number into the ISUP DN parameter. **End of Call Flow**.

Originating MEGACOM Nodal Access

2.08 For this call flow, calls are originated from a PBX location which uses the End Office Local Nodal Architecture to provide MEGACOM nodal service. The call terminates to a switched egress location.

NOTE:
Once SD is in effect for all service processing, calls will be processed in the SMO mode of operation. PMO will be allowed with the application of MR #6629, scheduled for 4E23 Release 4 Generic.

2.09 The Originating MEGACOM Nodal Access call flow is as follows:

1. The ALN end office receives a 7D, 10D, 1+10D or 011+CC+NN from the PBX. Using existing capabilities, the ALN end office performs the MEGACOM and WATS Band screening currently provided by the *4ESS* switch.
2. Based on the dialed digits, the ARS associated with the PBX trunk selects a MCRI which routes the call to the customer-specific/location-specific SFG.
3. Using the capabilities of the MCRI and SFG, the ALN end office performs the following functions for nodal calls:

   - Prefix the Home NPA of the PBX to all 7D calls, using existing prefix/delete capabilities.

     NOTE:
     The digits that are prefixed are provisioned into the end office, which does not enforce that they are the Home NPA of the PBX.

   - Associate the following information, if provisioned, with the call:
     - — OLI = 40
     - — PIC = (0)288
     - — Bearer Capability = not provisioned
     - — Billing Number = WATS BN. This is a mandatory parameter in the appropriate RC view.
   - Trigger creation of a new AMA module to record OLI and PBX trunk directory number.

   After this processing, the CPN for the call is the DN provisioned on the customer trunk group and the Charge Number for the call is the Billing Number retrieved from the MCRI/SFG.

4. The call is either routed to the ASN or routed using existing end office local routing based on per-customer provisioning as follows:
   - If the customer wants to receive per-SDN features (including number translation) on all calls including local calls, their routing is provisioned to route all calls to the ASN, and generate an access charge AMA record including the new AMA module triggered above. *Proceed to Step 5*.
   - If the customer wants to receive per-call PCP features (including number translation) only on toll calls, their routing is provisioned to:
     — Route toll calls to the ASN, and generate an access charge AMA record including the new AMA module triggered above. *Proceed to Step 5*.
     — Route local calls using existing and office local routing, which includes LNP processing if the destination NPA-NXX is opened to portability, and generate a POTS-type customer AMA record including the new AMA module triggered above. **End of Call Flow**.

5. The ALN end office sends the ISUP IAM to the *4ESS* switch, sending the following information:
   - CdPN = dialed digits (prefixed HNPA for 7D calls)
   - CPN = PBX trunk DN. This CPN should have an NPA-NXX that is assigned to the rate center in which the PBX is located
   - OLI = 40 (End Office Nodal MEGACOM)
   - Charge Number = WATS BN ANI which is the billing number associated with the SFG. The Charge Number is an NANP number, but may be non-dialable
   - CIP = (O)288 (three or four digit CIC)
   - USI = 3.1kHz audio.

6. The *4ESS* switch receives the ISUP IAM. An SDQuery message is sent by the *4ESS* switch to the SD per existing requirements; this SDQuery message includes the following information:
   - Digits (CdPN) = CdPN, mapped from ISUP CdPN
   - Digits (CDN) = PBX trunk DN, mapped from ISUP CPN
   - BN Digits (ANI) = WATS BN, mapped from ISUP Charge number. The digits (ANI) are an NANP number, but may be non-dialable OST = 40, mapped from ISUP OLI

- BCR = 3.1kHz audio, mapped from ISUP USI
- TSG Service Type in the SDQ information parameter = LDS.

7. The SD searches for matches per existing requirements. All End Office MEGACOM customers are provisioned in the SD with their ANI indicating 2DSA/2NCP for PCP service.

   Based on the ARS in the ALN end office, the only calls sent to the *4ESS* switch on these network interconnection facilities with OLI = 40 have POTS DNs; the ANI match should have a higher precedence in SD than any match on these DNs. The SD Transition Status associated with the Preference Index of the ANI record is SMO. This requires that End Office Nodal MEGACOM have a different Precedence Index than PCP. The SD does the following:

   - Sends an SDResponse message with operation "Wait for Instructions" to the *4ESS* switch
   - Sends an SPQuery message to the 2DSA/2NCP, with the following information:
     - — Digits (ANI) = WATS BN
     - — Digits (DN) = cdPNr, mapped from Digits (CdPN)
     - — OST = 40 (End Office Nodal MEGACOM)
     - — Digits (Calling DN) = PBX trunk DN.

8. The *4ESS* switch performs the same FEN/SC screening on the call as performed for switched access LDS calls received from end offices. Based on the ARS in the end office, the only calls sent to the *4ESS* switch on these facilities with OLI = 40 have POTS (domestic or international) DNs; these calls should have a FEN/SC outcome of "query and record".
9. The *4ESS* switch searches the ANI Trigger Table. No match should be found. End Office MEGACOM ANIs are not provisioned in the ANI Trigger Table.
10. The *4ESS* switch does not attempt to derive an SD Transition Type; all calls arriving with an OLI = 40 over a TSG with the FELN Characteristic 3 = Yes have an SD Transition Status of SMO.
11. The *4ESS* switch does not launch an NAI query for the incoming call based on the call having an SD Transition Status of SMO, per existing SD requirements.
12. The switch receives an SDResponse message. The operation value of the SDResponse is "Wait for Instructions". The switch waits for an SPResponse message from the 2DSA/2NCP. Any other response from the SD would be an abnormal condition.

13. The 2DSA/2NCP receives the SPQuery message from the SD and retrieves the customer record and provides appropriate PCP per-call features (for example, Account Code collection).
14. Based on receipt of the OST = 40, the PCP 2DSA/2NCP performs Local/Toll Differentiation using the content of the Digits (CDN) as the Local ANI.
15. The NCP sends a response message to the *4ESS* switch which includes the following:
    - A Connect operation with a digits (Routing number) parameter with an NANP routing number, a Generic Routing Information parameter indicating "No Dedicated Egress", and a Local/Toll Differentiation parameter
    - A Bill Call Operation with an ANI Services Billing Data parameter indicating "No Dedicated Egress".
16. The Originating *4ESS* switch, upon receipt of the message with a Bill Call operation and a Connect operation, performs an LNP NCP query if the destination NPA-NXX is opened to portability, generates an SDN AMA record and routes the call in the POTS domain based on the parameter sent from the 2DSA/2NCP as defined in 4E Local for Nodal Customers. The AMA record is identical to existing MEGACOM/PCP AMA based on a call arriving with an OLI = 40 over a TSG with the FELN characteristic = Yes. **End of Call Flow**.

Terminating MEGACOM 800 Nodal Egress

2.10 This call flow is for an MEGACOM 800 call which terminates to an End Office Local Nodal Location.

2.11 The call flow up to the point at which the 800 2DSD/2NCP sends the Charging - Bill Call and Connection Control - Connect operations to the *4ESS* switch is unchanged from existing service call flows.

2.12 The Terminating MEGACOM 800 Nodal Egress call flow is as follows:

1. The 800 2DSD/2NCP sends to the originating *4ESS* switch a TCAP message containing Charging - Bill Call and Connection Control - Connect operations. The Connect operation minimally contains a Digits (Routing number) parameter with an APN routing number and a Generic Routing Information parameter indicating "Dedicated Egress"; the Bill Call operation is per existing requirements.
2. The originating *4ESS* switch routes the call to the terminating *4ESS* switch. The call is routed in the DEV domain. No LNP NCP query is done based on the call being routed in the DEV domain.

   Class Of Service (COS) information is derived per existing requirements; existing COS derivation results in the appropriate M800 SI.
3. The call is routed through the ASN as is currently done using the APN number. The terminating switch is connected to the PBX through an ALN end office.
4. The terminating *4ESS* switch routes the call (based on the APN number) to a TSG in the ALN end office. This TSG of "732" voice TSG need not be the same TSG as the 732 TSG used for incoming SDN calls, but must be separate from the TSG used for sending calls with NANP destination numbers to the ALN end office. If the trunks from the *4ESS* switch to the ALN are:
   - Busy, the *4ESS* switch returns a RELEASE message, to the originating switch, with a cause value = 34 (no circuit available). If the customer is provisioned in the NCP for Alternate Destination Routing (ADR), the originating switch uses Centralized Alternate Direct Call Routing (CADCR) to provide ADR for the call. The alternate number provisioned for ADR must route over a different trunk group from the *5ESS*® to the PBX to receive full benefit of ADR.
   - Not busy, *proceed to Step 5*.

5. The terminating *4ESS* switch sends an IAM to the ALN end office with the following information:
   - CdPN = digits of incoming CPN parameter, coded as "National/ISDN" (NANP) per existing INPA requirements.
   - CPN = incoming calling party number parameter, if received.
   - GAP (Type of Digits = DN) = mapped from incoming DN parameter (based on TSG FELN characteristic = Yes)
   - GAP (Ported Number) = not sent (due to DEV domain resulting in no LNP query)
   - OLI = not sent (per provisioning of existing TSG parameters)
   - CHG = not sent (per provisioning of existing TSG parameters).
6. The terminating ALN end office receives the ISUP IAM and routes the call, based on the CdPN digits, using a DAS provisioned with APN numbers. The DAS points to a Route Index which directs the call to a specific PBX Trunk and provide delete/prefix capability.
7. If a GAP parameter is received from the *4ESS* switch, the ALN end office uses the Dialed Number Preferred indicator to determine whether the CdPN or GAP (DN) should be used for outpulsing to the PBX.
8. The PBX is associated with a Terminal Group which may route a call through an SFG to provide service measurements, engineerable capacity, and service-specific terminating access charge AMA. The Terminal Group determines whether to route the call through an SFG based on a DN-specific SFG index as follows:
   - If the trunks from the ALN end office to the PBX are busy, the ALN end office returns a RELEASE message to the OAS with a cause value = 17 (user busy). If the customer is provisioned in the NCP for ADR, the OAS uses CADCR to provide ADR for the call. The alternate number provisioned for ADR must be different from the POTS number assigned to the MEGACOM 800 location to receive full benefit from ADR.
   - If the trunks from the ALN end office to the PBX are not busy, *proceed* with Step 9.
9. The terminating ALN end office delivers the call to the customer PBX and generates a terminating access charge record with new AMA module appended. **End of Call Flow**.

Terminating TSAA/AVA Egress

2.13 This call flow is for POTS calls which terminate to an End Office Local Nodal Location using either TSAA or AVA.

NOTE:
Terminating TSAA/AVA does not currently terminate the call. However, 4E23 Release 4 Generic will provide the proper capability to terminate and bill the call (Feature 6605).

2.14 The call flow up to the point when the call is routed to the terminating ASN switch is unchanged from existing service call flows. The Terminating TSAA/AVA Egress call flow is as follows:

1. The terminating switch creates a TSAA/AVA record based on the following being provisioned properly in the terminating *4ESS* switch:
   - The Call Handling Instruction in the code group translations or PLU table entry set to TSA/AVA recording
   - Terminating recording set for the egress 288 trunk group to the ALN end office
   - The SI for the call being a valid SI for TSAA/AVA.
2. The terminating *4ESS* switch routes the call to a TSG to the ALN end office. This TSG is shown as the "288" voice TSG. If the trunks from the *4ESS* switch to the ALN end office are:
   - Busy, the call is final-handled. Because the ALN end office is the LSP, there is no overflow path available for the call.
   - Not busy, *proceed to Step 3*.
3. The terminating *4ESS* switch sends an IAM to the ALN end office with the following information:
   - CdPN = digits of incoming CdPN parameter, coded as "National/ISDN" (NANP) per existing requirements
   - CPN = incoming calling party number parameter, if received
   - GAP (Ported Number) = may be sent if the number is a ported number
   - OLI = not sent (per provisioning of existing TSG parameters)
   - CHG = not sent (per provisioning of existing TSG parameters).

4. The terminating ALN end office receives the ISUP IAM and routes the call, based on the CdPN digits, using DAS provisioned with NANP numbers. The DAS points to a Route Index which directs the call to a specific PBX trunk and provides delete/prefix capability.
5. The PBX trunk is associated with a Terminal Group which routes the call to the PBX. An SFG index is not associated with this type of call and thus an SFG is not used. If the trunks from the ALN end office to the PBX are:
   - Busy, the call is final-handled. In this architecture, there is no overflow path available for the call
   - Not busy, *proceed to Step 6*.
6. The terminating ALN end office delivers the call to the customer PBX and generates a terminating access charge record. This access record does not include the new AMA module. **End of Call Flow**.

3. Provisioning

Recent Change Forms Affected

A. Recent Change Forms 100, 101, 102, 107, 108, 109

3.01 A new field, FELN, is added to these forms.

Population Rules

3.02 The following population rules apply:

1. A FELN non-blank entry, either a "Y" or "N", is only allowed if the Trunk Block Signaling Characteristic is ISUP.
2. The FELN field can only be populated to "Y" (XL4TS_FELN set to 4XLTS_FELN_Y) if all of the following conditions are met:
   - The Trunk Block Type of Trunk is Local exchange Carrier Connecting (LCC) - (XL4TB_TOT is set to 4XLTOTLCC).
   - The ICT TSG Carrier Solutions CIC Based determination TSG indicator is set to OFF - (XL4TS_CCTT is set to 4XLTS_CCTTN).
   - The ICT/OGT TSG allows another Interexchange Carrier indicator is to be set to OFF - (XL4TS_IXC is set to 4XLTS_IXCN).

B. Recent Change Form 337

3.03 This form is modified to allow two new service type entries for the "SRVCT" field and populates the appropriate item, either XL4IIST or XL4OLIST as follows:

- The form input "LNSDN", with a symbolic value of 4XLSTLNSDN and a value of 8, is for Local Nodal SDN.
- The form input "LNMGC", with a symbolic value of 4XLSTLNMGC and a value of 9, is for Local Nodal MEGACOM.

C. Recent Change Form 809

3.04 Recent Change (RC) Form 809 is used to activate/deactivate Feature 5538 by populating the FEATURE ITEM field with PF37 and setting the ON OR OFF field to either ON or OFF. To activate the feature, set the ON OR OFF field to ON. To deactivate the feature, set the ON OR OFF field to OFF. The default is OFF.

3.05 Verify Forms 16az and 8j are associated with the ON OR OFF entries on RC 809.

Verify Forms Affected

A. Verify Forms 1a, 1b, and 1c

3.06 These forms are modified to display the contents XL4TS_FELN in the FELN field as follows:

- When the XL4TS_FELN item equals 4XLTS_FELN_N (=0), and the signaling characteristic of the trunk is not equal to ISUP (XL4TB_OSC NE 4XLOISUP and/or XL4TB_ISC NE 4XLIISUP), then display ---> "" (blank).
- When the XL4TS_FELN item equals 4XLTS_FELN_N (=0), and the signaling characteristic of the trunk is equal to ISUP (XL4TB_OSC EQ 4XLOISUP and/or XL4TB_ISC EQ 4XLIISUP), then display ---> "N" (no).
- When the XL4TS_FELN item equals 4XLTS_FELN_Y (=1), then display ---> "Y" (yes).

B. Verify Form 11d

This form is modified to display the new "FELN" TSG field to be included as an optional field (FD1_, DT1_--->FD4_, DT4_) for the VER:TSGLIST message.

C. Verify Form 3af

3.07 This form is modified to display the new "LNSDN" entry under the "SRVCT" field if the XL4IIST item is equal to the 4XLSTLNSDN assigned state. Also, this form is modified to display the new "LNMGC" entry under the "SRVCT" field if the XL4IIST item is equal to the 4XLSTLNMGC assigned state.

D. Verify Form 3ag

3.08 This form is modified to display the new "LNSDN" entry under the "SRVCT" field if the XL4OLIST item is equal to the 4XLSTLNSDN assigned state. Also, this form is modified to display the new "LNMGC" entry under the "SRVCT" field if the XL4OLIST item is equal to the 4XLSTLNMGC assigned state.

4. Recording (Not Affected)

5. Network Management (Not Affected)

6. Maintenance/Troubleshooting

New Input Message Fields

6.01 The *4ESS* switch shall accept two new fields in the existing **TEST:TCAPDSD** input message for ANI-based queries and populate the corresponding fields of the test query message:

- OLI : This specifies the originating line information, and is populated in the OST parameter of the test query. Valid values are 40 and 41. If omitted, the OST parameter is coded "0000 0000".
- Calling DN digits: This specifies the calling party number, and is populated in the Digits (Calling Party Number) parameter of the test query. Ten digits must be specified if included; if omitted, the Digits (Calling DN) parameter is not included in the test query.

Test Query Message

6.02 The **TEST:SD** input message must be used when sending a test query when SD has been provisioned and a service has been transitioned to SD in the *4ESS* switch.

6.03 With the introduction of SD, there is a possibility that a call service can be operating in one of two modes - PMO and SMO. PMO is the method of accessing data base information prior to SD.

6.04 The first call service transitioned to SD is PCP. SDN is scheduled to provision next. Whenever a test query is done for these services, the mode of operation for the service must be considered when using an input message that performs a test query. The following table illustrates which message to use:

PCP		SDN	
SMO	PMO	SMO	PMO
TEST:SD	*	TEST:SD	TEST:TCAPDSD

* PMO for PCP service is planned for 4E23 Release 4 Generic, at which time **TEST:TCAPDSD** should be used.

6.05 As other services are added to SD, consideration must be given to which input message to use for the mode of operation that particular service is provisioned for at the time of the test query.

Measurements

6.06 Files of TSG measurements generated for access by DEMS/DARICS shall include the value of the new FELN TSG parameter.

7. Transition Considerations

Deployment Requirements

7.01 It is not necessary for all *4ESS* switches in the network to be running the 4E23 Release 2 Generic for this feature to be fully operational.

Feature Activation

7.02 This feature is activated or deactivated as described in the Provisioning section of

this chapter.

7.03 This feature can also be turned on or off by an absolute word change. Item OD4PF37 in the OD4OFCCOPY2 structure is the office parameter that controls the on/off state of this feature.

CAUTION:
The OD4OFCCOPY2 structure also contains the on/off bits for many other features. Be certain that any changes you make affect only this feature.

7.04 The following information can be used to turn this feature on or off using the absolute word change:

- Structure: OD4OFCCOPY2
- Core address in 4E23 Generic: 7126221
- Size of OD4PF37: 1
- Displacement: 14 (octal)
- On: 1
- Off: 0.

8. Input/Output Manual Pages

8.01 Two new OLI values have been added for both **TEST:TCAPDSD** input and output messages. They are OLI value of 40 for PCP Transition Type, and OLI value of 41 for SDN Transition Type.

MESSAGE ID	TEST:TCAPDSD
WORK CENTER	MAC, MOC, NMOC, TOC
GENERIC	4E23 Rel. 2 and later
CLASS	ALL MESSAGE
APPLICATION	4E - Proprietary
TYPE	Input

1. **PURPOSE**

Requests a test query to be sent to the Network Control Point (NCP) from the 4ESS™ Switch serving as an Action Control Point (ACP). This test query tests the integrity of the Common Channel Signaling Version 7 (CCS7) network between the two end points utilizing the Consultative Committee on International Telephone & Telegraph (CCITT) based Transaction Capability Application Part (TCAP) protocol. It also serves as a tool to test the data for a particular Direct Services Dialing (DSD) customer. The types of queries sent to the NCP can be for Automatic Number Identification (ANI) - based services (Switched Digital Network [SDN]), dialed number-based services (A800 types) or Universal Subscriber Data Structure (USDS).

Format [1] is used to request an ANI-based test query (SDN services).
Format [2] is used to request a dialed number-based test query (A800 type services).
Format [3] is used to request a Universal Global Title Translation (UGTT) test query.
Format [4] is used to request a Network Access Interruption (NAI) test query.
Format [5] is used to request a Universal Subscriber Data Structure (USDS) test query.
Format [6] is used to request a destination-only query.
Format [7] is used to request a ANI-only query.
Format [8] is used to request both a destination and ANI query.
Format [9] is used to request the Local ANI digits in an SDN query.
Format [10] is used to request the Local ANI digits in a Positive Call Processing (PCP) query.
Format [11] is used to request the Carrier Identification Code in the NAI query.
Format [12] is used to request Local Nodal 8YY screening test query.
Format [13] is used to request dialed number based pay phone test queries.
Format [14] is used to request End Office Local Nodal (EOLN) digital link phase IV test queries.

2. **FORMAT**

[1] **TEST:TCAPDSD;QRYTYPE** *a*:**DIG** *b*,**ANI** *c* [,**APN**] [,**AUTHCODE** *d*] [,**RATE** *e*] [,**SGD** *f*] [,**RID** *g* [,**RID1** *h* [,**RID2** *i*]]] [,**CAR** *j*] [,**LIST**] [,**CD**]**!**

[2] **TEST:TCAPDSD;QRYTYPE** *a*:**DIG** *b*,**ANI** *c* [,**RATE** *e*] [,**APN**] [,**RID** *g* [,**RID1** *h* [,**RID2** *i*]]] [,**LIST**] [,**CD**]**!**

[3] **TEST:TCAPDSD;QRYTYPE** *a*:*{***ANI** *c*/**ANI** *c*,**APN***}* [,**SD**]**!**

[4] **TEST:TCAPDSD;QRYTYPE 3:DIG** *b*,**ANI** *c* [,**RATE** *e*] [,**IIDIGITS** *k*/,**OLI** */*/,**CID** *m*/,**OLI** *l*,**CID** *m*]**!**

[5] **TEST:TCAPDSD;QRYTYPE 8:DIG** *b*,**ANI** *c* [,**IIDIGITS** *k*/,**OLI** */*] [,**RATE** *e*] [,**TYP** *n*] [,**LIST**] [**INSEPR** *o*]**!**

[6] **TEST:TCAPDSD;QRYTYPE 11:DIG** *b*,**RATE 1!**

[7] **TEST:TCAPDSD;QRYTYPE 11:DIG** *b*,**ANI** *c*,**RATE 2!**

[8] **TEST:TCAPDSD;QRYTYPE 11:DIG** *b*,**ANI** *c*,**RATE 3!**

[9] **TEST:TCAPDSD;QRYTYPE 1:DIG** *b*,**ANI** *c* [,**APN**] [,**AUTHCODE** *d*] [,**RATE** *e*] [,**SGD** *f*] [,**LANI** *p*] [,**RID** *g* [,**RID1** *h* [,**RID2** *i*]]] [,**LIST**] [,**CD**]**!**

[10] **TEST:TCAPDSD;QRYTYPE 10:DIG** *b*,**ANI** *c* [,**APN**] [,**AUTHCODE** *d*] [,**RATE** *e*] [,**SGD** *f*] [,**LANI** *p*] [,**RID** *g* [,**RID1** *h* [,**RID2** *i*]]] [,**LIST**] [,**CD**]**!**

[11] **TEST:TCAPDSD;QRYTYPE 3:DIG** *b*,**ANI** *c* [,**RATE** *e*] [,**IIDIGITS** *k*/,**OLI** */*/,**CID** *m*/,**OLI** *l*,**CID** *m*] [,**CAR** *j*]**!**

[12] **TEST:TCAPDSD;QRYTYPE 13:DIG** *b*,**LANI** *p* [,**RATE** *e*]**!**

[13] **TEST:TCAPDSD;QRYTYPE** *a*:**DIG** *b*,**ANI** *c* [,**RATE** *q*] [,**APN**] [,**RID** *g* [,**RID1** *h* [,**RID2** *i*]]] [,**LIST**] [,**CD**]**!**

[14] **TEST:TCAPDSD;QRYTYPE 12:DIG** *b*,**ANI** *c* [,**OLI** */*] [,**SID** *r*] [,**LIST**]**!**

3. **EXPLANATION OF MESSAGE**

a The type of query to be sent:

1— ANI-based query

2— Non-Call Associated Temporary Signaling Connection (NCAT) ANI-based query

3— Dialed number-based query

4— NCAT dialed number-based query

5— NAI query

6— UGTT query

7— NCAT UGTT query

8— USDS query.

9— EasyReach® query.

10— PCP query.

11— Local Number Portability (LNP).

12— Universal International Freephone Number (UIFN) query.

13— Local Nodal 8YY screening query.

14— End office local nodal (Digital Link Phase IV).

b Customer specific digits that are required for the particular type of DSD call. Digits for the ANI-based queries can be either 7 digits or 10 digits. For the dialed number-based query, 10 digits must be specified. For international SDN and USDS queries, a "**011**" must prefix the dialed number, this is only valid for Format [1], Format [4], and Format [5]. 11 digits may be specified for Universal International Freephone Number (UIFN) calls.

c A required variable for the ANI-based and USDS test queries. Customer's 10-digit automatic number identification. For USDS, a 3 digit ANI is permitted.

d A customer's authorization code number. It is an optional variable. There can be a maximum of 12 digits. For EasyReach® query type this is the echo data that should be sent in the requery to the Quantum Routing Data System (QRDS). This can be a maximum of 10 bytes (20 digits).

e An optional variable used to specify a data rate for a DSD call. Not valid for LNP queries.

0— Non data (voice call) For USDS, this is the only valid value of data rate.

1— 1.536 Megabits Per Second (MBPS) clear

2— 1.536 MBPS restricted

3— 384 Kilobits Per Second (KBPS) clear

4— 384 KBPS restricted

5— 64 KBPS clear

6— 56 KBPS

7— 64 KBPS restricted

f Station group designator number. An optional variable for ANI-based queries. The value specified as input depends on the individual customer.

g	First set of Caller Interaction (CI) digits. Maximum number of digits is 15.
h	Second set of CI digits. The second set is not accepted unless the first set of CI digits have been entered. Maximum number of digits is 15.
i	Third set of CI digits. The third set is not accepted unless the first and second set of CI digits have been entered. Maximum number of digits is 15.
j	Carrier Identification Code. This must be a 4-digit number. These digits are used by the Number 2 Line Number Application For Consumers (2LAC)/ Network Control Point (NCP) databases for fraud detection. (Format [11]) These digits are used by the Number 2 Direct Services ANI Base (2DSA)/ Network Control Point (NCP), refer to Format [1].
LIST	If this keyword is present in the input message, then the dump of the message received from the NCP database is printed.
CD	Continuation Data (**CD**) indicates that this is one of two input messages. This is only valid if the **RID** keyword is used with the **CD** keyword on the first of two input messages. The **QRYTYPE** and **DIG** parameters are required in the second message.
APN	If this keyword is used to define the ANI variable, then the ANI must be an Action Point Numbering Plan (APN) ANI. If this keyword is not used to define the variable, then the ANI must be a North American Numbering Plan (NANP) ANI.
SD	Only valid with a UGTT query. If present then the secondary UGTT database will be queried. Default is to query the primary database.
k	Information digits, also called the originating station type. Identifies characteristics of the calling station (0-99).
l	Originating line identity, also called the originating station type (0-99). For EOLN test queries the valid **OLI** values are: 40 - PCP transition type and 41 - SDN transition type.
m	Carrier selection information: *1*— Presubscribed, no input. *2*— Presubscribed, input. *3*— Presubscribed, input or not.

4— Not presubscribed, input.

n Access type:

1— Switched access.

o Input Service Provider (INSEPR) message Identification (ID) (*1-9*).

p Local ANI digits. This should be 10 digits. These digits identify a Local Nodal customer.

q II/OLI digits:

5— II/OLI of 27.

6— II/OLI of 29.

7— II/OLI of 70.

r Calling directory number. The calling directory number is sent to the SDN database for EOLN test queries. This parameter consists of 10 digits.

4. **SYSTEM RESPONSE**

?D Data field contains an error. Invalid or out-of-range data was received in the input message.

?E Syntax Error exists in the message but cannot be resolved to the proper field. An invalid keyword combination was discovered.

PF Printout Follows. The test query has been initiated and the results will be printed.

RL Retry Later. No Teletypewriter (TTY) output buffer or trunk maintenance register available.

5. **REFERENCES**

PIDENTs
DSDCMESS
IOCPIMC4
TCAPTEST
TMAD0005

Output Message
TEST:TCAPDSD

MESSAGE ID	TEST:TCAPDSD
WORK CENTER	MAC, MOC, NMOC, TOC
GENERIC	4E23 Rel. 2 and later
APPLICATION	4E - Proprietary
TYPE	Output

1. **FORMAT**

[1] *TEST:TCAPDSD:QRYTYPE a:DIG b,ANI c* [,APN] [,AUTHCODE d]...
... [,RATE e] [,SGD f] [,LIST] [,CD]
{g|h}

[2] *TEST:TCAPDSD:QRYTYPE a:DIG b ,ANI c* [,APN] [,RATE e]...
... [,LIST] [,CD]
{g|h}

[3] *TEST:TCAPDSD;QRYTYPE a:{ANI c |ANI c, APN}* [,SD]
{g|h}

[4] *TEST:TCAPDSD;QRYTYPE 5:DIG b,ANI c* [,RATE e] ...
... [,IIDIGITS i|,OLI j|,CID k|,OLI j,CID k]
I

[5] *TEST:TCAPDSD;QRYTYPE 8:DIG b,ANI c* [,IIDIGITS i|,OLI j]...
... [,TYP m,] [,RATE e] [,LIST] [INSEPR n]
o: [p]
USDS SPC: q USDS SSN: r
[DENY REASON: {INVALID |2CCP DENY CALL - SDF}]
[ACG REQUEST]
[USDS TEST QUERY CONTINUING]
[SWITCH CAPABILITY:
PROCEED [APPLY TRUE VOICE PCC]
[APPLY 1+DL]
[QUERY NAI]
[ROUTE TO ALA]
[ALA: VALUE]

[6] *TEST:TCAPDSD;QRYTYPE 11:DIG b,RATE 1!*

[7] *TEST:TCAPDSD;QRYTYPE 11:DIG b,ANI c,RATE 2!*

[8] *TEST:TCAPDSD;QRYTYPE 11:DIG b,ANI c,RATE 3!*

[9] *TEST:TCAPDSD;QRYTYPE 1:DIG b,ANI c* [,APN] [,AUTHCODE d]...
... [,RATE e] [,SGD f] [,LANI s] [,LIST]!

[10] *TEST:TCAPDSD;QRYTYPE 10:DIG b,ANI c* [,APN] [,AUTHCODE d]...
... [,RATE e] [,SGD f] [,LANI s] [,LIST]!

[11] *TEST:TCAPDSD;QRYTYPE 5:DIG b,ANI c* [,RATE e]...
... [,IIDIGITS i|,OLI j|,CID k|,OLI j,CID k] [,CAR t]!

[12] *TEST:TCAPDSD;QRYTYPE 13:DIG b,LANI s* [,RATE e]!

[13] *TEST:TCAPDSD;QRYTYPE a:DIG b,ANI c* [,APN] [,AUTHCODE d]...
... [,RATE e] [,SGD f] [,LANI s] [,LIST] [,CD]

{g|h}
[RID: u]
[RID1: u]
[RID2: u]

[14] *TEST:TCAPDSD;QRYTYPE 3:DIG b,ANI c* [,APN] [,RATE e] [,LIST]

{g|h}

ANT INFORMATION
RTG DIGITS: v
DOMAIN: w
SIC: x
FAI: y
CSR: z

[15] *TEST:TCAPDSD;QRYTYPE 12:DIG b,ANI c* [,LIST]

{g|h}
OLI:j
SID:a1

2. **REASON FOR OUTPUT**

This output message is in response to the *TEST:TCAPDSD* input message.

Format 1-3 is in response to either a dialed ^number-based query or an Automatic Number Identification (ANI) - based test query request. The output from this test query will indicate whether the query was successful or not. If the query is successful, the output will show what operations were requested by the customer record at the NCP database along with the routing digits and domain value. If the query is not successful, the output will indicate the final handling code and reason for failure.

Format [4] is in response to a Network Access Interruption (NAI) test query request.

Format [5] is in response to a Universal Subscriber Data Structure (USDS) test query request.

Format [6] is in response to a destination-only query to the Local Number Portability (LNP) database.

Format [7] is in response to a an ANI-only query to the LNP database.

Format [8] is in response to both a destination and ANI query to the LNP database.

Format [9] is in response to an ANI based query.

Format [10] is in response to an ANI based query.

Format [11] is in response to an NAI based query.

Format [12] is in response to a Local Nodal 8YY screening test query.

Format [13] is in response to a test query containing the *RID*, *RID1*, and/or *RID2* keywords.

Format [14] is in response to the presence of an Alternate Number Translations (*ANT*) record for a specific test query.

Format [15] is in response to an End Office Local Nodal (EOLN) digital link phase IV test query.

3. **VARIABLE FIELD DEFINITIONS**

a The type of query sent:

- *1*— ANI-based query
- *2*— Non-Call Associated Temporary Signaling Connection (NCAT) ANI-based query
- *3*— Dialed number-based query
- *4*— NCAT dialed number-based query
- *5*— NAI query
- *6*— Universal Global Title Translation (UGTT) query
- *7*— NCAT UGTT query
- *8*— Universal Subscriber Data Structure (USDS) query
- *9*— EasyReach® query

10— Positive Call Processing (PCP) query.

11— Local Number Portability (LNP).

12— Universal International Freephone Number (UIFN) query.

13— Local Nodal 8YY screening query.

b Customer specific digits that are required for the particular type of Direct Services Dialing (DSD) call. This is a 10 digit number for dialed number based services. For ANI-based services, this may be a 7 or 10 digit number or an international number with *011* as the leading 3 digits. An international number may also be specified for USDS. 11 digits may be specified for Universal International Freephone Number (UIFN) calls.

c A required parameter for the ^ANI-based queries. This should be the customer's ^10-digit automatic number identification.

APN If this keyword was used in the input message to define the ANI parameter, then the ANI must be an Action Point Numbering Plan (APN) ANI.

If this keyword was not used in the input message to define the ANI parameter, then the ANI must be a North American Numbering Plan (NANP) ANI.

d A customer's authorization code number. An optional parameter with a maximum of 12digits. For EasyReach® query type this is the echo data that should be sent in the requery to the Quantum Routing Data System (QRDS). This can be a maximum of 10 bytes (20 digits).

e An optional parameter used to specify a data rate for a DSD call. Not valid for LNP queries.

0— Non data (voice call)

1— 1.536 Megabits Per Second (MBPS) clear

2— 1.536 MBPS restricted

3— 384 Kilobits Per Second (KBPS) clear

4— 384 KBPS restricted

5— 64 KBPS clear

6— 56 KBPS

7— 64 KBPS restricted

f An optional parameter for ^ANI-based queries. It is the station group designator number. The value specified as input depends on the individual customer.

LIST If this keyword was used in the input message, the dump of the message received from the Network Control Point (NCP) database is printed.

g The following text phrases may appear when the query succeeds:

A800SUPPLEMENTALORIGINFO—
Number of transactions.

ANI— ANI digits from NCP.

BLOCKEDPAYPHONEINDICATIONRECEIVED

CUSTOMIZEDANNOUNCEMENTRECEIVED—
One or more customized announcements have been received.

DOMAIN—
The routing domain associated with the digits.

CAR— Carrier Identification Code.

FAIDIGIT—
The digit returned form the NCP to determine the foreign administration identification for the carrier.

RATE—
Data rate for this call.

RECEIVEDACG

RECEIVEDCALLTAG

RECEIVEDCHECKAPPLICATIONSTATUS

RECEIVEDREFRESH

RECEIVEDREQUESTTOCANCELANNOUNCEMENT

RECEIVEDREQUESTTOPERFORMANASSIST

RECEIVEDREQUESTTOPERFORMNCPTRANSFER

RECEIVEDREQUESTTOQUEUECALL

RECEIVEDSENDTERMINATION

RESELLNON-FEATUREDCALL

ROUTINGDIGITS—
The digits returned from the NCP to route this call.

SGD— Semi Global Data (SGD) digit for this call.

STANDARDANNOUNCEMENTRECEIVED

SUPPLEMENTALROUTINGINFO—
The supplemental routing information specifies the service.

VALIDCUSTOMERID:888-000-1232—
UGTT query.
PRIMARYSPC:2523163
PRIMARYSSN:252
SECONDARYSPC:2523163
SECONDARYSSN:252

h The following text phrases may appear when the query fails.

EXCEPTIONCODE—
A number from *0-255* that defines the error.

FAILURE

FINALHANDLINGCODE

PROTOCOLERROR

RECEIVED^P-ABORT

RECEIVED^U-ABORT

TIMEOUT

SD Only valid with a UGTT query. If present then the secondary UGTT database will be queried. Default is to query the primary database.

i Information digits, also called the originating station type. Identifies characteristics of the calling station (*0-99*).

j Originating line identity, also called the originating station type (0-99).

k Carrier selection information:

1— Presubscribed, no input.

2— Presubscribed, input.

3— Presubscribed, input or not.

4— Not presubscribed, input.

l The output from the test query when successful:

ALLOWCALL

COMPLETED-SUCCESS

ELAPSEDTIME#.#SECONDS

m Access type:

1— Switched access

n Input Service Provider (INSEPR) message Identification (ID) (*1-9*).

o Result of the query:

USDSDENYRESPONSE

USDSPROCEEDRESPONSE

USDSWAITFORINSTRUCTIONSRESPONSE

USDSINSTRUCTIONS

USDSEXCEPTION

p Exception which was encountered while processing the USDS test query:

1— 4ESS™ switch in overload no USDS query possible.

2— Not possible to send USDS query due to stream down.

3— Not possible to send USDS query due to CNI buffer overflow.

4— NOC initiated control on USDS point code caused query to USDS to not be sent, both point codes attempted.

5— Database initiated control on USDS point code caused USDS query to not be sent.

6— Query not sent to USDS due to point code or SSN out of service.

7— Query not sent to USDS due to fact that both point codes/SSNS not populated in ODA.

8— First query was sent to the USDS and a DF1 timeout occurred, other PC attempted but OOS.

9— First query was sent to the USDS and DF1 timeout occurred, other PC attempted but not present in ODA.

10— Timed out while waiting for a response from the first USDS, second query will be attempted.

11— Timed out while waiting for a response from the second USDS query.

12— Timed out waiting for SP response after USDS instructed 4ESS™ to wait for instructions.

13— Caller abandoned while waiting for a response from the first USDS query.

14— Caller abandoned while waiting for a response from the second USDS query.

15— Caller abandoned while waiting for instructions from the SP after being instructed to wait.

16— Received a request to disconnect call but the reply code parameter was not present, call allowed to proceed.

17— Received a request to disconnect call but the reply code parameter did not indicate 2ccp request, call allowed to proceed.

18— SWCAP parameter indicated route to ALA but ALA parameter was not present, call proceeds.

19— SWCAP parameter not present in invoke switch capabilities operation.

20— Unrecognized indicators set in switch capability parameter for an invoke SWCAP operation.

21— Invalid parameter received in PI SWCAP operation, call allowed to proceed.

22— The message type received was invalid for the USDS operation received.

23— Return error message received with error code of unrecognized error code.

24— Return error message received with error code of unused error code.

25— Return error message received with error code of unrecognized component sequence.

26— Return error message received with error code of erroneous contents.

27— Return error message received with error code of unavailable resource.

28— Return error message received with error code of missing customer record.

29— Return error message received with error code of spare.

30— Return error message received with error code of data unavailable.

31— Return error message received with error code of task refused.

32— Return error message received with error code of queue full.

33— Return error message received with error code of no queue.

34— Return error message received with error code of reply overdue.

35— Return error message received with error code of data already exists.

36— Return error message received with error code of unauthorized request.

37— Return error message received with error code of not queued.

38— Return error message received with error code of invalid.

39— Return error message received with error code of IDB miscellaneous problems.

40— Return error message received with error code of IDB vacant line.

41— Return error message received with error code of IDB vacant NXX.

42— Return error message received with error code of IDB processor overload.

43— Return error message received with error code of IDB non purchased NPA.

44— *Return error message received with error code of capabilities mismatch.*

45— Return error message received with error code of improper caller response.

46— Return error message received with error code of unexpected parameter.

47— Return error message received with error code of missing parameter.

50— DLN indicates unrecognized package type.

51— Incorrect transaction portion indicated by DLN.

52— Incorrect transaction portion indicated by DLN.

53— DLN indicates badly structured component portion.

54— DLN indicates unrecognized component portion.

55— General unrecognized component.

56— General badly structured.

57— DLN indicates incorrect component portion.

58— Incorrect component portion due to invalid number of components.

59— Incorrect component portion, invoke component.

60— Incorrect component portion, return error component.

61— Unrecognized error value in return error component.

62— Unrecognized operation code value in *aninvoke* component.

63— Invalid message length.

79— Incorrect component portion, return result component.

83— P-abort cause indicates unrecognized message type.

84— P-abort cause indicates unrecognized transaction ID.

85— P-abort cause indicates badly formatted transaction portion.

86— P-abort cause indicates invalid transaction.

87— P-abort cause indicates resource limit exceeded.

88— U-abort cause indicates application protocol violation.

89— U-abort cause indicates unknown user problem.

90— U-abort cause indicates caller abandon.

91— U-abort cause indicates return error message received.

92— U-abort cause indicates reject message received.

93— U-abort cause indicates timeout.

100— Reject message has invalid type.

101— Reject component - general, invalid.

102— Reject component - general, unrecognized component.

103— Reject component - general, incorrect component portion.

104— Reject component - general, badly structured component portion.

105— Reject component - invoke, invalid.

106— Reject component - invoke, duplicate invoke ID.

107— Reject component - invoke, unrecognized parameter.

108— Reject component - invoke, unrecognized operation.

109— Reject component - invoke, resource limitation.

110— Reject component - invoke, initiating release.

111— Reject component - invoke, unrecognized linked ID.

112— Reject component - invoke, unexpected linked response.

113— Reject component - invoke, unexpected linked operation.

114— Reject component - return result, invalid.

115— Reject component - return result, unrecognized invoke ID.

116— Reject component - return result, unexpected return result.

117— Reject component - return result, unrecognized parameter.

118— Reject component - return error, invalid.

119— Reject component - return error, unrecognized invoke ID.

120— Reject component - return error, unexpected return error.

121— Reject component - return error, unrecognized error.

122— Reject component - return error, unexpected error.

123— Reject component - return error, unrecognized parameter.

124— Received a message for which the CCID in the message did not correlate to an active USDS call.

125— Received USDS response or instruction message without CCID parameter.

126— Received USDS message for which CCID matched a TSN but TSN was not in busy to CR state.

127— Received USDS message for which the CCID did not correlate to a valid TSN.

128— Received a USDS message which did not contain a valid operation.

129— Received UNITDATA service message indicating general error.

130— Received a UNITDATA service message indicating signaling point code prohibited.

131— Received a UNITDATA service message indicating subsystem prohibited.

132— Received a UNITDATA service message indicating signaling point code congestion.

133— Received a UNITDATA service message indicating subsystem congestion.

134— Message returned by CNI, cause value invalid.

135— Message returned by CNI, message returned during data retrieval.

136— Message returned by CNI, blocked.

137— Message returned by CNI, overload congestion.

138— Message returned by CNI, unknown reason.

139— Message returned by CNI, ambiguous message.

140— Message returned by CNI, message not transmitted user part prohibited.

141— Message returned by CNI, MTP restricted route.

142— Message returned by DLN, unrecognized reason.

143— Message returned by DLN, no TSN translations present should not happen for USDS.

144— Message returned by DLN, invalid format from 1B.

145— Message returned by DLN, invalid CNI message type.

q Point code of the USDS to which the message was sent, or from which the response was received. The point code appears in the AT&T point code format, Network Region Cluster Member.

r Subsystem number of USDS to which the message was sent or from which the response was received.

s Local ANI digits. This should be 10 digits. These digits identify a Local Nodal customer.

t Carrier Identification Code. This must be a 4-digit number. These digits are used by the Number 2 Line Number Application For Consumers (2LAC)/ Network Control Point (NCP) databases for fraud detection.

u CI digits.

v Routing digits listed in the Alternate Number Translations (*ANT*) record.

w Domain listed in the *ANT* record.

x Service Indicator Code (*SIC*). listed in the *ANT* record.

y Foreign Administration Identity (*FAI*). code listed in the *ANT* record.

z Carrier Specific Routing (*CSR*). preference listed in the *ANT* record.

a1 Calling directory number.

4. **ACTION TO BE TAKEN**

If the test query is successful, no action is required if the expected operations were received as a result of the query to the database.

If the test query is not successful, the failure results indicate the trouble.

5. **REFERENCES**

PIDENTs
DSDCMESS
TCAPTEST

Input Message
TEST:TCAPDSD

Inband/Q.931 Signaling for Carrier Solutions Nodal Customers Feature (5918)

3

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Inband/Q.931 Signaling for Carrier Solutions Nodal Customers Feature (5918)

3

1. Feature Description

1.01 This feature allows AT&T to offer long-distance transport services to resellers that require a nodal access arrangement. Using existing capabilities, this feature builds on existing capabilities available on nodal trunk groups, which are obtained over the following trunk types: Private Branch Exchange (PBX) using Q.931 signaling, DTMF, MF or DP signaling. In addition, this feature provides for terminating POTS service by extending Terminating Switched Access Arrangements (TSAA) to Carrier Solutions Nodal (CSN) customers.

1.02 The network architecture for this feature is based on a new Trunk Sub-Group characteristic (TSG), CSN, which is used on PBX trunk groups to uniquely identify nodal trunk groups that require Carrier Solutions call processing.

Specific Feature Capabilities

1.03 This feature provides the following capabilities:

- All existing inband signaling and supervision options that are available for Type of Trunk (TOT) = PBX are available for CSN arrangements. In addition, Q.931 signaling options are also available.
- Nodal trunk groups supporting the CSN arrangement will be provisioned with the following Trunk Sub-Group (TSG) characteristics: CSN = RESELL or AIWS to trigger unique call processing, and ACCID = Access ID value of the carrier to append the Access ID Module (Module 908) to the call detail records.

- CSN trunks are provisioned with the subscribed services fields for MEGACOM® or SDN (MEGC=Y or SDNA = Y, respectively). When CSN = RESELL or AIWS, the *4ESS*™ switch overwrites the SST used in existing procedures for MEGACOM and SDN service with the existing Carrier Solutions SST value of RSLDS or a new SST value of AIWS. The SST will not be overwritten by a Service Processor response of other call processing.
- CSN = RESELL or AIWS will not cause vacant code treatment for originating Toll Free, 500, 700, 710 or 900 calls. This is controlled by FEN block settings.
- CSN = RESELL or AIWS causes routing treatment in accordance with the Network Access Interrupt and Directory Assistance Feature (5754) for NPA-555-1212 calls.
- When the TSG ACCID field is non-zero, Module 908 is appended to the call detail record created for the call, including Structure Codes associated with Call Code 309 for MEGACOM, 129 for SDN, 831 for TSAA and 905/906 for Universal Subscriber Data Structure (USDS).

1.04 This feature emulates the characteristics of the switched access AT&T Carrier Solutions Wholesale offer, which provides the following capabilities:

- Support for voice and voice band calls (data calls not supported) —These are controlled through trunk group administration. Carrier Solutions Nodal (CSN) trunk groups use either MEGACOM or Software Defined Network (SDN) as the base service.
- Support for direct-dialed domestic and international long distance calls—These capabilities are included with MEGACOM and SDN services.
- Support for inbound toll free and POTS calls—This feature provides for terminating POTS service by extending TSAA to CSN customers.
- Provide for account code and authorization code features on outbound calls—These capabilities are included with MEGACOM and SDN services.
- Avoid AT&T branded announcements.
- Avoid Automatic Number Identification (ANI) Trigger Table screening.
- Provide for fraud control and monitoring—This feature builds on the capabilities already available with MEGACOM and SDN services.
- Support for Network Access Interrupt (NAI) to deny access to the network due to fraud or non-payment.
- Utilize Service Identity Index (SII) values to uniquely identify Carrier Solutions Calls—Carrier Solutions SII values are derived even though the base nodal service is MEGACOM or SDN.
- Avoid *AT&T TrueVoice*® Enhancements.

- Route Directory Assistance (DA) Calls to an unbranded DA platform and Avoid Directory Link.
- Provide Vacant Code treatment for outbound toll free, 500, 700, 710, and 900— This capability is accomplished through Far End Network (FEN) block administration.
- Route Call Detail Records to the Carrier Solutions billing system— This capability is provided by this feature.

Interactions With Other Features/Services

A. Number Portability (LNP)

1.05 For CSN calls, Number Portability (LNP) call processing on the dialed number is required to determine its Location Routing Number to route the call to termination. LNP call processing is not required on the ANI for CSN calls because it is not provided in call processing. Recording is invoked at the originating AT&T switch for CSN calls, and LNP modules will be appended as per LNP procedures. No new requirements were needed to address the interactions between LNP and this feature.

B. Fraud Detection (NetPROTECT)

1.06 AT&T NetPROTECT service provides fraud monitoring for nodal services through Toll Fraud Early Detection System (TFEDS) screening of call detail records. Some TFEDS functions are performed at the Global Fraud Management System (GFMS). Both TFEDS and GFMS are impacted by this feature. The NetPROTECT-like functions were modified to associate, through the value of the Access ID, potential fraud cases on CSN call detail records with the specific Carrier Solutions customer.

C. *AT&T TrueVoice*®

NOTE:
The following information does not apply if *AT&T TrueVoice* is removed from the AT&T Network by mid-1998, as planned.

1.07 The *4ESS* switch uses CSCR Phase II capabilities to support the option of avoiding *AT&T TrueVoice* for RESELL traffic. This is achieved by CSCR routing based on the SII values for RESELL traffic terminating domestically or internationally.

1.08 The *AT&T TrueVoice* Plus enhancements are not provided to CSN calls.

1.09 This feature allows CSN calls to be mapped as follows:

- To the existing SII values (91,92) for Carrier Solutions Platform, or
- To a new set of wholesale SII values (95,96).

By allowing CSN calls to be mapped to the same SII values used for other Carrier Solution Platform calls, *AT&T TrueVoice* avoidance is accomplished in the same manner as for other Carrier Solutions Platform calls. In addition, the processes used for forecasting capacity needs for *AT&T TrueVoice* avoidance for wholesale traffic are directly applicable to this feature.

D. Universal Subscriber Data Structure Supported Features

1.10 The Universal Subscriber Data Structure (USDS) project deploying 2CCP/NCP service processors that are part of the toll-specific call flow prior to this feature. The originating AT&T *4ESS* switch determines if a call is eligible for a USDS query, using existing procedures. The 2CCP/NCP determines which features to apply to the call and sends call handling instructions to the *4ESS* switch.

1.11 The *4ESS* switch queries a 2CCP/2NCP if it finds a match in the ANI-TT with the USDS query indicator set. Because the billing number of the CSN customer is not provisioned in the ANI-TT, there is no feature interaction.

E. Segmentation Directory (SD)

1.12 Segmentation Directory (SD) will be implemented in multiple phases. The current plan calls for transitioning Carrier Solutions, both switched access and nodal, in Segmentation Directory Phase 3, which will be implemented in multiple *4ESS* switch generic releases. Since this feature builds on the use of MEGACOM and SDN as underlying service capabilities, and since both will be transitioned to the Segmentation Directory prior to SD Phase 3, this feature includes capabilities that avoid interaction with the Segmentation Directory prior to the planned transition of Carrier Solutions in the SD Phase 3 time frame. Specifically, this feature prevents the *4ESS* switch from generating SD queries for CSN calls, and causes the *4ESS switch* to ignore any SD response that it may receive.

F. Network Access Interrupt

1.13 The Network Access Interrupt (NAI) for Direct Connect Calls Feature (5670) generates NAI queries for all MEGACOM service calls, including calls over CSN trunk groups using MEGACOM as the base service, which originate through the switch. This feature does not deny the queries for CSN trunk groups, and there is no intent to enter CSN billing numbers into 2LAC/2NCP to block CSN calls during real time call processing. Manual provisioning can be used to remove the CSN TSG from service, in order to deny access to the AT&T Network.

1.14 The NAI Call Redirection Feature (5460) does not apply when NAI is used for MEGACOM service; this can be accomplished via the provisioning process.

G. Directory Assistance and Directory Link Services

NOTE:
The overlay of the routing number for CSN or Switched Access Wholesale (Resell) DA calls will not occur until after any necessary screening.

1.15 Directory Assistance (DA) can be received by dialing 1+NPA+555+1212 from a nodal location. Directory Link Services provides call completion for the number requested when dialing 1+NPA+555+1212. Because each of these dialing sequences results in an AT&T branded announcement, the *4ESS* switch provides DA calls that originate over CSN trunk groups, as defined in the Network Access Interrupt and Directory Assistance Feature (5754). Feature 5754 is included with the Directory Assistance Resell Feature (5198), which was introduced in 4E21 and is documented in the *4ESS* Switch Product Release Document, 234-090-221AC.

1.16 Calls identified as both a Carrier Solutions and a DA call are routed by Feature 5754 via a Special Service Code (191-554-1212), which is different from the routing treatment for AT&T end-customer originated DA calls. With Special Service Code treatment, the calls are routed to a DA platform that is specifically configured to provide unbranded DA service for Carrier Solutions customers.

1.17 This feature does not provide Directory Assistance call completion (which is similar to Directory Link Service).

H. Universal International Freephone Number (UIFN)

1.18 This feature will not specifically deny Outbound Universal International Freephone Number (UIFN) calls over CSN access arrangements. If a CSN customer is provisioned with MEGACOM, the customer will be denied UIFN calling if the customer is not subscribed to international calling. If the customer is capable of dialing UIFNs, the *4ESS* switch will use existing call processing. However, the switch will not identify the call as a RESELL call; this is accomplished administratively, since UIFN numbers are mapped to a Dialed Number Service Type of INWATS or DNST4, and these values are not included in the mapping of the Carrier Solutions SII values. RICS routes these calls to the billing process defined by the UIFN feature, and does not send the information to the Carrier Solutions billing system.

I. Federal Government Services

1.19 AT&T currently provides Government Emergency Telecommunication Service (GETS) and Special Routing Arrangement Service (SRAS) to the federal

government. These services are identified in the AT&T Network by an NPA of 710. The Far End Network (FEN) Block on the CSN TSG is provisioned to block dialed numbers with an NPA of 710.

J. Universal T1.5 Access

1.20 This feature does not support UTA for CSN customers. This access is accomplished through administration. The CSN billing number will not be provisioned in the *4ESS* switch True Billing Number table for CSN trunk groups, and a vacant code will be applied per existing procedures.

2. Call Flow

Carrier Solutions Nodal Access Arrangement

2.01 As shown in Figure 3-1, the CSN customer can originate direct-dialed domestic or international long distance calls into the AT&T network. The CSN trunk group at the originating AT&T switch is provisioned for either MEGACOM or SDN service (using existing procedures). Necessary Carrier Solutions characteristics are triggered on originated calls by provisioning of the CSN field on the nodal TSG.

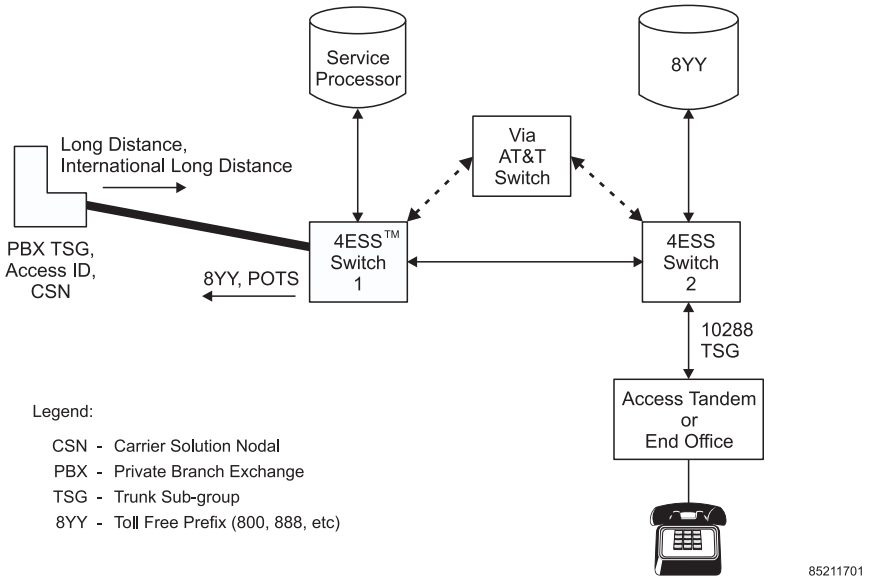

Figure 3-1. Carrier Solutions Nodal Network Access Configuration

2.02 The CSN customer may also receive 8YY or POTS calls on the nodal trunk group, if it is provisioned for the Switching Administration Support System (SASS) or Terminating Switched Access Arrangements (TSAA). For both originating and terminating calls to the CSN customer, recording information is directed to the Carrier Solutions billing system by the presence of an Access ID Module (Module 908), which is created by provisioning the Access Identification field on the nodal TSG.

Originating Call Flow

2.03 Calls originated by CSN customers are identified as CSN, which is a new nodal trunk group parameter for PBX trunk sub-groups (TSG). With this information, the AT&T network applies the Carrier Solutions to the MEGACOM or SDN call. The Access Identification TSG field is used to identify calls that originate on Carrier Solutions nodal TSGs in the downstream billing systems.

2.04 The call flows for calls dialed to domestic termination and calls dialed to international termination are described below. The type of signaling (inband: DTMF, MF or DP) or (out-of-band: Q.931) does not change the call flow.

Calls Dialed to Domestic Termination

1. The calling party dials a 1+7/10-digit North American Numbering Plan (NANP) number.
2. The call arrives at the originating AT&T switch (OAS), and the OAS determines if it is a CSN call as follows:
   - The OAS checks the setting of the office parameter that turns this feature ON or OFF. If it is set to OFF, the OAS proceeds with existing call processing for the call. This ends this call flow description. Normal call processing applies.
   - If this feature is turned ON, the OAS checks the value of CSN to identify the call as CSN.

     NOTE:
     The value of CSN is not passed in the trunk to Service Now (SNOW-T), which derives the CSN value from the new Trunk Type Modifier (TTM) for CSN TSGs.

   - If the trunk group parameter CSN is set to RESELL or AIWS (AT&T International Wholesale Service), the call is identified as CSN. Proceed to Step 3.

- If the CSN field is not present in the trunk group parameter or if CSN is set to None, the OAS proceeds with existing call processing. This ends this call flow description. Normal call processing applies.

3. The OAS determines that the call requires either MEGACOM or SDN call processing as a function of the CSN trunk group characteristics, and proceeds with standard call processing for the identified service.
4. The OAS performs screening, digit analysis and query actions that apply to either MEGACOM service or SDN, as follows:

   NOTE:
   An SDQuery message is not generated by the *4ESS* switch.

   - If the dialed/routing number is a toll-free, 500, 700, 710 or 900 number, the OAS applies vacant code, based on FEN block administration. **End of Call Flow.**
   - If the service is MEGACOM and the dialed number is NPA-555-1212, or if the service is SDN and the routing number returned from the 2DSA/2NCP query is NPA-555-1212, the number is overlaid with the Carrier Solutions DA routing number (as specified by Feature 5754). The call is routed to the unbranded Carrier Solutions DA platform.
   - If the dialed/routing number is a valid number for the service, call processing and routing continues per standard MEGACOM or SDN procedures, including the actions of features that may be active on the service for the customer.

5. For CSN calls, and if the CSN field equals RESELL, the OAS overwrites the Signaling Service Type (SST) of OMEG or SDN to the value of SST21 (RSLDS). If the CSN field equals AIWS, the OAS overwrites the SST of OMEG or SDN to the value of SST22 (RSLDS) defined for AIWS as follows:
   - Calls with the SST value of SST21 (RSLDS) receives basic long distance service. The *4ESS* switch sets the SII value of 91 (LDS RESELL), which is based on the Class of Service (COS) parameters TORIG=NODAL, TDEST=LEC, SST=SST21, and DNST=UNAS. The Transport Capability of RESELL traffic is the existing value for voice, and the Routing Pattern Index (RPI) is the existing value of 1 used for non-key voice traffic.
   - Calls with the new SST value of SST22 (AIWS) will receive basic long distance service. The *4ESS* switch sets the SII value of 95 (LDS RESELL), which is based on the Class of Service (COS) parameters TORIG=NODAL, TDEST=LEC, SST=SST22, and DNST=UNAS. The Transport Capability of RESELL traffic is the existing value for voice, and the Routing Pattern Index (RPI) is the existing value of 1 used for non-key voice traffic.

6. The OAS appends Module 908 to the recorded MEGACOM or SDN Structure Code, to reflect the Access ID value administered on the CSN trunk group.

Calls Dialed to International Terminations

1. The calling party dials 011+CC+NN or 1+NPA-NXX-XXXX, where the NPA or NPA-NXX is for an International World Zone 1 destination. (Calls to Canada and countries in the Caribbean area are international calls that fall within NANP.)
2. The call arrives at the OAS, and the OAS determines if it is a CSN call as follows:
   - The OAS checks the setting of the office parameter that turns this feature ON or OFF. If it is set to OFF, the OAS proceeds with exiting call processing for the call. Normal call processing applies. **End of Call Flow.**
   - If this feature is turned ON, the OAS checks the value of the CSN parameter to identify the call as CSN.

     NOTE:
     The value of CSN is not passed in the trunk to Service Now (SNOW-T), which derives the CSN value from the new Trunk Type Modifier (TTM) for CSN TSGs.

   - If the trunk group parameter CSN is set to RESELL or AIWS, the call is identified as CSN. Proceed to Step 3.
   - If the CSN field is not present in the trunk group parameter or if CSN is set to None, the OAS proceeds with existing call processing. Normal call processing applies. **End of Call Flow.**
3. The OAS determines that the call requires either MEGACOM or SDN call processing. The OAS proceeds with standard call processing for the identified service.
4. The OAS performs screening, digit analysis and query actions that apply to either MEGACOM or SDN with the exception that an SDQuery message is not generated.
5. For CSN calls, and if the CSN field equals RESELL, the OAS overwrites the SST of OMEG or SDN to the value of SST21 (RSLDS). If the CSN field equals AIWS, the OAS overwrites the SST of OMEG or SDN to the value of SST22 (RSLDS) defined for AIWS, as follows:
   - Calls with the SST value of SST21 (RSLDS) receive basic international long distance service. The *4ESS* switch sets the SII value of 92 (ILDS OUTBOUND RESELL), which is based on the COS parameters TORIG=NODAL, TDEST=ISC or IWZ1, SST=SST21, and DNST=UNAS. The Transport Capability of RESELL traffic is the existing value for voice, and the RPI is the existing value of 2 used for international long distance

outbound traffic, and the End-to-End Class of Service RPI (ERPI) is the existing value of 33 used for non-key international voice traffic.

- Calls with the new SST value of SST22 (AIWS) receive basic international long distance service. The *4ESS* switch sets the SII value of 96 (ILDS OUTBOUND RESELL), which is based on the COS parameters TORIG=NODAL, TDEST=ISC or IWZ1, SST=SST22, and DNST=UNAS. The Transport Capability of RESELL traffic is the existing value for voice, and the RPI is the existing value of 2 used for international long distance outbound traffic, and the End-to-End Class of Service RPI (ERPI) is the existing value of 33 used for non-key international voice traffic.

6. The OAS will append Module 908 to the recorded MEGACOM or SDN Structure Code, to reflect the Access ID value administered on the CSN trunk group.

Terminating Call Flows

2.05 This feature does not introduce any terminating call flow changes. There are changes at the Terminating AT&T Switch (TAS), and they are described in the Recording section of this chapter.

3. Provisioning

NOTE:
This feature relies on administration of the FEN block to control the treatment of Toll Free, 500, 700, 710 and 900 calls that are placed when TOT = PBX and CSN = RESELL or AIWS. This avoids the need for the *4ESS* switch to apply vacant code treatment as a function of a TSG field setting.

The overlay of the routing number for CSN or Switched Access Wholesale (Resell) DA calls will not occur until after any necessary screening.

Recent Change Form 809

3.01 This feature is activated by populating the FEATURE ITEM field on Recent Change (RC) Form 809 with PF52 and entering ON in the ON or OFF field. CSN processing is off when the ON or OFF field is populated with OFF.

3.02 Verify Forms 16az (input) and 8j (output) provide verification.

Signaling Service Type

3.03 This feature creates a new spare Signaling Service Type (SST22) item for AT&T International Wholesale Service (AIWS). Item SST22 is already associated with RC Forms 338, 640 and 642, and with Verify Forms 16ai, 3ah, 6ap and 6ba. There are no changes to these forms.

Trunk Sub-Group Recent Change Forms

3.04 A new field, CSN, has been added to TSG RC Forms 100, 101, 102, 107, 108 and 109 to support this feature. The CSN field is used to identify a CSN type of customer and can be populated with the following values:

Blank: A non-CSN customer (default value).

RS: A Resell CSN customer

AW: An AT&T International Wholesale customer.

3.05 As noted above, the valid CSN field entries, other than the default blank, are RS or AW. The RS and AW entry will be accepted only if either of the following checks is true:

- For 1-way incoming and 2-way TSG RC Forms:
  - — The Trunk Block Type of Trunk (TOT) field is equal to PBX and the Incoming Signaling Characteristic (ISC) field is either DPDDSD, DPIMMED, DTMFWK, DTS, MFDDSD or MFWINK.
  - — Or, if the TOT field is equal to PBX and the ISC field is equal to Q931 and the Primary Rate Interface Type (PRIT) field is equal to TSGPBX.
- For 1-way outgoing and 2-way TSG RC Forms:
  - — The Trunk Block TOT is equal to PBX (Private Branch Exchange) and the Outgoing Signaling Characteristic (OSC) field is either DPDDSD, DPIMMED, DPWINK, DTMFWK, ICOPNOP, MFDDSD, MFWINK, or MIOPNOP.
  - — Or, if the TOT field is equal to PBX and the OSC field is equal to Q931, and the PRIT field is equal to TSGPBX.

3.06 This feature enables a PBX type of trunk, associated with CSN customers, to store and identify a Carrier ID, but this field is not required to set the CSN field to RS or AW.

3.07 The CID field is verified by input Verify Form 11d and output Verify Forms 1a, 1b and 1c.

4. Recording

4.01 The *4ESS* switch and the CDRP will append the Access ID Module (Module 908) to all calls if the ACCID field on the TSG is non-zero.

4.02 If the CSN customer is subscribed to TSAA and receives a TSAA call, the terminating AT&T switch and the CDRP will append Module 908 to the recorded TSAA Structure Code (Call Code 831) to reflect the Access ID value administered on the CSN trunk group.

Recorded Information Collection System (RICS)

4.03 The Recorded Information Collection System (RICS) processes Module 908 for Call Codes 309 and 129, and when it recognizes an Access ID value of CARSOL, it sends the associated MEGACOM service, SDN and/or TSAA records to the Carrier Solutions billing system.

4.04 RICS processes Module 908 for Call Code 831.

4.05 RICS process Module 908 for Structure Codes 905 and 906, and it sends the records to IMPS without Module 908.

5. Network Management (Not Affected)

6. Maintenance/Troubleshooting (Not Affected)

7. Transition Considerations

Feature Dependencies

7.01 This feature is dependent on the following related features:

- Carrier Solutions CIC Based Determination (5198)
- Carrier Solutions CIC Based Determination NAI and DA Support for Resell Calls (5754)
- Carrier Solutions 1+CIC Wholesale Features, Phase 1 (5840).

Deployment Requirements

7.02 It is not necessary for all *4ESS* switches in the network to be running the 4E23 Release 2 Generic for this feature to be fully operational.

Feature Activation

7.03 This feature is activated or deactivated as described in the Provisioning section of this chapter.

7.04 This feature can also be turned on or off by an absolute word change. Item OD4PF52 in the OD4OFCCOPY2 structure is the office parameter that controls the on/off state of this feature.

CAUTION:
The OD4OFCCOPY2 structure also contains the on/off bits for many other features. Be certain that any changes you make affect only this feature.

7.05 The following information can be used to turn this feature on or off using the absolute word change:

- Structure: OD4OFCCOPY2
- Core address in 4E23 Generic: 7126222
- Size of OD4PF52: 1
- Displacement: 3
- On: 1
- Off: 0.

8. Input/Output Manual Pages (Not Affected)

Modification Request to DECOS—New Remote Link Interface and Route Control Feature (6137)

4

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Modification Request to DECOS—New Remote Link Interface and Route Control Feature (6137)

4

1. Feature Description

1.01 This feature is a Modification Request (MR) to the *Domestic End to End Class of Service (DECOS) Feature 4904*. This MR changes the DECOS feature as follows:

- Allows the *4ESS*™ switch to identify DECOS routing list based on Routing Data Block Index (RDBI) derived in number translation
- Introduces a new Network Management (NM) control, Route Cancel From option for NM Route Control, which cancels calls after a trunk could not be hunted to a particular route
- Prevents non-DECOS traffic from taking trunks by introducing proper bandwidth management on the DECOS routes
- Allows Alternate Signaling Transport Network-Network Interconnect (ASTN NI) and DECOS to work together when ASTN NI is available
- Enhances DECOS to follow the existing rules created by Local Number Portability (LNP) and currently used during hierarchical routing. These rules specify which digits (ported number vs. called number) should be sent to the LEC and which prefix/delete rules should be followed.

Background

1.02 The following is the feature description of *Domestic End to End Class of Service (DECOS) Feature 4904*. DECOS allows customers to specify how the trunk capacity should be allocated between the *4ESS* switch and a Local Exchange Carrier (LEC) switch (end office or access tandem) or between the *4ESS* switch and the customer switching equipment for different services. This includes traffic for both incoming and outgoing directions. Integrated trunk reservation ensures that each of these services gets as much of their allocation as they need. Capacity not needed by one service can be made available to other services that are seeing loads over their current allocation.

1.03 The primary application of DECOS in the AT&T Switched Network (ASN) is for ingress/egress routing. The ingress/egress portion of the network is where the AT&T switches connect to the LEC switches. DECOS improves the efficiency of trunk usage and protects levels of service to individual end offices.

1.04 The DECOS includes the following capabilities:

- Class of Service Concepts
  - — Trunk sharing among services
  - — Virtual networks
  - — Bandwidth management.
- Real-Time Network Routing Concepts
  - — Non-hierarchical selection of via routes, based on real time load
  - — Increased numbers of via routes can be handled.
- Automatic Provisioning.

1.05 The DECOS is based on two previous features, International End to End Class of Service (IECOS) and Class of Service/Real Time Network Routing (COS/RTNR). These features allowed the inter-toll networks and international networks to convert to a fully integrated, multi-service network.

1.06 The three main changes from ECOS to DECOS are the following:

- Expansion of number AREAS to 1023
- Provisionable DEL/PREFIX rules for alternate and overflow routes
- Allowing ECOS calls to use Forced InterToll Routing (FITR) when applicable.

2. Call Flow

2.01 The DECOS feature may affect both incoming calls and outgoing calls. Incoming calls that arrive on trunks marked for the DECOS feature may be blocked as a means of balancing traffic loads among competing traffic streams. Outgoing calls routed using DECOS may use a route chosen from a list of possible routes and may be selectively blocked. This incoming call flow is not affected by this MR.

Incoming DECOS Call Flow

2.02 The following is the incoming DECOS call flow:

(1) The Service Identity (SI) and Transport Capability (TC) of the call are determined.

(2) The Trunk Sub-Group (TSG) of the Incoming Trunk (ICT) checks to see if it belongs to an ECOS route.

(3) The AREA of the call is derived from the far-end area marked on the TSG.

(4) The SI, TC, and direction are mapped to an ECOS Routing Pattern Identity.

(5) Current traffic status of call load on calls origination route is checked.

(6) If there is unreserved idle capacity or the call is using capacity reserved for its ECOS Routing Pattern Identity (ERPI), then traffic parameters for the route are updated to reflect new traffic status. Call processing continues with digit translation.

(7) If the call is using capacity reserved for another ERPI, then the call is blocked. Call processing continues with final handling treatment for the call.

Outgoing DECOS Call Flow

2.03 The following is the outgoing DECOS call flow:

(1) The SI and TC of the call are determined.

(2) Translation of routing digits for the call identifies an Multiple Routing Treatment Table (MRTT). It can also be triggered by a Routing Data Block (RDB).

(3) The destination AREA of the call is determined by the far-end area of the first TSG of the first Routing Data Block (RDB) of the MRTT, or the first TSG of the RDB.

(4) The SI, TC, and direction are mapped to an ERPI.

(5) The destination AREA is used to determine the alternate routes. These alternate routes are provisioned with recent change form 526.

(6) The alternate routes are determined by the RDB generated route list. If an alternate 1 RDB generated route list is available, alternate 1 routes provisioned with recent change form 526 will not be used.

(7) An ECOS route is derived from the MRTT, if applicable, and the ECOS Route List.

(8) If the next route is allowable based on the ERPI value of the route and the route status, then the route is tried in Step 9. Otherwise, a load balancing algorithm is applied to each route in turn to determine whether idle capacity exists that may be used by the call.

(9) A route is found with idle capacity for the ERPI of the call. Then a search is made for a TSG with idle capacity that also supports circuit selection capabilities indicated. These are indicated by the circuit selection capability preference levels of the call. If one is found, then the call is routed on a trunk in this TSG and parameters are updated to reflect new traffic on the route. If no such TSG is found, then trunk hunt continues with the next route on the list.

(10) If no route is found with idle capacity for the ERPI of the call, then the call is treated with normal egress busy processing.

3. Provisioning

Office Data Assembler (ODA) Structures

A. HT4ECS_RDB

3.01 This is a new structure that is indexed by Routing Data Block Indices (RDBIs) to point to alternate 1 route lists generated by the RDB.

B. HT4ECS_ARL

3.02 Alternate 1 RDB generated routes for DECOS are added to this structure.

Recent Change Forms Affected

3.03 The TSG and RDB recent change forms automatically build ECOS alternate route lists. TSG forms 107 and 109 issue a warning if the alternate route lists are not entirely built. If this warning is issued these forms need to be reentered.

A. RC Forms 107, 109

3.04 These forms change characteristics of an existing TSG and can also end up adding, changing, or deleting ECOS areas.

B. RC Form 500

3.05 This form is modified to define a new domestic RDB and build RDB Alternate Routing Lists.

C. RC Forms 505,513

3.06 Form 505 adds a Trunk Sub-Group (TSG) to a domestic RDB. Form 513 updates many RDBIs at a time following form 505 rules.

D. RC Forms 508,514

3.07 Form 508 deletes a TSG in a domestic RDB. Form 514 updates many RDBIs at a time following form 508 rules.

E. RC Form 510

3.08 This form deletes a domestic RDB or a RDB Alternate Routing List if it exists.

4. Recording (Not Affected)

5. Network Management

Network Management Operations Support (NEMOS)

5.01 Modified NEMOS messages include the following:

- MSG 79 (ECOS Route Based Cancel/Skip Data)

  The Control Option (CO) field grows from 1 to 2 bits with the following states assigned:

  — 0 = Route Skip

  — 1 = Route Cancel-To

— 2 = Route Cancel-From

— 3 = Invalid.

- MSG 118 (ECOS Route Controlled Calls Data)

  The Control Option (CO) field grows from 1 to 2 bits with the following states assigned:

  — 0 = Route Skip

  — 1 = Route Cancel-To

  — 2 = Route Cancel-From

  — 3 = Invalid.

- MSG 140 (Global Control Removal Request)

  One new field is added and one existing fields definition changes:

  — Bit 4 added for ECOS Route Cancel-From

  — Bit 1 changed to ECOS Route Cancel-To from ECOS Route Cancel.

- MSG 169 (ECOS Route Skip Cancel Control).

  The Control Option (CO) field grows from 1 to 2 bits with the following states assigned:

  — 0 = Route Skip

  — 1 = Route Cancel-To

  — 2 = Route Cancel-From

  — 3 = Invalid.

5.02 New NEMOS messages for this feature are the following:

- MSG 78 (ECOS RDB-derived Destination Routing List Data)
- MSG 117 (DECOS RDB Call History Data).

6. Maintenance/Troubleshooting (Not Affected)

7. Transition Considerations

Deployment Requirements

7.01 It is not necessary for all *4ESS* switches in the network to be running the 4E23 Release 2 Generic for this feature to be fully operational.

Feature Activation

7.02 This feature is turned on automatically by software deployment. This feature will not affect ingress/egress routing until an AREA is defined and activated on the TSG.

8. Input/Output Manual Pages (Not Affected)

4ESS™ Switch AT&T Digital Link Location Routing Number Capabilities Feature (6330)

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4ESS™ Switch AT&T Digital Link Location Routing Number Capabilities Feature (6330)

5

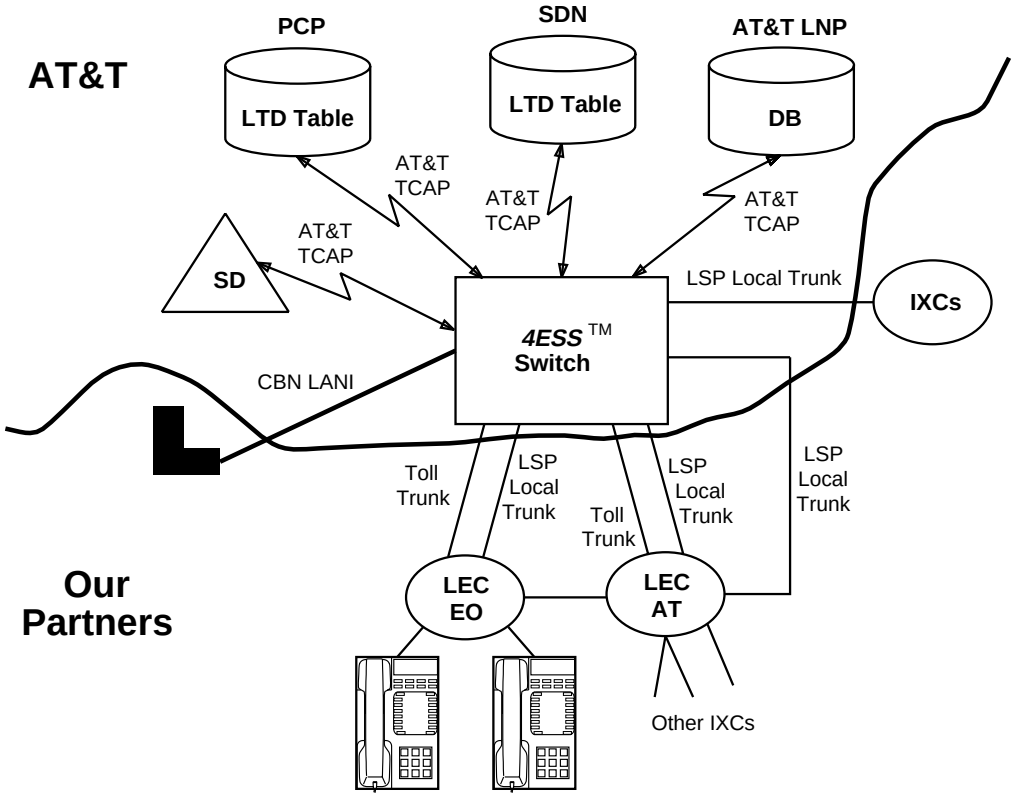
1. Feature Description

Description

1.01 This feature improves the call processing time of local calls to Digital Link customers in a Location Routing Number (LRN) environment. The calls are received over a new type of trunk identified as LSP LOCAL (TOT = LSP_LOCAL), which is used to carry local traffic. The improvement in call processing time is accomplished by providing the *4ESS*™ switch with the capability of recognizing and routing on LRNs, thus eliminating the need to do a Local Number Portability (LNP) database dip on every call received from the Local Service Provider on local trunks. This feature creates an LRN module for billing Interexchange Carriers (IXCs) and Local Service Providers (LSPs) to provide LNP processing on default routed calls. For Digital Link LRN architecture, see Figure 5-1.

1.02 This feature introduces end office capabilities that allow the *4ESS* switch to comply with the Illinois End Office Switching Generic Requirements. The *4ESS* switch End Office (EO) LRN capabilities include the following:

- Recognizing its own LRN or the LRN of another *4ESS* switch
- Performing LNP processing for default routed calls



Legend:

AT	-	Access Tandem
CBN	-	Connectng Network Access Billing Number
DB	-	Data Base
EO	-	End Office
IXC	-	Interexchange Carrier
LANI	-	Local Automatic Number Identification
LEC	-	Local Exchange Carrier
LNP	-	Local Number Portability
LSP	-	Local Service Provider
LTD	-	Local Toll Differentiation
PCP	-	Positive Call Processing
SD	-	Segmentation Directory
SDN	-	Software Defined Network
TCAP	-	Transaction Capabilities Application Part
TOT	-	Type of Trunk

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Figure 5-1. *4ESS* Switch Digital Link LRN Architecture

- Creating an Automatic Message Accounting (AMA) record to charge carriers for performing default LNP processing
- Generating an American National Standards Institute (ANSI) Cause Code 26 to terminate a misrouted call.

Related Features and Documentation

1.03 Previous features related to this feature are listed in Table 5-A. This Table provides a reference for more detailed information about earlier related features mentioned in the *Background* section as well as other sections in this document.

Table 5-A. Related Features and Documentation

Feature Number	Product Release Document	Product Release	Feature Title
4216	234-090-223AC	4E22 Release 3	Number Portability With Location Routing Number
5370	234-090-222AC	4E22 Release 2	Local Service for Nodals - Phase I
5371	234-090-223AC	4E22 Release 3	4E Local for Nodal Customers - Phase II
5371a	234-090-224AC	4E22 Release 4	4E Local for Nodal Customers - Phase II

Background

1.04 The first phase of the *4ESS* switch Digital Link service was developed in Feature 5370 where the *4ESS* switch responded to and generated Circuit Validation Test message parameters as if it were a local switch.

1.05 As a result of Feature 5371, customers were allowed to originate and terminate local calls from their Private Branch Exchange (PBX) to the AT&T network. When a call was originated, the Positive Call Processing (PCP) or Software Defined Network (SDN) database was queried to determine if the call was a toll call or a local call. The indication was returned from the Network Control Point (NCP) to the *4ESS* switch for digit routing for the local calls.

1.06 To allow customers to change their local service providers and keep their geographic telephone numbers, Feature 4216 provided Number Portability. This feature allowed limited location portability within a rate center where the customers could keep their numbers as long as they did not move out of their rate centers.

1.07 The previously mentioned toll features enabled AT&T to introduce local service in an LRN environment for *4ESS* switch Digital Link service, but the toll implementation did not include specific LRN end office switching capabilities. This feature introduces end office capabilities that continue to use the AT&T Toll LNP database to obtain ported number information for call processing. The *4ESS* switch is assigned LRNs and performs LNP processing for local calls.

1.08 An LRN is an identifier of an LSP End Office. The LRN has a 10-digit number format (NPA-NXX-XXXX) and the first six digits are uniquely assigned in the Local Exchange Routing Guide (LERG) to the end office. A 6-digit translation on the NPA-NXX of the LRN results in routing calls to the LSP End Office. When the *4ESS* switch acts as an End Office switch, it is assigned two LRNs per Local Access Transport Area (LATA) served.

AT&T Digital Link Network Capabilities

1.09 The *4ESS* switch Digital Link Network is capable of the following:

- Originating local and toll-free calls from nodal customers who have the 10-digit CBN_DIGS field populated with a geographic Automatic Number Identification (ANI) called Local ANI (LANI) on the nodal trunk group.

NOTE 1:
The LANI is a valid North American Numbering Plan (NANP) number that represents the geographic location of the *4ESS* switch AT&T Digital Link customer. The LANI, which is found on the Trunk Sub-Group, may be equal to the billing number or Wide Area Telecommunications Service (WATS) billing number if it conforms to the NANP point type. This feature needs LANI for use as an NANP number for delivery to an LSP, and it is used to query the industry toll-free database for toll-free calls from the *4ESS* switch AT&T Digital Link customers. The LANI is also used to differentiate between local and toll in the Number 2 Network Control Point (2NCP) and the Number 2 Direct Services ANI (2DSA).

NOTE 2:
An LSP is the provider of local access functionality to the end customer. The LSPs are synonymous with Local Exchange Carriers (LECS), Alternative Local Exchange Carriers (ALECSs), Certified Local Exchange Carriers (CLECs), Competitive Access Providers (CAPS), Community Antenna Television (CATV) companies, and other terms that may be used to refer to providers of local access. AT&T is the LSP for a *4ESS* switch AT&T Digital Link customer.

- Differentiating between local and toll calls with the SDN and Positive Call Processing (PCP), and providing routing instructions back to the originating *4ESS* switch
- Originating and terminating local calls between *4ESS* switch AT&T Digital Link customers
- Terminating local calls over a local Trunk Sub-Group (TSG) to a Local Service Provider on a LSP LOCAL trunk (TOT = LSP_LOCAL). The LSP LOCAL trunk is a new type of trunk used to carry local traffic as follows:
  - — Originating and terminating local calls between LSP end offices or tandems and the *4ESS* switch
  - — Providing Toll-free traffic from the *4ESS* switch AT&T Digital Link customers to the LSP tandem which performs the toll free service portability determination (using a set of dedicated LSP LOCAL trunks)
  - — Terminating toll calls from IXCs to the *4ESS* switch AT&T Digital Link customers over direct connect trunks or by way of LSP tandems.
- Signaling with Local Exchange Carriers (LECS) for local calls
- Backhauling non-AT&T and multi-carrier toll-free calls to the LSP on separate TSGs of the LSP LOCAL trunks
- Acting as a terminating switch for local calls which the LSP or IXC need to terminate to the nodal customer.
- Recognizing two Common Language Location Identifiers (CLLIs); one for toll capabilities and one for local capabilities
- Terminating local calls to the Terminating Switch Access Arrangement (TSAA) and Access Value Arrangement (AVA) access providers. These access providers are not *4ESS* switch AT&T Digital Link customers using TSAA/AVA capabilities with possible overflow to LSPs over local TSGs, that is, LSP LOCAL trunks. For TSAA/AVA access providers who are *4ESS* switch AT&T Digital Link customers, there is no overflow path.
- Creating access AMA records to bill the IXC/LSP for access charges.

2. Call Flow

2.01 The following typical Call Flow scenarios are provided for outbound calls and terminating calls for this feature. To make the call flow easy to follow, each numbered step in the call flow procedures is also shown as a circled number in the associated call flow figure.

Outbound Local LRN Call From a *4ESS*™ Switch AT&T Digital Link Customer

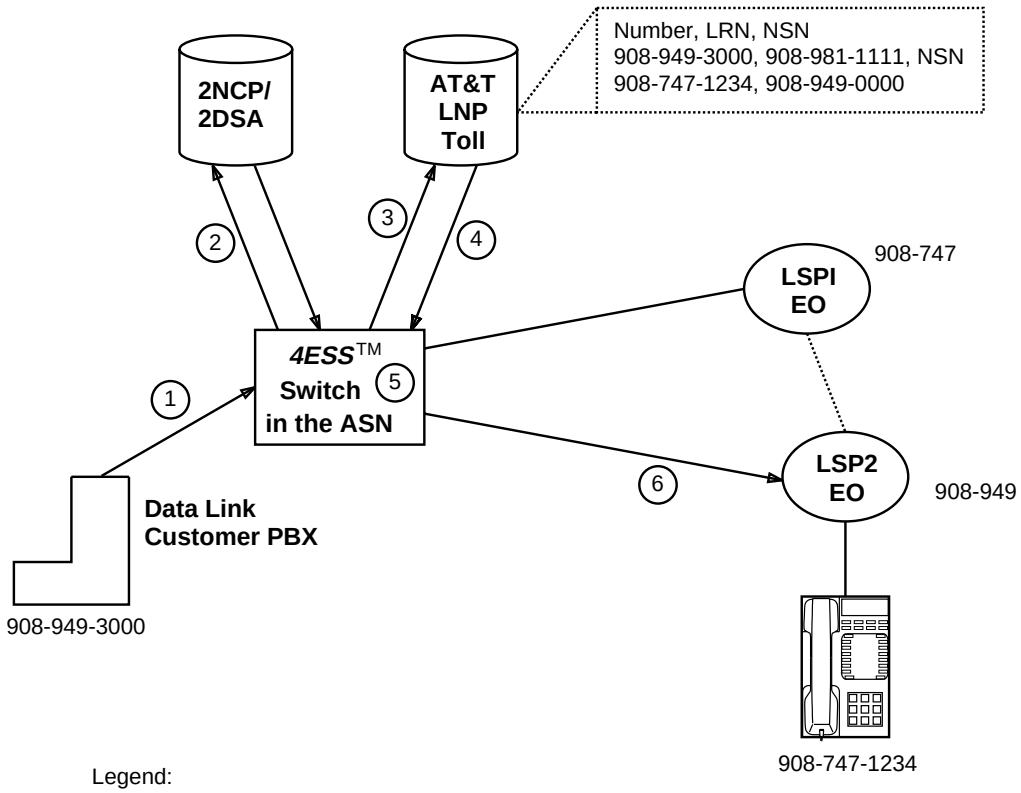
2.02 This section provides a typical call flow scenario for an outbound Local Location Routing Number (LRN) call from a *4ESS* switch AT&T Digital Link customer. See Figure 5-2. All other types of outbound LRN calls are as described for Feature 4216. See Table 5-A.

NOTE:
For this call flow, the Local Service Provider (LSP) has ported its number from the Local Service Provider 1 (LSP1) End Office (EO) to the LSP2 EO. Portability allows customers to change their local service providers without changing their telephone numbers as long as they remain within a rate center.

1. A *4ESS* switch Digital Link customer dials an LSP customer at 908-747-1234.
2. All service processing in the 2 Network Control Point (2NCP) and 2 Direct Service ANI (2DSA) is provided for the call, and by way of Local/Toll Differentiation (LTD), the call is determined to be a local call. Therefore, the LTD parameter is set to route and/or record local.

   NOTE:
   The LTD refers to the logic within the 2NCP/2DSA which compares the NPA-NXX of the local ANI with the NPA-NXX of the dialed number to determine if a call from a *4ESS* switch Digital Link customer is a local or toll call. The LTD logic in the 2NCP/2DSA returns an optional TCAP parameter called the LTD to the *4ESS* switch. The TCAP parameter indicates how to route the call.

3. The *4ESS* switch receives the LTD parameter of local and sets the Local Screening Index (LSI) to LOCAL_ORIG. The *4ESS* switch checks its portability table and recognizes that the NPA-NXX of the destination number (908-747) is opened to portability and launches a query to the AT&T Toll Local Number Portability (LNP) database.



Legend:

ANI	-	Automatic Number Identification
ASN	-	AT&T Switched Network
EO	-	End Office
LNP	-	Local Number Portability
LRN	-	Location Routing Number
LSP	-	Local Service Provider
NSN	-	Network Switch Number
PBX	-	Private Branch Exchange
2DSA	-	Number 2 Direct Services ANI
2NCP	-	Number 2 Network Control Point

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Figure 5-2. Outbound Local LRN Call From Digital Link Customer

NOTE 1:
The LSI is a new Subsequent Digit Screening Index created for this feature. After digit translations, an LSI is revealed. The LSI can have one of the following values:

- **LOCAL_ORIG** — Originating local calls from *4ESS* switch AT&T Digital Link customers
- **LOCAL_TERM** — Terminating local calls to *4ESS* switch AT&T Digital Link customers
- **Toll** — Default for Toll Calls.

NOTE 2:
The LOCAL_ORIG is one of the LSI values when the call is determined to be an outbound local call made by the *4ESS* switch AT&T Digital Link customer. This value can be passed on an inter-*4ESS* switch local call.

4. The LRN of the LSP2 EO (908-949-0000) serving the destination number is sent in response from the database.

   NOTE:
   The destination number is the number used to query the AT&T Toll LNP database when routing a call. The destination number can be the number received from the incoming Called Party Number Parameter (CdPN), the number dialed, or the number derived after service processing. The Software Defined Network (SDN) service processing provides a derived, or translated, number.

5. The *4ESS* switch formulates an Initial Address Message (IAM) which includes its Jurisdiction Information Parameter (JIP) as well as the CdPN with the LRN of 908-949-0000, the ported number Generic Address Parameter (GAP), and the destination number of 908-747-1234. The switch sets bit M of the Forward Call Indicator (FCI) parameter to 1. The Automatic Message Accounting (AMA) record in the *4ESS* switch captures the LRN Module.

NOTE 1:
The JIP is an existing optional Signaling System Number Seven (SS7) Integrated Services Digital Network User Part (ISUP) parameter that contains the NPA-NXX of an end office from which a call originates. In the LNP environment, for calls originating in an LNP area, the 6-digits of the NPA-NXX Master LRN owner for the originating switch are sent in the JIP.

NOTE 2:
The FCI is an existing mandatory SS7 ISUP parameter. Bit M of the FCI is the bit associated with LNP. In the LNP environment, bit M of the FCI is set to 1 to indicate that the LNP database query has been successfully performed for the destination number. The default for bit M is 0.

6. The *4ESS* switch performs digit translations for 908-949-0000. The *4ESS* switch subsequent digit translation is required and points to the Local Screening Index (LSI). The *4ESS* switch determines the routing treatment based on LSI and the call is routed to LSP2 over a local trunk group. If the local route is identified as non-LNP capable, then before delivering the call, the *4ESS* switch removes the LRN from the CdPN and moves the destination number from the ported number GAP into the CdPN. With an LNP capable call, the *4ESS* switch delivers the call with the IAM formulated in Step 5.

NOTE:
A non-LNP capable route refers to a trunk group provisioned with an indicator to signify that the switch connected to the trunk group is incapable of supporting LNP using LRN. The switch has neither the capability to query an LNP database nor the capability to recognize its own LRN and retrieve a destination number from the GAP. This issue is covered in Feature 4216. See Table 5-A.

Terminating Local LRN Call to a *4ESS* Switch AT&T Digital Link Customer

1. An LSP customer dials a *4ESS* switch AT&T Digital Link customer at 908-949-3000. See Figure 5-3.
2. The LSP EO serving that customer recognizes that 908-949 is opened to portability and launches a query to the LSP LNP database.
3. The LRN of the *4ESS* switch (908-981-1111) is sent in response from the database.
4. The LSP does the following:
   - Populates the CdPN with the LRN
   - Populates the ported number GAP with the destination number
   - Sets bit M of the Forward Call Indicator (FCI) parameter to 1
   - Routes the call to the *4ESS* switch over local trunks.
5. The *4ESS* switch receives the call over LSP_LOCAL trunks and determines that the LRN_LOCAL feature bit at the switch is ON. The switch sets the Local Screening Index (LSI) to LOCAL_TERM. Neither originating service processing nor querying of the Segmentation Directory (SD) is applied for this call. If an SDQuery is launched from the Data Link Node (DLN), the *4ESS* switch ignores any SDResponse or subsequent SPResponse.
6. Since a ported number GAP has been received, the *4ESS* switch retrieves the number from the CdPN parameter and does a table look-up in the LRN table. If the number matches one of the LRNs in the table assigned to this *4ESS* switch and it recognizes it as its own LRN, the call flow proceeds with Step 7. If, however, an LRN match is not found, or an LRN match is found but is not an LRN for this *4ESS* switch, the *4ESS* switch sends a release indicating a misrouted call (ANSI Cause Code 26). **End of Call Flow.**
7. The *4ESS* switch retrieves the destination number from the ported number GAP. The switch performs digit translations for the destination number and routes the call. In this case, the *4ESS* switch encounters an LSI and routes the call according to the LSI=LOCAL_TERM. The call is routed to the PBX of the *4ESS* switch AT&T Digital Link customer.

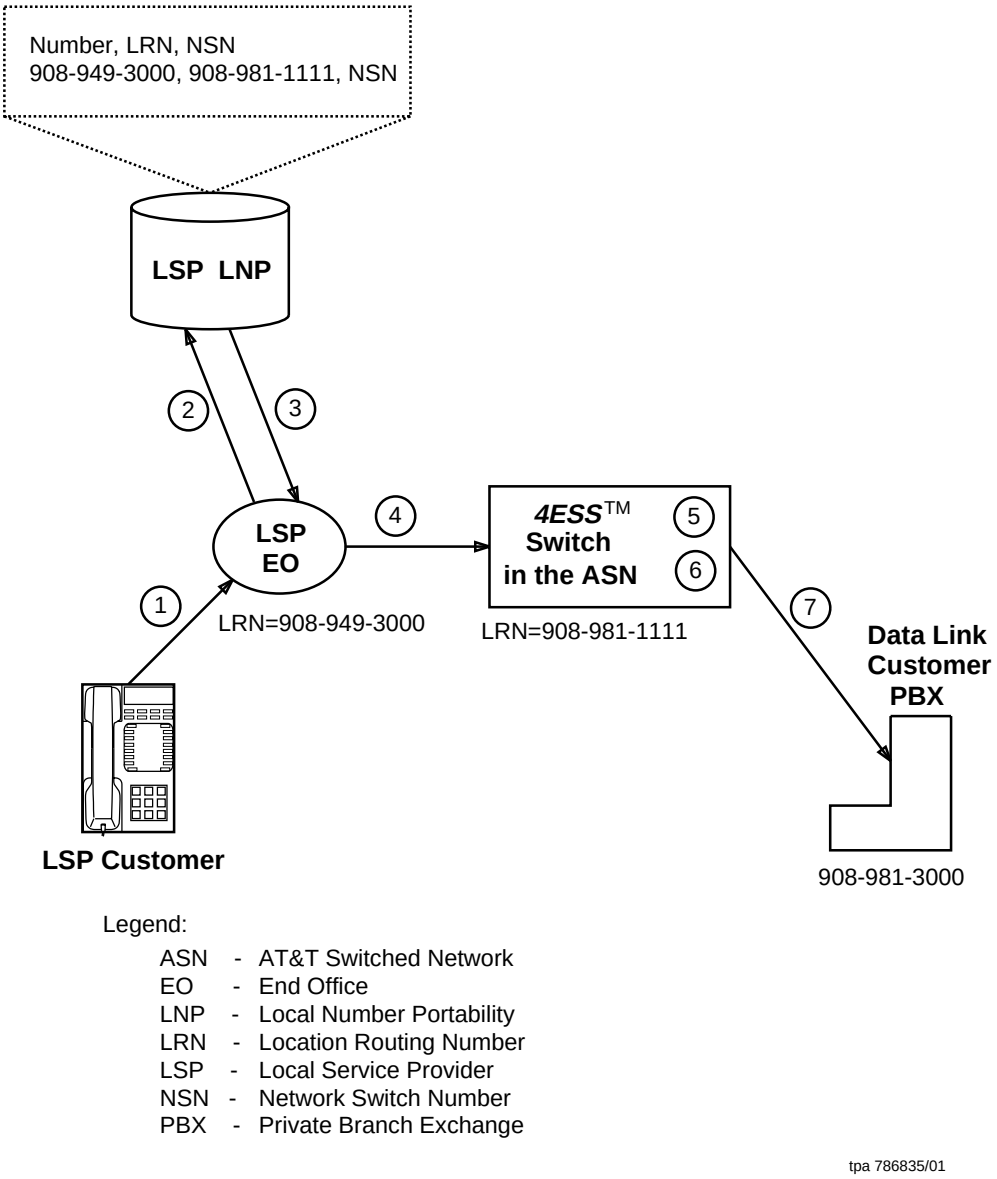


Figure 5-3. Terminating Local LRN Call to Digital Link Customer

Terminating AT&T Long Distance LRN Call to a *4ESS* Switch AT&T Digital Link Customer

NOTE:
For this call, the *4ESS* switch AT&T Digital Link customer number has been ported from an LSP EO.

1. An LSP customer dials a *4ESS* switch AT&T Digital Link customer at 908-949-3000. See Figure 5-4.
2. The LSP EO performs translations for 908-949, determines the call is a long distance call that belongs to AT&T, and subsequently delivers the call to the AT&T Switched Network (ASN).
3. The *4ESS* switch Number 1 receives the call and checks its portability table. It recognizes that the NPA-XXX of the destination number (908-949) is opened to portability and then it launches a query to the AT&T toll LNP database.
4. The *4ESS* switch Digital Link customer is provisioned in the AT&T Toll LNP database as a Terminating Switched Access Arrangement (TSAA) provider. The AT&T Toll LNP database returns the LRN and NSN of *4ESS* switch Number 2, which serves the *4ESS* switch AT&T Digital Link customer.
5. Since *4ESS* switch Number 1 has received both LRN and NSN, it checks its LRN Table to identify whether the returned LRN belongs to itself or to another *4ESS* switch. In this case, the LRN belongs to *4ESS* switch Number 2, and as a result, the *4ESS* switch Number 1 only routes the call based on LRN and does not forward a crank back indicator.

   NOTE:
   This differs from a TSAA in that for a TSAA, an LRN match is not found and thus the *4ESS* switch Number 1 would route the call on the NSN. The switch would then forward a crank back indicator in a manner that, if the direct connect trunk is busy, the *4ESS* switch Number 2 would crank back, and the *4ESS* switch Number 1 would attempt to route on the LRN per the LNP as described for Feature 4216. See Table 5-A.

6. The *4ESS* switch Number 1 formulates an IAM with the CdPN parameter populated with the LRN of the *4ESS* switch Number 2 serving the *4ESS* switch AT&T Digital Link customer. The ported number GAP includes the destination number 908-949-3000, and the M bit of the FCI is set to 1. The *4ESS* switch Number 1 routes the call to the *4ESS* switch Number 2 based on the LRN.

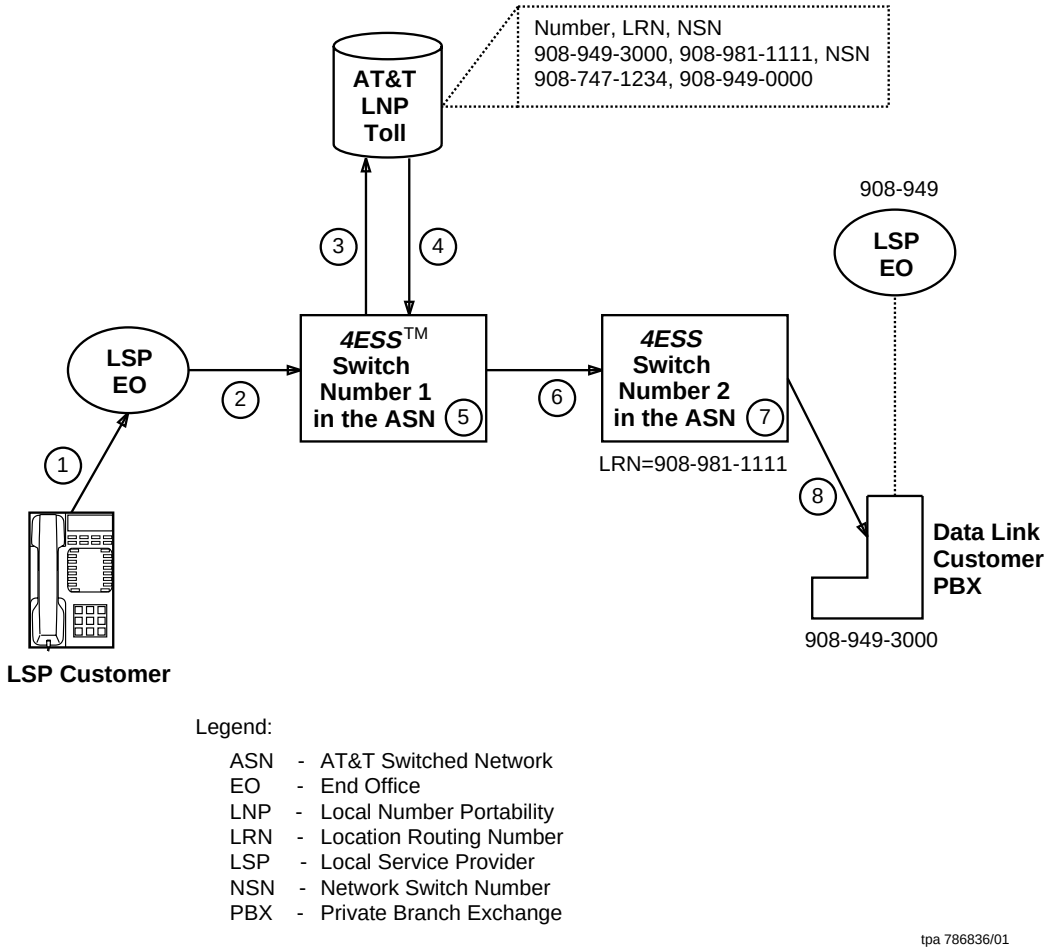


Figure 5-4. Terminating Long Distance LRN Call to a Digital Link Customer

7. Since a ported number GAP is received, the *4ESS* switch Number 2 retrieves the number from the CdPN parameter and does a table look-up in the LRN table. The number matches one of the LRNs in the table assigned to *4ESS* switch Number 2, and it recognizes it as its own LRN.

8. The *4ESS* switch Number 2 retrieves the destination number from the ported number GAP. It performs digit translation for 908-949-3000 and routes the call. In this case, an LSI is encountered. The *4ESS* switch Number 2 routes the call based on the default LSI=Toll to the PBX of the *4ESS* switch Digital Link customer.

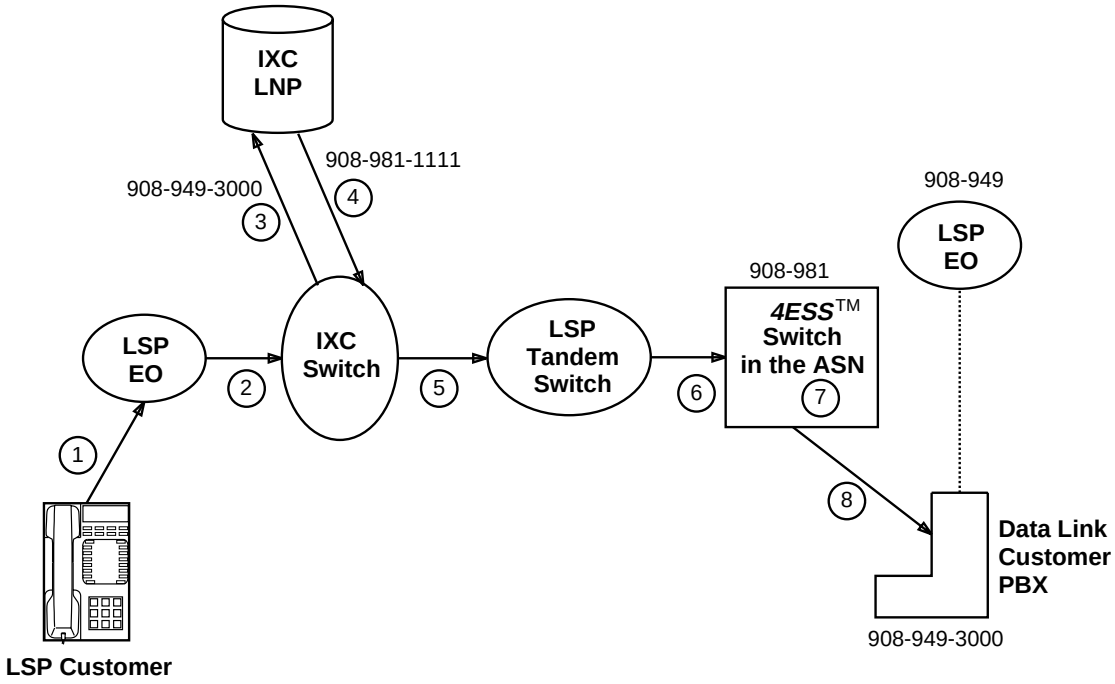
NOTE:
If an LRN match is not found in Step 7, the *4ESS* switch Number 2 routes on the CdPN as described for Feature 4216. See Table 5-A. This is an error condition that is difficult to detect. The error condition occurs only when the LRN Table at *4ESS* switch Number 1 is different than the LRN Table at *4ESS* switch Number 2. If the LRN table in *4ESS* switch Number 1 is correct when the *4ESS* switch Number 2 performs digit translations on the CdPN, which in this case would be the LRN, the call terminates to a final handling treatment. The current plan is that the final handling treatment of the reorder announcement will be provisioned and played for all calls routed on the LRNs belonging to a *4ESS* switch. If the LRN table in *4ESS* switch Number 1 is incorrect and sends the call to the wrong *4ESS* switch, the switch receiving the call attempts to route on the CdPN, which would be the LRN. This would also final handle the call since the LRN would not be served from that switch.

Terminating an IXC Long Distance LRN Call to a *4ESS* Switch AT&T Digital Link Customer

1. An LSP customer dials 908-949-3000 to reach a *4ESS* switch AT&T Digital Link customer. See Figure 5-5.
2. The LSP EO serving the caller performs translations for 908-949, determines that it is a long distance call, and delivers the call to the caller's chosen IXC.
3. The IXC switch performs translations, recognizes that 908-949 is opened to portability, and launches a query to the IXC LNP database.
4. The LRN of the *4ESS* switch (908-981-1111) is sent in the response from the database.
5. The IXC switch populates the CdPN with the LRN, the ported number GAP with the destination number, and sets bit M of the FCI to 1. It determines that 908-981 is the LERG assigned to the *4ESS* switch. Since the IXC has no direct connection to AT&T, it routes the call to a designated LSP tandem Switch to be handed off to the LERG assigned *4ESS* switch.

   NOTE:
   The LERG is a document managed by Bellcore that provides carriers with interconnection information for routing to NPA-NXXs. Information included in the document specifies which NPA-NXXs have been assigned by Bellcore to carriers, the carriers that own the NPA-NXXs, the associated end offices that serve the NPA-NXXs, the end office switch functionalities, and the number of digits required by the end office.

6. The LSP Tandem switch performs translations on the LRN in the CdPN, and with bit M of the FCI set to 1, routes the call over meet-point trunks to the LERG assigned *4ESS* switch. The call is routed with the ported number GAP and destination number with the LRN in the CdPN.



Legend:

ASN	-	AT&T Switched Network
EO	-	End Office
IXC	-	Interexchange Carrier
LNP	-	Local Number Portability
LSP	-	Local Service Provider
PBX	-	Private Branch Exchange

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Figure 5-5. Terminating an IXC Long Distance LRN Call to a Digital Link Customer

7. The *4ESS* switch receives the call from the LSP over LSP_LOCAL trunks and determines that the LRN_LOCAL feature bit at the switch is ON; it sets the LSI to LOCAL_TERM. Originating service processing, including querying of SD, is not applied to this call. If an SDQuery is launched from the DLN, the *4ESS* switch ignores any SDResponse or subsequent SPResponse. Since a ported number GAP is received, the *4ESS* switch retrieves the number from the CdPN parameter and does a look-up in the LRN table.

   If the number matches an LRN in the table assigned to this *4ESS* switch and it recognizes it as its own LRN, the call flow proceeds with Step 8. If an LRN match is not found or, if an LRN match is found, but is not an LRN of this *4ESS* switch, the *4ESS* switch sends a release indicating a misrouted call. The ANSI Cause Code 26 is indicated. **End of Call Flow.**

8. The *4ESS* switch retrieves the destination number from the ported number GAP. It performs digit translation on the destination number and routes the call. In this case, the *4ESS* switch encounters a Local Screening Index (LSI) and routes the call according to the LSI=LOCAL_TERM. The call is routed to the PBX of the *4ESS* switch AT&T Digital Link customer.

NOTE:
If direct trunking is provisioned between the IXC network and the LERG assigned *4ESS* switch, there is no need to route the call by way of LSP tandem.

Terminating an AT&T OSPS LRN Call to a *4ESS* Switch AT&T Digital Link Customer

NOTE:
For this call, the *4ESS* switch Digital Link customer has been ported from an LSP EO.

1. An LSP customer dials a *4ESS* switch AT&T Digital Link customer at 908-949-3000 by way of the operator. This is a toll call. See Figure 5-6.

2. The LSP EO delivers the call to the Operator Service Position System (OSPS).

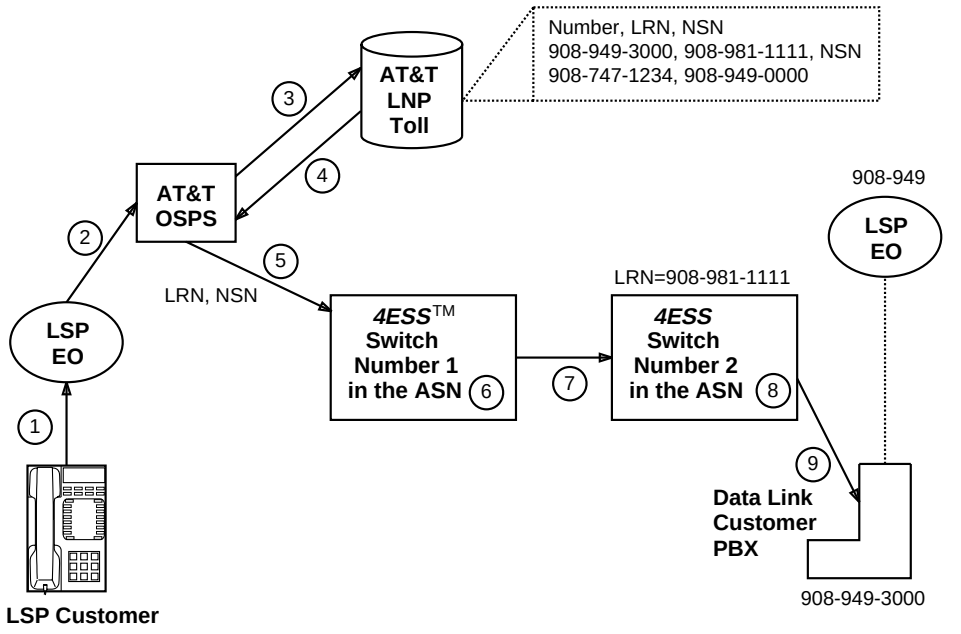
3. The OSPS checks its portability table and recognizes that the NPA-NXX of the destination number (908-949) is opened to portability and launches a query to the AT&T Toll LNP database.

4. The AT&T Toll LNP returns an LRN and an NSN.

5. The OSPS recognizes that a Network Switch Number (NSN) has been returned. The OSPS formulates an Integrated Services Digital Network User Part (ISUP) Initial Address Message (IAM) with the LRN in the CdPN parameter, the destination number in the ported number GAP, and the NSN in the NSN Generic Operation Parameter (GOP). The OSPS sets the M bit of the FCI to 1 and sends the call to the *4ESS* switch Number 1.

6. Since *4ESS* switch Number 1 has received both an LRN and an NSN, it checks its LRN Table to determine if the LRN returned belongs to itself or another *4ESS* switch. In this case, the LRN belongs to *4ESS* switch Number 2 and, as a result, *4ESS* switch Number 1 routes the call based on the LRN only and does not forward a crank back indicator. *Proceed to Step 7.*

   If the LRN had matched an LRN of *4ESS* switch Number 1, then the call flow would have proceeded to Step 9.



Legend:

ASN	-	AT&T Switched Network
EO	-	End Office
LNP	-	Local Number Portability
LRN	-	Location Routing Number
LSP	-	Local Service Provider
NSN	-	Network Switch Number
OSPS	-	Operator Service Position System
PBX	-	Private Branch Exchange

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Figure 5-6. Terminating OSPS LRN Call to a Digital Link Customer

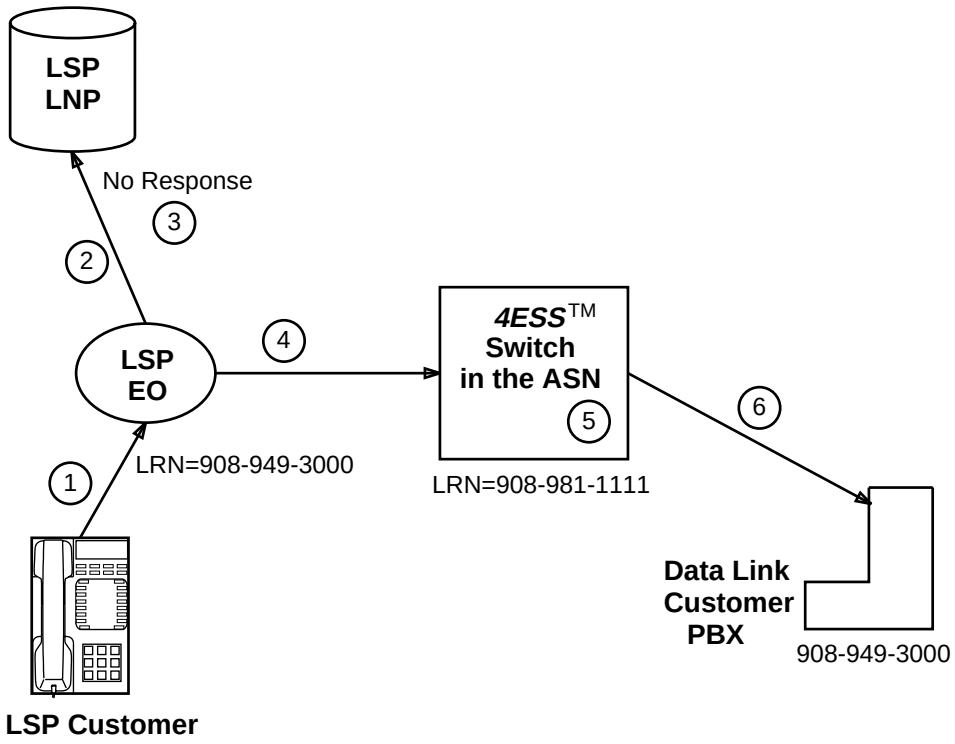
NOTE:
If an LRN match is not found, then *4ESS* switch Number 1 routes according to LNP where the OAS for the TSAA routes on the NSN and forwards a crank back indicator. This is done as described for Feature 4216. See Table 5-A. If the direct connect trunk is busy, the TAS cranks back and the OAS attempts to route on the LRN.

7. The *4ESS* switch Number 1 formulates an IAM with the CdPN parameter populated with the LRN of the *4ESS* switch serving the *4ESS* switch AT&T Digital Link customer. The ported GAP includes the destination number of 908-949-3000. The M bit of the FCI is set to 1 and the *4ESS* switch Number 1 routes the call to the *4ESS* switch Number 2 based on the LRN.
8. Since a ported number GAP is received, the *4ESS* switch Number 2 retrieves the number from the CdPN parameter and does a table look-up in the LRN table. The number matches one of the LRNs in that table assigned to this *4ESS* switch and it recognizes it as its own LRN.
9. The *4ESS* switch Number 2 retrieves the destination number from the ported number GAP. It performs digit translation on 908-949-3000 and routes the call. In this case, the *4ESS* switch encounters a default LSI=Toll and routes to the PBX of the *4ESS* switch AT&T Digital Link customer.

NOTE:
If an LRN match is not found in Step 8, the *4ESS* switch Number 2 routes on the CdPN per the LNP. This error condition, which is difficult to detect, occurs only when the LRN Table at *4ESS* switch Number 1 is different from the LRN Table at *4ESS* switch Number 2 as described for Feature 4216. See Table 5-A. If the LRN table in *4ESS* switch Number 1 is correct, when the *4ESS* switch Number 2 performs digit translation on the CdPN, which in this case would be the LRN, the call terminates to a final handling treatment. The current plan is that the reorder announcement will be provisioned and played for all calls routed on LRNs belonging to a *4ESS* switch. If the LRN table in *4ESS* switch Number 1 is incorrect and sends the call to the wrong *4ESS* switch, the *4ESS* switch receiving the call attempts to route on the CdPN, which would be the LRN. This would also final handle the call since the LRN would not be served from that switch.

Default Routed/Non-LNP Capable Switch Routed Call to an AT&T Digital Link Customer

1. The LSP customer dials 908-981-3000 to reach a Digital Link customer. See Figure 5-7.
2. The LSP EO serving the caller recognizes that 908-981 is open to portability and launches a query to the LSP LNP database.
3. No response is returned from the LSP LNP database.
4. The LSP EO performs translations on the dialed number and determines that 908-981 is the LERG assigned to the *4ESS* switch. The LSP EO populates the CdPN with the dialed number, and no ported GAP is populated. The LSP EO sets bit M of the FCI to 0 and routes the call to the *4ESS* switch.
5. The *4ESS* switch receives the call over the trunks from the LSP, determines that the LRN_LOCAL feature bit at the switch is ON, and sets the LSI=LOCAL_TERM. Originating service processing and querying of the SD should not be applied for this call. If an SDQuery is launched from the DLN, the *4ESS* switch ignores any SDResponse or subsequent SPResponse. If the M bit of the FCI received is set to 0 or if the LNP Capable indicator is set to NO, the *4ESS* switch performs digit translations on the destination number populated in the CdPN (908-981-1000) and routes the call.
6. In this case, the *4ESS* switch encounters an LSI = LOCAL_TERM and routes the call to the PBX of the *4ESS* switch AT&T Digital Link customer. **End of Call Flow.**



Legend:

ASN - AT&T Switched Network
EO - End Office
LNP - Local Number Portability
LSP - Local Service Provider
PBX - Private Branch Exchange

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Figure 5-7. Default Routed/Non-LNP Call to Digital Link Customer

Default Routed/Non-LNP Capable Switch Routed Call to an AT&T LERG Assigned Number Ported Away From AT&T

1. The LSP customer dials 908-981-1000 to reach a local customer that has ported their local number away from AT&T. See Figure 5-8.
2. The LSP EO serving the caller recognizes that 908-981 is open to portability and launches a query to the LSP LNP database.
3. No response is returned from the LSP LNP database.
4. The ESP EO performs translations on the dialed number and determines that 908-981 is the LERG assigned to the *4ESS* switch. The LSO EO populates the CdPN with the dialed number. A ported number GAP is not populated, bit M of the FCI is set to 0, and the call is routed to the *4ESS* switch.
5. The *4ESS* switch receives the call over the trunks from the LSP and determines that the LRN_LOCAL feature bit at the switch is ON; the switch sets the LSI=LOCAL_TERM. Neither originating service processing nor querying of the SD should be applied for this call. If an SDQuery is launched from the DLN, the *4ESS* switch ignores any SDResponse or subsequent SPResponse.

   When the M bit of the FCI received is set to 0 or because the LNP Capable Indicator is set to NO, the *4ESS* switch performs digit translations on the destination number populated in the CdPN (908-981-1000). In this case, the *4ESS* switch encounters a Final Handling Treatment and, therefore, needs to determine if default LNP processing might be required. This is done by checking whether the first 6 digits of the destination number could have a LERG number assigned to it, indicated by an entry in its NPA-NXX table.

   NOTE:
   If no match is found, the *4ESS* switch sends a REL message with a location code of Local Local Network. **End of Call Flow**.

6. In this case, a match is found, the *4ESS* switch changes the LSI from LOCAL_TERM to LSI=LOCAL_ORIG and performs LNP processing per the LNP.
7. The *4ESS* switch appends a LOCAL_NODAL module to be used to charge the LSP for performing LNP processing. The *4ESS* switch routes the call to the LSP EO.

   NOTE:
   If the call is to be routed inter-*4ESS* switch, the *4ESS* switch modifies the IAM to set the MLK bits of the Dynamic Non-Hierarchical Routing (DNHR) indicator parameter to 001 to indicate a LOCAL_ORIG processing.

8. The LSP EO recognizes its own LRN, retrieves the dialed number from the GAP, and routes the call to its local customer.

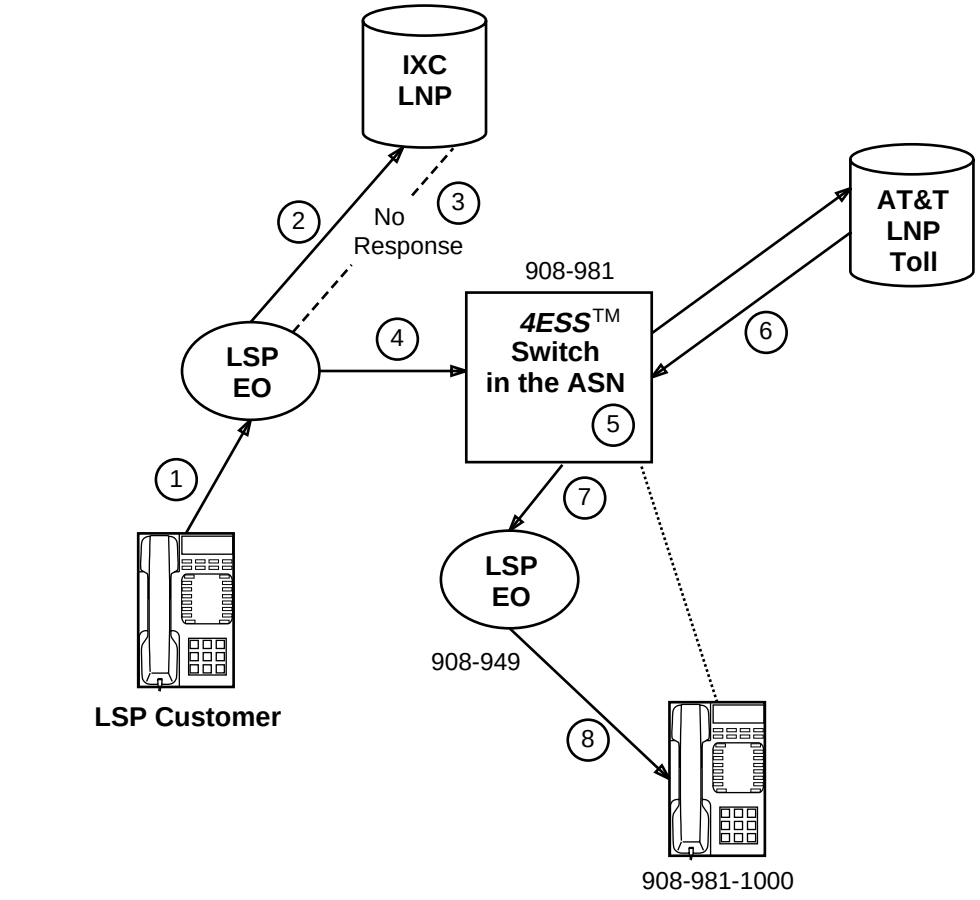

Figure 5-8. Default Routed/Non-LNP Call to LERG Assigned Numbers

3. Provisioning

Office Data and Administration Overview

3.01 The *4ESS* switch supports a new office wide bit that turns the Location Routing Number (LRN) Local processing (LRN_LOCAL) on or off. The default for this bit is off. The LRN_LOCAL bit can be on only if the Local Number Portability (LNP) bit (LNP_Processing) is ON as described for Feature 4216. See Table 5-A. The LRN_LOCAL bit is turned OFF if the LNP_Processing bit is turned OFF.

3.02 The *4ESS* switch supports Recent Change (RC) and Verify messages that support the assignment of LRN NPA-NXXs in the LRN Table. This assignment designates the first six digits of the LRNs assigned to each *4ESS* switch. The RC forms identify the LRN and the associated Network Switch Number (NSN) to which the LRN belongs. The NSNs, which are not stored in the LRN table, are used to set a switch indicator field in each specific *4ESS* switch. The verify messages, which do not show the associated NSN for each NPA-NXX, indicate the NPA-NXXs in the LRN Table and associated switch indicator field values.

3.03 The *4ESS* switch also supports Recent Change for the Local Exchange Routing Guide (LERG) Assigned table. The NPA-NXXs numbers partially or fully assigned to the *4ESS* switch are stored in this table.

A. Location Routing Number Table Definition

3.04 The LRN Table identifies the first six digits of all the LRNs assigned to all the *4ESS* switches. In addition, a one bit indicator is associated with those LRNs assigned to a specific switch. Each *4ESS* switch has a copy of the LRN Table with its specific LRN ownership marked with an indicator. The LRN Table is used by the *4ESS* switches in call processing to determine if an LRN received in an IAM is assigned to itself or another *4ESS* switch.

3.05 The LRN is a 10-digit number with a format of NPA-NXX-XXXX. In order to determine for call processing if the LRN is assigned to a *4ESS* switch in the AT&T Switched Network, the switch compares the NPA-NXX of the CdPN (received in the IAM) to the NPA-NXXs in the LRN Table. AT&T selects its LRNs only from the full NPA-NXXs which are LERG assigned through Bellcore. A partially assigned number is not used for LRN assignments to a *4ESS* switch.

3.06 The *4ESS* switch initially supports the assignment of up to 4800 NPA-NXXs in the LRN Table. An associated switch-indicator field is populated on a per switch basis to reflect which of the NPA-NXXs represent LRNs associated with a specific switch. When verifying an LRN table of a specific switch, an "R" in the switch indicator field indicates that the LRN belongs to that specific switch (R=Resident), while an "O" in the switch indicator field indicates that the LRN belongs to another *4ESS* switch (O=Other).

B. Local Exchange Routing Guide Table Definition

3.07 The *4ESS* switch supports a new table called the LERG assigned NPA-NXX table. The LERG assigned table is used during call processing to determine if default LNP processing should be performed. The only numbers provisioned in the LERG Table are those NPA-NXXs for which the *4ESS* switch has line numbers assigned.

3.08 This table has a maximum of 800 entries. The table is provisioned with the 6-digits of the NPA-NXX assigned to the *4ESS* switch. If the *4ESS* switch is assigned only a subset of the NPA-NXX, that is, NPA-NXX-0000 to 0999, the table is provisioned with the NPA-NXX. The NPA-NXX numbers are assigned to the various switches by Bellcore, and these assignments are published in the Local Exchange Routing Guide text.

Office Data Assembly Structures Affected

A. New Office Data Assembly Structures

HT46DIGLRN

3.09 A library has been added to allocate additional memory. The HT46DIGLRN structure is defined as a 128 word head-table structure defined in protected, simplex, disk-backed, API accessible and ODA populated memory. This structure contains the starting address of the AT&T LRN assignment subtranslators.

HT46LRGNASGN

3.10 A library has been added to allocate additional memory. The HT46LRGNASGN structure is defined as a three word structure defined in protected, simplex, disk-backed, API accessible and ODA populated memory. This structure contains the starting address of the 6-digit NPA-NXX LERG number assigned subtranslator.

B. Modified ODA Structures

OD4OFCCOPY2

3.11 An ON/OFF indicator (PF29), defined for Feature 4216, is used, and a new automatic turn-off provisioning action (PF36) associated with LNP is defined. These indicators are populated from RC Form 809. The associated Verify Forms are 16az and 8j. The new automatic OFF provisioning action has been added to ensure that the LRN_LOCAL processing indicator is turned OFF if LNP is turned OFF.

HT4DIGSUPP

3.12 An existing state is now used to identify a LERG call in the DSD call type for internal call processing only. It is not provisioned by ODA or RC. There are no RC form changes but text and population rule changes have been made for the RC 300-series forms.

HT4SA

3.13 A library has been updated to assign two new Space Administration use states for allocating subtranslators for two new 6-digit NPA_NXX translation functions.

Recent Change Forms Affected

A. New Recent Change Forms

Recent Change Form 666

3.14 RC Form 666, has been created for this feature. This form is used to assign 6-digit, NPA-NXX, codes as AT&T LRNs. The 6-digit assignment is determined by the NSN which is accompanied with each NPA-NXX entry. The following assignments are possible for a 6-digit code:

- LRN resident to this office
- LRN assigned to another AT&T office
- 6-digit code is not an AT&T LRN.

Figure 5-9 shows the layout of RC Form 666. The possible entries for each field in this form are shown in Table 5-B.

Table 5-B. Recent Change Form 666 Entries

Form Field	Field Entry
RC:LRNASIGN;CHG;	Blank, **BUF, TST, ACT, FTA, FTB, FTT**
ORNU (Order Number)	**1** to **999999**
NPA (3-Digit Codes)	**200** to **999**
NXX (3-Digit Code)	**200** to **999**
NSN (Network Switch Number)	Blank, **1** to **167**. A blank represents a non-AT&T LRN.

```
#  FORM 666  AT&T 6-DIGIT NPA-NXX LRN ASSIGNMENT
#  4E23R2>


RC:LRNASIGN;CHG;___:

ORNU -----'


         NPA      NXX      NSN      NPA      NXX      NSN
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,
         ___,     ___,     ___,     ___,     ___,     ___,


REMARKS ---------------------------------------------!



                        ASSOCIATED VERIFY MESSAGES

                     INPUT-16bt-VER:MISC LRNASN[;RES]:NPANXXa!(EOT)

                           OUTPUT-6bt-VER:MISC LRNASN
```

Figure 5-9. Recent Change Form 666

B. Modified Recent Change Forms

Recent Change Form 809

3.15 This form is used to enable and disable various feature bits. The layout of the form has not changed, but documentation and associated population rules have changed. The LRN_LOCAL processing is activated or deactivated by populating the FEATURE ITEM field with **PF36** and setting the ON OR OFF field to either **ON** or **OFF**. To activate the feature set the ON OR OFF field to **ON**.

NOTE:
Feature 4216, Number Portability with Location Number Routing, must also have been activated (PF29 set to **ON**).

To deactivate the feature, set the ON OR OFF field to **OFF.** The default is OFF.

3.16 The Local Number Portability with the LRN feature is activated or deactivated by populating the FEATURE ITEM field with **PF29** and setting the ON OR OFF field to **ON**. To deactivate the feature, set the ON OR OFF field to **OFF**. The default of this item is OFF.

NOTE:
With **PF29** entered in the FEATURE ITEM field and **OFF** entered in the ON OR OFF field, automatic provisioning occurs and the PF36 field (LRN_LOCAL processing) is set to **OFF** automatically.

New Verify Forms

A. Verify Form 16bt Input Message

3.17 This input message requests the verification of the AT&T 6-digit NPA-NXX codes as LRN assignments. The following three assignments are possible for a 6-digit code:

- An LRN resident to this office
- An LRN resident to another AT&T office
- An LRN that is not an AT&T LRN.

The output (6bt) for this input message specifies only the assignment and NPA-NXX codes that are AT&T LRN assigned. No output information is printed for 6-digit codes not assigned as AT&T LRNs. Table 5-C presents a description of the 16bt fields for verification of an LRN. Table 5-D shows several types of verification requirements along with the actual example message to be used for each requirement. The 16bt input message is as follows:

VER:MISC LRNASN[;RES]:NPANXXa!(EOT)

Table 5-C. Verify Form 16bt Field Descriptions

16bt Message Items	Field Description
Lower Case Letters	Variable Items In a Given Field.
Upper Case Letters	Enter exactly as shown.
Brackets	Optional Items. Items without brackets are required as the minimum input for this message.
EOT	End of transmission control on the keyboard.
RES	An option as per the NPANXX input. This keyword is used to specify only the LRNs that are assigned and resident to this office. If this option is not specified, all the LRNs that are assigned to AT&T are specified.
NPANXX	This is a six digit code. The only valid NPA and NXX codes that are allowed via recent change for an AT&T LRN are those in the 200 to 999 range. Entries = **000000** to **999999**. For the NPANXX field, a range or list may be verified. A range is specified by inserting a dash between the lowest and the highest numbered code in the range. An example is as follows: **VER:MISC LRNASN:NPANXX 200200-999999!(EOT)** A list can be entered by separating each code or range of codes with a comma and enclosing the entire group in parenthesis. An example would be: **VER:MISC LRNASN;RES:NPANXX (630979, 312200-312999)!(EOT)**

Table 5-D. Verify Form 16bt, Input Message Examples

16bt Message Requirement	Input Message
Verify a single NPA-NXX.	**VER:MISC LRNASN:NPANXX 630979!(EOT)**
Verify a range identifying all LRN assignments for an NPA.	**VER:MISC LRNASN:NPANXX (312200-312999)!(EOT)**
Verify a range identifying all resident LRN assignments for an NPA.	**VER:MISC LRNASN;RES:NPANXX (312200-312999)!(EOT)**
Verify a single NPA-NXX and two different ranges.	**VER:MISC LRNASN:NPANXX (630979,313200-312999,773200-773999)!(EOT)**
Verify a single NPA-NXX and two different ranges using the resident LRN assignment option.	**VER:MISC LRNASN;RES:NPANXX (630979,312200-312999,773200-773999)!(EOT)**
Verify a range identifying all possible NPA-NXX LRN assignments.	**VER:MISC LRNASN:NPANXX (200200-999999)!(EOT)**

B. Verify Form 6bt Output Message

3.18 This output message provides the ability to verify the AT&T 6-digit NPA-NXX codes as LRN assignments. The message specifies only the assignments that are AT&T LRN assigned. No information is printed for 6-digit codes that are not assigned as an AT&T LRN. The 6bt output Verify Form is shown in Figure 5-10. For this form, the meaning of each field is as follows:

Field	Field Description
NPA	3-Digit NPA code entries. Entries can be **200** to **999**
NXX	3-Digit NXX code entries. Entries can be **200** to **999**
ASN	Indicates assignment for the AT&T Switched Network. If **O** is displayed in this field, the LRN is assigned to another AT&T office. If **R** is displayed in this field, the LRN is resident to this office.

```
OUTPUT:                          VERIFY 6bt

     VER:MISC,OPT (LRNASN) [;RES]:


          NPA       NXX       ASN
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___
          ___,      ___,      ___


             RECENT CHANGE INPUT SOURCE - #666 RC:LRNASIGN;CHG;__:
```

Figure 5-10. Verify Form 6bt

C. Verify Form 6dl Input Message

3.19 This input message assigns or deletes 6-digit NPA-NXX codes as LERG numbers for the *4ESS* switch AT&T Digital Link LRN Capabilities. Table 5-E shows assign and delete requirements along with the actual example messages to be used for each. The input message and a description of the associated fields for assignment or deletion of LERG numbers are as follows:

RC:MISC;FHT,FTA:LRGNASIGN,a,b,c,d!

6dl Message Items	Description
Lower Case Letters	Variable fields that require user input data.
Upper Case Letters	Enter exactly as shown.
Exclamation Point	At end of message, indicates the end of the message.
a	The order number. It must be a unique number in the range **000001** to **999999**.
b	Specifies the action required. Entries are **A** for add or assign an LERG; or **D** to delete or unassign an LERG.
c	This field must be specified as **D** to indicate that LRGNASIGN data is being input. The maximum number of NPA-NXX 6-digit codes that can be assigned as Local Exchange Routing Guide Numbers is 800. The maximum number of 6-digit codes that can be entered per message is 32.
d	This field must be specified and is for entering the 6-digit NPA-NXX LERG number. Each LERG assignment must be six digits and within a valid NPA and NXX range. The valid range for an NPA or an NXX must be within **200-999.**

Table 5-E. Verify Form 6dl Input Message Examples

6dl Message Requirement	Input Message
Assign/Add 6-digit NPA-NXX codes as LRGNs.	**RC:MISC;FHT,FTA:LRGNASIGN,000001, A,D, 600979,312979,630979,773586!**
Unassign/Delete 6-digit NPA-NXX codes as LRGNs:	**RC:MISC;FHT,FTA:LRGNASIGN,000003, D,D,600979,773586!**

6dl Error Messages

3.20 If the 6dl input message cannot be successfully processed, an error code is output along with the input message, stopping on the data which is in error. The numeric error codes associated with the message in error are shown in Table 5-F.

Table 5-F. Verify Form 6dl Input Message Numeric Error Codes

6dl Error Code	Error Explanation
10, 448	An invalid Recent Change has been requested (unknown 9-letter name code).
763	This is an incorrect size or range check of an NPA-NXX entry. The specific entry associated with an error will be output.
1723	Additional entries cannot be added. The maximum number has been reached.
1724	The entry to be added already exists in the structure. The specific entry associated with an error will be output.
1725	The entry to be deleted is not in the structure. The specific entry associated with an error will be output.
1726	There are duplicate entries in the input message. The specific entry associated with an error will be output.

D. Verify Form 16dl Input Message

3.21 This input message provides the ability to verify the 6-digit, NPA-NXX codes as LERG Number assignments. Table 5-G shows 16dl input verification requirements along with the actual example message to be used for each requirement. The input message and a description of the associated fields for verifying NPA-NXX numbers assigned as LERG numbers are as follows:

VER:MISC:FHT LRGNASIGN[,DIG a]!(EOT)

16dlMessage Items	Field Description
Lower Case Letters	Variable fields that require user input data.
Upper Case Letters	Enter exactly as shown.
Brackets	Optional Items. Items without brackets are required as the minimum input for this message.
EOT	End of Transmission control on the keyboard.
Exclamation Point	At end of message, indicates the end of the message.
DIG	An NPA or an NPA-NXX to be verified as being LERG assigned. Possible entries are a 3-digit NPA or a 6-digit NPA-NXX. If a 3-digit NPA is entered, then all the LERG assigned entries that are within that NPA are retrieved and verified. If a 6-digit NPA-NXX is entered, that particular entry is checked or verified for LERG assignment. If this field is omitted, then all assigned LERG NPA-NXX entries are verified.

Table 5-G. Verify Form 16dl Input Messages Examples

16dl Message Requirement	Input Message
Verify all LRGN assigned NPA-NXX 6-digit codes.	**VER:MISC:FHT LRGNASIGN!(EOT)**
Verify all LERGs assigned to a particular 3-digit NPA.	**VER:MISC:FHT LRGNASIGN,DIG 312!(EOT)**
Verify if a particular 6-digit NPA-NXX code is LRGN assigned.	**VER:MISC:FHT LRGNASIGN,DIG 773586!EOT)**

E. Verify Form 6dl Output Message

3.22 The 6dl output Verify Form is shown in Figure 5-11. This form shows the 6-digit, NPA-NXX codes as LERG Number assignments. A description of the fields in the output message is as follows:

6dl Field	Field Description
NPA	Numbering Plan area for an assigned LERG
NXX	Office code for an assigned LERG. Entries are **200** to **999**.

```
OUTPUT:                          VERIFY 6dl

VER:MISC:FHT LRGNASIGN:


NPA NXX
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,
___-___,

      RECENT CHANGE INPUT SOURCE - #6dl RC:MISC;FHT,FTA:LRGNASIGN,a,b,c,d!
```

Figure 5-11. Verify Form 6dl

4. Recording

4.01 This feature allows the *4ESS* switch Toll-switch to accept and process local LNP calls for the *4ESS* switch Digital Link customers. To do this, the *4ESS* switch captures the local call information as part of the AMA recording. The LNP AMA recording of calls for this feature is covered under the following:

- Originating Local MEGACOM®* telecommunications services calls from the *4ESS* switch Digital Link Customer
- Originating local Software Defined Network (SDN) calls from the *4ESS* switch AT&T Digital Link customer
- Terminating calls from Local Service Providers (LSPs) and Interexchange Carriers (IXCs)
- Terminating local calls to the Terminating Switched Access Arrangement (TSAA) access provider.

Originating Local MEGACOM® Calls from a *4ESS* Switch AT&T Digital Link Customer

4.02 An Originating Location Routing Number (LRN) Module (Module 939) is not appended for MEGACOM calls originated over a *4ESS* switch Digital Link customer trunk group.

Originating Local SDN Calls From a *4ESS* Switch AT&T Digital Link Customer

4.03 An Originating LRN Module (Module 939) is not appended for SDN calls originated over a *4ESS* switch Digital Link customer trunk group.

Terminating Calls From LSPs and IXCs

4.04 The *4ESS* switch generates a Destination LRN Module (Module 939) when the *4ESS* switch performs LNP processing for local calls that terminate at the *4ESS* switch from the LSPs/IXCs over a TOT = LSP_LOCAL.

4.05 The *4ESS* switch does not generate an Originating LRN Module (Module 939) for calls that terminate at the *4ESS* switch from the LSPs/IXCs over a TOT = LSP_LOCAL. This is a new requirement with this feature.

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* MEGACOM® is a registered trademark of AT&T

Terminating Local Calls to the TSAA Access Provider

4.06 No additional LNP AMA changes have been presented in this area.

5. Network Management (Not Affected)

6. Maintenance/Troubleshooting

New Final Handling Codes

6.01 Several new Final Handling Codes are introduced for this feature. These codes are listed in Table 5-H.

Table 5-H. Final Handling Code Failures

FHC	Failure and Handling Method
2185	**Last Normal Condition–**Called Party Number was received via Local Number Portability Reply or incoming call from Operator Service Position System. **Irregular Condition–**The destination number failed to be translated. **Handling–**The call is killed with a vacant code treatment.
2186	**Last Normal Condition–**The switch received its own Location Routing Number and a ported number GAP. **Irregular Condition–**Translation of the called party number in the ported number GAP failed to get normal routing. **Handling–**The call is killed with a vacant code treatment.
2187	**Last Normal Condition–**The called party number was translated. **Irregular Condition–**LRN discovered that the Location Routing Number received does not belong to this switch. **Handling–**The call is killed and a release with ANSI standard cause #26 sent back on the ISUP incoming trunk.
2188	**Last Normal Condition–**The translation of the called party number and the PNG was retrieved and translated. **Irregular Condition–**The PNG resulted in a Final Handling Treatment call type. **Handling–**The call is killed and a release with ANSI standard cause #26 sent back on the ISUP incoming trunk.
2189	**Last Normal Condition–**Translation of the called party number was successful. **Irregular Condition–**The translation of the called party number revealed a vacant code and the number was not in the LERG table. **Handling–**The call is killed and a release with ANSI standard cause #31 sent back on the ISUP incoming trunk.

Table 5-H. Final Handling Code Failures (Contd)

FHC	Failure and Handling Method
2190	**Last Normal Condition–**Translation of the called party number was successful and the LNP response was received. **Irregular Condition–**The translation of the called party number revealed the LERGAN belongs to this switch, but the reply to the LNP query indicated that this number is not ported. **Handling–**The call is killed, with a standard vacant code treatment.
2191	**Last Normal Condition–**The switch attempted to send an LNP query. **Irregular Condition–**The LNP query failed—the condition is encoded in the Direct Services Dialing (DSD) exception code. **Handling–**The call is killed, with a call failure.
2192	**Last Normal Condition–**The *4ESS* switch received a reply to the LNP query. **Irregular Condition–**The LNP reply contained a destination number for which the routing translation failed to provide usable routing. **Handling–**The call is killed, with a vacant code treatment.
2193	**Last Normal Condition–**The ported number Generic Address Parameter is received from a Local Service Provider trunk. **Irregular Condition–**The ported number Generic Address Parameter is not formatted correctly. **Handling–**The call is killed, with a release message showing a cause of "invalid number format (address incomplete)."

7. Transition Considerations

Deployment Requirements

7.01 Full deployment of the 4E23 Release 2 Generic in all *4ESS* switches is required before turning on this feature.

Implementing the LRN End Office Environment

7.02 The transition to the End Office (EO) Location Routing Number (LRN) capabilities is conducted first in a Preparation Stage and second in a Loading Stage. The schedule is specified by the transition coordinator. For an overview of the differences in customer capabilities between Phase 2.1 and this feature, refer to Table 5-I. For references to other feature documents identified in the planning, loading, and turn-on procedures for this feature, see Table 5-A.

Table 5-I. Transition Planning Overview

Customer Capability	Phase 2.1 Coverage	Feature 6330 Coverage
Outgoing Local/Toll Differentiation	LTD Logic in NCP	LTD logic in NCP
Outgoing Local (Inter *4ESS*™ switch)	ISUP DNHR Indicator sets LSI=LOCAL_ORIG. TAS routes call as local	ISUP DNHR Indicator sets LSI=LOCAL_ORIG. TAS routes call as local
Incoming Screening	Service Category in Interim LNP environment; No screening with LRN	LSI=LOCAL_TERM
Customer Trunks	CBN_DIGS field with LANI Parameter; MTSC for 8YY backhaul	CBN_DIGS field with LANI Parameter; MTSC for 8YY backhaul
Carrier Trunks	TOT=LSP_LOCAL	TOT=LSP_LOCAL
8YY (Outgoing)	8YY Carrier Screening	8YY Carrier Screening
SDN/PCP Features	Customer Option	Customer Option
LNP	LRN per Toll LNP per Feature 4216; See Table 5-A. Ported *4ESS* switch AT&T Digital Link customers using LRN treated as TSAA. Interim solutions	End Office LRN; Interim solutions
Signaling	SS7; MF only when required by FAR-END network	SS7; MF only when required by FAR-END network
Customer Recording/Billing	EBAF module added to local call records	EBAF module added to local call records
Access Billing	Real Access AMAs used	Real Access AMAs used.

Legend:

ANI - Automatic Number Identification
AMA - Automatic Message Accounting
DNHR - Dynamic Non-Hierarchical Routing
EBAF - Extended Bellcore AMA Formats
ISUP - ISDN User Part
LANI - Local ANI
LTD - Local Toll Differentiation
LNP - Local Number Portability
LRN - Location Routing Number
LSI - Local Screening Index
MF - Multifrequency
MTSC - Multiple Treatment Screening Class
NCP - Network Control Point
PCP - Positive Call Processing
SDN - Software Defined Network
SS7 - Signaling System Number 7
TAS - Terminating AT&T Switch
TOT - Type of Trunk
TSAA - Terminating Switched Access Arrangement

A. Preparation Stage

7.03 Prior to loading, the following preparation is required for this feature at the *4ESS* switches:

1. *4ESS* switch support for 4E22 Release 3 Generic Feature 4216 has been deployed in all *4ESS* switches.
2. The ON/OFF bit for Feature 4216 is set to ON in all *4ESS* switches.
3. A master LRN is assigned to each *4ESS* switch serving *4ESS* switch AT&T Digital Link customers populated in the Jurisdiction Information Parameter (JIP) as per Feature 5371.
4. Additional LRNs have been assigned to each *4ESS* switch serving *4ESS* switch Digital Link customers.

B. Loading Stage

7.04 As this feature is deployed in each *4ESS* switch, the following activities should occur:

1. The NPA-NXXs, from which, numbers are assigned by the LERG to each specific *4ESS* switch, are populated in the NPA-NXX Table in the *4ESS* switch.
2. The NPA-XXXs to be populated must include all NPA-NXXs that have been assigned to a *4ESS* switch since the start of Feature 5370.
3. The NPA-XXXs of the LRNs selected for all the *4ESS* switches are loaded in all the LRN Tables.
4. These LRNs must include all LRNs that have been assigned to the *4ESS* switches in the AT&T Switched Network since the implementation of LRN in the industry.
5. Once all *4ESS* switches have been upgraded to the 4E23 Release 2 Generic, the LRN_LOCAL bit can then be turned ON in all the *4ESS* switches.

Feature Interaction and Dependencies

7.05 This feature interacts with the LNP 2NCP and the Terminating Switched Access Arrangement (TSAA).

7.06 The deployment of this feature is dependent on the following associated features:

- Prior to the deployment of this feature, deployment is required for Feature 5371.
- Prior to, or in conjunction with the deployment of this feature, deployment is required for LNP with LRN for Feature 4216.

Feature Limitations

7.07 The following are limitations for this feature:

- When an Interexchange Carrier (IXC) is unable to perform Local Number Portability (LNP) processing, the IXC terminates a toll call to the LSP end office that is assigned the NPA-NXX of the destination number in the LERG. The LSP end office can then perform default routing (LNP processing) and charge the IXC for doing the LNP processing. For this feature, when AT&T is the IXC that is unable to perform LNP processing, the AT&T *4ESS* switch end office (EO) does not attempt to perform default routing under the following conditions:
  - — Inability to access the LNP Network Control Point (NCP)
  - — Inability to receive a response from the LNP NCP
  - — Terminating Local Service Provider (LSP) is an AT&T *4ESS* switch EO.

  Special requirements to handle this situation have not been pursued since the unavailability of accessing a mated LNP NCP pair due to unplanned downtime of the STPs or the NCP is only 3.88 minutes per year.
- There is no capability to send the CPN as the ANI on LSP_LOCAL Multifrequency (MF) trunks.

Feature Activation

A. Turning On or Off Using RC Form 809

7.08 The LRN_LOCAL processing is activated or deactivated using RC Form 809 and by populating the FEATURE ITEM field with **PF36** and setting the ON OR OFF field to either **ON** or **OFF**. To activate the feature set the ON OR OFF field to **ON**.

NOTE:
Feature 4216, Number Portability with Location Number Routing, must also have been activated (PF29 set to **ON**).

To deactivate the feature, set the ON OR OFF field to **OFF.** The default is OFF.

7.09 The Local Number Portability (LNP) with LRN feature is activated or deactivated by populating the FEATURE ITEM field with **PF29** and setting the ON OR OFF field to **ON**. To deactivate the feature, set the ON OR OFF field to **OFF**. The default of this item is OFF.

NOTE:
With **PF29** entered in the FEATURE ITEM field and **OFF** entered in the ON OR OFF field, automatic provisioning occurs and the PF36 field (LRN_LOCAL processing) is set to **OFF** automatically.

B. Turning On or Off Using Absolute Word Change

7.10 This feature can also be turned on or off by an absolute word change. Item OD4PF36 in ODA structure OD4OFCCOPY2 is the office parameter that controls the state of the feature.

CAUTION:
The OD4OFCCOPY2 structure also contains the on/off bits for many other features. Be certain that any changes you make affect this feature only.

7.11 The following is the information needed to turn ODA bit OD4PF36 on or off using the absolute word change:

- Structure: OD4OFCCOPY2
- Core Address in 4E23 Generic: 7126221
- Size of OD4PF36: 1
- Displacement: 13 (octal)
- On: 1
- OFF: 0.

C. New Automatic-Off Provisioning Using Absolute Word Change

7.12 New automatic-off provisioning has been added to ensure that the LRN_LOCAL processing indicator is turned off if LNP is turned off. The OD4PF29 parameter was assigned in Feature 4216 to indicate whether or not LNP with LRN is active. The de-activation or population rules for this parameter have been modified with this feature.

7.13 The automatic-off provisioning can be turned on or off by an absolute word change. Item OD4PF29 in ODA structure OD4OFCCOPY2 is the office parameter that controls the state of the LNP ON/OFF modification.

CAUTION:
The OD4OFCCOPY2 structure also contains the on/off bits for many other features. Be certain that any changes you make affect this feature only.

7.14 The following is the information needed to turn ODA bit OD4PF29 on or off using the absolute word change:

- Structure: OD4OFCCOPY2
- Core Address in 4E23 Generic: 7126221
- Size of OD4PF29: 1
- Displacement: 4
- On: 1
- OFF: 0.

8. Input/Output Manual Pages

8.01 The following Input/Output Manual pages were modified to support this feature:

- **VER:MISC** (input)
- **VER:MISC-LRNASN** (output)
- **VER:MISC-FHTLRGN** (input and output).

MESSAGE ID	VER:MISC
WORK CENTER	MAC, MOC
GENERIC	4E22 Rel. 4 and later
CLASS	VER MESSAGE
APPLICATION	4E
TYPE	Input

1. **PURPOSE**

   This is a general purpose input message which requests specific information based upon the input to the **MISC** keyword.

   Format [1] requests carrier identification code data.

   Format [2] requests the status of internal feature bits, proprietary, and non-proprietary feature indicators.

   Format [3] requests Advanced Intelligent Network (AIN) data.

   Format [4] requests the service identity set for hourly End-to-End Class Of Service (ECOS) traffic data.

   Format [5] requests the service identity set for hourly Real Time Network Routing (RTNR) traffic data.

2. **FORMAT**

[1]	**VER:MISC CIP:CIN** *a***!**
[2]	**VER:MISC ONOFF!**
[3]	**VER:MISC AINITM!**
[4]	**VER:MISC SISHER!**
[5]	**VER:MISC SISHRR!**

3. **EXPLANATION OF MESSAGE**

CIP	Requests carrier identification code data for the input Circuit Identification Number (CIN). The **CIN** keyword must be input when Carrier Identification Parameter (**CIP**) is input.
a	Circuit Identification Number (**CIN**). Specified to output the carrier identification codes for a given CIN.
ONOFF	Requests the status of internal feature bits, proprietary, and non-proprietary feature indicators.

AINITM	Requests Advanced Intelligent Network data.
SISHER	Requests the service identity set for hourly End-to-End Class Of Service (ECOS) traffic data.
SISHRR	Requests the service identity set for hourly Real Time Network Routing (RTNR) traffic data.

4. **SYSTEM RESPONSE**

NA	Not Accepted.
PF	Printout Follows.

5. **REFERENCES**

PIDENTs
IOCPIMC4
VRFYCNTL
VRFYINPT
VRFYMISC

Output Messages
VER:MISC-AINITM
VER:MISC-ONOFF
VER:SISETHER
VER:SISETHRR
VER:TSG-CICS

MESSAGE ID	VER:MISC-LRNASN
WORK CENTER	MAC, MOC
GENERIC	4E23 Rel. 2 and later
APPLICATION	4E - Proprietary
TYPE	Output

1. **FORMAT**

   VER:MISC;OPT(LRNASN) [;RES]:

   NPA NXX ASN

   aaa, bbb, c,

2. **REASON FOR OUTPUT**

   To display the Local Routing Number (LRN) assignment data.

3. **VARIABLE FIELD DEFINITIONS**

a	Numbering Plan Area (*NPA*).
b	Exchange Number (*NXX*).
c	Assignment data:
	O— Other
	R— Resident

4. **ACTION TO BE TAKEN**

   None.

5. **REFERENCES**

   PIDENTs
   IOCPPVR4
   VRFYCNTL
   VRFYINPT
   VRFYMISC
   VRFYOUT

   Input Message
   VER:MISC

MESSAGE ID	VER:MISC-FHTLRGN
WORK CENTER	MAC, MOC
GENERIC	4E23 Rel. 2 and later
CLASS	VER MESSAGE
APPLICATION	4E - Proprietary
TYPE	Input

1. **PURPOSE**

   To output the 6 digit NPA-NXX Local Exchange Routing Guide Numbers (LRGNs).

   Format [1] when used will output all of the populated LRGN entries.

   Format [2] when used will output all populated LRGN entries which begin with the Numbering Plan Area (NPA) number input in the format.

   Format [3] is used to determine if the input three digit NPA and three digit Office Code (NXX) number has been populated in the LRGN tables.

2. **FORMAT**

   [1] **VER:MISC:FHT LRGNASIGN!**

   [2] **VER:MISC:FHT LRGNASIGN,DIG** ***aaa*****!**

   [3] **VER:MISC:FHT LRGNASIGN,DIG** ***bbbbbb*****!**

3. **EXPLANATION OF MESSAGE**

aaa	Three digit level entry NPA.
bbbbbb	Six digit level entry NPA NXX. Three digit NPA and three digit NXX.

4. **SYSTEM RESPONSE**

PF	Printout Follows.

5. **REFERENCES**

   PIDENTs
   IOCPIMC4
   VRFYMSCM

   Output Message
   VER:MISC-FHTLRGN

MESSAGE ID ..... VER:MISC-FHTLRGN
WORK CENTER ..... MAC, MOC
GENERIC ..... 4E23 Rel. 2 and later
APPLICATION ..... 4E - Proprietary
TYPE ..... Output

1. **FORMAT**

   VER:MISC:FHT LRGNASIGN:

   NPA NXX

   aaa-bbb
   aaa-bbb
   aaa-bbb
   . .
   . .
   . .

2. **REASON FOR OUTPUT**

   To display the Local Exchange Routing Guide Numbers (LRGNs).

   Up to 20 entries can be output per segment. Up to 40 segments may be printed if a request has been received to output all populated entries and the maximum number of entries (800) have been populated.

3. **VARIABLE FIELD DEFINITIONS**

aaa	Three digit level entry Numbering Plan Area (*NPA*).
bbb	Three digit Office Code (NXX).

4. **ACTION TO BE TAKEN**

   None.

5. **REFERENCES**
   PIDENTs
   VRFYMSCM

   Input Message
   VER:MISC-FHTLRGN

Release Summary—4E23 Release 2 Generic

6

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Release Summary—4E23 Release 2 Generic

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1. Growth and Retrofit Documents

1.01 The *4ESS* switch Growth and Retrofit Planning Group reports that the new features in the 4E23 Release 2 have no impact on the Growth and Retrofit documents.

2. Input/Output Messages

2.01 The following lists include the input and output messages for the 4E23 Release 2 Generic. A notation is included indicating whether each message is new, revised, or deleted.

- 4E23R2 Input Messages (IM-4B000-01)
  - IM rmv:sfi REV
  - IM rst:sfi REV
  - IM test:sd DEL
  - IM test:sfi REV
  - IM ver:misc REV
- 4E23R2 Output Messages (OM-4B000-01)
  - OM rept:iaofc REV
  - OM rept:iaofc REV
  - OM rept:iatsg REV
  - OM rmv:sfi REV
  - OM rst:sfi REV
  - OM test:sd DEL
  - OM test:sfi REV
  - OM ver:sd REV
  - OM ver:sisether NEW
  - OM ver:sisethrr NEW

- Proprietary Input Messages
  - — PIM test:sd NEW
  - — PIM test:tcapdsd REV
  - — PIM ver:misc REV
  - — PIM ver:misc-fhtlrgn NEW
- Proprietary Output Messages
  - — POM rept:iaofc REV
  - — POM rept:iaofc REV
  - — POM rept:iatsg REV
  - — POM test:sd NEW
  - — POM test:tcapdsd REV
  - — POM ver:misc-fhtlrgn NEW
  - — POM ver:misc-lrnasn NEW
- 4AP16R2 Input Messages
  - — IM load:gulp NEW
  - — IM upd:appdl NEW
- 4AP16R2 Output Messages
  - — OM load:gulp NEW
  - — OM rept:tdas REV
  - — OM upd:appdl NEW

3. OS Interfaces

NOTE: The information in this item is based on the Project Plan and the Product Release Document for this release.

3.01 Several features in this release interface with Operation Support Systems (OSSs). The following are any interfaces with AMA, DARICS, IRAS, MACOSS, NEMOS, RICS, TDAS, and TOPAS. The items shown are based on the references in the Product Release Document (PRD) for the 4E 23 Release 2 Generic.

- 4880a DARICS, NEMOS
- 5538 AMA, DARICS
- 5918 RICS
- 6137 NEMOS
- 6330 AMA

4. New or Changed Alarms

NOTE: The information in this item is based on the features documented in the Product Release Document for this release.

4.01 There are no new alarms related to the features documented in the Product Release Document for the 4E23 Release 2 Generic.

5. Measurements/OSOR

The information in this item is based on the features documented in the current Product Release Document.

5.01 The measurements related to Feature 4880a, Segmentation Directory Phase 2, Release 2, are the same as those for Feature 4880, Segmentation Directory Phase, Release 1, which was introduced in the 4E23 Release 1 Generic.

5.02 Feature 5538 affects the handling of Trunk Sub-Group measurements that are generated for access by DEMS/DARICS. Those measurements include the value of the new FELN TSG parameter.

6. Feature Activation Summary

6.01 The following is a summary of how the features documented in the Product Release Document for this release are activated.

- **Feature 4880a—Segmentation Directory Phase 2 Release 2**

  The Segmentation Directory Phase 1 Feature (4564) must be activated for this feature to be used.

  In order for the new services in Release 2 to receive Segmentation Directory treatment, SDTRS02 (SDN) and SDTRS03 (SDS) must be manually provisioned to SMO via RC 810.

  Entries can only be populated if this is an AT&T office (that is, OD4OPTSD in word OD4OPT is 4ODOPT_YES).

- **Feature 5538—End Office Local Nodal**

  This feature is activated by an on/off bit with Recent Change Form 809. It can also be activated by an absolute word change.

REL	ON/OFF	ODA Word	Field Name	Address	Disp&Size
4E23	RC 809	OD4OFCCOPY2	OD4PF37	7126221	H=14 (octal), S=1

- **Feature 5918—Inband Q. 931 Signaling for Carrier Solutions**

  This feature is activated by an on/off bit with Recent Change Form 809. It can also be activated by an absolute word change.

REL	ON/OFF	ODA Word	Field Name	Address	Disp&Size
4E23	RC 809	OD4OFCCOPY2	OD4PF52	7126222	H=3, S=1

- **Feature 6137—MR to DECOS: New RLI and Route Control**

  This feature is turned on automatically by software deployment. This feature will not affect ingress/egress routing until an AREA is defined and activated on a Trunk Sub-Group.

- **Feature 6330—*4ESS* Switch AT&T Digital Link Location Routing Number Capability**

  This feature is activated by an on/off bit with Recent Change Form 809. It can also be activated by an absolute word change.

REL	ON/OFF	ODA Word	Field Name	Address	Disp&Size
4E23	RC 809	OD4OFCCOPY2	OD4PF36	7126221	H=13 (octal),S=1

Abbreviations and Acronyms

2DSA
2 Direct Service ANI

2NCP
2 Network Control Point

A

ADL4
AT&T Digital Link Phase IV

ADR
Alternate Destination Routing

ALEC
Alternative Local Exchange Carrier

ALN
AT&T Local Nodal

AMA
Automatic Message Accounting

ANI
Automatic Numbering Identification

APN
Action Point Number Plan

ASN
AT&T Switched Network

ASTN NI
Alternate Signaling Transport Network-Network Interconnect

AVA
Access Value Arrangement

B

BCR
Bearer Capability Requested

C

CADCR
Centralized Alternate Direct Call Routing

CAPS
Competitive Access Providers

CATV
Community Antenna Television

CCLI
Common Language Location Identifier

CdPN
Called Party Number

CIP
Carrier Identification Parameter

CLECS
Certified Local Exchange Carriers

CLLI
Common Language Location Identifier

COS
Class Of Service

COS/RTNR
Class of Service/Real Time Network Routing

CPN
Calling Party Number

CSN
Carrier Solutions Nodal

D

DA
Directory Assistance

DARICS
Data Acquisition Reports and Integrated Communications System

DAS
Digit Analysis Selector

DECOS
Domestic End to End Class of Service

DEMS
Dynamic Engineering Mechanized System

DEV
Dedicated Egress Voice

DLN
Data Link Node

DN
Directory Number

DNHR
Dynamic Non-Hierarchical Routing

DSD
Direct Services Dialing

E

EO
End Office

ERPI
ECOS Routing Pattern Identity

ERPI
End-to-End Class of Service RPI

F

FCI
Forward Call Indicator

FELN
Far End AT&T Local Network

FEN
Far End Network

FITR
Forced InterToll Routing

G

GAP
Generic Address Parameter

GFMS
Global Fraud Management System

GOP
Generic Operation Parameter

I

IAM
Initial Address Message

ICT
Incoming Trunk

IECOS
International End to End Class of Service

ISUP
Integrated Services Digital Network User Part

ITN
Integrated Test Network

IXC
Interexchange Carrier

J

JIP
Jurisdiction Information Parameter

L

LANI
Local ANI

LEC
Local Exchange Carrier

LERG
Local Exchange Routing Guide

LNP
Local Number Portability

LRN
Location Routing Number

LSI
Local Screening Index

LSP
Local Service Provider

LTD
Local Toll Differentiation

M

MCRI
Modular Capability Route Index

MR
Modification Request

MRTT
Multiple Routing Treatment Table

N

NAI
Network Access Interrupt

NANP
North American Numbering Plan

NCC
Network Control Center

NCP
Network Control Point

NEMOS
Network Management Operations System

NESAC
National Electronic Switching Assistance Center

NM
Network Management

NSN
Network Switch Number

O

OAS
Originating AT&T Switch

OLI
Originating Line Information

ORNU
Order Number

OSPS
Operator Service Position System

OST
Originating Station Type

P

PBX
Private Branch Exchange

PCP
Positive Call Processing

PIC
Preferred Interexchange Carrier

PMO
Present Mode of Operation

PRD
Product Release Document

R

RC
Recent Change

RDB
Routing Data Block

RDBI
Routing Data Block Index

RPI
Routing Pattern Index

S

SAC
Service Access Code

SASS
Switching Administration Support System

SD
Segmentation Directory

SDDN
Software Defined Data Network

SDI-CSR
Switched Digital International Carrier Specific Routing

SDN
Software Defined Network

SDS
Switched Digital Services

SDTT
Segmentation Directory Transition Type

SFG
Simulated Facility Group

SI
Service Identity

SII
Service Identity Index

SMO
Segmentation Directory Mode of Operation

SRAS
Special Routing Arrangement Service

SS7
Signaling System Number Seven

SST
Signaling Service Type

T

TAS
Terminating AT&T Switch

TC
Transport Capability

TFEDS
Toll Fraud Early Detection

TOT
Type of Trunk

TSAA
Terminating Switched Access Arrangement

TSG
Trunk Sub-Group

TTM
Trunk Type Modifier

U

UGTT
Universal Global Title Translation

USI
User Service Information

W

WATS
Wide Area Telecommunications Service