
Meridian 1

Option 11C

1.5 Mb DTI/PRI Administration and Maintenance guide

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About this guide

This guide describes Integrated Services Digital Network (ISDN) for the Option 11C systems. It is written for Option 11 ISDN planning, installation, and maintenance staff.

Note: This document is intended to support the Meridian 1 Option 11. When only the term “Meridian 1” is referenced, it is meant to include all members of the Meridian 1 family (Meridian 1 Option 11C through Option 81C). Similarly, when a Meridian 1 is depicted in an illustration, it is intended to signify a Meridian 1 Option 11 through Option 81C.

According to the CCITT, ISDN is comprised of two interfaces:

- Primary Rate Interface (PRI)
- Basic Rate Interface (BRI)

This guide describes ISDN PRI only. ISDN Basic Rate Interface is described in *ISDN BRI Administration and Maintenance* 553-3011-311.

An overview is provided of ISDN features and interfaces, including the following:

- network clocking
- hardware and software implementation and maintenance
- Basic and Network Alternate Route Selection (BARS/NARS)
- network queuing

On Option 11 systems, ISDN is provided by the NTAK09 1.5 Mb DTI/PRI. In addition to ISDN PRI, this guide describes Digital Trunk Interface (DTI) and ISDN Signalling Link (ISL).

Chapter 1 — ISDN Interfaces: DTI and PRI

Overview of ISDN

Integrated Services Digital Network (ISDN) is a global networking strategy that provides a single, intelligent, universal network for voice and data communications. ISDN is a set of international standards that define the next generation of digital networking services.

Some of the benefits of ISDN are as follows:

- faster, more accurate, noise-free transmission, as well as greater security and reliability
- ability to carry multiple information types, including speech, data, image, and video
- standard interfaces to allow multi-vendor compatibility
- configuration flexibility when combining public and private networking facilities.

ISDN differs from traditional communication in that it uses “out-of-band” signaling. Signals are sent and received on a dedicated D-channel, leaving the remaining channels, called B-channels, free for voice and data.

Digital Trunk Interface

Digital Trunk Interface (DTI) pre-dates ISDN and Primary Interface (PRI). It is used for connections between PBX systems, or between a PBX and a Central Office. DTI may or may not be associated with ISDN features and functionalities.

This networking arrangement, like PRI, makes use of a digital carrier with 24 channels (T-1) instead of using dedicated trunks. Unlike PRI, DTI uses “in-band” signaling instead of using a D-channel.

In DTI, “A” and “B” bits are used to imitate traditional trunk signaling (ground start, loop start, and so on). These signaling bits rob bits from B-channels, reducing the number of bits available for voice and data from 64 K to 56 K.

Table 1 shows the impact that out-of-band (PRI) signaling versus in-band (DTI) signaling has on data transmission.

Table 1
DTI and PRI data transmission

Data Transmission Types	DTI	PRI
Asynchronous	up to 19.2 kbps	up to 19.2 kbps
Synchronous	up to 56 kbps	up to 64 kbps

ISDN interfaces

Meridian 1 Networking currently supports three forms of ISDN network interfaces:

- 23B+D Primary Rate Interface (23B+D PRI)
- nB+D Primary Rate Interface (nB+D PRI)
- nB+D ISDN Signaling Link Interface (nB+D ISL)
- 2B+D Basic Rate Interface (2B+D BRI)

Note: As noted earlier, this document does not contain information on ISDN BRI - this is information is contained in the *ISDN BRI Administration and Maintenance* 553-3011-311.

Primary Rate Interface

Primary Rate Interface is characterized by digital carriers and out-of-band signaling. All signaling is done over a D-channel, leaving the remaining B-channels free for voice and data transmission. The D-channel carries all the call set-up, call tear-down, calling line identification, and feature activation information.

PRI is referred to as either “23B+D” or “nB+D”. This distinction is based on the fact that one D-channel can support multiple digital carriers. In other words, the choice exists to have one D-channel per digital carrier, or to have one D-channel support a number of carriers.

23B+D Primary Rate Interface

In the 23B+D PRI arrangement, each digital carrier has its own D-channel. The first 23 channels are used for voice and data, while the 24th channel is always used as the D-channel. Voice and data channels are “clear”, meaning all 64 K are used for voice and data transmission.

Figures 1 and 2 describe 23B+D Primary Rate Interface.

Figure 1
The 23B+D PRI Structure

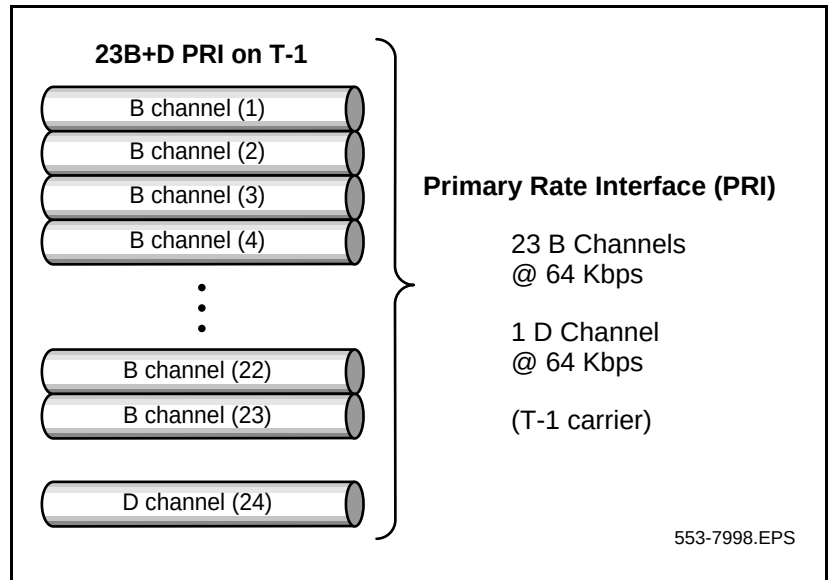
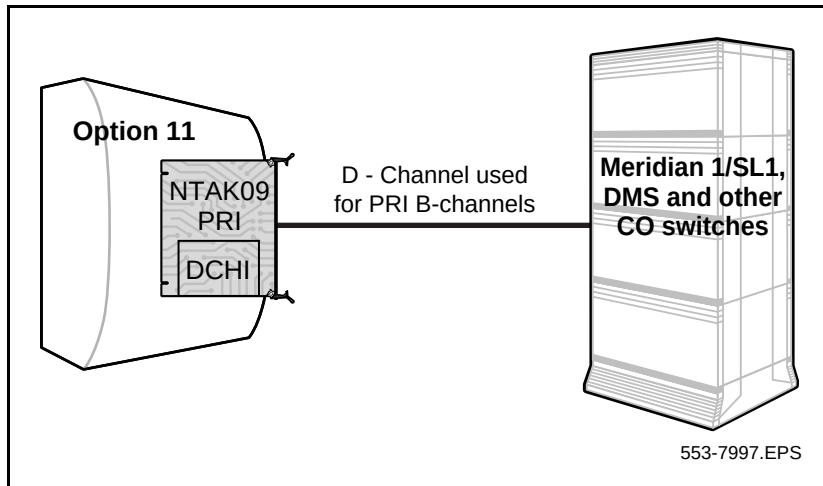


Figure 2
23B+D PRI to the Network



Note: DCHI stands for D-Channel Handler Interface.

nB+D Primary Rate Interface

In an nB+D PRI arrangement, one D-channel supports multiple digital carriers. A back-up D-channel is usually recommended when one D-channel is supporting a large number of channels.

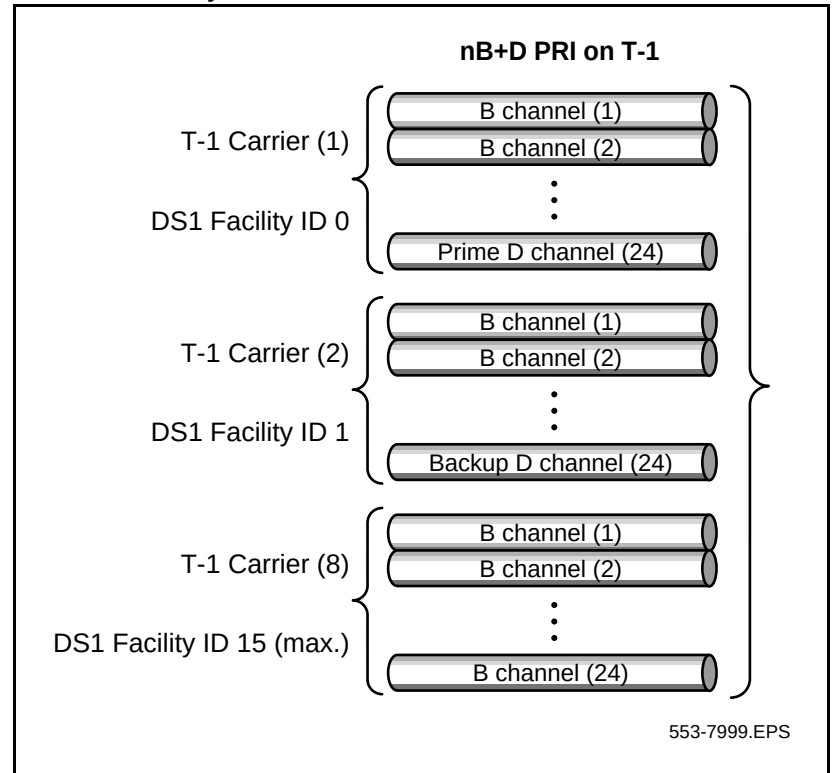
Note: CCITT currently specifies the PRI layer 1 protocol as a 23 + B structure. Layer 3 (Q.931), however, supports a larger PRI made up of multiple DS1 facilities.

On the Option 11 system, n (from nB+D) can be as large as 190 when a backup D-channel is present. This number is calculated as follows:

- One D-channel can support up to 8 carriers.
Number of channels: $24 \times 8 = 192$ B-channels.
- Two of these channels are used as D-channels; one as a primary D-channel and one as a backup D-channel.
Total B-channels: $192 - 2 = 190$ B-channels.

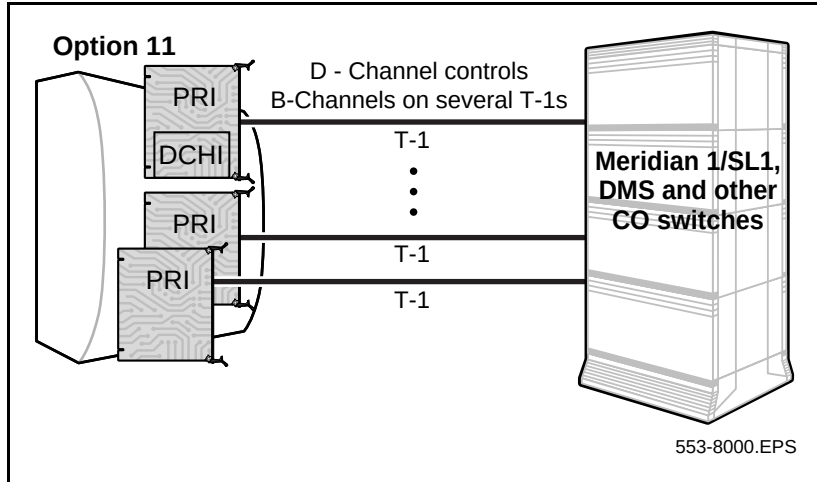
Figures 3 and 4 illustrate an nB+D PRI structure.

Figure 3
The nB+D Primary Rate Interface Structure



Note: Option 11 supports the same range of Facility IDs (0 to 15) as other Meridian 1 and SL-1 systems. The Option 11, however, is physically limited to a maximum of 8 DS1 facilities and 190 B-channels. The primary D-Channel will always have a Facility ID of 0, and the backup D-Channel a Facility ID of 1.

Figure 4
nB+D PRI to the Network



Possible PRI network configurations

The Meridian 1 Option 11 DTI/PRI can interface with the following systems (see Figure 2):

- other Meridian 1 systems (including Meridian 1/SL-1 and SL-100)
- DMS-100 systems
- DMS-250 systems
- AT&T #4ESS and #5ESS systems
- other devices that support a standard Q.931 protocol.

Chapter 2 — ISDN features

ISDN allows us to create a truly intelligent network based on its out-of-band signaling and intelligent messaging. New features have been developed to take advantage of these new capabilities. In addition, many existing features which were previously limited to Meridian 1/SL-1 internal uses have only now been expanded to the entire network. We refer to this as Network-wide feature transparency.

Features such as Calling Line Identification are now network wide features and can be sent to and received from other Meridian 1/SL-1 systems and DMS-100 central offices.

ISDN is an evolving product and new releases of software will introduce additional feature capability and connectivity.

This chapter will describe every ISDN related feature, and identify the required software packages for each feature, as well as provide operating parameters and feature interactions. Implementation procedures are described in Chapter 9 - ISDN Feature Implementation.

1.5/2.0 Mbps Gateway

For digital connectivity, via both Digital Trunk Interface (DTI) and Primary Rate Interface (PRI), North America uses 1.5 Mbps carriers programmed as Pulse Code Modulation Companding u-Law. Internationally, in places like Europe, 2.0 Mbps carriers programmed as Pulse Code Modulation Companding A-Law are used. To interconnect these two types of switches, gateways are used. A gateway switch performs conversion from A-Law to u-Law, and u-Law to A-Law.

The North America 1.5/2.0 Mbps Gateway feature provides support for the 1.5/2.0 Mbps gateway functionality in the North American market, by introducing software and hardware into North America that is already being deployed in International markets. This feature allows a Meridian 1 PBX to act as a gateway between a 1.5 Mbps Meridian 1 or Central Office switch programmed as u-Law, and a 2.0 Mbps Meridian 1 or Central Office switch programmed as A-Law. The Meridian 1 performs the conversion from A-Law to u-Law, and u-Law to A-Law.

Note 1: For a Meridian 1 to Meridian 1 connectivity, both switches must be running Release 24 software (in LD 17, the RLS prompt must be set to 24).

Note 2: This feature performs conversion from A-Law to u-Law, and u-Law to A-Law. It does not provide interworking between the T-1 and E-1 protocols. Only those features that are equipped on either side of the gateway will be supported transparently across the gateway.

The 2.0 MBit (E-1) in North America capability allows an added bandwidth capability to current Meridian 1 PBX customers, by introducing software and hardware into North America that is already being deployed in International markets. The Bearer channel (B-Channel) capability for PRI voice and data is increased from 23 to 30, and the A/B channels for DTI voice and data is increased from 24 to 30. For an nB+D configuration (nB+D is only supported in an MCDN environment, and not supported by QSIG), the B-Channel capability is 480.

The 2.0 MBit (E-1) in North America capability only applies to “closed campus” environments, supporting only Meridian 1 to Meridian 1 connectivity over the following interface types:

- SL1 (MCDN)
- ETSI (European Telecommunications Standard Institute)
- ETSI QSIG (European Telecommunications Standard Institute QSIG)
- ISIG QSIG (International Standards Organization QSIG)

Back-up D-Channel and nB+D are only supported in an MCDN environment (IFC type of SL1).

The North America 1.5/2.0 Mbps Gateway feature supports the following interfaces:

- SL1
- SL100
- D100
- D250
- ISIG
- ESIG
- ISGF
- ESGF

This feature is supported on large systems (Meridian 1 Options 51C, 61C, 81, and 81C), and on the small system (Meridian 1 Option 11C).

2.0 MBit/s hardware introduced into North America

To support the North America 1.5/2.0 Mbps Gateway feature, the following existing 2.0 Mbps cards have been introduced in North America.

For PRI2 on Meridian 1 large systems (Options 51C, 61C, 81, 81C):

- NT5D97AA Dual-port DTI2/PRI2 card (in PRI2 mode)
- NTBK51AA Downloadable D-Channel Daughterboard

Note: Please note the vintage requirement of the NTBK51 card. Only one version, the NTBK51AA, can be used with the DDP2 cards. The newer NTBK51BA version has only 30+30 pin connectors (instead of 40+30 pins in the AA version). The missing 10 pins in the BA version prohibits usage of port 0 on the DDP2 card. As shown below, the NTBK51BA is used on the Option 11C, with the NTBK50AA PRI2 card.

For DTI2 on Meridian 1 large systems (Options 51C, 61C, 81, 81C):

- NT5D97AA Dual-port DTI2/PRI2 card (in DTI2 mode)

For PRI2 on the Meridian 1 small system (Option 11C):

- NTBK50AA PRI2 card
- NTBK51BA Downloadable D-Channel Daughterboard, used by the NTBK50AA PRI2 card

For DTI2 on the Meridian 1 small system (Option 11C):

- NTAK10DB DTI2 card

The tables that follow summarize the PRI2 and DTI2 hardware requirements and compatibility.

Note: Please note the following when configuring a Clock Controller. For both large and small systems, either a Stratum 3 or a Stratum 4 Clock Controller is supported, depending on specific country requirements.

Table 2
Large systems (Options 51C, 61C, 81, 81C) PRI2 hardware compatibility

PRI2 card	D-Channel Handling	Clock Controller*
NT5D97AA in PRI2 mode	NT6D80 MSDL NT6D11AB/BA/AF external DCHI card NTBK51AA Downloadable D-Channel Daughterboard	QPC471 card (Stratum 3) QPC775 card (Stratum 4)
* Depending on specific country requirements, either Stratum 3 or Stratum 4 Clocking can be supported.		

Table 3
Large systems (Options 51C, 61C, 81, 81C) DTI2 hardware compatibility

DTI2 card	D-Channel Handling	Clock Controller*
NT5D97AA in DTI2 mode	Not Applicable	QPC471 card (Stratum 3) QPC775 card (Stratum 4)
* Depending on specific country requirements, either Stratum 3 or Stratum 4 Clocking can be supported.		

Table 4
Small system (Options 11C) PRI2 hardware compatibility

PRI2 card	D-Channel Handling	Clock Controller*
NTBK50AA	NTBK51BA downloadable D-Channel Daughterboard NTAK93 D-Channel Handler Interface Daughterboard	NTAK20BD Daughterboard (Stratum 3)
* Depending on specific country requirements, either Stratum 3 or Stratum 4 Clocking can be supported.		

Table 5
Small system (Options 11C) DTI2 hardware compatibility

PRI2 card	D-Channel Handling	Clock Controller*
NTAK10DB	Not Applicable	Integrated CC (Stratum 4)
* Depending on specific country requirements, either Stratum 3 or Stratum 4 Clocking can be supported.		

Hardware installation

For information on how to install the NT5D97AA Dual-port DTI2/PRI2 card, and the NTB51AA DDCH card on large systems (Options 51C, 61C, 81, and 81C), please refer to Nortel Publication 553-2901-212 *NT5D97 Dual-port DTI2/PRI2 Card Product description and installation*. Also refer to this publication for information on Clocking.

For information on how to install the NTB50AA PRI2 card, the NTAK10AA DTI2 card, the NTB51BA DDCH card, and the NTAK20AA Clock Controller on the small system (Option 11C), please refer to Nortel Publication 553-3011-315 *2.0 MBit DTI/PRI Administration and Maintenance Guide*.

2.0 MBit/s software introduced into North America

To support the North America 1.5/2.0 Mbps Gateway feature, the following existing 2.0 MBit/s software packages have been introduced in North America.

- 2.0 MBit/s Digital Trunk Interface (DTI2) package 129
- 2.0 MBit/s Primary Rate Interface (PRI2) package 154
- International ISDN Supplementary Features (ISDN INTL SUPP) package 161
- International Gateway (GPRI) package 167
- International Primary Rate Access (IPRA) package 202
- International nB+D (INBD) package 255, as an optional package for nB+D applications

Note: The following packages are required as prerequisites:

- Digit Display (DDSP) package 19
- Digital Trunk Interface (DTI) package 75
- Integrated Services Digital Network (ISDN) package 145

Conversion scenarios

Scenario 1 - Gateway u-Law Meridian 1 connected to A-Law Meridian/CO over an A-Law 1.5 Mbps connection

A North America (1.5 Mbps) Meridian 1 PBX, programmed as u-Law, is connected to an International (2.0 Mbps) Meridian 1 PBX, programmed as A-Law. The connection is over an A-Law 1.5 Mbps DTI/PRI link.

In this scenario, the conversion from A-Law to u-Law, and u-Law to A-Law, is done at the Meridian 1 programmed as u-Law. It is this Meridian 1 PBX that acts as the 1.5/2.0 Mbps gateway.

Scenario 2 - Gateway u-Law Meridian 1 connected to A-Law Meridian/CO over an A-Law 2.0 Mbps connection

A North America (1.5 Mbps) Meridian 1 PBX, programmed as u-Law, is connected to an International (2.0 Mbps) Meridian 1 PBX, programmed as A-Law. The connection is over an A-Law 2.0 Mbps DTI/PRI link.

In this scenario, the conversion from A-Law to u-Law, and u-Law to A-Law, is done at the Meridian 1 programmed as u-Law. It is this Meridian 1 PBX that acts as the 1.5/2.0 Mbps gateway.

Scenario 3 - Gateway A-Law Meridian 1 connected to u-Law Meridian/CO over an u-Law 1.5 Mbps connection

An International (2.0 Mbps) Meridian 1 PBX, programmed as A-Law, is connected to a North America (1.5 Mbps) Meridian 1 PBX, programmed as u-Law. The connection is over a u-Law 1.5 Mbps DTI/PRI link.

In this scenario, the conversion from A-Law to u-Law, and u-Law to A-Law, is done at the Meridian 1 programmed as A-Law. It is this Meridian 1 PBX that acts as the 1.5/2.0 Mbps gateway.

Scenario 4 - Gateway A-Law Meridian 1 connected to u-Law Meridian/CO over an u-Law 2.0 Mbps connection

An International (2.0 Mbps) Meridian 1 PBX, programmed as A-Law, is connected to a North America (1.5 Mbps) Meridian 1 PBX, programmed as u-Law. The connection is over a u-Law 2.0 Mbps DTI/PRI link.

In this scenario, the conversion from A-Law to u-Law, and u-Law to A-Law, is done at the Meridian 1 programmed as A-Law. It is this Meridian 1 PBX that acts as the 1.5/2.0 Mbps gateway.

Operating parameters

There are no operating parameters for this feature.

Feature interactions

There are no feature interactions for this feature. ISDN networking features will function transparently across the gateway if the dialing plans are consistent on both sides of the gateway.

Feature operation

No specific operating procedures are required to use this feature.

510 Trunk Route Member Expansion

The 510 Trunk Route Member Expansion feature allows a customer to configure a maximum of 510 trunk route members per route (range 1-510). The previous maximum was 254 (range 1-254).

The need for this expansion was particularly evident for a Meridian 1 to DMS Central Office connectivity, where the full potential of a T-1 nB+D configuration (384 B-Channels) was not able to be realized. The DMS supports one D-Channel per route. With a limit of 254 route members per D-Channel, this meant that the maximum offered by nB+D could not be utilized.

With the 510 Trunk Route Member Expansion feature implemented, when connecting a Meridian 1 to another Meridian 1, or a Meridian 1 to a DMS Central Office PBX, users now have greater flexibility when configuring their systems.

For a Meridian 1 to Meridian 1 connectivity, a user is now able to configure, on one trunk route, one D-Channel with 382 B-Channels, a Backup D-Channel, and a second D-Channel with another 128 B-Channels. If desired, another Backup D-Channel may be configured. Refer to Figure 5. For a Meridian 1 to DMS connectivity, a user may now configure the full complement of nB+D, which is one D-Channel with 382 B-Channels, and a Backup D-Channel. Refer to Figure 6.

This feature applies to the following trunk mode configurations:

- PRI mode
- DTI mode
- Shared mode
- Virtual Network Services (VNS)
- ISL mode
- Analog mode

The following trunk types are supported:

- ISA (Integrated Services Access)
- CBCT (NI-2 Call By Call Service Selection)
- COT (Central Office)
- TIE
- DID (Direct Inward Dial)
- FEX (Foreign Exchange)
- FGDT (Feature Group D)
- WATS (Wide Area Telecommunications Service)

The overlay programs that are affected are:

- LD, 14, the Trunk Data Block
- LD, 16 the Route Data Block

Maintenance routines are also affected. For the Call Trace LD 80, the TRAC c r m (trace calls, customer c, member m) is modified to allow “member” input from 1 to 510.

For the Automatic Trunk Maintenance LD 92, the ATMR c r m (Test customer c, route r, member m) is modified to allow “member” input from 1 to 510.

For traffic measurements, in the Customer Traffic Measurement Output report TFC002, the total number of trunks for the “Trunks Equipped” and “Trunks Working” fields has been increased to a maximum of 510.

In the CDR output format, the Originating Identification (ORIGID) and Terminating Identification (TERID) fields now displays the trunk route member field in the range 1-510.

Figure 5
510 trunk members expansion configured for a Meridian 1 to Meridian 1 connectivity

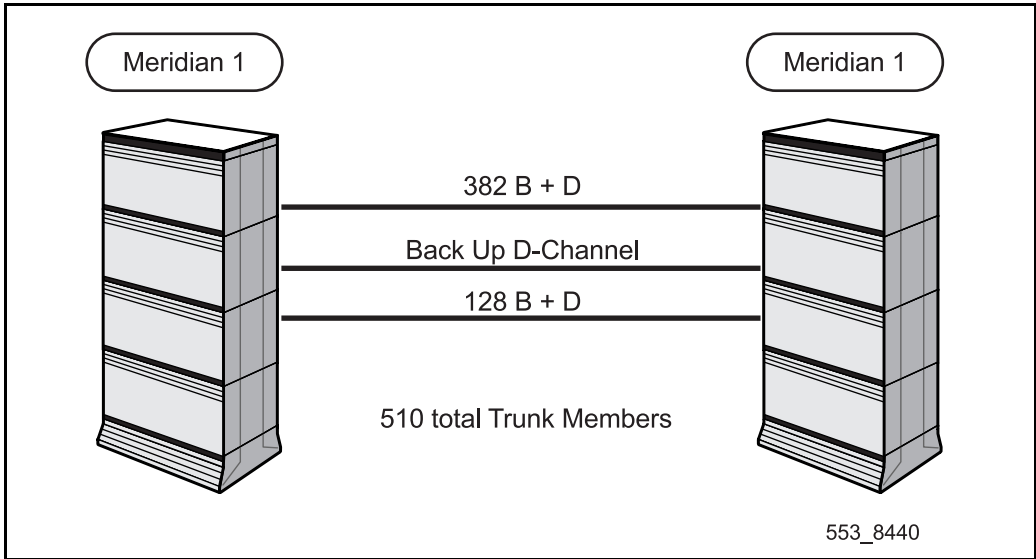
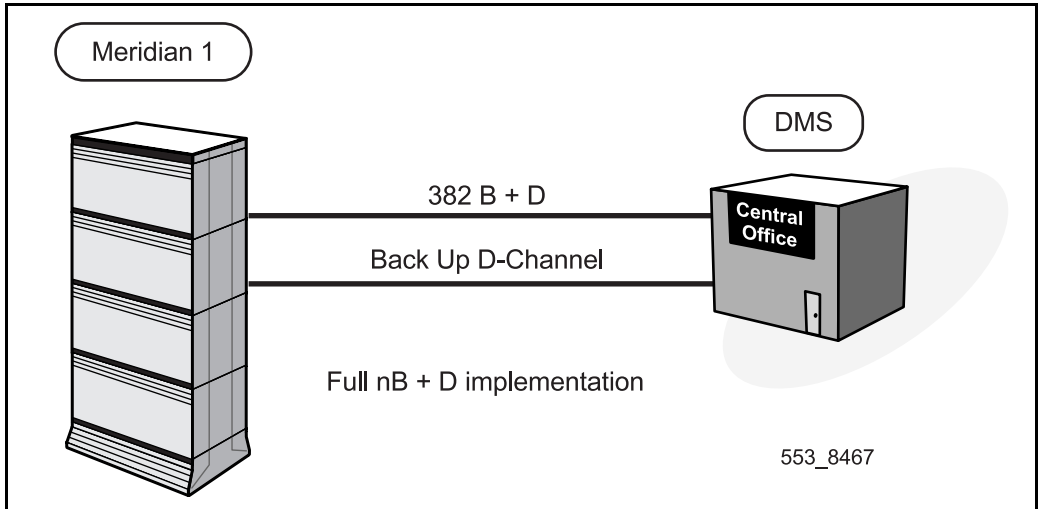


Figure 6
510 trunk members expansion configured for a Meridian 1 to DMS connectivity



Operating parameters

There are no operating parameters for this feature.

Feature interactions

Integrated Services Access

The ISA minimum (MIN) and maximum (MAX) fields for service routes may be configured in LD 16 at a value from 0-510.

NI-2 Call By Call Service Selection

The NI-2 Call By Call Service Selection maximum (MAX) field for service routes may be configured in LD 16 at a value from 0-510.

Meridian MAX

The Meridian MAX configuration does not support the 510 trunk member expansion. The Meridian 1 system software maps all trunk members which are greater than 254 (from 254-510) to trunk number 0, in the High Speed Link protocol.

For the Meridian MAX report, the MAX software collects all call statistics associated with trunk number 255 to trunk number 510, and displays the pegged value in the trunk number 0 field.

Feature packaging

The following package is required:

- Basic (BASIC) package 0

Feature operation

No specific operating procedures are required to use this feature.

64 kbps Clear Data Transport

ISDN PRI supports clear 64 kbps data transport on each B-channel. Connections from a Meridian 1 Option 21-71 tandeming through a Meridian 1 Option 11 to another Meridian 1 Option 21-71, SL-100, DMS-100, or other central office switch are supported over 64K clear transmission.

Package requirements

This feature requires the following options:

ISDN	option 145
DTI	option 75
PRI	option 146

Attendant and Network Wide Remote Call Forward

Prior to Release 20, the Remote Call Forward (RCFW) feature allowed a user to administer call forward from a remote set within the Meridian 1 or from outside the Meridian 1 through the Direct Inward System Access (DISA) number. The RCFW feature was not available on a network wide basis, nor was it applicable to Attendant Consoles. This enhancement introduces the RCFW feature across the Meridian Customer Defined Network (MCDN), while also providing the attendant with RCFW capabilities. New ISDN FACILITY messages are used to facilitate the RCFW feature operation in an MCDN.

The feature capabilities of the set-based (Flexible Feature Code activated) network wide application of the RCFW feature match those of the current standalone RCFW feature.

The attendant RCFW functionality is controlled by a new flexible Attendant key (RFW). The attendant has the capability to view the current call forward number and determine the call forward status of any station. It is also possible for an attendant to activate or deactivate call forward for a particular station. This functionality is applicable both local within the Meridian 1 and network wide.

A new optional customer-based password is introduced for attendant RCFW operation. This password is configured in LD 15 and is the only password required for attendant RCFW operation. The station control password previously used by the Flexible Feature Code (FFC) set-based RCFW is not required when the attendant activates RCFW by pressing the RFW key.

Operating parameters

The network wide application of this feature is only applicable to nodes in an MCDN. The nodes in the network must be Meridian 1 switches, running a minimum of Release 20 software. No other Central Office (CO) or PBX type is supported for this feature operation.

For set-based network operation of the Remote Call Forward feature, the Station Control Password Length (SCPL) must be configured to be the same length for all nodes in the network. Attempts to operate RCFW with different SCPLs will result in overflow tone being presented to the user.

For network operation of the RCFW feature, the Private Network Identifier (PNI) must be configured consistently for all nodes in the network.

The Attendant and Network Wide RCFW features use the existing RCFW code to activate or deactivate call forward on stations. As such, all limitations applicable to the local RCFW feature are applicable to the network and attendant operation of the feature.

As the Swedish CD Attendant Console does not support alpha characters, the “PWD” prompt is not displayed on the console’s digit display when a password is required. The indication that a password is required is limited to the winking RFW key lamp.

Feature interactions

Feature interactions for Attendant and Network Wide Remote Call Forward are described below.

Outpulsing of Asterisk and Octothorpe (OAPO)

If the OAPO package is equipped, the “#” will be treated as any other dialed digit and will not be used to signal end of dialing. The end of dialing digits to be used are defined in LD 15.

BRI

Since ISDN BRI sets do not support Flexible Feature Codes, Remote Call Forward cannot be activated from a BRI set.

Multiple Appearance DNs

The RCFW feature only applies to the primary appearances of Multiple Appearance DN, and it is recommended that only one appearance of a Multiple Appearance DN be configured as the prime DN.

For the case of multiple stations with the same prime DN and SCPW, the RCFW operation will apply to the station that has the Multiple Appearance Redirection Prime (MARP) assigned to it.

If none of the stations having the DN and SCPW assigned are configured as the MARP TN for that DN, the RCFA and RCFD will apply to all stations matching the DN and SCPW.

For the case of multiple stations with the same prime DN and SCPW, the RCFW operation will apply to the station that has the Multiple Appearance Redirection Prime (MARF) assigned to it.

The attendant-based RCFW feature will only apply remote call forward operation to the prime DN with MARF status. If the DN is not the prime DN or does not have MARF status, overflow tone will be received by the user.

Call Forward Activation from any Feature/Call Forward and Busy Status

There are no direct conflicts with either of these features and the RCFW feature.

Preventing Reciprocal Call Forward

When Preventing Reciprocal Call Forward Allowed (PVCA) is defined in LD 15, a set within the same customer configuration cannot be call forwarded to a set that is call forwarded back to it. Thus, CFW loops are prevented.

This feature applies when the CFW DN is changed by Remote Call Forward. For network operation of the set- and attendant-based RCFW features, entering an invalid CFW DN (under the rules of the PRCF feature) results in overflow tone being returned and the CFW DN being ignored.

Phantom TN

A Phantom TN does not physically exist, but can be configured with limited hardware associated with it (i.e., no sets or line cards); however, all required data blocks are configured.

The Phantom TN feature uses the RCFW feature to configure and activate/deactivate the CFW DN on the Phantom TNs.

As the data blocks associated with Phantom TNs match those of standard analog (500/2500 type) telephones configured within the Meridian 1, the operation of the RCFA and RCFD features on Phantom TNs is transparent to the RCFW feature. As such, the set-based local and network RCFW features can be used to configure and activate/deactivate the CFW DN of Phantom TNs.

The Phantom TN feature uses a Default Call Forward (DCFW) DN. If call forward is not active on the Phantom TN, all calls to the Phantom TN DN are routed to the DCFW DN.

The Phantom TN feature modifies the set-based RCFW feature so that if CFW is not active on the Phantom TN, and the CFW DN entered in the RCFV operation matches the DCFW DN, confirmation tone is returned to the RCFV user; if the CFW DN entered does not match the DCFW DN, overflow is returned.

This change to the set-based RCFV operation is applicable to the network RCFV operation. The operation of this feature network wide requires no changes to the ISDN message passing for the set-based network RCFV operation.

There is no Attendant RCFW operation which interacts with the DCFW DN of Phantom TNs.

Traffic Measurements

The peg count, for the attendant RFW key, will be generated on the first RFW key press of the RCFW operation. While the RFW key may be pressed multiple times during a single RCFW function, the peg count will only be implemented once.

The RFW key peg count will be included in the TFC005 feature key usage traffic report.

Feature packaging

The Attendant Remote Call Forward (ARFW) package 253 must be provisioned to activate the Attendant-based RCFW feature.

For network operation the following software packages are required: Integrated Services Digital Network (ISDN) package 145; Network Alternate Route Selection (NARS) package 58; and any other trunk or dialing plan packages as required by the customer's configuration.

The following are prerequisites for set-based RCFW: Optional Features (OPFT) package 1; Flexible Feature Codes (FCC) package 139; and Controlled Class of Service (CCOS) package 81.

The following are prerequisites for implementation on analog (500/2500 type) telephones: Special Service for 2500 Sets (SS25) package 18; and 500 Set Dial Access to Features (SS5) package 73.

Attendant Blocking of DN

Attendant Blocking of Directory Number (DN) allows a person to dial the attendant DN and request an external (long distance) call, and then disconnect while waiting for the call to be processed by the attendant. The requesting DN is idle and can receive and make calls.

When the attendant is ready to make the external (long distance) call, the Attendant Blocking of DN feature provides the attendant with the ability to block the DN while the external call request is being processed. The line appears busy to any caller attempting to contact the blocked DN. The blocked DN cannot be used to originate a call and will be connected to the attendant if it goes off hook. When the attendant has completed the external call, the blocked DN can be rung and the call extended. The attendant is guaranteed that the requesting DN is not busy and is available to take the call when the processing has been completed. This feature works in both standalone and Meridian Customer Defined Network (MCDN) environments.

Previously, this feature had been available on Swedish A345 PBXs, but now is also available on the Meridian 1. Although developed for Telia Sweden, the feature is applicable to all marketplaces desiring Attendant Blocking of DN functionality.

Operating parameters

The Attendant Blocking of DN feature can only be activated as the source party of the Loop key on the Attendant Console.

The attendant has the ability to use the Attendant Blocking of DN feature only for the following types of DNs: sets with ordinary Single Call Arrangement Non Ringing key (SCN)/Single Call Arrangement Ringing key (SCR) DNs and analog (500/2500 type) sets. HOT DNs, Multiple Call Arrangement None Ringing key (MCN)/Multiple Call Arrangement Ringing key (MCR) DNs, Automatic Call Distribution (ACD) DNs, Primary Line DNs (PLDNs), any trunk access code, Flexible Feature Codes (FFCs), Basic Rate Interface (BRI) and all other types of extensions are considered to be invalid for the Attendant Blocking of DN feature.

When the Attendant Blocking of DN feature is activated for a DN, it is only the DN dialed that is blocked. Other DNs assigned to the set will be idle.

If Attendant Blocking of DN is attempted on a Multiple Appearance Single Call Arrangement DN, all idle appearances of the DN will be blocked.

The Attendant Blocking of DN will only be supported on the following Attendant Console types: M2250; M1250; QCW4; QCW8; or M345CD.

Feature interactions

ACD

It is not possible to activate the Attendant Blocking of DN feature for an ACD DN. If an attempt to block an ACD DN is made, the attempt will be canceled and overflow tone will be returned. However, individual DNs on ACD sets can be blocked.

Attendant Hold

An Attendant Blocking of DN call can be put on hold by the attendant and will in this case be subject to normal Attendant Hold treatment. The Semi-automatic Camp-on (SACP) key lamp will be dark while on hold and be lit again when taken off hold. The same applies to Automatic Hold on the Loop key.

Attendant Break-in

The Attendant Blocking of DN and the source side Predial Break-in features are mutually exclusive for the same call. If the SACP key lamp is lit when the Break-in key is pressed to start a Predial Break-in attempt, the Break-in key is ignored. On the contrary, if the Break-in key lamp is lit and no call attempt is made on the source side when the SACP key is pressed to start an Attendant Blocking of DN, the SACP key is ignored.

If a Break-in attempt is made for an Attendant Blocking of DN call, the Break-in attempt will be considered to be temporarily denied.

It will be possible to Break-in on the destination side with an Attendant Blocking of DN call on the source side of the Attendant Console. The same limitations to Break-in will apply as if the source side call is a normal call.

Busy Lamp Field/Enhanced Busy Lamp Field

When a DN is blocked due to the Attendant Blocking of DN feature, the Busy Lamp Field/Enhanced Busy Lamp Field lamp corresponding to this DN displays the busy status of the DN as for ringing calls.

Busy Verify

The Attendant Blocking of DN and source-side Busy Verify are mutually exclusive for the same call. If the SACP key lamp is lit when the Busy Verify key is pressed to start a Busy Verify attempt, the Busy Verify key is ignored. On the contrary, if the Busy Verify lamp is lit when the SACP key is pressed to start an Attendant Blocking of DN attempt, the SACP key is ignored.

If a Busy Verify attempt is made on an Attendant Blocking of DN call, it will be denied.

Call Detail Recording Time to Answer

If the CDR Time to Answer feature is active, the time registration before answer will be started when the SACP key is pressed to ring the blocked DN and not when the DN is blocked.

Call Forward All Calls/Internal Calls/Call Forward and Busy Status

The Attendant Blocking of DN feature will override these Call Forward features. If the dialed DN of the set is idle, the DN can be blocked; if the DN is busy, busy tone will be heard.

Call Forward No Answer

The Attendant Blocking of DN feature will override the Call Forward No Answer feature. If the blocked DN of the set has the Call Forward No Answer feature active when the SACP key is pressed to ring the DN, the DN will ring until answered or disconnected. No Call Forward No Answer will be done for the Attendant Blocking of DN call.

Call Park

It is not possible to park an Attendant Blocking of DN call. If a Call Park call recalls to a blocked DN, the recall will be treated as if the DN is in a ringing state.

Call Waiting

If a set that has the Station-to station Call Waiting feature active (CLS SWA and a Call Waiting (CWT) key for SL-1 and digital sets) is idle when an Attendant Blocking of DN attempt is made, the Attendant Blocking of DN attempt will be allowed and processed as normal. If the DN is idle and there is an active call on the Call Waiting key, the Attendant Blocking of DN attempt will be allowed.

If a set has the Station-to-station Call Waiting feature active and the DN to be blocked is busy when an Attendant Blocking of DN attempt is made, the Attendant Blocking of DN attempt will be canceled and busy tone will be returned.

For a set that has the Call Waiting (or Station-to-station Call Waiting) feature active and a DN is blocked due to the Attendant Blocking of DN feature, any incoming call to the blocked DN will receive busy tone.

Camp-on

Camp-on will be denied for a DN that is blocked due to the Attendant Blocking of DN feature.

Directory Number Delayed Ringing

The Attendant Blocking of DN feature will override the Directory Number Delayed Ringing feature and ring the blocked DN immediately when the SACP key is pressed to ring the blocked DN.

Do Not Disturb

The Attendant Blocking of DN feature will override the Do Not Disturb feature. If the dialed DN of the set that has the Do Not Disturb feature active is idle, the DN will be blocked and if the DN is busy, busy tone will be heard.

FFC Boss Secretary Filtering

The FFC Boss Secretary Filtering feature will be overridden. If an Attendant Blocking of DN attempt is made for a set that has the Boss Secretary Filtering feature active, the dialed DN will be blocked if idle. If it is busy, busy tone will be heard.

Flexible Feature Codes

If a Flexible Feature Code is dialed after pressing the SACP key to initiate an Attendant Blocking of DN attempt, overflow tone will be provided and the attempt canceled.

Group Hunting

It is not possible to activate the Attendant Blocking of DN feature for a Pilot DN (PLDN). If an attempt is made to block a PLDN, the attempt will be canceled and overflow tone will be returned. If a DN that is a member in a Group Hunt (or Hunt) list is blocked by the Attendant Blocking of DN feature, the DN is considered to be busy.

HOT DN

It is not possible to activate Attendant Blocking of DN for a HOT DN extension. If an attempt to block a HOT DN extension is made, the attempt will be canceled and overflow tone will be returned.

Hunting

If Attendant Blocking of DN is attempted on a busy DN having the Hunting feature active, busy tone will be returned (overriding the Hunting feature).

Line Lockout

If an Attendant Blocking of DN attempt is made on a set in Line Lockout state, busy tone will be returned.

Make Set Busy

The Attendant Blocking of DN feature will override the Make Set Busy feature. If the dialed DN of the set that has the Make Set Busy feature is idle, the DN will be blocked and if the DN is busy, busy tone will be heard.

Multiple Appearance Multiple Call Arrangement

It is not possible to activate the Attendant Blocking of DN feature for a Multiple Appearance Multiple Call Arrangement DN (MCA DN (MCN/MCR)). If an attempt is made to block an MCA DN (MCN/MCR), the attempt will be canceled and overflow tone will be returned.

Multiple Appearance Single Call Arrangement

If Attendant Blocking of DN is attempted on a Multiple Appearance Single Call Arrangement DN (SCA DN (SCN/SCR)), all appearances of the DN will be blocked.

New Flexible Code Restriction

When the attendant has a blocked DN on the source side and dials on the destination side, any New Flexible Code Restriction active for the set of the blocked DN will be overridden. This is the same as if the attendant had a normal established call to the DN on the source side and dials the destination side.

Phantom TN

DNs on Phantom TNs will not be overridden by the Attendant Blocking of DN feature.

Radio Paging

If a transferred Radio Paging call recalls to a blocked DN, the recall will be treated as if the DN is busy.

Ring Again

It is possible to activate Ring Again towards a DN that is blocked due to the Attendant Blocking of DN feature.

Ringing Change Key

When the SACP key (or Signal Source) key is pressed to ring a blocked SCR where the Ring Change feature is activated, an audible ring signal will always be given. This is independent of the Ring Change status.

Ring/Hold LED Status

When a DN is blocked, the status of the DN lamp will be the same as for a call put on hold.

Semi-automatic Camp-on

The Attendant Blocking of DN feature uses the SACP key to activate a blocking attempt, but the Attendant Blocking of DN feature is only valid on the source side of the Attendant Console. The Semi-automatic Camp-on feature is only valid on the destination side of the Attendant Console.

To have the Attendant Blocking of DN feature available and not the Semi-automatic Camp-on feature, a new response to the SACP prompt has been introduced in LD 15. Prompt SACP = NO means the Semi-automatic Camp-on feature is not available even if the SACP package is equipped and an SACP key exists on the Attendant Console. To have the Semi-automatic Camp-on feature available the SACP prompt must be answered with SNGL or ALL which have the same meanings as before.

Signal Source

The Signal Source key can be used to notify a blocked DN. Using the Signal Source key for an Attendant Blocking of DN call will give the same response as the SACP key when the DN is blocked (i.e., ring the blocked DN and darken the SACP key lamp). The Signal Source key cannot be used to initiate an Attendant Blocking of DN call.

Single Call No Ringing DN

When the SACP (or Signal Source) key is pressed to ring a blocked Single Call No Ringing DN (SCN), an audible ring signal will be given.

Source Included when Attendant Dials

The Attendant Blocking of DN feature will follow the current Source Included when Attendant Dialing handling.

Vacant Number Routing

The Attendant Blocking of DN feature will work across an ISDN network if the call is routed due to the Vacant Number Routing feature.

Feature packaging

The Attendant Blocking of DN feature is packaged under Semi-automatic Camp-on (SACP) package 181.

To work in an ISDN network environment, Network Attendant Services (NAS) package 159 is required.

Feature operation***To block a DN***

- 1** The attendant presses an idle Loop key.
- 2** The attendant presses the Semi-automatic Camp-on (SACP) key.
- 3** The SACP key lamp lights.
- 4** The attendant dials the source DN that is to be blocked. If the dialed DN is idle, the DN lamp will have the same state as a call put on hold, but the DN will not ring. If the DN is busy, the attendant hears busy tone and the SACP key lamp darkens.

If the dialed DN is idle, it is blocked. The DN lamp indicates a call on hold state, although the DN will not ring (for analog [500/2500 type] telephones, there is no indication that the DN is blocked). On the Attendant Console, the SACP key lamp remains lit and the Source key lamp begins blinking.

If the dialed DN is busy, the attendant presses the Release (or Release SRC) key to release the call.

To place an outgoing call for the blocked DN

- 1 The attendant establishes a call to the desired destination in the normal way.
- 2 The attendant presses the SACP (or Signal SRC) key. The ringback tone is heard.
- 3 If the source DN answers, the attendant presses the Release key to extend the call between the destination to the source.

To release a blocked DN

The attendant presses either the SACP key or Signal Source key to ring the DN

—or—

The attendant presses either the Release key or the Release Source key to release the source DN, which then becomes idle.

To notify a blocked DN of an established call

The attendant presses the SACP or Signal Source key.

Automatic Trunk Maintenance (ATM)

ATM is not supported on the Option 11 system.

B-Channel Overload Control

The B-Channel Overload Control feature provides a solution to the problem situation of having a high rate of incoming calls from a Central Office over ISDN PRI trunks to busy destinations on a Meridian 1¹, causing slow dial tone and other realtime overload type problems on the Meridian 1.

The feature delays the release of an ISDN PRI call by using a configurable timer (BCOT) when a call encounters a busy condition. The delay in releasing the seized B-Channel prevents a new call from being presented on the same B-Channel. This delay cumulatively results in decreasing the incoming call rate, thereby avoiding degradation of real-time response. This delay is applied using ISDN protocol compliant messaging. The delay is in milliseconds, so that it is virtually transparent to the caller.

The value for the B-Channel Control timer is configured in Overlay 16, on a per-route basis. Although a value from 0-4000 milliseconds is accepted, a value of 256 is recommended. The entered value is rounded down to multiples of 128. After a value has been entered and rounded down (if necessary), the value is printed on the screen before the next prompt is displayed. For example, if a value of 400 is entered, the system rounds this value down to 384 and prints 384 on the display. The next prompt is then displayed.

After the BCOT timer expires, the normal disconnect sequence will take place and a new call may be presented. Figure 7 and Figure 8 represent a “before-and-after” representation of the B-Channel Overload Control feature application.

1. An example where this could happen would be where a telemarketing firm advertises a product by giving an 1-800 number. In response to the advertisement, the company receives a burst of incoming calls in a short period of time. Many of the calls may receive busy treatment, and in a busy situation, the Meridian 1 rejects the calls.

Figure 7
Before the B-Channel Overload Control Timer has been applied

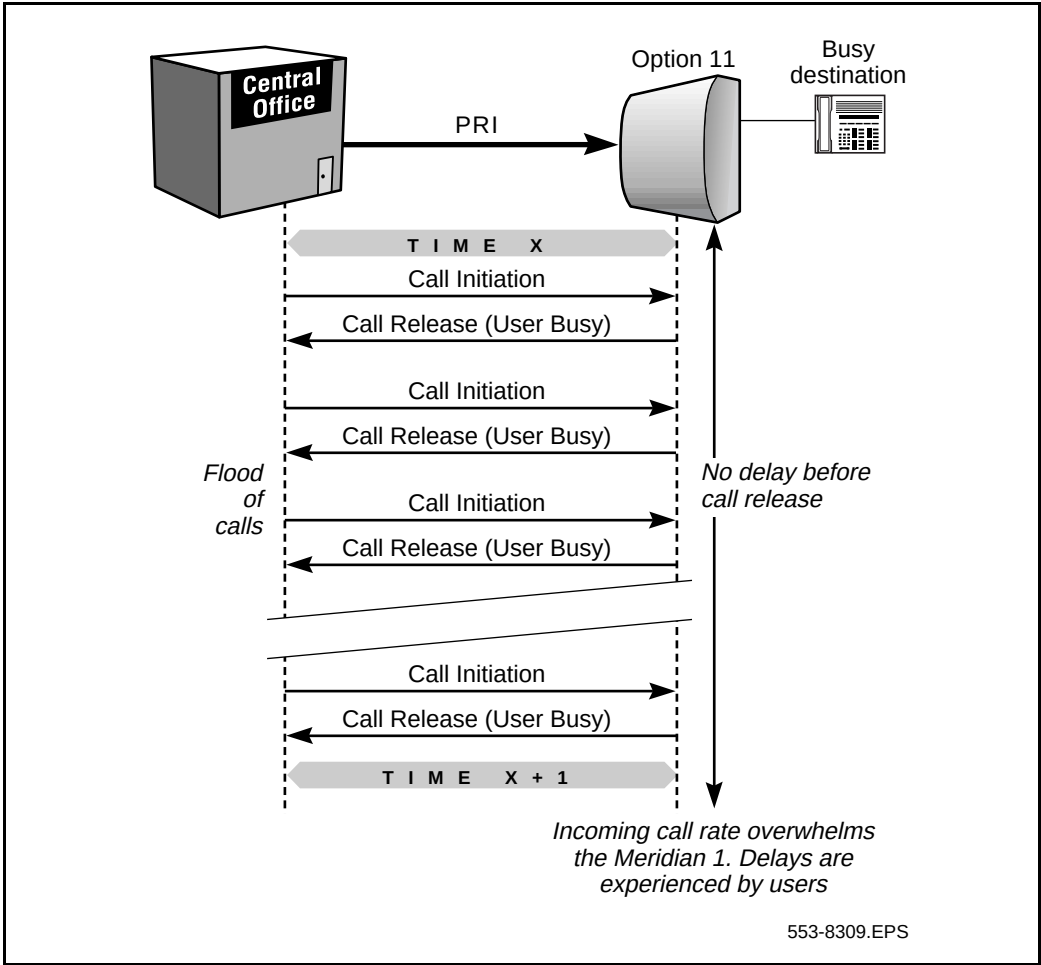
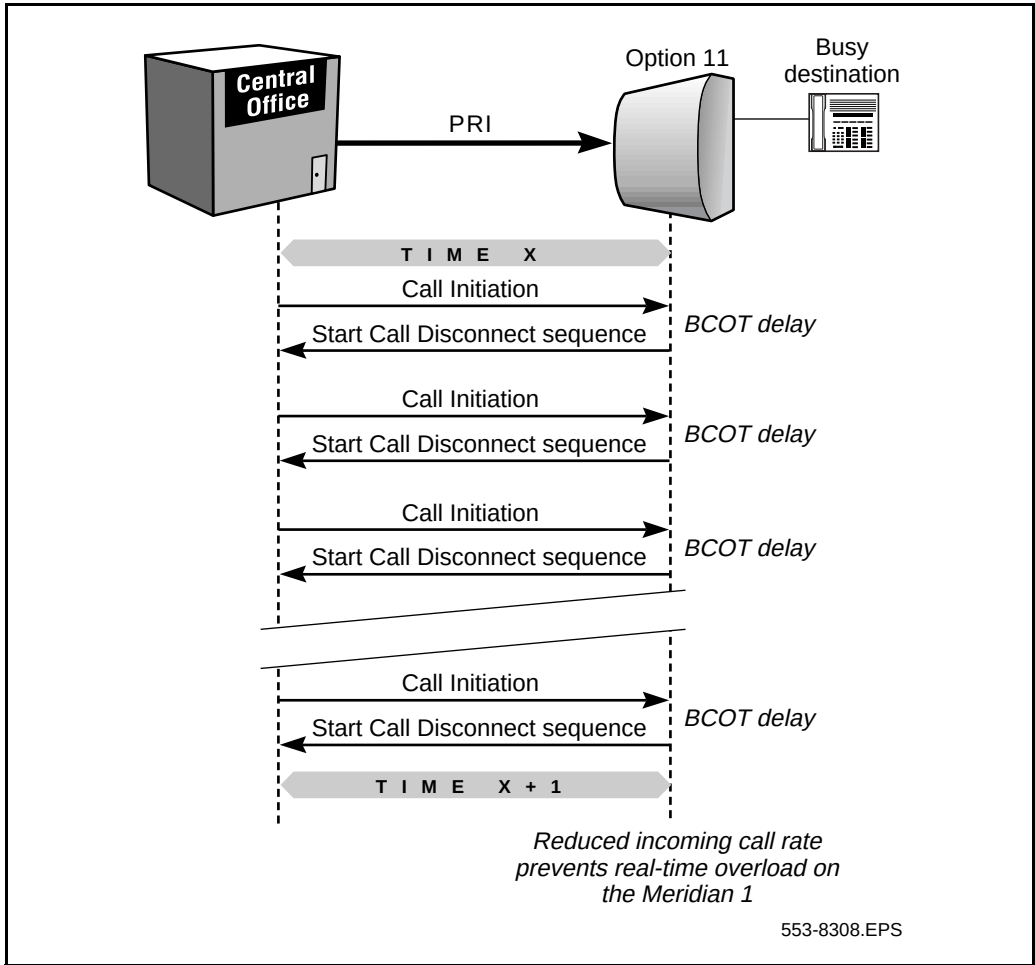


Figure 8
After the B-Channel Overload Control Timer has been applied



B-Channel Overload Control Timer (BCOT) considerations

Please consider the following pertaining to the application of the BCOT:

- When configuring the BCOT in Overlay 16, the recommended value to be used is 256 milliseconds (most problem scenarios can be solved with this value). Even though the maximum value of 4 seconds may be entered, it is suggested that this value not be used (since callers do not receive any audio feedback while the timer is running, they would receive only silence for four seconds).
- After a value is entered in response to the BCOT prompt in Overlay 16, the system rounds this value down by a multiple of 128 milliseconds, if necessary (the actual time delay is in the range of +0 to -128 milliseconds from the entered value). This value is printed before the next prompt is displayed.
- When a system is upgraded for the first time to a software release containing the BCOC feature, all BCOT timers are initialized to 0.
- By default, the BCOC feature is disabled on all routes (BCOT = 0). To activate the BCOC feature for a route, a service change on the BCOT timer is required using Overlay 16.
- A new Peg counts field for the “Total number of activations of BCOC activations for this route” is added to the TFC002 traffic report. This count will apply to all Meridian 1 routes that interface with DMS, Lucent, and NI-2 TR-1268 switches. For the Integrated Services Access (ISA) Call By Call Type and the NI-2 Call By Call Service Selection features, the peg counts are done against the service routes, and not a master route. The peg count for a master route will always be zero.

Refer to Table 6 and Table 7 for a sample traffic measurement report output.

Traffic measurement output

For non-ISA and non-NI-2 Call By Call service routes, the TFC002 traffic measurement report has been updated for the BCOC feature as shown by Table 6.

Table 6
TFC002 format for a non-ISA and non-NI-2 Call By Call routes

System ID	TFC002
...	
Route Number	Route Type
Total number of trunks configured	Total number of trunks working
...	Total number of incoming calls
...	Total number of outgoing calls
...	...
Total number of activations of BCOC for this route	

For ISA and NI-2 Call By Call service routes, the TFC002 traffic measurement report has been updated for the BCOC feature as shown by Table 7.

Table 7
TFC002 format for an ISA service route.

System ID	TFC002
...	
Route Number	Route Type
Total number of trunks configured	Total number of trunks working
...	Total number of incoming calls
...	Total number of outgoing calls
Total incoming calls on the service route	Total outgoing calls on the service route
Total number of activations of BCOC for this route	

Operating parameters

This feature applies only to the following ISDN PRI to North American Central Office connectivities:

- DMS-100
- DMS-250
- SL-100
- Lucent 4ESS
- Lucent 5ESS and
- National ISDN-2 (NI-2) TR-1268

This feature supports both circuit switched voice and data calls.

This feature does not distinguish between normal busy conditions and overload busy conditions, since its functionality depends on the BCOT value configured at the route level. All busy calls on the route receive the same BCOT treatment.

This feature does not support Virtual Network Services trunks.

This feature is activated for the following call types:

- incoming calls presented on a busy set on a node interfacing directly to a Central Office (see Figure 9 on page 37); or incoming calls from a Central Office being tandemed to a private network and presented on a busy set (see Figure 10 on page 38)
- incoming calls presented on an ACD DN whose ACD queue has reached its maximum limit
- incoming calls presented on a Controlled Directory Number (CDN), and being released by Customer Controlled Routing (CCR) due to a “User Busy” cause
- incoming calls that are tandemed to a route whose trunk members are all busy

Figure 9
Busy set is a on node interfacing directly to a Central Office

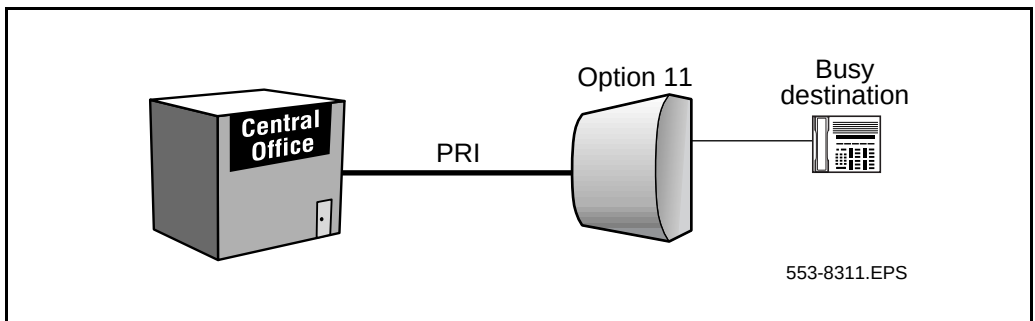
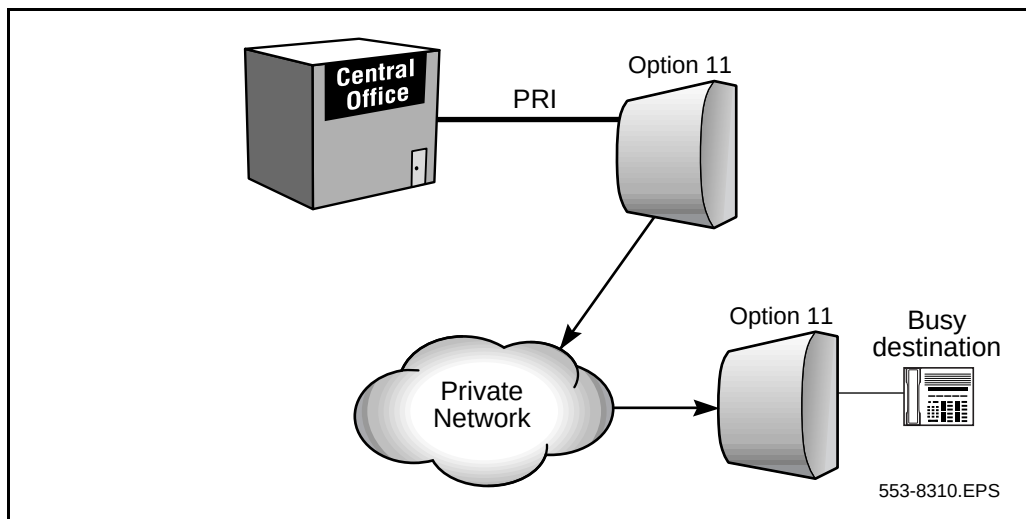


Figure 10
Busy set is a on node tandemed to a Central Office



Feature interactions

Automatic Call Distribution

ACD allows a large volume of calls to be made to the same DN (called the ACD DN), and answered by a group of telephones (called ACD agent positions). Incoming calls are distributed so that the agent that has been idle the longest receives the first call.

Whenever an incoming ACD call gets released immediately due to a “User Busy” cause, the Meridian 1 starts the B-Channel Overload Control timer and sends a “Call Proceeding” message rather than releasing the call immediately (the amount of time, in milliseconds, that the B-Channel remains seized depends on the value entered for the timer in Overlay 16). After the timer expires, the normal disconnect sequence will take place.

Call Interflow

Call Interflow allows an ACD supervisor to redirect excess traffic to an Interflow DN. All Interflow calls that are to be given busytone will be affected by the B-Channel Overload Control feature, in that a delay will be imposed on these calls before the caller receives the busytone.

Enhanced ACD Routing

Enhanced ACD Routing allows different delay treatments to be given to ACD calls from different sources but to the same ACDN DN. Enhanced ACD Routing uses a Control DN, which does not have agent positions but rather specifies a destination default ACD DN to which incoming calls are directed. Multiple Control DNs can place calls into the same ACD queue, so different treatment can be given to these calls (the treatment given to a call is determined by the parameters defined for the Control DN, and not the ACD queue).

The Control DN has a limit to the number of unanswered calls that it can have at its default DN. Once the limit is exceeded, new calls are given busytone and Central Office calls are placed in the ACD queue. These calls that are to receive busytone will be affected by the B-Channel Overload Control feature, in that a delay will be imposed on these calls before the caller receives the busytone.

Secondary DN Call Blocking

Secondary DN Call Blocking blocks new incoming ACD calls to the Secondary DN of an ACD agent, so that the agent can handle a current call without interruption. The calls to the Secondary DN receive busytone. These calls that are to receive busytone will be affected by the B-Channel Overload Control feature, in that a delay will be imposed on these calls before the caller receives the busytone.

Supervisor Control of Queue Size

Supervisor Control of Queue Size allows ACD DNs busytone to be given to selected call types. These calls that are to receive busytone will be affected by the B-Channel Overload Control feature, in that a delay will be imposed on these calls before the caller receives the busytone.

Integrated Services Access

Integrated Services Access (ISA) allows multiple routes to share the same the common pool of B-Channels for connectivity between a Meridian 1 PBX and a Central Office PBX such as the DMS-100 and the DMS-250. Unlike dedicated routes, which require each service route to have its own trunks of the same trunk type, ISA trunks are shared among many service routes, which can carry calls of different types that can change on a per call basis.

The B-Channel Overload Control feature interacts with ISA in that all incoming calls over an ISA route that are released because of a “User Busy” cause, will be delayed as defined by the B-Channel Overload Control timer.

NI-2 Call by Call Service Selection

NI-2 Call By Call Service Selection allows multiple services to share the same the common pool of B-Channels for an NI-2 TR-1268 PRI interface. Dedicated routes are not required. The service types can be assigned on a per call basis.

Intercept Treatment

All calls that are released by Intercept treatment due to a “User Busy” cause will be delayed as defined by the B-Channel Overload Control timer.

Remote Virtual Queuing

Since Remote Virtual Queuing interworks over a Meridian 1 to DMS interface, the B-Channel Overload Control feature imposes a delay on the automatic retry capability of RVQ, which is used when congestion is encountered due to no idle trunks being available.

Auxiliary Products

All calls that interact with the auxiliary products Customer Controlled Routing (CCR), Integrated Call Center Manager (ICCM), and Meridian Link, an that are being released due to “User Busy” cause, are delayed by B-Channel Overload Control until its timer expires.

Attendant Blocking of DN

This feature enables the attendant to block calls from being made to a DN while an external call request from that DN is being processed. The blocked calls receive busytone.

The B-Channel Overload Control feature interacts with Attendant Blocking of DN in a Meridian 1 to Central Office interface, by imposing a delay on any call coming in from a CO that terminates on a blocked DN and receives busytone treatment due to “User Busy” cause.

Call Connection Restriction

This feature imposes restrictions on a caller’s access to the public network, private network, and services and features. If any restriction is detected when a call is attempted, the call is denied and intercept treatment as defined in the Customer Data Block is applied. If the intercept treatment results in the call being released due to a “User Busy” cause, the B-Channel Overload Control feature imposes a delay on the release.

Meridian Network Services Drop Back Busy and Off Hook Queue

The B-Channel Overload Control feature does not affect the operation of the Drop Back Busy capability. If Off Hook Queuing is active, B-Channel Overload Control will not be activated.

Network Individual Do Not Disturb

This feature allows extends the functionality of the Individual Do Not Disturb feature to a network environment. If a DN is in the Do Not Disturb mode, calls may be made from it, but incoming calls to it would receive Intercept treatment. If the treatment is busytone, the B-Channel Overload Control feature imposes a delay on the release of these calls.

Trunk Barring

This feature allows customers the option of denying certain types of trunk-to-trunk connections. Attempted calls over these trunks would receive Intercept treatment. If the treatment is busytone, the B-Channel Overload Control feature imposes a delay on the release of these calls.

Feature packaging

The B-Channel Overload Control feature requires the following packages:

- Integrated Services Digital Network (ISDN) package 145
- 1.5 Mbps Primary Rate Access (PRA) package 146

Feature operation

No specific operating procedures are required to use this feature.

Backup D-Channel

In order to increase the reliability of the D-Channel and enhance the serviceability of the Primary Rate Interface, a secondary or backup D-Channel is supported.

The Backup D-Channel feature provides redundancy for the NTAK93 D-Channel Handler Interface (DCHI) daughterboard. The D-Channel Handler Interface provides the signaling and protocol for call set-up, call tear down and feature activation. The B-channels can either be PRI B-channels or analog or digital trunks with the ISDN Signaling Link (ISL) feature.

Because the DCHI is so important to customer trunking requirements, an additional D-Channel Handler Interface can be configured so that automatic switchover to the backup DCHI occurs in the case of primary D-Channel failure. This exercise requires co-ordination with the far end to ensure that the backup D-Channel is properly configured and identified.

When the backup D-Channel is configured, one D-Channel is active and the other one acts as a backup. If the active D-Channel fails, the auto-recovery software will first attempt to recover the primary D-Channel. If the recovery is successful, the D-Channel goes back into operation. However, if this recovery does not take place, software switches the D-Channel messaging to the backup D-Channel on a different PRI link. If the active backup D-Channel fails after the problem with the primary D-Channel has been resolved, the auto recovery software will automatically switch back to the primary D-Channel. During the switchover procedure, established calls will remain intact; transient calls, however, may be dropped.

The Recovery to Prime feature (RCVP) is a service changeable option which, if selected, will automatically changeover to the primary D-Channel whenever the primary D-Channel becomes established due to autorecovery or a maintenance command.

The Backup D-Channel requires a separate NTAK93 daughterboard (DCHI), NTAK09 DTI/PRI card, or alternatively, the NTRB21 T1 Multipurpose Digital Interface (TMDI) card, and a T1 facility. For dedicated ISL applications, a separate NTAK02 circuit card, modem and NTAK19BA cable are required.

Prior to X11 release 18, the Back-Up D-Channel feature is only supported between Meridian 1/SL-1 systems, and can be configured for either ISL or PRI applications. With X11 release 18 and later software, the backup D-channel provides connections from Meridian 1 to the following systems:

- Meridian 1 - DMS-250 (BCS 32 and later)
- SL-100 - AT&T 4ESS
- DMS-100 - (BCS32 and later)

In X11 release 18 and later, the backup D-channel conforms to the Meridian Customer Defined Networking (MCDN) protocol and AT&T's TR41449 and TR41459.

Package requirements

The Backup D-Channel feature is part of the basic ISDN option package, the requirements are as follows:

ISDN	option 145
PRI	option 146
ISL	option 147

Basic Call Service

ISDN basic call service transmits the ISDN call and consists of call progress signaling and voice or data transmission.

Three types of numbering plans are supported: Coordinated Dialing Plan (CDP), North American 10-digit numbering plan (E.164), and Uniform Dialing Plan (UDP).

Basic call service is supported for the following switch interfaces:

- Meridian 1 Option 11 to Meridian 1/SL-1
- Meridian 1 Option 11 to Meridian SL-100
- Meridian 1 Option 11 to DMS-100
- Meridian 1 Option 11 to DMS-250
- Meridian 1 Option 11 to DMS Centrex
- Meridian 1 Option 11 to AT&T #4ESS
- Meridian 1 Option 11 to AT&T #5ESS

Call Progress Signaling

PRI supports 64 Kbps out-of-band signaling on the D-Channel for:

- call set-up
- call tear down
- feature activation
- local busy and reorder tones.

Messages to generate local tones are transmitted on the D-Channel. Both out-of-band messages and in-band tones are provided for ringback.

Voice or data transmission

Voice and high speed (64 kbps) data are transmitted on the B-channel and assigned on a per call basis. The following modes of transport are available:

- 56 Kbps circuit switched data transmission
- 64 Kbps circuit switched voice or data transmission

Numbering plans

Three numbering plans are supported:

- Coordinated Dialing Plan (CDP) of 3 to 10 digits
- North American 10-digit numbering plan (E.164)
- Uniform Dialing Plan (UDP) which includes the Electronic Switched Network (ESN) 7-digit private numbering plan with 3-digit NARS location codes.

Typically, the numbering plan for a customer's private network consists of a 3-digit location code, such as the ESN number, and a 4-digit extension. This allows the same extension to be used for private networks and for Direct Inward Dialing (DID) from the public network.

Package Requirements for Basic Call Service

Basic Call Service requires the following:

ISDN	option 145
PRI and/or ISL	option 146 and/or ISL option 147

Bearer Capability in Call Detail Recording

The Bearer Capability in Call Detail Recording feature allows the operator to use bearer capability information to apply different rates based on the type of Call Detail Recording (CDR) calls for trunks.

ISDN calls provide information on the bearer capabilities used for each trunk call. Bearer capability information also gives the trunk characteristics for each call such as rate, voice or data dedicated, and packet or circuit mode transfer.

The Bearer Capability in CDR feature applies for CDR tickets involving trunks only. For non-trunk calls, such as set-to-set calls, blank characters are output. For all trunks not listed below, 99 is output in the CDR.

The Bearer Capability in CDR feature supports the following trunks:

- North American ISDN trunks
- MCDN trunks
- QSIG trunks
- DTI and DTI2 trunks

Table 8 shows the new bearer capability codes printed in the CDR ticket and their meaning.

Table 8
Bearer capability information printed in the CDR

Code	Meaning
01	Circuit mode speech
02	Circuit mode 3.1 kHz
03	Circuit mode unrestricted 64 kbit/s digital information transfer
04	Circuit mode unrestricted 64 kbit/s digital information transfer rate adapted from 56 kbit/s
05	Packet mode unrestricted digital information transfer
06	Circuit mode 7 kHz audio or videotelephony
07	Circuit mode restricted 64 kbit/s digital information transfer
08	Circuit mode video
99	Unknown or non-existent

Bearer Capability in the Call Detail Recording for ISDN

For ISDN protocols, the bearer capability is contained in the BCAP Information Element (IE). The IE is a mandatory field of the SETUP message sent to initiate a call. The correspondence between the ISDN BCAP IE and the code for CDR is shown in Table 9. When the received BCAP fields do not match the values shown in Table 9, 99 is output.

Table 9
Correspondence between the ISDN BCAP Information Element and CDR code

Code	Byte 3 bits 4-0 information transfer capability	Byte 4 bits 6-5 transfer mode	Byte 5 bits 4-0 user information layer 1 protocol	Meaning of CDR code
01	00000	00	/	Circuit mode speech
02	10000	00	/	Circuit mode 3.1 kHz audio
03	01000	00	/	Circuit mode unrestricted 64 kbit/s digital information transfer
04	01000	00	00001 or 01000 <i>Note:</i> See byte5a, bits 4-0, user rate must be 01111 (56 kbit/s).	Circuit mode unrestricted 64 kbit/s digital information transfer rate adapted from 56 kbit/s
05	01000	01	/	Packet mode unrestricted digital information transfer
06	10001	00	/	Circuit mode 7 kHz audio or videotelephony
07	01001	00	/	Circuit mode restricted 64 kbit/s digital information transfer
08	11000	00	/	Circuit mode video

Bearer Capability in the Call Detail Recording for DTI

For DTI trunks, the bearer capability is set during the call processing according to the value entered at prompt DSEL of the route data block in overlay 16. If it is a voice call, 01 is output in the CDR. If it is a data call, 03 is output in the CDR.

Bearer Capability in the CDR ticket

The new CDR format is composed of three lines. Each printed item is assigned a line number and a location on that line. If features are restricted or not equipped, the corresponding field in the CDR record is filled with spaces. The first line is 87 characters long; the second line is 86 characters long.

The bearer capability information is introduced at the end of the third line. Prior to the introduction of the Bearer Capability in CDR feature, this line had 48 characters. With the Bearer Capability in CDR feature, the length is increased by three characters. The bearer capability information is located at position 49-50. Table 10 shows the new format of the third line of CDR tickets with the BCAP field in **bold**.

The BCAP field is filled with blank characters if:

- the calls involves sets only, or
- the new BCAP prompt is set to NO (In LD 15, Type = CDR; CDR = YES; BCAP = NO.)

The bearer capability information is present in all CDR tickets involving trunks.

Table 10
Third line of CDR new format

Position	Content	Description
1	blank	
2	&	Third line of TTY
3 - 13	time to answer	Time To Answer ringing/total waiting
14	blank	
15 - 30	blid	Billing Line IDentification
31	blank	
32 - 38	cab	M911 Call Abandon tag
40 - 42	cdr100h	100-Hour Duration
43	blank	
44 - 45	npi	CLID Numbering Plan Identification
46	blank	
47	ton	CLID Type of Number
48	blank	
49 - 50	BCAP	Bearer Capability
51	blank	

Operating parameters

The Bearer Capability in CDR feature is supported on X11 Release 24 and later. It requires the new CDR format (that is, FCDR = NEW in LD 17).

If both the originating and terminating sides are trunks, the bearer capability information is taken from the incoming trunk.

If an initialization (INIT) occurs during an established trunk call, the bearer capability information is lost and 99 is output.

Feature interactions

ISDN Bearer Capability Information Element

The Bearer Capability in CDR feature does not change the bearer capability functionality; the bearer capability information in the CDR record is read from the message Call Register where it is stored. If a particular bearer capability is not supported by Meridian 1, it will not be displayed in the bearer capability field in the CDR.

Feature packaging

Bearer Capability in CDR requires these packages:

- Call Detail Recording (CDR) package 4
- Call Detail Recording on Teletype Terminal (CTY) package 5
- New Call Detail Recording (FCDR) package 234

Feature operation

There are no specific operating procedures required to use this feature.

Call Connection Limitations

The Call Connection Restriction product improvement allows limiting conditions to be placed on call connections across the ISDN. Call configurations which would degrade transmission integrity or network performance are prevented.

The following conditions are placed on network call connections:

- No more than one trunk without disconnect supervision can be used in a call connection. Otherwise, trunk lock-up could occur within the network. (This also applies to call-joined connections. Two call connections cannot be joined if each makes use of a trunk without disconnect supervision.)
- Tandem nodes are limited, to prevent potential transmission problems. The maximum number of tandem nodes to be allowed in a call connection can be set between 0 and 31, by way of service change.
- PSTNs can be limited. If so specified, only a single PSTN is permitted in a call connection; or, an unlimited number of PSTNs can be allowed.

- μ /A-Law conversions are limited, to prevent potential transmission problems. The maximum number of conversions to be allowed in a call connection can be set between 0 and 31, by way of service change.
- Satellite delays are limited. The maximum number of Satellite delays to be allowed in a call connection can be set between 0 and 5, by way of service change.

These call limitations only apply within an ISDN environment. For this product improvement to be effective, ISDN connectivity must be available between the originating and terminating nodes.

With the use of multiple call transfers, conferencing and other manipulations, it is possible to bypass this product improvement's control of the number of unsupervised trunks in a call connection. In these situations, other ISDN call-connection limitations may also be overcome.

The Call Connection Restriction product improvement overrides the Satellite Link Control feature. Whereas the Satellite Link Control feature limited the number of Satellite access lines or intermachine trunks to one, the Call Connection Restriction product improvement allows this limit to be service-changeable.

When calls are joined, it is possible to produce a call connection which violates some of the call-connection restrictions. Under these conditions, it is possible to exceed the limits on tandem nodes, μ /A-Law conversions and network call redirections.

Call Forward All Calls/No Answer

Call Forward All Calls and Call Forward No Answer enable callers to manually forward or forward on a no answer to any other station on the ISDN network. The receiving location is provided with the dialed number, the calling number, and if CPND is optioned, the caller's name plus the reason for the redirection. The caller's display is also updated to show the name and number of the person the call was redirected to plus the reason for the redirection.

This feature is applicable to the following telephones for Name and Number display:

- M2250 Attendant Console
- Meridian Telephones equipped with digit display:
 - M3000 Touchphone
 - M2317
 - M2008
 - M2616
 - M2216

Package requirements

The package requirements are as follows:

Digit Display	option 19
ISDN	option 145
PRI	option 146 or ISL option 147
Calling Party Name Display	option 95

Call Forward, Break-In and Hunt Internal or External Network Wide

The Call Forward, Break-In and Hunt Internal or External Network Wide feature determines whether a call is treated as internal or external on a network wide basis. A call is treated as internal if it terminates and originates within a private network. A call is treated as external if it terminates or originates outside a private network. These definitions of internal/external call are applied to incoming calls for the Call Forward by Call Type feature and to outgoing calls for the Break-In feature.

A network-wide call receives internal treatment if the Numbering Plan Identifier (NPI) in the Calling Line Identification (CLID) is private. Conversely, if the NPI is not present, the Network Attendant Services (NAS) information will be used if it is configured.

This feature operates using the available information that is associated with a call. This information is decoded to determine different treatments for Break-In Indication, Call Forward/Hunt by Call Type or Internal Call Forward.

If neither the CLID, NAS, or QSIG information is present, the following occurs. The route class mark defined in the route data block will be used to collect information necessary to determine whether a call should be given internal or external treatment. The network wide definition can be superseded by the route class. This can be configured on a route basis by entering “LOC” at the new prompt “IDEF” in the customer data block configuration (LD 15).

With a private network interexchange signaling protocol QSIG, the CLID and NPI are used if they are present. If this information is not present, then the QSIG specific data giving information on the far end of the call is used.

Operating parameters

The only features impacted by this feature are Call Forward/Hunt by Call Type, Internal Call Forward and Attendant Break-In. The Attendant Break-In feature will continue to treat conference calls as external. Network side conference is not considered.

For outgoing calls, this feature functions by the information created from the terminating node back to the originating node.

QSIG calls are treated depending on the equivalent information to the NPI or to NAS type information transported.

Internal Call Forward considers the transferred party and not the transferring party (both attendant and set) when the transferring party is on the treating node. Information transported across the network by NAS or QSIG from a network side transferred call is not considered. The information on the transferring party only will determine the type of treatment given to a call.

Feature interactions

Attendant Break-In

Attendant Break-In Indication and Prevention

Call Forward by Call Type

If the Internal/External definition in LD 15 is set to YES, a call is treated as internal or external on a network wide basis.

Call Forward, Internal

If a treated call is a transfer call and the transferring call is on the treating node, the transferred party will be considered. However, when the transferring party is not on the treating node, the transferring party will determine the treatment given.

Call Transfer

Network Call Transfer

Network Call Redirection

The treatment of a call following a call transfer (Call Forward/Hunt by Call Type) is based on the transferring set and the call originator's set. The set display on network call modification or redirection does not change.

Network Attendant Service

When a call is transferred, a new facility message is sent to the transferred party's node to transport the terminal indicator parameter or the access trunk information parameter.

QSIG

Call Forward, Break-In and Hunt Internal or External Network Wide uses the NAS equivalent information that is transported on protocols such as Party Category and Progress Indicator for QSIG.

Feature packaging

Call Forward, Break-In and Hunt Internal or External Network Wide is included in base X11 system software.

NAS messaging requires Network Attendant Services (NAS) package 159.

QSIG requires QSIG package 263.

Feature operation

No specific operating procedures are required to use this feature.

Call Forward/Hunt Override via Flexible Feature Code

Call Forward Override provides all telephone users (having a specific Class of Service) and attendants with the ability to override Intercept Computer Call Forward (ICP-CFW), Call Forward All Calls, Call Forward No Answer, Hunting and Make Set Busy by entering a Flexible Feature Code. In order to use this feature, the originating set must have Call Forward Hunt Allowed (CFHA) Class of Service. When this feature is enabled if override is attempted, and the called party is idle, the set is rung regardless of any diversion. If the dialed set is busy and has Hunt active, the calling party will terminate on the wanted set and receive a busy indication. Sets without Call Forward/Hunt Override denied (CFHD) Class of Service will not be able to use the Call Forward/Hunt Override (CFHO) Via Flexible Feature Code (FFC) feature.

Call Forward/Hunt Override Via FFC works in network environments with Meridian 1 nodes and Meridian Customer Defined Network (MCDN) links.

Operating parameters

The Call Forward/Hunt Override FFC can only be used in predial mode from a set (i.e., it has to be dialed before dialing the DN that has Call Forward All Calls, Intercept Call Forward, Call Forward No Answer, Internal Call Forward, Hunt, or Make Set Busy active).

The Call Forward/Hunt Override FFC can only be dialed from its own node (i.e., it has to be dialed before any trunk access code).

On an ABCD set the Call Forward/Hunt Override FFC can only be configured as a predial FFC (ABCD sets are a type of German telephone).

Call Forward/Hunt Override FFC can only be used against extensions with one of the following type: HOT/MCN/MCR/SCN/SCR/Basic Rate Interface (BRI) DNs and analog (500/2500 type) sets.

It is not possible for BRI extensions to dial a Call/Forward Hunt Override FFC.

The Call Forward/Hunt Override via FFC feature can only be used in standalone and MCDN environments. If no MCDN links are involved, no information about Call Forward/Hunt Override will be passed on to other nodes.

To get the functionality of Call Forward/Hunt Override Via FFC in an MCDN environment these enhancements must be integrated in the originating node, terminating node and any intermediate nodes.

Feature interactions

Attendant Blocking of DN

Using Call Forward/Hunt Override FFC after activation of ABDN is not allowed. Any attempt will be canceled and overflow tone will be returned.

Automatic Call Distribution (ACD)

ACD DNs are not overridden by Call Forward/Hunt Override Via FFC. Any attempt will be canceled and access denied treatment will be returned. Individual DNs on an ACD set are overridden by Call Forward/Hunt Override Via FFC with the same limitations as for other sets.

Barge-in

Busy Verify

Break-in

Using Call Forward/Hunt Override Via FFC after activation of Barge-in, Busy Verify or Break-in is not allowed. Attempts will be canceled and overflow tone will be returned.

Using post-dial Break-in after dialing the Call Forward/Hunt Override FFC is possible after encountering a busy set, if Break-in is enabled.

Basic Rate Interface (BRI)

BRI sets are not supported; any attempt to dial Call Forward/Hunt Override from a BRI set will be ignored and access denied treatment will be returned.

Boss Secretary Filtering
Call Forward All Calls
Call Forward No Answer
Call Forward and Busy Status
Internal Call Forward/Make Set Busy

These features are overridden by the Call Forward/Hunt Override Via FFC feature, but there are no changes to the features themselves.

Call Transfer

A set can activate Call Forward/Hunt Override Via FFC when initiating a transfer. If the transfer is completed while ringing, the Call Forward/Hunt Override will still be active and passed on to the transferred party.

Call Waiting

Call Waiting can be used even if the Call Forward/Hunt Override Via FFC feature has been activated. When a busy set with Call Waiting configured is encountered, it will terminate on Call Waiting.

Call Waiting Redirection

There is no interaction with the Call Waiting treatment component of the Call Waiting Redirection feature. However, Call Forward/Hunt Override via Flexible Feature Code does override CFNA, and thus the CFNA treatment given to unanswered Call Waiting calls by the Call Waiting Redirection feature is overridden by the CFHO feature. The incoming call will continue to be given Call Waiting treatment as if the Call Waiting Redirection feature is disabled when the CFHO feature is enabled by the calling party.

Camp-on

When a busy set is encountered, it is possible to Camp-on to the set, even if Call Forward/Hunt Override Via FFC has been activated.

Direct Inward System Access (DISA)

DISA is not supported. Any attempt to dial the Call Forward/Hunt Override FFC will be ignored and access denied treatment will be returned.

Do Not Disturb (DND)

This feature is not overridden by the Call Forward/Hunt Override Via FFC feature.

Flexible DN (FDN)***External Flexible DN (EFD)***

It is not possible to store the Call Forward/Hunt Override FFC as an FDN or EFD.

Group Call

It is not possible to use the Call Forward/Hunt Override FFC as a Group Call DN.

Group Hunt

Primary Line Directory Numbers (PLDNs) are not overridden by the Call Forward/Hunt Override Via FFC feature. Any attempt will be ignored and access denied treatment will result.

Hunt

This feature is overridden by the Call Forward/Hunt Override Via FFC feature. If a set activating Call Forward/Hunt Override Via FFC encounters a busy set no hunt steps will be performed; the call will terminate on the DN and busy tone will be returned.

Hunt DN/External Hunt (EHT) DN

It is not possible to store the Call Forward/Hunt Override FFC as a Hunt or EHT DN.

Idle Extension Notification (IEN)

This feature can be used even if the Call Forward/Hunt Override Via FFC feature is activated. When a busy set is encountered, it is possible to place an IEN request against the set.

Intercept Computer (ICP) Call Forward

This feature is overridden by the Call Forward/Hunt Override Via FFC feature. The Call Forward/Hunt Override FFC replaces the ICP Override FFC.

Last Number Redial

The Call Forward/Hunt Override FFC and the dialed DN are stored under Last Number Redial.

***Multiple Appearance Multiple Call Arrangements (MCAs)
Multiple Appearance Single Call Arrangements (SCAs)***

If the Call Forward/Hunt Override FFC is used against an MCA (MCR/MCN) or SCA (SCR/SCN) DN it will override any active forward and terminate on all idle appearances. If all appearances are busy, busy treatment will be returned.

Primary Line Directory Number (PLDN)

It is not possible to store the Call Forward/Hunt Override FFC as a PLDN.

Phantom DN

This feature is not overridden by the Call Forward/Hunt Override Via FFC feature. If Call Forward/Hunt Override Via FFC is used against a phantom TN the call will be canceled and overflow tone will be given.

Phantom TN

This feature is not overridden by the Call Forward/Hunt Override FFC. If a Call Forward/Hunt Override FFC is used against a Phantom TN, the call will be canceled and overflow will be given.

Priority Override

It is possible to use Priority Override after using the Call Forward/Hunt Override FFC and encountering a busy set.

Radio Paging

If Radio Paging is activated in a call where Call Forward/Hunt Override has been used, the Call Forward/Hunt Override feature will be deactivated.

***Ring Again
Network Ring Again***

Using the Ring Again feature is possible after using the Call Forward/Hunt Override FFC and encountering a busy signal. Ring Again can be placed against the set for which the Call Forward/Hunt Override FFC was used (i.e., the set with CFW active should be rung by the Ring Again feature).

***Ring Again No Answer
Network Ring Again No Answer***

Using the Ring Again No Answer feature is possible after using the Call Forward/Hunt Override FFC and encountering an idle set that does not answer. Ring Again No Answer can be placed against the set for which the Call Forward/Hunt Override FFC was used (i.e., the set should be rung by the Ring Again No Answer feature).

Single Digit Access (SDA)

It is not possible to store Call Forward/Hunt Override FFCs in an SDA list.

Semi-automatic Camp-on (SACP)

This feature can be used even if the Call Forward/Hunt Override Via FFC feature is activated. When encountering a busy set, it is possible to activate SACP, if it is applicable.

Speed Call

The Call Forward/Hunt Override FFC cannot be stored in a speed call list.

Feature packaging

In a standalone environment the Flexible Feature Codes (FFC) software package 139 must be provisioned to activate this feature.

For network environments, Network Attendant Service (NAS) package 159 must also be provisioned. Attendant Overflow Position (AOP) package 56 must be restricted, as it is mutually exclusive with Network Attendant Service.

Feature operation

The user gets the same functionality in a Meridian Customer Defined Network (MCDN) as in standalone environments. The Call Forward/Hunt Override information is transmitted from the originating node to the terminating node using the Network Attendant Service (NAS) feature.

Activation of the service is call dependent; network-wide Call Forward/Hunt Override is part of the NAS feature.

To activate the Call Forward/Hunt Override feature, the user dials the FFC for Call Forward/Hunt Override and the DN of the wanted party. If the set is idle, the set is rung regardless of any diversion (e.g., Call Forward All Calls, Intercept Call Forward, Call Forward No Answer, or Hunt) or Make Set Busy on the set.

If the set(s) have displays, the display(s) are updated. If the display on the originating set is updated when the call is answered, the Call Forward/Hunt Override FFC will no longer be displayed.

If the dialed set is busy and Hunt is active, the calling party will terminate on the wanted set and will receive busy indication.

If the dialed set is idle, but does not answer within the defined number of ringing cycles for CFNA, the call is not forwarded (i.e., it continues to ring).

If the dialed set is busy, the attendant can activate Camp-on, if Camp-on is applicable. In addition, Ring Again can be placed against a set for which Call Forward/Hunt Override was used and a busy set was encountered.

Call Page Network Wide

Prior to X11 Release 22, call paging was only accessible if both the attendant or user and the paging trunk route were located on the same node. The Call Page Network Wide (PAGENET) feature expands call paging capabilities by allowing an attendant or user to access a paging trunk route located on a different node.

The PAGENET feature controls external paging access privileges with the following levels of access: Restricted, Controlled and Uncontrolled. On the paging trunk, trunks are assigned a level of access on a trunk route basis. On other network nodes, access privileges can be assigned to attendant consoles and sets.

If the paging trunk route at the paging node is configured as PAGENET Restricted, all external users are prevented from accessing the paging trunk route. Access attempts from an external location are given a defined intercept treatment by the paging node.

PAGENET Controlled allows limited access to external users meeting the following criteria:

- the attendant console or set is programmed with PAGENET allowed in the Class of Service;
- the point-to-point D-channel is configured with remote capability (e.g RCAP=NAC).

With PAGENET Uncontrolled, all external users can access the paging route provided that the call paging request to the paging node is incoming via a TIE or a VNS Bearer trunk.

When the call paging request has been accepted and established by the paging node, the originator does not receive any special indication when the call is connected to the paging trunk.

Operating parameters

If the NTAK02BB SDI/DCH circuit card is used on systems with a software vintage earlier than Generic X11 Release 21.40, it must be ensured that the power is removed from the card before it is used for the operation of Call Page Network Wide. This will normally take place during software upgrade; otherwise, the card must be removed and the power must be reset.

To support Call Page Network Wide within a dedicated ISL/VNS configuration, a NTAK02 (minimum vintage **BB**) DCH circuit card must be used.

Call Page Network Wide will only be supported on the NTBK51BA D-Channel Daughterboard, for D-channel handling with PRA.

A user may experience a delay between the time of dialing the last digit and the actual call termination. The Call Page Network Wide feature does not change this operation. Therefore, with external paging calls the user may not realize when a connection is actually established unless the paging equipment provides audible notification.

External PAGENET uncontrolled calls are supported on Integrated Services Digital Network (ISDN) and non-ISDN networks provided that the incoming trunk into the Paging node is a TIE Trunk.

External PAGENET Controlled is only supported on Virtual Network Services (VNS) and ISDN networks, provided that the caller is using an Attendant Console or PAGENET allowed set and the point-to-point D-channel connection between the nodes has remote capability of network access (e.g. RCAP = NAC).

Feature interactions

Attendant Barge-In

Attendant Break-In

For external PAGENET uncontrolled calls, Attendant Barge-In is blocked at the Paging node, per existing operation. For external PAGENET controlled calls, Attendant Barge In is blocked at both the originating and Paging node.

Attendant Call Extension

If an attendant's source (SRC) or destination (DEST) Key is connected to an external PAGENET uncontrolled trunk, Attendant Call Extension is not blocked. However, if an attendant's SRC or DEST Key is connected to an external PAGENET controlled route, Attendant Call Extension is blocked.

Call Forward All Calls

Call Forward No Answer

Hunt

PAGENET does not block a station set from being programmed to Call Forward All Calls, Call Forward No Answer or Hunt to an external Paging trunk. At call termination time, calls that are forwarded to an external PAGENET uncontrolled trunk are not blocked. However, calls forwarded to an external PAGENET controlled trunk are given access denied intercept treatment at the Paging node.

Call Park

Call Transfer

Conference

No Hold Conference

A station set or Attendant Console that parks, transfers or conferences an external PAGENET uncontrolled call is not blocked. However, an external PAGENET controlled call is blocked.

Originator Routing Control/Remote Virtual Queuing

This is supported for an incoming call to a Paging trunk when all the trunk members of the dialed Paging route are busy.

Feature packaging

Call Page Network Wide (PAGENET) requires package 307.

Feature operation***Internal Paging Call***

No specific operating procedures are required to use this feature.

External Paging Call

When a user makes an external Paging call via dial access, one of the following dialing plans must be used:

- Route Access Code (ACOD) that connects user to Paging node and Paging route ACOD;
- BARS/NARS; or
- Coordinated Dialing Plan.

Call Park Network Wide

Prior to X11 Release 22, a call in a parked state on a System Park Directory Number (DN) or station set park DN could only be retrieved by an attendant console or a station set located within the same node. The Call Park Network Wide (CPRKNET) feature builds on the existing functionality of Call Park and introduces the following capabilities: Network Call Park, Call Park Expansion and External Call Park Access.

Network Call Park enables an attendant or a station set to park a call on System DN or DN within a Meridian Customer Defined Network (MCDN). This networking capability requires users at parking, parked at, tandem and accessing nodes be equipped with Network Attendant Services (NAS). The parking node refers to the location of the attendant or station set parking the call, the parked at node is the location of the parked call, the tandem node is the routing bridge for the parked call and the accessing node is the location of the user retrieving the parked call.

Call Park Expansion increases the amount of Call Park blocks and number of System Park DNs. With CPRKNET configured, a user can define up to five different Call Park blocks. Each call park block can be separately configured with programmable parameters (such as recall timers). The maximum recall timer is expanded from 240 to 480 seconds and the maximum number of System Park DNs in each block is increased from 50 to 100 directory numbers.

External Call Park Access permits an external caller to retrieve a call in parked stated through either a Direct Inward Dial (DID) trunk or a TIE trunk. The external user must initially be informed that a call has been parked. The external party is informed and can only retrieve the parked call if they know the accessing DN. It is important to note that if a system administrator utilizes the enhancements offered by Call Park Expansion and configures five call park blocks then these System Park DN ranges must be known by all users attempting to access this feature.

Operating parameters

The existing Call Park feature packaging is expanded in X11 Release 22. With Release 22, recall timer and number of System Park DNs expansions are included in base system software. However, the new CPRKNET package is required to access the multiple call park blocks and networking capabilities.

Network Call Park does not support Centralized Attendant Service.

The existing Trunk Barring feature ensures that only an appropriate incoming trunk can be connected to a parked party.

The existing Trunk Group Access Restriction (TGAR) feature checks the incoming accessing trunk. A parked call can only be retrieved if the TGAR and Trunk Access Restriction Group (TARG) of the trunks correctly match.

Call Park Expansion

The Primary Call Park Block must be defined for the customer.

Network Call Park

Network Call Park is supported if the network has all nodes connected by MCDN ISDN links with NAS signaling configured. All the current limitations of the NAS feature apply to CPRKNET.

The CPRKNET package must be enabled on both the parking and parked nodes. The package is not required on the tandem node.

The parking node and the parked at node must have a Primary Call Park Block defined.

When the call park recall timer expires on a parked call at another node, the call recalls to the attendant at the parking node regardless of the configuration of the recall park call to attendant (RECA) timer of the associated call park block. This recall to an attendant occurs even if the call was parked by a station set.

A remotely parked call recalls to an attendant, or Network Attendant if configured, at the parking node when the timer expires. This recall to the attendant occurs even if the parking party is a station set.

Parked Call External Access

Only a call that is parked on a System Park DN can be retrieved by an incoming trunk. A call parked on a station DN cannot be retrieved by an external caller.

Only incoming Direct Inward Dial (DID) or TIE trunks can retrieve a parked call. A user does not receive any special indications when retrieving a parked call. The user is connected to the parked call immediately.

Feature interactions

Answer Supervision

If a parked call is connected to an incoming trunk with Answer Supervision, the appropriate messages on the status of the call are sent through the incoming trunk to the far end.

Basic Alternate Route Selection

Network Alternate Route Selection

An Electronic Switched Network (ESN) number can be assigned as the System Park or Station Set DN to a Network Call Park call. A parked call on a System Park DN can be retrieved by a caller outside the parked node via BARS/NARS dialing.

Camp-On

When an attendant attempts to extend a call to a busy station across the network and the busy station returns a Camp-On allow signal, an attendant has the option of camping on a call or continuing with Network Call Park.

Coordinated Dialing Plan

A Coordinated Dialing Plan number can be assigned to a Network Call Park call that the attendant or station set is attempting to park.

Trunk Anti-Tromboning

The Trunk Anti-Tromboning feature is invoked if programmed at all interim Private Branch Exchanges (PBXs) in the call.

Recall to Same Attendant, Network Wide

Network Call Park supports this feature. However, all limitations and restrictions associated with Network Wide Recall to Same Attendant are applicable.

Feature packaging

The Network Call Park and External Call Park Access capabilities of the Call Park Network Wide (CPRKNET) requires package 306 and Network Attendant Services (NAS) package 159. With Release 22, expansions to the recall timer and the number of System Park DNs are included in Call Park (CPRK) package 33.

Feature operation

Call Park Expansion

Attendant Console with Park Key

Attendant Console via Dial Access

Meridian 1 Proprietary Set with Display and Park Key

- 1 Press PRK key, or dial SPRE + 71 or Call Park FFC.
- 2 An available System Park DN is displayed. To override this DN, dial another Park DN.
 - If number dialed is an available Park DN, the digit display is cleared and only the dialed Park DN is displayed (without SPRE + 71 or CPRK FFC).
 - If number dialed is invalid or unavailable station Park DN an overflow tone is heard.
 - If number dialed is an unavailable System Park DN, overflow tone is heard. If another System Park DN is available in the Call Park Block, the system assigns this DN. The available System Park DN is displayed and silence is returned.
- 3 Press PRK key or if using SPRE or FFC press Release RLS key to complete call park.

Meridian 1 Proprietary Set with Display via Dial Access

- 1 Press the CONF or TRN key.
- 2 Dial SPRE + 71 or CPRK FFC.
- 3 An available Primary System Park DN is displayed. To override this DN dial another Park DN.
 - If number dialed is available, digit display is cleared and dialed Park Access ID is displayed (without SPRE + 71 or CPRK FFC).
 - If number dialed is an invalid System Park DN or an unavailable station park DN, overflow tone is heard.
 - If number dialed is an unavailable System Park DN, but another available System Park DN exists in the Call Park Block, the available System Park DN is displayed. Silence is returned.
- 4 Press the CONF or TRN key to complete call park.

***Meridian 1 Proprietary without Display
Analog (500/2500) type telephones***

The Call Park operation on these types of telephones is not affected.

Network Call Park

The existing Call Park operation is modified to accommodate the Network Call Park capabilities of the CPRKNET feature. A user must enter a Park DN that is either a Station Park DN or a System Park DN that is located at another node, within the attendant's or station set's MCDN network.

Attendant Console

***Meridian 1 Proprietary Set with Display with Park Key
Attendant Console via Dial Access***

- 1 Press the PRK key or dial SPRE + 71 or CPRK FFC.
- 2 An available Primary System Park DN from parking node is assigned and displayed.
- 3 To override the displayed System Park DN with another Park DN, dial the ESN number and remaining digits.
 - At the remote node, if there is an available Park DN, silence is heard. The digit display of the set is cleared and the dialed Park DN is displayed without the SPRE + 71 or CPRK FFC.
 - At the remote node, if numbers dialed are invalid or unavailable, overflow tone is heard.
 - At the remote node, if the numbers dialed are an unavailable System Park DN but another System Park DN is available in the Call Park Block, the system assigns this DN. The available System Park DN is displayed and silence is returned. If no DN is available and there is no other available DN in the Call Park Block, overflow tone is heard.
- 4 If using an Attendant Console, press the RLS key, or if using Meridian 1 Proprietary Set with Display, press the PRK key to complete call park.

Attendant Parking an Extended Call

- 1 Press the PRK key.
- 2 Extended party is released and ringback or busy tone is removed. SPRE + 71 + ESN number of the extended call are displayed.
 - At the remote node, if there is an available Park Access ID, silence is heard.
 - At the remote node, if numbers dialed are an invalid or unavailable Park DN, overflow tone is heard.
- 3 Press the RLS key to complete call park.

Meridian 1 Proprietary Set with Display via Dial Access

- 1 Press the CONF or TRN key.
- 2 Dial SPRE + 71 or CPRK FFC.
- 3 An available Primary System Park DN from the parking node is displayed.
- 4 To override this with another Park DN, dial the ESN number and digits.
 - At the remote node, if there is an available Park Access ID silence is heard. The digit display is cleared and the dialed Park Access ID is displayed without the SPRE + 71 or CPRK FFC.
 - At the remote node, if the ESN number is an invalid or unavailable Park DN, overflow tone is heard.
 - At the remote node, if dialed System Park DN is not available but there is another available System Park DN in its Call Park Block, the available System Park DN is displayed. Silence is returned.
- 5 Press CONF or TRN key to complete call park.

Meridian 1 Proprietary Set without Display with PRK key***Meridian 1 Proprietary Set without Display via Dial Access******Analog (500/2500 type) set***

- 1 Press the PRK, CONF, TRN or perform switchhook flash depending on type of set and key assignment.
- 2 Dial SPRE + 71 or CPRK FFC.

- 3 Dial the ESN Number and digits.
 - At the remote node, if there is an available Park DN, silence is heard.
 - At the remote node, if numbers dialed are invalid or unavailable, overflow tone is heard;
- 4 Press same key in Step 1 or go on-hook to complete call park.

Canceling Call Park Network Wide during operation

The procedure for canceling the Call Park Network Wide feature follows the existing operation of canceling Call Park. However, once an overflow tone is heard, the attendant or station set must cancel the Call Park attempt and restart the Call Park process. The operation of canceling Call Park on different terminals is described below.

Attendant Console

Press the RLS DEST Key. Call Park is canceled and the original call is reconnected to the attendant console.

Meridian 1 Proprietary Set

Press the flashing DN Key. Call Park is canceled and the original call is reconnected to the attendant console or the station set.

Analog (500/2500 type) Set

Complete a switchhook flash. Call Park is canceled and the original call is reconnected to the attendant console or the station set.

External Call Park Access

External Call Park Access allows a parked call on a System Park DN to be retrieved by an external user via an incoming DID or TIE trunk. This capability requires that the node where the call is parked (parked at node) is equipped with the CPRKNET feature and the Primary Call Park Block is defined. To enable external access capabilities, calls must be parked against a System Park DN.

- 1 Call Parked.
- 2 External access caller must be notified or know where the parked call is located.

- 3 Depending on specific dialing plan configuration, the external access caller must dial one of the following to access the call in parked state:
- for Coordinated Dialing Plan, dial System Park DN;
 - for ESN, dial Access Code + Location Code + System Park DN;
 - for DID, dial area code + Local Exchange + System Park DN; or
 - for DISA, dial DISA number + (Authorization Code + DISA Security Code) + System Park DN.

Call Pick-Up

If an incoming ISDN call is answered using the Call Pick-Up Feature, the displays for the originating and terminating sets will be updated to indicate the correct connected party as well as the reason for redirection.

Call Pickup Network Wide

The Call Pickup Network Wide feature enables the following functionalities to be extended over a Meridian Customer Defined Network ISDN network:

- Ringing Number Pickup
- Directed Call Pickup by Group Number
- Directed Call Pickup by DN, and
- Display Call Pickup.

With the exception of Display Call Pickup, user operation of the above features remains unchanged. To display Call Pickup, press the Display key, followed by the Call Pickup key. Display Call Pickup is modified so that the Ringing Number Pickup (RNP) key winks for five seconds once a local or remote ringing DN is found and displayed. During this time, the user can press the RNP key to initiate a Call Pickup directed to the displayed DN.

With Call Pickup Network Wide, users must be assigned to the same Call Pickup group regardless of network location. Each Ringing Number Pickup Group may be linked to a Speed Call List (SCL) which is used when there is not an applicable local set to pick up. Different groups may be linked to different SCLs.

To be able to route calls through the network from one originating node to a destination node, an ISDN Private Integrated Services Network Exchange (PINX) DN is defined for each node in the network. The ISDN PINX DN is a DN taken from the customer's numbering plan used to aid with the routing of network calls. It does not correspond to a real terminal on the node, so can never be busy. Each SCL contains a list of PINX DNs which correspond to the remote nodes or customers to be searched. Thus, the purpose of the Speed Call List is to let the system know where to look in the network to pick up the call. If a pickup group is linked to a Speed Call List, this group is considered as being network wide.

The search is conducted in an ascending order as programmed in the Speed Call List (i.e., entry 0 first). This Speed Call list is used when there is not an applicable local set to pick up.

When a network search is performed, a slight delay occurs before a call is connected or rejected, during which time the set will receive silence. This delay is traffic dependent. If for any reason the call cannot be rerouted to the requesting party, the call will ring again at the originally dialed DN and the requesting party will receive overflow tone.

Operating parameters

Call Pickup Network Wide is not supported over a Virtual Network Services (VNS) link.

A Speed Call List must be configured with the PINX DNs of the remote switch. The local PINX DN must be configured in the Customer Data Block (LD15).

If on one single node two calls are ringing at the same time, the call with the higher priority will be picked up. But if on two nodes two calls are ringing at the same time (one call on each node), the call on the node searched first will be picked up (i.e., a normal ringing call on the local node is picked up before a priority ringing set on a remote node).

Feature interactions

Access Restrictions

All access restrictions applicable to Network Alternate Route Selection (NARS)/Basic Alternate Route Selection (BARS) calls (including Class of Service, Network Class of Service, Trunk Barring (TBAR), and New Flexible Code Restriction (NFCR) restrictions based on digit manipulation) apply to a redirected call from the receiving node to the requesting node. This means that there are no limitations added to the access restriction checks for calls being redirected by the Call Pickup Network Wide feature.

If the call is blocked because of any of these access restrictions on either the receiving, tandeming, or requesting node, the originally called party is re-rung and the party attempting to pick up the call receives overflow tone.

Attendant-Extended Calls

The Call Pickup Network Wide feature can be used to pick up attendant-extended calls to a remote station.

Automatic Call Distribution (ACD)

The Call Pickup Network Wide feature cannot be used to pick up a call to an ACD DN. Calls to ACD DNs will be skipped and queue scanning will search for another ringing call.

A call to a non ACD DN on an ACD set can be picked up as a normal call. A call transferred by an ACD agent can be picked up as a call transferred by a normal set. In addition, it is possible to pick up as a normal call a call originated by an ACD set on a non ACD DN key.

ISDN Basic Rate Interface (BRI)

An ISDN BRI terminal cannot initiate a call pickup, and a call ringing at an ISDN BRI terminal cannot be picked up.

Call Back Queuing

A call redirected by the Call Pickup Network Wide feature cannot be subject to Call Back Queuing.

Call Collision (Glare)

A call redirected by the Call Pickup Network Wide feature will be treated as for normal ISDN calls. A new trunk will be found if possible; otherwise, the requesting party will receive overflow tone.

Call Park

The Call Pickup Network Wide feature cannot be used to pick up parked calls. A recall of a parked call can be picked up, in which case the call is unparked and answered by the requesting party.

Called Party Name Display

Network Call Party Name Display information will be exchanged during Call Pickup Network Wide calls if the sets involved in the call would normally exchange the information for calls over the routes that have been used for the original call and the call pickup. Conversely, if Network Called Party Name Display would not operate for a normal call from the originating party to the terminating party, the service will not be supported when Call Pickup Network Wide is involved.

Name displayed on the requesting party

If a remote ringing station is picked up, the originating party's name is always displayed, independent of the requesting party's Class of Service.

Call Redirection

Network Call Redirection

Call redirection only has an interaction if the call being picked up has already been redirected. In this case, the original redirecting number will be passed on instead of the DN of the set from which the call is being picked up. The redirection reason displayed will remain as the previous displayed redirection reason if the Called Party Name Display is involved.

Call Transfer

Network Call Transfer

A call may be picked up before or after the transferring party has completed the transfer.

For pickup before transfer completion, the transferring party is displayed updated information by the Call Pickup Network Wide feature when the call is picked up. Then, when the transfer is completed, normal call transfer information is exchanged by each party involved in the final call.

For pickup after call transfer completion, everything happens as if the call had been made directly from calling to ringing party. After pickup is performed, displays are updated as for normal Call Pickup.

Call Waiting

Call Waiting calls cannot be picked up.

Call Waiting Redirection

A call that is redirected by the Call Waiting Redirection feature to the active set's Call Forward No Answer DN may be picked up.

Conference

Call Pickup Network Wide may be used to pickup an enquiry call from a conference, subject to the same limitations as apply to Call Transfer.

Data Calls

The Call Pickup Network Wide feature cannot be used to pick up data calls.

Dial Intercom

The Dial Intercom feature is not supported network wide. Any pickup attempt from a distant node to a local intercom call will be rejected, because the far-end user is considered as not being in the same intercom group.

Group Call

The Group Call feature does not allow having a remote party in a Group Call list. Therefore, a Group Call cannot be picked up by a remote station. If during the network scanning a Group Call is found, it will be ignored and the network scanning will continue.

Multi-Tenant Service

The Call Pickup Network Wide is not supported in a multi-tenant environment.

Network HOT Type D Intercom

It is not possible to pick up a HOT type I call; however, it is possible to pick up a HOT type D call.

Network Routing Restrictions

NARS Anti-Tromboning

At the receiving node where the set is ringing, NARS Anti-Tromboning does not apply to a call being redirected by the Call Pickup Network Wide feature.

Network Attendant Service/ISDN Call Connection Limitations

ISDN Call Connection Limitations (ICCL) apply to Call Pickup Network Wide calls. If the call being redirected by the Call Pickup Network Wide feature is blocked due to one of the ICCL limitations (e.g., Tandem Threshold, Call Redirection Threshold, Number of MU/A Law Conversions, Disconnect Supervision), the originating call will re-ring the originally called party and overflow tone is given to the requesting party.

Night DN

The Call Pickup Network Wide feature can be used to pick up a call to the night number if it is ringing an ordinary station (i.e., analog (500/2500 type) telephone, 16-button Dual-tone Multifrequency, or proprietary set).

Off-Hook Queuing

A call redirected by the Call Pickup Network Wide feature cannot be the subject of Off-Hook Queuing.

Path Optimization

Network Attendant Services (NAS)

NAS Anti-Tromboning is supported by the Call Pickup Network Wide feature.

Trunk Route Optimization Before Answer

The Call Pickup Network Wide feature does not support Trunk Route Optimization Before Answer.

Secondary DN

For calls to, from, or picked up from a secondary DN, all line IDs displayed after a successful pickup will follow the current rules for Calling Line ID and Connected Number. The exception is for Display Call Pickup; if the call is ringing at a secondary DN, the line ID on the requesting user's display will be the ringing DN (that is, the secondary DN). Once the pickup is completed, the displays will be as for normal pickup.

Vacant Number Routing

The Call Pickup Network Wide feature fully supports Vacant Number Routing (VNR) if the route or the set of routes given by the customer for VNR contains at least one MCDN link.

Virtual Network Services

The Call Pickup Network Wide feature will not work in conjunction with the Virtual Network Services feature.

Feature packaging

The Call Pickup Network Wide feature is included in Integrated Services Digital Network (ISDN) package 145.

The following packages must also be provisioned to activate this feature:

- Directed Call Pickup (DCP) package 115
- Advanced ISDN Network Services (NTWK) package 148, and
- 1.5 Mbps PRA package 146

Feature operation***Display Call Pickup***

This feature is only supported on Meridian Digital Telephones (with the exception of the M2317, and M3000).

- 1 Press the DSP key.
 - The DSP key is lit.
- 2 Press the RNP key.
 - The RNP key is flashing.
- 3 The display will show: Hbbbb1 Haaaa2

Where 1 = The DN of the originating party if it is local or available from CLID. If no CLID is available for a remote, originating party, either the route access code and the route member number are displayed if the ringing set is local, or dashes (“----”) are displayed if the ringing set is remote. This is because the route access code of a route has no meaning on the requesting node. The “H” is displayed if the DN can be determined and it is located on another node.

Where 2 = The DN of the originally called (ringing) party. The “H” is displayed if the DN is located on another node than the requesting party.

- The RNP key is winking for five seconds.

4 Press the DN key.

- The DN key is lit.

5 Press the RNP key. If the RNP key is pressed during the five seconds it is winking, Directed Call Pickup by DN is attempted. If the RNP key is dark when pressed, normal Ringing Number Pickup treatment takes place.

- The RNP key is flashing.

6 You are connected to the call.

- The RNP key becomes dark.
- For sets with display the following is shown:
“Name”1
Hcccc2 Hbbbb3 “P”4

Where 1 = Either the originating party’s name or the originally called party’s name is displayed depending on the requesting party’s Class of Service.

Where 2 = The DN of the originating party if it is local or available from CLID. If no CLID is available for a remote, originating party, either the route access code and the route member number are displayed if the ringing set is local, or dashes (“----”) are displayed if the ringing set is remote. This is because the route access code of a route has no meaning on the requesting node. The “H” is displayed if the DN can be determined and it is located on another node.

Where 3 = The DN of the originally called party. The “H” is displayed if the DN is located on another node than that of the requesting party.

Where 4 = The string defined in LD 95 for Call Pickup. The default is “P”

Ringling Number Pickup

To answer a call in your Call Pickup group from a Meridian Digital Telephone:

- 1** Lift the handset, or press a DN key.
 - The DN key is lit (if pressed).
- 2** Press the RNP key or dial SPRE + 3 or dial PURN FFC.
 - The RNP key is flashing.
- 3** You are connected to the call.
 - The RNP key becomes dark.
 - For sets with display, refer to step 3 under “Display Call Pickup”.

To answer a call in your Call Pickup group from an analog (500/2500 type) telephone:

- 1** Lift the handset.
- 2** Dial SPRE + 3 or PURN FFC.
- 3** You are connected to the call.

Directed Call Pickup by Group Number (Group Pickup)

To answer a call in another Call Pickup group from a Meridian Digital Telephone:

- 1** Lift the handset, or press a DN key.
 - The DN key is lit.
- 2** Press the GPU key or dial SPRE + 94 or dial PUGR FFC.
 - The GPU key is lit (if pressed).

- 3 Dial the pickup group number.
 - Once the group number is dialed completely, the GPU key is flashing to indicate that a search or scan is in progress.
- 4 You are connected to the call.
 - The GPU key becomes dark.
 - For sets with display, refer to Step 3 under “Display Call Pickup”.

To answer a call in another Call Pickup group from an analog (500/2500 type) telephone:

- 1 Lift the handset.
- 2 Dial SPRE + 94 or PUGR FFC.
- 3 Dial the pickup group number.
- 4 You are connected to the call.

Directed Call Pickup by Directory Number (DN Pickup)

To answer a call on a specified DN from a Meridian Digital Telephone:

- 1 Lift the handset, or press a DN key.
 - The DN key is lit.
- 2 Press the DPU key or dial SPRE + 95 or dial PUDN FFC.
 - The DPU key is lit (if pressed).
- 3 Dial the extension number.
 - Once the group number is dialed completely, the DPU key is flashing to indicate that a search or scan is in progress.
- 4 You are connected to the call.
 - The DPU key becomes dark.
 - For sets with display, refer to Step 3 under “Display Call Pickup”.

To answer a call on a specified DN from an analog (500/2500 type) telephone:

- 1 Lift the handset.
- 2 Dial SPRE + 95 or PUDN FFC.
- 3 Dial the extension number.

You are connected to the call.

Called Party Disconnect Control

This feature is not supported over ISDN facilities. Once the call clearing procedure is invoked, the call is taken down completely.

Calling Line Identification

Calling Line Identification (CLID) is a feature that delivers the calling party's telephone number to the called party's telephone set across the ISDN network. The CLID display lasts for the duration of the call.

The CLID display feature is supported for the following switch configurations:

- Meridian 1/SL-1 to Meridian 1/SL-1
- Meridian 1/SL-1 to DMS-100
- Meridian 1/SL-1 to SL-100

CLID supports both outgoing and incoming calls as follows:

Outgoing Calls

The calling party number that is sent out with the call SETUP message on the D-channel is based on:

- the numbering plan (private or public);
- the customer option configured in the Customer Data Block (LD 15), either Prime Directory Number (PDN) or Listed Directory Number (LDN);

Note: An attendant console can only be assigned an LDN.

- the class of service (COS) assigned to the set calling set.

If the numbering plan is private, the PDN is sent, regardless whether PDN or LDN is configured as the customer option.

If the numbering plan is public:

- if the customer option is set to LDN, then the set's Listed Directory is sent;
- if the customer option is set to PDN, either the Prime Directory Number or Listed Directory Number is sent, depending on the class of service (COS) assigned to the calling set in LD 10 or LD 11.

For private network calls, the calling party number consists of either the Electronic Switched Network (ESN) location code and the DN or the Coordinated Dialing Plan (CDP) DN. If the Prime DN is less than four digits, zeros are appended to create a four digit DN. If it is more than four digits, the last four numbers are used to identify the DN. For public network calls, it is the standard North American Numbering Plan seven or ten digit number.

Incoming Calls

For incoming calls across the ISDN network, the CLID received over the D-Channel is displayed instead of the trunk route access code and trunk member number.

The following devices, if equipped with a digit display, can receive and display a CLID number:

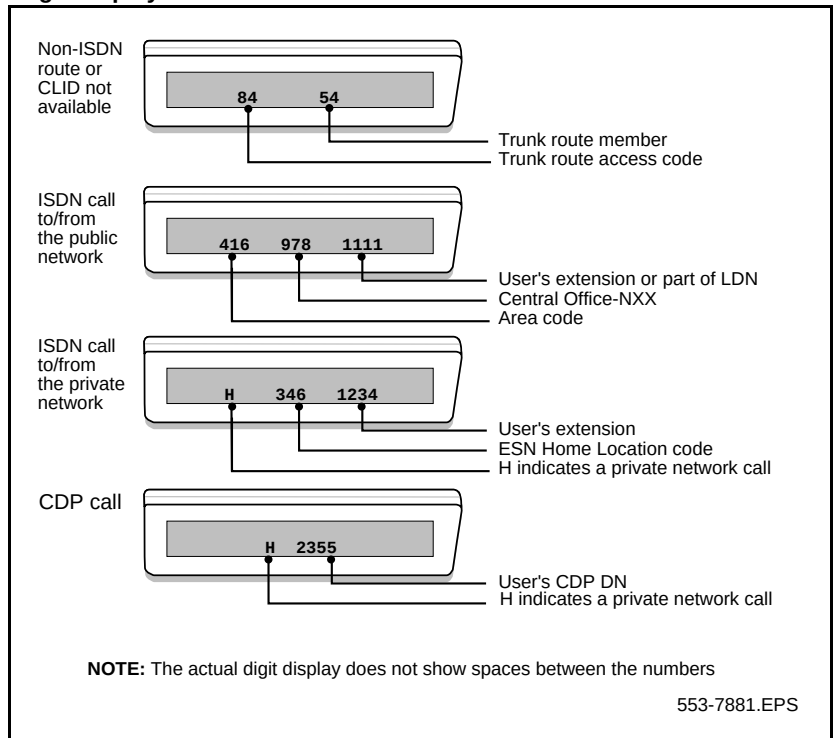
- Attendant Consoles
- Digital sets equipped with digit display
- ASCII terminals with data adapter such as ADM or programmable data adapter.

The digit display contents are described as follows:

- If the CLID display is unavailable because the call was not routed on ISDN routes, the trunk route access code and the trunk route member number are displayed. Note that Dialed Number Identification Service (DNIS) digits may be displayed as well if proper software is equipped.

- For public networks, the CLID displays the Standard North American Numbering Plan 10-digit number.
- For a private network with NARS, the CLID display is preceded by the letter “H”, followed by the ESN Home Location Code and the user's extension number or the customer's Listed Directory Number.
- For a private network with CDP, the CLID display is preceded by the letter “H”, followed by the user's CDP directory number or the customer's Listed Directory Number.

Figure 11
Digit Display format for CLID



Package requirements

Calling Line Identification requires the following:

ISDN (PRI or ISL)	option 145, 146 and/or 147
PRI	option 146 or ISL option 147
Digit Display	option 19

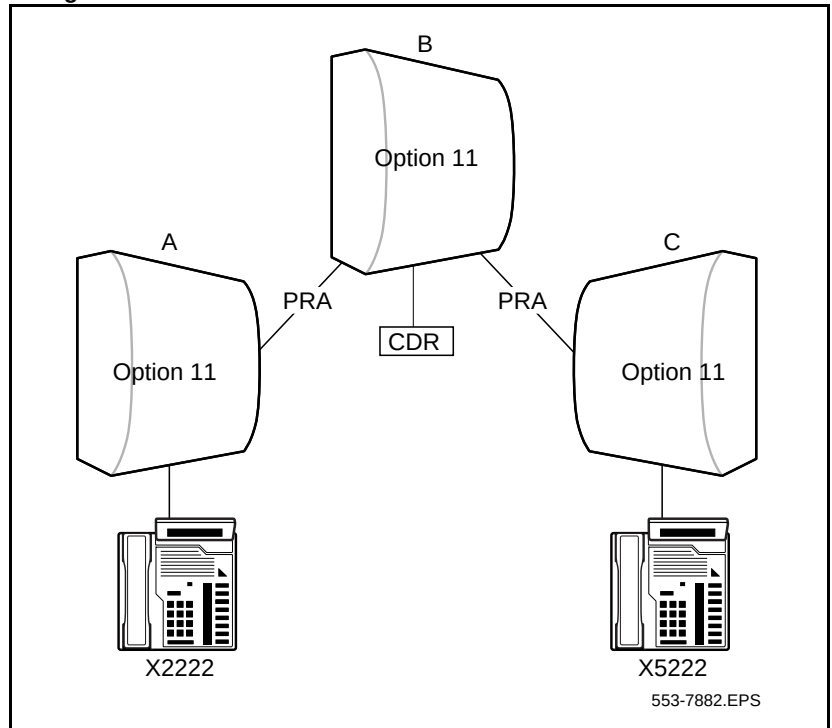
Calling Line Identification in Call Detail Record

This service provides the addition of a Calling Line Identification (CLID) field in the Call Detail Record (CDR). The addition of the CLID field will allow customers to charge back the calling party for services rendered in connection with their incoming calls. For example, calls placed to a service center may be charged back to departments receiving the service.

Another use of the CLID in CDR feature is to capture the actual calling DN at the tandem PBX. In a three Meridian 1 system configuration, when a user on PBX “A” calls PBX “C” through PBX “B”, the callers CLID from PBX”A” can be captured on the CDR at PBX “B.”

Note: Node B may also be a CO or other common carrier supporting CDR.

Figure 12
Using CDR



In this example DN 2222 on PBX A is calling DN 5222 on PBX C where PBX B is used as a tandem PBX. PBX B's CDR captures the actual extension (X2222) of the caller. Previously, only the trunk route and member number of the incoming TIE at PBX B could be captured.

Package Requirements

CDR package requirements are as follows:

ISDN	option 145
PRI	option 146 or ISL option 147
CLID in CDR	Option 118 is only required at the collecting location (i.e. site B)

Centralized Attendant Service (CAS)

CAS is not supported on the Option 11 system.

Calling Party Privacy

The Calling Party Privacy (CPP) feature enables the Meridian 1 to support the blocking of a Calling Party’s Number and Name from being displayed at the terminating set on a per-call basis. Users can dial a Calling Party Privacy code (e.g., *67 from a Meridian 1 proprietary set or 1167 from an analog (500/2500 type) set) to prevent their telephone number and name from being displayed on a receiving telephone across the Public Switched Telephone Network (PSTN). Internal calls within the Meridian 1 will have originating numbers or names displayed even though the originating call has requested privacy.

This feature also allows a per-line blocking Class of Service to be programmed for station sets for public network calls. This relieves the user from having to dial the Flexible Feature Code (FFC) for every call, but in every other way is equivalent to the per-call blocking.

Depending on the trunk route configuration, public network numbers which tandem over the Meridian 1 Meridian Customer Defined Network (MCDN), prior to exiting to the PSTN, Privacy Indicator will be passed along if dialed by the originator. This means that users can be sure that their privacy wishes are respected whether the call exits directly at the originating node, or is given alternate routing through a private network. However, if private network nodes are connected by non Integrated Services Digital Network (ISDN) Electronic Switched Network (ESN) trunks, the complexity of the signaling precludes the transmission of the Privacy Indicator. To compensate for this, outgoing Central Office (CO), Foreign Exchange (FEX), Wide Area Telephone Services (WATS), and Direct Inward Dialing (DID) trunks, may be configured to automatically generate a Privacy Indicator for calls received from incoming non-ISDN trunks.

A Privacy Indicator is used to signify that a call is a Calling Party Privacy call. For an outgoing non-Integrated Services Digital Network (ISDN) trunk call, the Privacy Indicator is defined in the outgoing trunk route as a digit string (e.g., *67). No Privacy Indicator is expected for an incoming non-ISDN trunk call. For an ISDN call between two Meridian 1 switches, the Privacy Indicator is represented by setting the Presentation Indicator field to “Presentation Restricted” in the Calling Party Number Information Element (IE) and the Calling Party Name Display (CPND) Indicator to “Presentation Denied” in the Display IE. For an outgoing ISDN call to the Public Exchange/Central Office, the Privacy Indicator is represented by setting the Presentation Indicator field to “Presentation Restricted” in the Calling Party Number IE and excluding the Display IE with the CPND information. An incoming ISDN call is marked as a CPP call (i.e., carries the Privacy Indicator) if the Presentation Indicator field is set to “Presentation Restricted” in the Calling Party IE or the CPND Indicator is set to “Presentation Denied” in the Display IE.

Operating parameters

The code to be dialed by the user can be flexibly defined, although *67 will be usual in North America. Multiple codes can be defined allowing a different code (e.g., 1167) to be used for rotary sets.

The code which is outpulsed on non-ISDN analog or digital trunks can also be flexibly defined on a per-route basis. Different codes can be programmed for routes which mix Digitone (DTN) and Dial Pulse (DIP) Classes of Service.

Frequently, the codes outpulsed on trunks will be the same as those dialed from station sets, but there is no reason why they cannot be different.

A non-ISDN trunk route will not be able to provision the CPP feature if Outpulsing of Asterisk and Octothorpe (OPAO) package 104 is equipped on the switch. During SYSLOAD, the CPP database will be removed from the non-ISDN trunk routes if the OPAO package is equipped.

Central Office Trunk (COT), Foreign Exchange (FEX), Wide Area Telephone Service (WATS), and Direct Inward Dialing (DID) are the only trunk route types allowed to outpulse the Privacy Indicator for an outgoing non-ISDN call.

ISDN implementations include DSM-100/250, SL-100, AT&T4, AT&T5, TR-1268 (NI-2) and Meridian Customer Defined Network (MCDN) private networks.

The Privacy Indicator defined for a non-ISDN trunk route (dial pulse or digitone) consists of any arbitrary digit sequence (0-9) up to four digits in length. The asterisk “*” or octothorpe “#” is not allowed in the Privacy Indicator for an outgoing dial pulse trunk route. The asterisk is only allowed as the first digit of the Privacy Indicator (e.g., *67) for an outgoing digitone trunk route; the octothorpe is not allowed in any Privacy Indicator on an outgoing digitone trunk route.

If a user requests privacy by dialing the Flexible Feature Code (FFC) defined for the CPP feature, and CPP is not provisioned in the outgoing trunk route, the call will proceed without carrying the Privacy Indicator.

No Privacy Indicator is expected to be received from the Public Exchange/Central Office on non-ISDN DID trunks. This would be treated as a misdial.

The CPP feature will not inhibit the Calling Party Number and Name from being displayed for an internal call within a local Meridian 1 customer group.

A common number defined for the Special Prefix (SPRE) code in the database is “1”. Thus, “1167” will not be accepted as an FFC for CPP due to the conflict with existing DNs. The technician should either change the SPRE code, or define a new FFC for CPP to be used by a rotary telephone.

Feature interactions

Autodial

An outgoing trunk call initiated by pressing the Autodial key will carry the Privacy Indicator if the Calling Party Privacy (CPP) code followed by the normal dialing sequence is stored against the Autodial key. The CPP code is counted against the maximum number of digits (currently 23) stored against the Autodial key.

A user can also store the CPP code against the Autodial key. An outgoing CPP call can be initiated by pressing the Autodial key, followed by manually dialing the digits.

An outgoing CPP call can also be initiated by dialing the CPP code, followed by pressing the Autodial key against which the normal dialing sequence of digits have been stored.

Automatic Call Distribution

A call placed by means of Enhanced Automatic Call Distribution (ACD) Routing, Enhanced Interflow, Enhanced Night Call Forward, Enhanced Network Routing, or Network ACD will respect the CPP request of the originator.

Automatic Call Distribution MAX (ACD MAX)

The Calling Line Identification (CLID) is still included in ACD MAX reports, even if the caller has requested CPP.

Call Detail Recording

The current Call Detail Recording (CDR) records which include the Calling Party Number will continue to do so even if the caller has requested CPP. The FFC for CPP dialed by the user will be included in the dialed digits field when generating a CDR record.

An outgoing non-ISDN trunk call outputting the Privacy Indicator will include the Privacy Indicator in the outputted digits field when generating the CDR records if the outgoing non-ISDN trunk route has Outputted Digit Option (DPD) activated.

Call Forward All Types Hunt

If an incoming ISDN trunk call with the Privacy Indicator is forwarded, the Privacy Indicator will be tandemmed to the far end to inhibit the display of the Calling Party Name or Number provided that the outgoing trunk route on the tandem node also has CPP provisioned.

If an incoming non-ISDN trunk call is forwarded to a trunk, the outgoing trunk call from the tandem node will carry the Privacy Indicator if the outgoing trunk route on the tandem node has the TCPP option set.

The CPP code can also be stored on the forwarding DN. If the CPP is requested on the forwarding DN, the Privacy Indicator will be outpulsed to the terminating node to inhibit the number of the forwarding set (i.e, at the tandem node) from being displayed on the terminating set. In this case, the forwarding station must include the CPP in the forwarding DN (such as *67 + ACOD + the DN on the terminating node).

The above scenario also applies to Hunt and Network Hunt.

Call Hold, Deluxe Call Hold, Permanent

When a user takes an incoming trunk call with the Privacy Indicator off of hold, no Calling Party Number or Name will be displayed on the set.

Call Pickup

If an incoming trunk call with the Privacy Indicator is picked up locally, the display of the calling Party Number and Name are not displayed on the terminating set.

Call Pickup Network Wide

If an incoming trunk call with the Privacy Indicator is picked up by a remote set (requesting party), the display of the calling Party Number and Name are not displayed on the requesting set.

Call Transfer

If an incoming non-ISDN call is being transferred or an incoming ISDN call is transferred to a non-ISDN trunk, the Calling Party Name and Number will not be passed on to the terminating set. The CPP feature will not change this operation.

For cases where an incoming call with the Privacy Indicator is transferred over an MCDN trunk, or to a local station, the name and/or number of the originating party will not be displayed on the set of the final terminating party.

Calling Line Identification Restriction (CLIR)

The Flexible Feature Code is not supported on BRI sets. Calling Party Privacy can only be requested by setting the soft key “ID PRES” (if it exists) to “Denied” or the “PRES” prompt to “NO” in LD 27. If the Calling Party Number IE with the Presentation Indicator set to “Presentation Allowed” is included in the SETUP message generated by the BRI terminal, this BRI terminal will not allow Calling Party Privacy, as the Presentation Indicator generated by the BRI terminal always overwrites the CLIR service option.

Call Party Name Display (CPND)

In current operations an incoming ISDN call with the Call Party Name Display (CPND) Indicator field set to “Presentation Denied” still displays the Calling Party Name.

The CPP feature will inhibit the display of the Calling Party Name for an incoming ISDN call with the CPND Indicator field set to “Presentation Denied”.

Conference

The CPP feature will pass the Privacy Indicator to the terminating set to inhibit the display of the Calling Party Name and Number if the Conference feature is used for the purpose of performing a transfer.

Calling Party Name Display Denied

For outgoing calls, if the CPP package is equipped, the CPP feature will take precedence over the Calling Party Name Display Denied feature for restricting the Calling Party Name and Number. For example, if an outgoing ISDN call is marked as a CPP call, the outgoing SETUP message will include the Calling Party Number IE with the Presentation Indicator set to “Presentation Restricted” and the Display IE with the CPND Indicator set to “Presentation Denied”, to inhibit both the Calling Party Number and Name being displayed on the terminating set, regardless of whether or not the Calling Party Name Display Denied feature allows the display of the Calling Party Name and/or Number.

The Calling Party Name Display Denied feature takes precedence over the CPP feature for displaying an incoming ISDN call.

Feature Group D

If an incoming Feature Group D (FGD) call terminates at a Meridian 1 switch locally, the received 10-digit Automatic Number Identification (ANI) will be displayed on the terminating set if the Show ANI Digits on Terminal Displays (SHAN) field is set to “YES” in the FGD data block associated with the incoming trunk route. If the originator requests CPP, the end office will not send the 10-digit ANI to the PBX.

If an incoming FGD call is routed to another switch via ISDN Primary Rate Interface (PRI) or Integrated Service Link (ISL), the outgoing SETUP message will include the 10-digit ANI (if it exists) as the Calling Party Number with the Presentation Indicator set to “Presentation Restricted” if the outgoing trunk route has the TCPP option on. The TCPP option takes precedence over the SHAN field defined in the FGD data block associated with the incoming trunk route to restrict the 10-digit ANI display.

Hot Line

A Hot Line call will carry the Privacy Indicator if the Calling Party Privacy (CPP) code followed by the normal dialing sequence is stored in the Hot Line DN. The CPP will count against the maximum number of digits (currently 31) allowed for the Hot Line DN.

Incoming Trunk Programmable CLID

If the incoming trunk route is a non-ISDN route, the billing number assigned by the incoming trunk route will be passed to the Public Exchange/Central Office with the Presentation Indicator field set to “Presentation Restricted” if the outgoing ISDN trunk route has the TCPP prompt set to “YES”. If the TCPP prompt is set to “NO”, the Presentation Indicator is set to “Presentation Restricted” only if the BDSP (Billing Display) prompt in the incoming trunk route is set to “NO”.

If the incoming trunk route is an ISDN route, the “Restricted” Presentation Indicator will be tandemed to the outgoing trunk route. If the Presentation Indicator is set to “Presentation Allowed” or no Calling Party Number IE is received in the incoming trunk route, the billing number assigned by the incoming trunk route will be passed to the Public Exchange/Central Office with the Presentation Indicator field set to “Presentation Restricted” only if the incoming trunk route has the BDSP prompt set to “NO”.

Last Number Redial

The Last Number Redial (LNR) feature will store the CPP code in the LNR data space if the CPP code was included in the last number dialed by the user. Any subsequent outgoing redialed call will send the Privacy Indicator to the far end.

Malicious Call Trace

Incoming calls to stations having the Malicious Call Trace feature enabled will continue to include the Terminal Number (TN) of the calling party in the Malicious Call Trace record, even if the caller has requested CPP.

Meridian Link

The CLID is still included in the Application Module Link (AML) messages sent to the Meridian Link Module even if the call has requested CPP.

Meridian Mail

When an incoming ISDN call with the Privacy Indicator terminates on Meridian Mail, the Calling Party Name and Number will not be passed to Meridian Mail to be recorded. When the called party retrieves the messages, no Calling Party Number or Name will be played, and the called party will not be able to initiate the Call Sender feature either, since no CLID is recorded.

Calls placed by means of Through Dial will be able to request privacy. These are calls where the person accessing Meridian Mail can dial 0 followed by any telephone number. The caller will be able to dial the CPP code as part of the number following 0.

Meridian MAX

The CLID is still sent to the Meridian MAX even if the caller has requested CPP.

Meridian 911

An incoming 911 call with ANI information will always display the ANI digits on the terminating set or pass the ANI information to the Meridian 911 application.

Network Message Services

An incoming trunk call with the Privacy Indicator will not display the Calling Party Name and Number on the Message Center operator's terminal.

Network Ring Again

A call placed by means of the Network Ring Again feature will respect the CPP requested when the call was originally dialed.

Private Line Service

The Private Line Service feature will output the Privacy Indicator only if it is dialed by the originator. An asterisk will be output to the far end only if it is an OPAO call, otherwise the asterisk signals a three-second pause.

Ring Again – Busy Trunk

A call automatically redialed by the Ring Again – Busy Trunk feature will respect the CPP requested when the call was originally dialed.

Speed Call

System Speed Call

An outgoing trunk call initiated by dialing the Speed Call code will carry the Privacy Indicator if the CPP code followed by the normal dialing sequence is stored in the Speed Call Entry represented by the Speed Call code. The CPP code will be counted against the maximum number of digits (currently 31) allowed per Speed Call list entry.

A user can also store the CPP code in the Speed Call Entry (or Speed Call key). An outgoing CPP call can then be initiated by dialing the Speed Call code (or pressing the Speed Call key), followed by manually dialing the digits.

However, existing Speed Call limitations do not allow a user to dial *67 (or anything else) before accessing a Speed Call list entry.

Stored Number Redial

During Stored Number Redial (SNR) programming, a user can store the CPP code followed by the normal dialing sequence in the SNR data space. Outgoing calls originated by the SNR feature will send the Privacy Indicator to the far end. The CPP code will be counted against the maximum number of digits (currently 31) allowed by the SNR feature.

During an active call on a Meridian 1 proprietary telephone, the Stored Number Redial feature will store the CPP code in the SNR data space if the CPP code was included in the number dialed by the originator. The outgoing redialed calls will send the Privacy Indicator to the far end.

Trunk Optimization Before Answer

An optimized call due to Trunk Optimization Before Answer will respect the CPP requested by the originator.

Feature packaging

Calling Party Privacy (CPP) is package 301, which requires Flexible Feature Codes (FFC) package 139. Non ISDN trunks must restrict the Outpulse Asterisk and Octothorpe (OPAO) package 104 to provision the CPP feature.

Feature operation

Any outgoing call initiated from a set with Calling Party per-line blocking (CLBA) Class of Service will request Calling Party Privacy.

If the originating party has CLBD Class of Service, the Calling Party Privacy feature can only be activated on a per-call basis; if standard dialing procedures are used, no CPP is requested, and the call will proceed as usual. The user must do one of the following to request CPP:

- 1 Precede any dialing of a call with a new Flexible Feature Code defined for the CPP feature. This operates from all telephone types, except BRI sets.
- 2 The Flexible Feature Code is not supported on BRI sets; however, Calling Party Privacy can be requested by setting the softkey “ID PRES” (if it exists) to “Denied” state or the “PRES” prompt to “NO” in LD 27.

Note: If the Calling Party Number IE with the Presentation Indicator set to “Presentation Allowed” is included in the SETUP message generated by the BRI terminal, this BRI terminal will not allow Calling Party Privacy, as the Presentation Indicator generated by the BRI terminal always overwrites the CLIR service option.

Calling Party Privacy Override

Calling Party Privacy Override (CPPO) enhances the functionality of the Calling Party Privacy (CPP) feature. With Calling Party Privacy Override, calling party information can be selectively unblocked on a per-call basis.

The Calling Party Privacy (CPP) feature enables the Meridian 1 system to permanently block the Calling Party Number and Name from being displayed on the terminating set across the Public Switched Telephone Network (PSTN). This permanent blocking occurs when Class of Service is set to Calling Party Number and Name per-line blocking allowed (CLBA). When Class of Service is set to Calling Party Number and Name per-line blocking denied (CLBD), the user can block the Calling Party Number and Name on a per-call basis. To block the calling party information on a per call basis, the user dials a Calling Party Privacy Flexible Feature Code (FFC) prior to dialing the destination number.

With the Calling Party Privacy Override feature, a Private Branch Exchange (PBX) user can selectively unblock calling party information on a per-call basis when Class of Service is set to CLBA. The user unblocks the calling party information by dialing a Calling Party Privacy Override Flexible Feature Code prior to dialing the destination number. When the CPPO Flexible Feature Code is dialed before the destination number, the user's calling party information is displayed on the terminating set. The default for the Calling Party Privacy Override Flexible Feature Code is “*82” for Meridian 1 proprietary sets and “1182” for analog (500/2500 type) sets. The Calling Party Privacy Override Flexible Feature Code is defined in Overlay 57.

CPPO is provisioned on a trunk route basis. Any trunk type¹ that can support an outgoing call can request the CPPO feature.

When the CPPO Flexible Feature Code is dialed prior to the normal dialing sequence, the call is marked as a CPPO call. The CPPO Flexible Feature Code is then removed from the dialed digits stored in the call register. If the outgoing trunk route provisions CPPO, then the Privacy Override Indicator is sent to the far end, and the Calling Party Number and Name information is displayed on the receiving telephone. If the outgoing trunk route does not provision CPPO, the call does not carry the Privacy Override Indicator.

The following example illustrates Calling Party Privacy Override functionality:

- 1** Set A, a Meridian 1 proprietary set with Class of Service set to CLBA, goes off-hook.
- 2** Set A dials the Calling Party Privacy Override Flexible Feature Code, defined in Overlay 57. Calling Party Privacy Override is initiated.
- 3** Set A dials the destination number for Set B.
- 4** The call rings on Set B.
- 5** The calling party information of Set A is presented on the display screen of Set B.

Outgoing calls

For an outgoing non-ISDN trunk call, the Privacy Override Indicator is defined on the outgoing trunk route. The CPPO Flexible Feature Code is outpulsed to the far end provided that the outgoing trunk route provisions CPPO. If CPPO is not provisioned on the trunk route, then the call does not carry the Privacy Override Indicator.

1. For non-ISDN trunks, only Central Office Trunk (COT), Direct Inward Dial (DID), Foreign Exchange (FEX), and Wide Area Telephone (WATS) trunks are supported. However, all ISDN trunk routes support the CPPO feature.

For an outgoing ISDN call from one Meridian 1 to another, the Privacy Override Indicator is represented when the Presentation Indicator field is set to “Presentation Allowed” in the Calling Party Number Information Element (IE) and the Call Party Name Display (CPND) Indicator field is set to “Presentation Allowed” in the Display IE.

For an outgoing ISDN call to the Central Office, the Privacy Override Indicator is represented when the Presentation Indicator field is set to “Presentation Allowed” in the Calling Party Number IE and when the CPND information is included in the Display IE.

Incoming calls

An incoming ISDN call is recognized as a CPPO call (that is, it carries the Privacy Override Indicator) if the Presentation Indicator field is set to “Presentation Allowed” in the Calling Party Number IE and if the CPND Indicator is set to “Presentation Allowed” in the Display IE (if it exists¹).

When an incoming call is on a non-ISDN route, the Meridian 1 does not receive the Privacy Override Indicator.

Tandem Calls

Incoming ISDN calls

ISDN to ISDN tandem

For an incoming call tandeming through the Meridian 1, any incoming Privacy Override Indicator is only repeated to the outgoing trunk route that also has CPPO provisioned.

When an incoming ISDN trunk call is tandemed through an ISDN trunk to a Meridian 1 switch, the Presentation Indicator or the CPND Indicator, received from the incoming ISDN trunk, is tandemed to the outgoing ISDN trunk.

1. Call Party Name Display (CPND) information is optional for ISDN calls.

When an incoming ISDN trunk call is tandemed through an ISDN trunk to a CO, the Presentation Indicator received from the incoming ISDN trunk is tandemed to the outgoing ISDN trunk. If the Display IE with the CPND Indicator set to “Presentation Allowed” is received from an incoming ISDN trunk, the Display IE, containing the Call Party Name, is sent across in the SETUP message tandemed to the outgoing ISDN trunk.

ISDN to non-ISDN tandem

When an incoming ISDN trunk call is tandemed to a non-ISDN trunk, the incoming call is treated as a CPPO call only if both the CLID and CPND Indicators are set to “Allowed”. Otherwise, the call is treated as a CPP call.

Incoming non-ISDN calls

For incoming non-ISDN calls, the Meridian 1 does not receive the Privacy Override Indicator.

When a call on an incoming non-ISDN route is tandemed on the Meridian 1, the call is tandemed based on how the CPP flag (TCPP) prompt is defined in the Route Data Block for the outgoing route.

When TCPP is set to YES, an incoming non-ISDN call tandemed to this route is treated as a CPP call.

When TCPP is set to NO, an incoming non-ISDN call tandemed to this route is treated as a CPPO call.

Non-ISDN to ISDN tandem

Even though a Privacy Override Indicator is not provided for an incoming non-ISDN trunk call, if the outgoing route has TCPP set to NO, the Presentation Indicator field in the Calling Party IE is set to “Presentation Allowed”.

Non-ISDN to non-ISDN tandem

A Privacy Override Indicator is not provided for an incoming non-ISDN trunk call. If the outgoing route has TCPP set to NO, the Privacy Override Indicator defined for that route is outpulsed, provided that the outgoing route provisions CPPO.

Operating parameters

Central Office Trunks (COT), Foreign Exchange (FEX), Wide Area Telephone Service (WATS), and Direct Inward Dial (DID) are the only trunk route types (including ISA service routes) that can outpulse the Privacy Override Indicator for an outgoing non-ISDN call. All ISDN trunk routes provision the CPPO feature.

A non-ISDN trunk route does not provision the CPPO feature if the Outpulse Asterisk and Octothorpe (OPAO) package (package 104) is configured. During SYSLOAD, the CPPO database is removed from the non-ISDN trunk routes if the OPAO package is configured.

The Privacy Override Indicator, defined for a non-ISDN trunk route (dial-pulse or digitone), consists of any four arbitrary digits from 0-9. The asterisk (*) or octothorpe (#) cannot be part of the Privacy Override Indicator for dial-pulse trunks. For digitone trunks, the asterisk (*) can only be the first digit of the Privacy Override Indicator Flexible Feature Code.

The asterisk and octothorpe are not outpulsed if the OPAO package is configured. The asterisk signals a 3-second pause and the octothorpe indicates end-of-dialing. The octothorpe cannot be used in a Privacy Override Indicator.

Privacy Override Indicators are not received from the CO or non-ISDN DID trunks.

The CPPO Flexible Feature Code cannot conflict with any internal DN, including the Special Prefix (SPRE) code.

When a user dials the Flexible Feature Code defined for the CPPO feature and if CPPO is not provisioned on the outgoing trunk route, the call proceeds without carrying the Privacy Override Indicator.

The CPPO feature does not affect whether or not the Calling Party Number and Name information is displayed for internal calls within the Meridian 1 system, even if the originator requests CPPO.

All incoming non-ISDN calls with the Privacy Override Indicator terminate on the Meridian 1. If the Privacy Override Indicator is not defined in the Flexible Feature Code for CPPO, an overflow tone (unrecognized digits) is provided to the user.

If the Stored Number Redial (SNR)/Last Number Redial (LNR) feature is used by the originator of a CPPO call to store the dialed digits, the CPPO Flexible Feature Code is stored against the SNR/LNR database. If the user removes that CPPO Flexible Feature Code and then the SNR/LNR feature is used to re-initiate the call, overflow tone is returned to the user.

ISDN implementation for this feature includes DMS100/250, SL-100, AT&T4, AT&T5, TR-1268 (NI-2), Meridian Customer Defined Network (MCDN) Private Networks, EuroISDN, QSIG, and BRI trunks.

The CPPO feature is supported on the following International PRI (IPRI) connectivities: Ericsson AXE-10 CO Connectivity (Australia), Ericsson AXE10-CO Connectivity (Sweden), French Numeris CO Connectivity, Japan D70 CO Connectivity, Swissnet 2 CO Connectivity, SYS-12 CO Connectivity, 1TR6 CO Connectivity (Germany), and Asia Pacific ISDN Phase 2.

The CPPO feature supports the following North American connectivities: DMS100/250, S1100, Lucent #4 ESS (ESS4), Lucent #5 EES (ESS5), and TR-1268 (NI-2).

CPPO does not support R2MFC signaling.

Feature interactions

Attendant Consoles

A CPPO call can be originated from any Meridian 1 Attendant Console. Attendant Consoles request CPPO by preceding the normal dialing sequence with the Flexible Feature Code for CPPO.

Attendant Consoles can also initiate a CPPO call using the Autoline key. An outgoing trunk call, initiated by pressing the Autoline key, carries the Privacy Override Indicator if the CPPO Flexible Feature Code, followed by the normal dialing sequence, is stored against the Autoline key. The CPPO Flexible Feature Code is counted against the maximum number of digits (currently 31) stored against the Autoline key.

The CPPO Flexible Feature Code can also be stored against the Autoline key. An outgoing CPPO call can then be initiated by pressing the Autoline key followed by manually dialing the destination number.

An outgoing CPPO call can also be initiated by dialing the CPPO Flexible Feature Code followed by pressing the Autoline key, on which the normal dialing sequence of digits for the destination number is stored.

Autodial

An outgoing trunk call, initiated by pressing the Autodial key, carries the Privacy Override Indicator if the CPPO Flexible Feature Code followed by the normal dialing sequence is stored against the Autodial key. The CPPO Flexible Feature Code is counted against the maximum number of digits (currently 31) stored against the Autodial key.

The CPPO Flexible Feature Code can be stored against the Autodial key. In this case, an outgoing CPPO call can be initiated by pressing the Autodial key followed by manually dialing the normal sequence of digits for the destination number.

An outgoing CPPO call can also be initiated by dialing the CPPO Flexible Feature Code followed by pressing the Autodial key on which the normal dialing sequence of digits for the destination number is stored.

Automatic Call Distribution

Calls placed by means of Enhanced Automatic Call Distribution (ACD) Routing, Enhanced Interflow, Enhanced Night Call Forward, Enhanced Network Routing, and Network ACD recognize the originator's CPPO request.

Automatic Call Distribution MAX

If the CPP package is equipped, ACD MAX reports include the Calling Line Identification (CLID) for incoming ISDN calls that have the CLID Presentation Indicator set to "Allowed".

Basic Rate Interface

Although Basic Rate Interface (BRI) networking is not supported in North America, CPPO treats BRI trunk calls in the same manner as an ISDN trunk call.

Call Detail Recording

Call Detail Recording (CDR) records continue to include the Calling Party Number even if the caller has requested CPPO. When the CDR record is generated, the CPPO Flexible Feature Code dialed by the originator is included in the DIGIT field (if it displays the dialed digits).

The CPPO Flexible Feature Code dialed by the originator is not included in the DIGIT field if it displays the outpulsed digits. The Privacy Override Indicator, outpulsed by an outgoing non-ISDN trunk route that provisions CPPO, is included in the outpulsed digits.

Call Pickup Network Wide

When an incoming trunk call with the Privacy Override Indicator is picked up by a remote set (the requesting party), the Calling Party Number and Name is displayed on the requesting set.

Call Hold

When an incoming trunk call with the Privacy Override Indicator is taken off hold, the Calling Party Number and Name information is displayed on the set.

Call Forward All Types**Hunt****Network Hunt**

The existing call redirection functionality is not changed by this feature.

When an incoming ISDN trunk call with the Privacy Override Indicator is forwarded into the public or private networks, the Privacy Override Indicator is tandemed to the far end to allow the display of the Calling Party Number and Name, provided that the outgoing trunk route on the tandem node has CPPO provisioned.

When an incoming ISDN call with Calling Party Number and Name set to “Presentation Allowed” is forwarded to a set within the same node, the Calling Party Number and Name is displayed on the terminating set.

When an incoming non-ISDN trunk call is forwarded onto a trunk¹, the outgoing trunk call from the tandem node carries the Privacy Override Indicator, provided that the outgoing trunk route on the tandem node has CPPO provisioned. Also, the TCPP prompt in the Route Data Block must be set to NO.

The CPPO Flexible Feature Code can be stored on the forwarding Directory Number (DN), including the forwarding DN for Call Forward All Calls, Hunt DN and Flexible Call Forward No Answer DN (FDN).

If CPPO is requested on the forwarding DN and the call is forwarded across an ISDN link, the outgoing SETUP message includes the Redirecting Number IE (if it exists) with the Presentation Indicator set to “Presentation Allowed”.

If CPPO is requested on the forwarding DN and the call is forwarded across a non-ISDN link, no Privacy Override Indicator is outpulsed to the terminating node if the originating set did not request CPPO. This is because no Redirecting Number information is sent across a non-ISDN link.

When an internal call is forwarded into the public or private networks, if the originator requests CPPO and the outgoing trunk route provisions CPPO, the Privacy Override Indicator is sent to the far end to allow the display of the Calling Party Number and Name.

Call Pickup

With CPPO activated, when an incoming trunk call with the Privacy Override Indicator is picked up locally, the Calling Party Number and Name information is displayed on the terminating set.

Call Transfer

As per existing operation, if an incoming non-ISDN call is transferred or an incoming ISDN call is transferred to a non-ISDN trunk, the Connect Party Number and Name information is not passed to the terminating node. The CPPO feature does not change this operation.

1. A Privacy Override Indicator is not expected on this route.

When an incoming call with the Privacy Override Indicator is transferred across the MCDN network or to a local set, the originator's calling party information is displayed on the final terminating set.

Calling Line Identification Restriction

Basic Rate Interface (BRI) sets do not support the Flexible Feature Code (FFC) feature. CPPO can only be requested by applying the existing Calling Line Identification Restriction (CLIR) Service option. This is done by setting the soft key "ID PRES" (if it exists) to "Allowed" or the Presentation of CLID to far end on outgoing calls (PRES) prompt to YES in Overlay 27. Then an outgoing ISDN/non-ISDN trunk call carries the Privacy Override Indicator if the outgoing trunk route provisions CPPO. However, if the Calling Party Number Information Element (IE) with the Presentation Indicator set to "Presentation Denied" is included in the SETUP message generated by the Basic Rate Interface (BRI) terminal, then the BRI terminal does not allow CPPO. This is because the Presentation Indicator, generated by the BRI terminal, always overwrites the Calling Line Identification Restriction (CLIR) service option.

Calling Party Privacy

If the user requests both Calling Party Privacy and Calling Party Privacy Override, then the feature last requested takes precedence. The Flexible Feature Code dialed last determines the type of call.

If a set with Class of Service set to CLBA requests CPPO by dialing the CPPO Flexible Feature Code, then the call is treated as a CPPO call. If a set with Class of Service set to CLBD requests CPP by dialing the CPP Flexible Feature Code, then the call is treated as a CPP call.

If a user dials the Flexible Feature Code for CPPO followed by the Flexible Feature Code for CPP, then the call is treated as a CPP call. If a user dials the Flexible Feature Code for CPP followed by the Flexible Feature Code for CPPO, then the call is treated as a CPPO call.

Calling Party Privacy and Call Forward

Set A, requesting CPPO, calls Set B. Set B Call Forwards All Calls to Set C. The CPP Flexible Feature Code is part of the forwarding DN. Set A's number and name is displayed on Set C as the Calling Party Number and Name; although, no redirecting number is displayed on Set C. The tandem node sends the Display IE with the Presentation Indicator set to "Allowed" and the Redirecting Number IE with the Presentation Indicator set to "Restricted".

Set A, requesting CPP, calls Set B. Set B Call Forwards All Calls to Set C. The CPPO Flexible Feature Code is part of the forwarding DN. Set B's number is displayed on Set C as the Redirecting Number; although, no Calling Party Number and Name is displayed on Set C. The tandem node sends the display IE with the Presentation Indicator set to "Restricted" and the Redirecting Number IE with the Presentation Indicator set to "Allowed".

Calling Party Privacy and Call Transfer

Set A, requesting CPPO, calls Set B. Set B answers the call, requests CPP, and initiates a transfer to Set D. After the transfer is complete, Set A's Calling Party Number and Name is displayed on Set D. The request made by the connected party takes precedence over the transferring party while displaying the Connect Party Number and Name.

Set A, requesting CPP, calls Set B. Set B answers the call, requests CPPO, and initiates a transfer to Set D. After the transfer is complete, Set A's Calling Party Number and Name is not displayed on Set D. The request made by the connected party takes precedence over the transferring party while displaying the Connect Party Number and Name.

Conference

The CPPO feature passes the Privacy Override Indicator to the terminating set in order to display the Calling Party Number and Name, if the Conference feature is used for the purpose of performing a transfer.

Display of Calling Party Denied

When the CPP package is equipped, the CPPO feature takes precedence over the Display of Calling Party Denied (DPD) feature for allowing the Calling Party Number and Name to be displayed. For example, when an outgoing ISDN call is marked as a CPPO call, then the outgoing SETUP message includes the Calling Party Number IE with the Presentation Indicator set to “Presentation Allowed” and the Display IE with the CPND Indicator set to “Presentation Allowed”. This enables both the Calling Party Number and Name to be displayed on the terminating set, regardless of whether the DPD feature allows or denies the display of the Calling Party Number and/or Name.

E.164 ESN Numbering Plan Enhancement

CPPO can be requested for ESN calls by preceding the dialing sequence with the Flexible Feature Code defined for the CPPO feature. The CPPO Flexible Feature Code is counted against the maximum number of digits (currently 31) allowed for the destination DN.

Feature Group D

When an incoming Feature Group D (FGD) call terminates at a Meridian 1 switch locally, the received 10-digit Automatic Number Identification (ANI) is displayed on the terminating set if the Show ANI Digits on Terminal Displays (SHAN) field is set to YES in the FGD data block that is associated with the incoming trunk route. If the originator requests CPPO, the end office sends the 10-digit ANI to the PBX.

If an incoming FGD call is routed to another switch via ISDN Primary Rate Interface (PRI) or ISDN Signaling Link (ISL), the outgoing SETUP message includes the 10-digit ANI (if it exists) as the Calling Party Number (CLID) with the Presentation Indicator set to “Presentation Allowed”. This occurs if the incoming call requests CPPO. CPPO takes precedence over the SHAN field that is defined in the FGD data block and is associated with the incoming trunk route to allow the 10-digit ANI display.

Hot Line

Hot line calls carry the Privacy Override Indicator if the CPPO Flexible Feature Code followed by the normal dialing sequence is stored in the Hot Line DN. The CPPO Flexible Feature Code is counted against the maximum number of digits (currently 31) allowed for the Hot Line DN.

Last Number Redial

The Last Number Redial (LNR) feature stores the CPPO Flexible Feature Code in the LNR database if the CPPO Flexible Feature Code was included in the last number dialed by the user. The outgoing redialed calls also send the Privacy Override Indicator to the far end.

Incoming Trunk Programmable Calling Line Identification

When the incoming trunk route is a non-ISDN route, the billing number (CLID) assigned by the incoming trunk route is passed to the CO with the Presentation Indicator field set to “Presentation Allowed”, if the outgoing ISDN trunk route has the TCPP prompt set to NO.

When the incoming trunk route is an ISDN route, the “Allowed” Presentation Indicator is tandemmed to the outgoing trunk route. If the Presentation Indicator is set to “Presentation Allowed” or no Calling Party Number IE is received on the incoming trunk route, the billing number assigned by the incoming trunk route is passed to the CO with the Presentation Indicator field set to “Presentation Allowed”, if the incoming trunk route has the Billing Number Display (BDSP) prompt set to YES or NO.

ISDN Signaling Link

CPPO treats an ISDN Signaling Link (ISL) call in the same manner as an ISDN trunk call.

Malicious Call Trace

An incoming call to a set with the Malicious Call Trace (MCT) feature activated includes the Terminal Number (TN) of the calling party in the MCT record, whether or not the caller has requested CPPO.

Meridian 911

An incoming 911 call with Automatic Number Identification (ANI) information always displays the ANI digits on the terminating set or passes the ANI information to the Meridian 911.

Meridian Interactive Voice Response

An incoming ISDN call with the CLID Presentation Indicator set to “Allowed” sends the CLID to the Meridian Interactive Voice Response (IVR) if the CPP package is equipped.

Meridian Link

If the CPP package is equipped, an incoming ISDN call with the CLID Presentation Indicator set to “Allowed” includes the CLID in the Application Module Link (AML) messages sent to the Meridian Link module.

Meridian Mail

When an incoming ISDN call with the CLID Presentation Indicator set to “Allowed” terminates on Meridian Mail, the CLID passed to Meridian Mail is recorded. The call is treated by Meridian Mail as an external call.

Calls placed by means of Through Dial can request Calling Party Privacy Override. These calls involve the person accessing Meridian Mail (mailbox user or incoming caller) dialing 0 followed by any telephone number. The caller is able to dial a CPPO Flexible Feature Code plus the normal dialing sequence, following the 0. The asterisk (*) or octothorpe (#), as part of the CPPO Flexible Feature Code, are rejected by Meridian Mail. Therefore, the CPPO Flexible Feature Code can only consist of seven digits (0-9).

Meridian MAX

If the CPP package is equipped, an incoming ISDN call with the CLID Presentation Indicator set to “Allowed” sends the CLID to Meridian MAX.

Network Call Redirection

If a set receives a call and is then redirected to the public network on an ISDN trunk that supports call redirection, then the redirecting IE in the outgoing SETUP message has the Presentation Indicator set accordingly. For instance, if the call that had requested CPPO is redirected, the outgoing SETUP message has the Presentation Indicator set to “Allowed”.

Network Message Center

An incoming trunk call with the Privacy Override Indicator displays the Calling Party Number and Name on the Message Center operator’s terminal.

Network Ring Again

A call placed by means of the Network Ring Again feature recognizes the CPPO request from when the call was originally dialed.

Nortel Symposium Call Center

As per existing operation, an incoming CPPO call routed to Nortel Symposium Call Center contains the CLID.

Private Line Service

The Private Line Service feature outpulses the Privacy Override Indicator only if it is dialed by the originator. The asterisk (*) is outpulsed to the far end only if it is an Outpulse Asterisk and Octothorpe (OPAO) call. Otherwise, the asterisk (*) signals a three-second pause.

Remote Virtual Queuing

The Remote Virtual Queuing feature has automatic re-try capabilities that are used when congestion is encountered within the network. The same Calling Party Privacy Override considerations are provided to the “re-tries” as were provided to the originally dialed call.

Ring Again – Busy Trunk

A call that is automatically redialed by the Ring Again - Busy Trunk feature recognizes the CPPO requested when the call is originally dialed.

Speed Call

System Speed Call

When an outgoing trunk call is initiated by dialing a Speed Call code, the Speed Call code carries the Privacy Override Indicator if the CPPO Flexible Feature Code followed by the normal dialing sequence is stored in the Speed Call Entry represented by the Speed Call code. The CPPO Flexible Feature Code is counted against the maximum number of digits (currently 31) allowed per Speed Call list entry.

The user can also store the CPPO Flexible Feature Code in the Speed Call Entry (or Speed Call key). An outgoing CPPO call can be initiated by dialing the Speed Call code (or pressing the Speed Call key), followed by manually dialing the digits.

Stored Number Redial

In the Stored Number Redial (SNR) programming mode, the user can store the CPPO Flexible Feature Code, followed by the normal dialing sequence in the SNR database. The outgoing calls originated by the Stored Number Redial feature send the Privacy Override Indicator to the far end. The CPPO Flexible Feature Code is counted against the maximum number of digits (currently 31) allowed by the SNR feature.

During an active call on a Meridian 1 proprietary set, the Stored Number Redial feature stores the CPPO Flexible Feature Code in the SNR database if the CPPO Flexible Feature Code is included in the number dialed by the originator. The outgoing redialed calls also send the Privacy Override Indicator to the far end.

Trunk Anti-Tromboning

When trunks are removed, due to the Trunk Anti-Tromboning (TAT) operation, an ISDN call recognizes the CPPO/CPD requested by the originator.

Trunk Optimization Before Answer

An optimized call, due to Trunk Optimization Before Answer (TRO) operation, recognizes the CPPO/CPD requested by the originator.

Virtual Network Services

CPPO treats Virtual Network Services (VNS) trunk calls in the same manner as ISDN trunk calls. For instance, CPPO does not affect the existing VNS operation. If CPPO was requested when originating a call, the Presentation Indicator field of CLID is set to “Presentation Allowed”.

VISIT

The VISIT which connects to a set receives the Calling Party Number or Name, since an incoming CPPO call sends the Calling Party Number or Name to the set for display.

Feature packaging

The Calling Party Privacy Override feature requires the following package:

- Calling Party Privacy (CPP) package 301, which has the following dependency:
 - Flexible Feature Codes (FFC) package 139.

For Calling Party Name Display, Calling Party Name Display (CPND) package 95 is required. ISDN package 145 is required for ISDN routes.

Note: Non-ISDN trunks must restrict the Outpulse Asterisk and Octothorpe (OPAO) package 104 to provision the Calling Party Privacy Override feature.

Feature operation

For a user to override the Calling Party Number and Name per-line blocking allowed (CLBA) Class of Service, the following steps must be performed.

- 1 The user goes off hook.
- 2 The user initiates a call by dialing the Calling Party Privacy Override Flexible Feature Code, defined in LD 57.
- 3 The user dials the destination number.

Coordinated Dialing Plan

This package can be used with NARS (Option 58) or as a standalone feature to provide a coordinated dialing plan in an ISDN environment.

Package Requirements

Package requirements are as follows:

BRTE	option 14
BQUE	option 28
NCOS	option 32
FCBQ	Option 117

Data Packet Network Access X.25

PRI trunks may be configured to access a Public Data Packet Network (DPN - X25) via the DMS-100 ISDN node, provided that this service is made available by the serving Central Office. On a per call basis, any B-channel can be used to access the packet network.

No high-speed data is currently available on Option 11.

Package Requirements

The package requirements are as follows:

ISDN	option 145
PRI	option 146

DCH Error Reporting and Monitoring

DCH Error Reporting and Monitoring are an ISDN Primary Rate Interface feature that provides messages that indicate the cause of the establishment or release of the D-Channel to aid in diagnosis during installation and maintenance.

D-channel message monitoring is used to analyze and screen the Layer 3 protocol messages traveling between the near and far end D-channels.

With X11 Release 16, message monitoring can be performed only on a per D-channel basis using LD 96. That is, once the message monitor is turned on, all messages are output for that D-channel. The messages output might be excessive.

X11 Release 18 provides additional commands in LD 96 that allows selective message monitoring based on:

- the D-channel
- the B- or ISL channel
- the message types for a specific feature
- any specific message

Refer to the *X11 Software Guide* provided with your Option 11 system for details about the operation and use of LD 96 and the DCH Error Reporting Digital Trunk Interface and Primary Rate Interface Time Slot Reuse (DTI/PRI)

This feature eliminates call blocking due to time slots being unavailable. By allowing a time slot reserved for a primary function to be reused for any subsequent requirements during call processing, all channels on DTI or PRI loops will be available for use.

Time slots reserved for a particular DTI or PRI channel are stored in an unprotected data structure allowing easy access, such as a call register. Each time a new path is required for the same DTI or PRI channel, the data structure can be accessed to determine if there is a reserved time slot that can be reused. If the new path requirements is intra-group (single-group switch), then the time slot can be reused. If the new path requirement is inter-group (multi-group switch), the reserved time slot can be reused if a matching junctor slot is available.

A count is kept of the number of times that a time slot has been reused. The time slot is not idled until all reservations have been canceled.

This feature applies to the following loop types on single-group switches:

- 1.5 Mbit 24-channel DTI
- 2 Mbit 30-channel DTI
- 1.5 Mbit 23 B+D PRI
- 2 Mbit 30 B+D PRI, and
- 2 Mbit Japan Digital Multiplex Interface (DMI).

Operating parameters

This feature applies only to network enhanced machines.

Feature interactions

None.

Feature packaging

None.

Direct Inward System Access (DISA)

Special dial tone is returned in-band only on the B-channel. Additional code digits are via in-band DTMF tones.

Display of Access Prefix on CLID

The Display of Access Prefix on Calling Line Identification (CLID) feature enhances the set display by adding the Local, National or International prefix to the CLID display.

The four digit access prefix is a combination of the access code and the National or International prefix. The access code defines the best outgoing route for an external call and the prefix code defines National or International calls. If the trunk requires the International prefix of two digits, the access code (ACOD) is a maximum of two digits.

The Access Prefix Display on CLID feature supports:

- Meridian 1 proprietary sets: M2008, M2216, M2016, and M2317
- Meridian 1 Attendant Consoles: M2250 and M1250

The Display of Access Prefix on CLID feature supports the following Integrated Services Digital Networks (ISDN) interfaces:

- Basic Rate Interface (BRI) trunks
- Meridian Customer Defined Network (MCDN)
- Q-reference Signaling Point (QSIG)

Operating parameters

If CLID is not available, the trunk access code and the prefix number are displayed according to the existing feature operation.

The Display of Access Prefix on CLID feature supports the Coordinated Dialing Plan (CDP) or the Uniform Dialing Plan (UDP).

The Display of Access Prefix on CLID feature does not support analog (500/2500) sets, CLASS sets, or Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) sets.

Feature interactions

Automatic Set Display

The feature provides enhanced display of CLID of an incoming trunk call at a Set when the Set is busy. The Automatic Set Display can be configured to display both the Access Prefix and CLID.

Meridian Communication Adaptor

The pass through feature on the set modifies the Display of Access Prefix on CLID.

Selectable Conferee Display and Disconnect

The Selectable Conferee Display and Disconnect feature displays and allows the disconnect of conferenced sets.

Feature packaging

The Display of Access Prefix on CLID feature requires the Integrated Services Digital Network (ISDN) package 145.

Feature operation

No specific new operating procedures are required to use this feature.

Display of Calling Party Denied

Display of Calling Party Denied (DPD) permits Analog (500/2500 type) and Meridian 1 proprietary sets to either allow or deny associated name and directory number information from being displayed on other sets when involved in a call. This feature is supported on internal calls (same node) and calls placed over a Meridian Customer Defined Network (MCDN) Integrated Services Digital Network (ISDN).

DPD uses the following Class of Service options in LD 10 and LD 11: Display Digits Allowed/Denied (DDGA/DDGD) Name Display Allowed/Denied (NAMA/NAMD). Display of Calling Party Denied Class of Service options are programmed on a per set basis.

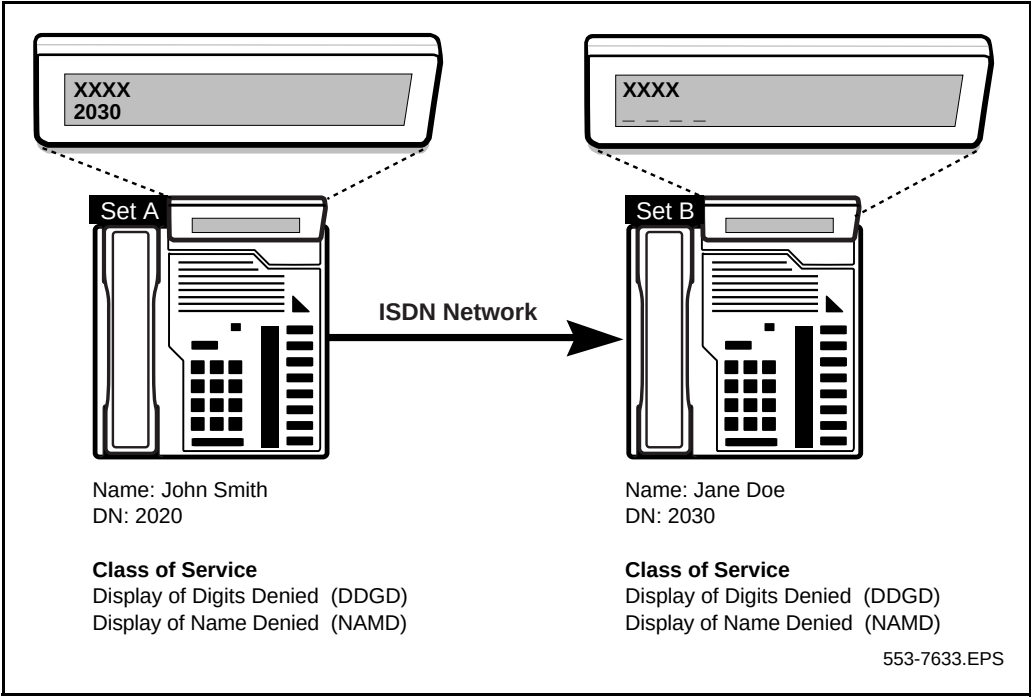
Table 11 outlines the possible configurations and the resulting display on both the calling and called parties display.

Table 11
Display Scenarios on Calling and Called Party's Sets.

CALLING PARTY'S CLASS OF SERVICE	CALLED PARTY'S CLASS OF SERVICE	DISPLAY OF CALLING PARTY	DISPLAY OF CALLED PARTY
DDGA NAMA	DDGA NAMA	Called Party's DN Name of Called Party	Calling Party's DN Name of Calling Party
DDGA NAMA	DDGD NAMD	Called Party's DN X X X X	Calling Party's DN Name of Called Party
DDGD NAMD	DDBA NAMA	Called Party's DN Called Party's Name	----- X X X X
DDGD NAMD	DDGD NAMD	Called Party's DN X X X X	----- X X X X

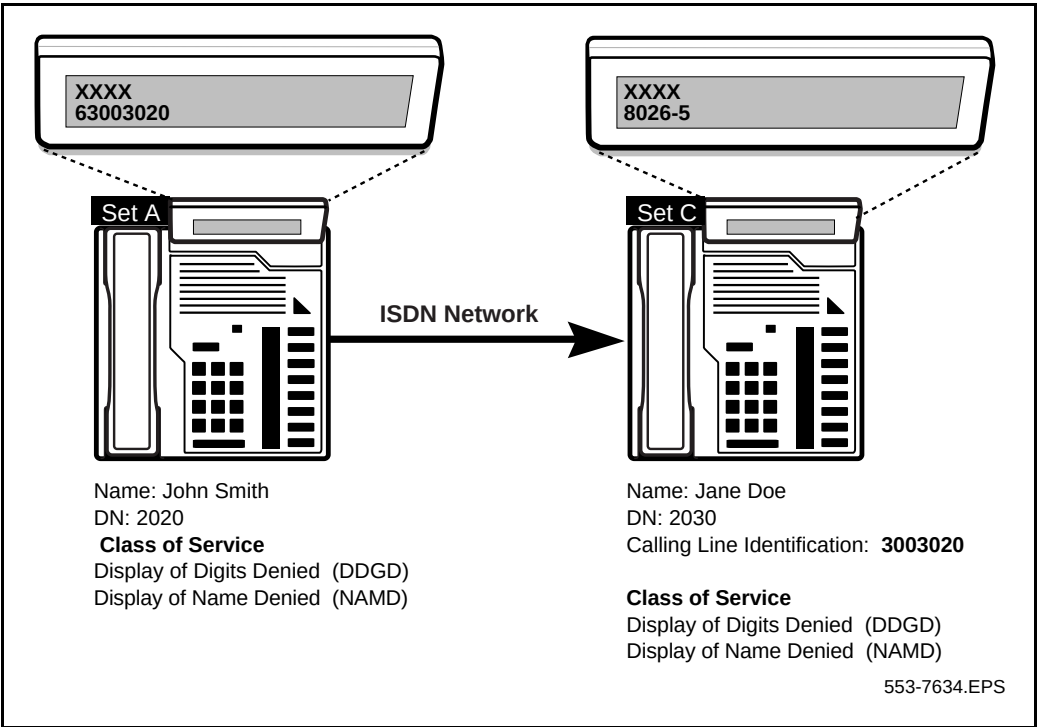
Figure 13 illustrates the functionality of Display of Calling Party Denied (DPD) on a nodal basis when both the calling and called parties have enabled DPD Class of Service options. The calling party has configured a Digit Display Denied (DDGD) and Name Display Denied (NAMD) Class of Service. The called party has the same Class of Service options programmed. When the calling party dials the called party, the called party's set restricts the display of the calling party's associated name and directory number. The calling party's name is replaced by a string of dashes (---), and the associated name is replaced by the string XXXX.

Figure 13
 Calling Party and Called Party on the Same Node



As illustrated in Figure 14, for calls placed over a MCDN ISDN network, a Display of Calling Party Denied and Display Digits Denied (DDGD) on the calling party's set, prevents the Calling Line Identification (CLID) from being displayed on the called party's set. In this case, the calling party's CLID is replaced by the ISDN route access code and route member number. If the calling party has configured Name Display Denied (NAMD), the calling party's associated name is not displayed on the called party's set.

Figure 14
ISDN Network Calls



Operating parameters

Display of Calling Party Denied (DPD) is only supported on internal calls and Meridian Customer Defined Network (MCDN) ISDN networks.

Display of Calling Party Denied is not supported on ISDN BRI sets.

The called party's directory number always appear on the display of the calling party's set. This occurs whether or not the called party has a Digit Display Denied (DDGD) Class of Service.

Feature interactions

Attendant Console

An Attendant Console's display is not impacted by this feature. Display is provided to an attendant regardless of the Class of Service configured on a set. To prevent the display of calls placed over an ISDN network, Network Attendant Service (NAS) must be configured.

Call Detail Recording

For internal calls, calling and called party's Directory Numbers are included in Call Detail Recording (CDR) records. For MCDN ISDN network calls, the calling or connected party's DN is included in the CDR regardless of the set's Class of Service.

Call Forward All Type

When a set activates any of the call forwarding features, display information on incoming calls is updated in accordance with the Class of Service programmed for that Directory Number.

The terminating set display is dependent on the Calling Party Name Display (CPND) Dialed Name Display Denied/Allowed Class of Service. If the terminating set has a Dialed Name Display Allowed, the display on the terminating set reflects the name and DN of the forwarding set and the DN of the calling party. The terminating set's display is dictated by the DPD Class of Service options configured. If these options are set to denied, then dashes and X's are displayed.

For a MCDN ISDN call, calling party's Calling Line Identification (CLID) is replaced with the ISDN route access code (ACOD) and the route member number, and the calling party's CLID is replaced with a string of dashes.

Call Hold

When a call is retrieved from hold, the calling and called party's displays reflect their individual Class of Service options.

Call Park

When the Call Park timer expires on a parked call, a set's display does not include the name and DN of the calling party. When a parked call is retrieved by another set, display information is based on the Class of Service of individual sets.

Call Pickup

When a call is picked up from another set, the terminating set's display is in accordance with the Class of Service of individual sets. The calling party's display includes the dialed DN, the terminating DN and the name of the terminated set. However, if the terminating set has Digit Display Denied (DDGD), then both the called and terminating sets' DNs are blocked from the calling party's display. The same occurs with Digit Display Allowed (DDGA); both the called and terminating sets' DNs are displayed on the calling party's set.

Call Transfer

When a set transfers a call, display information is updated according to the Class of Service of the respective Terminal Numbers (TNs). This occurs for both internal and ISDN network calls.

When a call is transferred to another Meridian 1, the calling party's DN and name information is sent and displayed on the set that answers the call. However, if the calling party has Name Display Denied, then the name information is not transferred to the set that answers the call.

If a blind call transfer occurs, the DN of the terminating set is displayed to the calling party, regardless of the DPD Class of Service options configured.

Calling Party Name Display

Display of Calling Party Denied transfers display information that is used by the Calling Party Name Display (CPDN) feature for ISDN calls. If the CPDN of an incoming call is set to "Presentation Denied", the calling party's name information is restricted on the called party's set. For internal calls, name information is taken directly from a set's data block.

Calling Party Privacy

Calling Party Privacy takes precedence over Display of Calling Party Denied on outgoing calls over an MCDN ISDN network. This precedence pertains to the display of the calling party and the name of the called party.

Calling Party Privacy does not affect internal calls using Display of Calling Party Denied.

Conference

For internal and network conference calls, display information is not provided on any of the conferee's sets. When setting up a conference call, by conferencing one set at a time, the display on the conferee's set is in accordance with individual Class of Service. Display is provided for conference calls when the sets are located over the same network.

Dial Intercom

Display information on sets involved in a Dial Intercom Group (DIG) call is based on the individual Class of Service of each set. If a DN is denied for a set involved in a DIG call, the DIG number for that set is replaced by one dash (–) in the case of 10 DIG stations. For 100 DIG stations, the DIG number is replaced by two dashes (– –).

Group Call

The calling party's display shows the DN of the last set to connect into the Group Call, regardless of the Class of Service. The called sets display the Group Number only.

Hot Line

Display information on sets in a Hot Line call is based on the individual Class of Service of each set.

Meridian 911

An incoming M911 call with Automatic Number Identification (ANI) information always displays ANI digits on the terminating set, regardless of the calling party's DPD Class of Service.

Meridian Mail

A calling party's name and/or DN within Meridian Mail are not impacted by this feature. When a Digit Display Denied (DDGD) call is forwarded to Meridian Mail, the calling party's DN is provided to Meridian Mail and is available when reviewing messages.

Multiple Appearance Directory Number

When a Multiple Appearance Directory Number (MADN) is dialed and ringing, the calling party's display does not show name information, provided that at least one of the MADN TNs has a Name Display Denied (NAMDD) Class of Service.

The called party's display shows the name and number of the calling party, according to the Class of Service of the calling party's TN.

Network Attendant Services

When a call is placed to an attendant over an ISDN network with Network Attendant Services (NAS) configured and Calling Party Name Display (CPND) equipped, the Attendant Console displays the calling party's DN and name. The same occurs when an attendant places a call over the network; however, an Attendant Console's display shows the connected party name and number.

If NAS is not configured, the name and calling/connected party's number is displayed to the attendant provided that the calling/connected party has the Display of Calling Party Denied (DPD) Class of Service options configured to Allowed. If Class of Service options are set to Denied, then this information is not displayed to the attendant.

***No Hold Conference
Voice Call***

Display information on sets involved in a No Hold Conference and Voice calls are based on the individual Class of Service of each set.

Feature packaging

For internal calls, Display of Calling Party Denied (DPD) requires Calling Party Name Display (CPND) package 95.

ISDN Network calls require Calling Party Name Display (CPND) package 95 and Integrated Service Digital Network (ISDN) package 145.

Feature operation

Internal Call

Calling Party's Class of Service Digit Display Denied (DDGD)

- 1 Set A, Calling Party, dials Set B, Called Party.
- 2 Set A's Digit Display Denied (DDGD) Class of Service prevents Set A's DN from being displayed on Set B. Set A's DN is replaced by "— — — —" on Set B's display.

Calling Party's Class of Service Name Display Denied (NAMD)

- 1 Set A, Calling Party, dials Set B, Called Party.
- 2 Set A's Name Display Denied (NAMD) Class of Service prevents Set A's name from being displayed on Set B. Set A's name is replaced by "X X X X" on Set B's display.

Called Party's Class of Service Name Display Denied (NAMD)

- 1 Set A, Calling Party, dials Set B, Called Party.

Set A has a Name Display Denied(NAMD) Class of Service. Set B also has a Name Display Denied (NAMD) Class of Service.Set B's Class of Service prevents Set B's name from being displayed on Set A.

E.164/ESN Numbering Plan Expansion

The E.164/ESN Numbering Plan Expansion feature provides the capabilities to meet the International Telegraph and Telephone Consultative Committee (CCITT) recommendation E.164 for Integrated Services Digital Network (ISDN) and Public Switching Telephone Network (PSTN) dialing.

Generally, the following enhancements are offered by this feature:

- the support of the numbering plan for ISDN and PSTN dialing has been increased to a 15-digit maximum, from a 12-digit maximum;
- the removal of the leftwise-unique restriction imposed on ESN Supplemental Digit Restriction and Recognition (SDRR) entry codes. For example, if 555 is an existing entry, a new entry of either 55 or 5551212 can be entered;
- the addition of “allow” (ALLOW) as a new Supplemental Digit Restriction and Recognition (SDRR) entry type in LD 90. There are now nine entry types for Supplemental Digit Restriction and Recognition. One entry type (DENY), denies a call from going through if the digits in the SDRR entry match the dialed digits. There are seven other entry types that provide special treatments if the digits in the SDRR entry matches the dialed digits. The new ALLOW entry allows a call to go through, if the dialed digits did not match any entry within the Supplemental Digit Restriction and Recognition table;
- the Special Number Translation (SPN) screening digits scheme is changed; and
- the capability of the Meridian 1 base features to store digits is increased to 31 digits.
- the capability to send up to 32 digits to the Extended Conference and Tone & Digit Switch card, allowing an International Number to be sent in a single Automatic Number Identification (ANI) message. Previously, only 16 digits could have been outpulsed in a single ANI message, which included the start digit, the end digit, and an optional information digit. This left only 13 or 14 digits of the actual International Number to be outpulsed in a single ANI message. This meant that the International Number may have been sent in two separate ANI messages.

The specific enhancements delivered by the E.164/ESN Numbering Plan Expansion feature are provided by the tables that follow.

Summary of new ESN functionalities

Table 12 summarizes the changes made to the ESN functionality. Please note that the components that are not affected are not listed.

Table 12
Summary of ESN changes

Component	Old	New
Maximum number of digits for a Special Numbering Translation screening.	11	19
Maximum number of Digit Manipulation Index (DMI) deletion digits.	15	19
Maximum number of Digit Manipulation Index (DMI) insertion digits.	24	31
Maximum number of Supplemental Digit Restriction and Recognition (SDRR) tables, with BARS.	256	1500
Maximum number of Supplemental Digit Restriction and Recognition (SDRR) tables, with NARS.	512	1500
Maximum number of words per Supplemental Digit Restriction and Recognition (SDRR) entry.	3	4
Maximum number of digits in each Supplemental Digit Restriction and Recognition (SDRR) entry.	7	10
Maximum length of Flexible Numbering Plan (FNP) Flexible Digit Number Length (FLEN) numbers for Special Number Translation (SPN).	16	24
Maximum length of Flexible Numbering Plan (FNP) Flexible Digit Number Length (FLEN) numbers for Trunk Steering Codes (TSCs).	16	24
Maximum number of digits per Free Special Number Screening (FSNS) Special Number.	11	19
Total number of digits for screening under Free Special Number Screening (FSNS).	14	22

Maximum number of possible Supplemental Digit Restriction and Recognition (SDRR) entry types.	8	9 ('ALLOW' is added). ALLOW is a new entry type in LD 90. This entry allows a call to go through as if the dialed digits did not match any entry within the Supplemental Digit Restriction and Recognition table.
Restriction imposed on Supplemental Digit Restriction and Recognition (SDRR) entry codes.	Leftwise Unique.	None. The leftwise-unique restriction imposed on SDRR entry codes is removed. For example, if 555 is an existing entry, a new entry of either 55 or 5551212 can be entered.

Summary of Meridian 1 base features enhancements

Table 13 summarizes the changes made to the base Meridian 1 features functionality. Please note that the components that are not affected are not listed.

Table 13
Summary of Meridian 1 base features changes

Component	Old	New
Maximum number of digits for an Autodial entry. Note that this enhancement does not apply to M3000 sets.	23	31
For the No Hold Conference functionality, the maximum number of digits for a Conference Autodial target DN entry.	23	31
Maximum number of digits for the Call Forward All Calls DN. Note that this enhancement does not apply to M2317 and M3000 sets.	23	31
Maximum number of digits for the Internal Call Forward DN.	23	31
For the Phantom DN functionality, the maximum number of digits for the Default Call Forward DN.	23	31
Maximum number of digits for the Customer Call Forward DN.	16	23
Maximum number of digits sent in an ANI message.	16	32

Summary of Automatic Call Distribution (ACD) enhancements

Table 14 summarizes the changes made to the ACD functionality. Please note that the components that are not affected are not listed.

Table 14
Summary of Meridian 1 ACD changes

Component	Old	New
Maximum number of digits for the ACD Night Forward DN.	23	31
Maximum number of digits for the ACD Interflow DN.	23	31

Summary of Customer Controlled Routing (CCR) enhancements

Table 15 summarizes the changes made to the Customer Controlled Routing functionality. Please note that the components that are not affected are not listed.

Table 15
Summary of CCR changes

Component	Old	New
Maximum number of Termination DN digits in the CCR ITR To-Route-A-Call message.	24	31

Summary of ISDN features enhancements

Table 16 summarizes the changes made to the ISDN functionality. Please note that the components that are not affected are not listed.

Table 16
Summary of ISDN changes

Component	Old	New
For ISDN BRI basic call service line access (BRIL), the maximum number of Called Party Information Element digits.	24	31
For the ISDN QSIG interface, the maximum number of Called Party Information Element digits.	24	31
For the ISDN BRI NI-1 Call Forward All Calls feature, the maximum number of digits for the forward DN.	20	31

Operating parameters

All existing operating parameters that apply to the Meridian 1 ESN functionality, base system features, and ISDN PRI and ISDN BRI networking features apply to the E.164/ESN Numbering Plan Expansion feature.

The enhancements introduced by the E.164/ESN Numbering Plan Expansion feature pertaining to Called Party Information Element digits (CDPN), and forwarded and redirected DNs do not pertain to the M5317 and M5209 ISDN BRI terminals, since these terminals follow the BRI ETSI standard placing a maximum limit of 24 digits on Called Party Information Element digits and redirected DNs.

The 31-digit expansion pertaining to the Call Forward All Calls DN does not apply to Meridian M2317 and M3000 sets, since the their firmware limits entering a CFAC DN from the set to a maximum of 23 and 28 digits, respectively.

An Autodial key cannot be configured on a Meridian M3000 set; instead, the M3000 sets are equipped with a private directory, which allows automatic dialing of a stored DN entry by touching the corresponding name on the set's display screen. Since the firmware of the M3000 limits the length of a DN entry to a maximum of 28 digits, the 31-digit expansion pertaining to the Autodial does not apply to Meridian M3000 sets.

Since the Network Call Trace feature can output a maximum of 21 digits to be printed on the TTY, the 31-digit expansion does not apply to Network Call Trace.

The 16 digit maximum pertaining to the Calling Party Number, Connected Party Number, Redirecting Number, and Redirection Number has not been expanded by the E.164/ESN Numbering Plan Expansion feature.

If all the digits of a DN are dialed automatically, such as for a Speed Call or for any redial feature, only the first 31 digits are processed. This means that any digits that are inserted by, for example, network signaling, pretranslation, or digit manipulation, are counted as part of these 31 digits. Therefore, even fewer than the automatically dialed digits may be processed.

Flexible Feature Codes (FFC) DNs may have a length of 1-7 digits. Call Forward All Calls (CFAC), Internal Call Forward All Calls (ICF), and Remote Call Forward (RCFW) are supported by FFCs, and can be activated, deactivated, and verified using FFCs. When activating CFAC using the Remote Call Forward FFC (RCFA), or when verifying the Call Forward DN using the Call Forward All Call FFC (CFWV), the Remote Call Forward FFC (RCFV), or the Internal Call Forward All Calls FFC (ICFV), the FFC DN is kept, using eight of the available 31 digits. For the CFAC DN or ICF DN, this means that only 23 possible digits can be stored or verified using FFCs. As a result, this limitation does not accommodate the 31 digit CFAC DN and ICF DN expansion introduced by the E.164/ESN Numbering Plan Expansion feature.

Calling Party Privacy (CPP) allows a caller to block his or her name from appearing on the called party display. The call is marked as a CPP call by entering a CPP FFC, up to seven digits long. This means that up to seven additional digits may have to be stored for automatic dialing. These digits are stored in sequence, and subsequent digits may not be processed.

In the case of CPP outpulsing, the CPP outpulsed digits (typically *67 or 1167) are stored after CPP has been activated. If this call goes over a trunk, the CPP outpulsed digits are sent to the far end to indicate that the call is a CPP call. For ISDN calls, a CPP flag is marked in the ISDN message. For non-ISDN CPP calls, digits that are already stored, such as for Call Forward, Autodial, and Speed Call, may be pushed out when the CPP digits are inserted, since only 31 digits can automatically be processed. This means that up to four digits may be removed from the digits that are outpulsed.

The System Access Enhancement (SAE) feature impacts the accepted values for the Call Forward All Calls DN, and the Internal Call Forward DN, when entered in LD 10 and LD 11. This feature allows all values between 4-31 to be accepted, rather than the normal accepted values of 4, 8, 12, 16, 20, 24, 28, 31. Also, the default is 4, rather than 16.

The Called Party Information Elements expansion provided by the E.164/ESN Numbering Plan Expansion feature, applies to ISDN QSIG GF Transport feature.

Feature interactions

The E.164/ESN Numbering Plan Expansion feature does not interact with the Meridian 1 base system features and ISDN PRI and BRI networking features, other than as described in Table 12 to Table 16, and in the operating parameters.

Feature packaging

The E.164/ESN Numbering Plan Expansion feature does not introduce a new package. However, the following packages are required to support the new expansions.

For ESN expansions:

- Basic Alternate Route Selection (BARS) package 57;
- Network Alternate Route Selection (NARS) package 58;
- Flexible Numbering Plan (FNP) package 160.

For ISDN expansions:

- Digit Display (DDSP) package 19;

- Integrated Services Digital Network (ISDN) package 145;
- 1.5 Mbps Primary Rate Access (PRA) package 146;
- Integrated Service Digital Network Signaling Link (ISL) package 147;
- Meridian 1 Extended Peripheral Equipment (XPE) package 203;
- Basic Rate Interface (BRI) package 216;
- Basic Rate Interface Line Application (BRIL) package 235;
- QSIG Interface (QSIG) package 263.

For base system features expansions:

- Optional Features (OPTF) package 1;
- 2500 Telephone Features (SS25) package 18;
- Automatic Call Distribution (ACD) package 40;
- Automatic Call Distribution Advanced (ACD) package 41;
- Automatic Call Distribution Basic (ACD) package 45;
- 500 Telephone Features (SS5) package 73;
- Controlled Class of Service (CCOS) package 81;
- Background Terminal (BGD) package 99;
- Flexible Feature Codes (FFC) package 139;
- Phantom Terminal Numbers (PHTN) package 254.

Electronic Lock Network Wide/Electronic Lock on Private Lines

The basic Electronic Lock feature has been enhanced to provide the following capabilities:

- The feature can be implemented network wide.
- The capability to define (for the locked sets), on a per customer basis, a Controlled Network Class of Service (CNCS) different from the Network Class of Service (NCOS), which is defined on a per set basis.
- Locking can be implemented for Private DNs.

In a Meridian Customer Defined Network (MCDN) environment, Electronic Lock Network Wide can be used to change the Class of Service of a set in a remote location. Electronic Lock Network Wide is activated or deactivated from any node by dialing the Electronic Lock Flexible Feature Code (FFC), the password, and the DN of the set to be changed. Since the password length defined at the destination node is not known at the originating node, the Station Control Password (SCPW) length (defined in LD 15) must be defined the same for all network nodes.

If the originating node has the FFC Confirmation Tone option selected, a confirmation tone is given when the feature is successfully activated or deactivated. Overflow tone is given if the operation is unsuccessful. There is no FFC verify code for Electronic Lock.

When a locked set makes an outgoing trunk call, if Controlled Network Class of Service is defined, the Network Class of Service (NCOS) defined by CNCS is used instead of the NCOS defined in LD 10 or 11 for the set. If network signaling is configured for the trunk that normally transmits the NCOS of the set between Electronic Switched Network (ESN) nodes, the CNCS is transmitted instead of the NCOS. This prevents a locked set from reaching the exchange network by tandeming through a TIE trunk using ESN.

A new prompt (PELK) is introduced in the Customer Data Block to implement Electronic Lock on private lines. If this option is enabled, an outgoing call on a private line of a locked set is subject to the same restrictions as all other DNs on the set. The same intercept treatment would be given as for a regular DN. The restrictions for private lines, as well as other DN keys on the set, are controlled by the Controlled Class of Service (CCOS), and by the CNCS if defined. Therefore, for outgoing calls, the Class of Service restrictions and/or New Flexible Code Restriction (NFCR) apply to private line keys on locked sets. Only outgoing calls are affected. The Class of Service of a non-locked set has no affect on private lines.

Operating parameters

The Network Dialing Plan must be either a Coordinated Dialing Plan (CDP) or a Uniform Dialing Plan (UDP).

The set password lengths must be equal for all nodes in the network.

Network wide operation is only supported through an MCDN ISDN network.

The Electronic Lock feature must be equipped on both originating and remote nodes.

The FFC used is defined on the node from which Network Electronic Lock is being activated. To activate or deactivate Network Electronic Lock from any remote node, the user has to use the FFC Electronic Lock Activate (ELKA) or Electronic Lock Deactivate (ELKD) code defined on that remote node.

ISDN Basic Rate Interface (BRI) sets cannot be used to lock another set, nor can they be locked themselves.

An analog (500/2500 type) telephone with a private line DN or a Meridian Digital Telephone set with a private line on the Prime DN cannot be locked.

Feature interactions

Automatic Call Distribution (ACD)

An ACD set cannot be locked.

Call Forward (CFW)***Call Forward No Answer (CFNA)***

For Call Forwarding, the COS and NCOS used for the forwarding call can be taken from either the forwarding set or from the forwarded set, depending on the option defined in the Customer Data Block.

For example, set B call forwards all calls to an external trunk. Set A calls set B. If OPT = CFF in LD 15 (Call Forward forwarded to party's COS and NCOS), the COS and NCOS of set B are used for forwarding the call to the trunk. If OPT = CFO (Call Forward originating party's COS and NCOS), the COS and NCOS of set A are used for forwarding the call to the trunk.

Direct Inward System Access (DISA)

The Electronic Lock feature cannot be activated or deactivated when accessing the node through DISA.

Electronic Switched Network Authcode

If a station user enters an authcode on the set, regardless of the status of the set being locked or not, the NCOS defined for the authcode is used. The ESN Authcode feature overrides the Electronic Lock Network Wide feature.

Flexible Numbering Plan

If a network is equipped with a flexible numbering plan (i.e., not all the network DNs are the same length), hanging up before the usual end-of-dialing timeout cancels the request for activation or deactivation of Electronic Lock. Dialing an octothorpe (#) after the network DN will cause the request for activation or deactivation of the Electronic Lock to be sent immediately, instead of waiting for the usual end-of-dialing timeout to send it.

Multiple Appearance DN

The same locked or unlocked state applies to all Terminal Numbers with the same primary DN and the same SCPW. Terminal Numbers with the same DN, but not having the same SCPW, cannot be locked or unlocked.

New Flexible Code Restriction (NFCR)

With NFCR, toll denied stations are allowed or denied calling privileges according to the Facility Restriction Level (FRL) assigned to the NCOS defined in the protected line block. For a locked set, NFCR uses the FRL assigned to the CNCS to determine its calling privileges if one is defined; if no CNCS is defined, the NCOS of the locked set will be used.

Scheduled Access Restrictions (SAR)

The SAR feature overrides Electronic Lock.

Virtual Network Services (VNS)

Electronic Lock can function in a VNS environment.

Feature packaging

Electronic Lock Network Wide/Electronic Lock on Private Lines is packaged under Flexible Feature Codes (FFC) package 139.

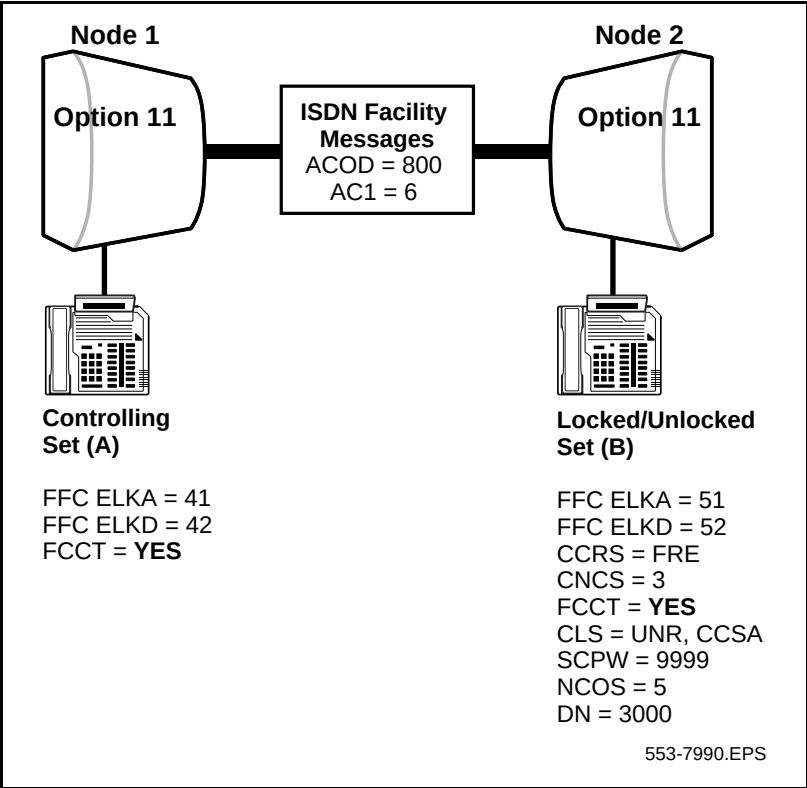
Use of this feature requires the following additional packages:

- Controlled Class of Service (CCOS) package 81
- Network Class of Service (NCOS) package 32, and
- Integrated Services Digital Network (ISDN) package 145.

Feature operation***Electronic Lock Network Wide***

In this example, an MCDN ISDN network is set up connecting Node 1 to Node 2. Set A is the Controlling set. Set B is the set to be locked and unlocked by Set A. The digits that set A would dial to ring set B are to be in the format of a CDP or UDP dialing plan. This is standard dialing for ISDN features.

Figure 15
Network Electronic Lock



To lock set B (in Node 1) from set A (in Node 2), the user goes off-hook and dials the Electronic Lock Activate (ELKA) FFC defined in the Customer Data Block of Node 1, followed by the Station Password (SCPW) defined for set B, and the digits that set A would normally dial to ring set B (e.g., 41 + 9999 + 6-343-3000). If the FFCT option is configured as YES in LD 57 in the Customer Data Block of Node 1, confirmation tone is given to set A to confirm that the lock operation has been successful. Set B becomes locked if it was previously in an unlocked state.

If Set B was already locked, the above operation is ignored and Set B remains locked; however, a confirmation tone is provided to verify that the set is locked.

If the lock operation was unsuccessful, overflow tone is given.

To unlock set B (in Node 1) from set A (in Node 2), the user goes off-hook and dials the Electronic Lock Deactivate (ELKD) FFC defined in the Customer Data Block of Node 1, followed by the SCPW defined for set B and the digits that set A would normally dial to ring set B (e.g., 42 + 9999 + 6-343-3000). If the FFCT option is configured as YES in LD 57 in the Customer Data Block of Node 1, confirmation tone is given to set A to confirm that the unlock operation has been successful. Set B becomes unlocked if it was previously in a locked state.

If Set B was already unlocked, the above operation is ignored and Station B remains unlocked; however, a confirmation tone is provided to verify that the set is unlocked.

If the unlock operation was unsuccessful, overflow tone is given.

Electronic Lock on Private Lines

Feature operation of Electronic Lock for Private Lines is the same as for the basic Electronic Lock feature.

Controlled Network Class of Service

No specific operating instructions are required to use Controlled Network Class of Service.

Emergency Services Access

Purpose of this overview

The purpose of this overview is to provide a synopsis of the Emergency Services Access (ESA) feature description. For complete information on ESA, please refer to *Emergency Services Access Feature Description and Administration* (553-3001-313).

Emergency Services Access feature overview

Emergency Services Access (ESA) is a totally new feature that places a customer in compliance with new federal legislation that requires the Private 911 type of functionality provided by ESA. Please note, however, that the ESA feature is also generally useful for users who are not subject to legislation, and is broad enough to be used in different countries. For example, it will be appreciated by any customer who wants to route emergency calls in a special manner, or who wants to be notified when a telephone user makes an emergency call. It would also appeal to a customer who wishes to have ESA calls answered on-site, on the business premises, rather than being forwarded to the Public Services Answering Point (PSAP).

The focus of the Emergency Services Access (ESA) feature is to provide the following capabilities:

- A special ESA Directory Number access (such as 911) can be defined to access emergency services. This number can be dialed without having to first dial an ESN access code.
- The Meridian 1 recognizes that the dialed ESN DN is an emergency call, and provides special treatment.
- Route the call to special trunks designated to handle ESA calls (either dedicated to handle only ESA calls, or shared to handle other types of calls as well).
- Provide flexible Automatic Numbering Identification (ANI) number translation for non-DID numbers (and for DID numbers, if desired by the customer).
- Send out the ANI of the station with the call, so that the PSAP can use it to determine the caller's location.

- Support a networking environment, that is, where the ESA call is originated on one node, and then routed across the network to another node for onward routing into the Public Network and the PSAP.
- Provide On-site Notification, so that the customer's staff knows that an ESA call is in progress.

There are four major components of ESA that provide the functionality described above.

With 'ESA Call Recognition' an Emergency Services Access DN (such as 911) can be configured on the Meridian 1. When a caller dials the ESA DN (there is no need to first dial an Access Code), the Meridian 1 automatically recognizes the call as an Emergency Services Access call and sets up special treatment.

With 'ESA Call Routing' outgoing trunk routes may be designated to handle ESA calls.

With 'ESA Calling Terminal Identification' the Meridian 1 composes an ESA calling number for outgoing ESA calls.

With 'On Site Notification' a Meridian 1 output device (such as a terminal or a set) may be configured to provide an on-site alerting capability for ESA calls. The last two capabilities allow emergency and security personnel to respond more promptly in the event of an ESA call.

Packaging

ESA is comprised of three different packages, which must be implemented separately depending on the functionality that a customer desires.

The Emergency Services Access (ESA) package 329 provides ESA Call Recognition, ESA Call Termination Identification, and ESA Call Routing. It also provides basic number translation, such as the addition of NXX and NPA (area and office) codes, but not non-DID to DID translation (this is provided by the ESA_CLMP package). The ESA_SUPP package provides supplementary capabilities, such as networking capabilities (for example, incoming ISDN to CAMA number conversions), and On Site Notification. The ESA_CLMP package provides translation of non-DID to DID numbers.

System configurations

The most common Meridian 1 system configurations that are possible with ESA are as follows:

- non-networking, handling DID ESA calls or non-DID ESA calls
- networking configuration, handling ESA calls for the following scenarios:
 - Non-ISDN network, originating node is non-Meridian 1
 - Non-ISDN network, originating node is a Meridian 1
 - ISDN network, originating node is non-Meridian 1
 - ISDN network, originating node is a Meridian 1
- standalone configuration (on-site call answering). A standalone configuration is one where ESA calls are answered on the business premises, rather than being forwarded to the PSAP. The calls, however, may then be redirected to the PSAP, if required.

Error Handling on ISDN Signaling Link Analog E&M TIE Trunks

The Integrated Services Digital Network Signaling Link (ISL) Analog E&M TIE Trunks feature identifies error conditions that are generated by external equipment and ensures that faulty trunks cannot be used. When the error condition is removed the trunk is put back into service.

When an error condition is identified while the trunk is idle, the trunk is put into a maintenance busy mode and a trunk error message is printed. If an error occurs while a call is being sent, an error message is printed and the call proceeds; the trunk unit is put into maintenance busy mode after the call is disconnected. Outgoing calls cannot be made on units that are in maintenance busy and incoming calls are rejected.

Once the external equipment removes the error condition, a message is printed and a restart message is sent on the D-channel to indicate that the unit is usable.

Operating parameters

Error Handling on ISL Analog E&M TIE Trunks only functions on ISL Analog E&M TIE Trunks and not on other types of ISL TIE trunks. This function only operates when the D-channel is established.

E&M types applicable to this feature include two-wire and four-wire with TY1 and TY2 signaling types. The feature applies to immediate start, delay dial start and wink start arrangement types.

This feature is designed to operate only when ISL E&M TIE trunks are used in conjunction with transmission equipment.

To implement Error Handling on ISL Analog E&M TIE trunks the FALT prompt response in the Route Data Block (LD 16) must be YES. If FALT=NO, then no error handling will occur on the route.

Feature interactions

There are no interactions with other features.

Feature packaging

Error Handling on ISL Analog E&M Tie Trunks is ISDN Signaling Link (ISL)is package 147 and is included in ISDN Signaling (ISDN) package 145.

Feature operation

Overlay changes

The enabling/disabling commands in the maintenance overlay is changed so that if the trunk unit is in error state the following occurs:

- The trunk unit cannot be enabled until the external error condition is removed. The message TRK533 is printed to warn the user that the enable command is cancelled because an error exists on the ISL E&M TIE Trunks. When this occurs, the trunk unit will remain in maintenance busy mode.

These overlay changes ensure that error states on both sides of the link are not affected by enabling/disabling the unit.

Error Applied to Unit

- An error condition can be generated by the external equipment when a unit is idle, during call setup or when a call is established.

Error applied, Unit Idle

- If an error is detected the unit is put in maintenance busy mode and the error message TRK531 is printed.

Error applied, Call Setup

- If an error is detected during call setup the error message TRK531 is printed.
- After the call is disconnected, the trunk is put into maintenance busy mode.

Error applied, Call Established

When an error is applied while a call is established, it is detected after the call is disconnected. If the release message is not received within the time defined by the supervision timer then the E lead remains grounded and causes an error condition. The following occurs:

- The unit is put into maintenance busy mode and the error message TRK531 is printed.

Error State

When the unit is an error state then it is not available for incoming or outgoing calls. The error state is maintained until it is cleared by external equipment.

Outgoing Calls

Normal call processing selects the next available channel for outgoing calls.

Incoming Calls

Far end attempts to make calls will send a SETUP message. If the unit is in an error state, a Release Complete message is sent. The far end trunk will be put into a LOCKOUT state.

Restart Message

During an error state, a RESTART message is received from the far end. This message is ignored so that the error state of the unit is preserved.

Error Removed

If the error condition is removed by external equipment, the trunk is marked IDLE, the error message TRK532 is printed and a RESTART One Channel message is sent on the D-channel. The far end trunk unit changes from LOCKOUT to IDLE state.

No specific operating procedures are required to use this feature, however the following system messages will occur throughout feature operation.

Message Number	Events
TRK531 tn	An error has been detected on ISL E&M TIE, unit will be put to Maintenance Busy.
TRK532 tn	Error Condition on ISL E&M TIE removed.
TRK533 tn	Enable command is cancelled on this unit because an error exists on the ISL E&M TIE trunks.

ESN on PRI/ISL

Most Electronic Switched Network (ESN) services are available over a DTI or PRI network, with the following exceptions:

- Network Call Transfer (NXFER)
- Coordinated Call Back Queuing (CCBQ)
- CBQ to Conventional Main (CBQCM)
- Off-Hook Queuing (OHQ)

Note: The above exceptions are based on Generic X11 release 16.

Network Class of Service (NCOS) is part of the ESN feature, and allows control of the following:

- User access to routes
- Eligibility of queuing for a user
- Eligibility for a user to receive Expensive Route Warning Tone (ERWT)
- Eligibility to access Network Speed Call (NSC)

An NCOS is assigned to every user on the Meridian 1/SL-1 system. Depending on the NCOS assigned, users are either allowed or denied to place local, long distance and/or International calls. During a tandem call, DTI/PRI sends the NCOS of the user across the DTI/PRI link as a prefix to the dialed number. This allows network access control to be based on a consistent set of NCOSs for calls originating anywhere on the network.

Northern Telecom's ISDN/PRI networking feature development is based on Network Automatic Route Selection (NARS) and/or Coordinated Dialing Plan (CDP). The NARS feature distinguishes between private and public network calls using the first 2 to 3 digits dialed. This digit processing allows a NARS switch to process the call immediately upon dialing the last digit and thus results in instantaneous sending of the call setup message.

CDP uses Distant Steering Codes (DSC) and Trunk Steering Codes (TSC). DSC codes are recognized in software and also provide instantaneous cut-through. However, TSC and the number that follows varies in length, therefore end of dialing timers are used.

ISDN with CDP or NARS provides the exact display of the CLID across the network. However, when some switches use CDP and the others use NARS, the correct display of the CLID may not make sense. The NARS switches will be sending the location code plus the extension number, whereas the CDP switches will be sending only the CDP number. In some networks, the CDP number does not contain enough information to be able to dial back the calling number if necessary.

Option 148 (Advanced Network Features) provides Network Ring Again (NRAG). Because of NRAG and other features (NACD, NMS, TRO) planned in future X11 software releases, and the complexity of inserting and deleting digits in the number dialed in an all CDP or NARS or combination CDP/NARS network, Northern Telecom requires that every switch in the network be equipped with either NARS or CDP software.

With the CDP Expansion enhancement, X11 Release 15 and later ISDN networks may now support a 3 to 10 digit Coordinated Dialing Plan (CDP). Prior to X11 Release 15, a 3 to 6 digit ISDN CDP was supported.

The Automatic Insertion of ESN Access Codes feature (INAC) provides greater flexibility in designing network numbering plans. This enhancement allows either AC1 or AC2 to be used as the access code for private network and long distance calls. Previously, only AC1 could be used for these types of calls. Advanced Networking Features such as NACD and NMS require that INAC be implemented, rather than using Digit Manipulation Tables to insert the appropriate ESN Access Code.

Package Requirements

ESN on PRI/ISL requires the following:

ISDN	option 145
PRI	option 146 or ISL option 147
NARS	option 58 and/or CDP option 59 and NSIG option 37 (or Multi-Site 1 or 2)

Flexible Night Service

Night Service can only be used via the customer data block since there is no NITE prompt in the ISDN ISA trunk data block. See the ISA Feature Description earlier in this chapter.

Flexible Numbering Plan Enhancement

The Flexible Numbering Plan Enhancement (FPE) allows the Flexible Numbering Plan (FNP) feature to be enabled/disabled through service change at a Customer level. FNP is enabled/disabled in Overlay 15 by defining the FNP prompt.

Operating parameters

All operating parameters that apply to the existing FNP feature also apply to the FNP Enhancement.

Feature interactions

Flexible Numbering Plan

The Flexible Numbering Plan Enhancement does not change the functionality of the FNP feature.

Vacant Number Routing

Vacant Number Routing (VNR) is available only when FNP is enabled (FNP = YES). Therefore, VNR is only prompted in Overlay 15 when FNP = YES. When FNP is disabled, VNR is also disabled.

Feature packaging

The Flexible Numbering Plan Enhancement feature requires Flexible Numbering Plan (FNP) package 160, which depends on Network Alternate Route Selection (NARS) package 58.

Feature operation

No specific operating procedures are required to use this feature.

Idle Extension Notification

This feature provides the attendant with the ability to be notified when a busy extension becomes idle. A typical application of this feature is in the case of the attendant wanting to leave an urgent message to someone who is on their extension, but does not want to break-in to their call.

The Idle Extension Notification feature is not supported on ACD DN's.

- An Idle Extension Notification call cannot be placed on hold by the attendant. If the attendant attempts to place an Idle Extension Notification call on hold before the Release key is pressed, the Idle Extension Notification request is canceled and the call is disconnected. An answered Idle Extension Notification recall cannot be placed on hold until after the SACP key is pressed to ring the extension.
- When an attendant has requested an Idle Extension Notification, it can be canceled by then pressing the Position Busy key. This will also cancel all other Idle Extension Notification requests.
- Idle Extension Notification and pre-dial Break-In are mutually exclusive. It is possible to press the Break-In key, the DN of a busy extension (to override call forward, for example), and then press the SACP key to request Idle Extension Notification. While the SACP lamp is lit, it is not possible to press the Break-In key to complete the Break-In. Conversely, if a Break-In conference is underway, it is not possible to activate Idle Extension Notification by pressing the SACP key.
- If the SACP lamp is lit during the pre-dial Break-In sequence, the only available possibilities are: to press the Release key to request for Idle Extension Notification; to press the SACP key again to remove the request; or to press the Release SRC key to release the source without requesting Idle Extension Notification. If the Idle Extension Notification request is removed by pressing the SACP key a second time (or due to any other limitation of Idle Extension Notification), Break-In is then possible.

It is not possible to do a Post-Dial Break-In on the source side of the attendant, therefore it is not possible to request for Idle Extension Notification in conjunction with Post-Dial Break-In. This means that it is not possible to a Break-In after an Idle Extension Notification recall is answered if the wanted extension becomes busy again.

- When an extension that is being supervised for an Idle Extension Notification to the attendant becomes idle, it is kept busy from receiving any incoming calls. The lamp on the attendant console for that DN will display a busy status, according to the parameters of the Busy Lamp Field/Enhanced Busy Lamp Field feature.
- It is not possible to request for Idle Extension Notification if the Busy Verify feature has been activated after the Busy Verify key is pressed.
- When an extension that is being supervised for Idle Extension Notification becomes idle, it has the ability to make outgoing calls. If Call Forward All Calls or Intercept Call Forward are activated at the extension before the attendant presses the SACP key to ring that extension, the attendant's call will be forwarded to the Call Forward destination. The attendant display will show both the call forward DN as well as the original extension's DN.

If the Call Forward DN is busy, SACP can be activated towards the Call Forward DN, if all the requirements for allowing Idle Extension Notification are met by this DN.

- If an extension has Call Waiting configured, it is not possible to request Idle Extension Notification. Call Waiting has precedence over the Idle Extension Notification feature.
- When an extension is blocked for receiving calls due to the Idle Extension Notification feature, camp-on is not possible.
- It is not possible to request for Idle Extension Notification towards an extension that has the Do-Not-Disturb feature activated.
- It is not possible to request for Idle Extension Notification towards an extension that is Second Degree Busy. Idle Extension Notification is only possible on an extension that is First Degree Busy.
- It is not possible to set Idle Extension Notification towards a pilot DN.
- If the attendant dials a busy extension that has Hunting configured and where all the DNs in the hunt chain are busy, Idle Extension Notification may be requested towards the dialed extension.
- ISDN BRI extensions always have the Call Waiting feature equipped, therefore Idle Extension Notification is not possible.

- The Idle Extension Notification feature is available for ISDN Meridian Customer Defined Networking (MCDN) networks using BRI TIE trunks if Network Attendant Service is configured.
- It is not possible to request for Idle Extension Notification towards an extension that has the Make Set Busy feature activated.
- If Idle Extension Notification is requested for a Multiple Call Arrangement DN, the first extension with this DN that becomes idle will cause the recall. This extension will also be blocked from receiving calls.
- An Idle Extension Notification recall will always recall to the same attendant, regardless of the configuration of the Recall To Same Attendant (RTSA) feature.
- During the time that an extension is supervised or temporarily blocked from receiving calls due to the Idle Extension Notification feature, it is possible to activate Ring Again towards that extension. It is also possible to request for Idle Extension Notification on an extension that is supervised for Ring Again. When the extension becomes idle, the Idle Extension Notification will be served first.

Package Requirements

Feature	Package Number
ISDN	145
NAS	159
SACP	181
SUPP	131
BKI	127

In-Band Automatic Number Identification

In-Band ANI is a Northern Telecom Meridian 1 capability which allows an Inter-Exchange Carrier such as MCI or Sprint to send the Meridian 1 the calling party's 10 digit phone number through standard digital trunks (T1s). The Meridian 1 can then terminate the number to the following:

- The digit display of an auto terminating ACD set
- A Meridian Link connection
- A CDR record

Note: In-Band ANI is only supported via MCI using the DMS-250 Inter-exchange switch.

A three or four digit Dialed Number Identification Service (DNIS) can be delivered instead of the ANI digits if required.

Package Requirements

The In-Band ANI feature requires software options; 40, 98, 145, 146 and 149.

Incoming Trunk Programmable Calling Line Identification

The Incoming Trunk Programmable Calling Line Identification feature allows a billing number to be assigned to incoming trunk routes. The billing number length can be from one to 16 digits, and is only used when the incoming trunk terminates to a PRI trunk connected to a Public Exchange/Central Office. The billing number is inserted into the Calling Line Identification (CLID) field of the outgoing PRI trunk route.

An option is also provided that allows the billing number to have the "Presentation Allowed" field in the outgoing route CLID to be allowed or denied. This will allow or deny the display of the billing number when the call terminates on a set off the Central Office.

In addition, incoming routes that support CLID can have the Billing Number replace the CLID for tandeming only.

Operating parameters

This feature is not supported on SL-1 interfaces.

M911 trunks do not support the billing number.

If the route defined is both incoming and outgoing, the billing number will only be used for incoming calls to support outgoing Integrated Services Digital Network (ISDN) routes.

The billing number is not unique; the same number can be programmed for multiple routes.

The billing number is only inserted on tandem calls for supporting trunks to the Central Office. Therefore, the display of billing number on sets is not provided, and the CDR output will not show the billing number.

There is no control over how the Central Office uses the billing number. The presentation indicator is configurable to either allow or deny the displaying of the billing number. This is only used for the outgoing call to the Central Office which means when the call terminates on a set off the Central Office the billing number will be displayed at that set if the option is set (BDSP = YES).

Call redirection is not supported (e.g., if the incoming call terminates on the Meridian 1 and is transferred, or call forwarded to the Central Office, the billing number is not passed on to the Central Office).

Feature interactions

Not applicable.

Feature packaging

The Incoming Trunk Programmable Calling Line Identification feature is part of basic X11 system software. The following software option package is required to activate this feature:

- Integrated Services Digital Network (ISDN) package 145.

For ISDN and networking, some or all of the following packages may be required:

- Basic Alternate Route Selection (BARS) package 57
- Network Alternate Route Selection (NARS) package 58
- Coordinated Dialing Plan (CDP) package 59

- Basic Routing (BRTE) package 14, and
- Network Class of Service (NCOS) package 32.

Feature operation

No specific operating instructions are required to use this feature.

ISDN Calling Line Identification enhancements

The capabilities introduced by the ISDN Calling Line Identification (CLID) Enhancements greatly increases the functionality of CLID within any ISDN network.

These enhancements replace the previous method of constructing CLID, and allow much more flexibility when programming CLID for any telephone set on a Meridian 1. Prior to Release 22, a CLID was defined as either a Listed Directory Number (LDN) or Primary Directory Number (PDN). The contents of these data fields were used to generate the CLID for a call. The CLID could only be built from key 0 of a set. This meant that regardless of what key was used to make a call, it was the CLID for key 0 that was sent. Also, only one office code and one location code could have been assigned in the CLID for a customer.

CLID is now table-driven (when LD 15 is loaded, a customer can configure a CLID table), and virtually any of the information contained in the fields of the CLID table can now be programmed against any DN or DN key, on a per set basis. This means that the CLID that is sent from a set is now predicated on what is in the CLID table, rather than the LDN or PDN. That is, a CLID for any key is now built by taking the information contained in a particular field in the CLID table and adding that information to the key's DN. A multi-line set can now have DN keys that each has its own CLID. Or, as explained in "How CLID entries are assigned to a set" on page 158, the CLID of any one key could, on a set, be programmed to use the CLID of any other key on the set.

Also, the Meridian 1 can now support multiple office codes, location codes and steering codes in CLID (this is more fully explained in the section "How a CLID table is built", which follows.) This means that any telephone set on one Meridian 1 can send a CLID that will have calls returned to another Meridian 1. This type of configuration would typically be used in cases where a customer would want calls to be returned to only one central location.

Note: Since the system does not perform verification of CLID entries that are defined in a CLID table, it is the responsibility of the system administrator to ensure that DN keys are programmed correctly.

How a CLID table is built

New prompts have been added to LD 15 that create a CLID table for a customer. This table contains CLID ‘entries’ (up to 4,000.) Each entry contains unique information pertaining to CLID, as explained in the following sections.

North American Numbering Plan

For users of a North American Numbering Plan, the Meridian 1 can now support multiple Home Central Office Codes (HNXXs), Home Numbering Plan Area (HNPA) codes, Home Location Codes (HLOCs) and Local Steering Codes (LSCs), on a DN or DN key basis.

For a North American Numbering Plan, each CLID entry can contain the following:

- a one-six digit national code for a home national number (HNTN);
- a one-12 digit local code for a home local number (HLCL), or a one-12 digit Listed Directory Number for a switchboard;
- a one-seven digit Home Location Code (HLOC); and
- a one-seven digit Local Steering Code (LSC).

International Numbering Plan

For users of an International Numbering Plan, the Meridian 1 can now support multiple Prefix 1 (PFX1) and Prefix 2 (PFX2) contents, and multiple Home Location Codes (HLOCs) and Local Steering Codes (LSCs), on a DN or DN key basis.

For an International Numbering Plan, each CLID entry can now contain the following:

- a one-six digit national code for a home national number (HNTN), which is the equivalent of PFX1;
- a one-12 digit local code for a home local number (HLCL), which is the equivalent of PFX2, or a one-12 digit Listed Directory Number for a switchboard;

- a one-seven digit Home Location Code (HLOC);
- a one-seven digit Local Steering Code (LSC).

Another new capability, which applies to both the North American Numbering Plan and the International Numbering Plan, pertains to how the HLCL is constructed. A new prompt, DIDN (which signifies “use DN as a DID number”) in LD 15, allows the HLCL to be built either using the digits in the HLCL plus the digits of the active key (if DIDN is set to “YES” - the DN is considered to be a DID number and is included in the CLID), or only the digits in the HLCL (if DIDN is set to “NO” - the DN is not included in the CLID since it is not a DID number), or based on a search on the DN keys, beginning from key 0, to find the CLID to be used (DIDN is set to “SRCH”). Please refer to Examples one to six in the “Examples of CLID generation” section starting on page 159.

How CLID entries are assigned to a set

Once the CLID table has been built for a customer, any CLID entry can be assigned to any set, on a per DN or DN key basis (any DN or DN key can be programmed against the information defined for any CLID entry in the CLID table.) This means that for a multi-line set, DN key 0 may send one CLID (the information contained in one CLID entry), DN key 1 may send a different CLID (the information contained in another CLID entry), and DN key 2 may send yet another CLID (the information contained in a third CLID entry). Therefore, a customer may now send different CLIDs from the same set.

Another enhancement pertains to Meridian 1 proprietary sets. When configuring the CLID for a DN key in LD 11, the value entered against the KEY prompt may be a CLID table entry number (0-3999), which corresponds to a CLID entry in the CLID table or ‘D’. If ‘D’ is entered, the Meridian 1 initiates a search on the set for a DN key, starting from key 0. The first found CLID is then sent as the CLID of the active DN key. This means that a call can be made on one key, and the CLID of another key is sent. This configuration is typically used in an ACD or Hotline DN key application, where, for example, the CLID for a particular key is not desired to be sent. Please refer to Examples seven, eight and nine in the “Examples of CLID generation” on page 159.

Prior to the CLID enhancement, for feature keys, such as the Call Transfer key (TRN), the Conference key (AO3 and AO6) and the No-hold Conference key (NHC), the DN of key 0 was used as the CLID DN when a call transfer or conference occurred over ISDN trunks. With the CLID enhancement, the CLID DN is now associated with the active DN key, rather than key 0.

Examples of CLID generation

The examples that follow show CLID generation using different combinations of CLID entries for DN keys, for Private ESN UDP/CDP calls and for Public Local and Public National calls.

Most of the examples use a North American Numbering Plan, since the construction of CLID entries in a CLID is the same for both a North American Numbering Plan and an International Numbering Plan. In some cases, however, examples are provided that pertain to calls using an International Numbering Plan.

Therefore, unless otherwise stated in the headings, the examples provided in the following sections pertain to calls made using a North American Numbering Plan.

The CLID construction for a CLID call type is as follows:

- Private ESN UDP Number - HLOC + DN
- Private ESN CDP Number - LSC + DN
- Public Local Number - HLCL + DN
- Public National Number - HNTN + HLCL + DN

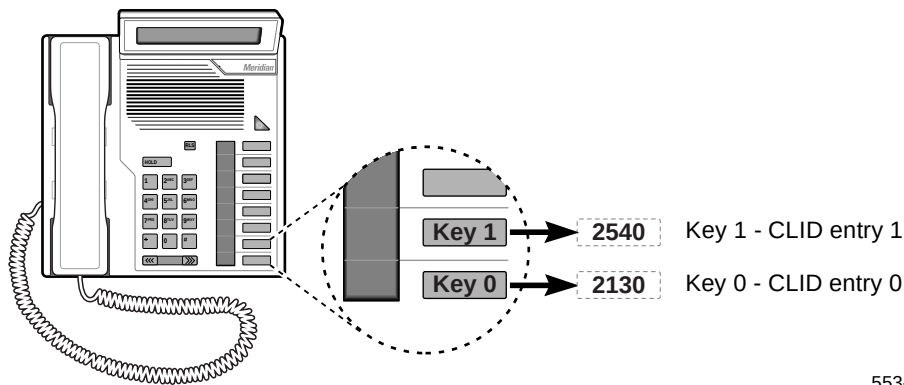
Please note that for calls made using the International Numbering Plan, the CLID for a Public Number is a National Number. For the examples of using the International Numbering Plan, the construction of a Public Local Number is for reference purposes only.

Example 1 - Set has DID number on DN key 0

In this example, the calls are made on DN key 0, which has a DID number. Key 0 is configured against CLID table entry 0, and key 1 is configured against CLID table entry 1.

Table 17
Set has DID number on DN key 0

CLID entry	HNTN (code for the home national number)	HLCL (code for the home local number), or LDN	DIDN (use the DN as the DID?)	HLOC (home location code)	LSC (local steering code)
Entry 0	415	940	YES	646	5
Entry 1	415	9699170	NO	646	5
Entry 2			SRCH	646	5



553-7655.EPS

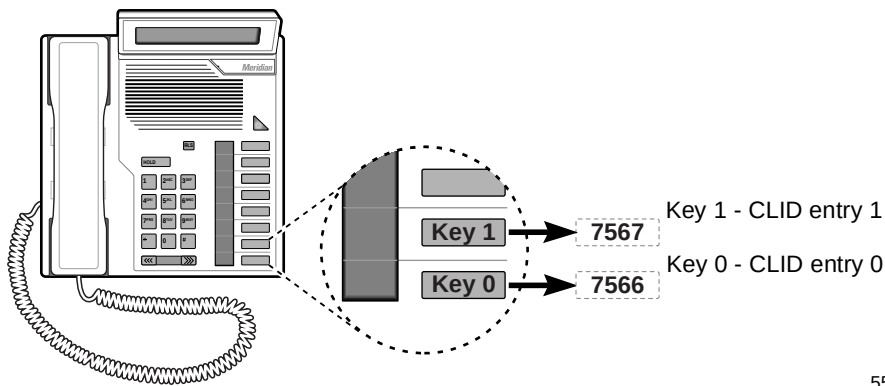
- 1** For a private ESN UDP call made from Key 0 (DN 2130) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 0 (646) plus the DN of the active key (2130).
 - That is, the CLID that is sent would be 646 2130.
- 2** For a private ESN CDP call made from Key 0 (DN 2130) on the set, the CLID would be built as follows:
 - LSC from CLID entry 0 (5) plus the DN of the active key (2130).
 - That is, the CLID that is sent would be 5 2130.
- 3** For a public local call made from Key 0 (DN 2130) on the set, the CLID would be built as follows:
 - HLCL from CLID entry 0 (940) plus the DN of the active key (2130).
 - That is, the CLID that is sent would be 940 2130.
- 4** For a public national call made from Key 0 (DN 2130) on the set, the CLID would be built as follows:
 - HNTN from CLID entry 0 (415) plus the HLCL from CLID entry 0 (940) plus the DN of the active key (2130).
 - That is, the CLID that is sent would be 415 940 2130.

Example 2 - Set has DID number on DN key 0, International Numbering Plan.

In this example, the calls are made on DN key 0, which has a DID number. Key 0 is configured against CLID table entry 0, and key 1 is configured against CLID table entry 1.

Table 18
Set has DID number on DN key 0, for an International Numbering Plan.

CLID entry	HNTN (code for the home national number, equivalent to PFX1)	HLCL (code for the home local number, equivalent to PFX2), or LDN	DIDN (use the DN as the DID?)	HLOC (home location code)	LSC (local steering code)
Entry 0	2	6476	YES	578	6
Entry 1	2	64767676	NO	578	6
Entry 2			SRCH	578	6



553-7656.EPS

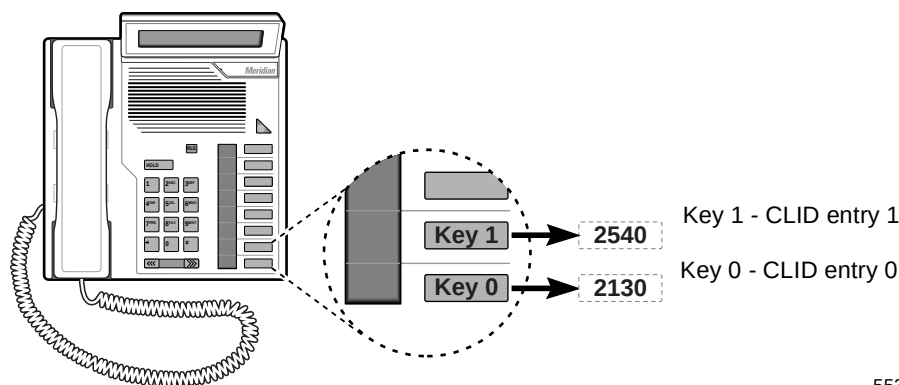
- 1 For a private ESN UDP call made from Key 0 (DN 7566) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 0 (578) plus the DN of the active key (7566).
 - That is, the CLID that is sent would be 578 7566.
- 2 For a private ESN CDP call made from Key 0 (DN 7566) on the set, the CLID would be built as follows:
 - LSC from CLID entry 0 (6) plus the DN of the active key (7566).
 - That is, the CLID that is sent would be 6 7566.
- 3 For a public local call made from Key 0 (DN 7566) on the set, the CLID would be built as follows:
 - HLCL from CLID entry 0 (6476) plus the DN of the active key (7566).
 - That is, the CLID that is sent would be 6476 7566.
- 4 For a public national call made from Key 0 (DN 7566) on the set, the CLID would be built as follows:
 - HNTN from CLID entry 0 (2) plus the HLCL from CLID entry 0 (6476) plus the DN of the active key (7566).
 - That is, the CLID that is sent would be 2 6476 7566.

Example 3 - Set does not have a DID number on DN key 1 (DIDN set to NO)

In this example, the calls are made on DN key 1, which does not have a DID number. Key 0 is configured against CLID table entry 0, and key 1 is configured against CLID table entry 1, which has the DIDN option set to NO. This means that the CLID is built using only the digits defined in the HLCL field of table entry 1 (the DN of key 1 would not be sent in the CLID after the HLCL digits.)

Table 19
Set does not have a DID number on DN key 1 (DIDN set to NO).

CLID entry	HNTN (code for the home national number)	HLCL (code for the home local number), or LDN	DIDN (use the DN as the DID?)	HLOC (home location code)	LSC (local steering code)
Entry 0	415	940	YES	646	5
Entry 1	415	9699170	NO	646	5
Entry 2			SRCH	646	5



553-7655.EPS

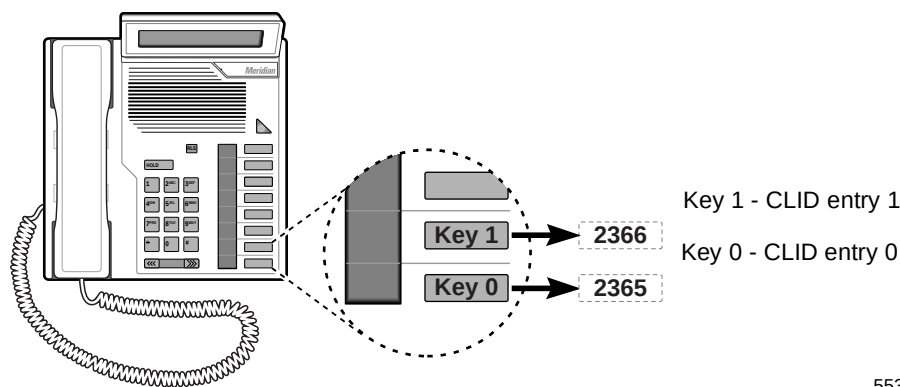
- 1 For a private ESN UDP call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 1 (646) plus the DN of the active key (2540).
 - That is, the CLID that is sent would be 646 2540.
- 2 For a private ESN CDP call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - LSC from CLID entry 1 (5) plus the DN of the active key (2540).
 - That is, the CLID that is sent would be 5 2540.
- 3 For a public local call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HLCL from CLID entry 1 (9699170) - the DN of key 1 is not sent.
 - That is, the CLID that is sent would be 9699170.
- 4 For a public national call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HNTN from CLID entry 1 (415) plus the HLCL from CLID entry 1 (9699170).
 - That is, the CLID that is sent would be 415 9699170.

Example 4 - Set does not have a DID number on DN key 1 (DIDN set to NO), International Numbering Plan.

In this example, the calls are made on DN key 1, which does not have a DID number. Key 0 is configured against CLID table entry 0, and key 1 is configured against CLID table entry 1, which has the DIDN option set to NO. This means that the CLID is built using only the digits defined in the HLCL field of table entry 1 (the DN of key 1 would not be sent in the CLID after the HLCL digits.)

Table 20
Set does not have a DID number on DN key 1 (DIDN set to NO).

CLID entry	HNTN (code for the home national number)	HLCL (code for the home local number), or LDN	DIDN (use the DN as the DID?)	HLOC (home location code)	LSC (local steering code)
Entry 0	89	3505	YES	581	6
Entry 1	89	35052020	NO	581	6
Entry 2			SRCH	581	6



553-7657.EPS

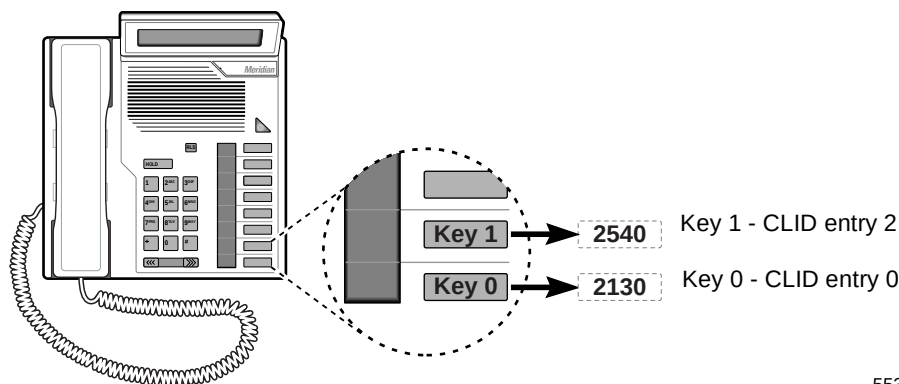
- 1 For a private ESN UDP call made from Key 1 (DN 2366) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 1 (581) plus the DN of the active key (2366).
 - That is, the CLID that is sent would be 581 2366.
- 2 For a private ESN CDP call made from Key 1 (DN 2366) on the set, the CLID would be built as follows:
 - LSC from CLID entry 1 (6) plus the DN of the active key (2366).
 - That is, the CLID that is sent would be 6 2366.
- 3 For a public local call made from Key 1 (DN 2366) on the set, the CLID would be built as follows:
 - HLCL from CLID entry 1 (35052020) - the DN of key 1 is not sent.
 - That is, the CLID that is sent would be 35052020.
- 4 For a public national call made from Key 1 (DN 2366) on the set, the CLID would be built as follows:
 - HNTN from CLID entry 1 (89) plus the HLCL from CLID entry 1 (35052020).
 - That is, the CLID that is sent would be 89 35052020.

Example 5 - Set does not have DID number on DN key 1, SRCH option is used (DIDN is set to SRCH)

In this example, the calls are made on DN key 1, which does not have a DID number. Key 0 is configured against CLID table entry 0, and key 1 is configured against CLID table entry 2, which has the DIDN option set to SRCH. This means that the CLID assigned for key 1 is constructed based on a search starting from key 0. When a CLID entry is found, which has DIDN set to YES (that would be key 0), the HLCL for that key is used in the CLID for key 1. Therefore, the CLID that is sent for key 1 would contain the HLCL of key 0 plus the DN of key 1.

Table 21
Set does not have a DID number on DN key 1, SRCH is used (DIDN is set to SRCH).

CLID entry	HNTN (code for the home national number)	HLCL (code for the home local number), or LDN	DIDN (use the DN as the DID?)	HLOC (home location code)	LSC (local steering code)
Entry 0	415	940	YES	655	6
Entry 1	415	9699170	NO	655	6
Entry 2			SRCH	655	6



553-7655.EPS

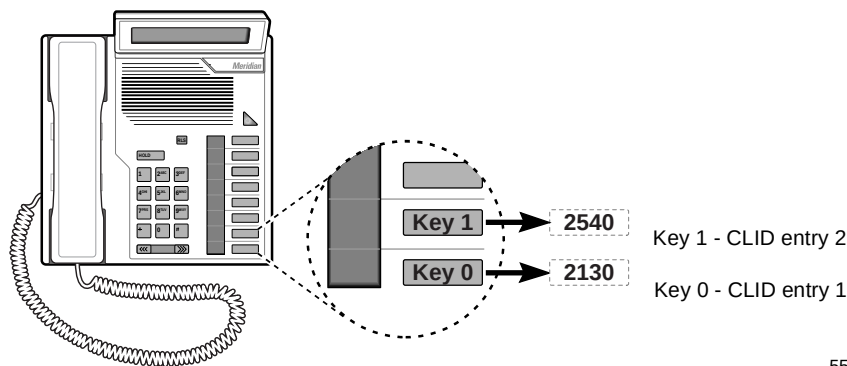
- 1 For a private ESN UDP call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 2 (655) plus the DN of the active key (2540).
 - That is, the CLID that is sent would be 655 2540.
- 2 For a private ESN CDP call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - LSC from CLID entry 2 (6) plus the DN of the active key (2540).
 - That is, the CLID that is sent would be 6 2540.
- 3 For a public local call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HLCL of CLID entry with DIDN set to YES (the HLCL of key 0, which is 940) plus the DN key 0 (2130.)
 - That is, the CLID that is sent would be 940 2130.
- 4 For a public national call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HNTN from CLID entry 0 (415) plus the HLCL from CLID entry 0 (940) plus the DN of key 0.
 - That is, the CLID that is sent would be 415 940 2130.

Example 6 -Set does not have DID number on DN key 1, SRCH option is used but does not find a DID

In this example, the calls are made on DN key 1, which does not have a DID number. Key 0 is configured against CLID table entry 1, and key 1 is configured against CLID table entry 2, which has the DIDN option set to SRCH. This means that the CLID assigned for key 1 is constructed based on a search starting from key 0. Key 0 is configured against table entry 1. Since table entry 1 has DIDN set to NO, the search next takes place on key 1, which is configured against table entry 2. Since table entry 2 does not have DIDN set to YES either, the search fails to find a CLID entry which has DIDN set to YES. This means that the CLID for key 1 is constructed using only the HLCL of the active DN (that is, the HLCL for key 1, which is the HLCL defined in table entry 2.)

Table 22
Set does not have a DID number on DN key 1, SRCH option fails to find a DID.

CLID entry	HNTN (code for the home national number)	HLCL (code for the home local number), or LDN	DIDN (use the DN as the DID?)	HLOC (home location code)	LSC (local steering code)
Entry 0	415	940	YES	646	5
Entry 1	415	9699170	NO	646	5
Entry 2	408	9885560	SRCH	655	6



553-7655.EPS

- 1 For a private ESN UDP call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 2 (655) plus the DN of the active key (key 1, 2540).
 - That is, the CLID that is sent would be 655 2540.
- 2 For a private ESN CDP call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - LSC from CLID entry 2 (6) plus the DN of the active key (2540).
 - That is, the CLID that is sent would be 6 2540.
- 3 For a public local call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HLCL of CLID entry 2 (9885560) - since the search failed to find a DID number, only the HLCL of the active key (key 1, which is configured against table entry 2) is sent in the CLID. Since the DN of Key 1 (2540) is not a DID number, it is not sent in the CLID.
 - That is, the CLID that is sent would be 9885560.
- 4 For a public national call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HNTN from CLID entry 2 (408) plus the HLCL from CLID entry 2 (9885560) - since the DN of Key 1 is not a DID number, the DN (2540) is not sent..
 - That is, the CLID that is sent would be 408 9885560.

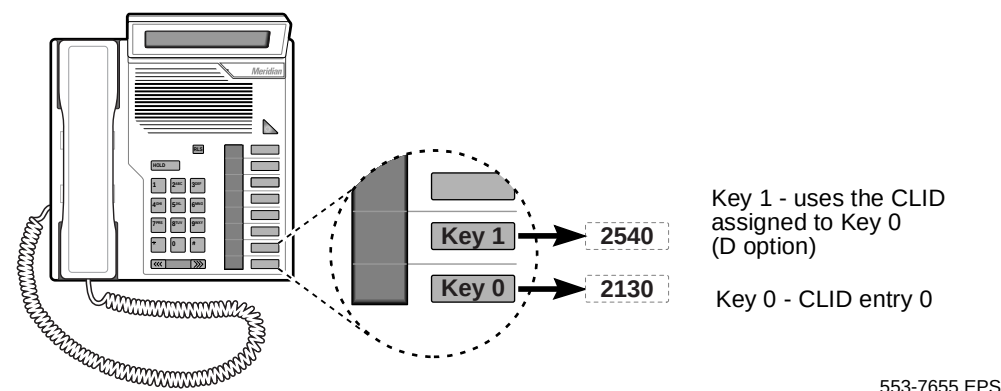
Example 7 - Set with DN KEY prompt of “D” on key 1

In this example, the calls are made on DN key 1, which has the KEY prompt set to “D” in LD 11. This means that a search is done on the set for a DN key, starting from key 0. The CLID of the found DN (key 0 in this case) key is used as the CLID of the active DN key; that is, the CLID for key 0 is used as the CLID for key 1.

Key 0 is configured against CLID table entry 0, and key 1 uses the CLID assigned to key 0.

Table 23
Set with DN KEY prompt of “D” on key 1.

CLID entry	HNTN (code for the home national number)	HLCL (code for the home local number), or LDN	DIDN (use the DN as the DID?)	HLOC (home location code)	LSC (local steering code)
Entry 0	415	940	YES	646	5
Entry 1	415	9699170	NO	646	5
Entry 2			SRCH	646	6



553-7655.EPS

- 1 For a private ESN UDP call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 0 (646) plus the DN for key 0 (2130) - since the Key option has been set to 'D', a search is done from key 0 to find a DN key. The CLID for the found DN key is used as the CLID of active DN key - therefore, CLID for key 0 (the found DN) is used in the CLID for key 1. This also applies to cases 2, 3 and 4 which follow.
 - Therefore, the CLID that is sent would be 646 2130.
- 2 For a private ESN CDP call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - LSC from CLID entry 0 (5) plus the DN of key 0 (2130).
 - That is, the CLID that is sent would be 5 2130.
- 3 For a public local call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HLCL of CLID entry 0 (940) plus the DN of key 0 (2130).
 - That is, the CLID that is sent would be 940 2130.
- 4 For a public national call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HNTN from CLID entry 0 (415) plus the HLCL from CLID entry 0 (940) plus the DN of key 0 (2130).
 - That is, the CLID that is sent would be 415 940 2130.

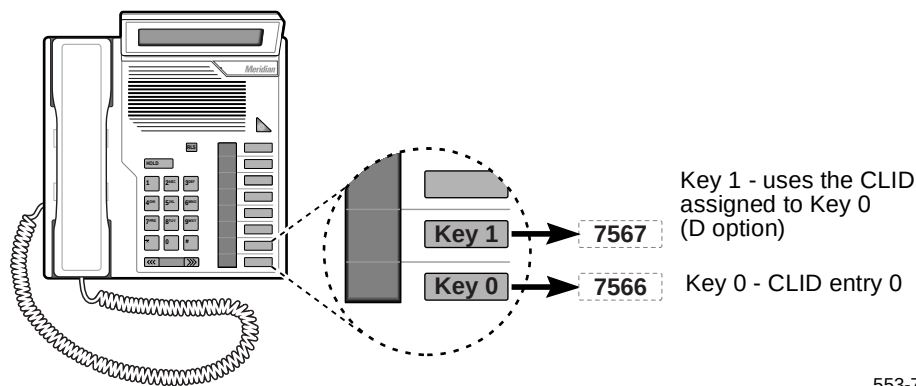
Example 8 - Set with DN KEY prompt of “D” on key 1, International Numbering Plan

In this example, the calls are made on DN key 1, which has the KEY prompt set to “D” in LD 11. This means that a search is done on the set for a DN key, starting from key 0. The CLID of the found DN (key 0 in this case) key is used as the CLID of the active DN key, that is, the CLID for key 0 is used as the CLID for key 1.

Key 0 is configured against CLID table entry 0, and key 1 uses the CLID assigned to key 0.

Table 24
Set with DN KEY prompt of “D” on key 1.

CLID entry	HNTN (code for the home national number)	HLCL (code for the home local number), or LDN	DIDN (use the DN as the DID?)	HLOC (home location code)	LSC (local steering code)
Entry 0	2	6476	YES	578	6
Entry 1	2	64767676	NO	578	6
Entry 2			SRCH	578	6



553-7656.EPS

- 1 For a private ESN UDP call made from Key 1 (DN 7567) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 0 (578) plus the DN for key 0 (7566) - since the Key option has been set to 'D', a search is done from key 0 to find a DN key. The CLID for the found DN key is used as the CLID of active DN key - therefore, CLID for key 0 (the found DN) is used in the CLID for key 1. This also applies to cases 2, 3, and 4 which follow.
 - Therefore, the CLID that is sent would be 578 7566.
- 2 For a private ESN CDP call made from Key 1 (DN 7567) on the set, the CLID would be built as follows:
 - LSC from CLID entry 0 (6) plus the DN of key 0 (7566).
 - That is, the CLID that is sent would be 5 2130.
- 3 For a public local call made from Key 1 (DN 7567) on the set, the CLID would be built as follows:
 - HLCL of CLID entry 0 (6476) plus the DN of key 0 (7566).
 - That is, the CLID that is sent would be 6476 7566.
- 4 For a public national call made from Key 1 (DN 7567) on the set, the CLID would be built as follows:
 - HNTN from CLID entry 0 (2) plus the HLCL from CLID entry 0 (6476) plus the DN of key 0 (7566).
 - That is, the CLID that is sent would be 2 6476 7566.

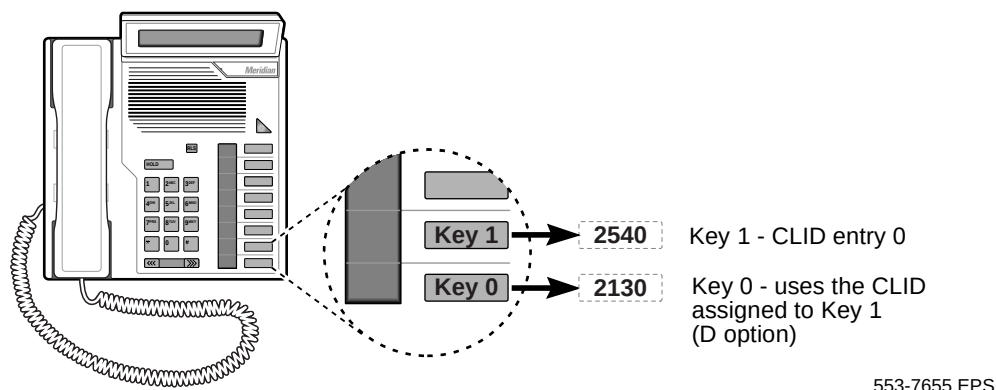
Example 9 - Set with DN KEY prompt of “D” on key 0

In this example, the calls are made on DN key 0, which has the KEY prompt set to “D” in LD 11. This means that a search is done on the set for a DN key, starting from key 0. The CLID of the found DN key (key 1 in this case) is then used as the CLID of the active DN key, that is, the CLID assigned to key 1 is used as the CLID for key 0.

Key 1 is configured against CLID table entry 0, and key 0 uses the CLID assigned to key 1.

Table 25
Set with DN KEY prompt of “D” on key 0.

CLID entry	HNTN (code for the home national number)	HLCL (code for the home local number), or LDN	DIDN (use the DN as the DID?)	HLOC (home location code)	LSC (local steering code)
Entry 0	415	940	YES	646	5
Entry 1	415	9699170	NO	646	5
Entry 2			SRCH	655	6



553-7655.EPS

- 1 For a private ESN UDP call made from Key 0 (DN 2130) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 0 (646) plus the DN for key 1 (2540) - since the Key option has been set to 'D', a search is done from key 0 to find a DN key. The CLID for the found DN key is used as the CLID of active DN key - therefore, CLID for key 1 (the found DN) is used in the CLID for key 0. This also applies to cases 2, 3, and 4 which follow.
 - Therefore, the CLID that is sent would be 646 2540.
- 2 For a private ESN CDP call made from Key 0 (DN 2130) on the set, the CLID would be built as follows:
 - LSC from CLID entry 0 (5) plus the DN of key 1 (2540).
 - That is, the CLID that is sent would be 5 2540.
- 3 For a public local call made from Key 0 (DN 2130) on the set, the CLID would be built as follows:
 - HLCL of CLID entry 0 (940) plus the DN of key 1 (2540).
 - That is, the CLID that is sent would be 940 2540.
- 4 For a public national call made from Key 0 (DN 2130) on the set, the CLID would be built as follows:
 - HNTN from CLID entry 0 (415) plus the HLCL from CLID entry 0 (940) plus the DN of key 1 (2540).
 - That is, the CLID that is sent would be 415 940 2540.

Operating parameters

In order for CLID to be properly delivered, a CLID entry must be defined in the CLID table for a customer. If a CLID entry or table is not defined, the active DN is sent as CLID.

The ISDN Calling Line Identification (CLID) Enhancements feature only pertains to calls that are made over ISDN routes.

The CLID that is sent from the Meridian 1 may be subject to any restrictions which may be imposed by the serving Telco.

This feature does not change the operation of CLID for attendant consoles. The codes for different call types are extracted from CLID entry 0 in LD 15, the customer data block. If the call type is private, the attendant DN is used. If the call type is public, LDN0 is used.

There is no system validation of digits entered in the CLID entry via a service change. Therefore, caution must be taken that any digits that are entered are valid and correct.

There is no cross-validation of the CLID entry associated with a set against the CLID entry entered in LD 15. If a CLID entry is deleted from the CLID table and the CLID entry remains assigned to a DN key, the active DN is sent as CLID.

The maximum number of digits for a CLID in an ISDN message is 16.

The restriction remains of constructing a seven-digit local number or a 10-digit national number, for the North American Numbering Plan. Also, a seven-digit maximum is maintained for an ESN Uniform Dialing Plan number, if the Flexible Numbering Plan package is not equipped. The seven and 10 digit restriction for a public number does not apply to International ISDN interfaces.

The CLID is constructed using the information in the CLID table associated with the active DN key for the calling party in the Setup message and the connected party in the Connected and Notify messages. This feature does not change the Information Elements pertaining to any other ISDN network DNs, such as for Redirecting and Original Called Number.

For ISDN supplementary services, the ISDN CLID enhancements do not change how a Network DN is constructed. For a Local Number, the Network DN is formed using the Home Central Office Code (HNXX)/Prefix 2 (PFX2). For ESN Numbers, the Network DN is formed using the Home Location Code (HLOC) for a Uniform Dialing Plan number or the Local Steering Code (LSC) for a Coordinated Dialing Plan number.

Feature interactions

Attendant Administration

Administration of a CLID entry, for a set from an attendant console, is not supported.

Automatic Call Distribution

The ACD DN is sent as the CLID for a call made by an ACD agent using a DN key on a key other than Key 0. With the feature enhancement, the CLID is constructed using the CLID entry associated with the active DN key. The ACD agent ID is not designed to be sent as the CLID.

If an ACD agent has an active call on Key 0 and if a call transfer or conference is initiated by the ACD agent, the CLID entry associated with the ACD DN Key 0 is used as the CLID (for remote calls only.)

There is no CLID entry for an analog (500/2500 type) ACD DN. The CLID associated with the analog (500/2500 type) DN is used when a call transfer or conference is initiated by an ACD agent on an analog (500/2500 type) set.

Call Detail Recording

The CLID in the CDR records, including the X records, contains the DN of the key from which the call is made, not the DN of Key 0.

Call Pickup Network Wide

The Private Integrated Services Network Exchange (PINX) DN in the customer data block is used for Call Pickup Network Wide. The network DN for the PINX DN is constructed using the existing Home Location Code (HLOC) or Local Steering Code (LSC) in LD 15. The DN of the originating party is constructed using the CLID associated with the active DN key. The DN of the originally called (ringing) party is constructed using the existing HLOC or LSC in LD 15. For calls picked up from a secondary DN, the redirection DN in the Notify message is formatted with the CLID entry 0 of LD 15.

Calling Party Name Display

If a call transfer or conference is initiated on a multiple appearance DN programmed on a key other than Key 0, the Call Party Name Display associated with the DN of the active key is used, rather than the Call Party Name Display for Key 0.

CLID for an ISDN BRI set

For an internal call terminating on an ISDN BRI set, the calling set's Dialed Digits Denied (DDGD)/Dialed Digits Allowed (DDGA) Class of Service is used to determine whether to send Calling Party Number to the terminating ISDN BRI set for display purposes.

Connected Number

When a call is modified, such as by a call transfer, this feature enhancement will try to use the CLID entry associated with the active DN key if available, otherwise the connected number will be constructed using CLID entry 0.

Network Attendant Service

If Network Attendant Service is equipped, CLID entry 0 is used for incoming trunks.

Network Call Redirection

Network Call Redirection constructs Redirecting Number and Redirection Number. The feature enhancement does not change the construction of the Redirecting Number. However, the Redirection Number of the Notify message is constructed using the CLID entry 0 of LD 15.

Network Message Services***Message Waiting Indication with DMS***

When a user leaves a voice message, from a multiple appearance DN, on a key other than Key 0 (such as Key 1), the caller's recorded number will be the multiple appearance DN on Key 1, rather than the primary DN of Key 0. This means that when the user returns the call, he/she will ring the DN of Key 1 on all the sets that have the appearance of the DN.

When a user retrieves messages using a multiple appearance DN key other than Key 0, the user now retrieves the messages on the other DN key.

The mail box number for a Network Message Service user is based on the original called number, in the form of a Coordinated Dialing Plan (CDP) or Uniform Dialing Plan (UDP) number. The construction of the original called number is not changed. If a user's DN is using a different Home Location Code or Local Steering Code for CLID, the Meridian Mail database adds the user's CLID as the mail box number. For example, if the first called number for a user is 6462300, a UDP number, and the user's CLID is 6472300, using CLID entry 'x', the user's mail box numbers are 6462300 and 6472300.

In general, with the enhancement of sending the DN associated with an active key to make a call to Meridian Mail, the secondary key's DN is included in the Meridian Mail User's definition (for either a local or remote user.)

Network Ring Again

The Network Ring Again feature remains operational when a user uses a multiple appearance DN on a key other than Key 0 to activate Network Ring Again, since Network Ring Again saves the Terminal Number of the set that initiates Network Ring Again.

Remote Virtual Queuing

The Remote Virtual Queuing (RVQ) feature remains operational when a user uses a multiple appearance DN on a key other than Key 0 to activate RVQ.

Transaction Capabilities Application Part (TCAP)

The network DN for TCAP messages is constructed using the existing Home Location Code (HLOC), Local Steering Code (LSC) or Home Numbering Plan Area (HNPA)/Home Central Office Code (HNXX) prompts in LD 15. The feature enhancement does not change the construction of the TCAP messages.

Feature packaging

The ISDN Calling Line Identification (CLID) Enhancements feature does not introduce any new package. However, Integrated Services Digital Network (ISDN) package 145 is required as a dependency.

Feature operation

No specific operating procedures are required to use this feature.

ISDN QSIG Alternate Routing

The QSIG Alternate Routing feature provides a solution to calls encountering congestion due to high traffic situations within a QSIG network. Both the QSIG interface protocols, European Telecommunications Standard Institute (ETSI), and International Standards Organization (ISO), are supported by this feature.

This feature uses the routing capability of Network Alternate Route Selection (NARS) to re-route a congested call. For each QSIG call translated at a Meridian 1 node, NARS selects one route from up to 512 routes to complete the call. These routes are programmed in a route list. Each route in the list is called an entry. There may be up to 64 entries in each route list. Any combination of trunks (such as public exchange, TIE) can be specified in a route list. QSIG Alternate Routing may be configured for each of the 512 different routes.

Congestion occurs when all trunks of a route are busy. With the introduction of the QSIG Alternate Routing feature, each entry of a route list on one node can be configured to take an alternate entry (route) from the route list of that node (Private or Public Exchange), if congestion is encountered.

Using LD 86, the Electronic Switched Network (ESN) administration overlay, the option defined for the Step Back On Congestion (SBOC) prompt determines the type of alternate routing available to calls over a particular route. These options may be as follows:

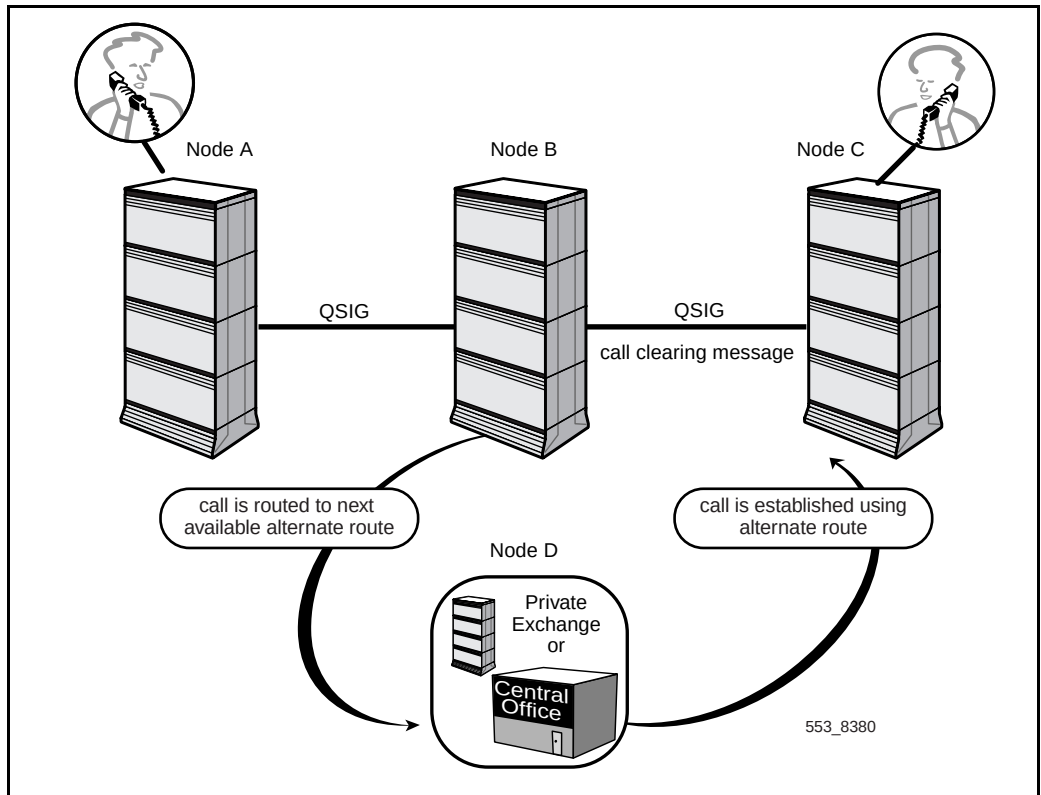
- NRR (no alternate routing is performed. The call receives congestion treatment).
- RRO (reroute if a call encounters congestion at the originating node. If congestion is encountered at a transit node, the call drops back to the originating node, so that the originating node decides if re-routing is required. The drop-back functionality, which is part of the ISDN Drop Back Busy feature, is also configured in LD 86, using the IDBB prompt).
- RRA (reroute the call at any node, whether congestion is encountered at the originating or transit node).

QSIG Alternate Routing is triggered at the controlling node when a Call Clearing message (DISCONNECT or a REJECT) is received, and the cause value is to activate QSIG Alternate Routing. The cause values are defined using LD 86.

Transit node operation

Consider the following calling scenario for a transit node operation (refer to Figure 16). An attempt is being made to establish a call over a QSIG link, from originating node A to terminating node C, via transit node B. All the trunks pertaining to the call attempt at node C are busy. Node C sends congestion message information, along with a supported QSIG Alternate Routing cause value, back to node B.

Figure 16
Transit node operation



At node B, the SBOC option, as defined in LD 86, is checked to determine the routing treatment. If SBOC = RRA, the next free alternate route is tried. In our example, the first free alternate route that is found is between node B and node D. Node D can either be a Private or Public Exchange. If the Network Class of Service access checks are passed, the direct leg between the congested node (node C) is released, and a indirect new leg is created to node C, through node D. The call would then be established from node A, to node B, to node D, to node C.

An attempt is made to find a free alternate route until all of the alternate routes, as defined in LD 86, are tried. If no free alternate route is available, the congestion message information is sent from node B to the originating node A, where the QSIG Alternate Routing functionality is activated. If no alternate routes are found, the call receives network blocking treatment, as defined by prompt NBLK in LD 15, as part of the initial customer configuration.

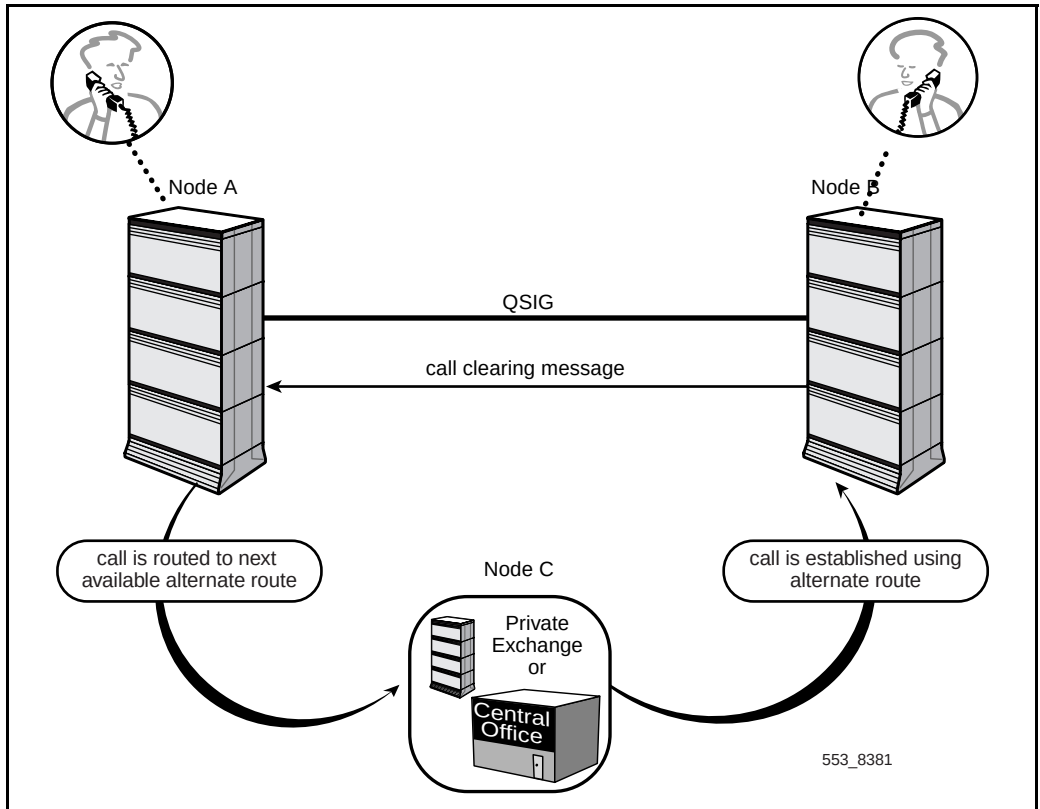
If SBOC = RRO, the congestion information is passed back from transit node B to the originating node A. At node A, QSIG Alternate Routing is activated in an attempt to find an alternate route to set up the call from node A, to node B, to node D, to node C.

If SBOC = NRR, no alternate routing is performed. The call receives network blocking treatment, depending on the congestion cause value and the type of treatment defined by prompt NBLK in LD 15.

Originating node operation

Consider the following calling scenario for an originating node operation (refer to Figure 17). An attempt is being made to establish a call over a QSIG link, from originating node A to terminating node B. All the trunks All the trunks pertaining to the call attempt at node B are busy, so node B sends congestion message information, along with a supported QSIG Alternate Routing cause value, back to node A.

Figure 17
Originating node operation



At node A, the SBOC option, as defined in LD 86, is checked to determine the routing treatment. If SBOC = RRA or RRO, the next free alternate route is tried. In our example, the first free alternate route that is found is between node A and node C. Node C can either be a Private or Public Exchange. If the Network Class of Service access checks are passed, the direct leg between the congested node (node B) is released, and a new indirect leg is created to node B, through node C. The call would then be established between node A, to node B, to node C.

An attempt to find a free alternate is made until all of the alternate routes, as defined in LD 86, are tried. If no alternate routes are found, the call receives network blocking treatment, as defined by prompt NBLK in LD 15, as part of the initial customer configuration.

If SBOC = NRR, no alternate routing is performed. The call receives network blocking treatment, depending on the congestion cause value and the type of treatment defined by prompt NBLK in LD 15.

Operating parameters

There are two forms of QSIG Call Transfer - QSIG Call Transfer by the “rerouting” method, and QSIG Call Transfer by the “join” method. QSIG Alternate Routing and the QSIG Call Transfer by the “re-routing” method are mutually exclusive.

Optional Information Elements (IEs) may be lost at a rerouting node. Only the following optional Information Element (IEs) are tandemmed in the SETUP of the alternate call, if they are present in the congested call:

- Calling number
- Called and calling subaddress
- High layer compatibility
- Low layer compatibility

On a QSIG network, optional IEs (like progress IEs) carried in the SETUP messages are lost when the alternate routing occurs at a transit node. Mandatory IE are always tandemmed transparently.

GF facility information is lost at a transit node. If QSIG Alternate Routing is performed, Facility IEs contained in the SETUP message are lost, so services like QSIG Name Display, QSIG Call Diversion (rerouting and by join method) are not delivered to the end-user. QSIG Alternate Routing is exclusive with QSIG Call Transfer, if the rerouting method is used. This does not have a major impact, since QSIG Call Transfer by rerouting is optional, whereas QSIG Call Transfer by join is mandatory. It is therefore advised that if a third-party PBX is part of a QSIG network, QSIG Call Transfer by join method is used.

Missing progress IEs due to QSIG Alternate Routing activation may create a situation where a call fails involving an ISDN BRI set. This may occur when a Meridian proprietary set calls an ISDN BRI set over a QSIG link, and QSIG Alternate Routing is triggered. In this case the Progress Indicator Number 3 “Originator is not ISDN” is lost.

Route Access codes are not supported. A Coordinated Dialing Plan (CDP) or a Uniform Dialing Plan (UDP) is required for the QSIG Alternate Routing feature.

Feature interactions

Drop Back Busy and Off-Hook Queuing

QSIG Alternate Routing takes precedence over ISDN Drop Back Busy, if both are configured on an MCDN-to-QSIG gateway node.

Intercept treatment

If QSIG Alternate Routing fails to find an alternate route for a call encountering congestion at a transit node, intercept treatment is not applied at the transit node. The call is dropped back to the originating node, with the appropriate congestion IE information.

Overlap Sending

QSIG Alternate Routing is supported over both the enbloc and overlap signaling methods.

QSIG Name Display

When QSIG Alternate Routing is triggered at a tandem node, no calling name display information is sent in the call SETUP message for the new call over the alternate route. However, the calling name display information is sent from an originating node or at an MCDN-to-QSIG gateway node, if it is available.

QSIG Path Replacement

QSIG Alternate Routing cannot be applied to a QSIG Path Replacement call set-up. Therefore, QSIG Path Replacement is rejected if congestion is encountered.

Virtual Network Services

QSIG Alternate Routing can function over all QSIG-based bearer interfaces supporting Virtual Network Services.

MCDN End to End Transparency

When QSIG Alternate Routing is triggered at a tandem node, the Facility IE messages containing the Network Attendant Services (NAS) and Network Attendant ACD (NACD) information are not included in the SETUP message for the new call over the alternate route.

Feature packaging

The following packages are required for the QSIG Alternate Routing feature:

- Basic Routing (BRTE) package 14
- Network Class of Service (NCOS) package 32

One of the following:

- Coordinated Dialing Plan (CDP) package 59, or
- Network Alternate Route Selection (NARS) package 58, or
- Basic Alternate Route Selection (BARS) package 57

Feature operation

No operating procedures are required to use this feature.

ISDN QSIG Basic Call

Integrated Services Digital Network (ISDN) Q Reference Signaling Point (QSIG) Basic complies with the ISDN protocol that specifies that Layer 3 signaling requirement for support of circuit switched call control at the “Q” reference point between Private Telecommunications Network Exchanges (PTNXs) connected within a Private Telecommunications Network (PTN). This protocol was adopted by the European Telecommunications Standards Institute (ETSI) and the International Standards Institute (ISO). Most of the major European PTNX manufacturers will be supporting ISDN connectivity based on this standard. QSIG is also supported in North America.

QSIG is oriented toward signaling and services that occur between two “peer-to-peer” switches across a “Q” reference point. For example, two PBXs, a PBX and a Centrex switch or two Centrex switches could exchange signaling and services across a “Q” reference point.

The ISDN QSIG Basic Call features introduces the following basic call services on Meridian 1 ISDN 1.5 MBit PRI on QSIG connectivities (these services were previously available only on ISDN 2.0 MBit PRI on QSIG connectivities, as introduced in Generic X11 Release 20):

- Basic Call Service
- 64 K clear bearer capability
- TIE call types
- Connected number delivery (COLP/COLR)
- Channel Negotiation
- Flexible numbering plan
- Enbloc dialing
- Calling Line Identification (CLIP/CLIR)

Operating parameters

Meridian Customer Defined Network (MCDN) features cannot be interworked between an MCDN and QSIG interface, with the exception of basic call, Calling Line Identification Presentation/Restriction and Calling and Connected Line Presentation/Restriction.

Meridian 1 accepts up to three Progress Information Elements (IE) in one message on the QSIG interface.

QSIG is supported on 1.5 Mbps PRI on Option 11C via the downloadable D-channel daughterboard.

The maximum length of a ISDN message is limited to 260 bytes.

Only circuit mode connection is supported.

nB+D is not supported for QSIG.

Hardware requirements

For 1.544 Mbps PRI on Option 11C, the NTAK09 PRI card and the NTBK51 downloadable D-channel daughterboard are required. Alternatively, the NTRB21 T1 Multipurpose Digital Interface (TMDI) card may be used.

Feature interactions

Backup D-Channel

Backup D-channel is not supported on the QSIG interface.

ISDN Signaling Link

For Option 11C, ISL on QSIG is not supported.

Network Attendant Services

ISDN QSIG Basic Call interacts with Network Attendant Services (NAS) as if the call is going to a route without NAS being equipped.

Network Automatic Call Distribution

Network Automatic Call Distribution signaling is not supported on the QSIG interface. Network ACD operation on QSIG is the same as the existing Network ACD treatment for unsupported interfaces.

Network Call Redirection

When a call is terminated on the Meridian 1 and Network Call Redirection (NCR) is active, the QSIG Basic Call can still operate; however, the original called number and redirection number IE that are used by NCR will not be sent on the QSIG interface.

Network Call Trace

Network Call Trace is not supported on the QSIG interface.

Network Calling Party Name Display

Network Calling Party Name Display (NCPND) is supported within the Meridian Customer Defined Network only. When QSIG is involved in the call setup, the existing NCPDN operation on unsupported interface applies on QSIG.

Network Message Service

Network Message Service (NMS) is only supported on the Meridian Customer Defined Network. NMS operation on QSIG is the same as the existing treatment for unsupported interfaces.

Network Ring Again

Network Ring Again signaling is supported within the Meridian Customer Defined Network only. Network Ring Again requests which go through the QSIG interface will not be supported.

Remote Virtual Queuing

Remote Virtual Queuing (RVQ) does not operate on the QSIG interface. The existing RVQ operation on unsupported interface applies on the QSIG interface.

Trunk Route Optimization

Trunk Route Optimization (TRO) is supported within an MCDN network only. When a redirecting node sends a message to the originating node and the TRO request is accepted, the new call will go through the QSIG interface just as a normal basic call. However, TRO signaling will not be able to operate on the QSIG interface.

Virtual Network Service

A QSIG link can be used as a B-channel for the Virtual Network Service (VNS) over a private network. All VNS services are supported as normal. QSIG is only used as a speech bearer.

Feature packaging

ISDN QSIG Basic Call (QSIG) is package 263. The following packages are also required:

- International Primary Rate Access (IPRA) package 202;
- Digit Display (DDSP) package 19; and
- Integrated Services Digital Network (ISDN) package 145.

Feature operation

No specific operating procedures are required to use this feature.

ISDN QSIG Call Completion

The ISDN QSIG Call Completion feature expands Ring Again functionalities on QSIG interfaces. This feature provides Call Completion to Busy Subscriber (CCBS) and Call Completion on No Response (CCNR) supplementary services.

The Call Completion to Busy Subscriber (CCBS) supplementary service allows the calling party to apply a Ring Again request when encountering a busy Directory Number (DN). The Meridian 1 alerts the calling party when occupied DN is available to receive a call. The calling party has the option of completing this call without making a new call attempt.

Call Completion on No Response (CCNR) supplementary service allows the calling party to apply a Ring Again request to an unanswered DN. With this service, the Meridian 1 alerts the calling party when the dialed DN becomes idle after a period of activity. The calling party has the option of completing the call without making a new call attempt.

Operating parameters

ISDN QSIG Call Completion supports Uniform Dialing, Customer Dialing and Group Dialing plans.

This feature uses QSIG GF platforms.

Call Completion on No Response (CCNR) on a QSIG network is not supported on Analog (500/2500 type) sets.

Call Completion to Busy Subscriber and Call Completion on No Response are not supported on ISDN BRI sets.

A PINX (Private Integrated Services Network Exchange) DN must be configured in the Customer Data Block (LD 15). The PINX DN is used for routing free notification on the MCDN. The DN configured should be consistent with the type of number plan used. PINX DN is also used for incoming Direct Inward Dialing (DID) calls in the same manner as Listed Directory Number 0 (LDN0) is used for a basic call.

Feature interactions

Access Restrictions

Call Restriction

Trunk Group Access Restrictions

ISDN QSIG Call Completion does not override Access, Call Restriction or Trunk Group Access restrictions. When Call Completion is activated, the second call has the same restrictions as the initial call that received either no answer or a busy indication.

Attendant Consoles

Call Completion requests cannot be directed to or from an Attendant Console.

Automatic Call Distribution

Call Completion requests cannot be directed to or from Automatic Call Distribution (ACD) Directory Numbers (DNs).

An ACD set that uses a normal DN key (not the ACD key) can activate the Ring Again key when encountering a busy or no answer situation.

Call Detail Recording

A Call Detail Recording (CDR) is not produced for Call Completion signaling. The second call receives a CDR as a normal call.

Call Forward All Types

When the Call Forward feature is activated on a local basis and an incoming Call Completion request is received, the Call Completion request is registered against the forwarded DN.

Call Transfer

Call Completion notification is only presented to the Call Completion originating set. This notification cannot be transferred to another station. Once the second call is completed, the call can be transferred.

If a user encounters a busy or no answer situation during a transfer operation, Call Completion can be activated.

Call Waiting

On an Analog (500/2500 type) set, Call Completion notification waits until the set has finished an active call. If Call Waiting is configured on a set, notification is presented after the Call Waiting call. If an additional call is queued while Ring Again free notification is waiting on a set, the waiting call takes precedence over the Call Completion notification. An established Call Completion call is also queued if a set has Call Waiting feature equipped and is occupied on another call.

Conference

A Call Completion request cannot be made on a conference call attempt.

Direct Inward System Access

Call Completion on Busy Subscriber (CCBS) and Call Completion No Response (CCNR) are not supported on Direct Inward System Access (DISA) calls when the call destination is busy.

Do Not Disturb

An incoming notification overrides a set with Do Not Disturb (DND) activated. Call Completion requests can be applied to sets with the DND feature activated. However, this request does not advance until the DND feature is deactivated.

Flexible Feature Codes

Analog (500/2500 type) set can use Flexible Feature Codes (FFCs) to activate Call Completion to Busy Subscriber requests.

Group Hunt

Call Completion to Busy Subscriber cannot be applied to Pilot DN when no idle set is located during a Group Hunt call.

Hot Line

Call Completion cannot be used in conjunction with the Hot Line feature.

Maintenance Busy

Call Completion on Busy Subscriber is not accepted against a set in Maintenance Busy state.

Make Set Busy

Sets that have Make Set Busy (MSB) activated can request Call Completion to another DN, as the free notification overrides the MSB feature. Incoming Call Completion to Busy Subscriber (CCBS) requests do not override the MSB feature. A set is considered busy while MSB is active. A CCBS request is registered against a busy set, but only advances when the MSB feature is deactivated and the set remains free.

Permanent Hold

Analog (500/2500 type) sets with Permanent Hold cannot use the Ring Again functionalities.

Ring Again***Ring Again No Answer***

Analog (500/2500 type) sets can have only one Call Completion to Busy Subscriber request at a given time. Meridian 1 proprietary sets can make Ring Again requests based on the number of Ring Again keys programmed on a set.

Feature packaging

ISDN QSIG Call Completion (QSIG-SS) is package 316. The package dependencies for QSIG-SS are:

- Optional Features (OPTF) package 1; and
- ISDN QSIG GF Transport (QSIGGF) package 305.

Depending on the application, the following packages are also required.

For the QSIG ISDN PRI interface:

- Digit Display (DDSP) package 19;
- Coordinated Dialing Plan (CDP) package 59;

- Integrated Services Digital Network (ISDN) package 145;
- 1.5 Mbps Primary Rate Access (PRA) package 146;
- Flexible Numbering Plan (FNP) package 160;
- Multipurpose Serial Data Link (MSDL) package 222; and
- QSIG Interface (QSIG) package 263.

Feature operation

Call Completion on Busy Subscriber

Meridian 1 Proprietary Sets

- 1 Set A calls Set B on an outgoing QSIG route and receives a busy indication.
- 2 Before releasing this call, Set A presses the Ring Again key (RGA) to activate Ring Again functionality. The DN lamp flashes.
- 3 When the far end receives a Call Completion on Busy Subscriber (CCBS) request, Set A's RGA lamp key is steadily lit, and the DN lamp darkens.
- 4 Set A awaits notification that Set B is free. Set A can make or receive calls while waiting for notification.
- 5 When Set B goes on-hook, Set A is notified in the form of a one second burst of ringing and the RGA key lamp fast flashes.
- 6 The recall is accepted by selecting the DN key and pressing the RGA key. Set A has thirty seconds to accept the recall before it is cancelled.
- 7 If Set A accepts the recall and Set B is free, the call is rung. However, if Set B has either received or originated another call, Set A receives a busy indication. Set A has the option of requesting CCBS again.

Note: If Set A presses the RGA key before receiving notification then the request is cancelled.

Analog (500/2500 type) sets without RGA key

- 1 Set A calls Set B on an outgoing QSIG route and gets a busy indication.
- 2 Set A performs a switch-hook flash and a special dial tone is heard.

- 3 Set A dials RGA Activate Flexible Feature Code (FFC) or SPRE +1 to activate CCBS feature. This request cancels and replaces previous RGA Activate requests.
- 4 If an FFC is dialed, an FFC confirmation tone if programmed indicates that the CCBS request is registered.
- 5 Set A goes on-hook and is free to make or receive other calls.
- 6 When Set B goes on-hook, Set A receives a burst of tone and has thirty seconds to accept the recall before it is cancelled.
- 7 If Set B has originated or received another call, Set A receives a busy indication and has the option of requesting the CCBS again.

Note: If Set A presses the RGA key before receiving notification then the request is cancelled.

Call Completion No Response

Meridian 1 Proprietary Sets

- 1 Set A calls Set B on an outgoing QSIG route. The call rings but is not answered. Set A receives a ringback tone.
- 2 Set A presses RGA key to activate Ring Again on No Answer prior to releasing the call. The DN key lamp darkens.
- 3 Set A goes on-hook and is free to make or receive calls.
- 4 When Set B makes a call and goes on-hook. Set A is notified by a one second burst of tone and the RGA lamp fast flashes.
- 5 Set A can accept the call by selecting a DN key and pressing the RGA key. Set A has thirty seconds to accept this call.
- 6 If Set A accepts the call and Set B is free, the call goes through. However, if Set B receives or originates another call, Set A receives a busy indication. Set A has the option of requesting CCBS.

Note: If Set A presses the RGA key before receiving notification then the request is cancelled.

ISDN QSIG Call Completion Enhancement

The ISDN QSIG Call Completion was introduced in Release 22, to provide Call Completion to a Busy Subscriber (CCBS) and Call Completion on No Response (CCNR) over QSIG networks.

- **Call Completion to a Busy Subscriber (CCBS).** This service allows a calling party to apply a Ring Again request to a called party that is busy. When the busy party becomes free, the calling party receives notification and can complete the call without making a new call attempt.
- **Call Completion on No Response (CCNR).** This service allows a calling party to apply a Ring Again request to a called party that is idle, and does not answer. The calling party receives notification after the Meridian 1 notices subsequent activity on the called extension, that has again become idle.

With Release 24, the QSIG Call Completion Enhancement feature introduces the following functionalities:

- allows the method of Operation Coding for the CCBS and CCNR Supplementary Services to be configured by Object Identifier, used for European Telecommunications Standard Institute (ETSI) interfaces, or by Integer Value, used for International Standards Organization (ISO) interfaces. The Operation Coding method is configured as a remote capability using the RCAP prompt for an ISDN PRI D-Channel.
- supports all ETSI/QSIG to MCDN and DPNSS1 gateways.

Operating parameters

Call Completion to a Busy Subscriber (CCBS) is available only on interfaces supporting the ETSI QSIG Generic Functional Protocol Transport.

Call Completion to a Busy Subscriber (CCBS) is not supported on ISDN BRI sets.

The QSIG Call Completion Enhancement feature cannot use route access codes. The feature can only use a Coordinated Dialing Plan or Uniform Dialing Plan. Also, this feature does not support digit manipulation tables.

Call completion on QSIG uses two signaling types, **Connection Retention**, where the signaling connection remains established until call completion is achieved, or the call completion attempt is cancelled, and **Connection Release**, where the signaling connection is cleared after each phase of call signaling, and a new signaling connection is established for each subsequent phase of call independent signaling. At the terminating side of the call connection, both signaling methods are mandatory, and are supported by the Meridian 1. At the originating side, although both methods are possible, the Meridian 1 supports only the Connection Retention type.

A call completion recall over a QSIG interface uses two methods of establishing the recall, **Path Reservation**, where a bearer connection between the originating and terminating sides is established before presenting the recall to the originating party, in order to avoid network congestion, and **Non-path Reservation**, where a bearer connection between the originating and terminating sides is established after the originating party answers the recall, and the recall attempt is cancelled if network congestion is encountered. At the terminating side of the call connection, both methods of recall are mandatory, and are supported by the Meridian 1. At the originating side, although both methods are possible, the Meridian 1 supports only the Non-path Reservation method, since it is used by MCDN. Also, the Path Reservation method is not supported over QSIG to MCDN or DPNSS1 gateways.

For a QSIG call completion attempt, if the called party is found to be again busy after the originating party responds to a call completion recall, there are two methods of behavior that the Meridian 1 may take. With the **Request Retention** method, the call completion request remains in place at both the originating and terminating side. The terminating side begins monitoring the terminating party. With the **Service Cancellation** method, the call completion request is cancelled at both the originating and terminating sides. The Request Retention method is not supported on the Meridian 1.

Busy name information sent with a DISCONNECT message is only supported for Overlap Receiving (the OVLR prompt is set to YES in LD 17).

Feature interactions

Access Restrictions/trunk Group Access Restrictions

QSIG Call Completion cannot override access restrictions placed on a call. The second call due to either CCBS or CCNR is under the same access restrictions as the first call.

Attendant Console

A CCBS or CCNR cannot originate from, or terminate to, an attendant console.

Automatic Call Distribution

A CCBS or CCNR cannot originate from, or terminate to, an ACD Directory Number.

Call Connection Restriction

QSIG Call Completion cannot override call connection restrictions placed on a call. The second call due to either CCBS or CCNR is under the same call connection restrictions as the first call.

Call Detail Recording

There is no CDR information created for a CCBS attempt. A new call that is established as part of CCBS is subject to CDR, as per a normal call.

Call Forward

When a CCBS or CCNR request is received on a set which has been call forwarded, the CCBS or CCNR request is registered against the DN to which the set has been forwarded.

Call Transfer

Call Completion free notification can only be presented to the originating station, and cannot be transferred to another station. However, once the call has been established, it behaves as a normal call, with respect to call transfer.

During a call transfer operation, a caller that encounters a busy or no answer situation, can still activate the call transfer.

Call Waiting

A Call Completion free notification is presented to an analog (500/2500) set after an active call has been completed. If there is a call waiting on the set, the Call Completion free notification is presented to the set after the call waiting call has been completed. If another call waiting occurs while a Ring Again free notification is waiting on the set, the new call waiting presentation takes precedence.

A Call Completion call may wait to be established on a set that is busy on another call, and has the Call Waiting feature activated.

Conference

A Call Completion request cannot be made as part of a conference call attempt.

Customer Controlled Routing

A Call Completion attempt request be applied to a Customer Controlled Routing DN.

Direct Inward System Access

CCBS cannot be applied to DISA calls when the terminating party is busy. CCNR cannot be applied to DISA calls when the terminating party does not answer.

**Directory Number - Multiple Appearance Directory Number
Redirection Prime**

MARP does not apply to a Call Completion attempt.

Do Not Disturb

Stations with the Do Not Disturb feature active may make Call Completion requests against other stations, subject to the same restrictions as if the feature were not active. The incoming Call Completion free notification overrides the Do Not Disturb state.

Flexible Numbering Plan

A Flexible Numbering Plan may be used with QSIG Call Completion, as long as the numbering plan is consistent over the network.

Group Call

A Call Completion request cannot be applied to a group call.

Group Hunt

CCBS cannot be applied to a PLDN when no idle set is found during a group hunt call.

Hot Line

A Call Completion request cannot be used in conjunction with the Hot Line or Enhanced Hot Line feature.

Initialize

If a system initialize occurs at a Meridian 1, all Call Completion requests at the Meridian 1 are deleted. If the requesting party is not on the Meridian 1 which has initialized, it is not notified that a Call Completion request has been cancelled.

Maintenance Busy

A Call Completion request cannot be made against a set in maintenance busy state.

Make Set Busy

If a set with Make Set Busy active makes a Call Completion request to another station, then the Call Completion free notification overrides the Make Set Busy state. Incoming CCBS requests, however, do not override the Make Set Busy state. A CCBS request can only be completed once Make Set Busy is deactivated.

Permanent Hold

Analog (500/2500) sets with a call on permanent hold cannot use the Ring Again feature.

Pretranslation

Pretranslation may be used in conjunction with a Call Completion request.

Ring Again/Ring Again No Answer

Analog (500/2500) sets can only have one Call Completion request active at a time. Meridian proprietary sets may make as many Call Completion requests as available keys to support the requests.

Ring Again Inhibition

Ring Again cannot be activated if a limit of 12.5% of all available call registers in the Ring Again queues is exceeded.

DPNSS1 Call Back When Free and Next Used

In a QSIG to DPNSS1 gateway, a caller on one node can activate Ring Again to any other destination party at another node, using a combination of QSIG and DPNSS1 links.

Electronic Switched Network

QSIG Call Completion uses a Uniform Dialing Plan or Coordinated Dialing Plan Numbering Plan.

The use of the Connection Retention procedure (refer to the relevant discussion on page 198, as part of the ‘Operating parameters’ section) on QSIG does not require that the Numbering Plan be symmetrical (although this approach is not recommended). The called destination, which is being monitored as part of CCBS or CCNR, does not require notification as how to connect to the originating party. This applies only if the Connection Retention procedure is used. If the Connection Release procedure is used, the numbering plan has to be symmetrical, so that the destination party can use the CLID of the originating party, to send the Call Connection free notification.

Hunting and Group Hunting

Hunting and Group Hunting is not supported by the QSIG Call Completion feature.

ISDN Basic Rate Interface

QSIG Call Completion is not supported on ISDN BRI sets. CCBS and CCNR cannot neither be activated or received on a ISDN BRI set.

Network Call Redirection - QSIG Diversion***Call Completion to Busy Subscriber***

If CCBS is invoked on a busy destination that has been diverted over a QSIG interface, the originating Private Integrated Services Network Exchange (PINX) stores the diverted-to number issued by the served PINX, to use it for CCBS call treatment. This diverted-to number is used as received, without any digit manipulation.

Call Forward Unconditional and Call Forward Busy take precedence over CCBS.

Call Completion on No Reply

If CCNR is invoked on a destination that does not answer, and that has been diverted over a QSIG interface, the originating Private Integrated Services Network Exchange (PINX) stores the diverted-to number issued by the served PINX, to use it for CCNR call treatment. This diverted-to number is used as received, without any digit manipulation.

Call Forward No Reply takes precedence over CCNR.

Feature packaging

The following packages are required for the **QSIG** component of the QSIG Call Completion Enhancement feature:

- QSIG Supplementary Services (QSIG-SS) package 316
- QSIG Generic Functional Protocol Transport (QSIG-GF) package 305
- Q-reference Signaling Point Interface (QSIG) package 263
- Multi-purpose Serial Data Link (MSDL) package 222
- Overlap Signaling (OVLP) package 184 (optional)
- Flexible Numbering Plan (FNP) package 160
- Primary Rate Access (PRA) package 146
- Integrated Services Digital Network (ISDN) package 145
- Coordinated Dialing Plan (CDP) package 59
- Network Alternate Route Selection (NARS) package 58
- Basic Alternate Route Selection (BARS) package 57
- Digit Display (DDSP) package 19
- Ring Again (RGA) package 1

Feature operation

No operating procedures are required to use this feature.

ISDN QSIG Call Diversion Notification

ISDN QSIG Call Diversion Notification allows the Meridian 1 to provide notification to the originating calling party and forwarded-to (diverted) party when a call is forwarded over an ISDN QSIG private network. With this feature, call diversion is invoked by the following triggers:

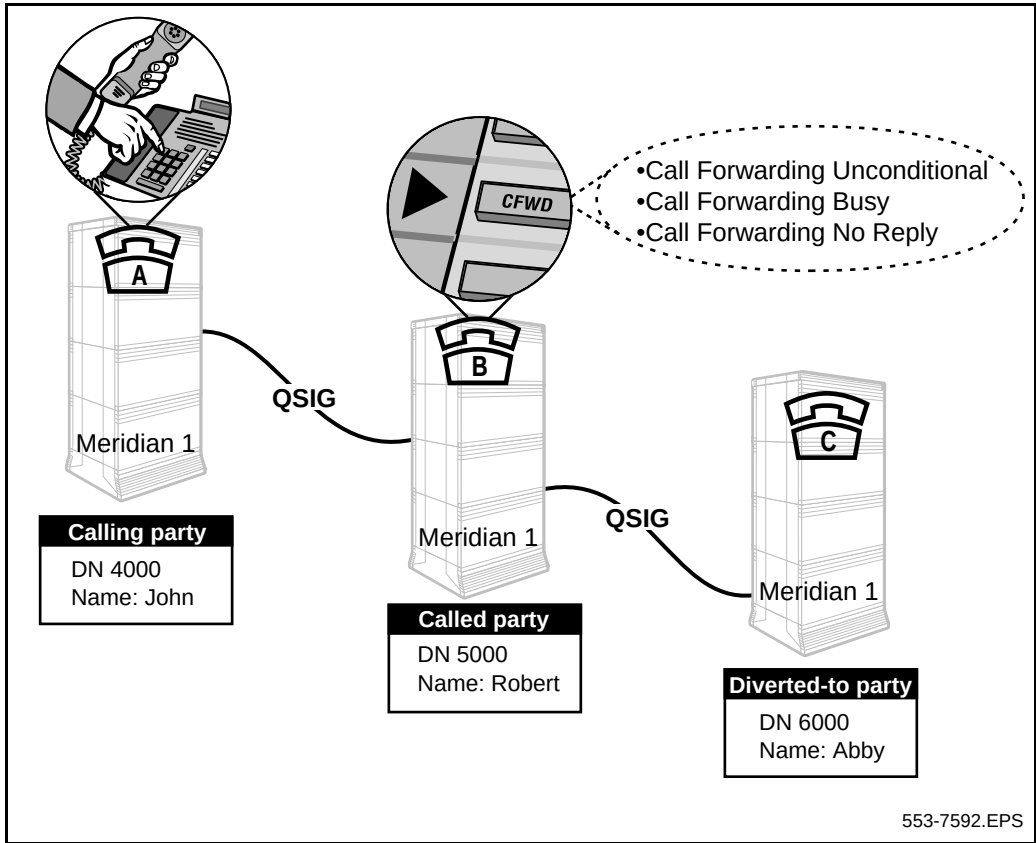
- Call Forwarding Busy (CFB) - the called set is in use
- Call Forwarding No Reply (CFNR) - the called set does not answer after a given number of rings
- Call Forwarding Unconditional (CFU) - the called set is forwarded as soon as the set is reached

With this feature, notification can be provided to the calling party and the forwarded-to (diverted) party that call diversion has occurred. When provisioned, call diversion notification is displayed on the calling party's set and on the forwarded-to (diverted) party's set according to the existing terminal display configuration.

Diversion notification provided to the calling and forwarded-to (diverted) party depends on the subscription options (Class of Service) configured on the called party's set. The called party can configure two diversion options. One Class of Service option is applicable to the calling party and the other option is applicable to the forwarded-to (diverted) party. These new Classes of Service determine if call diversion notification is provided to the calling party and the forwarded-to party and what type of diversion information these parties receive.

Figure 18 shows an example of a Call Diversion environment.

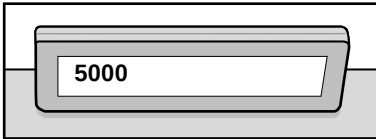
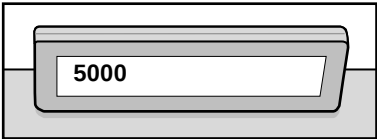
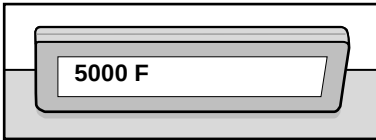
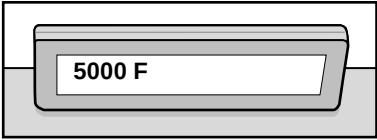
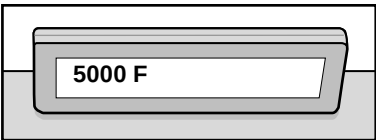
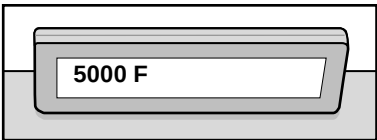
Figure 18
Call Diversion Environment



Calling Party's Notification

The calling party that originates the call receives notification of call diversion depending on the configuration of the called party's set. As shown in Table 26, the called party configures one of the three possible Classes of Service.

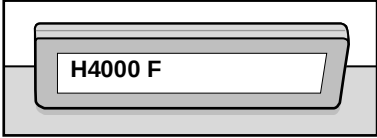
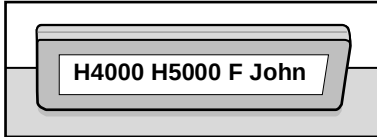
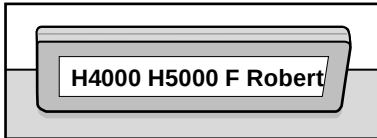
Table 26
Calling Party's Notification

Called Party's Diversion Subscription Options (Class of Service)	Calling Party's Display when call is forwarded.	Forwarded-to Party's Display
CLS = DNO1 No diversion notification provided to calling party.		
CLS = DNO2 Diversion notification provided without forwarded-to (diverted) party's number and name.		
CLS = DNO3 (default) Diversion notification provided with forwarded-to (diverted) party's number and name when available.		

Called Party's Notification

The forwarded-to (diverted) party receives notification of call diversion depending on the configuration of the called party's set. As shown in Table 27, the called party configures one of the two possible Classes of Service.

Table 27
Forwarded-to Party's Notification

Called Party's Diversion Subscription Options (Class of Service)	Forwarded-to Party's Display.	Forwarded-to Party's Class of Service
DNDN = No Called party's number and name are not released to the forwarded-to (diverted) party.		DNDD = Dialed Name Display Denied (default)
DNDY = Yes (default) Called party's number and name are released to forwarded-to (diverted) party.		DNDD = Dialed Name Display Denied (default)
DNDY = Yes (default) Called party's number and name are released to forwarded-to (diverted) party.		DNDA = Dialed Name Display Allowed

On the forwarded-to (diverted) party's set, the Dialed Name Display Allowed/Denied (DNDA/DNDD) Class of Service allows the forwarded-to (diverted) party to choose the name displayed after call diversion. If the forwarded-to (diverted) party configures a Dialed Name Display Allowed (DNDA) Class of Service their display shows one of the following:

- the original called party's name when available; or
- if the original called party's name is not available, the redirecting name when available; or
- if neither of the two previous names are available, then nothing is displayed.

If the forwarded-to (diverted) user has configured a Dialed Name Display Denied (DNDD) Class of Service then the calling party's name is displayed if available. Otherwise, nothing is displayed.

Operating parameters

A Meridian 1 user cannot remotely activate or deactivate QSIG Call Diversion Notification from either a Meridian 1 or on another third party Private Branch Exchange (PBX).

As per the current operation of the Call Forward features, the Meridian 1 does not provide any indication, such as an LED, on the called party's set that call diversion has been activated.

The validity of the forwarding number is not supported. If an invalid forwarding directory number is dialed no verification is provided by the system.

The calling party is notified each time a call redirection occurs, provided this information is supplied by the network. If previous call diversion notification is provided, then it is replaced by last received. If call redirection occurs and no call redirection information is provided by the network, then any notification information that has previously been provided remains unchanged.

When a call redirection occurs no call diversion information is provided by the network. However, if a previous notification has been provided then the call diversion information remains unchanged.

The maximum allowable size of QSIG name information is 50 characters. With the Call Party Name Display feature, only 27 characters string length is supported. Accordingly, names processed by the Meridian 1 may be truncated.

Across a network, it is not possible to prevent reciprocal Call Forward from occurring. However, the capabilities of the Flexible Orbiting Prevention Timer and Total Redirection Count features can be used.

QSIG Call Diversion Notification requires Coordinated Dialing Plan (CDP) or Uniform Dialing Plan (UDP). Digit manipulation is not supported.

Interworkings with Meridian Customer Defined Network (MCDN) call redirection and QSIG Call Diversion Notification is not supported.

Interaction with Meridian Mail and this feature is not supported.

Feature packaging

QSIG Call Diversion Notification is ISDN QSIG Supplementary Service - Call Completion (QSIG-SS) package 316 which has the following dependencies:

- QSIG Interface (QSIG) package 263
- Calling Party Name Display (CPND) package 95
- Digit Display (DDSP) package 19
- ISDN QSIG-GF Transport (QSIG-GF) package 305
- Coordinated Dialing Planing (CDP) package 59 or Uniform Dialing Plan (UDP) package 58

On a 1.5 Mbps PRI interface the following packages are required:

- Integrated Services Digital Network (ISDN) package 145
- Multipurpose Serial Data Link (MSDL) package 222

Feature operation

No specific operating procedures are required to use this feature.

ISDN QSIG Call Diversion Notification Enhancements

Released in Release 23, the QSIG Call Diversion Notification feature allows the Meridian 1 to provide notification to the originating calling party and forwarded-to (diverted) party when a call is forwarded over an ISDN QSIG private network. With this feature, call diversion is invoked by the following triggers:

- Call Forwarding Busy (CFB) - the called set is in use
- Call Forwarding No Reply (CFNR) - the called set does not answer after a given number of rings
- Call Forwarding Unconditional (CFU) - the called set is forwarded as soon as the set is reached

With this feature, notification can be provided to the calling party and the forwarded-to (diverted) party that call diversion has occurred. When provisioned, call diversion notification is displayed on the calling party's set and on the forwarded-to (diverted) party's set according to the existing terminal display configuration.

Diversion notification provided to the calling and forwarded-to (diverted) party depends on the subscription options (Class of Service) configured on the called party's set. The called party can configure two diversion options. One Class of Service option is applicable to the calling party and the other option is applicable to the forwarded-to (diverted) party. These Classes of Service determine if call diversion notification is provided to the calling party and the forwarded-to party and what type of diversion information these parties receive.

The QSIG Call Diversion Notification service is provided across an ISDN QSIG network using the QSIG Generic Functional (GF) protocol transport platform introduced in Generic X11 Release 22.

With Release 24, the QSIG Call Diversion Notification Enhancements feature allows the QSIG Call Diversion Notification functionality to be also supported over a QSIG/Meridian Customer Defined Network (MCDN) and a QSIG/Digital Private Signaling System No.1 (DPNSS1) network, as well as a QSIG network.

The notification of the originating set and the diverted-to set now depends on the type of signaling protocol that is in play (QSIG, DPNSS1, or MCDN), at what stage of the call establishment that the diversion takes place, and the user's subscription option.

Determination of the rerouting node

The determination of the rerouting node depends on the type of diversion that is configured for the node, either Call Diversion by Rerouting or Call Diversion by Forward Switching.

If the Forward Switching method is implemented (call diversion is generated by the Meridian 1 or another third-party PBX also using the Forward Switching method), the rerouting node is the served node. If the Call Diversion by Rerouting method is implemented (a third-party switch using the Rerouting method generates a diversion), the rerouting node is the originating node.

The Forward Switching method is the one presently implemented on Meridian 1. It performs the diversion by joining together the first connection from the originating user's node to the served user's node, and the second new connection from the served user's node to the diverted-to user's node. In fact, the rerouting node is the served user's node.

Notifications rules

This section describes Originating and Diverted-to user's notification rules, for single as well as multiple diversions in a pure QSIG environment.

Single Diversion

Originating and Diverted-to user's Notifications are detailed for the following scenario: "Station A calls Station B. Station B has activated CFU, CFB or CFNR to Station C. Station C answers".

Originating user's notification rules

Diversion Reason Notification rules:

- This reason is displayed or not on the originating user's set (as soon as Diversion Notification information is received from the served node) according to the served user's Subscription option (see Table 28 on page 214).

Diverted-to Number Notification rules:

- The diverted-to number (received in the Diversion Notification information delivered by the served node) is displayed on the originating user's set:
 - if the received presentation information (received in the Diversion Notification information issued from the diverted-to node) indicates that presentation is allowed.
 - if the served user's subscription option (received within Diversion Notification information from the served node) allows it (see Table 28 on page 214).

Diverted-to Name Notification rules:

- The diverted-to name, when available (as optionally received as part of the Diversion Notification information delivered by the diverted-to node), is displayed on the originating user's set:
 - if the intrinsic name presentation (received in the Diversion Notification information issued from the diverted-to node) indicates that presentation is allowed.
 - if the served user's subscription option (received within Diversion Notification information from the served node) allows it (see Table 28 on page 214).

Note that DNDA/DNDD functionality has no impact on the originating user's notification.

When both originating and served users are on the same node, the existing Meridian 1 treatment is still applicable, which is that the served user's subscription options have no impact on the originating user notification.

When both originating and diverted-to users are on the same Meridian 1 node, and diversion is performed by the Rerouting method, then the served user's subscription options are effective for the originating user notification only before the diverted-to user answers, but no name is provided. As soon as the diverted-to user answers, then the originating user receives full notification (reason, diverted-to user's number and name), as per the served user's subscription option.

Table 28 sums up originating user’s Notification according rules, according to the served user’s Subscription options.

Table 28
originating user’s notification versus served user’s Subscription option.

	Originating user’s display	
Served user’s Subscription option: “Calling user receives notification that the call has been diverted”	after receipt of served user’s diversion notification information	after receipt of diverted-to user’s diversion notification information
No	5000	5000
Yes without diverted-to number and name	5000 F	5000 F
Yes with diverted-to number and name when available	5000 F	5000 H6000 F Cathy

Diverted-to user's notification rules

Diversion Reason Notification rules:

- The reason is displayed on the diverted-to user's set (as soon as Diversion Notification Information is received from the served node).

Served Number Notification rules:

- The served user's number (the originally-called number) is displayed or not on the diverted-to user's set, according to the served user's Subscription option (see Table 29 on page 216). If the served user's Subscription option is to not release the calling party name/number to the diverted-to user, the served user's number may be either displayed with dashes (if received with a restricted presentation) or not displayed at all (if no served user's number is received).

Served Name Notification rules:

- The functionality DNDA/DNDD allows the diverted-to user to choose the name to be displayed after diversion has taken place:
 - if the diverted-to set has a DNDA class of service, then the diverted-to user's set displays one of the following:
 - the original called name when available (as optionally received from the served user's node, depending on the previous served user's Subscription Option), or
 - if the original called name is not available, the redirecting name when available (as optionally received from the served user's node, depending on the served user's Subscription Option), or
 - nothing if none of the two previous names is available.
 - if the diverted-to set has a DNDD class of service, then the calling user's name is displayed if available, otherwise nothing is displayed.

When both served and diverted-to users are on the same node, the present Meridian 1 treatment applies, that is, the served user's subscription options have no impact on the diverted-to user notification.

When both the originating and diverted-to users are on the same Meridian 1 node and diversion is performed by the Rerouting method, then served user's subscription options have no impact on the diverted-to user notification. In this case, DNDA functionality is not supported.

Table 29 sums up the diverted-to user’s Notification rules, according to the served user’s Subscription options and the diverted-to user’s class of service DNDA/DNDD.

Note that, in the case presented in the example, the Originating user name is Abby, with a DN of 4000. The Served user name is Bobby, with a DN of 5000. The Diverted-to user name is Cathy, with a DN of 6000.

Table 29
diverted-to user’s notification versus served user’s Subscription option and diverted-to user class of service for single diversion

Served user's Subscription option: "Served user releases the number/name to the diverted-to user"	Diverted-to user's display (after receipt of served user's diversion notification information) depending on the diverted-to user class of service:	
	DNDD	DNDA
No	H4000 H---- F Abby OR H4000 F Abby	H4000 H---- F OR H4000 F
Yes	H4000 H5000 F Abby	H4000 H5000 F Bobby

Multiple diversions

Originating and Diverted-to user's Notifications are detailed for the following scenario: "Station A calls Station B. Station B has activated CFU, CFB or CFNR to Station C. Station C has activated diversion to Station D, which itself has activated diversion to Station E. Station E has activated diversion to Station F. Station F answers".

Originating user's notification rules

Diversion Reason Notification rules:

- The same rules apply as per the single diversion case (refer to page 212). The last diversion reason will replace the previous one.

Diverted-to Number Notification rules

The diverted-to number (as received in the last Diversion Notification information message issued from the last served node) is presented to the calling user if all of the following conditions apply:

- all previously Diversion Notifications information messages received at the originating node contain a subscription option with a value of "Yes with diverted-to number/name", and
- any previously Diversion Notification information message issued from the diverted-to node contain a presentation indicator that allows presentation.

The last diverted-to number will replace the previous one.

Diverted-to Name Notification rules

The diverted-to name, when available (as optionally received within the Diversion Notification information message delivered by the diverted-to node), is presented to the calling user if all of the following conditions apply:

- all previously Diversion Notifications information messages received at the originating node include a subscription option with a value of "Yes with diverted-to number/name", and
- the intrinsic name presentation is allowed.

The last diverted-to name will replace the previous one. Note that DNDA/DNDD functionality has no impact on the originating user's notification.

Diverted-to user's notification rules

Diversion Reason Notification rules:

- The same rules apply as per the single diversion case (refer to page 213).

Served Number Notification rules:

- Either the originally-called number (as soon as a Diversion Notification information message is received from the last served node) is displayed or not on the diverted-to user's set, according to the first served user's Subscription option.

Served Name Notification rules:

- The same rules, including the DNDA/DNDD functionality, apply as for the single diversion case (refer to page 215).

Table 30 sums up a multiple diversion case considering the different parties' Subscription option, and the diverted-to user class of service.

Note that, in the case presented in the example, the Originating user name is Abby, with a DN of 4000. The first Served user name is Bobby, with a DN of 5001. The second Served user name is Billy, with a DN of 5002. The Diverted-to user name is Cathy, with a DN of 6000.

Table 30
diverted-to user's notification versus served user's Subscription option and diverted-to user class of service for multiple diversions.

Served users' Subscription option: "Served user releases the number/name to the diverted-to user"		Diverted-to user's display (after receipt of diversion notification information) depending on the diverted-to user class of service:	
Bobby	Billy	DNDD	DNDA
No	No	H4000 H---- F Abby OR H4000 F Abby	H4000 H---- F OR H4000 F
Yes	No	H4000 H5001 F Abby	H4000 H5001 F Bobby
No	Yes	H4000 H---- F Abby OR H4000 F Abby	H4000 H---- F Billy OR H4000 F Billy
Yes	Yes	H4000 H5001 F Abby	H4000 H5001 F Bobby

Feature interactions

Call Forward by call type

This feature allows to perform CFNA or Hunt to a different DN (FDN/EFD or HUNT/EHT) whether the call is internal or external.

This feature is supported by QSIG Diversion. The definition of an ‘internal call’ is not modified by the introduction of the QSIG Call Diversion Enhancements feature. An ISDN trunk call using private numbering is considered internal (note that no attempt is made to determine the real originating party with QSIG, only the type of numbering plan for the QSIG call is used).

Call waiting redirection

The Call Waiting Redirection (CWTR) feature allows unanswered calls given Call Waiting treatment to receive call redirection via Call Forward No Answer (CFNA) for the active set. An unanswered call receiving Call Waiting treatment is redirected to the active set’s CFNA DN after the expiration of the customer data block defined CFNA timer selected for that set. This redirected call is treated as an unanswered call by the CFNA DN (the call receives messaging services such as Meridian Mail, Voice Mail, and Message Centers).

As this feature consists in a CFNA treatment, QSIG Call Diversion Notification feature handles it as a usual CFNA.

Call Forward Subscription Option

The behavior of the Call Forward Subscription Option is not changed. The QSIG Call Diversion Notification Subscription Options are defined as Classes of Service, but the active one will always be the Served User’s Subscription Option, independently of the OPT overlay configuration (CFO/CFF).

Phantom TN

A Phantom TN can not be remotely activated, deactivated or interrogated through QSIG.

When a Phantom TN is Call Forwarded, the QSIG Diversion Notification is handled as if the Phantom TN was a normal DN.

Call Forward to Trunk Access Code

The CFTA prompt in LD 15, the Customer Data Block, is used to allow or disallow a Call Forward Trunk Access Code to be assigned to Call Forward All Calls DID calls.

Since QSIG Call Diversion is only supported on CDP or UDP dialing plans, it cannot be activated by CFTA.

Flexible Orbiting Prevention Timer

The Flexible Orbiting Prevention Time is supported on QSIG Diversion. However, since it limits the number of diversions that can be performed by a set in a given time, it is recommended that the Total Redirection Count capability be used instead.

Call Forward/Hunt Override

This feature is not supported on QSIG Diversion. A Meridian 1 user can neither originate nor receive a call over a QSIG link via Call Forward/Hunt Override. At gateways between QSIG and MCDN, this information is lost.

Access restrictions/trunk group access restrictions

Access restrictions are checked on the served node. This means that QSIG Diversion is not performed if the served user is not able to access the route to the diverted-to node.

Dialing plans

ISDN QSIG GF transport platform supports both the ISO QSIG GF specification and the ETSI QSIG GF specification. The same numbering plans and types of numbers supported by QSIG basic call are also supported by ISDN QSIG GF transport for any DN address translation required. They are summarized below:

E.164 Numbering Plan:

- Unknown
- International Number
- National Number
- Subscriber Number

Private Numbering Plan:

- Unknown
- ESN LOC (level 1 regional number)
- CDP (local number)

Unknown Numbering Plan:

- Same as for QSIG basic call. An Unknown Numbering Plan is treated as a Private numbering plan, with an ‘unknown’ type of number.

Meridian Link

Present Call Indication

A Present Call Indication message contains an IE called “Call Type”, which contains Diversion information about the incoming call. In case of a QSIG Diverted incoming call, this field is updated.

Unsolicited Status Message

When a set stops ringing because Call Forward No Reply has been applied to a QSIG call, an Unsolicited Status Message is sent to Meridian Link.

Meridian Mail

A QSIG call diverted to Meridian Mail may access the different Meridian Mail functionalities (message reception, mailbox interrogation). However, as no other information is provided to Meridian Mail, the different functionalities accessed through QSIG are only partially supported.

Call Completion to a Busy Subscriber

Call Forward Unconditional and Call Forward Busy

If Call Completion to a Busy Subscriber (CCBS) is to be invoked against a busy diverted-to user, the originating PINX stores the diverted-to number issued by the served PINX in order to use it for further CCBS treatments, without any manipulation.

Call Forward Unconditional (CFU) and Call Forward Busy (CFB) take precedence over CCBS.

Call Completion on No Reply***Call Forward Unconditional, Call Forward Busy, and Call Forward No Reply***

If Call Completion on No Reply (CCNR) is to be invoked against a diverted-to user who does not answer, the originating PINX stores the diverted-to number issued by the served PINX in order to use it for further CCNR treatments, without any manipulation.

Call Forward No Reply (CFNR) takes precedence over CCNR.

QSIG Name Display Supplementary Services***Calling Name***

After a QSIG Diversion takes place, and Call Diversion Notification information is received at the diverted-to node, the calling name is displayed on the diverted-to user's set only if this set has a DNDD class of service. If the diverted-to user's set has a DNDA class of service, another name or nothing is displayed.

Alerting/Connected Name

When both names from a QSIG Name Display Service and a QSIG Diversion Notification are included in a same message, the name from the QSIG Name Display Service will be ignored. Note that these names should be the same.

If a name, either from QSIG Name Display Service and QSIG Diversion Notification, is received, it will be displayed only if no subsequent subscription option forbids it.

QSIG Path Replacement

QSIG Path Replacement can be triggered after QSIG Diversion has been applied. As QSIG Diversion has its own optimization method (diversion by Rerouting), an IE indicating the method used is sent by the Meridian 1 during QSIG Diversion towards the diverted-to node. At the diverted-to Meridian 1 node, upon receipt of this IE, QSIG Path Replacement should only be started if diversion has not already optimized the call.

QSIG Call Transfer

There is no interaction when Station A and Station B are connected after a diversion, and then Station B transfers the call to Station C.

Station A and Station B are connected. Station B transfers the call to Station C, who then diverts the call to Station D. The notification depends on when Station B completes the transfer. If the transfer is completed before the diversion occurs, then the two services do not interact. The final notification is given by the Call Diversion Notification. If the diversion is initiated before the transfer has been completed, then the final notification depends on the transfer notification rules.

QSIG Alternate Routing

When a QSIG Alternate Routing is performed, the Facility IE sent with the setup message are not re-sent. Therefore, the diverted-to user does not receive the DLI2 information and is not notified that a diversion occurred.

Preventing Reciprocal Call Forward

Configuring the Preventing Reciprocal Call Forward Allowed (PVCA) option in LD 15 prevents Call Forward looping. A set that has been call forwarded to another set, will not have the same call-forwarded back to it.

This functionality is not supported across a QSIG network.

ISDN BRI Supplementary Services - ETSI Call Forward Unconditional

This feature implements the ETSI BRI Call Forward Unconditional feature, which allows a BRI set to activate Call Forward Unconditional. Two Call Forward DN's can be configured, one for voice and one for data.

A BRI set, as a served user, has the subscription option choices to notify both originating and diverted-to parties.

Note: If the originating or diverted-to set is a BRI set, notification information is provided to this set, but the treatment by the set is subject to the manufacturer's implementation.

Attendant and Network Wide - Remote Call Forward

The Attendant and Network Wide- Remote Call Forward feature expands the set based Remote Call Forward functionality to apply across an MCDN ISDN network, and to allow Remote Call Forward for a set to be activated from an attendant.

This functionality cannot be used to activate QSIG Call Diversion.

Total Redirection Count

The Total Redirection Count (TRCL) prompt in LD 15 allows the maximum number of redirections for a customer to be defined between 1 and 7 (0 by default). The counter is incremented each time the call is diverted by Call Forward All Calls, Hunt, Call Forward No Answer, or Call Forward Busy, in an MCDN environment, whether on-node or off-node. The counter is reset when the call is answered or enters the attendant queue.

This feature is supported by QSIG, which transports the equivalent information.

Note that this feature is an available solution for avoiding infinite diversion loops, since Preventing Reciprocal Call Forward is not supported network-wide.

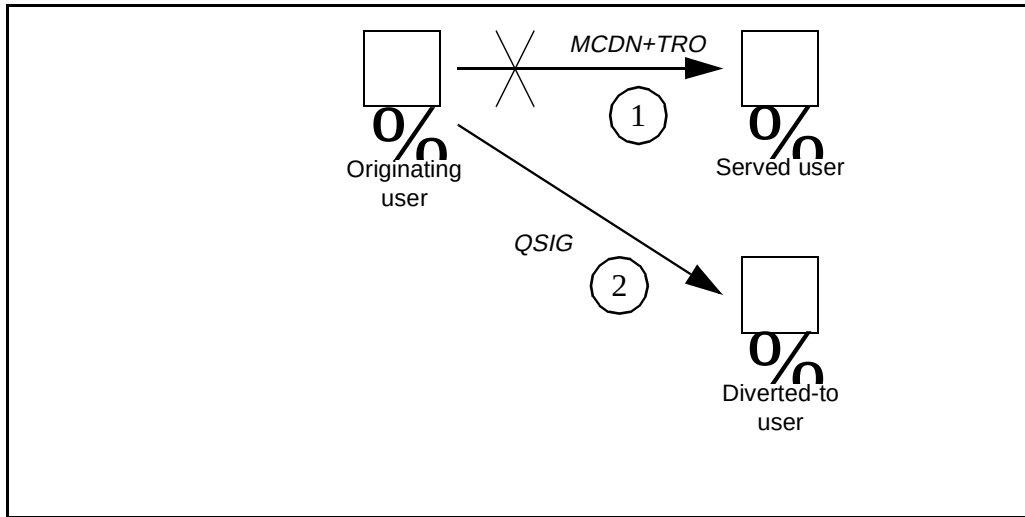
MCDN Trunk Route Optimization

Consider the case presented in Figure 19 on page 226.

For Call Forward No Answer (CFNA), call (1) is cleared before call (2) starts, which is not the usual mechanism for full QSIG CFNA.

Diversion Notification Information messages are sent from originating node to the diverted-to node. As the Served User's Subscription Option is not known (as well as the name in certain conditions), it is assumed to be "Served user releases the number/name to the diverted-to user: no". As a result, Diversion Notification Information messages provided in this case only contain the diversion counter, diversion reason and eventually the original reason for diversion.

Figure 19
Call from MCDN TRO Diverted to QSIG



MCDN Trunk Route Optimization is blocked on MCDN calls due to the Rerouting method used by QSIG Diversion on No Reply, as far as the original call being kept by the originating PINX to eventually be restored for further treatment. This case arises if the diverted-to user activates TRO before alerting, that is, if Call Forwarded All Calls has been activated against the diverted-to user.

MCDN Trunk Anti Tromboning (TAT)

As the MCDN Trunk Anti Tromboning feature is activated once the call is established, there is no interaction between this feature and QSIG Call Diversion Notification.

ISDN Call Connection Limitations

QSIG Diversion is included in the Call Redirection Threshold, as part of the ISDN Call Connection Limitations feature.

Timed Reminder Recall

In case of QSIG Diversion on No Reply by the Rerouting method, if the original call is under Slow Answer Recall Timing, then the new call resulting from QSIG Diversion is also timed for Slow Answer Recall. This applies if the new diversion call is over an ETSI QSIG link, or to a local analog (500/2500) set or Meridian proprietary set, but not to a BRI set.

The timer applied to the new diversion call is the remaining timer of the original call at the time of diversion.

Feature packaging

The following packages are required for the QSIG Call Diversion Notification Enhancements feature:

- Q-reference Signaling Point Interface Supplementary Services (QSIG-SS) package 316
- QSIG Generic Functional Protocol Transport (QSIG-GF) package 305
- Q-reference Signaling Point Interface (QSIG) package 263
- Multi-purpose Serial Data Link (MSDL) package 222
- Primary Rate Access (PRA) package 146
- Integrated Services Digital Network (ISDN) package 145
- Coordinated Dialing Plan (CDP) package 59, **or**, if the Uniform Dialing Plan is used, **either**
- Network Alternate Route Selection (NARS) package 58 **or**
- Basic Alternate Route Selection (BARS) package 57

For a QSIG/DPNSS1 Gateway, the following additional packages are required:

- DPNSS Network Services (DNWK) package 231
- Digital Private Networking Signaling System No. 1 (DPNSS) 123
- Integrated Digital Access (IDA) package 122

For notification display, the following additional packages are required:

- Call Party Name Display (CPND) package 95
- Digit Display (DDSP) 19

Feature operation

No specific operating procedures are required to use this feature.

ISDN QSIG Call Transfer Notification

The ISDN QSIG Call Transfer Notification feature supports the Call Transfer Notification capability over QSIG private networks, and over mixed QSIG/MCDN and QSIG/DPNSS1 networks.

The QSIG Call Transfer supplementary service, introduced in Release 20, provided the capability of using the Transfer by Call Join function to join two separate QSIG calls, resulting from a call transfer activation, into one call between the originating party and the transferred-to party. However, there was no notification, via protocol message exchange between the originating and transferring nodes, that the transfer had taken place.

With the introduction of the QSIG Call Transfer Notification feature in Release 24, whenever a call transfer occurs over a QSIG link, or over a QSIG/MCDN or QSIG/DPNSS1 gateway, a notification of the transfer is sent to the originating and transferred-to party. The information, conveyed in call transfer messages, includes the redirection and originating number, redirection and originating name, and the redirection reason (transfer). This information is displayed on the sets of originating and terminating party. It is also captured in Call Detail Recording records.

The method of Operation Coding for the Call Transfer Notification feature is configured by Object Identifier, used for European Telecommunications Standard Institute (ETSI) interfaces, or by Integer Value, used for International Standards Organization (ISO) interfaces. The Operation Coding method is configured as a Remote Capability using the RCAP prompt in LD 16 and LD 17).

QSIG Call Transfer Notification at work

Consider the following application of the QSIG Call Transfer Notification feature being applied to a call within a QSIG Meridian 1 network (the network signaling occurs over QSIG links).

Station A (Betty, DN 5000) calls Station B (Anne, DN 4000), over a QSIG link. Station B transfers to Station C (Cindy, DN 6000), also over a QSIG link. Table 31 summarizes the display options pertaining to the originating set and transferred-to set.

Note: The underlined Class of Service values are in effect.

Table 31
Originating set and transferred-to set display possibilities

Originating set Class of Service	Originating set display	Transferred-to set Class of Service	Transferred-to set display
	Originating set display after receipt of transfer notification from transferred-to set		Transferred-to set display after receipt of transfer notification from originating set
CNDA NAMA DDGA	H6000 T Cindy	CNDA NAMA DDGA	H5000 T Betty
CNDA NAMA <u>DDGD</u>	H6000 T Cindy	CNDA NAMA DDGA	211-4 T Betty
<u>CNDD</u> NAMA DDGA	H6000	CNDA NAMA DDGA	H5000 T Betty

CNDA <u>NAMD</u> DDGA	H6000 T Cindy	CNDA NAMA DDGA	H5000 T XXXX
CNDA NAMA DDGA	----- T Cindy	CNDA NAMA <u>DDGD</u>	H5000 T Betty
CNDA NAMA DDGA	H6000 T Cindy	<u>CNDD</u> NAMA DDGA	H5000
CNDA NAMA DDGA	H6000 T XXXX	CNDA <u>NAMD</u> DDGA	H5000 T Betty

Note 1: No reason is displayed if the Class Of Service CNDD is configured on the set

Note 2: When presentation of the remote party number is not allowed (CLS DDGD on the remote party), the other party displays the following instead of the DN:

- The trunk access code and the route member, if a trunk is involved, that is, transfer to an other node; or
- Several dashes, if this party is on the transferring node, that is, local transfer to a node.

Operating parameters

The Call Transfer by rerouting method is not implemented.

The subAddressTransfer invoke APDU is not generated by Meridian1:

The maximum allowed size of the name information is 50 characters for QSIG. However, a maximum of 27 characters is allowed with the Calling Party Name Display (CPND) feature. Therefore, name display information might be truncated.

The call transfer notification is sent whatever the numbering plan is. However, the redirection number that is sent has any meaning only if either the Coordinated Dialing Plan (CDP) or Uniform Dialing Plan (UDP) is used to build the redirection number.

Digit manipulation can not be applied to the redirection number sent in the Call Transfer messages.

The Call Transfer Notification for a call extended by an attendant in an MCDN network is provided by the NAS feature. The Call Transfer QSIG/MCDN gateway does not map this NAS information into QSIG messages.

Feature interactions

Calling Line Identification Presentation/Restriction

CLIP/CLIR applies to the originating and to the transferred-to set display.

Connected Line Identification Presentation/Restriction

COLP/COLR applies to the originating and to the transferred-to set display.

Calling Name Identification Presentation/Restriction (CNIP/CNIR)

The Calling, Alerting or Connected name are not included in the ctComplete invoke APDU, at the transferring PINX.

Connected Name Identification Presentation/Restriction (CONP/CONR)

If a name, either from QSIG Name Display Service or QSIG Call Transfer Notification, is received, it will be displayed, if no presentation option forbids it.

On-Hold

The interaction with On-Hold is handled with the same manner as between MCDN Call Transfer Display and On-Hold.

Symposium Call Center Server

If a QSIG call is transferred to a Symposium Call Center DN, the call type is updated in the ICC message for QSIG Transfer.

Meridian Mail

A QSIG call transferred to Meridian Mail may access the different Meridian Mail functionalities (message reception, mailbox interrogation).

QSIG Name Display Supplementary Services (QNDS)

Calling, Alerting & Connected Name

The Calling, Alerting or Connected name is not included in the ctComplete invoke APDU, at the transferring PINX.

Connected Name

If a name, either from QSIG Name Display Service and QSIG Call Transfer Notification, is received, it will be displayed only if no presentation option forbids it.

QSIG Diversion

Call Forwarding Unconditional/Call Forwarding Busy

When the call transfer is completed, the diverted-to set displays the Call Transfer primary user DN and the transfer notification reason.

Call Forwarding No Reply

Call Transfer interacts with Call Forward No Reply (CFNR), if CFNR is invoked for an unanswered, transferred call.

Either the Transferring PINX acts as Rerouting PINX (in case of call transfer by join and call forwarding by rerouting, or the Secondary PINX acts as Rerouting PINX (call forwarding by forward switching.

QSIG Path Replacement (QPR)***QSIG Call Transfer as trigger for QPR***

QSIG Call Transfer can be configured as a trigger for QSIG Path Replacement. If configured, after the completion of the transfer, QSIG Path Replacement starts to obtain a more efficient connection, if necessary.

Feature packaging

The following packages are required for the QSIG Call Transfer Notification feature:

- Q-reference Signaling Point Interface Supplementary Services (QSIG-SS) package 263
- QSIG Generic Functional Protocol Transport (QSIG-GF) package 305
- QSIG Supplementary Services (QSIG-SS) package 316
- Q-reference Signaling Point Interface (QSIG) package 263
- Multi-purpose Serial Data Link (MSDL) package 222
- Primary Rate Access (PRA) package 146
- Integrated Services Digital Network (ISDN) package 145

For notification display, the following additional packages are required:

- Call Party Name Display (CPND) package 95
- Digit Display (DDSP) 19

Feature operation

No specific operating procedures are required to use this feature.

ISDN QSIG Generic Functional Transport

This feature provides a generic transport platform that will support QSIG compliant supplementary services and ISDN networking applications on a Private Integrated Services Digital Network (PISN), in accordance with the International Standards Organization (ISO) and the European Telecommunication Standards Institute (ETSI.)

ISDN QSIG GF Transport is supported on the following interfaces with the D-channel configured as International Standards Organization (ISO QSIG):

- ISDN 1.5 Mbps Primary Rate Interface (PRI); and
- ISDN Signaling Link (ISL).

Operating parameters

DN address translation requires the association with a customer number. For PRI, a prompt creates a customer number association with a given D-channel.

Feature interactions

There are no interactions with other features.

Feature packaging

ISDN QSIG GF Transport (QSIGGF) is package 305.

QSIG on 1.5 Mbps ISDN PRI interface requires the following packages:

- QSIG Interface (QSIG) package 263;
- QSIG GF Transport (QSIGGF) package 305;
- Integrated Services Digital Network (ISDN) package 145;
- 1.5 Mbps Primary Rate Access (PRA) package 146; and
- Multi-purpose Serial Data Link (MSDL) package 222.

ISDN Signaling Link (ISL) interface requires the following packages:

- QSIG Interface (QSIG) package 263; and
- QSIG GF Transport (QSSIGF) package 295;

- Integrated Service Digital Network Signaling Link (ISL) package 147; and
- Multi-purpose Serial Data Link (MSDL) package 222.

For ISL shared mode:

- Integrated Services Digital Network (ISDN) package 145; and
- 1.5 Mbps Primary Rate Access (PRA) package 146.

Feature operation

No specific operating procedures are required to use this feature.

ISDN QSIG/ETSI GF Enhancement

The Integrated Services Digital Network ISDN (ISDN) Q-reference Signaling Point (QSIG)/European Telecommunications Standards Institute (ETSI) Generic Functional Transport (GFT) was introduced in Release 22, to provide a set of generic transport mechanisms to support QSIG supplementary services over a Private or Public Integrated Services Network.

It must be noted that the ISDN QSIG/ETSI GF platform by itself does not actually support any features, it only provides the platform to be used by the various QSIG supplementary services.

The ISDN QSIG/ETSI Generic Functional (GF) Transport Enhancement feature has been introduced in Release 24 to provide improvements in call control, to allow the supported QSIG signaling protocols to better work seamlessly together. These improvements comprise the following:

For QSIG GFT:

- **Support of Call-Independent gateways between QSIG, and EuroISDN, Meridian Customer Defined Networking MCDN, and Digital Private Networking Signaling No. 1 (DPNSS1).**

The QSIG Cal-Independent Generic Functional Transport - Control capability has been modified, so that at these gateways, the CONNECT message of a QSIG supplementary service is not systematically sent after the receipt of a QSIG SETUP message. Instead, the control of the call processing, such as controlling the expiration of the T303 and T310 timers, is left to the QSIG supplementary service operating over the QSIG GFT.

— **Call Related Application Protocol Data Unit (APDU) transport.**

Transit Private Integrated Services Network Exchange (PINX) operation:

The Call Related APDU transport has been modified, to ensure that a call that is being optimized during QSIG Path Replacement is using the optimum path (the first available alternate route in a route list index). A transit Private Integrated Services Network Exchange (PINX) may now determine whether or not to intercept a Facility Information Element (IE) containing a Network Facility Extension (NFE) EndPinx message.

This modification also allows a Facility IE carried in a Setup message, that has encountered congestion, to be included in an alternate call, if QSIG Alternate Routing is activated on a transit node.

Calculating the remaining available length for an APDU:

The method of calculating the available length for an APDU in basic QSIG call control messages has been made more accurate. The available length for an APDU is now calculated as the difference between the maximum message length (260 octets) and the exact length of other mandatory and non-mandatory IEs in the message.

For ETSI GFT:

— **Call Related Application Protocol Data Unit (APDU) transport.**

Calculating the remaining available length for an APDU:

The method of calculating the available length for an APDU in basic ETSI call control messages has been made more accurate. The available length for an APDU is now calculated as the difference between the maximum message length (260 octets) and the exact length of other mandatory and non-mandatory IEs in the message.

Operating parameters

The operating parameters that follow are carried over from the ETSI Generic Functional Transport feature that was introduced in Release 22.

The following operating parameters apply to the ISDN QSIG ETSI GF component of the feature enhancements:

- The ETSI GF gateways to and from other signaling systems, such as QSIG and Meridian Customer Defined Networking (MCDN), are only supported for Call Independent gateways.
- The following ETSI GF functionalities are not supported:
 - the control of supplementary services using the separate message approach (Hold/Retrieve messages)
 - the bearer-related broadcast transport mechanism (multipoint configuration)
 - the bearer-independent point-to-point connections transport mechanism
 - the bearer-independent broadcast transport mechanism
 - the generic notification procedures
 - the network-side channel reservation function
 - the generic procedures for supplementary services management
 - the generic status request procedure
 - the support of the Extended Facility Information Element (FIE)

- During call processing, the translation of a DN address requires that the DN be associated with a customer number. For the processing of an ETSI basic call, this customer number association is found through the B-Channel identified in the Channel Identification Information Element.

For the DN address translation that is not associated with a basic call, the customer number/DN association has to be determined using other methods. For an ISDN PRI interface, the Private Integrated Services Network Exchange Customer (PINX_CUST) prompt in LD 17 is used to define a customer number to a D-Channel. This implies that bearer-independent messages on an ISDN PRI D-Channel are associated with a single customer, as configured in LD 17.

For example, in a multi-customer configuration, if every customer on a Meridian 1 PBX wishes to use the bearer-independent transport service over an ETSI PRI interface, then each customer requires the use of a separate D-Channel.

- The ISDN ETSI GF platform supports up to eight Remote Operation Service Element (ROSE) components in one message, either in a single Facility Information Element (FIE) or multiple FIEs. If a supplementary service requests that the ISDN ETSI GF Transport send a message exceeding this limit, a notification message is sent to the supplementary service.
- At a QSIG to a MCDN gateway, when a call-independent Setup message is received which has a valid gateway destination, and which includes several FIEs that belong to different supplementary services, then the gateway is not supported by this feature.
- The MCDN to QSIG GF “protocol converter” does not actually convert the MCDN features, it only provides the conversion platform. The individual MCDN features have to be ported to the ISDN QSIG GF separately.
- This feature does not implement or enhance any ISDN QSIG supplementary services, or networking applications such as Virtual Network Services (VNS).

- Although the transport of Manufacturer Specific Information (MSI) across a ISDN QSIG interface is used by the MCDN to QSIG GF “protocol converter”, a tandem PINX receiving this information may discard it. The MSI may be passed on to the next node only if the transit PINX is a Meridian 1.
- During call processing, the translation of a DN address requires that the DN be associated with a customer number. For the processing of a QSIG basic call, this customer number association is found through the B-Channel identified in the Channel Identification Information Element. For the DN address translation that is not associated with a basic call, the customer number/DN association has to be determined using other methods.

The ISDN QSIG GF transport does not support the use of the MCDN proprietary Private Network Identifier (PNI) numbers for the customer association. For an ISDN PRI interface, the Private Integrated Services Network Exchange Customer (PINX_CUST) prompt in LD 17 is used to define a customer number to a D-Channel. This implies that all call independent messages on an ISDN PRI D-Channel are associated with a single customer, as configured in LD 17.

For example, in a multi-customer configuration, if every customer on a Meridian 1 PBX wishes to use the call-independent transport service over a QSIG PRI interface, then each customer requires the use of a separate D-Channel. Note that this limitation also applies to MCDN features that are converted by the MCDN to QSIG GF “protocol converter”, to function over a QSIG network.

- Basic call setup and call-independent connection setup originating from a QSIG supplementary service may be rejected by the far end, due to the unavailability of system resources, and due to overdo control. A notification message will be sent to the supplementary service, so that it may initiate a retry.

- The call-independent connection-oriented APDU transport service requires that a transit node PINX retain any information pertaining to a call-independent connection, for the duration of the connection. This information may be required by a particular application to properly route subsequent messages associated with the same call-independent connection.

This requirement at the transit PINX implies that system resources, such as call registers, are used by the call-independent transport services at the tandem nodes. Therefore, applications that make use of call-independent transport services may be limited by the amount of available system resources allocated at the transit PINX.

- The Call Independent APDU transport can be supported by two different transport mechanisms, connection-oriented, or without connection. The later method is not supported on the ISDN QSIG GF platform.
- The Association Control Service Element (ACSE) and Dialogue Service Element (DSE) for application association is not supported by the ISDN QSIG GF platform on a Meridian 1. ACSE and DSE protocol data units that are received by the ISDN GF platform facility at a destination Private Integrated Services Network Exchange (PINX) will be discarded. A transit INX will pass on the ACSE and DSE data units transparently to the next node.
- The ISDN QSIG GF platform supports up to eight Application Protocol Data Units (APDUs), that is, Remote Operation Service Element (ROSE) components, in one message, either in a single Facility Information Element (FIE) or multiple FIEs. If a supplementary service requests that the ISDN QSIG GF Transport send a message exceeding this limit, a notification message is sent to the supplementary service.

Feature interactions

There are no feature interactions for this feature.

Feature packaging

The following packages are required for the ISDN QSIG/ETSI Generic Functional (GF) Transport Enhancement feature:

- Q-reference Signaling Point Interface (QSIG) package 263
- QSIG Generic Functional Protocol Transport (QSIG-GF) package 305

- Integrated Services Digital Network (ISDN) package 145
- Multi-purpose Serial Data Link (MSDL) package 222
- Primary Rate Access (PRA) package 146

For ISDN Signaling Link (ISL) QSIG, the following additional packages are required:

- ISDN Signaling Link (ISL) package 147

Feature operation

No operating procedures are required to use this feature.

ISDN QSIG Name Display

The Integrated Services Digital Network (ISDN) Q Reference Signaling Point (QSIG) Name Display feature provides three supplementary services pertaining to the calling or connected party name display. These supplementary services allow the calling/connected party to either present or restrict the display of name identification on an ISDN PRI link. ISDN QSIG Name Display feature supports the following services:

- Calling Name Identification Presentation (CNIP),
- Connected Name Identification Presentation (CONP), and
- Calling/Connected Name Identification Restriction (CNIR).

Calling Name Identification Presentation

Calling Name Identification Presentation (CNIP) service is available to the called/connected party. When this service is enabled, the calling party's name is displayed on the connected party's set. CNIP service is available on a permanent basis only, and requires the calling party to have the Class of Service Name Presentation Allowed, defined in LD 10 or LD 11.

Connected Name Identification Presentation

Connected Name Identification Presentation (CONP) is a service available to the calling party. When this service is enabled, the called/connected party's name is displayed on the calling party's set. CONP is provided on a permanent basis only and requires the called/connected party to have the Class of Service Name Presentation Allowed, defined in LD 10 or LD 11.

Calling/Connected Name Identification Restriction

Calling/Connected Name Identification Restriction (CNIR) prevents the calling/connected party's name from being presented to a called/calling party. CNIR is invoked on either a permanent basis, provided the calling/connected party has a Class of Service Name Presentation Denied defined in LD 10 or LD 11, or on a per-call basis. When CNIR is activated on a per-call basis, the Class of Service Name Presentation Allowed is configured, and Calling Party Privacy (CPP) Flexible Feature Code (FFC) is dialed prior to initiating a call. This supplementary service restricts presentation of the calling/connected party's name during a normal call establishment and also when the possibility of name presentation arises from the operation of other features, such as Call Transfer, Call Forwarding or Hunting.

Operating parameters

ISDN QSIG Name Display feature requires the QSIG General Functional (GF) transport platform. QSIG GF protocols provide name information that is contained in the facility information element. This protocol transports call control messages from one network to another.

Fifty characters string length is the maximum allowable size of name display information for QSIG. The Call Party Name Display (CPND) feature accepts 27 characters string length. If a name display exceeds these parameters, the name is truncated on the receiving set.

Interworking with existing Meridian Customer Defined Network (MCDN) Name Display feature is dependent upon the remote capability of the associated D-channel defined in LD 17 for PRI routes.

Individual service profiles cannot override Calling Name Identification Restriction requests. Therefore, when name display information has been restricted, it is not possible to obtain this information on the display of the set.

For ISDN BRI sets to have the capability to activate Calling/Connected Name Identification Restriction (CNIR) on a permanent basis, the PRES prompt in LD 27 must be defined PRES = NO.

Calling Party Privacy (CPP) Flexible Feature Codes (FFC) is not supported on BRI sets. Therefore, CNIR on a per-call basis is not supported on BRI sets.

Calling/Connected Name Identification Restriction (CNIR) takes precedence over Calling Name Identification Presentation (CNIP) and Connected Name Identification Presentation (CONP) services.

Feature interactions

Call Modification

If an incoming QSIG with name display presentation allowed receives call modification treatment, such as Call Pickup, Call Transfer, Conference, Call Forward All Types or Hunt, the reason for call modification is not displayed on the calling party's set. Name display information is not updated on the calling party's set. However, if a CONNECT message is sent, the calling party's name display is updated on receipt of this message.

Call Pickup

An incoming QSIG call with name display presentation allowed has name information displayed on the set that picks up the call. If the incoming QSIG call has presentation denied, the calling party's name is not displayed on the set picking up the incoming call.

Call Pickup Network Wide

When a QSIG call with name display presentation allowed is picked up on a MCDN, the calling party's name information is displayed on the set that answers the call. If presentation restricted is defined, then name information is not displayed.

Call Transfer

After the completion of a call transfer, an incoming QSIG call with name display presentation allowed has name information displayed on the destination set. If the incoming QSIG call has presentation denied, name information is not displayed to the destination set.

Call Transfer Network Wide

When a QSIG call with name display presentation allowed is transferred over a MCDN, the calling party's name information is displayed on the set that answers the call. If presentation restricted is defined, then name information is not displayed.

Conference***Conference Network Wide***

An incoming QSIG call with name display presentation allowed is conferenced locally. When a conferee drops out of the conference, calling party's name information is displayed and is passed on to another conferee. Name display information remains until the last local set remains on the call. With presentation restricted, the calling party's name information is not displayed as conferees leave the call.

Call Forward All Calls

When an incoming QSIG call, with name display presentation allowed Name Display, is forwarded locally, the calling party's name information is displayed on the forwarding set. With presentation restriction, the calling party's name information is not displayed to the destination set.

Call Forward All Calls - Network Wide

When a QSIG call with name display presentation allowed is forwarded over a MCDN, the calling party's name information is displayed on the forwarded set. If presentation restricted is defined, then name information is not displayed on the destination set.

Call Party Name Display***Calling Party Name Display Denied***

Call Party Name Display and Calling Party Name Display Denied interact with ISDN QSIG Name Display, depending on the Name Display configuration in LD 17 for PRI. When a QSIG network is interacting with an MCDN network providing network capability ND3, both the MCDN and QSIG Name Display feature function on the same level.

Calling Party Privacy

Calling Party Privacy (CPP) takes precedence over the ISDN QSIG Name Display feature.

Hunting

When an incoming QSIG call with name display presentation allowed is hunted locally, the calling party's name information is displayed on the destination set. With presentation restriction, the calling party's name information is not displayed.

Hunting - Network Wide

When a QSIG call with name display presentation allowed is forwarded over a MCDN, the calling party's name information is displayed on the forwarded set. If presentation restricted is defined, then name information is not displayed on the forwarded set.

Incoming DID Digit Conversion***Incoming DID Digit Conversion Network Wide***

IDC trunk and name information is passed and displayed to the terminating party when no name information is received from the Direct Inward Dial (DID) trunk. The Incoming DID Digit Conversion (IDC) feature is activated, and name information is associated with the converted digit sequence.

Name information received from a DID trunk takes precedence over an IDC trunk name.

Feature packaging

ISDN QSIG Name Display requires the following packages:

- Calling Party Name Display (CPND) package 95;
- Digit Display (DDSP) package 19;
- Calling Party Privacy (CPP) package 301; and
- Flexible Feature Codes (FFC) package 139.

The following packages are required for 1.5 Mbps ISDN PRI QSIG interface:

- ISDN QSIG Basic Call (QSIG) package 263;
- QSIG GF Transport (QSIGGF) package 305;
- Integrated Services Digital Network (ISDN) package 145;
- 1.5 Mbps Primary Rate Access (PRA) package 146; and
- Multi-purpose Serial Data Link (MSDL) package 222.

Feature operation

To activate Calling/Connected Name Identification Restriction (CNIR) on a per call basis, the calling party dials the Calling Party Privacy (CPP) Flexible Feature Code prior to initiating the call.

ISDN QSIG Name Display Enhancement

The QSIG Supplementary Service - Name Display feature, introduced in Release 22, supports the following Name Display supplementary services across an ISDN QSIG network:

- **Calling Name Identification Presentation (CNIP).** This service is offered to the called party, to provide the name of the calling party. Once configured, CNIP is permanently activated.

CNIP is based on the Class of Service of the originating set, as configured in LD 10 or LD 11. If the CLS prompt is configured as Name Presentation Allowed (NAMA), the name of the calling party is displayed on the set of the terminating party. If the CLS prompt is set to Name Presentation Denied (NAMD), or if the calling party name is not available (due, for example, to the name not being registered, or because of call interworking), then CNIP is not able to provide the caller's name to the called party.

Note: To restrict the presentation of a calling party on ISDN BRI sets, the Presentation (PRES) prompt in LD 27 is set to NO. This applies for the other Name Display supplementary services as well.

- **Connected Name Identification Presentation (CONP).** This service applies to an established call. It is offered to the calling party, providing alerting information, or the called or connected party name. Once configured, CONP is permanently activated.

CONP is based on the Class of Service of the terminating set, as configured in LD 10 or LD 11. If the CLS prompt is configured as Name Presentation Allowed (NAMA), the name of the called party is displayed on the set of the calling party. If the CLS prompt is set to Name Presentation Denied (NAMD), or if the called party name is not available (due, for example, to the name not being registered, or because of call interworking), then the called party name is not provided to the calling party.

- **Calling/Connected Name Identification Restriction (CNIR).** This service prevents the name display of a calling party from being presented to the called party.

CNIR may be activated for all calls by setting the CLS prompt in LD 10 or LD 11 to Name Presentation Denied (NAMD). If the CLS has been set to Name Presentation Allowed (NAMA), CNIR may be activated on a per-call basis, by dialing the Calling Party Privacy Flexible Code before making a call.

Note: The capability of activating CNIR on ISDN BRI sets is not supported.

These Name Display supplementary services are provided across an ISDN QSIG network using the QSIG Generic Functional (GF) protocol transport platform introduced in Generic X11 Release 22.

The QSIG Supplementary Service - Name Display Enhancement feature, introduced in Release 24, provides the option of choosing the method of Operation Coding for the Name Display supplementary services described above. The choice may be by Object Identifier, used for European Telecommunications Standard Institute (ETSI) interfaces, or by Integer Value, used for International Standards Organization (ISO) interfaces. The Operation Coding method is configured as a remote capability using the RCAP prompt for an ISDN PRI D-Channel.

Operating parameters

QSIG allows a maximum of 50 characters to be displayed for Name Display information. However, up to only 27 characters are allowed with the Calling Party Name Display feature. Consequently, if the name display string exceeds 27 characters, it will be truncated.

The QSIG Supplementary Service - Name Display Enhancement feature may interwork with the MCDN Name Display feature, depending on the Network Name Display (ND) method (either ND1, ND2, or ND3) configured as the Remote Capability (using RCAP prompt in LD 17) for the associated D-Channel. ND3 ensured the same level of service between the MCDN Name Display and QSIG Name Display supplementary services.

The user-based service profile cannot be used to override the Calling Name Identification Restriction service.

For Calling/Connected Name Identification Restriction (CNIR), restricting the presentation of name information is supported only for a calling party.

Busy name information sent with a DISCONNECT message is only supported for Overlap Receiving (the OVLRL prompt is set to YES in LD 17).

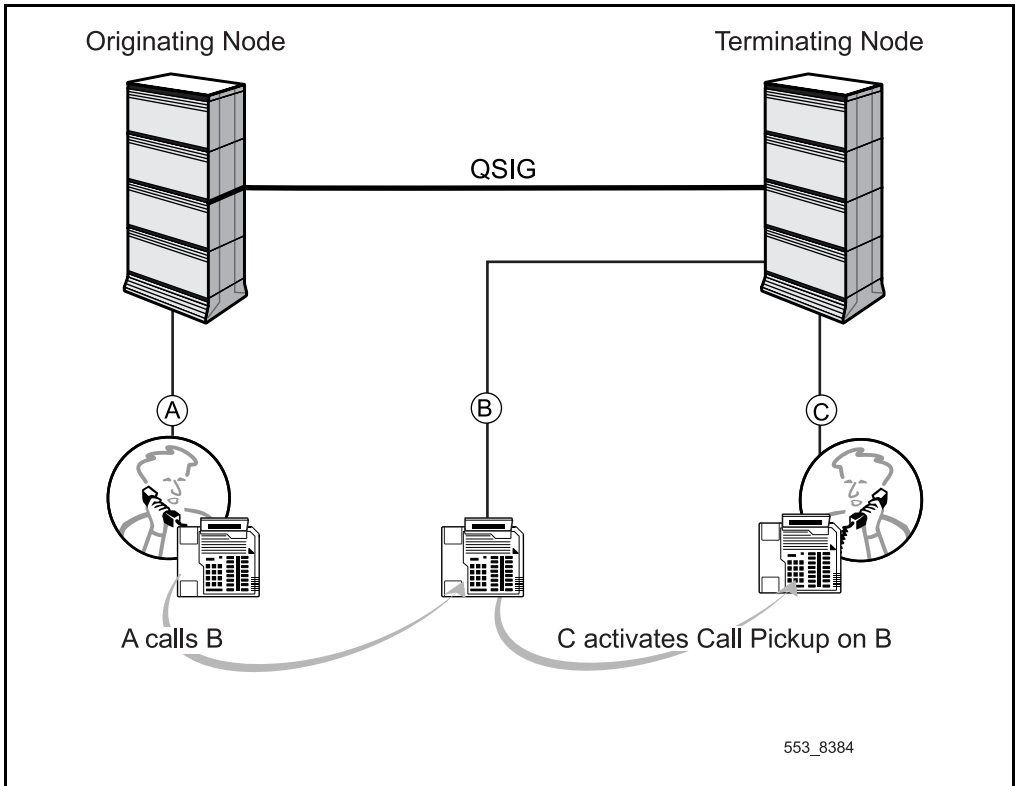
Feature interactions

Call Pickup (over a QSIG link)

Referring to Figure 20, Station A, at the originating node, calls Station B, at the terminating node, over a QSIG link. Station C, also at the terminating node, picks up the call.

If Station A has a Class of Service of Name Presentation Allowed (CLS = NAMA in LD 10 or LD 11), then Station A's name information will be presented to Station C. If Station A has a Class of Service of Name Presentation Denied (CLS = NAMD in LD 10 or LD 11), then Station A's name information will not be presented to Station C. Station A's display will be updated with the connected party (Station C) information, once the call pickup has been established. The reason for the call modification (Pickup) will not be presented to Station A.

Figure 20
Call Pickup over a QSIG link



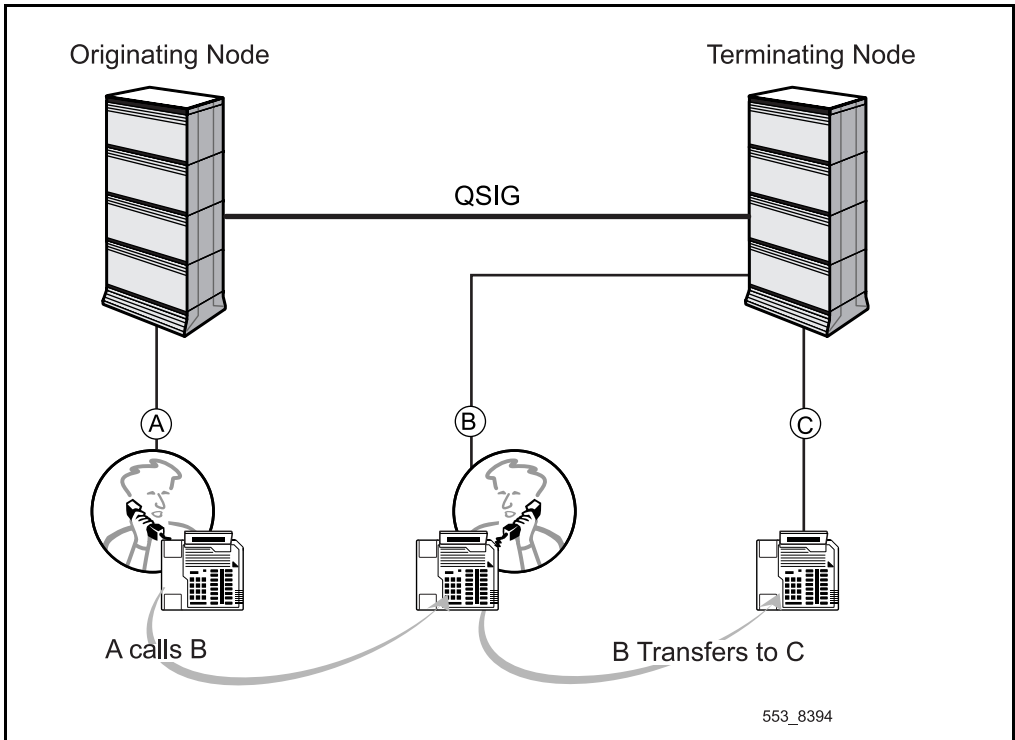
Call Transfer (over a QSIG link)

Referring to Figure 21, Station A, at the originating node, calls Station B, at the terminating node, over a QSIG link. Station B transfers the call to Station C, also at the terminating node.

If Station A has a Class of Service of Name Presentation Allowed (CLS = NAMA in LD 10 or LD 11), then Station A's name information will be presented to Station C, after the transfer has been completed.

If Station A has a Class of Service of Name Presentation Denied (CLS = NAMD in LD 10 or LD 11), then Station A's name information will not be presented to Station C, after the transfer has been completed. Station A's display will not be updated with the connected party (Station C) information, once the call transfer has been completed. The reason for the call modification (Transfer) will not be presented to Station A.

Figure 21
Call Transfer over a QSIG link



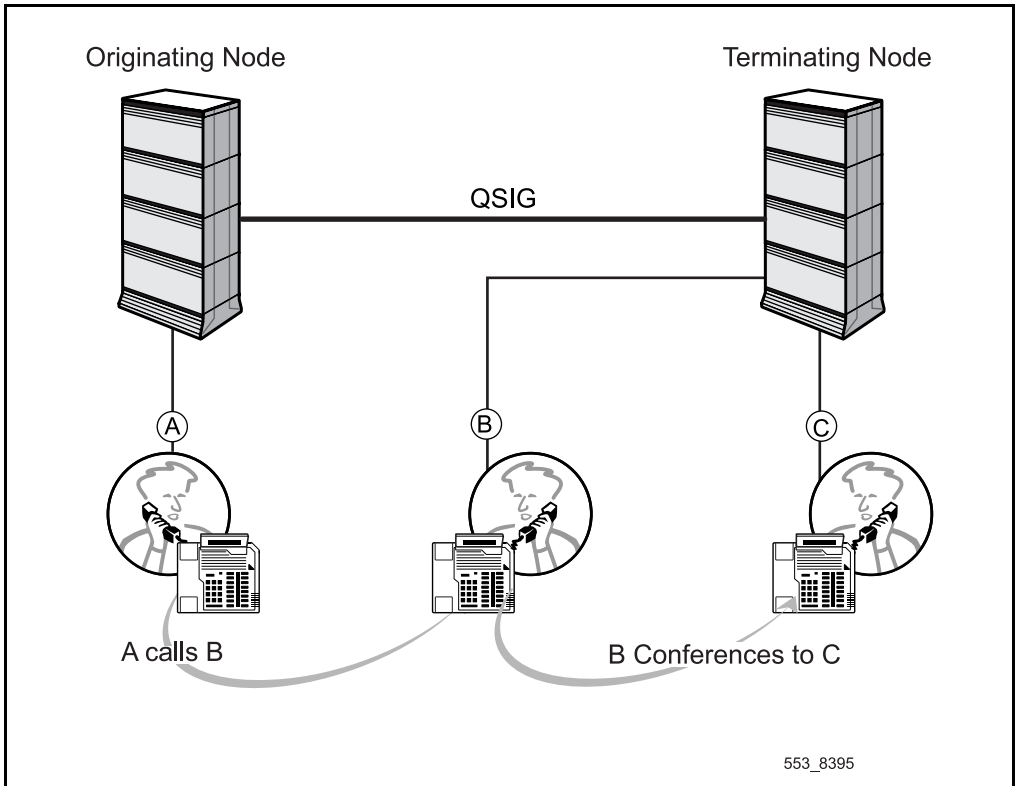
Conference (over a QSIG link)

Referring to Figure 22, Station A, at the originating node, calls Station B, at the terminating node, over a QSIG link. Station B conferences the call to Station C, also at the terminating node.

If Station A has a Class of Service of Name Presentation Allowed (CLS = NAMA in LD 10 or LD 11), then Station A's name information will be presented to Station C, after Station B drops out of the conference.

If Station A has a Class of Service of Name Presentation Denied (CLS = NAMD in LD 10 or LD 11), then Station A's name information will not be presented to Station C, after Station B drops out of the conference. Station A's display will be updated with Station B's name received in alert and connect messages.

Figure 22
Conference over a QSIG link



Call Forward all types (over a QSIG link)

Call Forward all types comprises the following call modifications:

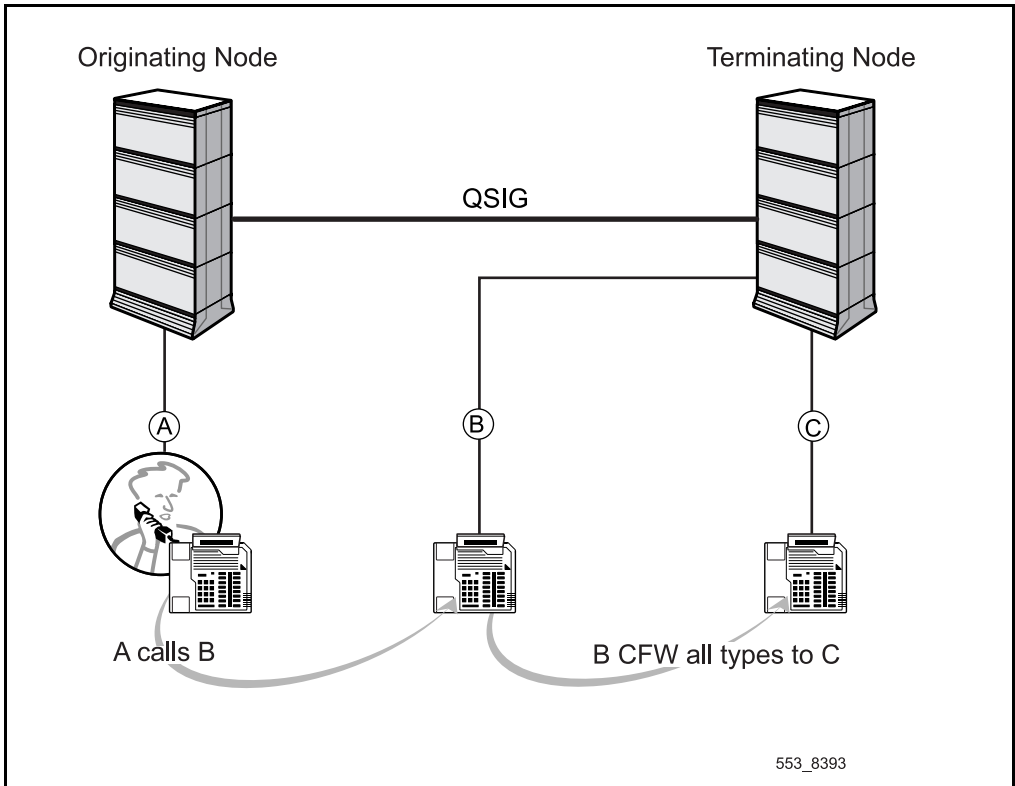
- Call Forward All Calls (CFW)
- Call Forward Busy (CFB)
- Call Forward by Call Type (CFT)
- Call Forward External Deny (CFX)
- Call Forward, Internal Calls
- Call Forward No Answer/Flexible Call Forward No Answer (CFNA)
- Call Forward No Answer, Second Level

Referring to Figure 23, Station A, at the originating node, calls Station B, at the terminating node, over a QSIG link. Station B forwards the call to Station C, also at the terminating node.

If Station A has a Class of Service of Name Presentation Allowed (CLS = NAMA in LD 10 or LD 11), then Station A's name information will be presented to Station C, after Station B completes the call forward. If Station A has a Class of Service of Name Presentation Denied (CLS = NAMD in LD 10 or LD 11), then Station A's name information will not be presented to Station C, after Station B completes the call forward.

In the case where Station B's set rings before Station C's set (during Call Forward No Answer), then Station A's display will be updated with Station C's name information, once Station C's set rings. In the case where Station C's set rings directly (during Call Forward All Calls), then Station A's display will be updated directly with Station C's name information. The reason for the call forward (type of call forward) will not be presented to Station A.

Figure 23
Call Forward All Types over a QSIG link



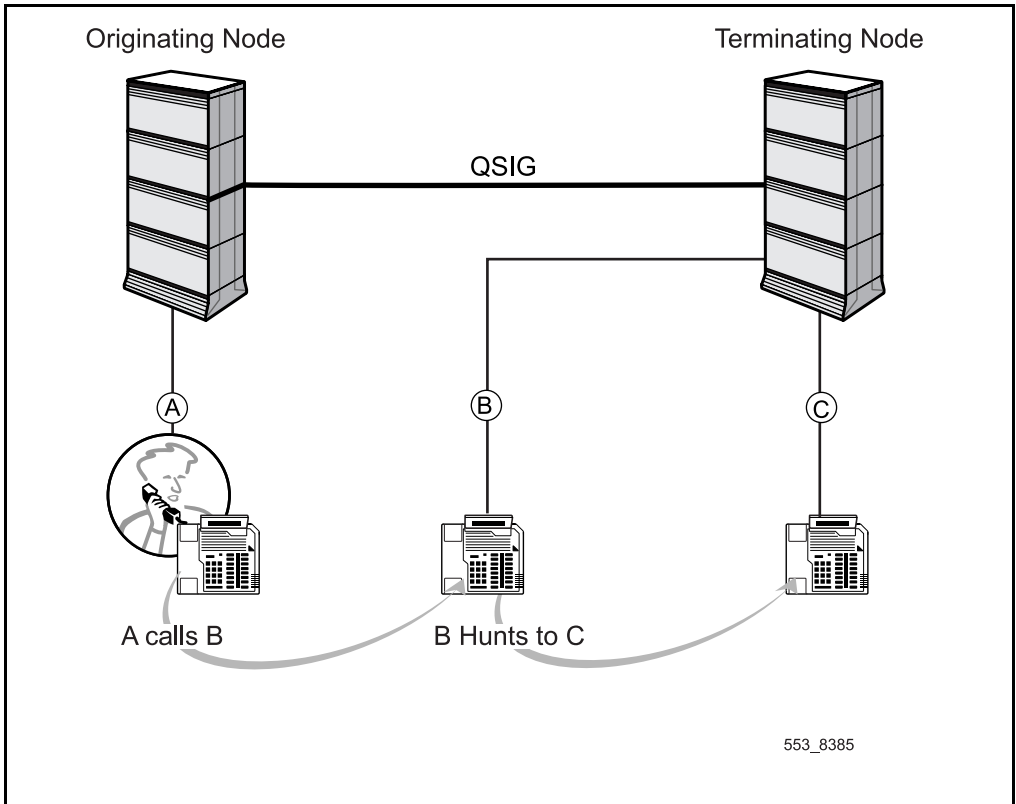
Hunt (over a QSIG link)

Referring to Figure 24, Station A, at the originating node, calls Station B, at the terminating node, over a QSIG link. The call is hunted from Station B to Station C, also at the terminating node.

If Station A has a Class of Service of Name Presentation Allowed (CLS = NAMA in LD 10 or LD 11), then Station A's name information will be presented to Station C, after the call hunt has been completed to Station C (Station C's set is ringing). If Station A has a Class of Service of Name Presentation Denied (CLS = NAMD in LD 10 or LD 11), then Station A's name information will not be presented to Station C, after the call hunt has been completed to Station C (Station C's set is ringing).

Station A's display will be updated with the Station C's name information, while Station C's set is ringing. The reason for the call modification (Hunt) will not be presented to Station A.

Figure 24
Hunt over a QSIG link

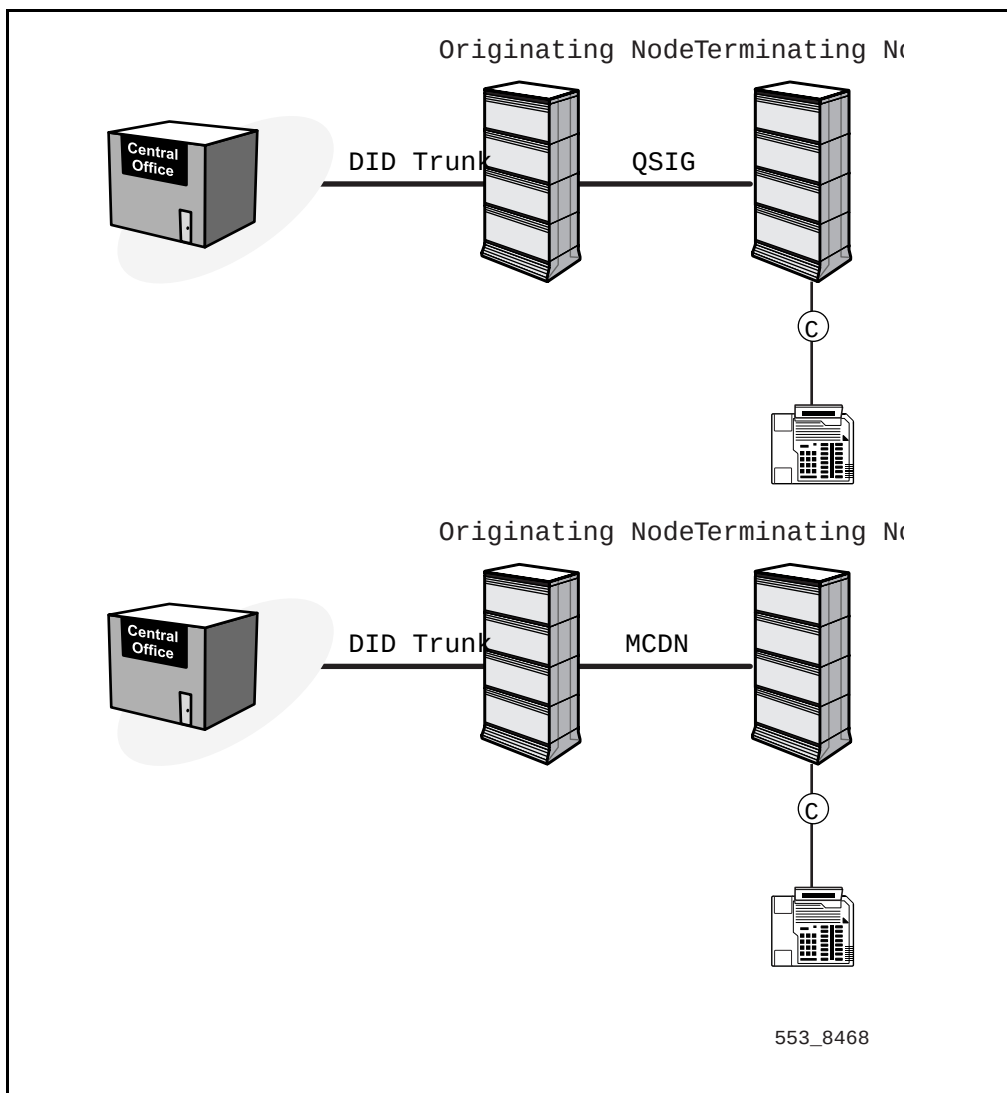


Incoming Digit Conversion (over a QSIG link)

Referring to Figure 25, a Central Office DID call comes over a Direct Inward Dial (DID) trunk to an originating node, and terminates on Station C at a terminating node, over a QSIG link.

If no name information is received from the DID trunk, and Incoming Digit Conversion (IDC) is activated and the incoming name information is associated to the new digit sequence, then this name information is passed to Station C at the terminating node. If name information is received from the DID trunk, this takes precedence over the IDC trunk name.

Figure 25
Incoming Digit Conversion over a QSIG link



Call Forward All Types (QSIG/MCDN link)

Call Forward all types comprises the following call modifications:

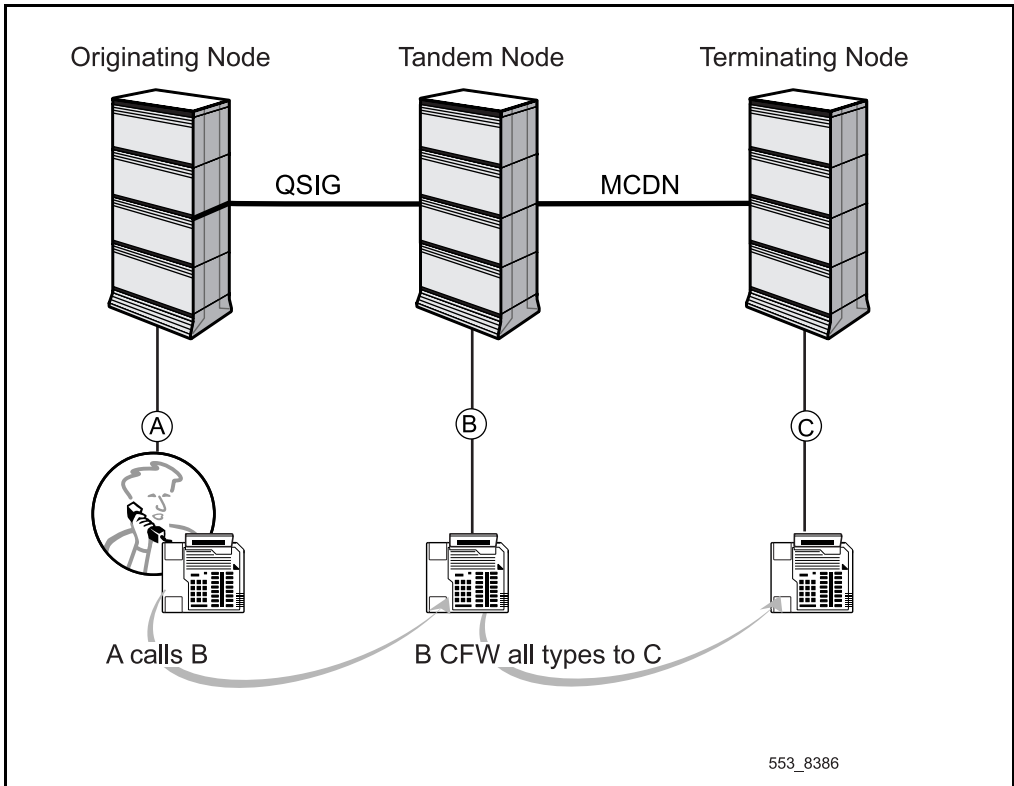
- Call Forward All Calls (CFW)
- Call Forward Busy (CFB)
- Call Forward by Call Type (CFT)
- Call Forward External Deny (CFX)
- Call Forward, Internal Calls
- Call Forward No Answer/Flexible Call Forward No Answer (CFNA)
- Call Forward No Answer, Second Level

Referring to Figure 26, Station A, at the originating node, calls Station B, at a tandem node, over a QSIG link. Station B forwards the call to Station C, at the terminating node, over an MCDN link.

If Station A has a Class of Service of Name Presentation Allowed (CLS = NAMA in LD 10 or LD 11), then Station A's name information will be presented to Station C, after Station B completes the call forward. If Station A has a Class of Service of Name Presentation Denied (CLS = NAMD in LD 10 or LD 11), then Station A's name information will not be presented to Station C, after Station B completes the call forward.

In the case where Station B's set rings before Station C's set (as in the case of Call Forward No Answer), then Station A's display will be updated with Station C's name information, once Station C's set rings. In the case where Station C's set rings directly (as in the case of Call Forward All Calls), then Station A's display will be updated directly with Station C's name information. The reason for the call forward (type of call forward) will not be presented to Station A.

Figure 26
Call Forward All Calls over a QSIG/MCDN link



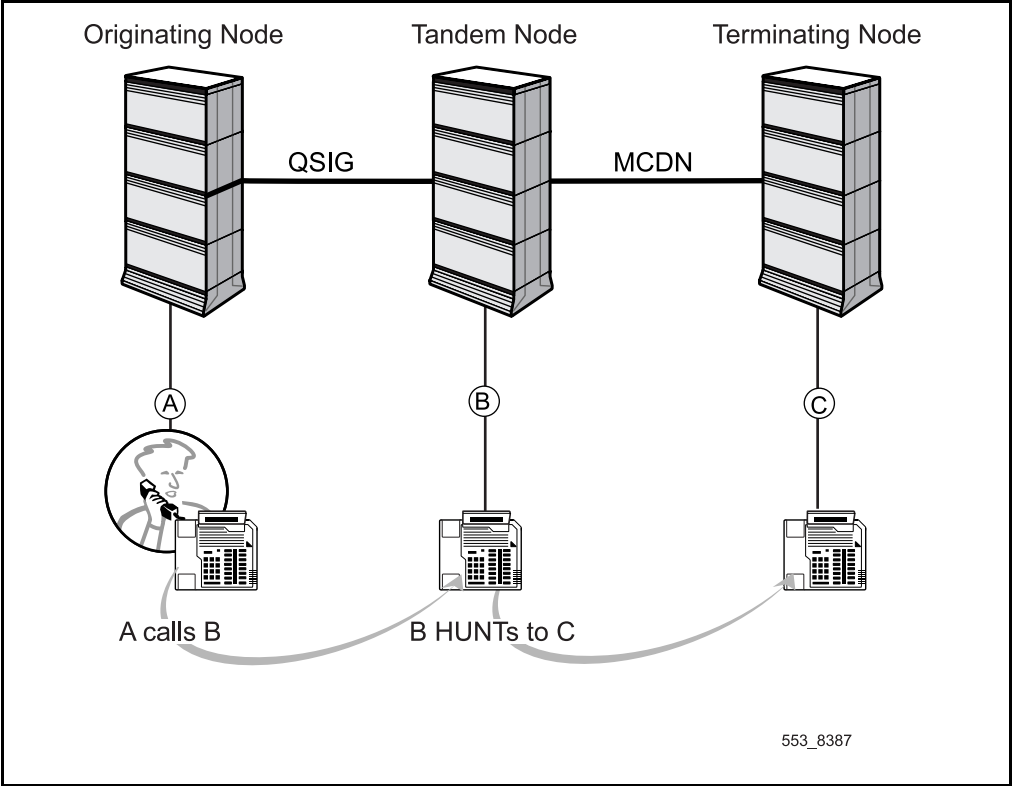
Hunt (QSIG/MCDN link)

Referring to Figure 27, Station A, at the originating node, calls Station B, at the terminating node, over a QSIG link. The call is hunted over an MCDN link from Station B to Station C, at the terminating node.

If Station A has a Class of Service of Name Presentation Allowed (CLS = NAMA in LD 10 or LD 11), then Station A's name information will be presented to Station C, after the call hunt has been completed to Station C (Station C's set is ringing).

If Station A has a Class of Service of Name Presentation Denied (CLS = NAMD in LD 10 or LD 11), then Station A's name information will not be presented to Station C, after the call hunt has been completed to Station C (Station C's set is ringing). Station A's display will be updated with the Station C's name information, while Station C's set is ringing. The reason for the call modification (Hunt) will not be presented to Station A.

Figure 27
Hunt over a QSIG/MCDN link

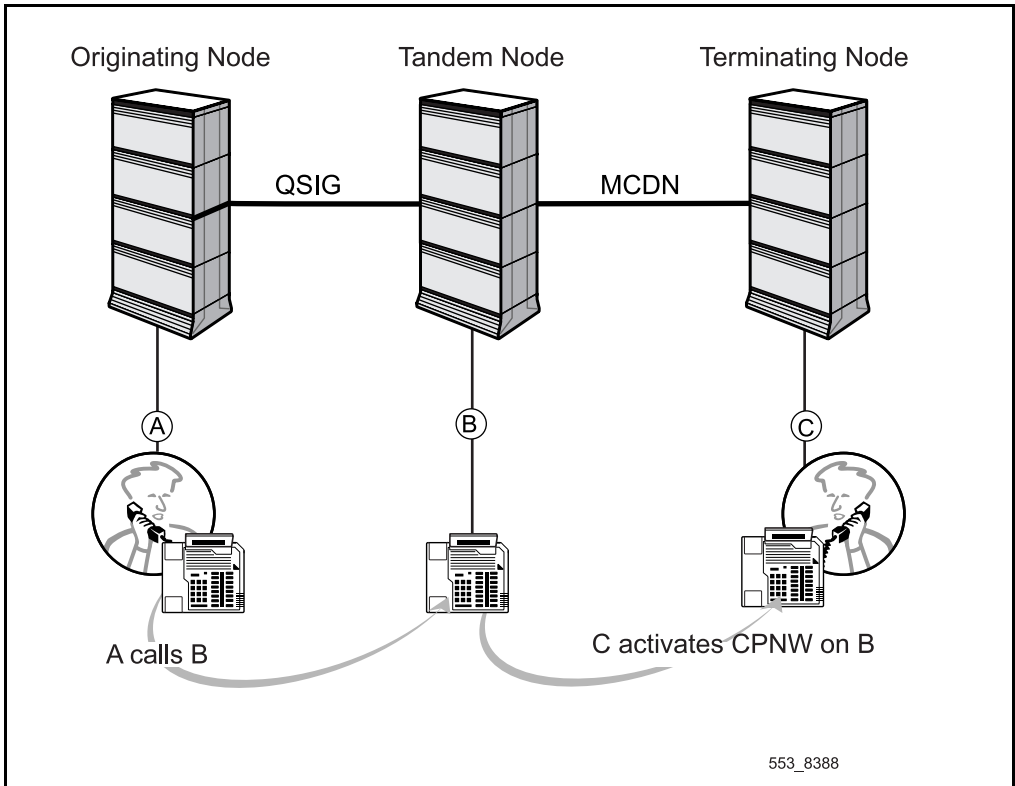


Call Pickup Network Wide (QSIG/MCDN link)

Referring to Figure 28, Station A, at the originating node, calls Station B, at the terminating node, over a QSIG link. Station C, at the terminating node, picks up the call over an MCDN link.

If Station A has a Class of Service of Name Presentation Allowed (CLS = NAMA in LD 10 or LD 11), then Station A's name information will be presented to Station C. If Station A has a Class of Service of Name Presentation Denied (CLS = NAMD in LD 10 or LD 11), then Station A's name information will not be presented to Station C. Station A's display will be updated with the connected party (Station B) information, once the call pickup has been established. The reason for the call modification (Pickup) will not be presented to Station A.

Figure 28
Call Pickup Network Wide over a QSIG/MCDN link



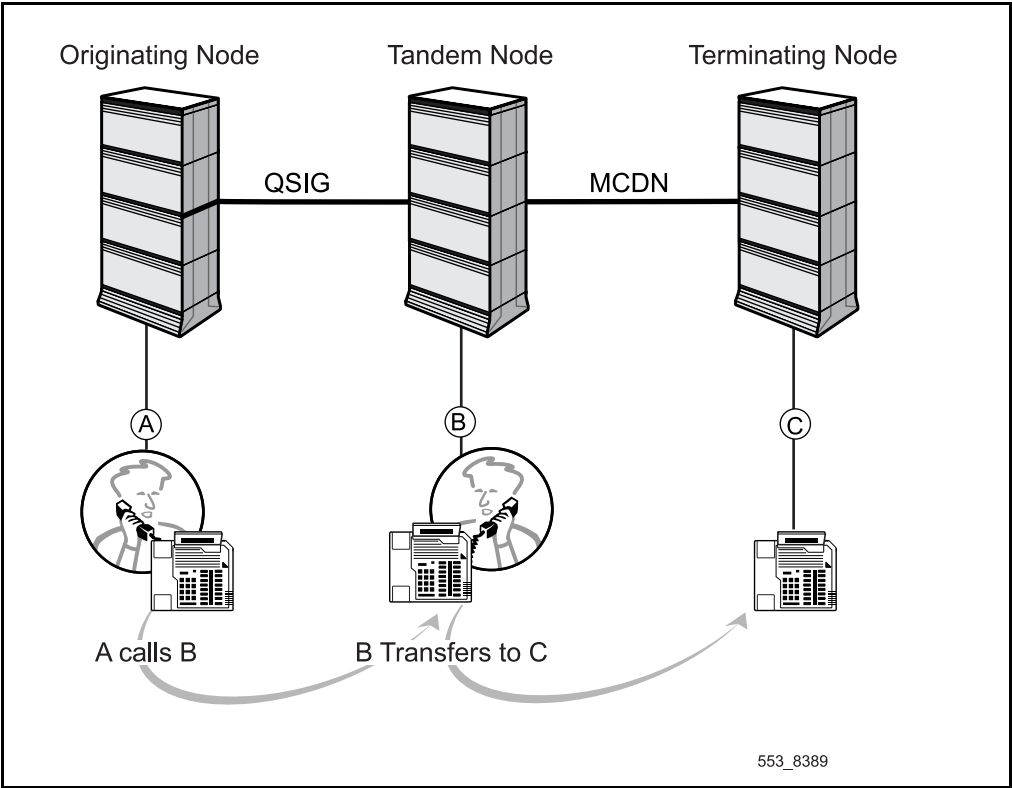
Call Transfer (QSIG/MCDN link)

Referring to Figure 29, Station A, at the originating node, calls Station B, at the terminating node, over a QSIG link. Station B transfers the call to Station C, at the terminating node, over an MCDN link.

If Station A has a Class of Service of Name Presentation Allowed (CLS = NAMA in LD 10 or LD 11), then Station A's name information will be presented to Station C, after the transfer has been completed.

If Station A has a Class of Service of Name Presentation Denied (CLS = NAMD in LD 10 or LD 11), then Station A's name information will not be presented to Station C, after the transfer has been completed. Station A's display will not be updated with the connected party (Station C) information, once the call transfer has been completed. The reason for the call modification (Transfer) will not be presented to Station A.

Figure 29
Call Transfer over a QSIG/MCDN link



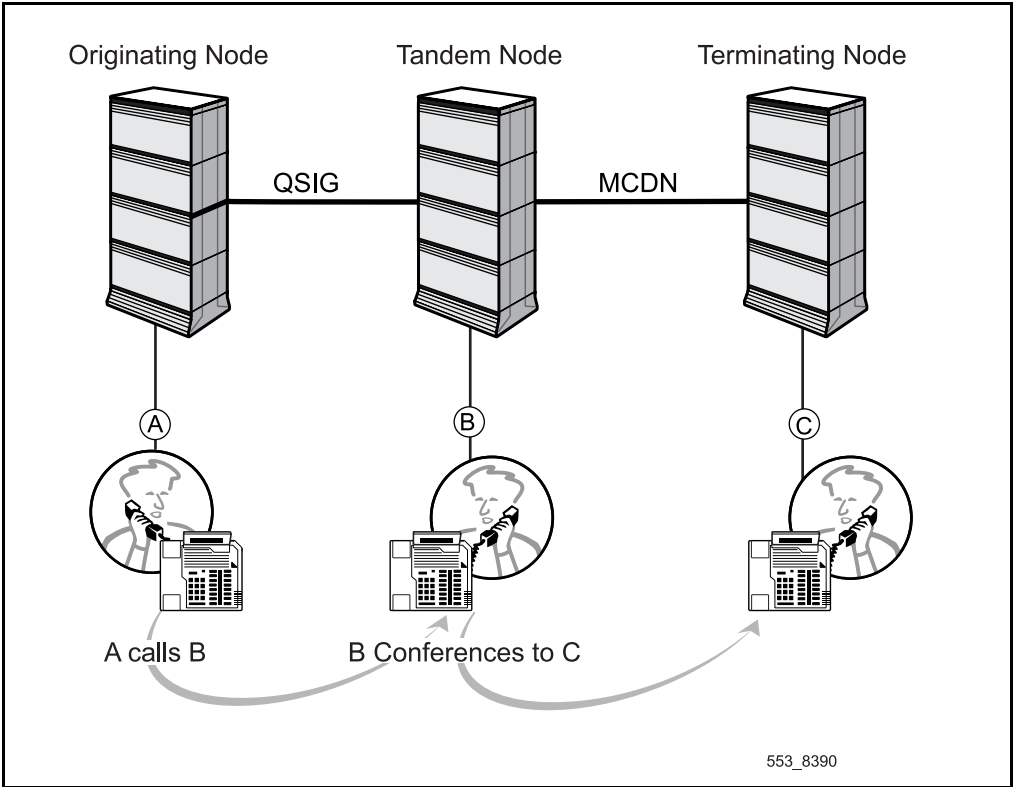
Conference (QSIG/MCDN link)

Referring to Figure 30, Station A, at the originating node, calls Station B, at the terminating node, over a QSIG link. Station B conferences the call to Station C, at the terminating node, over an MCDN link.

If Station A has a Class of Service of Name Presentation Allowed (CLS = NAMA in LD 10 or LD 11), then Station A's name information will be presented to Station C, after Station B drops out of the conference.

If Station A has a Class of Service of Name Presentation Denied (CLS = NAMD in LD 10 or LD 11), then Station A's name information will not be presented to Station C, after Station B drops out of the conference. Station A's display will be updated with Station B's name received in alert and connect messages.

Figure 30
Conference over a QSIG/MCDN link

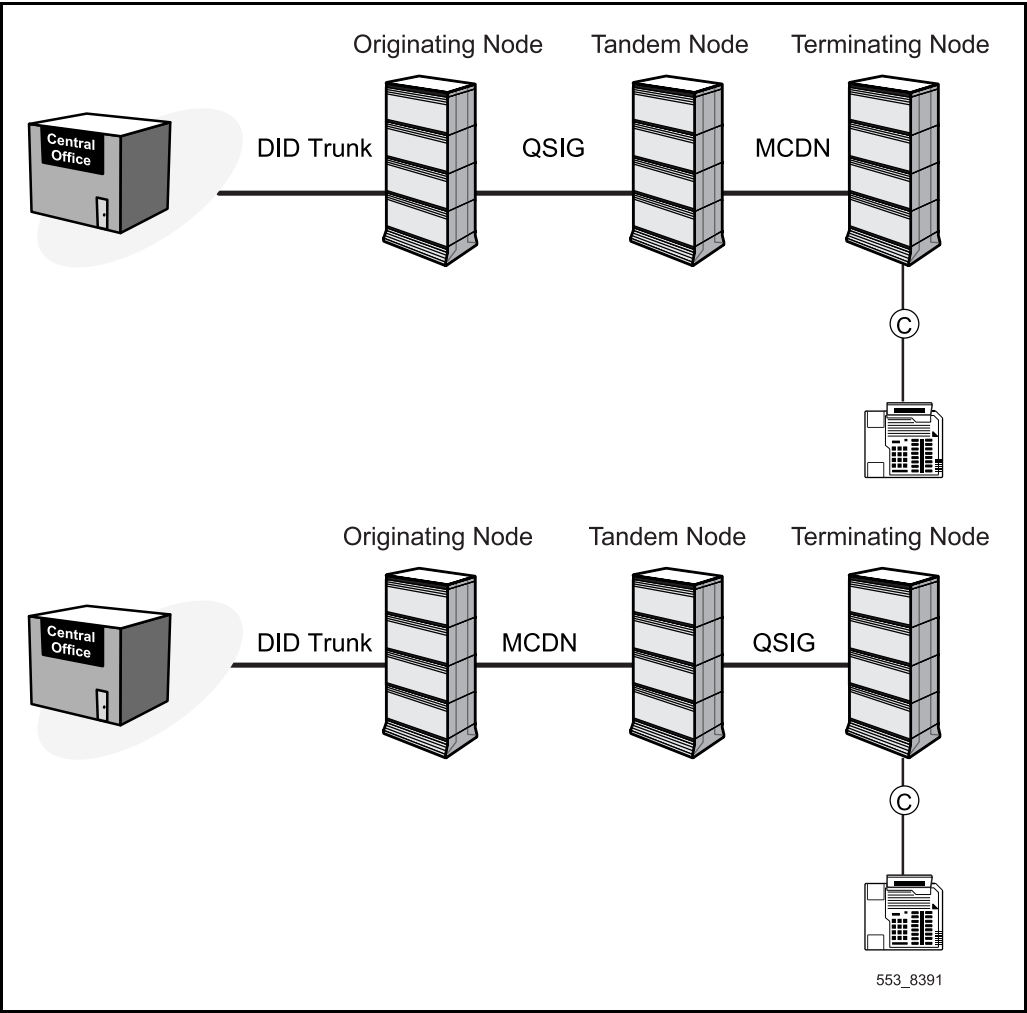


Incoming Digit Conversion (QSIG/MCDN or MCDN/QSIG link)

Referring to Figure 31, A Central Office DID call comes over a Direct Inward Dial (DID) trunk to an originating node. The call is routed to a tandem node over a QSIG link. From the tandem node, it is routed to Station C at a terminating node, over an MCDN link. Or, a Central Office DID call comes over a Direct Inward Dial (DID) trunk to an originating node. The call is routed to a tandem node over an MCDN link. From the tandem node, it is routed to Station C at a terminating node, over a QSIG link.

If no name information is received from the DID trunk, and Incoming Digit Conversion (IDC) is activated and the incoming name information is associated to the new digit sequence, then this name information is passed to Station C at the terminating node. If name information is received from the DID trunk, this takes precedence over the IDC trunk name.

Figure 31
Incoming DID Digit Conversion over a QSIG/MCDN, or MCDN/QSIG link

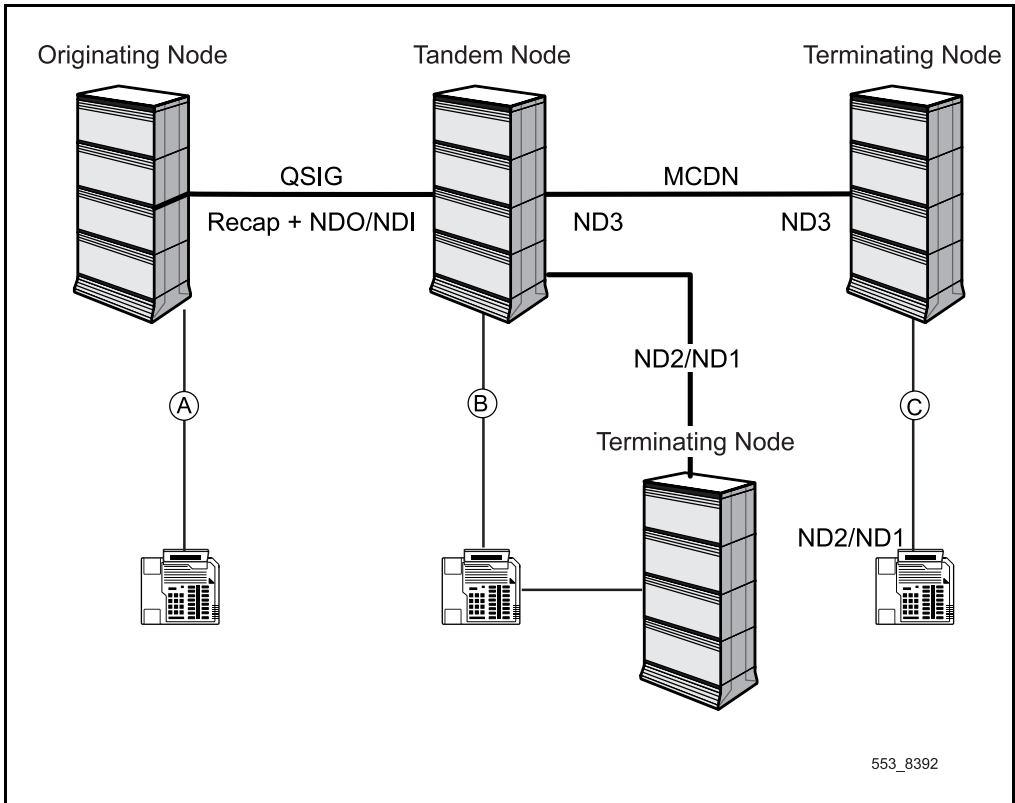


MCDN Name Display features (QSIG/MCDN link)

When a QSIG network interworks with an MCDN network, consistent interworking of the QSIG Supplementary Service - Name Display Enhancement feature and the MCDN Name Display features depends on how the Remote Capability (RCAP) has been configured for the MCDN Name Display feature.

For MCDN, the RCAP prompt is used to configure the Network Name Display (ND) method (either ND1, ND2, or ND3) for the associated D-Channel. ND3 ensures the same level of service between the MCDN Name Display and QSIG Name Display supplementary services. Refer to Figure 32.

Figure 32
MCDN Name Display features over a QSIG/MCDN link



QSIG Call Diversion Notification***Calling Name***

A QSIG Call Diversion occurs to a station. After the Diversion Notification Information is received at the diverted-to node, the station's display will be updated with the calling name information, if it has a Class of Service of Dialed Name Display Denied (CLS = DNDD in LD 10 or LD 11). If the set has a Class of Service of Dialed Name Display Allowed (CLS = DNDA in LD 10 or LD 11), then another name, or none, is displayed on the set.

Alerting and Connected Name

When the names from both a QSIG Name Display Service and a QSIG Call Diversion are included in the same message, the name from the QSIG Name Display Service will be ignored (the QSIG Name Display and the QSIG Call Diversion names should be the same).

QSIG Path Replacement

For QSIG Path Replacement, the name conveyed in any message of a new call is not displayed on any set.

QSIG Call Transfer***Calling, Alerting, and Connected Name***

For QSIG Call Transfer, the Calling, Alerting, and Connected Name are not provided at the transferring Private Integrated Services Network Exchange (PINX).

Connected Name

If connected name information is received, either as part of a QSIG Name Display Service or QSIG Call Transfer Notification, it will be displayed, unless there are subsequent presentation restriction options that may prevent it from being displayed.

Feature packaging

The following packages are required for the QSIG Supplementary Service - Name Display Enhancement feature:

- Q-reference Signaling Point Interface (QSIG) package 263
- QSIG Generic Functional Protocol Transport (QSIG-GF) package 305
- QSIG Supplementary Services (QSIG-SS) package 316

- Integrated Services Digital Network (ISDN) package 145
- Multi-purpose Serial Data Link (MSDL) package 222

For the QSIG Name Display service, the following packages are required:

- Digit Display (DDSP) 19
- Call Party Name Display (CPND) package 95
- International Supplementary Features (SUPP) package 131, to allow the Digit and Name Party restriction capability (without package 131, Digit and Name presentation will always be allowed)
- Calling Party Privacy (CPP) package 301
- Flexible Feature Code (FFC) package 139

Feature operation

No operating procedures are required to use this feature.

ISDN QSIG Path Replacement

ISDN QSIG Path Replacement allows an active connection through an ISDN QSIG private network to be replaced with more efficient connection. Path replacement service is invoked by the following triggers:

- QSIG Call Diversion (QSIG Call Diversion redirects Call Forwarding Busy, Call Forwarding No Reply and Call Forwarding Unconditional calls to another set over a QSIG network)
- Network congestion on the first Private Integrated Service Network Exchange (PINX) node

Note: Private Integrated Service Network Exchange (PINX) may be used interchangeably with Private Branch Exchange (PBX).

- Detection that the connected number differs from the called number

QSIG Path Replacement does not directly attempt to reduce the number of trunks involved in a call. This feature attempts to replace non-optimum paths across a QSIG network with an optimum path. The optimum path between to PINX nodes is the path which takes the first choice route to all PINXs. The optimum path is not set up until the terminating set answer the call.

ISDN QSIG Path Replacement uses the following replacement mechanisms: triangulation and anti-tromboning. These are described in more detail beginning on page 277.

QSIG Path Replacement is permanently active on the PINX. This service is triggered internally or externally by another PINX. QSIG Path Replacement can be invoked on a mixed network of QSIG and Non-QSIG (such as MCDN). Path replacement uses the PINX_DN in the Customer Data Block as a rerouting number. Only QSIG interfaces are optimized. The Meridian Defined Customer Network (MCDN) is not optimized.

The section that follows discusses the use of Private Integrated Service Network Exchange (PINX) DNs as part of the Path Replacement feature.

ISDN PINX DN

The Path Replacement feature must scan the PINX nodes to find the optimum path to a remote PINX node. To accomplish this trunk optimization function, Path Replacement makes non-call associated requests (D-Channel messages only, no B-Channels are used) to the Path Replacement feature at the remote PINX node. The requests are not directed to any existing DN on the remote PINX node, but to a processing function on that PINX node.

To be able to route those types of calls through the network from one originating node to a destination node, an ISDN PINX DN must be defined for each PINX node in the network.

The ISDN PINX DN is a DN taken from the customer's numbering plan used to aid with the routing of network calls. It does not correspond to a real terminal on the node, so it is never busy. The ISDN PINX DN uses the same number of digits as the numbering plan; either UDP or CDP. It is defined so that the Path Replacement feature on a distant node can make non-call associated calls to the Path Replacement feature on another node when no particular destination exists. Those calls are made using existing routing configurations, e.g. a CDP distant steering code or a UDP location code expecting a fixed number of digits. For example, the far end PINX node has a digit sequence composed of the steering code plus the ISDN PINX DN with the same length and digit sequence used to route normal calls from the distant node to the local node for CDP type calls and location code plus a 4 digit ISDN PINX DN for UDP type calls.

One ISDN PINX DN should be configured per network location. This ISDN PINX DN is used for the Path Replacement feature and other features such as Electronic Lock Network Wide/Electronic Lock for Private Lines and Call Pickup Network Wide features.

No user or feature other than Path Replacement, Electronic Lock Network Wide/Electronic Lock for Private Lines and Call Pickup Network Wide features will be allowed to dial the ISDN PINX DN. If a user dials this DN, they will receive overflow tone.

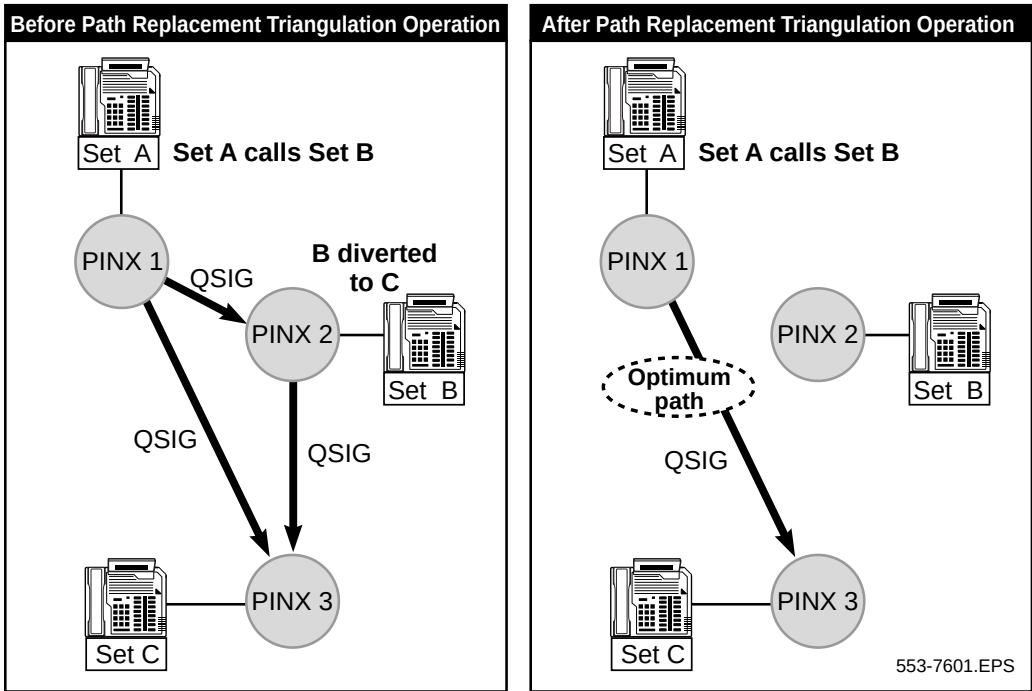
Triangulation Path Replacement

With Triangulation Path Replacement, either the originating or the terminating node involved in a QSIG call recognizes that a call is using a non-optimum path due to call diversion, network congestion or detection of a different number than dialed. If this call is still ringing, the originating/terminating node will wait for an answer signal before initiating triangulation path replacement. If the call is established, then replacement can be performed immediately.

The ISDN QSIG Path Replacement feature replaces non-optimum paths across a QSIG network with optimum paths. An optimum path between two nodes is the first choice route at all nodes. This feature does not attempt to reduce the number of trunks involved in a call but does attempt to locate the optimum path.

As shown in Figure 33, Set A on PINX 1 calls Set B on PINX 2. Set B has activated Call Forward All Calls to Set C on PINX 3. Trunk optimization occurs between PINX 1 and PINX 3. Trunks between PINX 1 and PINX 2 and PINX 2 and PINX 3 are torn down after the call is answered by Set C.

Figure 33
Triangulation Path Replacement



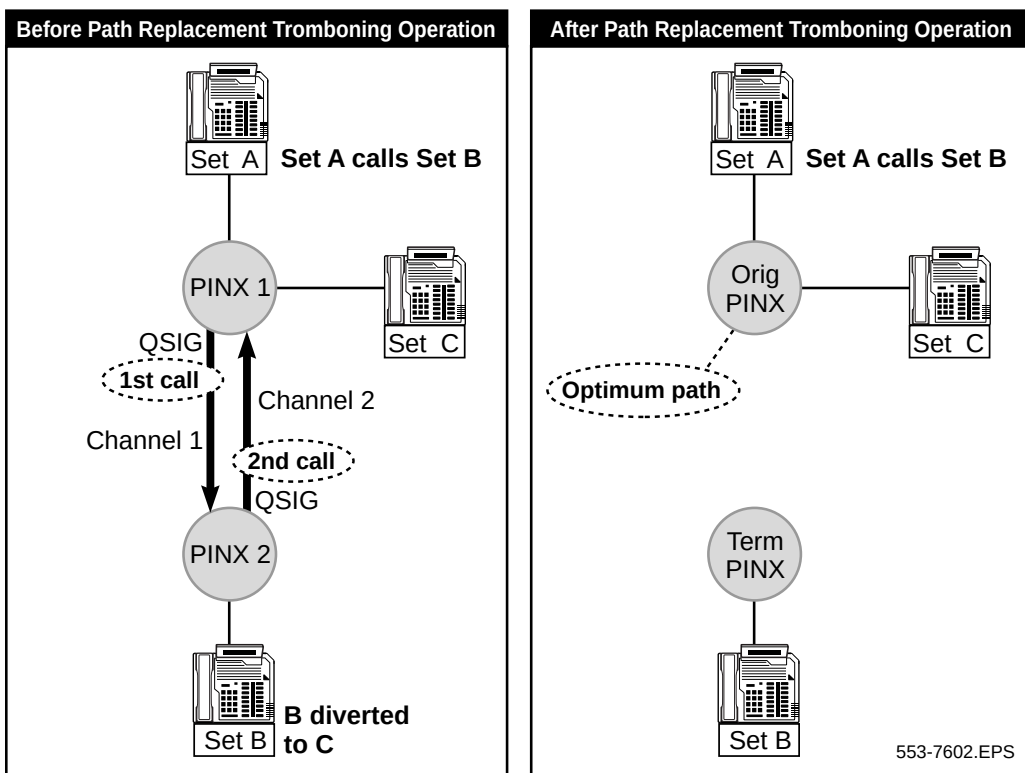
Anti -Tromboning Path Replacement

This feature performs anti-tromboning replacements to eliminate any dual parallel trunking that are caused by call modification. Anti-tromboning path replacement is only invoked after the divert-to caller answer the call.

Anti-tromboning is only performed when all the trunks are associated with the same customer.

As shown in Figure 34, Set A on PINX 1 calls Set B on PINX 2. Set B has activated Call Forward All Calls to Set C on PINX 1. Anti-tromboning occurs between PINX 1 and PINX 2 and these trunks are torn down after Set C answers the call.

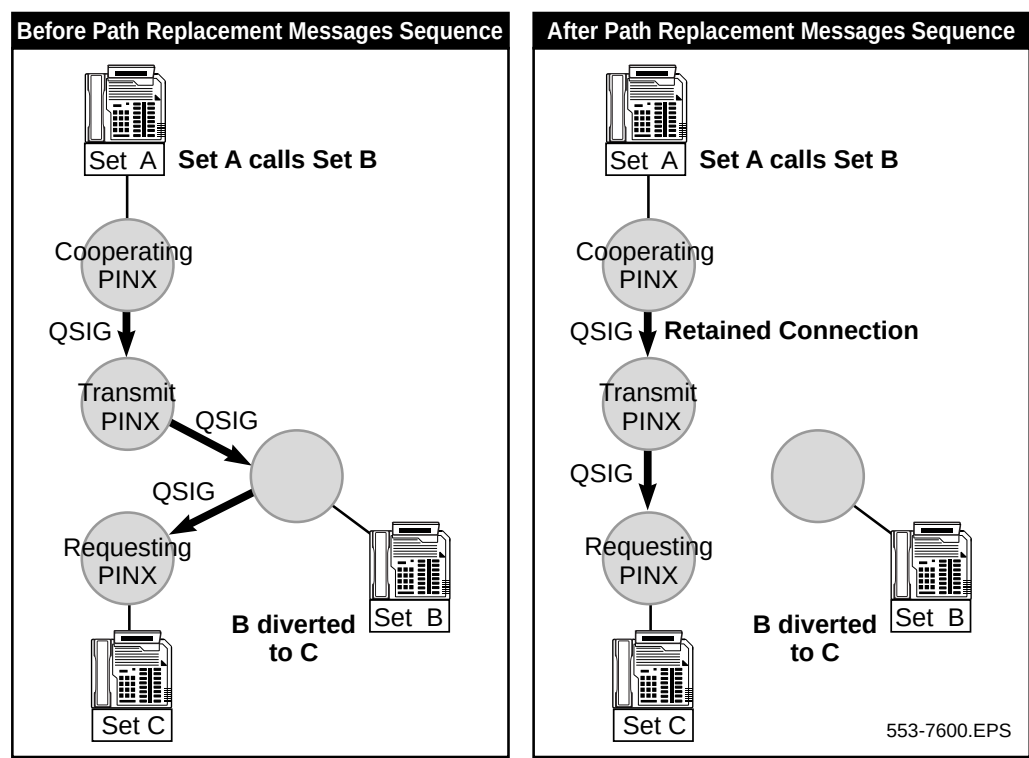
Figure 34
Tromboning Path Replacement



Retaining Path Replacement

When path replacement has been invoked, the cooperating PINX determines whether or not to retain part of the original connection provided that the original connection used the optimum route to reach the re-routed number. As shown in Figure 35, the connection between the cooperating and transit PINX is retained after path replacement has occurred.

Figure 35
Path Replacement Retaining Part of Old Connection



Operating parameters

Network congestion occurs when a non-optimum path from the first PINX node is detected.

When call diversion is not supported by a PINX node, path replacement is triggered when the connected number differs from the called party's number.

ISDN QSIG Path Replacement requires the Multi-Serial Data Link (MSDL) card. This feature is only supported on Coordinated and Uniform Dialing Plans. Route Access Codes are not supported. Digit manipulation is not supported.

If a path replacement request is triggered and fails with the cause "invalid Rerouting Number" the request is discontinued. No attempt is made with another rerouting number.

When a call has several triggers for path replacement and the first trigger fails, no other attempts are performed using the other triggers. Path replacement triggers are chosen according to the following order:

- 1** QSIG Call Diversion
- 2** Congestion on the first PINX
- 3** Different Connected Number

The configuration of diversion and connected number triggers can generate a lot of path replacement collisions if the QSIG Call Diversion feature is configured on the QSIG network. In this situation, it is recommended that only the diversion trigger be configured. This establishes the optimized call in the same direction as the originating call.

Feature interactions

Attendant Console

Path replacement calls invoked by an attendant are not supported.

Attendant Barge In

Attendant Break In

The Attendant Barge In and Attendant Break In features are not supported during path replacement operation.

Automatic Call Distribution

ISDN QSIG Path Replacement calls placed in an Automatic Call Distribution (ACD) queue are initially rejected. Path replacements requests are accepted after the call is answered by an ACD agent.

Call Transfer

When a local is transferred by the Meridian 1 during an ISDN QSIG Path Replacement request, then the replacement request is terminated. After Call Transfer, the Meridian 1 may accept path replacement from another PINX. QSIG Call Transfer is not supported at this time.

Call Hold

Path Replacement cannot be invoked on a held call. Path replacement is only accepted on an active call.

Conference Calls

The Meridian 1 does not invoke path replacement when callers are involved in an established conference. Any replacement requests from a far end PINX are rejected when a call is on an established conference.

Customer Controlled Routing

Following a Customer Controlled rerouting, path replacement is only invoked by the connected number trigger.

Direct Inward System Access

Path replacement does not occur on a Direct Inward System Access (DISA) call. The Meridian 1 does not invoke the Path Replacement feature on DISA calls.

Music***Radio Paging******Recorded Announcement***

The Meridian 1 does not invoke the Path Replacement feature on Music, Paged or Recorded Announcement calls.

Feature packaging

The following packages are required for ISDN QSIG Path Replacement:

- QSIG Supplementary Services (QSIG-SS) package 316
- QSIG-GF Transport (QSIGGF) package 305
- QSIG Interface (QSIG) package 263
- Network Alternate Route Selection (NARS) package 58 (for Uniform Dialing Plan), or Coordinated Dialing Plan (CDP) package 59

On a 1.5 Mbps PRI interface the following packages are required:

- Integrated Services Digital Network (ISDN) package 145
- ISDN Primary Rate Access (PRA) Central Office package 146
- Multipurpose Serial Data Link (MSDL) package 222

Feature operation

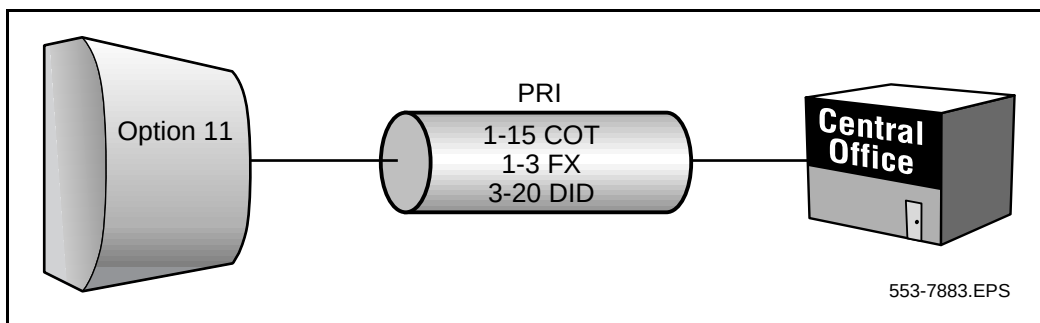
No specific operating procedures are required to use this feature.

Integrated Service Access (ISA)

By using various call set-up messages, the Meridian 1/SL-1 can designate to the network which service is desired on a call-by-call basis. Similarly, the network can indicate to a Meridian 1/SL-1 on a call-by-call basis, the service for the incoming call. The selection of a B-channel is on a call-by-call basis as specified by the call type, which specify the attributes of the call.

ISA eliminates the need for dedicated 'B' channels for each service. Rather than having a fixed number of CO, WATS, or FX trunks, trunks are shared for the various services. Dedicated 'B' channels, however, could be provided if the customer requires them.

ISA allows a flexible connection to the Central Office that offers more efficient trunk utilization based on the calling patterns of the customer. Channels are utilized on a Call by Call basis as determined by the minimum and maximum numbers specified on the Meridian 1/SL-1.



X11 release 18 (and later)

In X11 release 18, ISA is enhanced to provide the following:

- Private, INWATS, FX and TIE call types received from an ISA master route terminate to an individual set with or without Incoming Digit Conversion (IDC) for the DMS and AT&T interfaces.
- ISA service routes allow an auto-terminate DN to be defined in the route data block. Calls can terminate to an ACD queue using Dialed Number Identification Services (DNIS) for the DMS and AT&T interfaces.

- Private call type is supported for the DMS interface on a per route basis. (Specify Private in LD16.)
- Service Identifier (SID) is supported with INWATS call types for the DMS interface.
- The Service Identifier (SID) value no longer defaults to route number. A unique value must be specified by the user.
- When printing the route data block for an ISA master route, all the associated service routes are printed after the new prompt, SVRT, in LD 21. The following figure shows how SVRT in LD 21 prints the ISA service routes configured in LD 16.

<u>Prompt</u>	<u>Response</u>
ROUT	50
TKTP	TIE
ISAR	YES
RTN	60

<u>Prompt</u>	<u>Response</u>
ROUT	51
TKTP	WAT
ISAR	YES
RTN	60

<u>Prompt</u>	<u>Response</u>
ROUT	52
TKTP	COT
ISAR	YES
RTN	60

LD 21

<u>Prompt</u>	<u>Response</u>
ROUT	60
TKTP	ISA
SVRT	50
	51
	52

Note: The prompt SVRT does not appear in LD 16. When the route is configured in LD16, this information is added automatically to the ISA master route.

553-5142.EPS

Characteristics of the X11 release 18 ISA enhancements are detailed below:

- The range of the Service Identifier (SID) for the Meridian 1 to DMS interface is from 0 to 511. Each SID received in the ISA trunks uniquely corresponds to a service route defined in LD16. Also, each service route uniquely corresponds to a SID in the DMS machine type.
- The range of the Service Parameter for the Meridian 1 to ESS interfaces is from 0 to 9 for the parameterized WATS band service. WATR and COTR depend on the operation of service routes.
- For Meridian 1 to DMS interfaces, if there is no Network Specific Facility Information Element (NSF) (IE) received in the ISA master route, Meridian 1 treats the call using the service route configuration defined for the COTR prompt in LD16. If the trunk type of the COTR is COT, all the calls terminate to the Meridian 1 attendant. If the trunk type of the COTR is DID, each call terminates to its DID number. Similarly, if the trunk type of the WATR is WAT, all the calls terminate to the Meridian 1 attendant. If the trunk type of the WATR is DID, each call terminates to its DID number.
- For the Meridian 1 to ESS interfaces, if there is no NSF IE received in the ISA master route, Meridian 1 treats the call using the ISA service route configuration which is defined as the ACCUNET service for the SRVC prompt in LD16. If the trunk type of the ISA service route is Direct Inward Dialing (DID), each call terminates to its DID number.
- If an INWATS call or Public call received in the ISA master route is intended to be terminated to the Meridian 1 attendant, either IDC can be used to convert the incoming called number of the attendant DN, or the incoming called number must match the Listed Directory Number (LDN) in the Customer data block. You can also terminate one service route per ISA route by programming the service route number at the COTR and WATR prompts.
- For the Meridian 1 to DMS interfaces, the minimum and maximum counter (Min/Max) function is on a per service route basis. For example, route 40 (call type of OUTWATS with SID 9) or route 45 (call type of OUTWATS with SID 13), can each reserve its own minimum B-channels and limit its maximum B-channels to be used in the ISA pools.

- Since AT&T is limited to one service type per service route in a given ISA master route, for the Meridian 1 to ESS interfaces, the Min/Max counter function is on a per service route basis. That is, AT&T supports only one Min/Max function for the service types in a given ISA master route, not a Min/Max per band. Configure only one set of the minimum and the maximum B-channels in LD16 for all the bands of the WATB service.
- For AT&T interfaces, only 9 possible services may be used per ISA master route. With Northern Telecom DMS products, there are 512 possibilities, one for each SID value.

Package Requirements

Package requirements are as follows:

ISDN	option 145
PRI	option 146
NARS or CDP	option 58 (NARS) or option 59 (CDP)
CBC (DCA)	Option 117
NTWK	option 148 (for Centrex connectivity)
Note 1: Package 149, IEC, is required for Inter-exchange carrier, that is DMS-250 and AT&T 4ESS. Note 2: If Incoming Digit Conversion (IDC) is required (see Feature implementation), then Package 110, IDC for DID, is necessary. It is dependent on Package 49, New Flexible Code Restriction. Note 3: If Dialed Number Identification Services (DNIS) is required (see Feature implementation), then Package 98, DNIS, is required.	

Integrated Trunk Access (ITA)

Integrated Trunk Access is a Meridian 1 capability allowing a T-1 facility to include both ISDN out-of-band signaling trunks as well as 'A' and 'B' bit signaling trunks. This capability has applications with ISDN private line service, multiplexers and digital cross-connects.

Package Requirements

This feature requires the following options:

ISDN	option 145
DTI	option 75
PRI	option 146

ISDN Networking: Advanced Network Services

This package allows for the activation of Network Ring Again, Network Call Redirection and Trunk Optimization.

Package Requirements — NTWK with NARS and PRI

Package requirements are as follows:

NARS	option 58
PBXI	option 75
ISDN	option 145
PRI	Option 117

Package Requirements — NTWK with NARS and ISL

Package requirements are as follows:

NARS	option 58
ISDN	option 145
ISL	option 147

Package Requirements — NTWK with CDP and PRI

Package requirements are as follows:

CDP	option 59
PBXI	option 75
ISDN	option 145
PRI	Option 117

Package Requirements — NTWK with NARS and ISL

Package requirements are as follows:

CDP	option 59
ISDN	option 145
ISL	option 147

Package Requirements — NARS and CDP

All PRI applications require Digital Trunk Interface PBXI option 75. ISL applications do not require option 75 unless used in conjunction with DTI. NSIG (option 37) is required for TCOS and ESN Signaling.

ISDN Signaling Link (ISL)

This feature allows a user with analog or digital tie trunks to replace in-band signaling with out-of-band D-Channel signaling. TIE trunk types (including DTI) are supported on Meridian 1/SL-1 to Meridian 1/SL-1 connections only.

The ISDN link provides ISDN Feature Networking Services to locations where a DTI/PRI link (T1 span) is not available or not economically justified.

ISL uses a dedicated channel at speeds between 24 and 64 Kbps to establish the ISDN D-Channel for transmission of the ISDN Q.931 signaling protocol. The D-Channel link is established to the far end using one of the following types of facilities:

- 24th channel on a PRI in the case of ISL shared mode (same as PRI)
- a pair of modems or Meridian 1 Data Modules in the case of ISL dedicated mode

The associated voice or data is sent through the existing conventional analog or digital trunks.

Note: In the case of D-channel failure, signaling will revert back to conventional in-band signaling. This Auto recovery feature is available in Meridian 1/SL-1 systems.

Package Requirements

ISDN signaling Link requires the following:

ISDN	option 145 and ISL option 147

ISDN Signaling Package

This package is the base platform required by all other ISDN packages. It provides the CCITT Q.931 layer 3 signaling, for support of ESN/ISDN features.

MCDN Alternate Routing

The MCDN (Meridian Customer Defined Network) Alternate Routing feature provides a solution to calls encountering congestion due to high traffic situations within an MCDN network. The MCDN Alternate Routing feature is supported over an MCDN-based ISDN protocol.

The MCDN Alternate Routing feature uses the routing capability of Network Alternate Route Selection (NARS) to re-route a congested call. For each MCDN call translated at a Meridian 1 node, NARS selects one route from up to 512 routes to complete the call. These routes are programmed in a route list. Each route in the list is called an entry. There may be up to 64 entries in each route list. Any combination of trunks can be specified in a route list.

The MCDN Alternate Routing feature may be configured for each of the 512 different routes.

Congestion occurs when channels within the network are not available. With the introduction of the MCDN Alternate Routing feature, each entry of a route list on one node can be configured to take an alternate entry (route) from the route list of that node (Private Exchange or Central Office), if congestion is encountered.

Alternate routing configuration takes place in LD 86, the Electronic Switched Network (ESN) administration overlay. The option defined for the Step Back On Congestion (SBOC) prompt determines the type of alternate routing available to calls over a particular route.

Alternate routing options are:

- NRR: no alternate routing is performed. The call receives congestion treatment.
- RRO: re-route at the originating node if a call encounters congestion. If congestion is encountered at a transit node, the call drops back to the preceding node, so that the preceding node decides if re-routing is required.
- RRA: re-route the call at any node, whether originating or transit node, when congestion is encountered.

To ensure that MCDN Alternate Routing occurs for all nodes in a system, define all nodes as SBOC = RRA. Conversely, to prevent MCDN Alternate Routing from occurring on any nodes, define all nodes as SBOC = NRR.

Refer to “Originating node operation” on page 294, “Transit node operation” on page 296, and “MCDN Alternate Routing examples” on page 298 for more information on MCDN Alternate Routing operation for each SBOC prompt.

The MCDN Alternate Routing feature is triggered at the controlling node when a Call Clearing message (DISCONNECT or RELEASE COMPLETE) is received, and the cause value in the Call Clearing message is supported for the MCDN Alternate Routing feature. The cause values which activate the MCDN Alternate Routing feature are:

- Cause 3 = No route to destination
- Cause 27 = Destination is out of service
- Cause 34 = No channel/circuit available
- Cause 38 = Network out of order
- Cause 41 = Temporary failure
- Cause 42 = Congestion

Note: If any of the cause values listed below are received in a Call Clearing message, the non-MCDN Alternate Routing retry operation occurs; that is, an attempt is made to retry the call. The retry first attempts to find another idle channel in the same route. If all the channels in that route are busy, it attempts to find another channel in the next alternate route in the Route List Block.

- Cause 6 = Channel unacceptable
- Cause 44 = Requested circuit/channel not available
- Cause 82 = Identified channel does not exist

Refer to Figure 36, Originating node operation. If Node C sends one of the non-MCDN Alternate Routing cause values, the Call Clearing message is sent back to Node A which attempts non-MCDN Alternate Routing.

Refer to Figure 37, Transit node operation. If Node C receives one of the non-MCDN Alternate Routing cause values:

- Node C attempts to find an alternate route but none is available.
- Node B is a transit node and does not attempt to find an alternate route.
- Node A attempts to find an alternate route but none is available.

Originating node operation

Consider the following calling scenario for an originating node operation. An attempt is being made to establish a call over an MCDN link, from originating node A to terminating node D, through transit nodes B and C. Congestion occurs between nodes C and D.

Whether node C is defined as SBOC = RRA or RRO or NRR, the congestion message, along with a MCDN Alternate Routing feature cause value, is always sent back to node B.

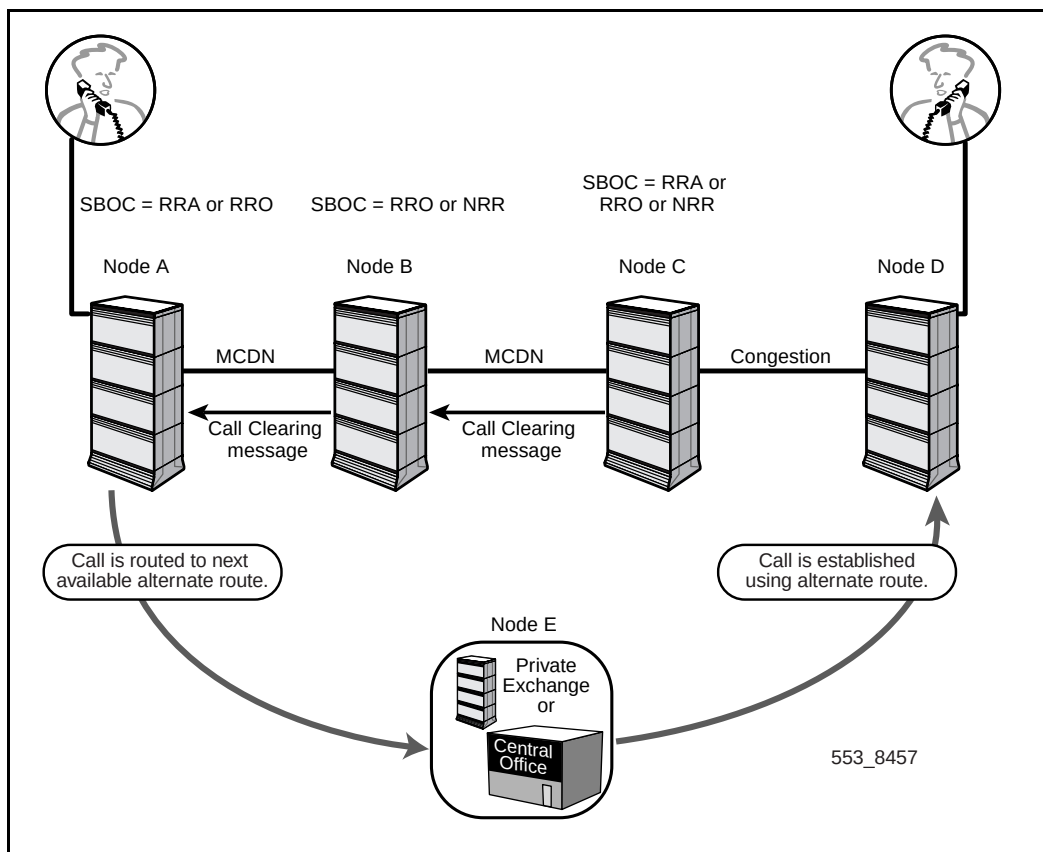
At node B, the SBOC option is checked to determine the routing treatment:

- If **node B is defined as SBOC = NRR**, the Call Clearing message is sent back to the preceding node, A.
- If **node B is defined as SBOC = RRO**, the Call Clearing message is sent back to node A because A is the originating node.
- If **node B is defined as SBOC = RRA**, an attempt is made to find an available alternate route until all of the alternate routes, as defined in the Route List (the RLB prompt in LD 86) are tried. If no alternate route is available, the congestion message information is sent from node B to the preceding node, A.

In the originating node operation, node A must be defined as SBOC = RRA or RRO to perform MCDN alternate routing from node A to E to D.

Figure 36 illustrates an originating node operation. With congestion between nodes C and D, the Call Clearing message is sent from node C to B. Because node B is defined as SBOC = RRO or NRR, the Call Clearing message is sent back to node A. With node A defined as RRA or RRO, an attempt is made to find an available alternate route. The first available alternate route is found between nodes A and E. Node E can be either a Private Exchange or Central Office. The Network Class of Service access checks are passed, the direct leg between the congested node, C, is released, and an alternate route is created from node A through node E. The call is then rerouted from nodes A and E to the terminating node, D. The call is established using alternate route.

Figure 36
Originating node operation



Transit node operation

Consider the following calling scenario for a transit node operation. An attempt is being made to establish a call over an MCDN link, from originating node A to terminating node D, through transit nodes B and C. Congestion occurs between nodes C and D.

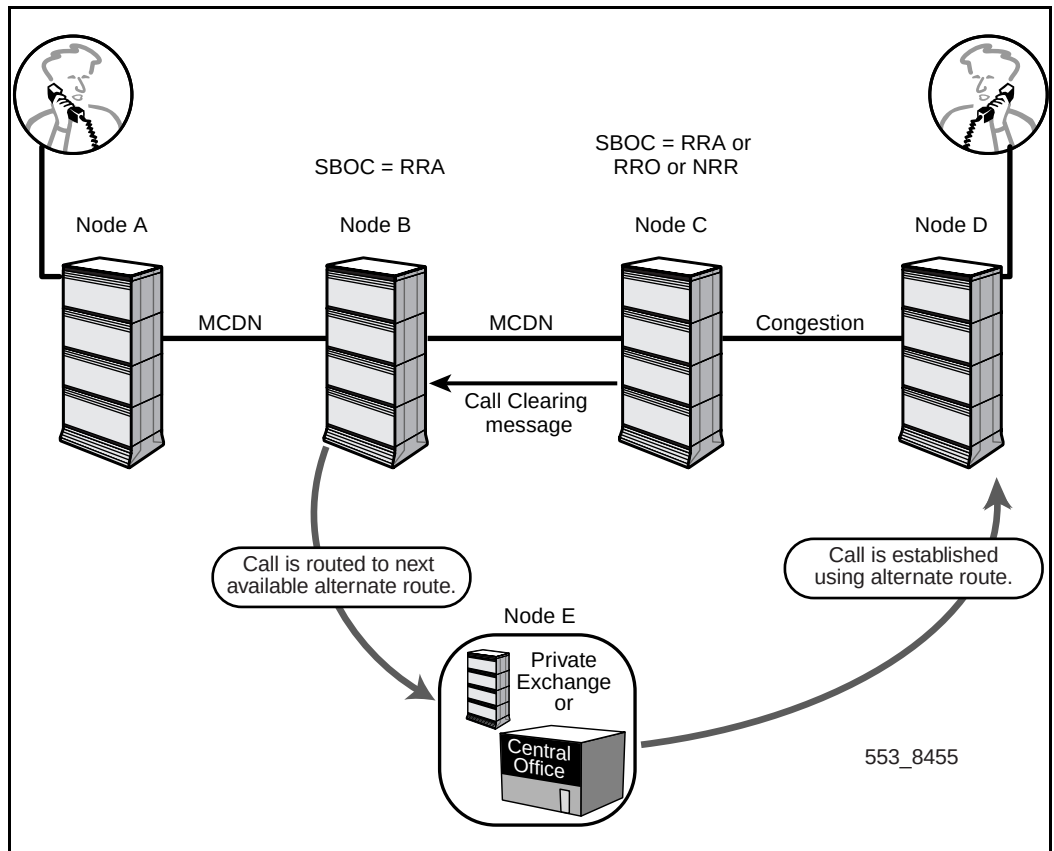
Whether node C is defined as SBOC = RRA or RRO or NRR, the congestion message, along with a MCDN Alternate Routing feature cause value, is always sent back to node B.

At node B, the SBOC option is checked to determine the routing treatment:

- If **node B is defined as SBOC = NRR**, no rerouting occurs; the Call Clearing message is sent back to the preceding node, A.
- If **node B is defined as SBOC = RRO**, the Call Clearing message is sent back to the preceding node, A, because node B is not the originating node.
- If **node B is defined as SBOC = RRA**, an attempt is made to find an available alternate route until all of the alternate routes, as defined in the Route List (the RLB prompt in LD 86) are tried.

Figure 37 illustrates a transit node operation with node B defined as SBOC = RRA. The first available alternate route is found between nodes B and E. Node E can either be a Private Exchange or Central Office. The Network Class of Service access checks are passed, the direct leg between the congested node (node D) is released, and an alternate route is created from node B through node E to the terminating node, D.

Figure 37
Transit node RRA operation

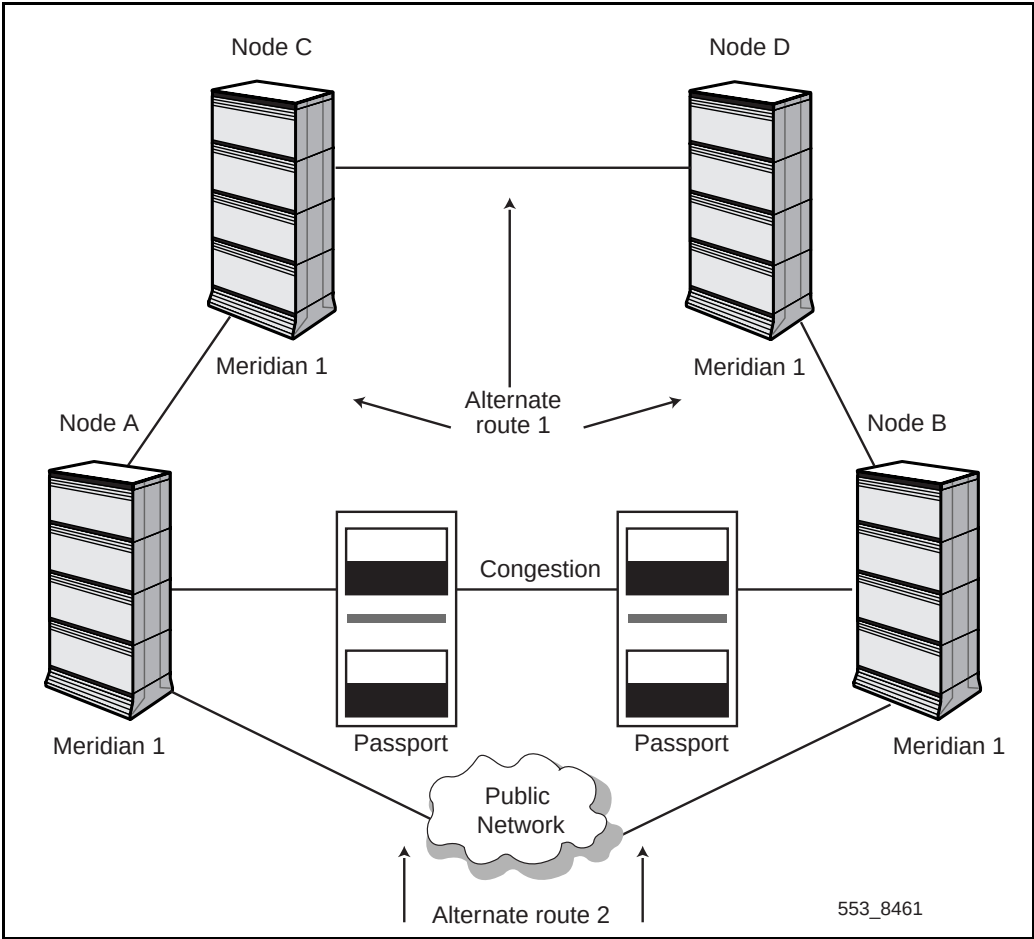


MCDN Alternate Routing examples

Example 1: Meridian 1 networked with Passport

In this scenario (refer to Figure 38), node A attempts to call node B using a primary route through Passport. The primary route is congested. Passport sends the cause value in the Call Clearing message to node A. With node A defined as SBOC = RRA or RRO, the cause value triggers a retry to make the call through the next alternate route. Alternate route 1 is from node A to node B through nodes C and D. If alternate route 1 is unavailable, then an attempt is made to route the call through alternate route 2: node A to node B through the Public Network.

Figure 38
Example of Meridian 1 with Passport network

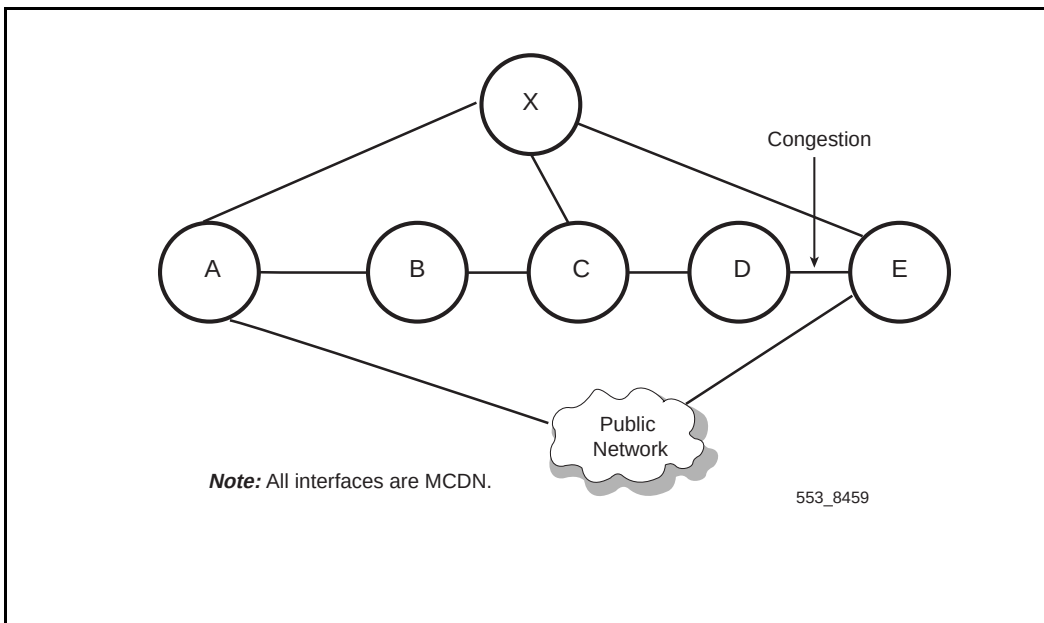


Example 2: Multi node network

Consider a scenario (refer to Figure 39) where a call is made from node A to node E through nodes B, C, and D. If there is congestion between nodes D and E, the Call Clearing message is sent from node D to node C:

- If node C is defined as SBOC = RRA, an attempt is made to find an alternate route. An alternate route is found from node C through node X to node E.
- If node C is defined as SBOC = RRO or NRR, the Call Clearing message is sent back to node B. Whether node B is defined as SBOC = NRR or RRO or RRA, the Call Clearing message is sent back to node A. Whether node A is defined as SBOC = RRO or RRA, an attempt is made to find an alternate route. Alternate routes in this case are either from node A through node X to node E or from node A to node E through the Public Network.

Figure 39
Example of multi node network

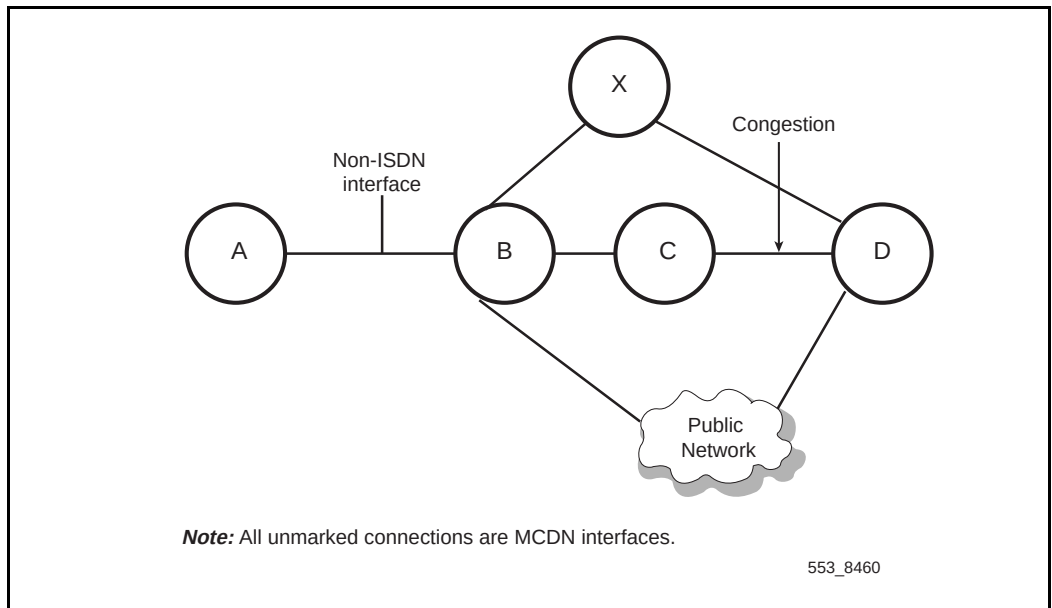


Example 3: Tandem call with non-ISDN originating node

This scenario (refer to Figure 5) shows a tandem call with a non-ISDN originating node. When a call is made from node A to node D, the call is routed through nodes B and C. Congestion is encountered between nodes C and D.

Whether node C is defined as SBOC = RRA or RRO or NRR, the Call Clearing message is always sent back to node B.

- If node B is defined as SBOC = RRA, an attempt is made to find an alternate route. The alternate route through node X or through the Public Network to terminating node D is used to route the call.
- If node B is defined as SBOC = RRO or NRR, no alternate routing is attempted because the link between nodes B and A is non-ISDN. The call is cleared according to non-MCDN Alternate Routing operations.

Figure 40**Example of a tandem call with non-ISDN originating node**

Operating parameters

Route Access codes are not supported for MCDN Alternate Routing. The Coordinated Dialing Plan (CDP) or the Uniform Dialing Plan (UDP) is required for MCDN Alternate Routing, but not both. If UDP is used, Network Alternate Route Selection (NARS) or Basic Alternate Route Selection (BARS) must be provisioned.

Feature interactions

Automatic Least Cost Routing

When a Call Clearing message is received, the MCDN Alternate Routing feature attempts a retry through the next alternative route, whether the alternative route is an Initial Set (ISET) or an Extend Set (ESET) route.

Drop Back Busy

If both the MCDN Alternate Routing feature and Drop Back Busy feature are configured in the same MCDN network, the MCDN Alternate Routing feature takes precedence.

Expensive Route Warning Tone

The Expensive Route Warning Tone is provided at the originating node when the MCDN Alternate Routing attempts to re-route the call through an expensive route. The Expensive Route Warning Tone is **not** provided when re-route to an expensive route occurs at a transit node.

Intercept treatment

The intercept treatment for network blocking is not applied at the transit node if the MCDN Alternate Routing feature is active at the transit node. The call is dropped back with the appropriate congestion IE information.

If the MCDN Alternate Routing feature fails to find an alternate route for a call encountering congestion at a transit node, intercept treatment is not applied at the transit node. The call is dropped back to the originating node with the appropriate congestion IE information.

Integrated Services Access

The MCDN Alternate Routing feature is supported for MCDN Integrated Services Access (ISA) routes.

ISDN Signaling Link

The MCDN Alternate Routing feature is supported for MCDN D-Channel ISDN Signaling Link (ISL) routes.

Network Attendant Service

The Network Attendant Service (NAS) feature operation is transparent to the MCDN Alternate Routing. The NAS drop back function takes priority over the MCDN Alternate Routing drop back function.

Off-Hook Queuing

Off-Hook Queuing (OHQ) takes precedence over the MCDN Alternate Routing feature. At the node where congestion is first encountered, if all outgoing routes are busy, the call is cleared back immediately to the preceding node only if there are no queuing features at this node.

The MCDN Alternate Routing feature comes into operation only at the preceding node when a Call Clearing message is received. OHQ waits until the busy route becomes available. If this route does not become available before OHQ times out, a Call Clearing message is sent.

Overlap Signaling

The MCDN Alternate Routing feature is supported over both the enbloc and overlap signaling methods.

Remote Virtual Queuing

The MCDN Alternate Routing feature takes precedence over Remote Virtual Queuing (RVQ) when congestion is encountered at the tandem node: an attempt is made to find an alternative route instead of informing the call originator to activate Ring Again Allowed.

Trunk Barring

If trunk barring prevents any trunk to trunk connection at the tandem node, the MCDN Alternate Routing feature retries on the next available route in the Route List Index (RLI).

Virtual Network Services

The MCDN Alternate Routing feature can function over all MCDN-based bearer interfaces supporting Virtual Network Services (VNS).

Feature packaging

The MCDN Alternate Routing feature requires the following packages:

- Basic Routing (BRTE) package 14
- Network Class of Service (NCOS) package 32
- Coordinated Dialing Plan (CDP) package 59 **or** Uniform Dialing Plan (UDP)
 - UDP requires either Network Alternate Route Selection (NARS) package 58 or Basic Alternate Route Selection (BARS) package 57
- Digital Trunk Interface (DTI) package 75

For an ISDN Primary Rate Interface (PRI), the following packages are required:

- ISDN Signaling (ISDN) package 145
- 1.5 Mbit/s Primary Rate Access (PRA) package 146 **or** ISDN Signaling Link Interface (ISL) package 147

Feature operation

There are no operating procedures required to use this feature.

MCDN End to End Transparency

Meridian Customer Defined Network (MCDN) services are based on propriety specific Integrated Services Digital Network (ISDN) signaling. The MCDN End to End Transparency feature conveys MCDN proprietary services on a standardized interface, ISDN QSIG. The QSIG gateway supports MCDN features both in a QSIG network and a mixed MCDN/QSIG network. It is the MCDN QSIG conversion tool which provides the basis for support of the selected MCDN applications such as Network Attendant Service (NAS), Network Automatic Call Distribution (NACD), and Network Message Service (NMS).

The MCDN End to End Transparency feature supports the following features:

- MCDN to QSIG encapsulation conversion tool
- NAS using the QSIG transport
- NACD using the QSIG transport
- Network Message Service - Message Center (NMS-MC) and Network Message Service - Meridian Mail (NMS-MM) using the QSIG transport

All three MCDN applications, NAS, NACD, and NMS, are supported over the ISDN Primary Rate Interface (PRI) using the QSIG generic functional protocol (transport).

Figure 41 shows the MCDN End to End Transparency feature with QSIG links; Figure 42 shows the MCDN End to End Transparency feature in a mixed QSIG/MCDN network.

Figure 41
MCDN End to End Transparency feature with QSIG links

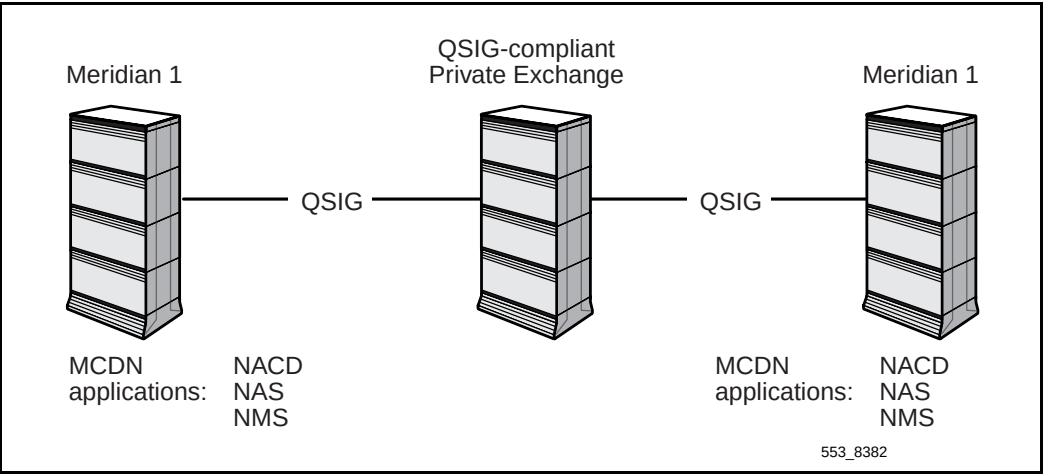
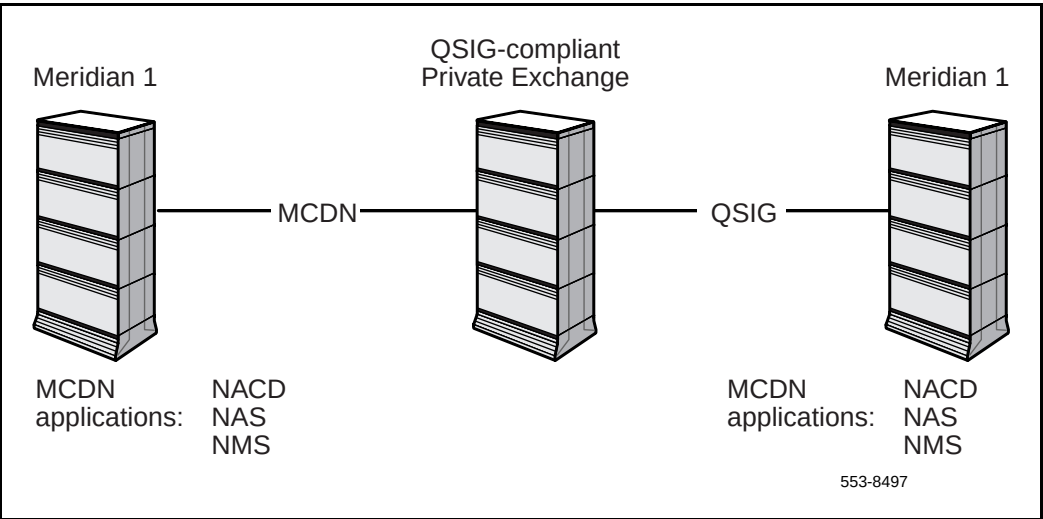


Figure 42
MCDN End to End Transparency feature with QSIG/MCDN links



NAS using the QSIG transport

The MCDN End to End Transparency feature supports NAS on the ISDN Primary Rate Interface (PRI) using the QSIG transport. The following NAS functionalities are available on QSIG:

- NAS Routing
- ISDN Call Connection Limitations
- Incoming Call Indication
- Attendant Break-In
- NAS Anti-Tromboning
- Call Extension
- Timed Reminder Recall
- Camp-On
- Call Waiting

For further information about these NAS features, see *ISDN Primary Rate Interface description and administration* (553-2901-100).

NACD using the QSIG transport

The MCDN End to End Transparency feature supports NACD on the ISDN Primary Rate Interface (PRI). The ESN Coordinated Dialing Plan (CDP) or Uniform Dialing Plan (UDP) is required but may not be mixed together. The following NACD functionalities are available on QSIG:

- Make Set Busy (MSB) key
- Not Ready (NRD) key
- Individual DN key (IDN)
- Dialed Number Identification Service (DNIS) and DNIS Name Display
- Calling Line Identification (CLID)
- ACD-C and ACD-D reports

For information about these NACD features, see *Network ACD description and operation* (553-3671-120).

NMS-MC and NMS-MM using the QSIG transport

The MCDN End to End Transparency feature supports both NMS-MC and NMS-MM on the ISDN Primary Rate Interface (PRI) using the QSIG transport.

NMS-MC using the QSIG transport provides:

- Message Center access (direct or indirect)
- Message Waiting Indication notification

A direct call results from a station dialing the DN of the Message Center or pressing the Message Waiting key. An indirect call is a call network redirected to the Message Center.

NMS-MM using the QSIG transport provides:

- Meridian Mail access (direct or indirect)
- Message Waiting Indication notification
- NMS-MM features except Call Sender and Thru-Dialing

For further information about these NMS-MC and MNS-MM features, see *ISDN Primary Rate Interface description and administration* (553-2901-100).

Operating parameters

The Manufacturer Specific Information (MSI) carries the MCDN proprietary information transparently over a QSIG network. The third-party node must support the QSIG generic functional protocol (transport) and MSI.

Directory Number (DN) address translation requires the association with a customer number, as configured using the CUST prompt in LD 15.

Either CDP or UDP is required but they may not be mixed together.

Digit manipulation is not supported for DN transported on QSIG.

Operating parameters for NAS using the QSIG transport

Attendant and users must be located on Meridian 1 nodes to obtain full NAS capabilities.

For NAS Anti-Tromboning capability, both legs must be on the same D-Channel. If the tromboning occurs with one MCDN trunk and one QSIG trunk, the redundant legs are not removed because they are not associated with the same D-Channel.

For a call established through International Standards Organization (ISO) QSIG trunks, the transit counter information is not updated at a QSIG tandem node because the message information is transparent; therefore, the transit counter does not reflect exactly the number of transit nodes the call has gone through.

NAS using the QSIG transport does not support Supervisory Console, Call Park, Charge Account, Do-not disturb and Group Do-not disturb, Barge-in, or Emergency Transfer.

Operating parameters for NACD using the QSIG transport

With the MCDN End to End Transparency feature, NACD continues to work fully with Symposium in an MCDN network. The MCDN End to End Transparency feature does not support NACD with Symposium using the QSIG transport or a mixed MCDN/QSIG network.

Messages which are resent at the first timer expiration on MCDN are sent once only on QSIG. At the first timer expiration on QSIG, the transaction is cancelled. This applies to the following messages: database update, the logical call request, the cancellation (from source or from target and for any reason) and the status exchange.

Operating parameters for NMS-MC and NMS-MM using the QSIG transport

NMS-MC and NMS-MM using the QSIG transport indirect access is based on the QSIG Call Diversion feature. The QSIG Call Diversion feature must be available and configured in the network.

NMS-MC using the QSIG transport is provided for NMS-MC users and operations located on Meridian 1 nodes.

NMS-MM using the QSIG transport supports all NMS-MM features except Call Sender and Thru-Dialing.

Feature interactions

Feature interactions with NAS using the QSIG transport

Interactions specific to NAS using the QSIG transport are discussed in the following section. Refer to *ISDN Primary Rate Interface description and administration* (553-2901-100) for generic NAS feature interactions.

QSIG Transit Counter

The QSIG Transit Counter Information Element (IE) is defined only with the ETSI interface; it carries the number of transit nodes the call has gone through. It is updated when a SETUP is sent on an ETSI QSIG trunk. Similarly, the NAS ISDN Call Connection Limitations (ICCL) information is updated when a SETUP is sent on a NAS MCDN or QSIG trunk.

For a call established using the International Standards Organization (ISO) interface for QSIG trunks, the counter information is not updated at a QSIG tandem node because the message information is transparent; therefore, the transit counter does not reflect exactly the number of transit nodes the call has gone through.

QSIG Attendant Recall

QSIG Attendant Recall allows a call extended on an ETSI QSIG trunk to recall the attendant if it is not answered within a customer-defined time. When ETSI QSIG is used and MQC_FEAT is set to NAS, NAS Timed Reminder Recall is enabled and takes precedence over QSIG Attendant Recall.

QSIG ANF Path Replacement/QSIG Call Transfer

QSIG ANF Path Replacement allows an established connection through a QSIG private network to be replaced by a new connection after a call modification to obtain a more efficient connection. It handles triangulation as well as tromboning mechanisms.

QSIG ANF Path Replacement take precedence on NAS anti-tromboning if the “Call transfer complete” FACILITY message is received before the ‘Call extension complete’ FACILITY message. Otherwise, NAS anti-tromboning applies and the QSIG ANF Path Replacement is not initiated when a ‘Call transfer complete’ FACILITY message is received.

Feature interactions with NACD using the QSIG transport

Interactions specific to NACD using the QSIG transport are discussed in the following section. Refer to *Network ACD description and operation* (553-3671-120) for information on generic NACD feature interactions.

QSIG Name Display

When QSIG Name Display is configured using the QSIG transport D-Channels and the name is allowed to be displayed and if the call is diverted to the target node through NACD routing, the originator's name is displayed on the target agent's set and the name of the target agent's ACD DN is displayed on the originator's set when the target agent answers the call.

Feature interactions with NMS-MC using the QSIG transport

Interactions specific to NMS-MC using the QSIG transport are discussed in the following section. Refer to *Network ACD description and operation* (553-3671-120) for information on generic NACD feature interactions.

NACD and NAS encapsulation within QSIG

For ACD and attendant Message Centers that are NACD or NAS, the ACD agents and attendants may reside at different nodes. With packaging requirements satisfied at the node where the MC call is presented, either the NACD agents or the NAS attendants are treated as a Message Center.

If the Message Center is an attendant, the NMS-MC feature operation remains the same as for a simple NMS-MC set. If the attendant NMS-MC has a specific ICI key defined, when a message Waiting call terminates to the attendant NMC-MC, the ICI lamp changes to lit to indicate a NMS-MC call.

As for MCDN, it is not recommended to use NACD or NAS as a NMS-MC unless the message data base can be made available to all agents or attendants at different nodes.

Feature packaging

The MCDN End to End Transparency feature requires these packages:

- MCDN End to End Transparency (MEET) package 348
- Multi-purpose Serial Data Link (MSDL) package 222
- QM reference signaling point Interface (QSIG) package 263
- QSIG Generic Functional protocol (QSIGGF) package 305

Depending on the application, other packages are also required.

For the QSIG ISDN PRI interface, the following packages are also required:

- ISDN Signaling (ISDN) package 145
- 1.5 Mbit/s Primary Rate Access (PRA) package 146
- Advanced ISDN Network Services (NTWK) package 148

For NAS using the QSIG transport, you must have the ISDN PRI packages and the following packages (the same packages as required for on the MCDN transport):

- Basic Routing (BRTE) package 14
- Basic Queuing (BQUE) package 28
- Network Class of Service (NCOS) package 32
- Network Alternate Route Selection (NARS) package 58
- Coordinated Dialing Plan (CDP) package 59
- Flexible Call Back Queuing (FCBQ) package 61
- Multi-Tenant Service (TENS) package 86
- Attendant Break-In/Trunk Offer (BKI) package 127
- Network Attendant Service (NAS) package 159
- Remote Virtual Queuing (ORC/RVQ) package 192

Note 3: NAS packages and Attendant Overflow Position (AOP) are mutually exclusive and cannot be equipped on the same system.

Note 4: NAS packages and Centralized Attendant Service (CAS) are mutually exclusive and cannot be packaged together.

For NACD using the QSIG transport, you must have the ISDN PRI packages and the following packages (the same packages as required for NACD on the MCDN transport):

- Basic Routing (BRTE) package 14
- Digit Display (DDSP) package 19
- Basic Queuing (BQUE) package 28

- Network Class of Service (NCOS) package 32
- Basic Automatic Call Distribution (BACD) package 40
- Automatic Call Distribution, Package B (ACDB) package 41
- Basic Alternate Route Selection (BARS) package 57 **or** Coordinated Dialing Plan (CDP) package 59 **or** Network Alternate Route Selection (NARS) package 58
- ACD Enhanced Flow (EOVF) package 178
- Network Automatic Call Distribution (NACD) package 207

For NMS-MC using the QSIG transport, you must have the ISDN PRI packages and the following packages (the same packages as required for NMS-MC on the MCDN transport):

- Message Waiting Center (MWC) package 46
- Network Message Services (NMS) package 175

In addition, Automatic Call Distribution (ACD) Messages Services require the following ACD packages.

- Basic Automatic Call Distribution (BACD) package 40
- Automatic Call Distribution, Package B (ACDB) package 41
- Automatic Call Distribution, Package C (ACDC) package 42
- Automatic Call Distribution, Package A (ACDA) package 45

For NMS-MM using the QSIG transport, you must have the ISDN PRI packages and the following packages (the same packages as required for NMS-MM on the MCDN transport):

- End-To-End Signaling (EES) package 10
- Integrated Message System (IMS) package 35 (for home node only)
- Basic Automatic Call Distribution (BACD) package 40
- Automatic Call Distribution, Package A (ACDA) package 45
- Message Waiting Center (MWC) package 46
- Command/Status Link (CLS) package 77
- Network Message Services (NMS) package 175

Feature operation

For NAS and NMS-MC and NMS-MM feature operation, see *ISDN Primary Rate Interface description and administration* (553-2901-100).

For NACD feature operation, see *Network ACD description and operation* (553-3671-120).

Manual Trunk Service

This service is not supported over ISDN facilities.

Meridian 1 PRI to DMS-100

Connection to a Central Office equipped with a DMS-100 can be accomplished using three methods:

- 1 **Dedicated channels:** similar to Digital Trunking-DTI, but with Calling Line Identification (CLID), speed of call setup and out-of-band signaling.
- 2 **Call by Call (ISA):** service selection without maximum or minimum settings for each trunk type. This arrangement would ultimately provide blockage to some routes.
- 3 **Call by Call (ISA):** service selection with maximum and minimum settings for each trunk type. This may also be referred to as dynamically allocating trunk types on a call by call basis.

Note that a combination of options is also possible, i.e. dynamically allocating some channels, while providing a number of dedicated channels per customer's request all on the same link.

Availability

The availability of the above options depends on local service offerings.

Software implementation and feature activation coordination between the Central Office and Meridian 1 PBX personnel is very critical and must be achieved during initial installation and on an ongoing basis.

Considerations

Configuration of this link requires consideration of software constraints in its initial implementation. Some of these considerations are listed below:

- Only one incoming WATS route at any time can be configured on this link. Work-arounds are possible using TIE routes and must be arranged with the central office. This constraint applies to methods 2 and 3 above.
- Only one incoming COT or incoming DID route can be configured. The link can only support DID or DOD but not both. Again, work-arounds are possible using TIE route and must be arranged with the central office. This constraint applies to methods 2 and 3 above.

A Meridian 1 PRI to a DMS-100 interconnection requires a Uniform (UDP) or Coordinated (CDP) Dialing Plan plus ISDN if you are in a private network environment.

Package requirements

This feature requires the following options:

ISDN	option 145
PRI	option 146
NARS	option 58
CBC (DCA)	Option 117
NTWK	option 148 (for Centrex connectivity)

Note: In the above chart, CBC is Call by Call without maximum or minimum settings (Method 2). DCA is Dynamic Channel Assignment (Method 3).

Meridian Mail Trunk Access Restriction

The Meridian Mail Trunk Access Restriction (MTAR) feature prevents direct or indirect call transfer or conference of external calls to Meridian Mail. In this feature, external calls are defined as incoming/outgoing trunk calls that originate or terminate outside a private network.

This definition is applicable to all types of trunks, with the exception of TIE trunk calls. External calls are separated from a transferring/conferencing set on a network using TIE trunks. MTAR operation is dependant on the information sent to the remote node from the node that is attempting to transfer/conference. MTAR is triggered if the network information (such as Network Attendant Service or Calling Line Identification) indicates that an external call and a transfer/conference attempt to Meridian Mail is occurring. MTAR is also triggered if local information, such as Route Class, indicates an external call and a transfer/conference attempt to Meridian Mail is occurring.

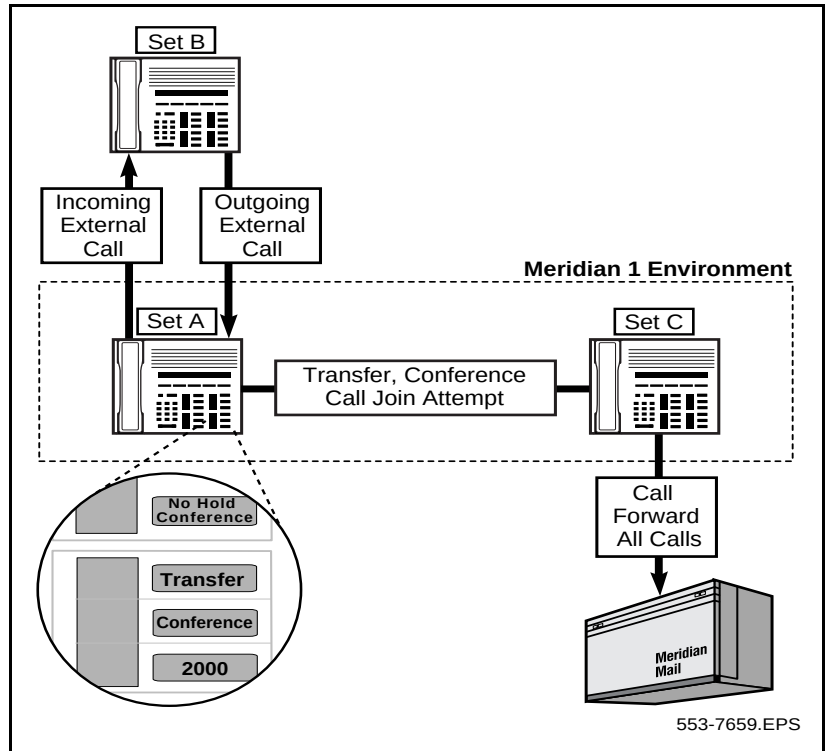
Meridian Mail Trunk Access Restriction averts potential Meridian Mail system abuse by distinguishing between internal and external calls that are directed to Meridian Mail. When activated, Meridian Mail Trunk Access Restriction impacts the operation of the following features:

- Call Transfer
- Conference,
- No Hold Conference, and
- Call Join capabilities of the Multi-Party Operation feature.

Meridian Mail Trunk Access Restriction prevents the completion of any Call Transfer, Conference, No Hold Conference or Call Join attempts on incoming/outgoing external calls to Meridian Mail.

As illustrated in Figure 43, Maters capabilities prevent an established call between Set A, an internal call, and Set B, an external call, from being forwarded to Meridian Mail. When Set A attempts to either Transfer, Conference, No Hold Conference or Call Join Set B to Set C, which is either a direct Meridian Mail DN or has activated Call Forward All Calls (CFAC) to Meridian Mail, the transfer and conference keys are ignored when pressed to complete operation.

Figure 43
Meridian Mail Trunk Access Restriction Call Transfer



Operating parameters

MTAR does not treat Centralized Attendant Position and Night Attendant sets as Attendant Consoles. These sets receive treatment based on their actual set type. For example, if the night attendant is a Meridian 1 proprietary set, then it is treated as Meridian 1 proprietary set.

The operation of an Attendant Console is not affected when this feature is enabled. An attendant can transfer or conference an external line to Meridian Mail directly or indirectly.

MTAR does not affect Automatic Attendant, Customer Controller Routing, Integrated Voice Response or Meridian Link features. However, if a user disallows any of these features from accessing Meridian Mail, the application must be written to take this into account.

Call transfer from ISDN Basic Rate Interface (BRI) set is not supported.

In a networking environment, Meridian Mail must reside on the same node as the transferring/conferencing set.

Feature interactions

Traffic Reporting

Traffic Reporting and Meridian Administration Tool's (MAT) traffic report, TFC005, are modified to report the number of times this feature is requested. A new line is added for the Meridian Mail Trunk Access Restriction which is identified by the feature number "27" and its peg count.

Network Call Transfer

Network Call Conference

Meridian Mail Trunk Access Restriction (MTAR) requires the transferring or conferencing set and Meridian Mail to be located on the same node. If the transferring or conferencing set are located not on the same node as Meridian Mail, the MTAR feature is not provoked because the call transfer/ conference attempt is terminated by a network on Meridian Mail.

However, an external call can be transferred or conferenced over the network, using TIE trunks. This operation is dependant on the type of network information the remote node forwards to the node where the transfer/conference attempt is made. Meridian Mail must be on the transferring/conferencing node. If network information is provided, indicating that an external call is attempting to transfer/ conference to Meridian Mail, the MTAR feature is invoked. When no network information is provided, MTAR is provoked if the local information (Route Class) indicates that an external call to Meridian Mail is being attempted.

Feature packaging

Meridian Mail Trunk Access Restriction requires Message Waiting Center (MWC) package 46.

Feature operation

Call Transfer/Conference

Meridian 1 Proprietary Set

Set A is a Meridian 1 proprietary set with Transfer Key and Conference Key.

- 1 An incoming/outgoing external call is established between Set A and Set B, an external party. The call between Set A and Set B is active on Key X.
- 2 Set A presses the Transfer/Conference Key that automatically puts Set B on Hold.
- 3 Set A dials Set C. Set C has either Call Forward All Calls to Meridian Mail or is a Meridian Mail DN.
- 4 When Set A attempts to transfer/conference Set B by pressing more than once the Transfer/Conference Key it is ignored.
- 5 Set A recovers Set B by pressing Key X.

No Hold Conference

Meridian 1 Proprietary Set/ISDN BRI Set

When Meridian Mail Trunk Access Restriction is enabled, direct or indirect no hold conference to an external call is permitted. During direct or indirect no hold conference, the calling party is never put on hold.

Set A is a Meridian 1 proprietary set or an ISDN BRI set with a No Hold Conference Key configured as either No Hold Conference, Conference Autodial, Conference Speed or Conference Hotline.

- 1 An incoming/outgoing external call is established between Set A and Set B, an external party. The call between Set A and Set B is active on Key X.
- 2 Set A presses the No Hold Conference Key.
- 3 Set A dials Set C. Set C is has either Call Forward All Calls to Meridian Mail enabled or is a Meridian Mail DN.
- 4 The conference is set up as normal. However a two party connection between Set B, an external party, and Meridian Mail is not allowed if the call controller releases. If this occurs, the connection between the trunk and Meridian Mail party is dropped.

Transfer

Analog (500/2500 type) Set

Set A is an Analog (500/2500 type) set with a XFA Class of Service (transfer and three/six party conference allowed).

- 1 An incoming or outgoing external call is established between Set A and Set B, an external party.
- 2 Set A performs a switchhook flash that puts Set B on hold.
- 3 Set A dials Set C. Set C has either Call Forward All Calls to Meridian Mail enabled or is a Meridian Mail DN.
- 4 Before or after the Meridian Mail has answered, Set A attempts to transfer Set B to Meridian Mail by going on-hook.
- 5 This attempt is treated as an illegal transfer. Set A is re-rung and reconnected with Set B when going off-hook.

Conference

Analog (500/2500 type) Set

Set A is an Analog (500/2500 type) set with a XFA Class of Service (transfer and three/six party conference allowed).

- 1 An incoming or outgoing external call is established between Set A and Set B, an external party.
- 2 Set A performs a switch hook flash that puts Set B on hold.
- 3 Set A dials Set C. Set C has either Call Forward All Calls to Meridian Mail enabled or is a Meridian Mail DN.
- 4 Before or after the Meridian Mail has answered, Set A attempts to conference Set B to Meridian Mail by performing another switchhook flash.
- 5 The conference is not permitted. Set A is reconnected to Set B. The call to Meridian Mail is disconnected.

Set A is an Analog (500/2500 type) set with a TSA Class of Service (three party service allowed).

- 1** An incoming or outgoing external call is established between Set A and Set B, an external party.
- 2** Set A perform a switch hook flash that puts Set B on hold.
- 3** Set A dials Set C. Set C has either Call Forward All Calls to Meridian Mail enabled or is a Meridian Mail DN.
- 4** Before or after Meridian Mail has answered, Set A attempts to conference Set B to Meridian Mail by dialing the conference control digits.
- 5** The conference is not permitted and Set A is reconnected to Set B. The call to Meridian Mail is disconnected.

Table 32 summarizes how different external calls are handled when Meridian Mail Trunk Access Restriction is enabled.

Table 32
Summary of Meridian Mail Trunk Access Restrictions

Telephone	External Call Type	Operation	Failure Treatment	Result
500/2500	Incoming	Transfer to Meridian Mail (MMail)	Re-ring to transferring set	Not allowed
500/2500	Incoming	Transfer to set with Call Forward All Calls (CFAC) to MMail	Re-ring to transferring set	Not allowed
500/2500	Outgoing	Transfer to MMail	Disconnect external call and Meridian Mail	Not allowed
500/2500	Outgoing	Conference to set with CFAC to MMail	Disconnect external call and Meridian Mail	Not allowed
500/2500	Outgoing/ Incoming	Conference to MMail	Reconnect to external call. Disconnect call to MMail	Not allowed
500/2500	Outgoing/ Incoming	Conference to set with CFAC to MMail	Reconnect to external call. Disconnect call to MMail	Not allowed
Meridian 1 Proprietary	Outgoing/ Incoming	Transfer/Conference to MMail	Operation ignored	Not allowed
Meridian 1 Proprietary	Outgoing/ Incoming	Transfer/Conference to set with CFAC to MMail	Operation ignored	Not allowed
Meridian 1 Proprietary	Outgoing/ Incoming	No Hold Conference to Meridian Mail or to set CFAC to MMail	Not applicable	Allow
Meridian 1 Proprietary	Outgoing/ Incoming	No Hold Conference release to make MMail to trunk two-party connection	Disconnect MMail and external trunk	Not allowed
Meridian 1 Proprietary	Outgoing/ Incoming	Call Join of external call to MMail	Operation ignored	Not allowed

Basic Rate Interface	Outgoing/Incoming	Conference to MMail	Operation ignored	Not allowed
Basic Rate Interface	Outgoing/Incoming	Conference to set with CFAC to MMail	Operation ignored	Not allowed
Attendant	Outgoing/Incoming	Transfer/Conference to Meridian Mail	Not Applicable	Allowed
Attendant	Outgoing/Incoming	Transfer/Conference to set with Call Forward All Calls to Meridian Mail	Not Applicable	Allowed

Message Waiting Indication (MWI)

Message Waiting Indication (MWI) Interworking provides a means to pass the Message Waiting Indicator across a private network with the following types of systems: Meridian 1 Option 11, DMS-100, DMS-250, SL-100. This feature is compatible with Meridian 1 Network Message Services.

Note: Throughout this discussion, the phrase “other system” refers to the DMS-100, DMS-250, or SL-100.

MWI Interworking enables Meridian 1 users to subscribe to a the voice message system on the other system, or users on the other system to subscribe to the voice message system on Meridian 1.

With this feature, a single message system can serve a combined network, with either of two configurations:

- Meridian 1 Option 11 hosts the Message Center, and serves both Meridian 1 users and users of the other system in the same enterprise group.

Figure 44
Private Corporate Network with Meridian 1 Option 11 hosting the Message Center

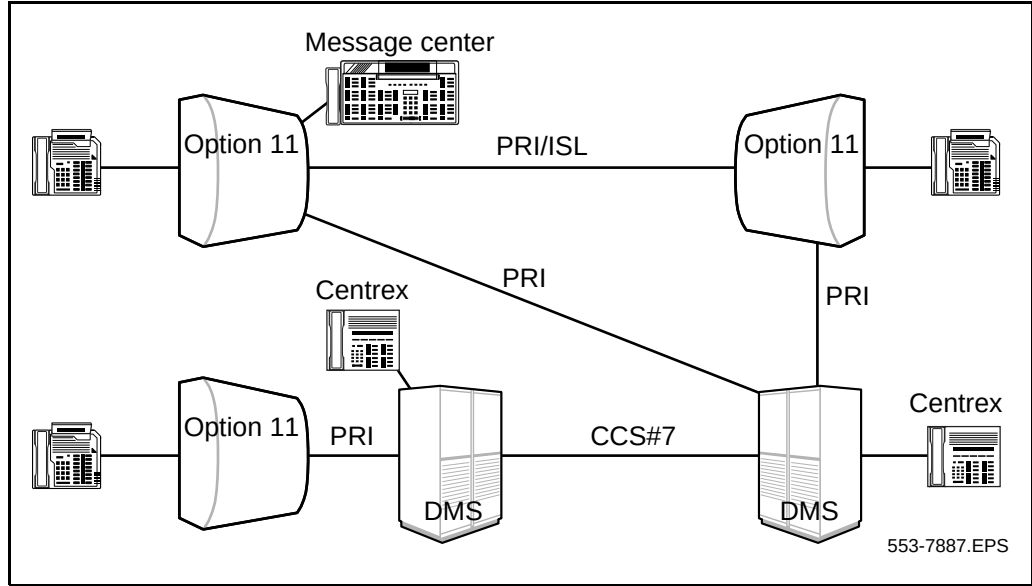
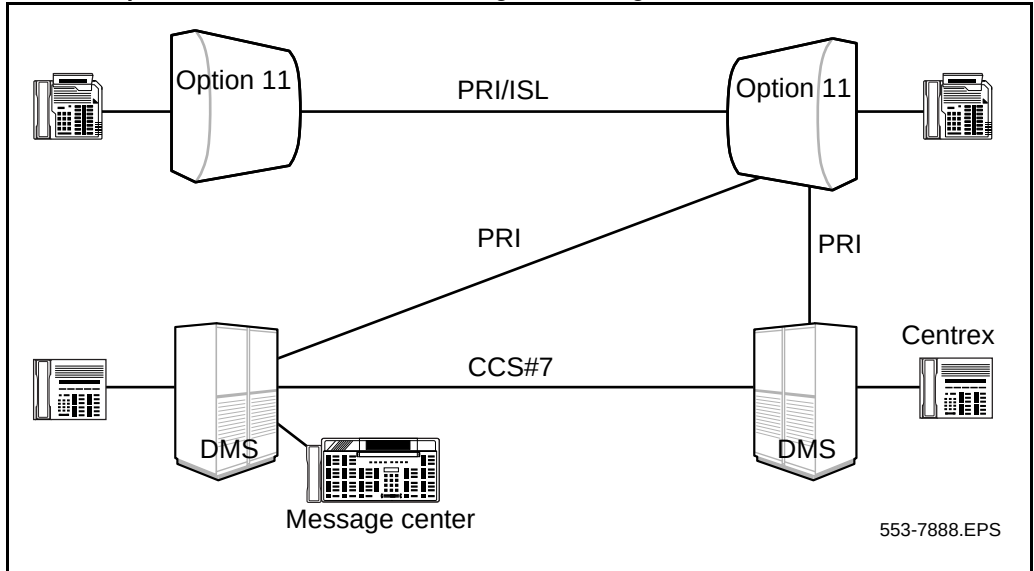


Figure 45

Private Corporate Network with DMS hosting the Message Center



Operating parameters

The switches in the network are connected as shown the Table below.

Network switch connections

To connect	Use
Meridian 1 to Meridian 1	ISDN/PRI/ISL
Meridian 1 to other system	PRI
Other system to other system	PRI/CCS#7

If the Message Center is on a Meridian-1 and it serves users on DMS, the Meridian-1 must be on X11 release 19 or later.

If the Message Center is on DMS for MWI Interworking, a Meridian-1 that is connected to DMS must be on X11 release 19 or later.

End-to-End Signalling is required to access the Message Center features from a local or remote system.

Only Meridian Mail is supported for use as the Message Center on a Meridian 1. This feature does not support any other messaging system, such as a manual Message Center hosted on a Meridian 1, a non-Meridian product hosting the Message Center, or other server applications (such as FAX servers or E-Mail).

The other system can be a tandem switch. DMS BCS 36 or later supports DMS-100, DMS-250, and SL-100 systems. Only Northern Telecom systems are supported.

Feature interactions

- Multi Customer MWI
Interworking does not support multiple customers because Meridian Mail supports only one customer. If multiple customers are required, multiple Meridian Mail servers are required.

- **Multi Tenant**
Meridian Mail Phase 8 and later supports Multi Tenant. For MWI Interworking, tenants that belong to the same customer can use one or multiple Message Center servers. Tenants from different customers cannot use the same Meridian Mail. The customer can allow (or disallow) access to this feature for specific tenants by configuring (or not configuring) the tenant's sets for call forwarding to Meridian Mail DN.
- **Trunk Optimization Before Answer**
There is no Trunk Optimization when the call is redirected to DMS, or answered by Meridian Mail. This applies to applications such as Auto Attendant.
- **Network Message Services–Meridian Mail**
The Facility message for MWI Interworking uses a different Transaction Capabilities Application Part (TCAP) format from that used for other network message services. Message conversion occurs when sending and receiving MWI Facility messages with software earlier than X11 release 19.
- **DCH Error Monitoring**
X11 release 17 DCH Error Monitoring monitors ISDN messages on a per feature basis. The conflict between the Service Identifier used by Meridian 1 and DMS for Network Message Services is resolved by providing a different Service Identifier (H70). X11 release 19 supports both the existing (H7C) and new Service Identifiers.

However, if the MWI RCAP for the D channel is added or deleted in Overlay 17, the D channel message monitoring must be disabled and enabled so that DCH Error Monitoring will work properly for the Network Message Services (NMS) feature.

- **ISDN/AP Link Recovery**
Calls in the Meridian Mail ACD queue are redirected to the ACD Night Call Forward DN when the Application Modular Link (AML) goes down.

Feature packaging

MWI Interworking is available as package 219. It requires the Network Message Service features of Meridian Mail release 7. It also requires that the other system be equipped with BCS 36 at a minimum. The package requirements for each node are described in the following tables.

Table 33
Package requirements for the originating node (the node with Message Center users)

MWI package 219	If connected to DMS (BCS 36) for Interworking
NMS package 175	
BACD package 40 and ACDA package 45	If ACD DN is used as the Message Center DN
ISDN Signaling package 145	
ISDN Primary Rate Access package 146 or ISDN Signaling Link package 147	
ISDN Network Service package 148	
Message Center (MWC) package 46	
End-to-End Signaling (EES) package 10	

Table 34
Package requirements for the host node (the node hosting the Message Center)

MWI package 219
NMS package 175
Integrated Message System (IMS) package 35
ISDN/AP package 77
BACD package 40
ACDA package 45
ISDN Signaling package 145

ISDN Primary Rate Access package 146 or ISDN Signaling Link package 147 ISDN Network Services package 148 Message Center (MWC) package 46 End-to-End Signaling (EES) package 10	X11 release 19 or later is required.

Table 35
Package requirements for the tandem node (the node that does not have Message Center users)

MWI package 219	If connected to DMS (BCS 36) for Interworking
ISDN Signaling package 145	
ISDN Primary Rate Access package 146 or	
ISDN Signaling Link package 147	
ISDN Network Services package 148	

National ISDN 2 TR-1268 Primary Rate Interface

The National ISDN 2-TR-NWT-001268 Primary Rate Interface (PRI) feature provides an Integrated Services Digital Network (ISDN) PRI interface to the Public Exchange/Central Office that conforms to portions of the National ISDN-2 (NI-2) specification as developed by the National ISDN users Forum (NIUF) and documented in Bellcore Specification TR-1268.

The Meridian 1 supports the following call services on the NI-2 interface:

- Basic call service
- Circuit-mode bearer capabilities (speech, 3.1 kHz audio, 64 kbps digital, and adapted 56 kbps to 64 kbps digital)
- Enbloc sending
- Channel negotiation
- In-band tone and announcement
- Calling number delivery, and
- A back-up D-channel is provided to improve the reliability of an ISDN PRI interface that consists of more than one Digital Signal Level 1 (DS1) facility. The primary and back-up D-channels reside on the 24th channel of separate DS1 facilities. Both D-channels provide signaling information for the interface, but only one can be in service at any given time.

The Meridian 1 does not support the following TR-1268 functionalities:

- Packet Mode Unrestricted Digital Information bearer capability
- Circuit Mode Unrestricted Digital Information at $n \times 64$ kbps, H_0 and H_{11} channels bearer capability (due to the lack of hardware support of providing contiguous timeslots)
- Up to two Calling Party Number information elements for terminating calls
- Up to two redirecting numbers provided for originating and terminating calls
- Subaddressing
- Calling party number privacy on subscription basis

- Call-by-Call Service Selection, and
- Switched DS1/Switched Fractional DS1 Service.

Operating parameters

The existing Network Call Redirection limitation on unsupported interface applies to the NI-2 interface. The Meridian 1 NI-2 interface generates the Redirecting Number (RN) Information Element (IE) of the most recent instance of redirection of an internal call forward call. If the Meridian 1 receives an RN IE at the NI-2 interface, it passes it along. If there are more than one RN IEs, the later ones are treated as duplicates and are discarded.

A maximum of 16 DS1 loops can be supported when both the primary and backup D-channels are configured (i.e., $16 \times 24 - 2 = 382$ B-channels); however, the Meridian 1 is limited to 254 trunks in a single route. Stepping to a second route is permitted only if the Meridian 1 is supported by a far end switch.

The ISDN NI-2 TR-1268 PRI feature requires a DTI/PRI card and D-channel handler card.

Feature interactions

Integrated Service Access (ISA)

Integrated Service Access is not supported on this interface.

ISDN Signaling Link (ISL)

ISDN Signaling Link is not supported on this interface.

Feature packaging

The ISDN NI-2 TR-1268 PRI Basic Call feature is contained in North American National ISDN Class II Equipment (NI2) package 291.

The following packages are also required to activate this feature:

- Integrated Services Digital Network (ISDN) package 145
- 1.5 Mbps Primary Rate Access (PRA) package 146, and
- Multi-purpose Serial Data Link (MSDL) package 222.

Feature operation

No specific operating instructions are required to use this feature.

Network ACD (NACD)

Network ACD allows call centers with multiple locations to solve the problem of fluctuating call traffic. The Network ACD feature uses Integrated Services Digital Network (ISDN) to efficiently and quickly route calls to available agents within a network of Meridian 1 systems. Using the timed overflow routing tables associated with ACD, customers can specify ACD-DNs within the Meridian 1/SL-1 network to which calls should be directed.

Note: This feature is currently incompatible with the similar feature on the SL-100.

NACD is cost effective because calls remain in queue at their original location while waiting for an agent to become available in either the source queue or one of the target queues located throughout the network. Only when an agent becomes available in a remote queue will the call actually be sent over an ISDN voice channel. Prior to the call being sent, communication between locations is handled via the ISDN D-Channel.

The management report information on package C reflects the changes introduced by the NACD feature.

ACD-MAX Release 3 supports the NACD feature. Three new reports and three additional management displays are provided to allow customers to determine call traffic patterns and service levels throughout the network. Centralization of this information will be provided with the introduction of the Network Administration Center. Network Administration Center requires an ACD-MAX in each network location and provides reports and displays on the entire NACD environment.

NACD is not supported on Package D, PDP 11 - Generic 9000 software.

For correct display on ACD-MAX, NACD supports only a UDP numbering plan. CDP will be supported at a later date. It is important to note that the system regular users can operate using one dialing plan (i.e. CDP or UDP) while the NACD operates using another numbering scheme (i.e. UDP with location codes).

Package Requirements

Network ACD package requirements are as follows:

options:
14, 19, 28, 32, 37, 40, 41, 45, 57, (58 or 59), 61, 75, 111, 145,
(146 or 147), 148, 178, 207

Note: Option 11 systems only support Meridian ACD-MAX.

Network Alternate Route Selection

This package allows for efficient alternate routing of calls across the network and provides a uniform dialing plan in an ISDN environment.

Package Requirements

Package requirements are as follows:

BRTE	option 14
BQUE	option 28
NCOS	option 32
FCBQ	option 117

Network Attendant Service

Network Attendant Service (NAS) provides stand-alone attendant capabilities throughout a network. Any node in the network may have its attendant services located at any other node in the network, part-time or full-time.

Functionality

The activation of Network Attendant Service is controlled by the NAS key on the Attendant Console. When a call is presented to an attendant and the NAS key is not activated, the call receives normal attendant service. If the NAS key is activated, the call receives alternate treatment, based on one of the NAS conditions described below.

Network Attendant Service schedule

The NAS schedule allows a prioritized list of attendant alternatives (attendant locations) to be defined for up to 31 half-hour time periods. Each period can have up to four alternate attendants defined against it. During one of these time periods, a request for attendant service will use one of the alternatives, according to the specified order - the first attendant alternate is attempted, and if all attendants are in Position Busy, the following alternate in the sequence is attempted, and so on.

If none of the attendant alternatives are available, an attempt is made to give local attendant service, which may lead to the application of local NIGHT service.

Night Service

Night Service treatment is defined individually for each node.

With the introduction of NAS routing, identifying whether or not a system is in Night Service becomes more complex. Table 36 shows when Night Service treatment is in effect. When all the conditions in a vertical column are met, the system is considered to be in Night Service.

Table 36
Determination of Night Service

Local Attendants exist	No	No	No	Yes	Yes	Yes
Local Night active				Yes	Yes	Yes
NAS key active	No	Yes	Yes	No	Yes	Yes
No alternatives in current NAS schedule		Yes			Yes	
All alternatives in current NAS schedule tried			Yes			Yes

Status of local attendants

When NAS routing is active and there is an available attendant at the local switch, the call terminates at the local attendant, if one is available. If a local attendant is not available, the call may either be placed in the local attendant queue (if the Call Waiting threshold has not been exceeded and the console Call Waiting lamp is not flashing), or may receive local NIGHT service.

Alternate routing to attendant positions

Calls can be routed from one attendant to another attendant location in the network. Each node can be programmed with the attendant DNs for up to seven other switches. Up to four of these seven attendant DNs can be used as alternatives for any one time period. Each of the four attendant alternatives for each time period can have Drop Back Busy and/or Off-hook Queuing options configured.

If a call is to be routed to an alternate attendant at another node and all trunks to the other node are busy, the call is queued for an available route to the alternate (if the alternate has the Off-hook Queuing feature). The call remains queued for a specified time, which, upon expiring, causes the call to be directed to the next alternate attendant.

The operation of NAS routing, as controlled by the activation of the NAS key, is summarized in Table 37.

Table 37
NAS Routing Possibilities

	NAS Key	Home Attendant	Night Key	CW Lamp	Trunks to Remote	Action
1	Dark	All Busy	Dark	X	X	Queue to Home Attendant
2	Dark	Not Busy	Dark	Dark	X	Select Home Attendant
3	Dark	X	Lit	X	X	Route to Home Night
4	Lit	Not Busy	Dark	Dark	X	Select Home Attendant
5	Lit	All Busy	Dark	No Flash	X	Queue to Home Attendant
6	Lit	All Busy	Dark	Flash	Not Busy	Route to Remote Attendant
7	Lit	All Busy	Dark	Flash	All Busy	Queue to Home Attendant
8	Lit	X	Lit	X	Not Busy	Route to Remote Attendant
9	Lit	X	Lit	X	All Busy	Queue to route

Drop Back Busy

When a call reaches a Remote node, no attendant is available, and NAS routing or Night Service at that switch is about to be performed (if the Drop-back busy option was set at the originating switch and sent with the call), the call is treated by the originating switch as though no attendant is available at the Remote switch. Another alternative is selected from the originating switch.

Note: Drop Back Busy (DBB) and Remote Virtual Queuing (RVQ) are both packaged under the Originating Routing Control/Remote Virtual Queuing (ORC-RVQ) package 192. If RVQ and DBB are both configured, DBB will take precedence over RVQ. If the user wishes to activate RVQ, DBB must be disabled for a route entry in response to the IDBB prompt. If the user wishes to activate DBB, it must be enabled by entering DBI or DBA.

Attendant Off-hook Queuing

During peak periods, a call may be prevented from reaching a remote attendant if all possible routes to that attendant are busy. If these routes have off-hook queuing, the call will queue on these routes. If activated in the NAS programming and on the route list for the call, queuing occurs before the system attempts other alternatives. The alternatives are tried after the Off-hook Queuing (OHQ) timer expires.

Network Attendant Service capabilities

The following sections describe the network capabilities that are offered as part of NAS.

Break-in

The Break-in feature allows an attendant to enter an established call anywhere in the network and to offer another call or important message to one of the parties involved in the call. Break-in is provided as a key (BKI) function. The BKI key can be pressed before dialing the DN of the required station (pre-dial) or after (post-dial).

When the BKI key is pressed, the following situations may exist:

- **Break-in request recognized** — this is a temporary processing state, that occurs when an attendant tries to break-in to a party at another node, and lasts until the signaling protocol for the break-in attempt is completed.
- **Break-in ignored** — this state occurs if the required party has disconnected at the point of break-in, is idle without the Make Set Busy or Do Not Disturb features active, or is idle with the Call Forward feature active. In all cases, the party is rung, and the attendant can extend the call.
- **Break-in allowed** — the attendant can break into the required party, consult with the required party, and extend another call to the party if (a) the source is an external call, (b) Camp-on is available on the required party, and (c) the established call is a basic call.
- **Break-in denied** — break-in is not allowed if any of the above conditions are not met.

- **Break-in temporarily denied** — the attendant temporarily cannot break-in to the required party, but can try again later. This situation occurs if:
 - the required party is dialing, involved in a consultation call, or is on hold
 - the required party's set is ringing or receiving an indication tone
 - the required party's set is connected to a paging, dictation, recorded announcement, or integrated voice messaging trunk
 - the party to be extended is a local party or trunk with warning tone denied Class of Service
 - network blocking to a remote node has been encountered
- **Break-in consult only** — the attendant can break into the required party, and can consult with the party but cannot extend another call. This situation occurs if:
 - the attendant originates the call
 - the source is an internal call
 - the source is an external call and neither Camp-on nor Call Waiting is possible on the required party
 - the attendant attempts a pre-dial break-in and the required party is busy with Call Forward active.

Call extension

Restrictions that apply to attendants at local nodes also apply to calls extended across the network to remote node attendants.

Attendant control prevents the calling set from disconnecting until the attendant releases. Once the attendant releases or extends and releases the call, attendant control is relinquished.

Timed reminder recalls

Timed reminder recalls are attendant-extended calls that return to the attendant when their timers expire. The timers apply to slow answer calls, camped on calls, and call waiting calls.

When the attendant extends the call to a party at another node, the trunks between the attendant and the source and the attendant and the destination are not taken down after the Release key is pressed. This is true even if tromboning has occurred. This allows the attendant node to monitor the outgoing trunk for an answer signal. If no answer signal occurs within the specified time, the call is presented again to an attendant (or to the original attendant, if Recall to Same Attendant is active on the attendant node).

Anti-tromboning is only invoked after the destination has answered and the attendant has released from the call.

Incoming Call Indication

The Incoming Call Indicators (ICI) will operate in the same manner as a stand-alone Meridian 1 for incoming calls from stations or trunks.

New ICI types are introduced for NAS routed calls for each trunk type. The indicators can be the following:

- a dial 0 call (ordinary or fully restricted)
- a recall request
- a line lockout intercept
- Call Redirection (Call Forward No Answer, Call Forward Busy)
- an interpositional call
- a Listed Directory Number (LDN)
- a Message Center call
- NAS trunk types (type of trunk on which the call came into the originating switch. The choices are: NDID, NCO, NTIE, NFEX, and NWAT)

Attendant Display

Three features which pass information useful for attendant display are:

- Calling Line Identification (CLID)
- Network Call Party Name Display
- Network Call Redirection

For incoming calls, the CLID received (if available), is displayed instead of the Trunk Route Access Code and Trunk Member Number. If the call comes from the private ISDN network and there is a name associated with the calling telephone, the name is displayed on consoles with alphanumeric displays.

Reason for redirection codes are displayed if the call has been redirected by a feature such as Call Forward All Calls.

Camp-on and Call Waiting

Both Camp-on and Call Waiting allow calls extended to a busy set a further opportunity to reach that set. If the call is extended across the network to a busy set, Camp-on or Call Waiting may be attempted in the same manner as in the stand-alone case.

Tenant Service

If Multi-Tenant (TENS) software package 86 is equipped, the table number in the NAS overlay programming can be referenced to an individual Console Presentation Group. Each tenant can have its own individual NAS routing programmed.

Centralized Attendant Service vs. Network Attendant Service

NAS has some similarities to a previous non-ISDN application called Centralized Attendant Service (CAS). There are significant differences as well.

Centralized Attendant Service

- Allows attendants to be centralized at one Main switch connected to Remote switches with Release Link Trunks (RLTs).
- When a remote switch has the CAS feature key activated, incoming calls to the Remote switch are redirected to the Main switch where an attendant answers the call.
- The call comes into the Main switch on an RLT. The attendant can extend the call back to a telephone at the Remote switch. The call is routed on the same RLT trunk which was used when the call came into the Main switch.
- Once the call is ringing at the telephone, the RLT trunk is released.
- If the telephone goes unanswered, the call recalls to the attendant at the Main switch. A Release Link Trunk is used for the recall.
- The CAS feature is activated using a key on a proprietary telephone or console at the Remote switch.
- When users at different switches call each other or the attendant places a call to another switch, normal TIE trunks are used.

Network Attendant Service

- NAS allows several switches to have attendants who answer calls which have been redirected by the NAS feature. The switches are connected with Primary Rate Interface (PRI) or ISDN Signaling Link (ISL) connections.
- NAS routing allows a call destined for the local attendant to be diverted to a Remote attendant. This routing is governed by a NAS schedule, a NAS key, or a permanent NAS Active setting which can be programmed.
- NAS calls can result in tromboned trunk connections between the Remote switch and the Attendant switch. These connections remain until the ringing telephone answers the call. This can result in two tromboned TIE trunks or channels being held up while a telephone is ringing.

- If anti-tromboning has been programmed, the tromboning is corrected after the telephone is answered.
- If the telephone goes unanswered, the call recalls to the attendant at the Main switch. A PRI channel or ISL trunk is used for the recall.
- A NAS key may be optionally programmed on an Attendant Console.
- NAS calls and normal user calls all use the same PRI/ISL trunks.

There are three additional differences between NAS and CAS:

- NAS routing is used when calls waiting in the local attendant queue exceed one of two thresholds. CAS routes all calls to the Main CAS switch.
- NAS chooses an attendant from up to four alternatives per time period. With CAS, each Remote site has only one Main switch to which to route calls.
- NAS routing can also be based on the status of trunks to other nodes and Night Service indicator status. These factors do not affect call routing with CAS.

Operating parameters

NAS and the Centralized Answering Position (CAP) capability are mutually exclusive. A Meridian 1 system may not have an actual attendant console. Instead, the system may be configured to use a Centralized Answering Position (typically, using a Meridian 2616 digital set.) The CAP Directory Number (DN) is the customer Night DN. Since no attendant is configured, the customer is viewed to be in Night Service and any calls for the attendant are directed to the CAP.

An attendant answering position must be an attendant console, and not a Meridian digital set.

NAS and Attendant Overflow Position packages are mutually exclusive and may not be packaged together.

Trunk Group Busy applies only to trunk groups on the node where the attendant resides.

The Uninterrupted Line Connection feature continues to work on a stand-alone switch basis; however, Network-wide Break-in, based on warning tone Class of Service, cannot be guaranteed. Only one Attendant at a time is allowed to break into a connection. Break-in is allowed for telephones only, not trunks or other attendants. Attendant Control is not provided if the connection is a result of a Network Break-in.

Unsupported features

NAS does not support:

- Supervisory Console
- Call Park
- Charge Account
- Do-Not-Disturb and Group Do-Not-Disturb.

The following functions and features are not supported across the network:

- Barge-in
- Busy Verify
- Emergency transfer.

Feature interactions

Attendant Interposition Call

An attendant is not able to call a specific attendant on another node by dialing the attendant DN followed by the attendant number. The attendant dials the Network Alternate Route Selection (NARS), Coordinated Dialing Plan (CDP), or Listed Directory Number (LDN) the same way a telephone dials to reach the attendants at another node.

Busy Verify

Pre-dial Break-in provides equivalent functionality but has several advantages over Busy Verify. Busy Verify does not operate on a network-wide basis.

Call Forward, Break-In and Hunt Internal or External Network Wide

When a call is transferred, a new facility message is sent to the transferred party's node to transport the terminal indicator parameter or the access trunk information parameter.

INIT ACD Queue Call Restore

Call information associated with Network Attendant Service is lost after system initialization and call restoration.

ISDN QSIG Basic Call

ISDN QSIG Basic Call interacts with Network Attendant Services (NAS) as if the call is going to a route without NAS being equipped.

Listed Directory Numbers, Network-wide

This feature enables LDNs to be recognized network- wide when NAS is used. Up to six LDNs can be defined per Meridian 1. The same LDNs must be configured in multiple nodes. The LDN which users dial can be programmed as a CDP number, for example, and input in the NAS overlay as the ID of remote attendants.

Recall to Same Attendant

This feature operates on a network-wide basis for the following call types:

- Slow Answer Recall
- Camp-on Recall, and
- Call Waiting Recall.

The operation of this feature is affected by the programming for the option in the Customer Data Block of the system where the attendant answering the call resides.

Feature packaging

The following packages are required for NAS:

NAS requires the following packages:

- Network Attendant Services (NAS) package 159;
- Advanced ISDN Network Services (NTWK) package 148;
- Network Automatic Routing System (NARS) package 58 or Coordinated Dialing Plan (CDP) package 59;
- Network Class of Service (NCOS) package 32;
- Basic Routing (BRTE) package 14;
- Attendant Break-In/Trunk Offer (BKI) package 127;
- Basic Queuing (BQUE) package 28;
- Flexible Call Back Queuing (FCBQ) package 61;
- Originating Routing Control/Remote Virtual Queuing (ORC-RVQ) package 192 for Drop Back Busy (please see note under “Drop Back Busy” description);
- Integrated Services Digital Network (ISDN) package 145;
- ISDN Supplementary Features (ISDNS) package 161; and
- 1.5 Mbps Primary Rate Access (PRA) package 146 or ISDN Signaling Link (ISL) package 147.

Feature operation

There are no operating procedures specified for this feature.

Network Call Party Name Display (NCPND) and Network Name Delivery (NND)

Network Call Party Name Display (NCPND) offers a network-wide visual display of the Calling Party and Called Party Names on telephone sets with Alpha-Numeric Displays.

Across the ISDN DTI/PRI network, the NCPND feature displays the following:

- the calling party's name on the terminating set
- the called party's name on the originating set

With this feature, each Meridian 1/SL-1 PBX in the network can contain the name and number of each user on that particular PBX. In the call set-up message, the originating PBX will send the CLID and calling party name to the terminating PBX. When the call is answered, the terminating PBX will send back the connected number and name.

For call redirections, the Dialed Name Display option may be selected via a service change which would provide a display of the redirecting name instead of the calling name for the set which is answering the redirected call. The originating set's display is not affected by the use of this option.

With X11 Release 16 and earlier, the NCPND feature may only be used for private network applications that support the Meridian 1 to Meridian 1 connection (SL-1 and SL-100). The name and number display for the called party is visible for the duration of the call. The name display is retained for the calling party, however, the number will be replaced by the trunk route and member if the call is placed on hold and then later retrieved.

With X11 Release 18 and later, Network Name Display Interworking allows caller and calling party name display in Meridian 1 connections to DMS-100, DMS-250 and Meridian 1 Options 11-81.

The following sets support the NCPND feature:

- M2250 Attendant Console

- Meridian Modular Telephones
 - M3000 Touchphone
 - M2317
 - M2008 with Display
 - M2616 with Display
 - M2016S with Display
 - M2216

Please consult the telephone User Guides to determine the exact display for each particular set.

Network Name Delivery (NND) is the method used to send the names and numbers across the network. There are two NND methods available: ND1 and ND2.

Operating parameters

Network Name Delivery method 1 (ND1) is available in X11 release 14 and later. The following list describes ND1 operating parameters.

- Meridian 1 to Meridian 1 connections only are supported.
- For X11 release 14, ND1 supports name display for redirected calls by Call Forward All Calls.
- With X11 release 16, ND1 supports the name display for call redirection by Call Forward No Answer, Hunt and Call Pickup if the redirection is done across the network. See “Network Call Redirection” in this chapter for configuration.
- If the called party is at a remote switch, the called party name is displayed on the caller's display only after the call is answered unless there was a redirection. (See Network Call Redirection in this chapter for a discussion of call redirection with X11 release 16 and later hardware.)
- A CPND enhancement allows the display of the redirecting name on the terminating telephone instead of the calling name by a service change option only if the first redirecting party is on the terminating switch.

- Prior to X11 release 16, ND1 supports the name display for call transfer only for a local transfer over PRI. In that case, the name is displayed on the terminating telephone.
- The maximum number of characters in a displayed name is 24.

Network Name Delivery method 2 (ND2) is available in X11 release 18 and later. ND2 provides network-wide name display in compliance with the Meridian Customer Defined Networking (MCDN) protocol.

The following list describes the ND2 operating parameters.

- ND2 supports direct PRI connections to Meridian 1 (with X11 release 18 and later), SL-100, and DMS (with BSC32 and later software).
- For Meridian 1 to Meridian 1, the maximum number of characters in a displayed name is 24. When connecting to a Central Office, 15 characters only are supported. Names exceeding this length are truncated.
- ND2 supports name delivery for Call Pickup, Call Transfer, Hunt and Call Forward All Calls/No Answer/Busy.
- A CPND enhancement allows the display of the redirecting name on the terminating telephone instead of the calling name by a service change option only if the first redirecting party is on the terminating switch.
- In all cases when the name is available, the called party name is displayed on the caller's display during the ringing phase. This is an enhancement over ND1 which displays names on connect.
- ND2 enhancements are not supported on connections to Meridian 1 using ND1. ND1 is applicable for X11 prior to release 16. ND2 is recommended for X11 release 18 and up. The far ends must match.

Package requirements

Network Call Party Name Display requires the following:

ISDN	option 145
PRI	option 146 or ISL option 147
CPND	option 95 and DDSP option 19

In addition, the appropriate digital set options (Telset package 88, 89 and 91 or 170) must be equipped to support the M3000, M2317 and Meridian Modular telephones.

Network Call Redirection (NCRD)

Network Call Redirection allows calls to be redirected across the ISDN network as a result of Hunting, Call Forward All Calls and Call Forward No Answer. (These features, with the exception of call forward all calls, used to be limited to the PBX of the called set).

Impact on CLID and CPND For both CLID and CPND, updated information is provided to both the calling and the called set's display when the call is redirected. With this enhancement, the display of the calling party shows the connected number when the call redirected to another number in the ISDN network.

If Network Calling Party Name Display (NCPND) is optioned, the calling party's set also displays the connected party's name. If a call is forwarded more than once, the calling party's set displays only the first re-directed number and name and the connected number and name.

Redirection reason

With Network Call Redirection, the terminating set displays the CLID from across the DTI/PRI network as well as the forwarded set's number. If NCPND is optioned, the calling party's name and number as well as the originally called party number is displayed at the terminating set. In addition, the sets of the calling and terminating parties will display the redirection reason (CFWD, CFNA, HUNT, PKUP, XFER).

Network Call Redirection also allows the customer to either block calls from being redirected over the network, or limit the number of redirections from 1 to 5 times per call.

Network Call Transfer and Attendant Extended Calls

Network Call Transfer and Attendant Extended Calls display the calling party name and number to the “Transferred to”/”extended to” party across the network. Also, if NCPND is optioned, the calling party’s display is updated to show the connected party’s name and number.

Note: Network Call Transfer over PRI does not provide the ESN Network Transfer feature. This feature eliminates tandem trunk connections that double back over the same route. PRI Network Transfer merely allows calls to be blindly transferred across the ISDN network.

Network Hunt

The Network Hunt feature extends the current capabilities of Hunt to a Meridian 1 network using either ISDN Primary Rate Interface (PRI) or ISDN Signaling Link (ISL). Also, the displays of originating and terminating sets of a redirected call are updated to correctly present information and the reason for redirection (Hunt).

For example, in a three Meridian 1 ISDN Network, when a user on site “A” calls a user on site “B” but is forwarded to site “C”, site “A” and site “C” set displays are updated. Site “A’s” set shows the originally dialed number, the connected number (site “C” number), and the reason for redirection (i.e., Busy). Site “C’s” set shows the calling number and name, the originally called number (site “B” number), and the reason for redirection.

Network Intercom (Hot Type D and Hot Type I Enhancements)

Hot Line enables a designated telephone to place calls to a predetermined destination that may be internal or external to the Meridian 1. The call does not require attendant intervention. When the handset is lifted, or when a preprogrammed key is activated, the system speed calls a preprogrammed DN. Hot Lines access a set of Terminal Numbers programmed by direct entry using LD 11, or by list entry such as System Speed Call (SCC) using LD 18. Once a Hot Line call enters the ringing state, it is the same as a normal call.

Prior to Release 21, there were two types of Hot Line keys (DN-based Hot Type D, and Speed Call List-based Hot Type L). Release 21 introduces another type of Hot Line key – Hot Type I, while also providing improvements to the existing Hot Type D. These two improvements function in both standalone and network environments.

Hot Type D provides the ability for Meridian Digital Telephones to have two-way calls on specially designated keys (not on the DN keys) with other Meridian Digital Telephone sets connected to Meridian 1 PBXs across a Meridian Customer Defined Network (MCDN) Integrated Services Digital Network (ISDN). A Hot Type D call can now terminate in three different modes: Voice, Ringing, and Non-ringing. With the Voice mode, speech path is automatically connected after a short ring. With Ringing and Non-ringing modes, the call must be manually answered by the called party; the difference between the two modes is that for Non-ringing no audible tone is given (the Hot Line key flashes to indicate the call).

Hot Type I

An option is available with Hot Type I to provide a No Answer Indication informing the called party that a Hot Line call was made during the called party's absence. If an Hot Line call cannot be completed on the Hot Line key, the calling party is informed via the set's display, and the call is completed over the network as a normally dialed call that attempts to terminate on the destination Prime DN.

Hot Type D Enhancement

Hot Type D allows more than one set having the same target DN defined for the Hot Type D key. This enhancement includes Voice, Ringing, and Non-ringing termination modes, and the capability to leave a No Answer Indication in some situations (i.e., the Hot Line key winks). A call terminating on an enhanced Hot Type D key operates the same as if terminating on a Hot Type I key, if the originating DN is the same as the target DN defined for the key. If it is not the same, but another Hot Line key exists on the set that has a target DN that matches the originating DN, a No Answer Indication is left on that key.

Operating parameters

Hot Type I calls are not allowed on analog (500/2500 type) telephones.

Hot Line keys cannot be defined for M3000 sets.

A Hot Line key should not be defined on a station without a Prime DN and likewise should not be defined on the primary key. If this is not done, the improved functionality will not work and the call is treated as a non-Hot Line call.

The network DN for Hot Type I and the No Answer Indication component of Hot Type D must be either a Coordinated Dialing Plan or a Universal Dialing Plan number that must terminate on a Prime DN of a Meridian Digital Telephone set; otherwise, the call is competed as a non-Hot Line call.

The network-wide application of Hot Type I is only applicable to nodes in a Primary Rate Interface (PRI), ISDN Signaling Link (ISL), Virtual Network Services (VNS), and Basic Rate Interface network. The originating and terminating nodes of the Network Intercom (Hot Type D and Hot Type I Enhancements) feature must be Meridian 1 switches running a minimum of Release 21 software. Tandem nodes in the private network must be Meridian 1 (minimum Release 21 software) or another MCDN node able to transfer Remote Operations Service Element (ROSE) facilities.

Hot Line keys must be defined with the same dialing plan.

The Hot Type D enhancements can also function across R2MFC trunks provided that the calling party's DN is provided.

Feature interactions

Attendant Blocking of DN

A Hot Type I key cannot be blocked by the attendant, because it has no DN.

Pressing a Hot Type D key that is attendant blocked establishes the call on the source side of the attendant.

Automatic Call Distribution (ACD)

Hot Type I calls cannot terminate on an ACD DN. A call attempting to terminate on an ACD DN receives overflow tone. Hot Line calls involving ACD sets must use the Hot Type D option.

Busy Forward Status (BFS)

In a Secretarial filtering scenario, the secretary's BFS lamp also will reflect that the boss' set is busy if the boss is on a Hot Type I call.

Call Forward

Hot Type I calls respect or override all kinds of Call Forward features (Busy, No Answer, All Calls, Internal, etc.) according to per-set definitions. If Call Forward is respected, the call becomes a normally dialed call and the originator will receive the appropriate indication on their display.

Call Join

Hot Type I calls can be moved to the Conference key with the Call Join feature.

Call Park

Hot Type I calls cannot be parked.

Call Party Name Display

Hot Type I calls display names the same as a normal call.

Hot Type I calls that become a normal call indicate on the originating station's display that the call is no longer a Hot Line call.

Call Pickup

Hot Type I calls cannot be picked up. An attempt to pick up a Hot Type I call results in an overflow tone.

Call Transfer

Hot Type I calls may be transferred to another Hot Line key or to a normal DN key; likewise calls on a normal DN key may be transferred to a Hot Line key.

Display Key

Hot Type I calls are supported by the Display key feature; pressing the Display key and then the Hot Type I key will show the target DN on the originating station's display.

Do Not Disturb (DND)

Hot Type I calls ignore the Do Not Disturb feature. Hot Line calls are presented to the defined target, even when DND is activated.

Last Number Redial

A Hot Line key cannot be redialed using the Last Number Redial feature.

Make Set Busy

Hot Type I calls terminating on a station in the Make Set Busy mode override Make Set Busy.

Multiple Appearance Redirection Prime (MARP)

If more than one set is allocated the same prime DN, the Hot Type I call will terminate on the set designated as the Multiple Appearance Redirection Prime (MARP). If the MARP DN is not the prime DN on the set, or if the set designated as the MARP DN is not a Meridian Digital Telephone set, the first Meridian Digital Telephone set with the prime DN will be used. If none of these conditions are met, the call will terminate as a non-Hot Line call and the calling party will be notified on the display.

Hot Type D calls can have voice termination only on a MARP Terminal Number (TN), or if there is no MARP TN, then on the first TN in the TN list. A No Answer Indication for Hot Type D can only be left on the MARP TN, or if there is no MARP TN, then on the first TN in the TN list.

Override

An internal Hot Type I call never returns busy, unless the call became a non-Hot Line call due to the Hot Line key being busy. In this case, the call behaves like a normally dialed call, and override can be used upon receipt of a busy signal.

Ring Again

Hot Line calls terminating on a busy key become normal calls. Hence, they may use the Ring Again feature under normal circumstances.

Ring Again – No Answer

If Ring Again No Answer is activated for a Hot Type I call, it is activated as if the call had been dialed normally.

Vacant Number Routing

Hot Types I keys and enhanced Hot Type D keys support vacant number routing.

Feature packaging

The Network Intercom (Hot Type D and Hot Type I Enhancements) feature is included in Enhanced Hot Line (HOT) package 70.

For Hot Type I in an ISDN network the following packages are required:

- Advanced ISDN Network Services (NTWK) package 148
- Integrated Services Digital Network (ISDN) package 145
- and at least one of 1.5 Mbps Primary Rate Interface (PRA) package 146, Integrated Services Digital Network Signaling Link (ISL) package 147, and Virtual Network Services (VNS) package 183.

R2MFC connectivity for Hot Type D requires:

- Multifrequency Compelled Signaling (MFC) package 128.

Feature operation

Press the Hot Type I or D key to initiate an Hot Line call to a target DN (the DN may be an external DN in an MCDN ISDN network).

The called party answers the call by pressing their Hot Type I or D key if configured. If the called party has no Hot Type I or D key configured, the call will behave as a normal call and is answered accordingly.

If the called party does not answer, and has No Answer Indication Allowed Class of Service, the Hot Type I or Hot Type D key will be winking as a form of No Answer Indication.

Network Message Services - Meridian Mail

Network Message Services - Meridian Mail allows a single Meridian Mail system to serve multiple network sites. Network Message Services offers network users complete call coverage regardless of their location in the customer's ISDN network. Users at any location in the network may access the Meridian Mail system as easily as if it were at their own location.

Option 11 systems can use this feature, but only as an originating remote site or a tandem node. The Option 11 cannot be the location that actually possesses the Meridian Mail hardware.

Access to Meridian Mail features is unchanged, regardless of whether Meridian Mail is being accessed by a user at the same location as Meridian Mail or by a user at a different location from the Meridian Mail system.

For example, with Network Message Services, an unanswered call to a user is forwarded across the ISDN network to Meridian Mail, which plays the user's mailbox greeting and takes the message. Meridian Mail then directs the Meridian 1/SL-1 serving the user to check the status of the user's message waiting light and turn the light on if necessary. Message waiting indication for users of 500/2500 sets is supported as well. The user accesses Meridian Mail and retrieves messages as usual.

Meridian Mail uses its unique link with the Meridian 1/SL-1 to match calling and called number information to user mailbox information as appropriate. Customers can centralize administration of Meridian Mail resources while still offering voice messaging to users throughout the network. Network Message Services enables customers to offer voice messaging to smaller network locations that might not be able to justify the purchase of a dedicated Meridian Mail system. All users have complete feature functionality, including message waiting indication and personal verification across the network.

Network Message Services complements other Meridian Mail options such as Meridian Mail networking by allowing customers maximum flexibility in providing voice messaging services to network users. Furthermore, shared and dedicated Meridian Mail systems can be linked via Meridian Mail networking, providing complete voice messaging access for all users on the network.

Network Message Services extends the value of ISDN Primary Rate Interface and ISDN Signalling Link networks by allowing shared access to Meridian Mail resources. The resources are used more efficiently and additional services are offered to network users.

Note: Password Suppression is not supported across a Meridian 1 network.

Package requirements

Meridian 1/SL-1 requirements for NMS-Meridian Mail vary slightly, depending on whether the Meridian 1/SL-1 originates calls to the Meridian Mail location, terminates calls to the Meridian Mail location, or simply serves as a tandem node in the network, passing information between “originating nodes” and “terminating nodes”.

Note: All the NMS node types must be equipped with their respective packages listed on the next two pages.

“Originating” node requirements are as follows:

- ISDN Primary Rate Access or ISDN Signalling Link (Option 145/146 or 145/147) and associated prerequisites
- Advanced ISDN features (Option 148)
- Network Message Services (Option 175)
- Message Center (Options 40, 45, 46)
- End-to-end signalling (Option 10)

“Tandem” node requirements (not currently available on Option 11) are as follows:

- ISDN Primary Rate Access or ISDN Signalling Link (Option 145/146 or 145/147), and associated prerequisites.
- Advanced ISDN features (Option 148)
- End-to-End signalling (Option 10)

“Terminating” node requirements are as follows:

- ISDN Primary Rate Access or ISDN Signalling Link (Option 145/146 or 145/147), and associated prerequisites.

- Advanced ISDN features (Option 148)
- Network Message Services (Option 175)
- End-to-end signalling (Option 10)

Meridian Mail prerequisites:

- Auxiliary Processor Link (Option 109)
- IVMS Link (option 35)
- Meridian Mail Link (Options 77, 85)
- Basic ACD Features (Options 40, 45, 83)
- Message Center (Option 46)

Meridian Mail must be equipped with Release 7 software and the Network Message Services software option package. The Meridian Mail system should also be engineered to support the total number of users expected to be served throughout the network. Generic X11 Release 16 is a prerequisite.

Network Message Services - Message Center

Network Message Services - Message Center extends the Message Center function to permit remote locations in a customer's network to be served by a single message center. Software messages are transported among Meridian 1/SL-1 PBXs via ISDN Primary Rate Interface or ISDN Signaling Link.

A caller to a station on one Meridian 1/SL-1 can leave a message with a Message Center located on another Meridian 1/SL-1 in the network. All existing Message Center types — message attendant, sets, and ACD sets — are supported.

Network Message Services - Message Center was developed to be transparent to end-users. Callers to a busy or unanswered station using sets without displays will not be aware that their call is being answered by a message center at another PBX location. The message center sends an indication of a message waiting to the user's station using the same mechanisms as are in place today (such as indication lamp or LCD key lamp). Users can call and retrieve their messages by simply pressing the Message Waiting Key on their telephone sets.

Package requirements

Network Message Services requires the following:

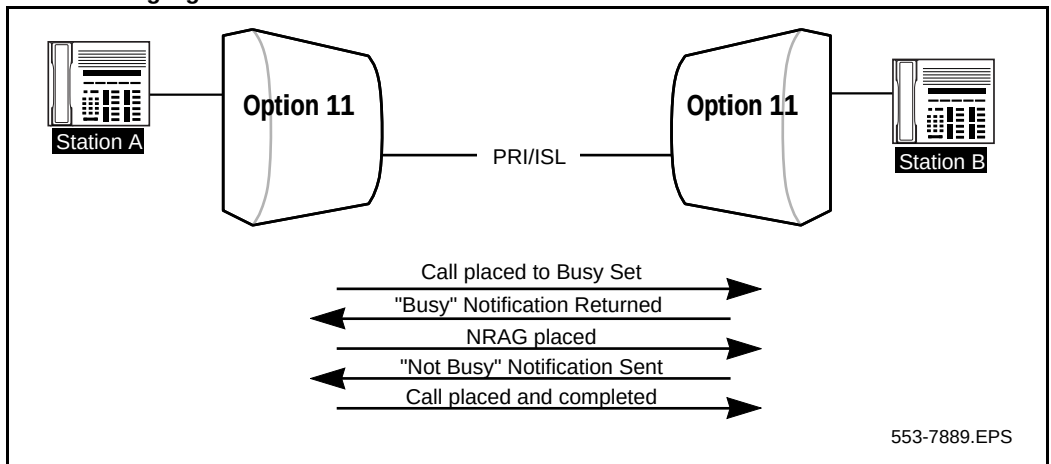
ISDN	option 145
PRI	option 146 or ISL option 147
NMS	option 175
NTWK	option 148

Note: If an ACD type Message Center is to be used, ACDA package #45 is required. The combination of packages # 46 (MWC), #40 (BACD), # 45 (ACDB) and # 42 (ACDC) provides ACD features and reports for the ACD type Message Center.

Network Ring Again

Network Ring Again operates on stations called over the ISDN PRI/ISL network. The Network Ring Again feature allows a caller on station “A” encountering a busy signal at station “B” to be notified when the busy station “B” becomes available. This feature works on calls placed anywhere in the ISDN network. When user “A” accepts the “not busy” recall, a normal call setup is then placed to destination “B” without user “A” re-dialing the called number. Figure 46 illustrates this situation.

Figure 46
Network Ring Again



Network Ring Again (NRAG) can be originated by a station in the Make Set Busy mode, and is also allowed to be activated against a station in the Make Set Busy Mode.

Network Ring Again is supported in UDP and CDP networks. Network Ring Again is only supported if the originating set sends for CLID.

Please note that NRAG does not operate on redirected calls. NRAG requires that every switch in the network be equipped with either NARS or CDP software.

Package requirements

The package requirements are as follows:

ISDN	option 145
PRI	option 145 or ISL option 147
Advanced Features (NTWK)	option 148

Network Wide Listed Directory Numbers

Listed Directory Numbers (LDNs) can be defined as Incoming Call Identification (ICI) keys on an Attendant Console, making it possible to have different presentations when different DN's are dialed. Previously, it was only possible to define four LDNs on a Meridian 1. This feature makes it possible to define six LDNs on a Meridian 1.

Prior to Release 20, when an LDN call was routed from one node to another, the call was presented as per trunk type (e.g., NDID, NTIE, NCO, NFEX, or NWAT). The call was presented on LDN key zero if none of these ICIs was configured. With this feature, if the dialed DN is an LDN and an LDN key exists corresponding to the dialed LDN, the call will be presented on that ICI LDN key.

This feature also enables LDNs to be recognized network wide when Network Attendant Service (NAS) is used. The same LDNs must be configured in multiple nodes. Network LDN is defined on a customer basis.

Operating parameters

The network part of this feature works in a Meridian Customer Defined Network (MCDN) environment with NAS configured.

The LDNs to be used network wide cannot be used in conjunction with Distant Steering Codes.

No new hardware is required for this feature.

Feature interactions

Feature interactions for Network Wide Listed Directory Numbers are described below.

Call Forward No Answer

With this feature, the LDN ICI has a higher priority than CFNA ICI. When a call is forwarded to an LDN via Flexible DN, the call will be presented on the LDN ICI.

Departmental Listed Directory Number

Departmental LDN is not supported over the network; however, this feature does provide two more LDNs for the DLDN feature.

Console Presentation Group

This feature provides two more LDNs per Console Presentation Group.

Console Operation/Console Presentation

Console Operation makes it possible for each console to select which ICI call types will be presented to the console. Network wide LDN does not work with the Console Presentation feature because it is not supported by NAS. Console Operation can, however, be configured with two new LDNs.

Network Message Center

With this feature, the LDN ICI has a higher priority than MWC ICI. When a call is forwarded to an LDN over the network to a message center, the call will be presented on the LDN ICI.

Network Attendant Service

The way the network LDN calls are presented in a NAS environment is changed by this feature. The presentation on the NDID, NTIE, NCO, NFEX or NWAT, and the LDN0 key is changed to the correct LDN key, if it exists. Otherwise, it will be presented as it previously was on the NDID or LDN0 key.

Console Operation/Queue Thermometer

The queue thermometer indicates how many calls are in the queue for a certain ICI key. An ICI key can correspond to more than one ICI type. Even though the ICI type of a call may be different with or without this feature active, it will not interact with queue thermometer operations.

Centralized Attendant Service

Centralized Attendant Service (CAS) is mutually exclusive to the NAS package. As the network wide LDN feature requires NAS for its networking functions, the network part of this feature will not work with CAS, but the two extra LDNs can be used locally.

Feature packaging

For standalone environments, there are no new software packages for this feature as it is included in basic packaging.

Since Network Wide LDN requires Network Attendant Service routing, the following existing software packages must be provisioned: Network Attendant Service (NAS) package 159; Network Alternate Route Selection (NARS) package 58; Network Class of Service (NCOS) package 32; Basic Routing (BRTE) package 14; and applicable ISDN options depending upon customer requirements.

To use the attendant queue thermometer, Console Operations (COOP) package 169 must be provisioned.

For Departmental LDN to be configured with six LDNS, Departmental LDN (DLDN) package 76 must be provisioned.

NI-2 Call By Call Service Selection

The National ISDN-2 (NI-2) Call By Call (CBC) Service Selection feature provides a standardized version of call by call service over an NI-2 TR-1268 interface¹, as defined in the Bellcore Technical Reference Specification TR-NWT-001270. It is intended that NI-2 CBC apply to all Class 5 type local exchanges complying with the NI-2 TR1270 standard.

Prior to the introduction of this feature, proprietary call by call capabilities were offered by Nortel's Integrated Services Access feature (ISA) Call By Call Type service for DMS switches (such as the DMS-100), and Lucent's Call By Call Service Selection for 5ESS Local Exchange Carriers. Table 39, "Differences between Nortel's ISA, Lucent's CBC, and NI-2 CBC," on page 370 provides a summary of the functional differences between the three offerings.

Note: The ISA Call By Call Type service and the NI-2 Call By Call Service Selection feature can co-exist on the same PBX.

NI-2 Call By Call Service Selection allows multiple service routes to share the same common pool of B-channels, rather than using dedicated routes that require each service route to have its own trunks. The channels are assigned to a service on a per call basis.

Figure 47 depicts a configuration using dedicated facilities, while Figure 48 shows an NI-2 Call By Call Service Selection configuration. Figure 49 provides a graphical representation of the NI-2 CBC master route and service routes.

1. The NI-2 Call By Call Service Selection feature provides all of the NI-2 TR-1268 Basic Call services introduced in Release 21. Please refer to the 'National ISDN-2 TR-1268 PRI Interface' feature module in the 553-2901-100 NTP for a description of the services that are offered.

Figure 47
Dedicated facilities configuration

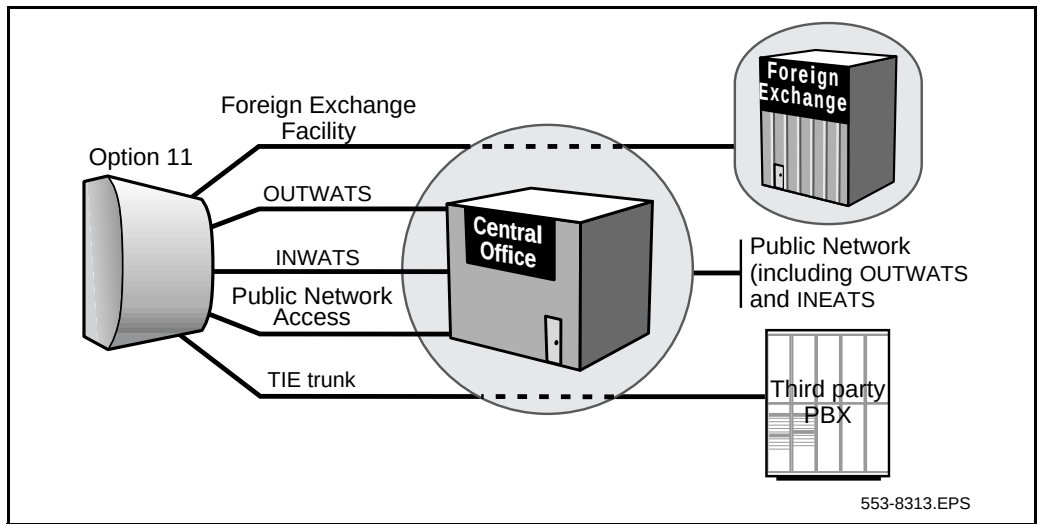


Figure 48
NI-2 Call By Call Service Selection configuration

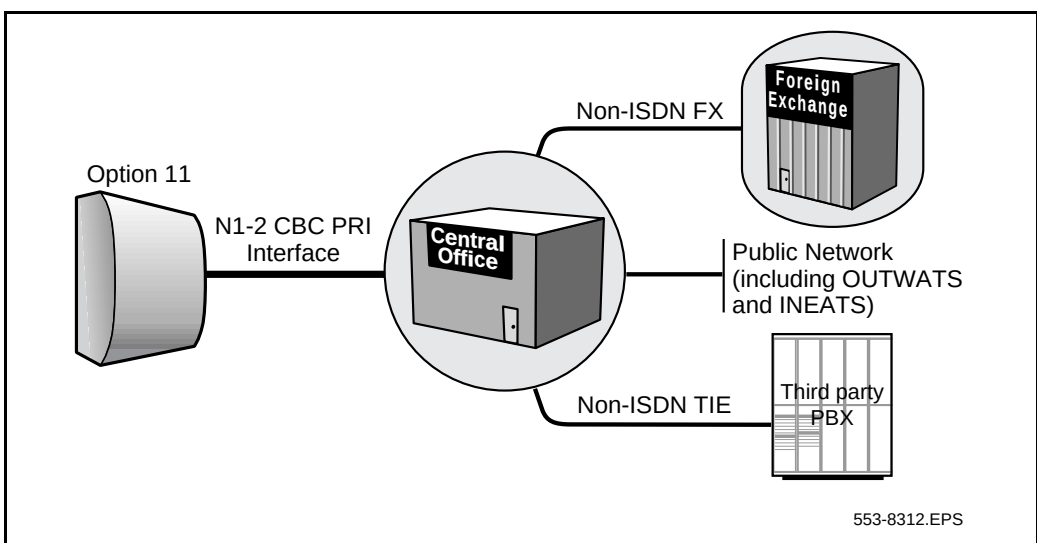
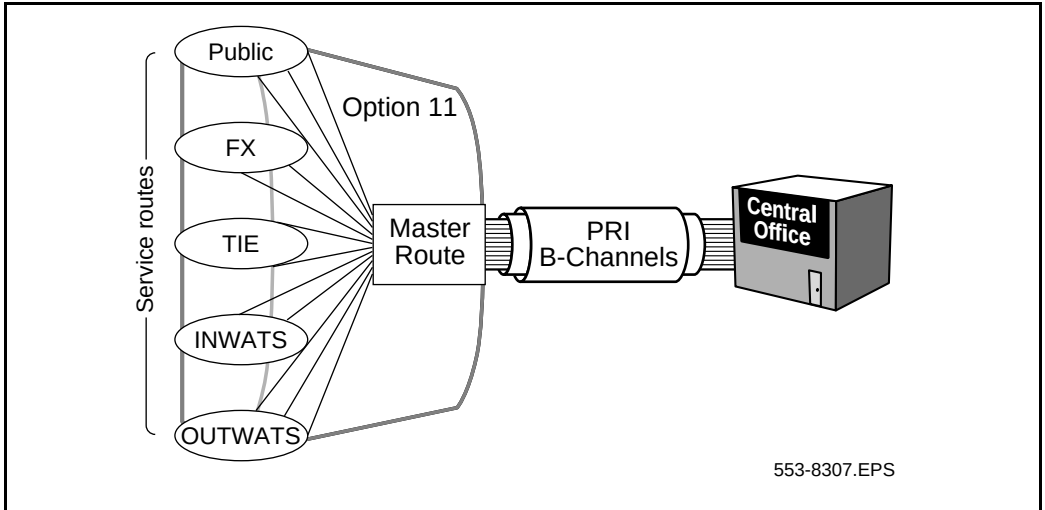


Figure 49
NI-2 CBC master route and service routes on the Meridian 1



Provisioning a master route and service routes

NI-2 Call By Call Service Selection is provisioned by configuring a trunk route as an NI-2 Call By Call Service Selection master route, and associated service routes. A master route contains a list of B-channels (trunks) to be shared by the different service routes. Service routes do not have dedicated trunks. They are associated with the master route and share trunks for different Call By Call services. Calls from the Central Office to the Meridian 1 are offered over the CBC master route.

The NI-2 CBC master route is defined in Overlay 16. The associated list of B-channels (trunks) is defined using Overlay 14. Then, the service routes are configured, also using Overlay 16. When configuring the service routes, the type of service to be carried over the B-channels for the NI-2 PRI interface is defined as a decimal value, as follows:

0 = Public call service (No Network Specific Facility IE is sent, since COT/DID routes are used)

19 = FX (Foreign Exchange) service

20 = TIE service

17 = Inward Wide Area Telecommunications Service (INWATS) service

18 = Outward Wide Area Telecommunications Service (OUTWATS) service. Information pertaining to the band number and the Inter-Exchange Carrier is stored in the service route. Three OUTWATS services may be accessed:

- IntraLATA OUTWATS, provided by a local service provider
- InterLATA OUTWATS, provided by a carrier other than that of the local service provider and
- Banded OUTWATS, using bands which each represents a geographical area to which a subscriber can place a call at a special tariff level

Lucent proprietary call by call services are as follows (these values are defined in the facility coding field in the NSF IE in order for the Meridian 1 to recognize the Lucent call by call services):

- 00001 = Access to Virtual Private Network (such as Lucent's Software Defined Network service)
- 00010 = MEGACOM 800
- 00011 = MEGACOM
- 00110 = ACCUNET switched digital service
- 00111 = International long distance service
- 01000 = International 800
- 01011 = Electronic Tandem Network
- 01101 = Private Virtual Network
- 10000 = DIAL IT and Lucent MultiQuest

For each FX and TIE trunk service, a Facility Number is assigned.

The maximum number of trunks limited by each service route is entered when configuring the service routes. The maximum number of channels per service (a maximum value is required by the Bellcore Technical Reference Specification) is controlled by the Central Office, and assigned at the time of subscription. It is this value that must be entered in Overlay 16.

There is no minimum limit specified by the Bellcore Technical Reference Specification, therefore no minimum value is assigned by the Central Office, or defined on the Meridian 1.

Engineering consideration pertaining to service maximums

The maximum value of trunks defined for any service type cannot exceed the network maximum, but the total of all maximums combined may be greater than the network maximum. For example, in a single 23B+D span, two service routes may be configured, each with a maximum of 15 trunks (B-channels). Even though the combined number of B-channels (30) is greater than the network maximum (23), a minimum of 8 B-channels would be left available for other service routes.

For an incoming call to the Meridian 1, if the maximum number of trunks defined for a service has been reached, the Meridian 1 will return a “Release Complete” message to the Central Office, with the “Cause” value set to “User Busy”. This allows the Central Office to return a busy tone to the caller.

Service routes for public network calls

NI-2 Call By Call Service Selection uses the Network Specific Facility (NSF) Information Element (IE) to indicate the requested service in the call request. If no NSF IE is included, the call is treated as a TR-1268 public network call (CO or DID).

Multiple service routes can be configured on a master route to serve outgoing public network calls, but only one service route may be specified in the master route to serve incoming public network calls (this is done using the IPUB prompt in Overlay 16). The route type for these service routes may be COT and DID. The result is that a system may be configured to handle public network calls with one incoming route and multiple outgoing routes, or one incoming and outgoing route with multiple outgoing routes.

NI-2 CBC service route treatment

Each service route stores the information, pertaining to a particular subscribed service, required to initiate or terminate a call. The information is transmitted to, or received from, the network by means of an NSF IE contained in the outgoing or incoming SETUP message.

Originating treatment (Meridian 1 to Central Office)

The Meridian 1 can designate the desired service to the Central Office, on a call-by-call basis. This is done by means of an NSF IE in the outgoing SETUP message. The NSF IE is built using the information configured in the service route. The SETUP message is sent by seizing a B-channel from a pool of channels associated to the CBC master route.

Termination treatment (Central Office to Meridian 1)

The Central Office, when offering a call to the Meridian 1 over the CBC master route, indicates in the NSF IE the type of service of the incoming call. The NSF IE contains the information required to identify a service route and to handle further call processing. The termination of NI-2 CBC service routes is based on the existing Nortel’s Integrated Services Access feature (ISA) call by call service treatment, and summarized in Table 38.

Table 38
Call termination for NI-2 CBC service route

TKTP	AUTO ^a = No				AUTO = Yes	
	DNIS ^b = No		DNIS = Yes		DNIS = No	DNIS = Yes
	IDC ^c = No	IDC = Yes	IDC = No	IDC = Yes		
COT	attendant	N/A ^d	N/A	N/A	AUDN ^e	N/A
FEX	attendant	IDC digit	N/A	IDC digit	AUDN	N/A
WAT	attendant	IDC digit	N/A	IDC digit	AUDN	AUDN ^f
DID	last n CAD digit ^g	IDC digit	N/A	IDC digit	AUDN	AUDN ^h
TIE	CAD	IDC digit	N/A	IDC digit	AUDN	AUDN ⁱ

a. AUTO = Autoterminate.

b. DNIS = Direct Number Identification Service.

c. IDC = Incoming Digit Conversion.

d. N/A = Not supported.

e. AUDN = Autoterminate DN. AUDN in LD 16 has the same significance as ATDN in LD 14.

f. Must be an ACD DN.

g. Last n CAD digit = the last n digits of the Called Party Number IE, where 'n' is defined using prompt LDN0 in LD 15.

h. Must be an ACD DN.

i. Must be an ACD DN.

Differences between ISA, CBC, and NI-2 CBC

Table 39 summarizes the differences between Nortel's ISA, Lucent's Call By Call Service Selection, and NI-2 Call By Call Service Selection.

Table 39
Differences between Nortel's ISA, Lucent's CBC, and NI-2 CBC

Nortel ISA	Lucent CBC	NI-2 CBC
Proprietary (interface specific to DMS-100 and DMS-250).	Proprietary (interface specific to Lucent 5ESS Local Exchange Carriers).	Bellcore-based standard CBC service (independent of switch type).
Services: — Public — PRIVATE — INWATS — OUTWATS — TIE — FX	Services: — ACCUNET — SDN — MEGACOM — MEGACOM 800 — WATB — WATM — LDS — IWAT — 1800	Standardized Services: — TR-1268 Public (CO or DID) — FX — TIE — OUTWATS (IntraLATA, Bands, and InterLATA) — INWATS Non-standardized Services: — e.g., Lucent proprietary services, as follows: • Access to operator • Access to Exchange Carrier Services (call by call services) • Access to Virtual Private Network • MEGACOM/ MEGACOM 800 • ACCUNET switched digital service • International long distance service • International 800 • Electronic Tandem Network • Private Virtual Network • DIAL IT and Lucent MultiQuest

Nortel ISA	Lucent CBC	NI-2 CBC
CBC calls are routed according to the Service Identifier in the Service Parameter of the NSF IE.	CBC calls are routed according to the service specified by the Facility Coding Value in the NSF IE.	CBC calls are routed according to the service specified by the Facility Coding Value and the Service Parameter in the NSF IE.
Up to 512 service routes can be configured on the Meridian 1 (one per Service Identifier value), enabling access to 512 possible services.	Only one service route can be configured per service type on the Meridian 1, enabling access to only nine possible services. — 1 ACCUNET — 1 SDN — 1 MEGACOM — 1 MEGACOM 800 — 1 WATB — 1 WATM — 1 LDS — 1 IWAT — 1 I800	Up to 512 service routes can be configured on the Meridian 1, enabling access to a maximum of 512 possible services ^a . — Public^b (COT or DID) — 1 INWATS — OUTWATS (98 bands, 1 IntraLATA, 1 InterLATA) — Up to 512 FX or TIE (for FX and TIE, a Facility Number may be assigned in LD 16 for each service route)
The operation mode for TIE trunks is senderized (see footnote a).	N/A	The operation mode for TIE trunks may be senderized ^c or cut-through ^d (Release 23 supports senderized mode only).
The minimum and maximum function are defined on a per service route basis.	The minimum and maximum function are defined on a per service route basis.	The maximum value is defined on a per service route basis (a maximum is required by the Bellcore Specification). The maximum value is also defined by the serving Central Office. There is no minimum value allowed by the Bellcore Specification.

One Public service route (no NSF IE) can be configured for multiple incoming and outgoing trunks, with a maximum and a minimum value.	N/A	A system may be configured to handle public network calls with one incoming route and multiple outgoing routes, or one incoming and outgoing route with multiple outgoing routes. The route type for these service routes may be COT and DID.

- a. The maximum cannot be greater than 512 for all call types.
- b. Multiple service routes can be configured on a master route to serve outgoing public network calls, but only one service route may be specified in the master route to serve incoming public network calls. The route type for these service routes may be COT and DID. The result is that a system may be configured to handle public network calls with one incoming route and multiple outgoing routes, or one incoming and outgoing route with multiple outgoing routes
- c. For a TIE trunk operating in senderized mode, the Central Office collects and screens the called digits before sending the digits to the Class II equipment or PBX at the end of the TIE trunk.
- d. For a TIE trunk operating in cut-through mode, the Central Office does not collect the called digits. The Class II equipment or the switch at the end of the TIE trunk are allowed to exchange inband information, such as dial tone and address information.

Operating parameters

For Release 23, NI-2 Call By Call Service Selection does not support the TIE trunk cut-through mode.

The maximum number of NI-2 Call By Call Service Selection routes that can be configured on a Meridian 1 is 512.

The maximum number of trunks per route is 254 per master route.

Feature interactions

Calling Party Privacy

The Calling Party Privacy feature allows a user the option of restricting the display of the calling number on the set of the called party. The INWATS service requires that the CLID always be displayed. Therefore, subscribers to INWATS cannot restrict the display of the calling number, even though they have the Calling Party Privacy feature active.

Feature packaging

The NI-2 Call By Call Service Selection feature requires the NI-2 Call By Call (CBC_PKG) package 334.

The following packages are also required as dependencies:

- National ISDN-2 (NI2) package 291
- Integrated Services Digital Network (ISDN) package 145
- Primary Rate Access (PRA) package 146
- Multi-purpose Serial Data Link (MSDL) package 222

Traffic measurement output

The TFC002 traffic report has been updated for NI-2 CBC as shown by Table 40:

Table 40
TFC002 NI-2 CBC trunks format

System ID	TFC002
Customer Number	
Route Number	Trunk Type
Trunks equipped	Trunks working
Incoming usage	Incoming peg count
Outgoing usage	Incoming peg count
Outgoing overflow	All trunks busy
Toll peg count	
Incoming CBC peg count	Outgoing CBC peg count

Trunk Type

For an NI-2 CBC master route, 'CBCT' is output in this field. For an NI-2 CBC service route, one of the following is output in the field, based on the trunk type of the route:

- FEX
- TIE
- CO
- DID
- WATS

Trunks Equipped

This field indicates the total number of trunks configured for the NI-2 CBC master route (this field would always be 0 for service routes).

Trunks Working

This field indicates the total number of trunks enabled (working) for the NI-2 CBC master route (this field would always be 0 for service routes).

Incoming usage

This field indicates the total number of incoming routes, for both the NI-2 CBC master route and service routes.

Outgoing usage

This field indicates the total number of outgoing routes, for both the NI-2 CBC master route and service routes.

Outgoing overflow

This field indicates the number of outgoing overflow routes for the NI-2 CBC master route (this field would always be 0 for service routes).

Toll peg count

This field indicates the toll peg count for the NI-2 CBC master route (this field would always be 0 for service routes).

Incoming peg count

This field indicates the incoming peg count increment when an incoming trunk call on the NI-2 CBC master route becomes idle (this field would always be 0 for service routes).

Outgoing peg count

This field indicates the outgoing peg count increment when an outgoing trunk call on the NI-2 CBC master route becomes idle (this field would always be 0 for service routes).

All Trunk Busy

This field indicates the increment when all trunks (incoming and outgoing) on the NI-2 CBC master route becomes busy. For a service route, this field indicates the increment when the number of calls (both incoming and outgoing) for the service route has reached its maximum value.

Incoming CBC peg count

This field indicates the incoming peg count for an NI-2 CBC service route.

Outgoing CBC peg count

This field indicates the outgoing peg count for an NI-2 CBC service route.

Feature operation

No specific operating procedures are required to use this feature.

Feature testing

Test each PRI trunk to ensure that the Meridian 1 completes an NI-2 CBC call. Run the following test for each of the available call types: TIE, Public (COT, DID), FX, INWATS, and OUTWATS.

To test NI-2 CBC, follow steps 1 through 8.

- 1** Select a PRI to be tested.
- 2** Access LD 60. Use STAT command on all pertinent B-channels.
- 3** Set all the Maximum value in all service routes to 1 (the Central Office must define the same value, that is, 1).
- 4** Make a test call on a trunk route that accesses the PRI being tested. Be sure the test call is to a valid destination.

- 5 Use LD 80 to ensure a B-channel from the NI-2 CBC pool is in use. Then:
 - Place the call on hold.
 - Make another call. You should receive an overflow signal (fast busy).
 - Repeat this procedure for every outgoing service route.
- 6 Disconnect both calls.
- 7 Ask the terminating end to place an incoming call for each incoming call type, then:
 - Place the call on hold.
 - Ask the terminating end to place another call. They should receive an overflow signal (fast busy).
 - Disconnect both calls.

NI-2/QSIG Compliance Update

The NI-2/QSIG Compliance Update feature makes the X11 Release 24.2x NI-2 and QSIG interfaces compliant with the latest standards documents.

Compliance with the standards has evolved as follows:

- ETSI QSIG basic call functionality now complies with the ETS 300-172, fourth edition (1997) standards document. Initially, support for the ISDN ETSI QSIG interface and the basic call capability was introduced in X11 Release 20. This version of the interface was based on the ETS 300-172, first edition (1990) document.
- ISO QSIG basic call functionality now complies with the North American standards document, ISO/IEC 115172 second edition. Initially, support for the ISDN ISO QSIG interface and the basic call capability was introduced in X11 Release 20. This version of the interface was based on the ISO/IEC 115172 first edition document.
- National ISDN-2 (NI-2) basic call functionality now complies with the latest North American standards document, Bellcore TR-NWT-001268.

The NI-2/QSIG Compliance Update feature changes the way the Meridian 1 handles a recoverable error. Instead of sending incorrect call state information, the Meridian 1 now sends a correct call state in the STATUS message.

The mandatory parts of the STATUS message are: CAUSE (indicates type of error) and CALL STATE. Whenever the Meridian 1 encounters a recoverable error it sends a STATUS message. Recoverable errors can be cases such as:

- the IE received is non-mandatory and unrecognized
- the IE is non-mandatory and has invalid contents

In cases such as these, the basic call can still be processed, without affecting basic services, if the call state sent does not hinder this process. All the protocol must do is report the errors.

Before the protocol compliancy was updated, the Meridian 1 sent the call state information as it existed before receiving the incoming call message with the recoverable error. This was not appropriate for other-vendor switches which dropped the call when the incorrect call state information was received. Now, the Meridian 1 sends the call state information, adjusted after the incoming call message was received. The adjusted call state information allows the other vendor switch to proceed with the basic call.

Operating parameters

A hardware upgrade is not required for this feature.

Fatal errors and errors in non-call-associated messages (such as maintenance messages) are not affected by this feature. These errors continue to use the existing error reporting mechanism.

Feature interactions

There are no feature interactions specified for this feature.

Feature packaging

The following packages are required for the ISDN PRI QSIG interface:

- ISDN Signaling (ISDN) package 145
- Primary Rate Interface (PRA) package 146
- Multi-Purpose Serial Data Link (MSDL) package 222
- QSIG Interface (QSIG) package 263

The following packages are required for the ISL QSIG interface:

- ISDN Signaling (ISDN) package 145
- Primary Rate Interface (PRA) package 146
- ISDN Signaling Link (ISL) package 147
- Multi-Purpose Serial Data Link (MSDL) package 222 (for ISL on PRI only)
- QSIG Interface (QSIG) package 263

The following packages are required for the PRI NI-2 interface:

- ISDN Signaling (ISDN) package 145
- Primary Rate Interface (PRA) package 146
- Multi-Purpose Serial Data Link (MSDL) package 222
- National ISDN-2 Interface (NI-2) package 291

Feature operation

There are no operating procedures specified for this feature.

Non-Associated Signaling Channels (nB+D)

On an Option 11 system, the D-Channel can support up to 8 PRIs in an nB+D environment with a minimum of 23 and a maximum of 190 B-channels. The 190 B-channel restriction is derived from the calculation of 8 PRIs x 24 B-channels minus 2 D-Channels.

An nB+D arrangement allows a PRI facility to consist of 24 B-channels, while the D-Channel is carried by, and shared with, another PRI link.

Package Requirements

Package requirements are as follows

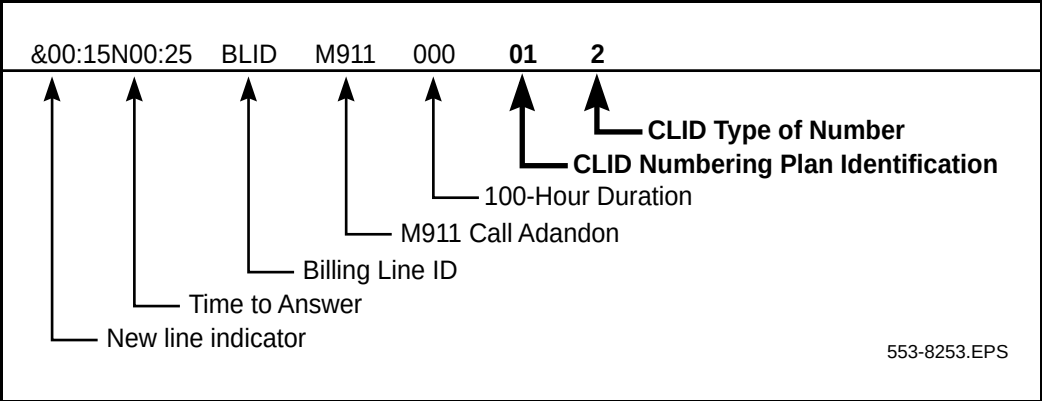
ISDN	option 145
PRI or ISL	option 146 (PRI) or option 147 (ISL)

NPI and TON in CDR Tickets

The Numbering Plan Identification (NPI) and Type Of Number (TON) in Call Detail Recording (CDR) Tickets¹ feature allows NPI and TON information to be optionally displayed on the third line of CDR tickets. NPI and TON are associated with Calling Line Identification (CLID) information, and are useful for billing incoming calls to the originating party.

The NPI and TON are only displayed for calls on an incoming ISDN trunk. Also, the New Format CDR (FCDR) prompt must be set to NEW and the Calling Line Identification (CLID) prompt must be set to YES in Overlay 17. Figure 50 illustrates the format of the third line of a CDR ticket.

Figure 50
Third line format for CDR ticket



1. “Ticket” is the international term for record.

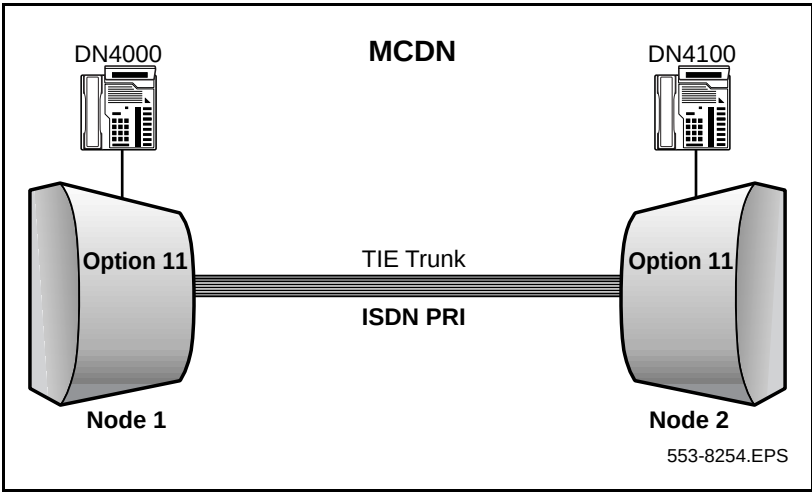
Table 41 describes the contents of the third line of CDR tickets.

Table 41
Third line contents of CDR tickets

Line	Position	Field	Field Definition
3	1	blank	
3	2	&	New line indicator
3	3-7	TTA	Time To Answer (Total ringing time)
3	8	REDIR/B	Time To Answer (Redirection Indicator)/Busy Tone Identifier
3	9-13	TWT	Time To Answer (Total Waiting Time)
3	14	blank	
3	15-30	BLID...xxx	Billing Line ID
3	31	blank	
3	32-38	ABANDON	M911 Call Abandon Tag
3	39	blank	
3	40-42	000	100-Hour Duration
3	43	blank	
3	44-45	NPI	CLID Numbering Plan Identification
3	46	blank	
3	47	TON	CLID Type Of Number
3	48	blank	

Figure 51 illustrates a scenario in which DN 4000 (on Node 1) places a call to DN 4100 (on Node 2) over a Meridian Customer Defined Network (MCDN), using a Coordinated Dialing Plan (CDP) Distant Steering Code (DSC). The call arrives at Node 2 on Route 201 Member 4. A CDR N ticket is produced when the call is disconnected.

Figure 51
Scenario involving a call over a Meridian Customer Defined Network



The CDR N ticket produced in the above scenario has the following format:

```

N 001 02 T201004 DN4100 02/10 18:07:15:00:02:24.0
& 4000XXXXXXXXXXXXX
&00:15N00:25 BLIDXXXXXXXXXXXXX          000 09 6

```

On line 3 of the ticket, the NPI value of “09” represents a private numbering plan. The TON value of “6” represents an Electronic Switched Network (ESN) Customer Dialing Plan (CDP). Please refer to Tables 42 and 43 for the NPI and TON information for an MCDN incoming trunk.

When an incoming call arrives on the Meridian 1, NPI and TON are sent in the calling party Information Element (IE) and are mapped into internal values. The correspondence between the Meridian 1 values and the values given in the specifications are described in Tables 42 to 49.

Tables 42 to 49 show the information printed in the CDR ticket, depending on the incoming trunk protocol. As shown in these tables, not all combinations of NPI and TON exist.

In the TON tables, only ISDN/Telephony numbering plan (Rec. E.164/E.163) and private numbering plans are detailed. For all other supported NPI values, TON has the value of “unknown number”.

Referring to the scenario in Figure 51, Tables 42 and 43 show the NPI and TON information for an MCDN incoming trunk.

Table 42
NPI information printed in the CDR ticket for an MCDN incoming trunk

NPI code in CDR	Corresponding value of NPI in specification
00	000 - unknown numbering plan
01	0001 - ISDN/Telephony numbering plan (Rec. E.164)
02	not used
03	not used
04	not used
08	not used
09	1001 - private numbering plan

Table 43
TON information printed in the CDR ticket for an MCDN incoming trunk

TON code in CDR	Corresponding value of TON in specification	
	NPI = ISDN/Telephony numbering plan (Rec. E.164)	NPI = private numbering plan
0	0000 - unknown number	0000 - unknown number
1	0001 - international number	not used
2	0010 - national number	not used
3	not used	0011 - ESN SPN
4	0100 - local number	not used
5	not used	0101 - ESN LOC
6	not used	0110 - ESN CDP

Tables 44 and 45 show the NPI and TON information for a QSIG incoming trunk.

Table 44
NPI information printed in the CDR ticket for a QSIG incoming trunk

NPI code in CDR	Corresponding value of NPI in specification
00	0000 - unknown
01	0001 - ISDN/Telephony numbering plan (Rec.E.164/E.163)
02	not used
03	0011 - data numbering plan (Rec.X.121)
04	0100 - telex numbering plan (Rec. F.69)
08	1000 - national standard numbering plan
09	1001 - private numbering plan

Note: QSIG refers to ISO QSIG and ETSI QSIG.

Table 45
TON information printed in the CDR ticket for a QSIG incoming trunk

TON code in CDR	Corresponding value of TON in specification	
	NPI = ISDN/Telephony numbering plan (Rec. E.164)	NPI = private numbering plan
0	000 - unknown or 110 - abbreviated number	000 - unknown or 110 - abbreviated number or 001 - level 2 regional number or 101 - level3 regional number
1	001 - international number	cannot be mapped
2	010 - national number	010 - level 1 regional number
3	011 - network specific number	011 - PTN specific number
4	100 - subscriber number	100 - local number
5	not used	cannot be mapped
6	cannot be mapped	cannot be mapped

Note: QSIG refers to ISO QSIG and ETSI QSIG.

Tables 46 and 47 show the NPI and TON information for a non-UIPE and non-MCDN incoming trunk.

Table 46
NPI information printed in the CDR ticket for a non-UIPE and non-MCDN incoming trunk

NPI code in CDR	Corresponding value of NPI in specification
00	0000 - unknown numbering plan
01	0001 - Rec. E.164
02	0010 - Rec. E.163
03	0011 - Rec. X.121
04	0100 - Telex numbering plan
08	1000 - national numbering plan
09	1001 - private numbering plan

Note: Non-UIPE refers to the 1TR6, AXE-10 for Australia and Sweden, Swissnet 2, Numeris VN4, SYS-12, and D70 connectivities. These interfaces are not supported in North America.

Table 47
TON information printed in the CDR ticket for a non-UIPE and non-MCDN incoming trunk

TON code in CDR	Corresponding value of TON in specification	
	NPI = ISDN/Telephony numbering plan (Rec. E.164)	NPI = private numbering plan
0	0000 - unknown number ¹	0000 - unknown number ¹
1	0001 - international number ²	not used
2	0010 - national number ²	not used
3	not used	0011 - network specific number ²
4	0100 - subscriber number ²	not used
5	not used	not used
6	not used	0110 - abbreviated number ²

1. For SYS-12, AXE-10 for Australia and Sweden, Swissnet, Numeris VN4, and D70 interfaces, all received values are mapped into unknown code. These interfaces are not supported in North America.

2. For all interfaces not mentioned in **1**.

Tables 48 and 49 show the NPI and TON information for an NI-2 incoming trunk.

Table 48
NPI information printed in the CDR ticket for an NI-2 incoming trunk

NPI code in CDR	Corresponding value of NPI in specification
00	0000 - unknown numbering plan
01	0001 - ISDN/Telephony numbering plan (Rec. E.164)
02	unused
03	unused
04	unused
08	unused
09	1001 - private numbering plan

Table 49
TON information printed in the CDR ticket for an NI-2 incoming trunk

TON code in CDR	Corresponding value of TON in specification	
	NPI = ISDN/Telephony numbering plan (Rec. E.164)	NPI = private numbering plan
0	not used	not used
1	001 - international number	not used
2	010 - national number	not used
3	not used	not used
4	100 - local number	100 - subscriber number
5	not used	not used
6	not used	not used

Operating parameters

The NPI and TON in CDR Tickets feature applies only for incoming ISDN trunk calls. NPI and TON information depends on the incoming trunk protocol.

The NPI and TON fields are left blank for internal calls, outgoing trunks, incoming non-ISDN trunks, or if the CLID prompt is set to NO.

When the FCDR prompt is set to OLD, the NPI and TON fields do not exist, regardless of how the CLID prompt is defined.

NPI and TON information is available with the following incoming interfaces: QSIG (ISO), MCDN, non-UIPE and non-MCDN, and NI2.

NPI and TON information is included in all types of CDR records that contain CLID information.

NPI and TON information is lost when system initialization occurs and the call is then reconstructed. In this case, if the call involves an incoming ISDN trunk and if the NPI and TON in CDR Tickets feature is configured, the NPI field contains two zeros (00) and the TON field contains one zero (0), regardless of the NPI and TON sent at call setup.

Feature interactions

The NPI and TON in CDR Tickets feature does not have any specific interactions with other features.

Feature packaging

The NPI and TON in CDR Tickets feature requires the following packages:

- Call Detail Recording (CDR) package 4
- Call Detail Recording on Teletype Machine (CTY) package 5
- New Format Call Detail Recording (FCDR) package 234
- Calling Line Identification in Call Detail Recording (CCDR) package 118

Feature operation

No specific operating procedures are required to use this feature.

Primary Rate Access Package

This package allows for the configuration of PRI in a 23B+D, nB+D, or ISL shared mode arrangement. It also allows for the transport of CLID and ESN/ISDN features.

Package Requirements

Package requirements are as follows:

PBXI	option 75
ISDN	option 145

Remote Virtual Queuing

Remote Virtual Queuing (RVQ) allows you to perform queuing type functions on a trunk (B-Channel) in your ISDN network. This feature is similar to the ESN features Coordinated Call-Back Queuing (CCBQ), and Call-Back Queuing to a Conventional Main (CBQCM). Prior to operating RVQ, you must have a working knowledge of the ESN features. Refer to *Electronic Switched Network description* (309-3001-100) for a complete description of these features.

Remote Virtual Queuing (RVQ) is supported on a private ISDN PRI/ISL network only.

When an outgoing network path is unavailable, Remote Virtual Queuing (RVQ) provides call back queuing. RVQ scans ahead on the ISDN trunk to be sure the entire path from origination to termination is available. When a path becomes idle, you are notified and can ring the path again to terminate the call.

Operating parameters

In addition to the function offered by CCBQ and CBQCM, RVQ provides the following:

- There is no limit to the number of nodes in the ISDN network that RVQ searches.
- The originating node has control of the call.

RVQ is supported in a private ISDN PRI/ISL network only. Any trunk other than an ISDN PRI or ISL trunk is considered a Non-RVQ Compatible (NRC) trunk. NRC trunks include analog trunks, T1 trunks, or public trunks. NRC also includes trunks connecting to a non-Meridian 1, non-ISDN, or Pre-Release 18 node.

The originating, tandem, and terminating nodes must run X11 release 18 or later software, and include all the required packages (refer to Feature packaging in this module).

Meridian Modular, 500/2500, SL-1, and Meridian digital telephones can activate and receive RVQ calls. Data terminals are also supported. Attendants cannot activate RVQ.

RVQ is activated only by telephones with Ring Again allowed.

AUTHCODE is supported on the first tandem node only.

The RVQ retry timer is set for each NCOS. Setting a specific NCOS with a low retry timer searches for more connections more often. The lower the timer, the greater the chance to connect the call.

Trunk Access codes are not supported.

ACD DN's are supported as a terminating DN.

Attendants are supported as terminating stations.

The maximum total amount of time RVQ searches for available paths is 30 minutes. The countdown begins as soon as the originator activates the Ring Again key.

Only one RVQ Ring Again attempt at a time is allowed. If Ring Again is pressed again, after activating it for RVQ, the most recent number dialed is the one attempted.

RVQ does not check the terminating telephone's status. The dialed DN may be invalid or busy. Once the path is available, the RVQ call can reach the dialed DN. It is possible the dialed telephone is busy, and Network Ring Again may be used if enabled. The tone indicating the trunks are busy is a fast busy tone. A busy DN is indicated by a standard busy tone.

RVQ searches throughout Meridian 1 networks only. Off-net trunks paths cannot be checked beyond the first trunk.

RVQ is a virtual queuing feature. Each RVQ call is independent of another. It does not operate by first in first out policy. The first caller to initiate RVQ is not necessarily the first person connected.

It may take up to 30 seconds for notification to reach the originator. The network path is reserved while RVQ notifies the caller. In a private network, the path is reserved from the originating node to the terminating node. Otherwise the path is reserved up to the first NRC trunk.

RVQ supports Uniform Dialing Plan (UDP), and Coordinated Dialing Plan (CDP). For NRC trunks, the E.164 public numbering plan is supported.

The following lists the trunk types RVQ supports.

— Private network ISDN trunks:

TIE

COT

Direct Outgoing Dial (DOD):

WATS

ISA

FEX

— NRC trunks:

COT

Direct Outgoing Dial (DOD):

WATS

FEX

ISA

TIE

RVQ supports Meridian 1 machines only, in a private ISDN PRI/ISL network. If tandeming to a non-Meridian 1 machine, it is treated as a Non-RVQ Compatible (NRC) trunk.

RVQ is canceled if the originating node system initializes.

If the originating node performs a cold start, RVQ is canceled.

RVQ from a Conventional Main (RVQCM) requires a special configuration.

With RVQ, callers cannot activate Ring Again to refuse expensive routes after the Expensive Route Warning Tone (ERWT) is given.

When using RVQ from a Conventional Main (RVQCM), the originating node seizes the same TIE trunk group that was used to initiate RVQCM for the callback. Thus, these trunk groups must be two-way (incoming/outgoing) and configured for far end disconnect.

Conventional mains must provide answer supervision on TIE trunks connected to the originating node. The system must also permit transmission or repetition of telephone dial pulses for RVQCM operation. This feature cannot be used with systems that operate in senderized mode. Operation may require adjustment of the interdigit timeout on systems that employ simulated cut-through operation.

Multiple callback queues are allowed per trunk group for the Conventional main by dialing any digits (up to 7) based on the availability of Meridian 1 call registers.

When utilizing RVQCM, do not call forward the calling telephone when awaiting callback. If the telephone is forwarded, it is possible that the TIE trunk will not be released at the end of the call.

Feature interaction

Drop Back Busy

Drop Back Busy (DBB) and Remote Virtual Queuing (RVQ) are both packaged under the Originating Routing Control/Remote Virtual Queuing (ORC-RVQ) package 192. If RVQ and DBB are both configured, DBB will take precedence over RVQ. If the user wishes to activate RVQ, DBB must be disabled for a route entry in response to the IDBB prompt. If the user wishes to activate DBB, it must be enabled by entering DBI or DBA. Refer to the “Implementation” section for more information.

Coordinated Call-Back Queueing

CCBQ and RVQ can both be enabled on a single machine.

Call-Back Queueing to a Conventional Main

CBQCM and RVQ can both be enabled on a single machine.

Direct Inward System Access

DISA DNs are not supported by RVQ.

Make Set Busy

RVQ can be originated by, and terminated on an ACD DN in Make Set Busy mode.

Network ACD

If a target agent is available on a remote node, RVQ cannot be activated if the busy trunk is found on its way to the target node.

Network Call Redirection

RVQ does not guarantee connection if the terminating telephone call forwards to a telephone on another node. When a terminating telephone call forwards to another node, that node is a redirected node. RVQ cannot search between terminating and redirected nodes.

Network Ring Again

Network Ring Again (NRAG) is activated only when the terminating telephone or console is busy. If both the network path and the terminating telephone are busy, RVQ is activated first. When the path is available, but the telephone is busy, then NRAG can be activated.

Off Hook Queueing

RVQ and Off Hook Queueing (OHQ) are compatible in a system. If OHQ is configured, it is implemented by leaving the handset off hook. RVQ is implemented by pressing the Ring Again key. Choosing one or the other method activates the specified feature.

Feature operation

RVQ supports private ISDN PRI/ISL networks, non-RVQ compatible (NRC) blocked trunks, and conventional mains (RVQCM).

RVQ on a private network. RVQ is supported for Meridian 1 machines, running X11 release 18 on an ISDN PRI/ISL network only. When a blocked network path is discovered, RVQ searches through the network to ensure the entire path will be clear when the blocked section is cleared. When all trunks along the path are available, RVQ notifies you.

When a trunk is busy, RVQ follows this checklist before invoking RVQ.

- The first tandem node must be a Meridian 1 node, running X11 release 18 or later software.

- The originating node's Network Class of Service (NCOS) must allow Call Back Queuing (CBQ).
- At least one route in the initial set of the route list must allow CBQ.
- The system has CBQ allowed at the Network Control Block.

When the checks are complete, activate RVQ by pressing the Ring Again key. As soon as the key is pressed, the retry timer begins. When the retry timer expires, RVQ checks the path again. The total amount of time RVQ will spend on a search is 30 minutes.

The retry counter controls the number of times the initial set is checked before RVQ searches the extended set. The extended set search includes all the trunks in both the initial and extended sets.

Tandem nodes must recognize the RVQ messages and pass them on to another tandem or terminating node.

RVQ with NRC trunks. RVQ searches the path until it reaches the first Non-RVQ Compatible (NRC) trunk. RVQ notifies the originator when that trunk is available, but cannot search beyond it. It is possible that the path may be blocked beyond the NRC trunk, and the call cannot go through.

Any trunk other than an ISDN PRI or ISL trunk is considered an NRC trunk. NRC trunks include analog, T1, or public trunks, as well as trunks connecting to a non-Meridian 1, non-ISDN, or non-X11 release 18 node.

When an NRC trunk is busy, RVQ follows this checklist before implementing RVQ.

- First tandem node must be a Meridian 1 node, with X11 release 18 or later.
- Originating node's NCOS must allow Call Back Queuing (CBQ).
- At least one route in the initial set of the route list must allow CBQ.
- The system has CBQ allowed at the Network Control Block.

When the checks are complete, activate RVQ by pressing the Ring Again key. As soon as the key is pressed, the retry timer begins. When the retry timer expires, RVQ checks the path again. The total amount of time RVQ will spend on a search is 30 minutes.

The retry counter controls the number of times the initial set is checked before RVQ searches the extended set. The extended set search includes all the trunks in both the initial and extended sets. Only the first NRC trunk is checked. RVQ cannot search beyond that trunk, even if the subsequent trunks are ISDN PRI/ISL.

RVQ on a conventional main (RVQCM). A conventional main call is one that comes from a non-Meridian 1 system into the private network through a TIE trunk to a Meridian 1 node. When the conventional main call enters the network, the default NCOS is assigned to the TIE trunk to determine RVQCM eligibility. Use Authcode last to upgrade the NCOS if necessary.

When a conventional main call is blocked, RVQ checks the following at the first Meridian 1 node to ensure RVQCM can be activated. The Meridian 1 node is considered the Originating node, and controls the call.

- The tandem and terminating nodes must be Meridian 1 nodes, running X11 release 18 or later software.
- The originating node's Network Class of Service (NCOS) must allow Call Back Queuing (CBQ).
- At least one route in the initial set of the route list must allow CBQ.
- The system has CBQ allowed at the Network Control Block.
- The incoming TIE trunk allows CBQ.

RVQCM is offered to the conventional main caller with a special offer tone (3 beeps). To accept RVQ, enter the calling number. After the same special confirmation tone (3 beeps) is heard, hang up. The originating node begins the retry timer and search process. When the retry timer expires, RVQ checks the path again. The maximum total amount of time RVQ will spend on a search is 30 minutes. When the path is free, the originating node calls the caller back (at the number entered). The phone rings, the same special callback tone (3 beeps) is heard, and the call is connected. RVQCM cannot be canceled from the conventional main once started.

If the calling telephone is busy, or does not answer the callback, the RVQ callback is placed in a 5 minute suspense state. After 5 minutes have passed, RVQ attempts the callback again. If the calling telephone is still busy, or does not answer, RVQ is canceled.

The retry counter controls the number of times the initial set is checked before RVQ searches the extended set. The extended set search includes all the trunks in both the initial and extended sets.

Note: The calling number is accepted only if the database has been configured to accept the given number of digits. If not, or if the caller does not hang up, overflow tone is given, and the call is disconnected. RVQCM does not verify that the dialed DN is valid or free.

Once started, RVQ cannot be canceled from the convention main. Operating parameters relating to Call Back Queuing for Conventional Mains (CBQCM) also apply to RVQCM as follows. Refer to the *ESN description* (309-3001-100) for complete discussions of CBQCM.

Users at Conventional Mains cannot activate Ring Again to refuse expensive routes after the Expensive Route Warning Tone (ERWT) is given.

The node seizes the same tie trunk group that was used to initiate RVQCM for the callback. These trunk groups must be two way (incoming/outgoing).

Conventional Mains must provide answer supervision on tie trunks connected to the node. These switches must also permit transmission, or repetition of telephone dial pulses for RVQCM operation. This feature cannot be used with systems that operate in senderized mode. Operation may require adjustment of the interdigit timeout on systems that employ simulated cut-through operation.

Multiple callback queues are allowed per trunk group for the Conventional Main by dialing up to 7 digits (any digits are allowed) based on the availability of Meridian 1 call registers.

CAUTION

Conventional Mains must not allow RVQCM callback calls to be modified by call transfer or call forward to an outside line. Call modifications like this can result in the tie trunk not being released at the end of the call.

Operating RVQ from a digital telephone. The following lists the steps required to activate RVQ from any Meridian digital, Meridian Modular, or SL-1 telephone.

- 1 Place a call to a DN on another node.
- 2 Hear overflow tone indicating a busy trunk along the call path.
- 3 Press the Ring Again (RGA) key. The RGA lamp lights, and the tone stops. If the lamp remains dark, RVQ may not apply.
- 4 Go on-hook.
- 5 The RGA lamp fast flashes, and a 1 second buzz indicates the path is available. If you are on another call, you hear the Ring Again tone.
- 6 Go off-hook (or press a DN key), and press the RGA key to connect the call. If the RVQ notice is not answered within 16 seconds, the RVQ notice stops, and the request is canceled.
- 7 If the terminating telephone is busy, you hear regular busy tone. You may activate Network Ring Again (NRAG) at this point.

Cancel the RVQ request at any time by pressing the RGA key. The associated lamp goes dark.

Operating RVQ from a 500/2500 telephone. The following lists the steps required to activate RVQ from any 500/2500 telephone.

- 1 Place call to a DN on another node.
- 2 Hear overflow tone indicating a busy trunk along the call path.
- 3 Switchhook flash, and hear special tone (3 beeps).
- 4 Dial the Ring Again SPRE or FFC, and hear confirmation tone. If RVQ is not enabled, intercept treatment is given.
- 5 Go on-hook.
The RVQ search takes place only when the telephone is idle. RVQ searches only while you are off-hook. However, the timer runs while you are on-hook, or off-hook.
- 6 Special ringing cadence indicates the path is available.

- 7 Go off-hook to connect the call.
If the RVQ notice is not answered within 16 seconds, the RVQ notice stops, and the request is canceled.

Cancel the RVQ request at any time by going off hook and entering the Ring Again deactivation SPRE or FFC.

Operating RVQCM from conventional main telephone. The following lists the steps required to activate RVQCM from a conventional main telephone.

- 1 Place call to a DN on a Meridian 1 node.
- 2 Hear special dial tone (3 beeps), or RAN if configured, indicating a busy trunk along the call path.
- 3 Dial the calling DN, and hear the same special tone (3 beeps).
- 4 Go on-hook.
- 5 The phone rings when the originating node calls back.
- 6 Go off-hook, hear the same special tone (3 beeps). Stay off-hook, and the call is connected. If the RVQ notice is not answered within the time set in LD 87 (CBTL prompt), the RVQ notice stops, and the request is canceled.

RVQ cannot be canceled from a conventional main telephone, but may timeout after 20 seconds

If the calling telephone is busy, or does not answer the callback, the RVQ callback is placed in a 5 minute suspense state. After 5 minutes have passed, RVQ attempts the callback again. If the calling telephone is still busy, or does not answer, RVQ is canceled.

Package requirements

- Originating Routing Control/Remote Virtual Queuing (ORC-RVQ) package 192, requiring:
 - Network Signaling (NSIG) package 37
 - Network Call Back Queuing (MCBQ) package 38
- ISDN Supplementary (ISDNS) package 161

- Main Network Queuing package 38
- Flexible Call Back Queuing package 61
- Digital Trunk Interface package 75
- ISDN signalling package 145
- ISDN PRI package 146 or ISL package 147
- Advanced Network Services package 148 (for NRAG capability)

T309 Timer

The T309 timer provides a 90-second wait interval after a D-channel failure before the B-channels are cleared. When the D-channel is re-established before T309 expires, a STATUS ENquiry message is sent by the network side. The user side responds with a STATUS message to report the status of the queried channel. If the call state matches, the call is preserved; otherwise, a RElease message is sent to the user side, clearing the call. If the user side does not respond with the STATUS message before the T322 timer expires, the call is cleared.

If T309 expires before the D-channel is re-established, indicating that there is a serious problem with the link, Meridian 1 clears all calls internally and sends a global RESTART when the D-channel is re-established.

For a Meridian 1 to Meridian 1 interface, the T309 timer is not used. The Meridian 1 keeps active calls established as long as possible and lets B-channel users decide when a call is to be dropped. The Meridian 1 specified as network side sends the STATUS ENquiry message on all active calls when the D-channel is re-established.

Prior to X11 release 18, the Meridian 1 does not support the T309 and sending the STATUS ENquiry message for North American interfaces. All active calls are cleared with a global RESTART whenever a D-channel is re-established.

The compatibility checking by means of the STATUS ENquiry message might leave some channels with mismatched states, which are cleared only when trying to reuse the channel.

T309 is dependent on both network and user sides. If a side does not have a Timer T309, it sends a global RESTART when D-channel is re-established.

AT&T 4ESS and 5ESS do not clear transient calls when the D-channel fails. If T309 expires, the calls are not cleared until the D-channel is re-established or the call is cleared by the far end.

Integrated Services Access—Integrated Services Access (ISA) tracks the number of active calls. Prior to X11 release 18, the counter for active calls is reset when the D-channel comes back. With the implementation of T309, active calls are preserved if the ninety seconds does not expire; the counter for active calls is not reset since active calls need to be tracked during the D-channel failure and reset.

Feature packaging

The T309 and STATUS ENquiry message are included in basic ISDN PRI/ISL functionality. No additional packages are required.

The T309 timer is preset at 90 seconds and cannot be service changed.

TMDI on Option 11C

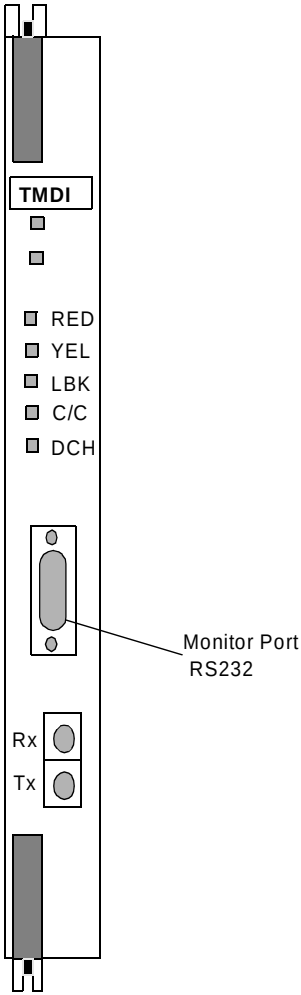
The NTRB21 TMDI card provides 1.5 MBit/s Digital Trunk Interface or Primary Rate Interface functionality on the Option 11C. The NTRB21 has a built-in downloadable D-Channel, and may occupy card slots 1-9 on the Option 11C main cabinet.

Note 1: For CISPR B group cabinets, the active Clock Controller (NTAK20) can only occupy slots 1-3. For FCC and/or CISPR A group cabinets, this limitation does not exist - the Clock Controller can occupy any available slot 1-9.

Note 2: The NTRB21 TMDI card requires that the Option 11C be loaded with at least Generic X11 Release 24 software. If an Option 11C switch is loaded with Release 24 (or later) software, the NTRB21 can be equipped together with the NTAK09 DTI/PRI card (with the NTBK51 downloadable D-Channel daughterboard), and the NTAK93 DCHI daughterboard.

Figure 1 shows a faceplate of the NTRB21 TMDI card.

Figure 1
NTRB21 TMDI card faceplate



Trunk Anti-Tromboning

The purpose of the Trunk Anti-Tromboning (TAT) feature is to optimize tromboned ISDN PRI trunks, ISDN Signaling Link (ISL), Virtual Network Services (VNS) trunks, or analog trunks within an ISDN PRI network. Anti-tromboning will be performed only after the third party answers, and provided that the tromboned PRI/ISL/VNS or analog trunks are associated with the same primary D-channel (with or without a backup D-channel) and the trunks are associated with the same customer. Anti-tromboning will not be performed if the tromboning trunks belong to different customers on the same node (even though they are associated with the same primary D-channel.)

Note: TAT also applies to a call entering a Meridian 1 network over a Central Office trunk. TAT eliminates the tromboning of private network trunks that may occur if the call is redirected or modified.

The term tromboning is used to define a situation whereby two PRI/ISL/VNS trunks, associated with the same D-channel, are being used in parallel. Basically, one PRI/ISL/VNS or analog trunk (B-channel) is established to handle an incoming call from a calling set at the originating node to a called set at the terminating node. A second PRI/ISL/VNS trunk or analog (B-channel) is then established to handle the loop-back of the same call that is redirected from the called station back to a different set at the originating node.

The loop back may result from a call being treated by Network Message Services - Meridian Mail, Network Call Redirection (such as Network Call Forward All Calls, Network Call Forward No Answer, Network Call Forward Busy, and Network Hunting), or by Call Modification (such as a call transfer.) These tromboned trunks are redundant. The Trunk Anti-Tromboning (TAT) feature eliminates these redundant trunks after the call is answered. Refer to “Example of an anti-tromboning operation” on page 405 for a basic example of how TAT is applied.

TAT may function with a Meridian 1 interworking with another Meridian 1, or Meridian 1 interworking with a DMS¹. In the first case, each Meridian 1 must be equipped with TAT. In the latter case, the DMS must be equipped with the MCDN Release Link Trunk (RLT) feature. The trunks may be PRI or VNS.

TAT and Trunk Optimization Before Answer (TRO-BA) may be configured on the same system. In this case, TRO-BA would attempt to optimize the trunks before a call is connected, and TAT would then attempt to optimize the trunks after the call is connected. Please refer to the “Trunk Anti-Tromboning and Trunk Optimization - Before Answer both equipped on the same Meridian 1” on page 417 for more information and examples.

Example of an anti-tromboning operation

The following example may be used as a basic demonstration of TAT at work within a simple Meridian 1 to Meridian 1 interworking (other interworking scenarios are described in the section Anti-tromboning scenarios beginning on page 408).

In Figure 52, the following situation exists:

- Station B at the terminating node receives an incoming call over a PRI trunk from Station A at the originating node; or, an incoming CO call is tandemed from the originating node to the terminating node;
- Station B answers the call, and activates Call Transfer to Station C residing at the originating node. A second PRI trunk is established to handle the new call;
- Station B completes the call transfer, leaving Station A connected to Station C (which is in ringing state) using the two PRI trunks. The PRI trunks remain tromboned until Station C answers the call.

1. Throughout this chapter, a DMS switch should be interpreted as being either an SL-100, DMS-250, or DMS-100 equipped with RLT.

Figure 52
Before Trunk Anti-Tromboning operation

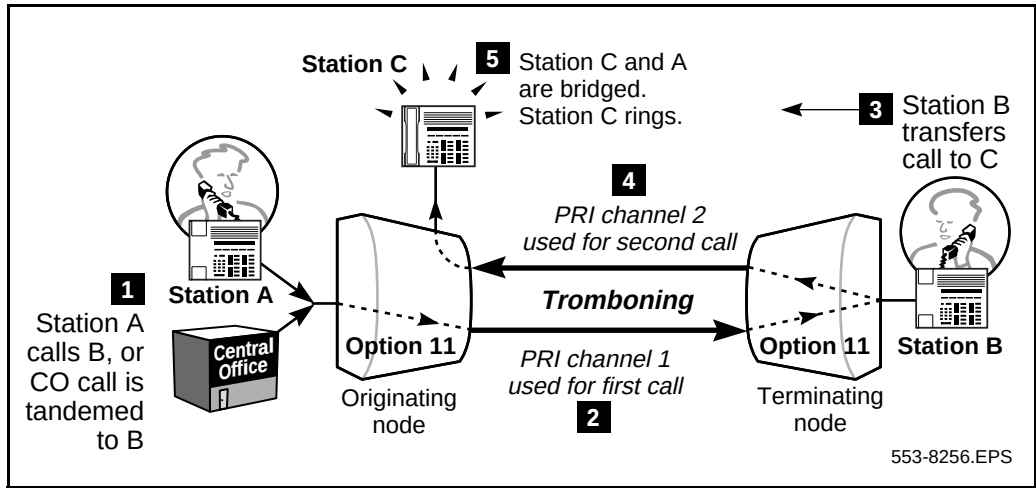
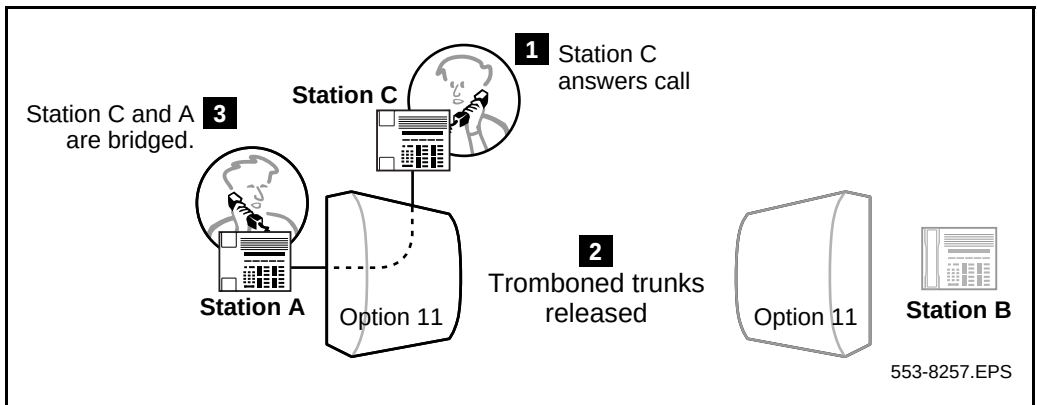


Figure 53 illustrates how the application of TAT eliminates the redundant ISDN PRI B-channels forming the loop-back. After Station C answers the call, Station A and Station C are bridged at the originating node and the redundant trunks are released, provided the trunks involved are associated with the same primary D-channel, and the same customer. This operation eliminates the use of extra network trunking facilities for the duration of the call.

Figure 53
After Trunk Anti-Tromboning operation



Note: If the TAT feature is not supported by either the originating or terminating node, or if the originating node is unable to bridge the call between Station A and Station C, then Station A and Station C remain connected via the tromboned trunks, for the duration of the call. Also, TAT would not release the tromboning trunks if Station A and Station C are both attendants.

Anti-tromboning scenarios

This section provides examples of various anti-tromboning scenarios, as applied with the Meridian 1 interworking with another Meridian 1, and a Meridian 1 interworking with a DMS equipped with RLT.

Please note that the following legend is used when showing connectivity in the illustrations.

Legend

———— PRI B-channel, or
ISL or VNS trunk

M1 = Meridian 1 switch equipped with TAT.

DMS = SL-100, DMS-250, or DMS-100 equipped with RLT.

Note: In the examples that follow, the Trunk Optimization Before Answer (TRO-BA) feature is not equipped.

Anti-tromboning operation for Network Call Redirection (case 1), Meridian 1 interworking with DMS

In Figure 54, the following case is represented for TAT as applied to a Network Call Redirection scenario (in the example, a case of a call forward is used), with two Meridian 1 switches interworking with a DMS.

- Station A located at an originating switch (Public Central Office or PBX) DMS node, makes an internodal call through a DMS and a tandem Meridian 1 node to Station B located at a terminating Meridian 1 node (first call);
- Station B, located at the terminating Meridian 1 node, is call forwarded through the tandem Meridian 1 node and the DMS, to Station C located at the originating switch (redirected call);
- Station C answers;
- Station A connects to Station C.

Figure 54

Anti-tromboning for Network Call Redirection (case 1), M1/DMS

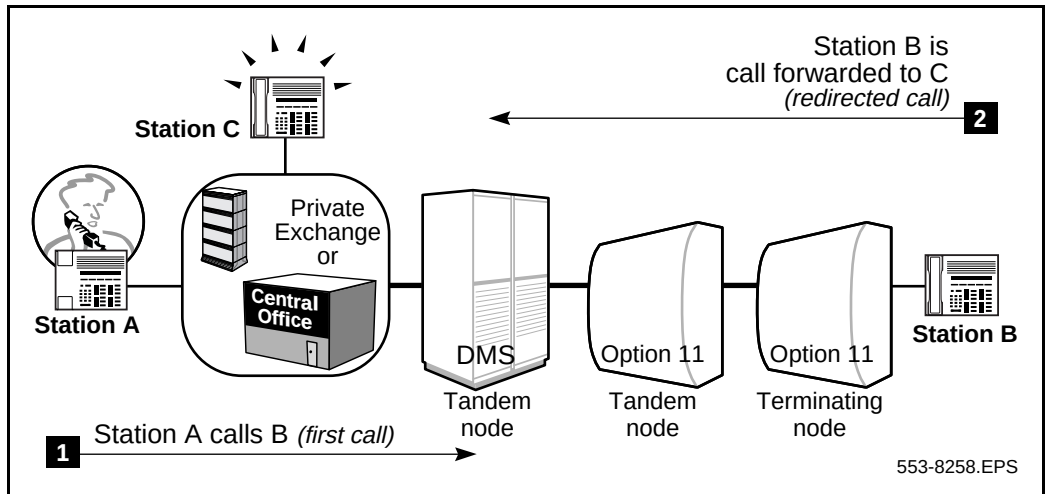
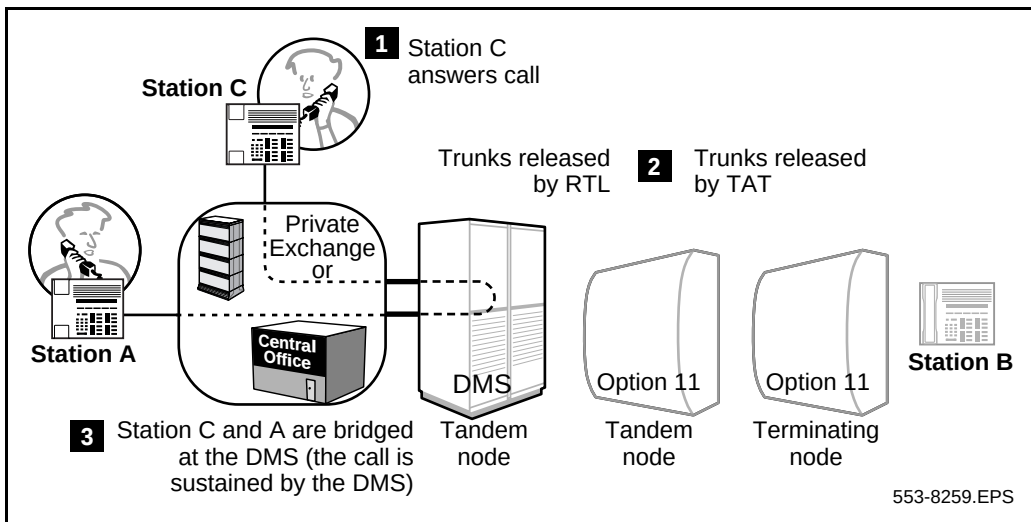


Figure 55 shows the results of anti-tromboning, after Station C answers the call.

- The call is bridged at the DMS tandem node, between A and C;
- The trunks between the terminating Meridian 1 and the tandem Meridian 1 are released by TAT;
- The trunks between the tandem Meridian 1 and the DMS are released by the RLT feature.

Figure 55
Results of anti-tromboning for Network Call Redirection (case 1), M1/DMS



Anti-tromboning operation for Network Call Redirection (case 2), Meridian 1 interworking with DMS

In Figure 56, another example is presented where TAT optimizes redundant trunks due to a call forward. In this case, the trunks between a terminating Meridian 1 node and tandem Meridian 1 node are optimized. The originating node is a DMS. Station C is a centralized attendant or a Meridian Mail position.

- Station A located at an originating switch (Public Central Office or Private Exchange), makes an internodal call through a tandem DMS and a tandem Meridian 1 node to Station B located at a terminating Meridian 1 node (first call);
- Station B, located at the terminating Meridian 1 node, is call forwarded to Station C located at the tandem Meridian 1 node (redirected call). Station C is a centralized attendant or Meridian Mail position;
- Station C answers;
- Station A connects to Station C.

Figure 56
Anti-tromboning for Network Call Redirection (case 2), M1/DMS

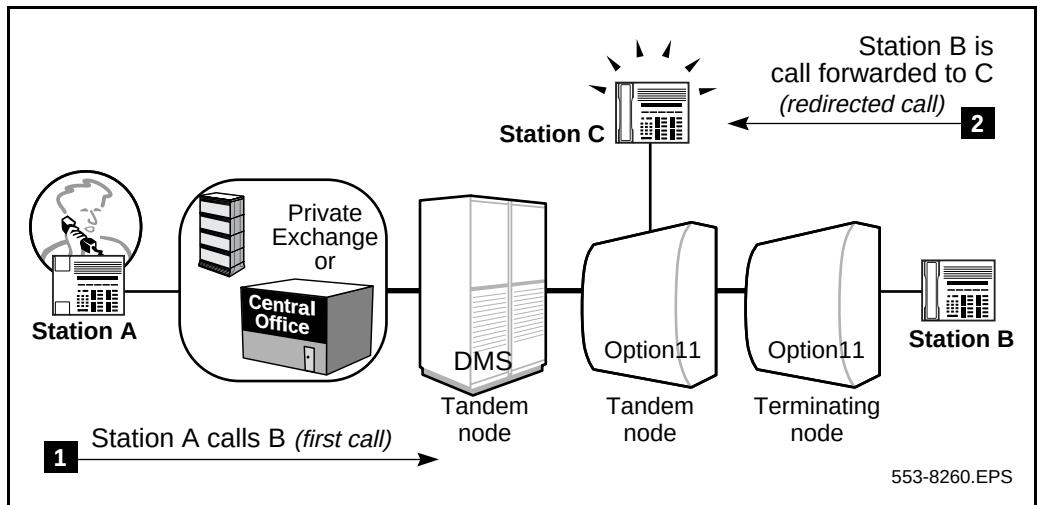
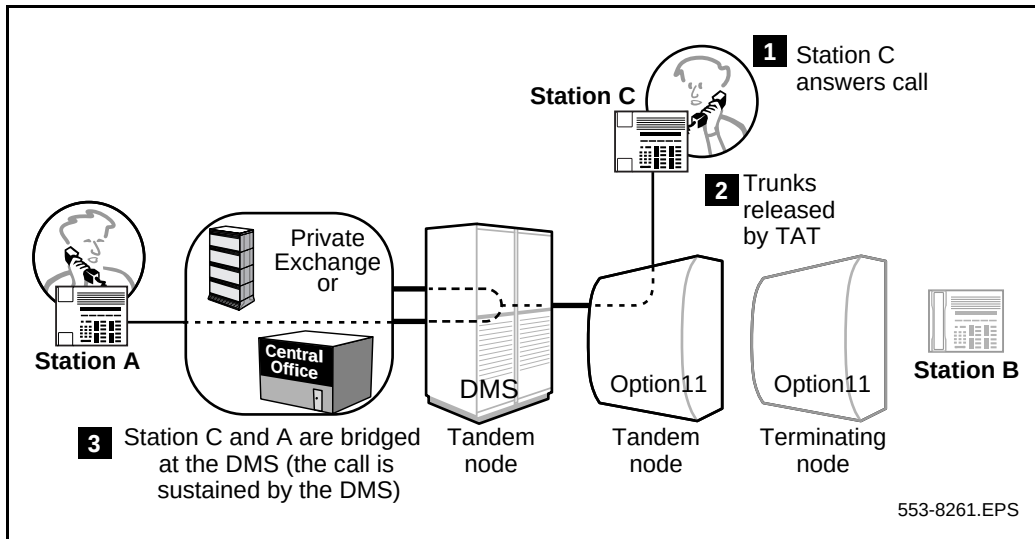


Figure 57 shows the results of anti-tromboning, after Station C answers the call.

- The trunks between the terminating Meridian 1 and the tandem Meridian 1 are released by TAT;
- Station C and Station A are connected.

Figure 57
Results of anti-tromboning for Network Call Redirection (case 2), M1/DMS



Anti-tromboning operation for Call Modification, DMS interworking with Meridian 1

In Figure 58, the following case is represented for TAT as applied to a Call Modification scenario, with DMS interworking with Meridian 1 (in the example, a case of a call transfer is used. Please note that the same effect would take place if Station B conferences in Station C and then drops out, leaving Station A and Station C connected.)

- Station A, located at an originating Meridian 1 node, makes an internodal call through a tandem DMS node to Station B located at a terminating Meridian 1 node (first call);
- Station B, located at a terminating Meridian 1 node, answers the call and initiates a call transfer, through the tandem DMS node, to Station C located at the originating Meridian 1 node (second call);
- Station C answers;
- Station B completes the call transfer.

Figure 58
Anti-tromboning for Call Modification, DMS/M1

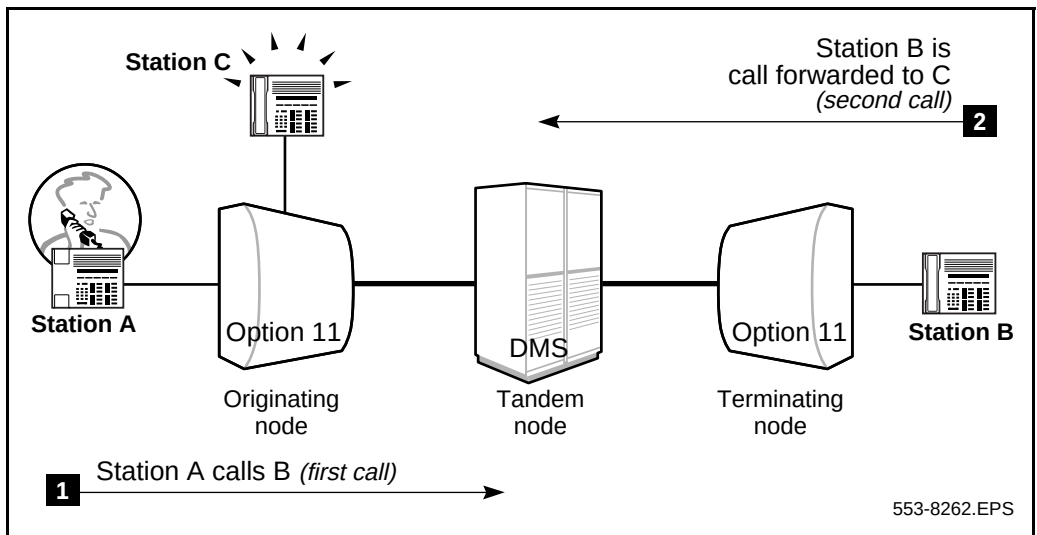
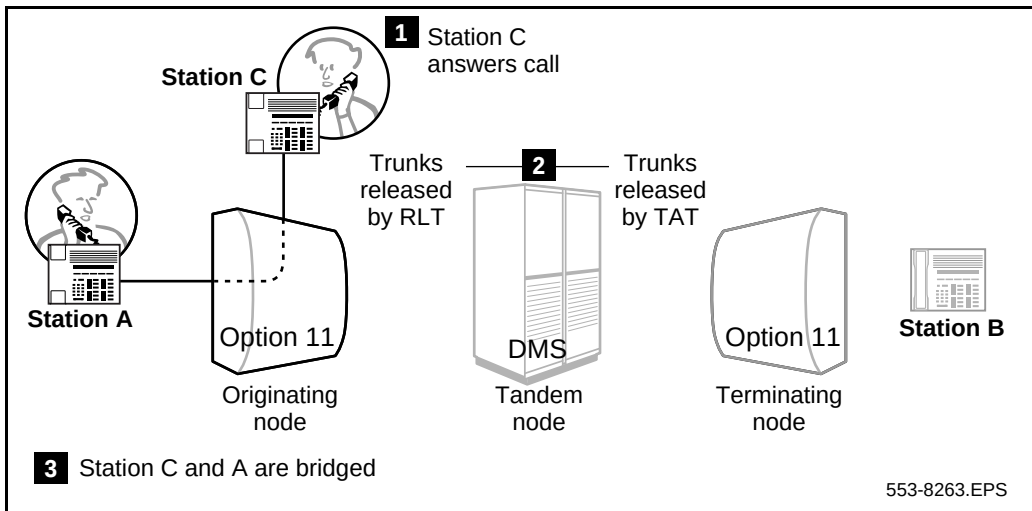


Figure 59 shows the results of anti-tromboning, after Station C answers the call.

- The call is bridged at the Meridian 1 originating node, between A and C;
- The trunks between the Meridian 1 terminating node and the DMS, and between the DMS and the Meridian 1 originating node and, are released by the RLT feature.

Figure 59
Results of anti-tromboning for network call transfer, DMS/M1



Anti-tromboning operation for Call Modification, Meridian 1 interworking with Meridian 1

In Figure 60, the following case is represented for TAT as applied to a Call Modification scenario, with Meridian 1 interworking with Meridian 1 (in the example, a case of a call transfer is used.)

- Station A, located at an originating Meridian 1 node, makes an internodal call through a tandem Meridian 1 node to Station B located at a terminating Meridian 1 node (first call);
- Station B, located at a terminating Meridian 1 node, answers the call and initiates a call transfer, through the tandem Meridian 1 node, to Station C located at the originating Meridian 1 node (second call);
- Station C answers;
- Station B completes call transfer.

Figure 60
Anti-tromboning for network call transfer, M1/M1

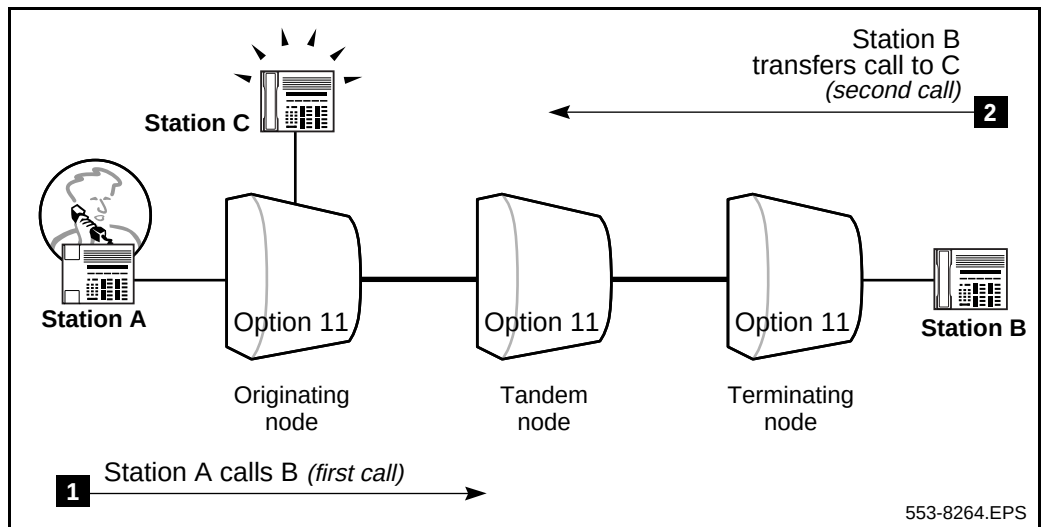
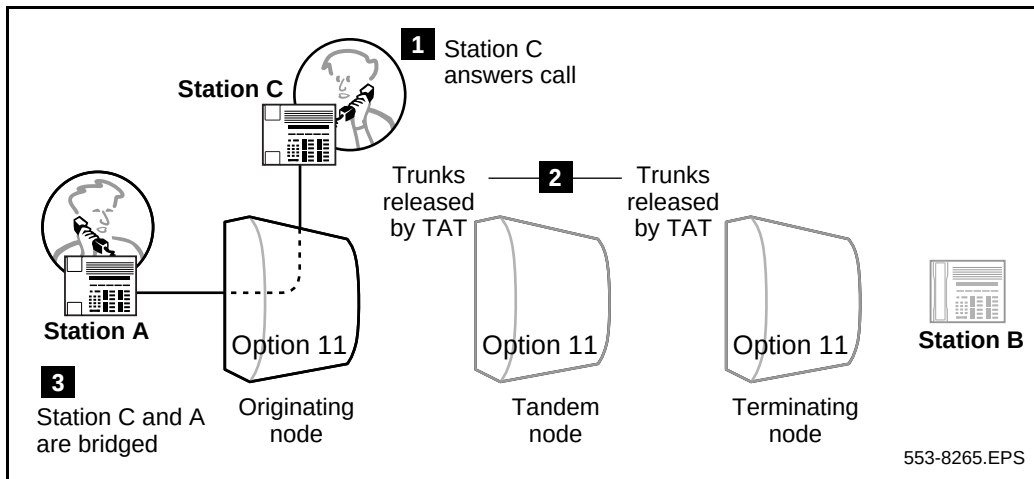


Figure 61 shows the results of anti-tromboning, after Station C answers the call.

- The call is bridged at the Meridian 1 originating node, between Station A and Station C;
- The tromboning trunks between the Meridian 1 terminating node and the Meridian 1 tandem node, and between the Meridian 1 tandem node and Meridian 1 originating node, are released by TAT.

Figure 61
Results of anti-tromboning for network call transfer, M1/M1



Trunk Anti-Tromboning and Trunk Optimization - Before Answer both equipped on the same Meridian 1

TAT and TRO-BA (including Virtual TRO-BA) may be configured together on the same Meridian 1 switch.

While TAT and TRO-BA both provide trunk optimization capabilities, there are major differences pertaining to how each feature optimizes trunks.

- If TAT and TRO-BA are both configured on the same Meridian 1 switch, TRO-BA takes precedence over TAT (refer to “TRO-BA takes precedence over TAT” on page 418.) TRO-BA attempts to optimize a route before a call is answered, and then TAT attempts to optimize trunks after the call has been answered. The TAT feature enhances this capability by eliminating redundant trunks between Meridian 1 and DMS switches equipped with the MCDN Release Link Trunk (RLT) feature.
- TAT and TRO-BA both eliminate redundant trunks for calls that are redirected by Network Call Forward All Calls, Network Call Forward No Answer, Network Call Forward Busy, or Network Hunting.
- TRO-BA will not optimize tromboned trunks resulting from a Call Transfer, while TAT will.
- TRO-BA will not optimize tromboned trunks resulting from an incoming trunk call, while TAT will.
- In the case of a call triangulation scenario, TRO-BA will attempt to eliminate tromboned trunks, while TAT will not. However, in this scenario, tromboning may actually result after TRO-BA has performed optimization. In this case, TAT will attempt to optimize the trunks. Refer to “TRO-BA and TAT functionality in a call triangulation scenario” on page 425.

Note: For more detailed information on the TRO-BA feature, refer to the ‘Trunk Optimization-Before Answer’ feature description module in this document.

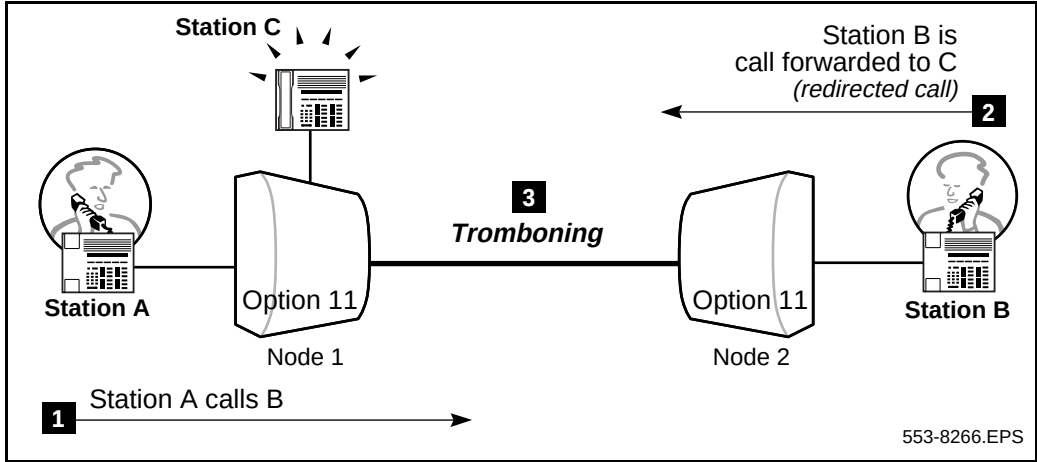
TRO-BA takes precedence over TAT

The following provides a basic example of how TRO-BA takes precedence over TAT in a call forward scenario.

Referring to Figure 62:

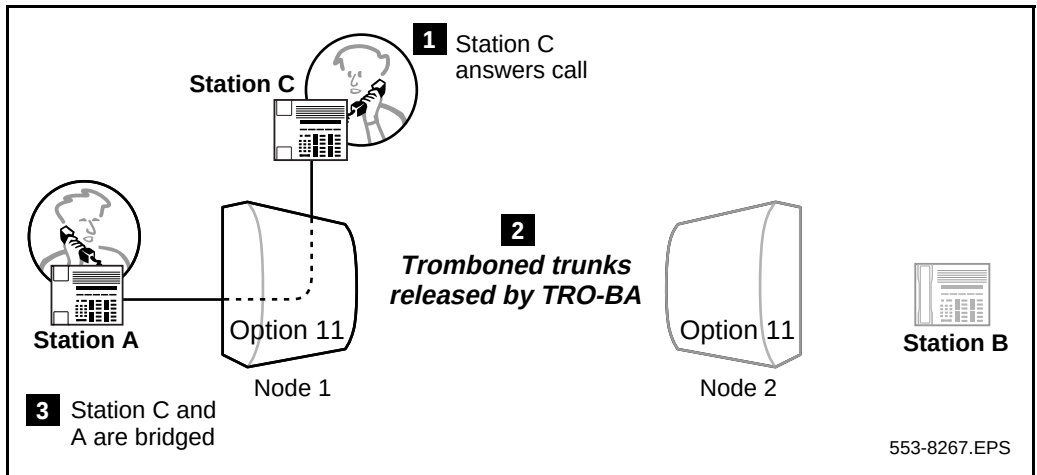
- Station A on Node 1 calls Station B on Node 2, over an ISDN PRI/ISL/VNS trunk;
- Station B on Node 2 is call forwarded all calls to Station C on Node 1, over another PRI/ISL/VNS trunk (redirected call.) This means that tromboning exists between Node 1 and Node 2.

Figure 62
TRO-BA/TAT operating together, before optimization in a call forward scenario



Before Station C answers, TRO-BA releases the tromboned trunks between Node 1 and Node 2, and bridges Station A and Station C locally. Refer to Figure 63. Since there no longer exist any tromboned trunks, TAT is not invoked.

Figure 63
After optimization has been applied by TRO-BA.

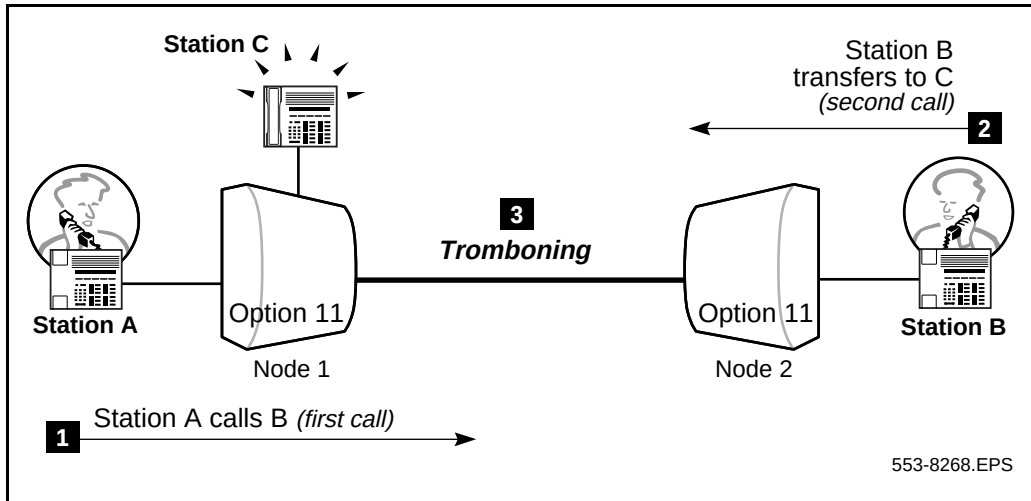


TRO-BA does not optimize trunks due to a call transfer - anti-tromboning is completed after the call is connected

As mentioned, TRO-BA will not release tromboned trunks that result from a call transfer. In this case, TAT will optimize the trunks, after the call is answered. Referring to Figure 64:

- Station A on Node 1 calls Station B on Node 2, over a PRI/ISL/VNS trunk (first call);
- Station B initiates call transfer to Station C on Node 1, over another PRI/ISL/VNS trunk, and completes the call transfer while Station C is still ringing. This means that a case of tromboning exists between Node 1 and Node 2 (second call);

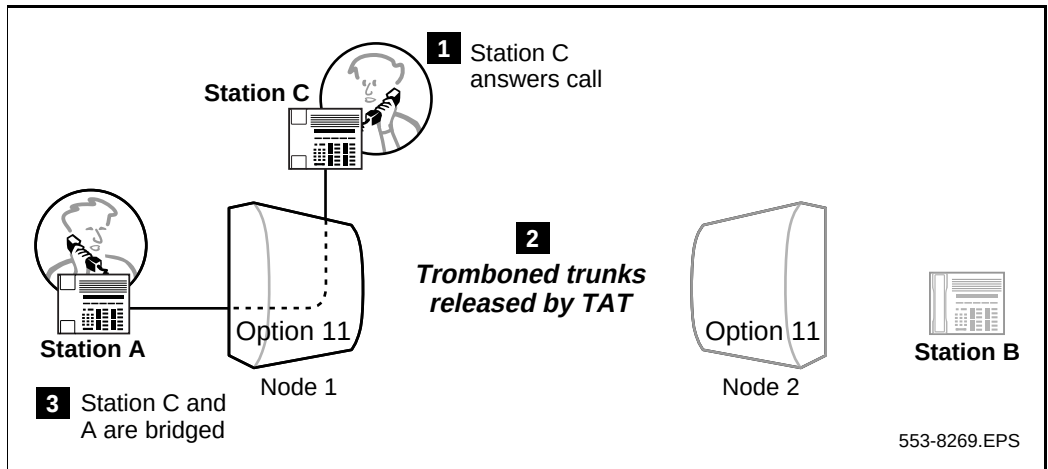
Figure 64
TRO-BA/TAT operating together, before optimization in a call transfer scenario.



Since TRO-BA does not release tromboned PRI trunks resulting from a call transfer, the trunks between Node 1 and Node 2 remain tromboned until Station C answers the call transfer.

While the call is still in ringing state, TRO-BA does not release the tromboned trunks. After Station C answers, TAT releases the tromboned trunks between Node 1 and Node 2, and bridges Station C and Station A locally. Refer to Figure 65.

Figure 65
After TAT applied to tromboned trunks due to a call transfer.



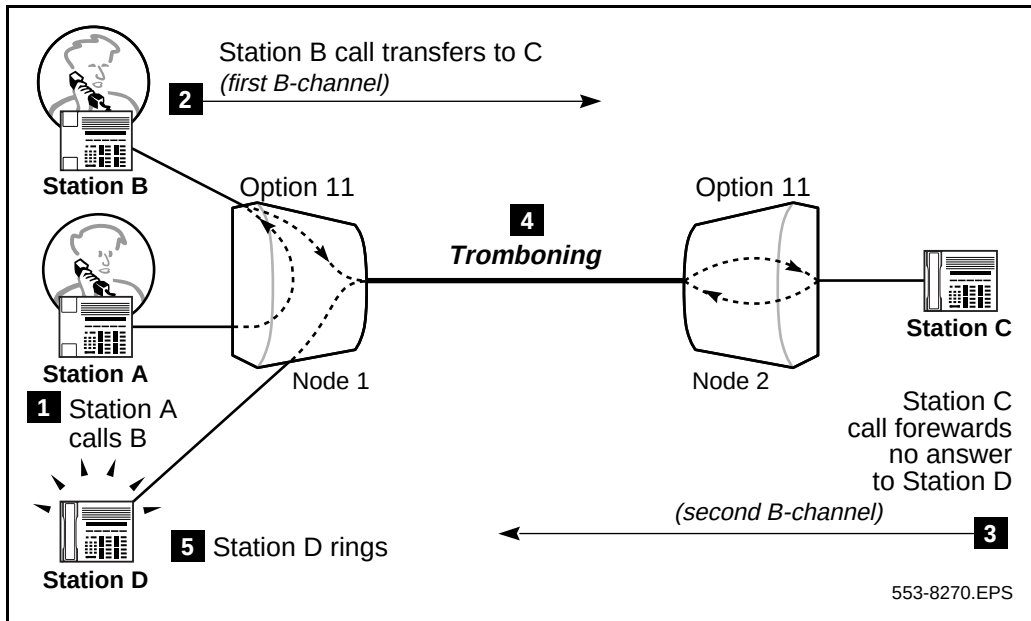
Trunk optimization with call redirection due to call transfer

Another case of TRO-BA and TAT interaction in the case of a call redirection initiated on the transfer key is as follows. Referring to Figure 66:

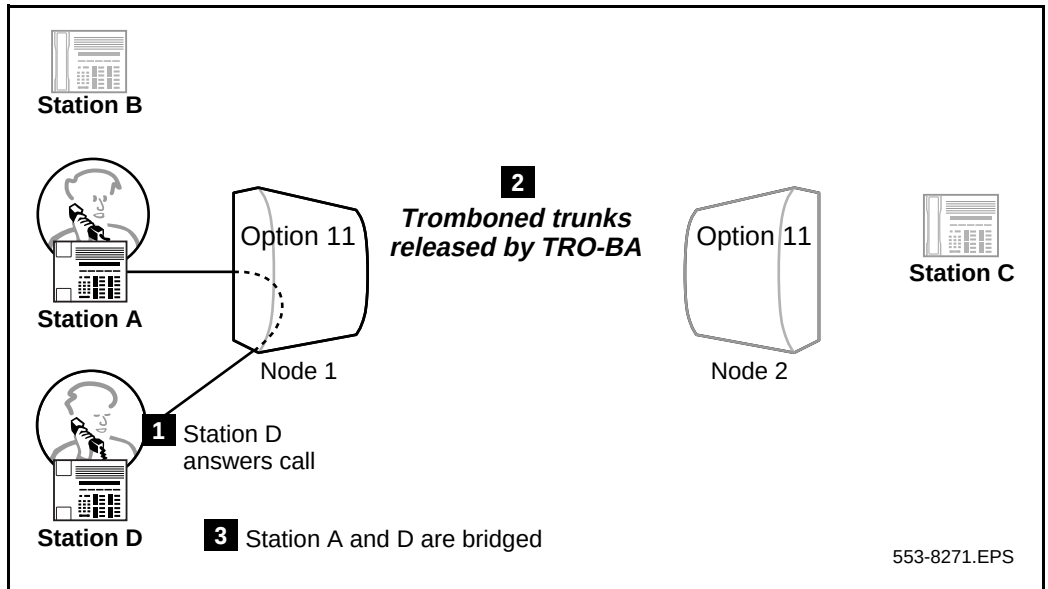
- Station A on Node 1 calls Station B, also on Node 1;
- Station B initiates a call transfer to Station C on Node 2, over a PRI/ISL/VNS trunk (first B-channel);
- Station C call forwards no answer to Station D on Node 1, over another PRI/ISL/VNS trunk (second B-channel, due to call redirection.) Therefore, tromboning of trunks exists between Node 1 and Node 2;

Figure 66

TRO-BA/TAT operating together, before optimization in a call transfer scenario.

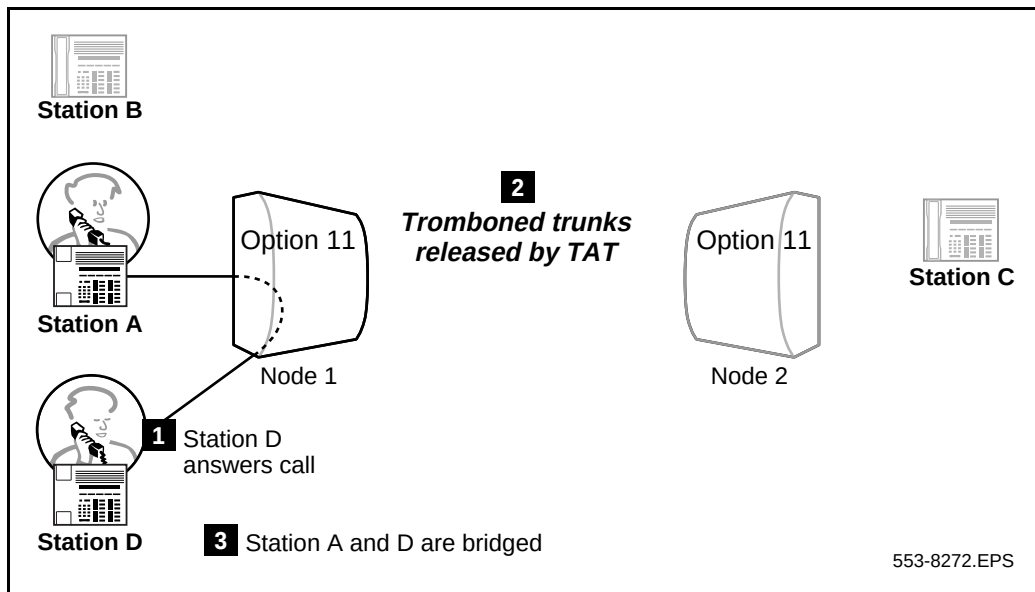


- Station B completes the call transfer while Station C is ringing. After the call is presented to Station D, TRO-BA optimizes the trunks, and bridges Station A and Station D locally. Refer to Figure 67.

Figure 67**Tromboned trunks released by TRO-BA.**

- If Station B does not complete the call transfer while Station C is ringing, but waits until Station D answers, TRO-BA will not perform optimization.
- After Station D answers, TAT applies anti-tromboning to release the trunks between Node 1 and Node 2, and bridges Station A and Station D locally. Refer to Figure 68.

Figure 68
Tromboned trunks released by TAT



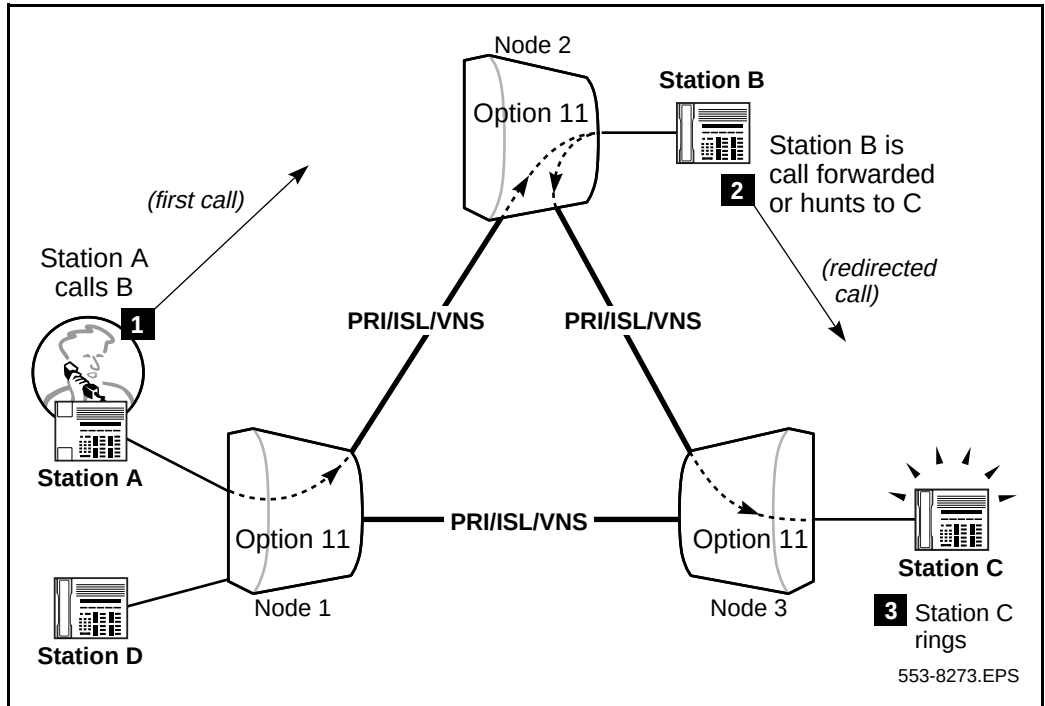
TRO-BA and TAT functionality in a call triangulation scenario

In the case of a call triangulation scenario, TRO-BA will attempt to eliminate tromboned trunks. TAT cannot perform this operation because a second D-channel is involved.

Referring to Figure 69:

- Station A on Node 1 calls Station B on Node 2 over a PRI/ISL/VNS trunk (first call);
- Station B on Node 2 is call forwarded or hunts to Station C on Node 3, over another PRI/ISL/VNS trunk (redirected call.) This means that two trunks are being used to handle one call;

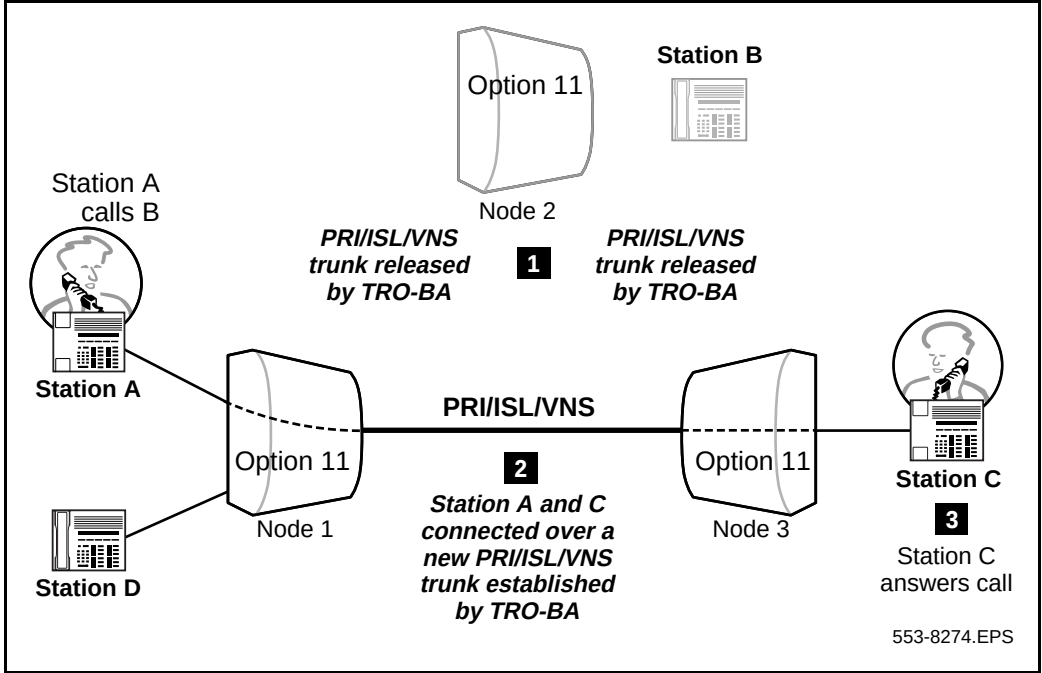
Figure 69
Call path before TRO-BA has been applied.



Before Station C answers, TRO-BA releases the trunks between Node 1 and Node 2, and between Node 2 and Node 3, and establishes a new PRI/ISL/VNS trunk connection between Node 1 and Node 3. Refer to Figure 70.

Note: The TAT feature cannot provide this functionality, because multiple D-channels are used.

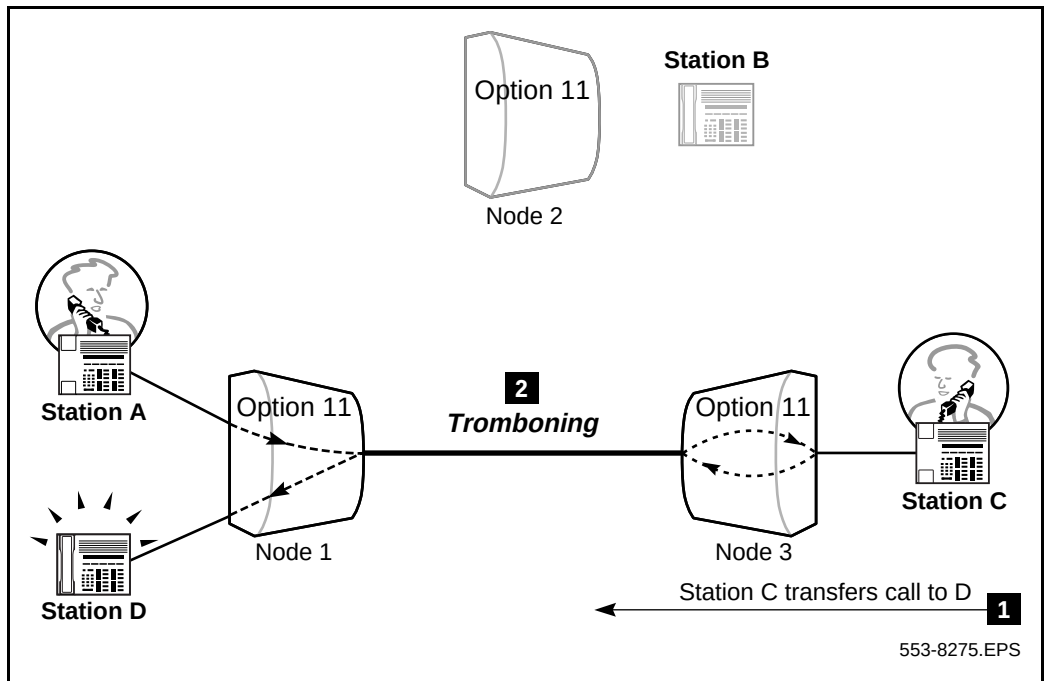
Figure 70
Call path after TRO-BA has been applied.



Tromboning may actually result after TRO-BA has performed optimization. In this case, TAT will attempt to optimize the trunks. An explanation whereby this scenario may occur follows.

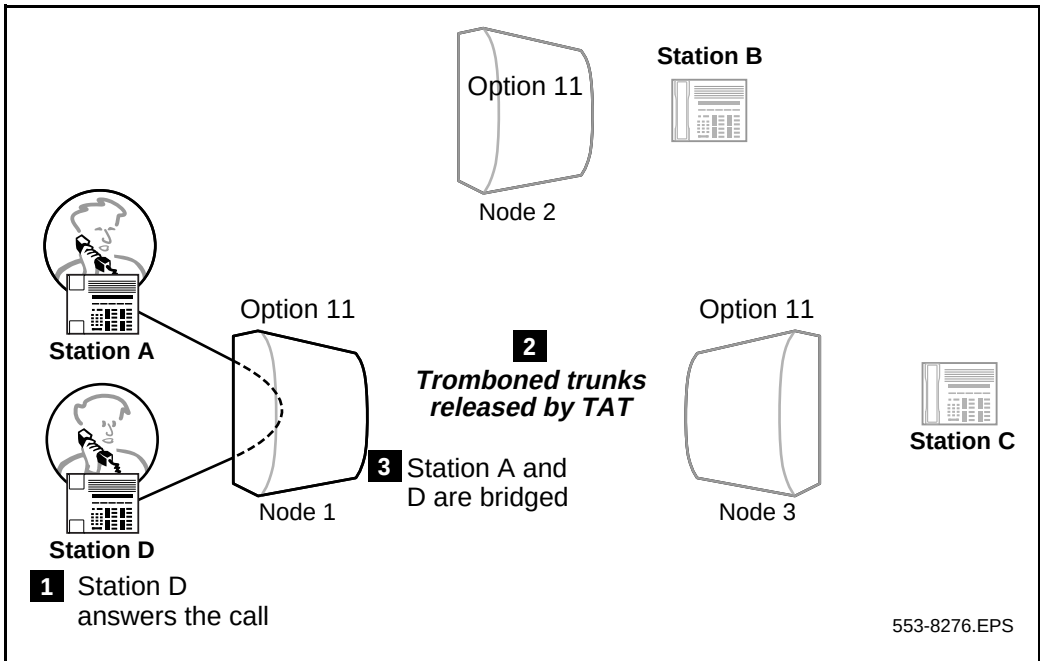
- Station C answers the call, and initiates a call transfer to Station D on Node 1, over a separate PRI/ISL/VNS trunk. This results in tromboning between Node 1 and Node 3. Refer to Figure 71.

Figure 71
Tromboning of trunks after TRO-BA has been applied.



- After Station D answers the call, and Station C completes the call transfer, TAT releases the tromboned trunks between Node 3 and Node1, leaving Station D and Station A bridged locally. Refer to Figure 72.

Figure 72
Tromboned trunks released by TAT



Operating parameters

If the NTAK02BB SDI/DCH circuit card is used on systems with a software vintage earlier than Generic X11 Release 21.40, it must be ensured that the power is removed from the card before it is used for the operation of the Trunk Anti-Tromboning feature. This will normally take place during software upgrade; otherwise, the card must be removed and the power must be reset.

To support Trunk Anti-Tromboning within a dedicated ISL/VNS configuration, a NTAK02 (minimum vintage **BB**) DCH circuit card must be used.

Trunk Anti-Tromboning will only be supported on the NTBK51BA D-Channel Daughterboard, for D-channel handling with PRA.

Anti-tromboning will be performed only after the third party answers, and provided that the tromboning PRI/ISL/VNS or analog trunks are associated with the same primary D-channel (with or without a backup D-channel) and the trunks are associated with the same customer. Anti-tromboning will not be performed if the tromboning trunks belong to different customers on the same node (even though they are associated with the same primary D-channel.)

Anti-tromboning will not be performed for a tromboned call between two attendants on the same node.

There are two types of protocols used for TAT operations, depending on the interface type. One is for the Meridian 1 to Meridian 1 interface, and the other is for Meridian 1 to a DMS equipped with the Meridian Customer Defined Network Release Link Trunk (RLT) feature.

If non-ISDN PRI trunks are involved in a call transfer call, ISDN signaling messages cannot be sent and anti-tromboning will not be performed.

Anti-tromboning will not be performed for tromboned trunks associated with a call originating on a set, and routed back to the same set.

TAT can cause a momentary interruption in data transmission during optimization. When TAT operations are performed at multiple tandem nodes, this effect is cumulative (in the milliseconds range.) Therefore, the impact of this loss is dependent on the terminals on both ends of the transmission, and may be recovered through re-transmission.

Feature interactions

Note: The feature interactions described in this section assume that only TAT (and not TRO-BA) is configured on a Meridian 1 system.

If TRO-BA is also configured with TAT on the same system, TRO-BA will take precedence over TAT, where it can.

Attendant

If an attendant has activated Busy Verify or Barge-in at the time that a message to invoke TAT is received, the anti-tromboning operation will be aborted.

Automatic Call Distribution (ACD)

The Trunk Anti-Tromboning feature will perform anti-tromboning operations to eliminate the PRI trunks associated with the same D-channel due to the following ACD operations: Enhanced Network Call Forward; Network ACD; Interflow Options; and Enhanced Interflow.

If an ACD agent is being observed at the time that a message to invoke TAT is received, the anti-tromboning operation will be aborted.

If an incoming PRI call that is in the ACD queue is answered by a Recorded Announcement (RAN), then the anti-tromboning operation will be performed only after an ACD agent answers the call.

Call Park Network Wide

The Trunk Anti-Tromboning feature is invoked if programmed at all interim Private Branch Exchanges (PBXs) in the call.

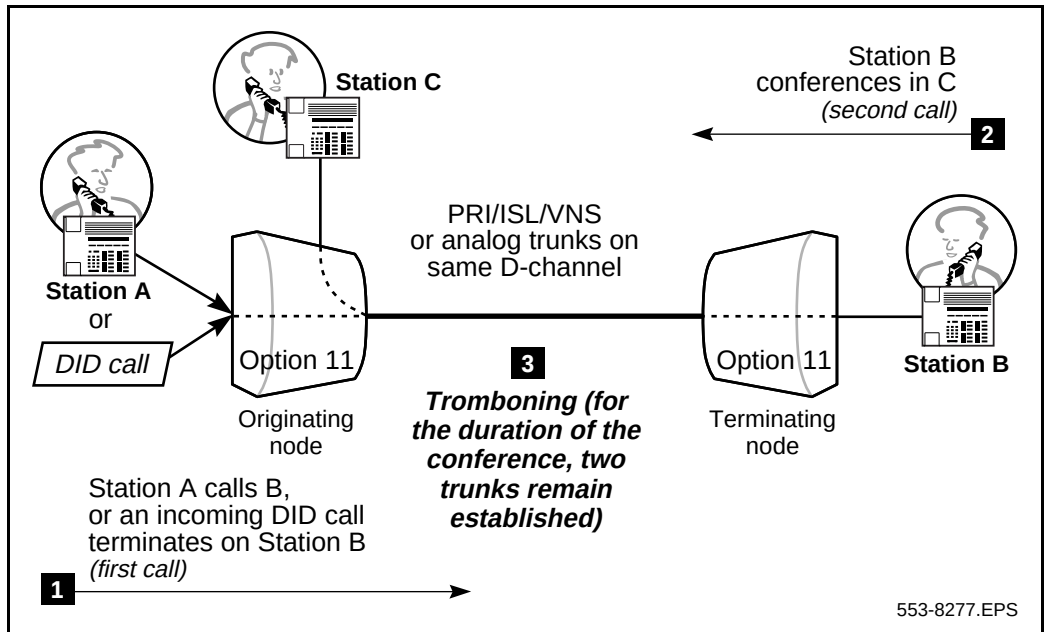
Conference

If the Conference feature is activated, the Trunk Anti-Tromboning feature will perform the anti-tromboning operations only when there are two parties remaining in the call, and the two parties are using PRI trunks associated with the same D-channel.

Referring to Figure 73:

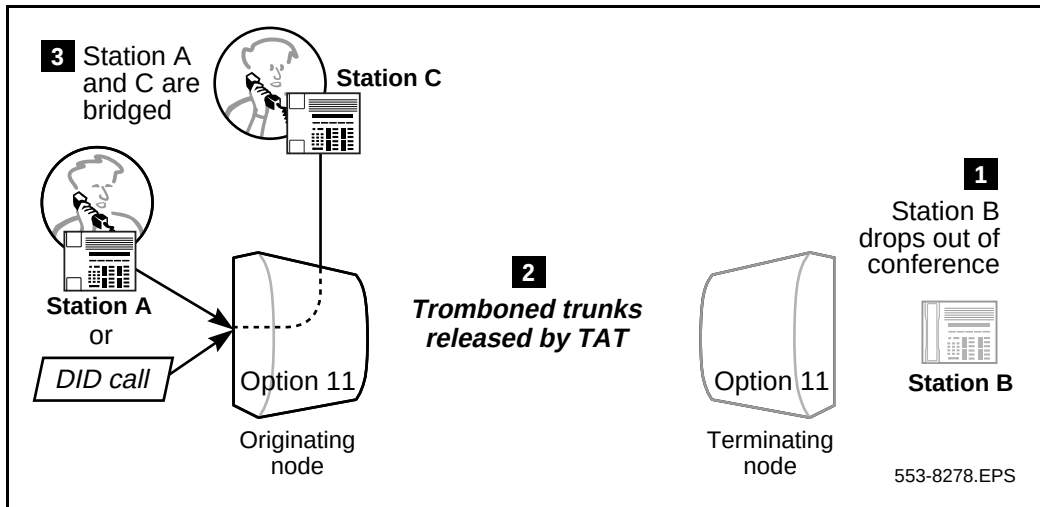
- Station A, or an incoming DID trunk call, at the originating node, is connected to Station B at the terminating node over a PRI/ISL/VNS or analog trunk (first call);
- Station B conferences in Station C, also located at the originating node, over a second PRI/ISL/VNS or analog trunk that is associated with the same D-channel as the first (second call);
- During the extent of the three-party conference, the two trunks are tromboned.

Figure 73
Conference call before TAT



When Station B drops out of the conference, anti-tromboning is invoked (TAT will not be invoked as long as the conference call situation exists.) The two tromboned trunks are released, and Station A, or the DID trunk, and Station C are bridged. This is illustrated by Figure 74.

Figure 74
Conference call after TAT



External Recorded Announcement.

If an attendant originates a call which, through call modification or call redirection creates tromboned trunks, and eventually terminates on a RANX equipment, TAT will not optimize the trunks. That is, TAT will not release tromboning PRI/ISL/VNS trunks resulting from an attendant initiating an outgoing trunk call.

INIT ACD Queue Call Restore

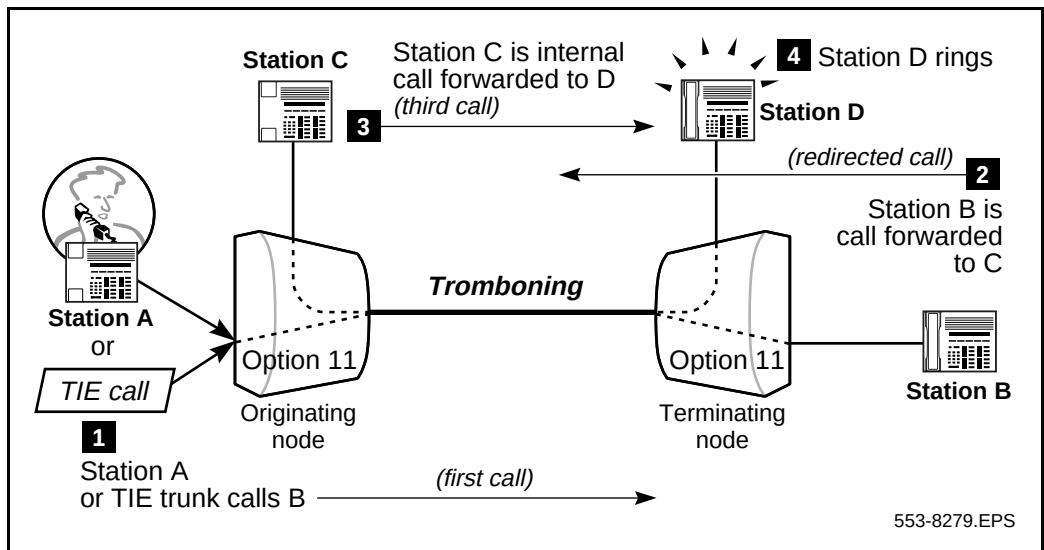
Trunk Anti-Tromboning is not supported on a call restored by INIT ACD Queue Call Restore.

Internal Call Forward (Meridian 1 to Meridian 1)

TAT will not affect the operation of Internal Call Forward between two Meridian 1 switches, while applying anti-tromboning to trunks. Referring to Figure 75:

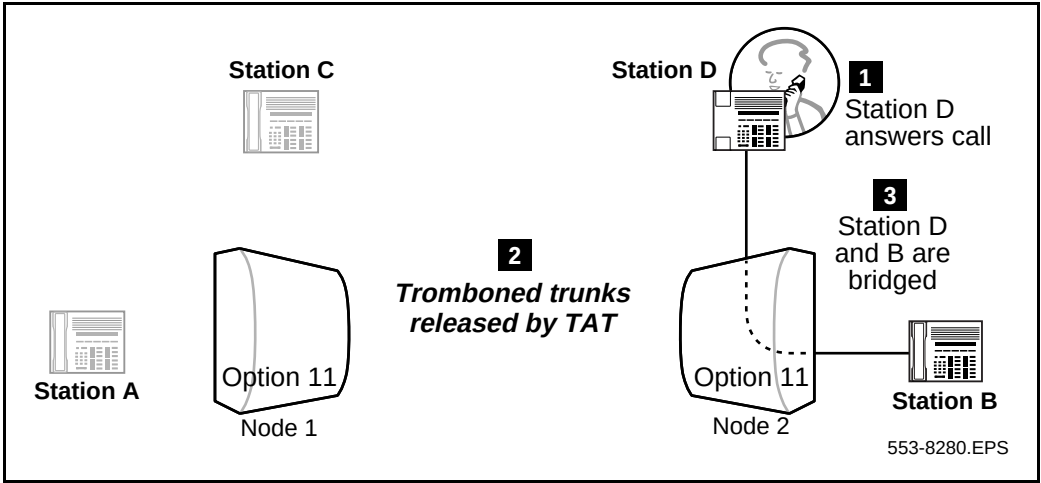
- Station A, or an incoming TIE trunk, on Node 1 calls Station B at Node 2. The call terminates on Station B at Node 2, over a PRI/ISL trunk (first call);
- Station B on Node 2 is call forwarded to Station C on Node 1 (redirected call). The trunks are tromboned.
- If the call is determined to be internal, and Station C is Internal Call Forwarded to Station D, the call is automatically forwarded to Station D on Node 2 over a third PRI/ISL trunk.

Figure 75
Internal Call Forward before TAT, Node 2 is a Meridian 1



After Station D answers the call, TAT releases the tromboned trunks between Node 1 and Node 2. Refer to Figure 76.

Figure 76
Internal Call Forward after TAT, Node 2 is a Meridian 1

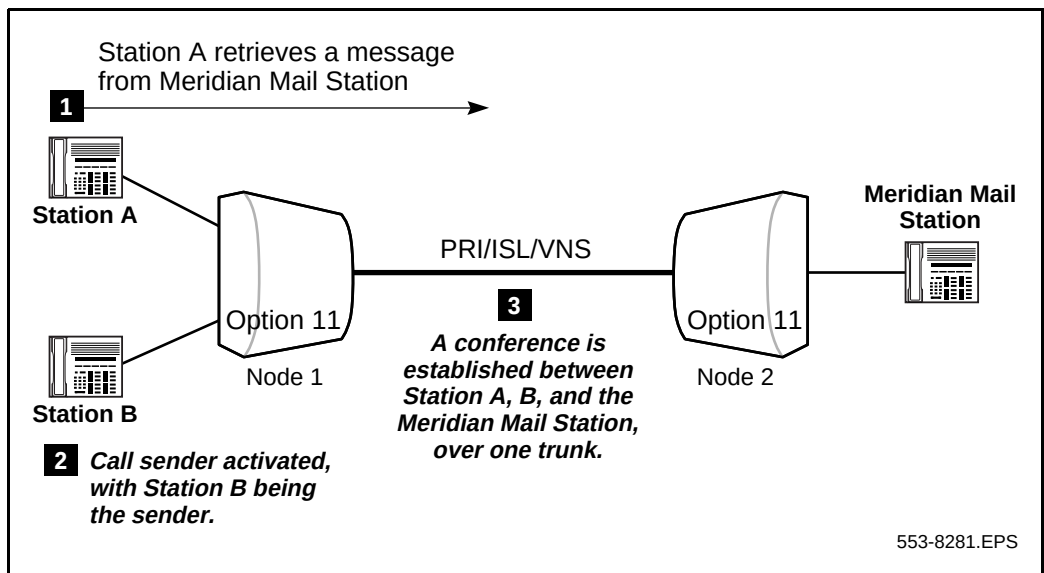


Meridian Mail

The TAT feature will release tromboned PRI/ISL/VNS trunks arising from the application of the Auto Attendant, Through-Dialing, and Operator Revert capabilities of Meridian Mail. If Network Message Services is activated, the associated Call Sender capability does not create an additional trunk when it is activated. Therefore, TAT is not applied. Referring to Figure 77:

- Station A, on Node 1, retrieves a message from a Meridian Mail station located on Node 2;
- Call Sender is activated, with Station B, located on Node 1, being the sender;
- Station A directly conferences in Station B. A consultation conference between Station A, Station B, and the Meridian Mail station is then established over one PRI/ISL/VNS trunk.

Figure 77
Call Sender operation, with Network Message Services active



Network Attendant Service (NAS)

If both TAT and NAS are equipped in a Meridian 1 network, the NAS feature takes precedence over TAT, if NAS is equipped end-to-end. There is no interworking between NAS and TAT. Refer to Figure 78 for the following calling scenarios.

Scenario 1

Station C at Node 2 calls the attendant at the remote node (Node 3), over a PRI trunk. The attendant extends the call to Station D, also at Node 2, over a separate PRI trunk. These trunks are considered to be tromboned.

Case 1 - TAT and NAS are equipped on all nodes

When Station D answers, The NAS functionality drops the tromboned trunks, and Station C and Station D are bridged.

Case 2 - NAS is not equipped

If NAS is not equipped, TAT performs anti-tromboning operations, removing the tromboned trunks and bridging Station C and Station D.

Scenario 2

Station A at Node 1 calls the attendant at Node 3, and the attendant extends the call to Station B on Node 1.

Case 1 - TAT and NAS are equipped on all nodes

If NAS and TAT are both equipped between Node 1 and Node 2, and between Node 2 and Node 3, then NAS takes precedence over TAT to optimize the tromboned trunks between Node 1 and Node 2, and Node 2 and Node 3.

Case 2 - NAS is not equipped

If only TAT is equipped between Node 1 and Node 2, and between Node 2 and Node 3, then TAT will release the tromboned trunks between Node 1 and Node 2, and Node 2 and Node 3.

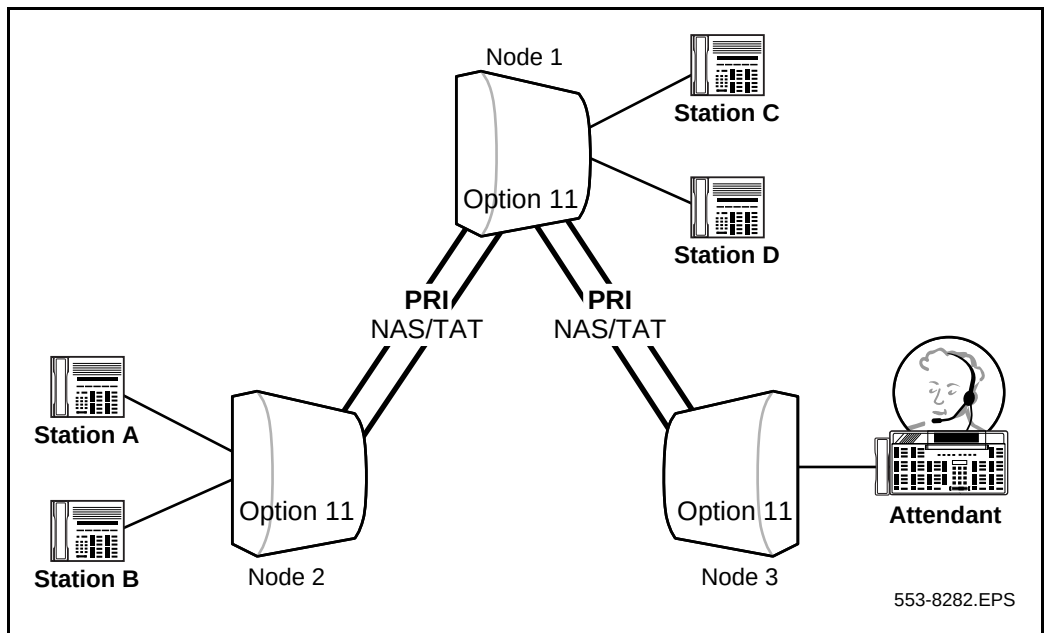
Case 3 - NAS is equipped between Node 1 and Node 2, and TAT is equipped between Node 2 and Node 3

If only NAS is equipped between Node 1 and Node 2, and only TAT is equipped between Node 2 and Node 3, then TAT releases the tromboned trunks between Node 2 and Node 3, and the call is bridged at Node 2. NAS does not optimize the tromboned trunks between Node 1 and Node 2.

Case 4 - TAT is equipped between Node 1 and Node 2, and NAS is equipped between Node 2 and Node 3

If only TAT is equipped between Node 1 and Node 2, and only NAS is equipped between Node 2 and Node 3, no anti-tromboning will be performed, because NAS is not equipped end to end.

Figure 78
NAS/TAT interworking



Network Call Pickup

The TAT feature will optimize tromboned trunks arising from the operation of the Network Call Pickup feature. For example, in Figure 79, Station A on Node 1 makes a call to Station B on Node 2 over a PRI/ISL/VNS or analog trunk. The call is picked up by station C on Node 1, over a separate PRI/ISL/VNS or analog trunk. After the call has been picked up, TAT will apply anti-tromboning to release the two tromboned PRI trunks. Station A and Station C are connected locally. Refer to Figure 80.

Figure 79
Network Call Pickup before TAT

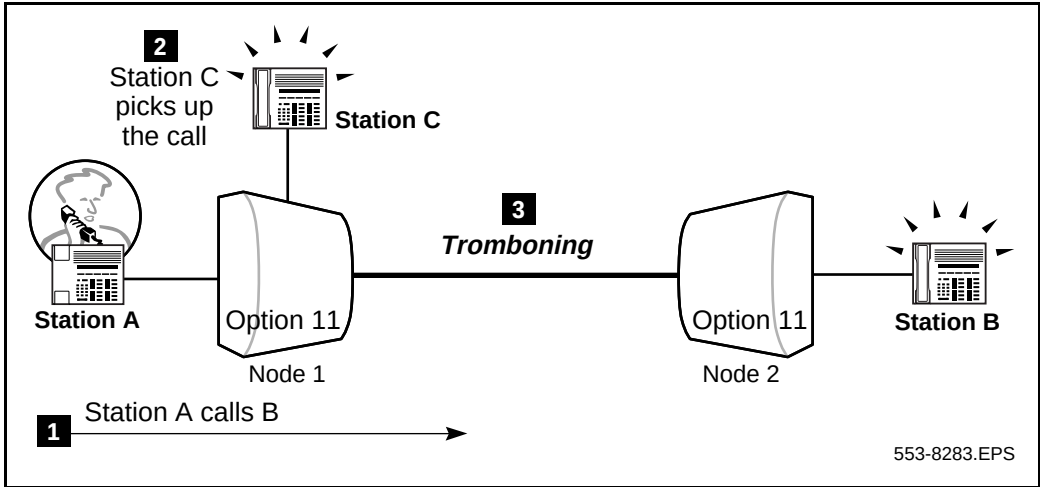
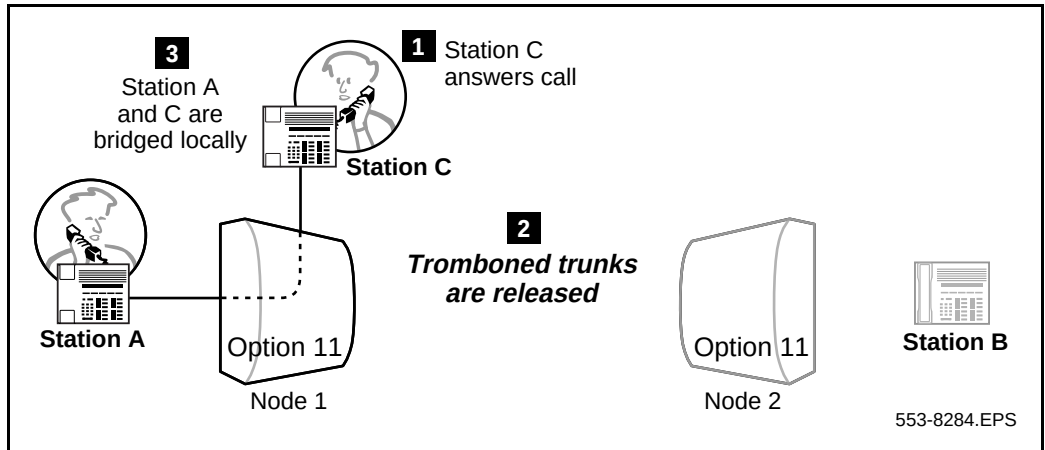


Figure 80
Network Call Pickup after TAT



Network Call Redirection

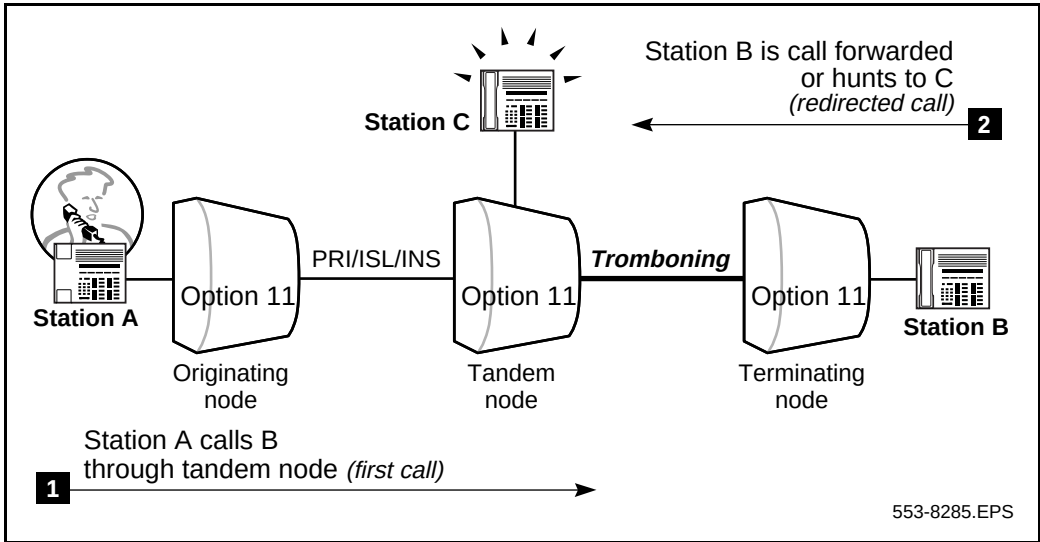
The Trunk Anti-Tromboning feature eliminates the tromboning of PRI/ISL/VNS or analog trunks resulting from the operation of any of the following Network Call Redirection features:

- Network Call Forward Unconditional
- Network Call Forward No Answer
- Network Call Forward Busy
- Network Call Forward by Call Type
- Network Hunt
- Internal Call Forward

Figure 81 illustrates the following scenario:

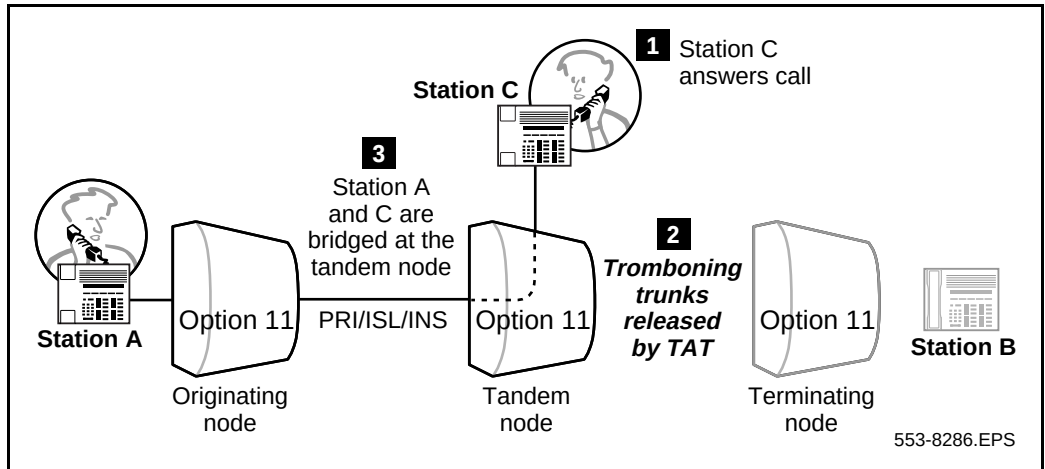
- Station A, on the originating node, calls Station B, on the terminating node, across a tandem node over a PRI/ISL/VNS trunk (first call);
- Station B is call forwarded or hunts over another PRI/ISL/VNS trunk, to Station C located on a tandem node (redirected call.) This causes tromboning between the terminating and the tandem nodes.

Figure 81
Network Call Redirection before TAT



After Station C answers, anti-tromboning is invoked. This causes the tromboned trunks to be released. Station A and Station C are connected at the tandem node. The results of this anti-tromboning are shown in Figure 82.

Figure 82
Network Call Redirection after TAT



Radio Paging System

If an attendant originates a call which, through call modification or call redirection creates tromboned trunks, and eventually terminates on a Radio Paging equipment, TAT will not optimize the trunks. That is, TAT will not optimize tromboning PRI/ISL/VNS trunks resulting from an attendant initiating an outgoing trunk call.

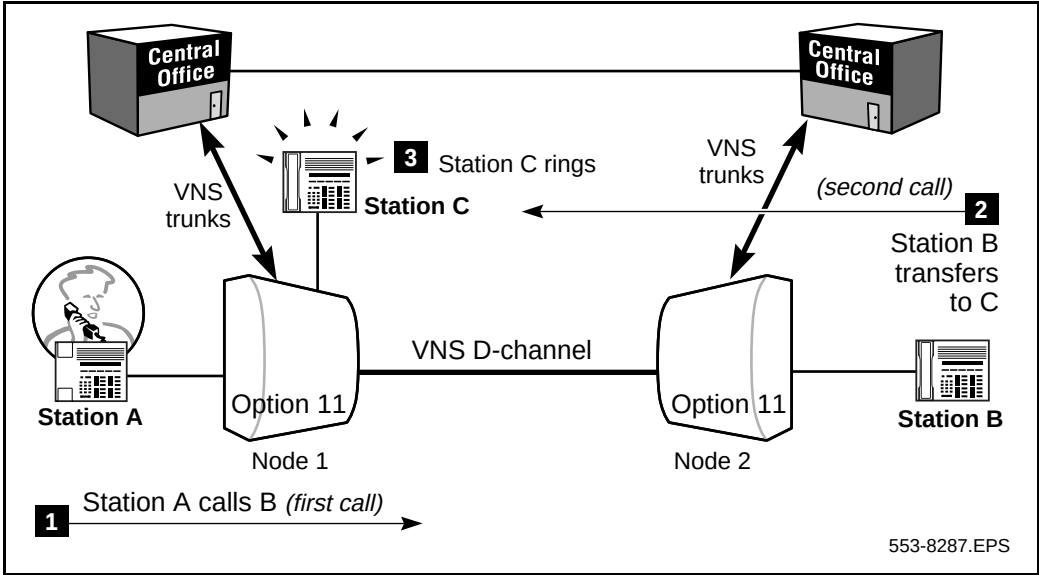
Trunk Route Optimization - Before Answer

See “Trunk Anti-Tromboning and Trunk Optimization - Before Answer both equipped on the same Meridian 1” on page 417.

Virtual Network Services (VNS)

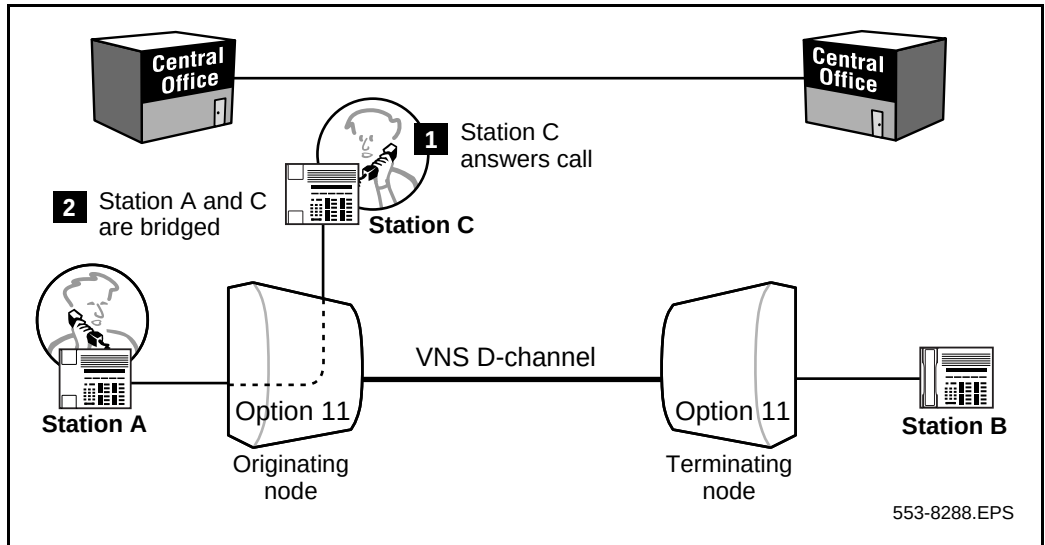
The Trunk Anti-Tromboning feature will perform anti-tromboning operations to eliminate tromboned trunks (physical B-channels) associated with the same VNS D-channel. For example, in Figure 83, Station A at the originating node calls Station B at the terminating node, over a VNS D-channel trunk. Station B transfers the call to Station C, also located at the originating node. The physical B-channel trunks associated with the D-channels are considered to be tromboned.

Figure 83
VNS before TAT



After Station C answers, the tromboned trunks are released, and Station A and Station C are bridged. Refer to Figure 84.

Figure 84
VNS after TAT.



Feature packaging

The Trunk Anti-Tromboning is packaged under (TATO), package 312. The following packages are required as dependencies:

- Multi-purpose Serial Data Link (MSDL) package 222;
- Integrated Services Digital Network (ISDN) package 145; and
- 1.5 Mbps Primary Rate Access (PRA) package 146; or
- Integrated Service Digital Network Signaling Link (ISL) package 147; and, optionally
- Advanced ISDN Network Services (NTWK) package 148.

Feature operation

The Trunk Anti-Tromboning feature is transparent to the user, provided all datafills and hardware are assigned and equipped properly.

Trunk Optimization (Meridian-1 to Meridian-1 only)

Trunk Optimization provides better utilization of customer networking facilities. The Trunk Optimization feature allows the Meridian 1/SL-1 to optimize trunks for redirected calls before answer. Trunk Optimization works with Call Forward All Calls, Call Forward No Answer, Hunting, and Busy Conditions, and avoids unnecessary use of additional channels or trunks.

Trunk Optimization does not apply to DID calls or calls originated by a non-ISDN TIE trunk.

An example of Trunk Optimization is shown in Figure 85. If a call is placed from originating station A to a remote station B over route 1, and the call is forwarded to station C over route 3, the system can reconnect calls on the most economical route available. In this case, the call is physically directed over route 2, allowing routes 1 and 3 to be used for additional calls.

It is important to point out the mechanism used to achieve trunk optimization:

- The redirecting node will send a message to the originating node informing it of the redirection number and the redirection reason.
- If the originating node supports trunk optimization and has a first route choice member available to the destination PBX, it will send a message back accepting Trunk Optimization.

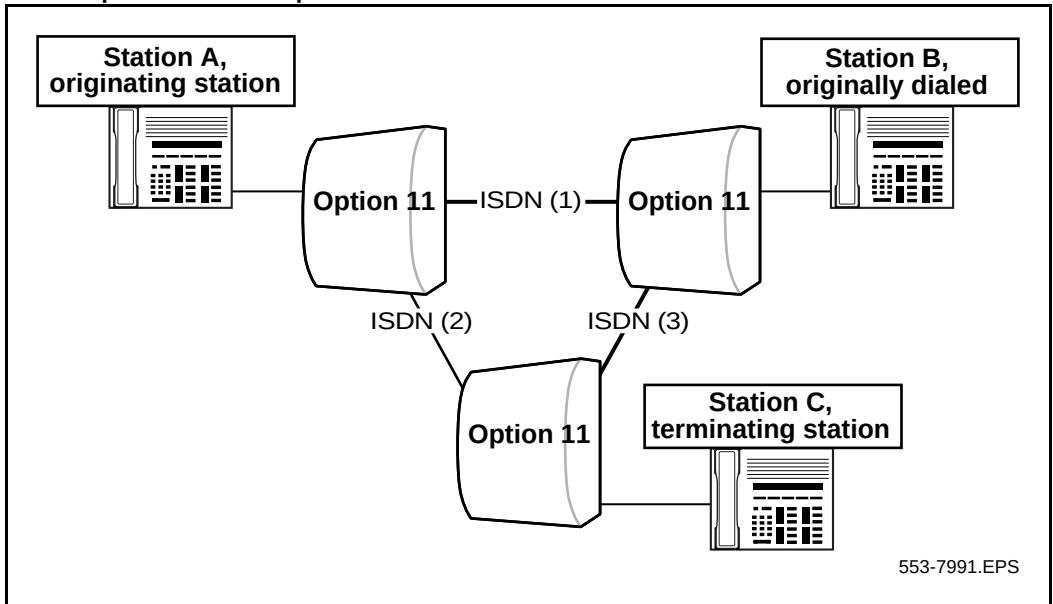
Note: First choice member is part of ESN route list entries in overlay 86.

- The redirecting node will send a message to release the connection.
- The originating node will confirm the disconnect and will establish a new non-redirected connection to the redirected number.

This process may repeat itself for every redirection hop that a call takes. The number of hops is software programmable.

If the originating node does not support Trunk Optimization, the call will then proceed without optimization on the current route. Trunk Optimization is programmable on a route basis using prompt TRO.

Figure 85
Trunk Optimization example



Note: TRO does not apply to DID calls or calls originated by a non-ISDN TIE trunk. TRO is transparent to users for NCRD.

If the users have alpha-numeric display telephone sets:

- the “calling party” will see:
 - the number originally dialed,
 - the number connected to, and
 - the reason for redirection
- the “called party” will see:
 - the originating number,
 - the originally called number, and
 - the reason for redirection

Package requirements

The Trunk Optimization feature requires the following software options:

ISDN	option 145
ISL	option 147
NTWK	option 148
PRI	option 146

Note: The above scenarios require that an ISDN Primary Rate Interface (PRI) or ISDN Signaling Link (ISL) network is in place between the Meridian 1/SL-1s.

Trunk to Trunk Connection

The Trunk to Trunk Connection feature introduces the following capabilities: transfer on ringing of an external trunk across the network, transfer of one supervised outgoing external trunk to another, conference of external trunks and outgoing trunk to trunk charging. These capabilities are available to a PBX set, Meridian 1 proprietary set or an Attendant Console.

Transfer on Ringing of External Trunk over Network

Allows the transfer on ringing of an established external trunk call over a supervised network trunk. If the called party does not answer within a specified time, the call will slow answer recall to the attendant on the transferring node. This capability ensures that available network resources are not occupied indefinitely.

Transfer of Outgoing External Trunk

Allows the connection of one outgoing external trunk to another through Call Transfer provided that both external trunks are supervised. This capability prevents external trunks from remaining connected indefinitely in instances where an external party disconnects when disconnect supervision is not available.

Conference of External Trunks

Allows external trunks to remain established in a conference call in circumstances when all external trunks involved in the call offer disconnect supervision.

Outgoing Trunk to Trunk Charging

Ensures that outstanding charging information, relevant to both outgoing calls, is contained in relevant Call Detail Recording records.

Operating parameters

Slow answer recall occurs when an external trunk is transferred on ringing across an answer supervised network TIE trunk to a set that does not answer. However, the resulting recall will be to an attendant on the transferring node and not to the original set which transferred the call.

When transferring one outgoing trunk to another, it is required that the two external calls involved are both answered prior to completing the transfer. Both external trunks involved must have both answer and disconnect supervision. When the last internal party disconnects from a conference call, involving two or more external trunks, all external trunks must have disconnect supervision for the call to remain established. If any one of the remaining external trunks does not have disconnect supervision, all external trunks will be dropped.

Feature interactions

Call Transfer

To transfer an external trunk on ringing across the network, the external trunk and internal TIE line must have both answer and disconnect supervision, and the external call must be established. To transfer one outgoing external trunk to another, both external trunks must have answer and disconnect supervision, and both external calls must be established.

Centralized Answering Position

The Option 11C system may not have an actual attendant console. Instead, the Option 11C will use Centralized Answering Position (CAP). The CAP Directory Number (DN) is the customer Night DN. Since no attendant is configured, the customer is viewed to be in Night Service and any calls for the attendant are directed to the CAP. Slow Answer Recall may be presented to a CAP when no attendant console is configured for the customer.

Conference

Trunk to Trunk connection allows external trunks to remain established in a call, provided that all external trunks involved have disconnect supervision. With respect to charging costs associated with a conference call, once the last set involved in the conference call disconnects, a search is made of all remaining trunks in the call to determine which call is established in the call for the longest period of time. This trunk is the chargeable Terminal Number (TN). This process is repeated to find the next chargeable TN.

Message Registration

The last party releasing the call collects the total value of outstanding Periodic Pulse Metering (PPM) generated on outgoing trunks. If the last party is an internal set, the outstanding PPM is stored against the meter of the set. If the last party is an internal TIE trunk, the outstanding PPM is stored against the meter associated with the internal TIE trunk access code. If the last party is an outgoing external trunk, the outstanding PPM is stored against the meter associated with the external trunk access code.

Night Service

If an attendant is placed in Night Service, calls to the attendant are directed to a station with the Night DN. Recalls are not directed to the Night DN. Recalls are put in the attendant call waiting queue when in Night Service.

Trunk Barring

Trunk Group Access Restriction

Trunk Barring and Trunk Group Access Restriction takes precedence over the Trunk to Trunk Connection feature.

Feature packaging

Trunk to Trunk Connection is included in base X11 system software.

Note: DID to TIE (DTOT) for Japan package 176 must be restricted to enable this feature.

Feature operation

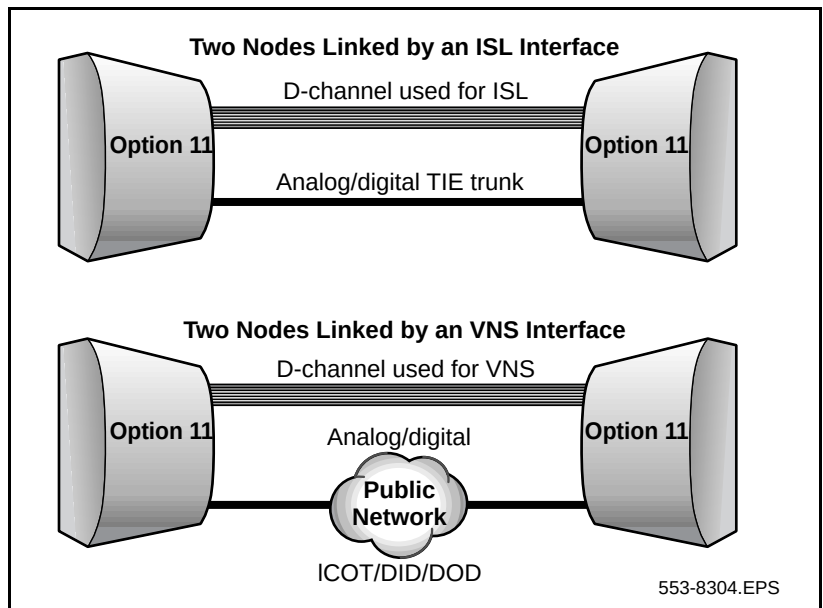
No specific operating procedures are required to use this feature.

Virtual Network Services

The Virtual Network Services (VNS) feature offers a means to use Meridian 1 Integrated Services Digital Network (ISDN) networking features when two Meridian 1 systems are linked by a D-channel and an available Public Switched Telephone Network (PSTN) trunk exists. The PSTN trunks in this configuration serve as the B-channel for the call's duration.

VNS is an enhancement of the ISDN Signaling Link (ISL) interface. The enhancement allows the voice and the signaling of a call to take different physical paths. In the case of an ISL call, the D-channel is used for signaling, whereas the voice/data uses a TIE trunk (Meridian 1 to Meridian 1 connection only). The VNS feature extends the number of trunk types supported for the voice path by including the possibility of using different public trunks (e.g., COT, DID, DOD). Figure 86 depicts the difference between two nodes linked by an ISL interface and two nodes linked using VNS.

Figure 86
VNS Interface/ISL Interface Comparison



Similar to the case of an ISL interface, the D-channel used for VNS can be shared with the D-channel of a Primary Rate Interface (PRI) that links two Meridian 1 switches, or it can use a D-channel that communicates with the far end through a pair of dedicated line modems, dial-up modems, or Meridian 1 data adapters.

When the D-channel used by VNS is on a PRI, the D-channel mode is defined as USR = SHAV, in LD 17, meaning that VNS, ISL and ISDN PRI calls can share this D-channel. In the other situation, the D-channel is defined as USR = VNS in LD 17, which allows ISL, and VNS calls to use this D-channel for signaling.

The following types of trunks and connectivities can be used for VNS calls:

- PRI trunks with:
Meridian Customer Defined Network (MCDN) connectivity.
- Analog trunks with:
disconnect supervision.
- 1.5 Mbps Digital Trunk Interface (DTI) trunks with:
Digitone Signaling (DTN), or Dial Pulse Signaling (DIP) connectivity.

All of these trunks are being referenced throughout this document as the VNS Bearers, or simply the Bearer trunks.

Although the VNS feature can use Central Office Trunks (COT), Direct Outward Dialing (DOD), and Direct Inward Dialing (DID) trunks to link two Meridian 1 nodes, VNS calls are presented, handled, and interact with other features as though private ISDN TIE trunks are used for that purpose. The exceptions that apply are stated in the “Feature interactions” section.

Note that TIE trunks can also be used with VNS. When this is the case, the connection does not necessarily need to be a direct Meridian 1 to Meridian 1 connection (e.g., when QSIG is used).

Speechpath availability

When extending a call to a Remote node, the attendant relies on the tones and lamp states to determine if it is possible to extend a call, camp-on a busy extension, break-in to a conversation, etc.

When using a VNS Bearer trunk, the tones can be those of the PSTN (especially for “intelligent” trunks such as ISDN connectivity). For example, when extending a call to a busy set over an ISDN PSTN Bearer, the attendant hears busy tone (from the PSTN) instead of silence.

If Attendant Console operation has to remain the same with VNS, an answer signal has to be sent right away to the PSTN for attendant extended calls, whatever the state of the terminating party. This allows the attendant to hear the tones coming from the terminating Meridian 1 node, instead of tones from the PSTN.

The prompt VRAT exists for the incoming Bearer route (LD 16) to allow or disallow automatic answering of attendant extended calls. The Network Attendant Service (NAS) feature must be configured to provide this functionality.

When a route is configured with VRAT = YES, tones are similar to those provided on a private Meridian 1 ISDN PRI network; however, some unanswered calls may be charged. If a route is configured with the default value (VRAT = NO), tones heard when extending a call from the attendant might be different than the ones provided over a private Meridian 1 ISDN network. Users are not charged for unanswered calls.

PSTN clearing of unanswered calls

In some countries, a PSTN call left unanswered is disconnected after a few minutes, in order to reduce the usage of equipment that has not been paid for. This creates a major difference between private networks using TIE lines and private networks using VNS. For example, with VNS a call left in a camp-on state would be cleared by the public network after several minutes.

The VNS Set Speechpath (VSS) timer of the incoming Bearer route (LD 16) can be configured to avoid this situation. It defines the interval after which an answer signal is sent from the terminating Meridian 1 node to the Public Exchange/Central Office.

The configuration of the VSS timer has an impact on the cost of the calls, because the public network starts charging upon the reception of the answer signal.

Numbering Plan

A requirement of VNS is that customers have to configure VNS DNs (VDNs) as part of their numbering plan. The VNS VDN expansion feature sets a new limit on the number of VDNs at 4000. VDNs are configured on Overlay 79.

The VDNs are defined in sets of blocks. Each block may contain any number of contiguous VDNs, as long as the total number does not exceed 4000. Within a block, it is possible to define a range of VDNs as well as individual VDNs. For example, a customer may define the following VDNs (in this example, the customer is defining a total of 164 VDNs.)

7200-7299
7320-7325
7355
7400-7455
7676

A customer may remove a block of contiguous VDNs, as long as there is no VNS call using a VDN in the block. To remove a block of contiguous VDNs, the block has to be first disabled in Overlay 79 (by entering DIS against the REQ prompt), to prevent new VNS calls from using any of the VDNs in the block. Once the block has been disabled, the system administrator has to wait until all the VNS calls, using any of the VDNs in the block, are cleared.

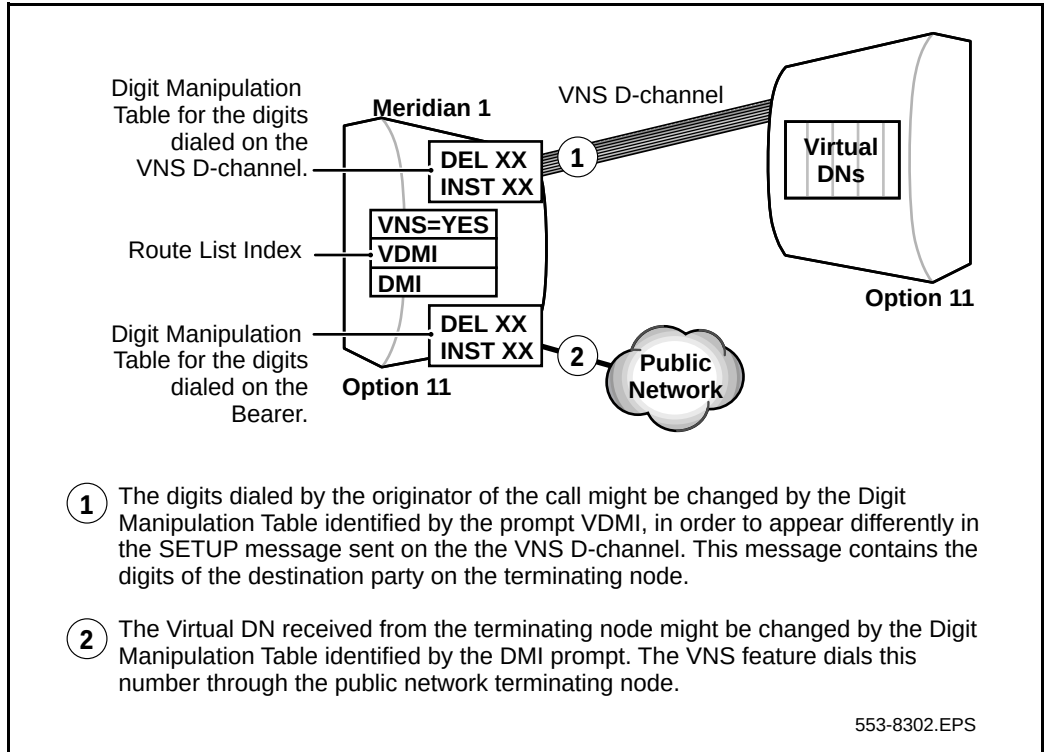
The system administrator can determine the number of VDNs used by VNS calls, by printing VNS information using the PRT command in response to the REQ prompt in Overlay 79 (note that the block of VDNs must be first disabled.) Once all of the VDNs are free (unused), the block of VDNs may be removed by using the OUT command.

An Electronic Switched Network (ESN) call is identified as being VNS once a valid entry configured when the prompt VNS = YES has been found in a Route List Block (LD 86) used for the digits dialed. A SETUP message is sent to the terminating node on the VNS D-channel. Manipulation of the digits included in the SETUP message is performed, if needed, using the digits dialed and according to the content of the Digit Manipulation Table referenced with the prompt VDMI.

On reception of the SETUP request, the terminating node sends one of its Virtual DNs back to the originating node. The terminating node expects to receive a call for that Directory Number (VDN) from one of its trunks linked

to the public network. The originating node, upon reception of the VDN, seizes a trunk and dials a number consisting of the VNS Virtual DN affected by the manipulations defined in the Digit Manipulation Table referenced by the prompt DMI. These manipulations are performed in order to dial the Virtual DN through the public network to the destination node.

Figure 87
Digit Manipulation



Failure of VNS D-channel

If the D-channel is not operable, the VNS route list entry is chosen, and then this entry is bypassed. In a network VNS environment, calls will remain queued at the source node.

If the VNS D-channel fails when a call is established, the call remains established. This is, however, without the ability to use the networking features normally supported by the VNS feature.

Failure of Bearer

Failure of the VNS Bearer trunk results in the VNS call being cleared.

Operating parameters

No new hardware is required for the VNS feature.

VNS requires a contiguous block of existing unused DNs (virtual DNs) at both the originating and the terminating nodes, which are a subset of the DID range of the customer. VNS virtual DNs can be up to seven digits long. A maximum of 100 virtual DNs can be assigned per customer.

VNS D-channel

VNS requires an established D-channel between the originating and terminating nodes for signaling. No intermediate nodes are permitted.

A VNS D-channel belongs to only one customer and cannot be shared by other customers for VNS calls.

VNS does not support Backup D-channels for VNS signaling.

D-channels provided by Basic Rate Interface (BRI) are not supported as VNS D-channels.

VNS reverts back to conventional signaling if the VNS D-channel fails.

VNS Bearer Trunks

Disconnect supervision is mandatory for all trunks, while answer supervision is not. In cases when it is not available, VNS will assume that the Bearer is answered as soon as the “end-of-dialing” timer has expired.

The following trunks are not supported as VNS Bearer trunks:

- Autoterminate trunks; and
- Basic Rate Interface trunks.

Any Incoming Digit Conversion on the incoming VNS Bearer trunk causes a VNS call to fail.

Data calls are supported only if the Bearer supports data calls.

Maximum number of VNS calls

Different elements control the maximum number of simultaneous VNS calls that can be processed by a Meridian 1 system. The number depends on the resources allocated for the VNS feature itself, the resources to be used for the voice path (Bearer trunks) and the resources available for VNS signaling over the D-channel.

For each customer

It is not possible to perform more VNS calls (incoming and outgoing) than the number of Virtual DNs defined for the customer in LD 79.

The number of VNS calls is limited by the number of available Bearer trunks. When all Bearers defined to be usable with VNS are busy, no other VNS calls can be made.

For each D-channel of the customer

The maximum number of VNS calls allowed to use a D-channel is limited by the value defined to the D-channel by the VNSM prompt in LD 17.

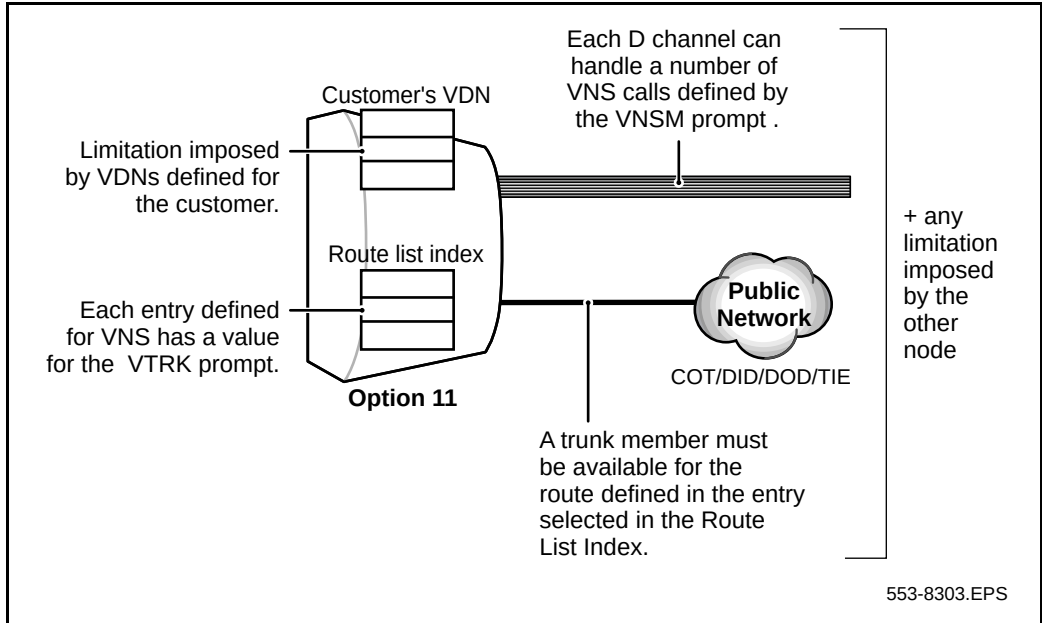
For each entry in a Route List Block

The maximum number of VNS calls that can be performed on a route listed in an entry of a Route List Block in LD 86 is limited by the value entered in response to the VTRK prompt.

On a network level

In the case of a non-symmetrical configuration between originating and terminating VNS nodes, the call limitation imposed by the more restrictive node applies.

Figure 88
VNS Call Limitations



Feature interactions

The following features are supported over VNS routes:

- Attendant Barge-In
- Attendant Break-In
- Attendant Recall with Splitting
- Basic Authorization Code
- Basic Rate Interface/Primary Rate Interface Interworking
- Calling Party Number
- Call Party Name Display
- Call Selection (ICI + loop)
- Console Digit Display

- Control of Trunk Group Access
- Digit Display
- Display of Calling Party Denied
- Electronic Lock Network Wide/Electronic Lock on Private Lines
- Network Attendant Service
- Network Call Redirection
- Network Class of Service
- Network Flexible Feature Codes
- Network Message Center
- Network Message Service to Meridian Mail
- Network Ring Again
- Network Ring Again No Answer
- Originator Routing Calls
- Radio Paging
- Trunk Optimization Before Answer

In addition, VNS has interactions with the following features:

Access Restriction

When a user has trunk access barred (i.e, via Trunk Group Access Restriction (TGAR), New Flexible Call Restriction (NFCR), or Toll Denied Class of Service), the user will still be able to make a VNS call.

If a customer wants users to be toll restricted even for VNS calls, the Minimum Facility Restriction Level (FRL) in the Route List Block (i.e., LD 86) can be used.

Attendant Call

When an attendant extends a call over a VNS network, it is not possible to release the call before the status of the destination is known. This applies regardless of Network Attendant Service (NAS) configuration.

Autoterminate

Autotermination on VNS Bearer trunks is not supported, because a VNS Virtual DN is expected on a VNS Bearer exactly the way it was passed back on the VNS D-channel.

Call Detail Recording (CDR)

Call Detail Recording is supported on VNS routes with the exception of the 911 CDR Improvement and Meridian 911 ANI in CDR features. The CDR output is controlled by the Bearer trunk (i.e., CDR output defines the details of the call made on the Bearer, and not the VNS D-channel). The Calling Line Identity will be output in the CDR record for incoming calls.

Call Pickup Network- Wide

The Call Pickup Network Wide feature will not work in conjunction with the Virtual Network Services feature.

Calling Line Identification

Calling Line Identification is supported on VNS routes. All display information is taken from messages on the VNS D-channel. The VNS Bearer does not drive the display of such information.

Charge Display at End of Call

In the case of VNS calls, no charge information is displayed.

Direct Inward Dialing (DID) Treatment

Since VNS is handling calls as though they were made using ISDN TIE trunks even when VNS DID Bearer trunks are used, the VNS feature does not adhere to the special treatment given to regular DID trunks.

Distinctive Ringing

Except in the case of Network Distinctive Ringing, the Distinctive Ringing feature is not supported by VNS. An incoming call using VNS on a Bearer trunk defined with the prompt DRNG = YES will ignore this value and will perform the same treatment as though the value was DRNG = NO (i.e., no distinctive ringing provided).

Electronic Switched Network (ESN)

The following ESN features are supported on VNS routes:

- ESN Basic Automatic Route Selection

- ESN Coordinated Dialing Plan Routing Enhancement
- ESN Coordinated Dialing Plan
- ESN (999 Loc.)
- ESN Flexible Numbering Plan
- ESN Free Calling Area Screening
- ESN Incoming Trunk Group Exclusion
- ESN Network Authorization Code
- ESN Network Automatic Route Selection
- ESN Network Routing Controls (Time-of-day Scheduling)
- ESN Network Speed Call
- ESN Tone Detection, and
- ESN Off-Hook Queuing.

Incoming Digit Conversion

Since VNS Virtual DNs must be received on the incoming VNS Bearer (DID) trunks, as they are defined at the terminating node, the VNS feature is not supported for routes that perform digit conversion on the digits used for VNS Virtual DNs.

ISDN Call Connection Limitation (ICCL) Checks

The VNS trunk from the external network looks exactly like an ISDN TIE trunk and accordingly is subject to ICCL checks and call restrictions applied thereon.

ISDN QSIG Basic Call

A QSIG link can be used as a B-channel for the Virtual Network Service (VNS) over a private network. All VNS services are supported as normal. QSIG is only used as a speech bearer.

Intercept Treatment

Intercept treatment applied to VNS calls is configured as for TIE trunks.

Network ACD

Network ACD (NACD) is supported by VNS. When a call queued at a source node receives notification that an agent is free and reserved at the target node,

a VNS call is made to the target node. At that time, the call is removed from the queue at the source node. The call will continue to receive ringback (or Recorded Announcement (RAN) if configured) while it is waiting for the VNS call to be completed. When an alerting message is received from the target node, the ringback or RAN is removed and the speechpath with the Bearer is connected. The user will thus hear ringback tone (given either by the PSTN or the Meridian 1 at the target node, depending on the Bearer type), until the agent answers the call.

If for some reason the ALERTING message is not received, the user is requeued (at the top of the queue at the source node). Since ringback or RAN were not removed in the first place, the user is unaware that an attempt to reach a remote agent has been made and has failed.

Since PSTN Bearer trunk call establishment may take longer than PRI2 TIE trunk call establishment, it is necessary to allow more time for the call to arrive at the agent's set than provided by the regular NACD feature. The Agent Reservation Timer should be configured to accommodate a longer interval.

If an agent is reserved at the target node, but the call fails to reach that node (e.g., all trunks are busy), the agent will stay reserved until NACD Target Reservation Timer (RAGT) expires (the target node has no indication that the call has encountered a busy condition). This is more critical when NACD is used with VNS, because (RAGT) must be set to a greater value.

NACD allows up to 20 remote target nodes to be defined in the routing tables. Since the maximum number of VNS Virtual DNs per customer is 100, it is not realistic to configure 20 target nodes using VNS routing; this would only allow five Virtual DNs per target node and thus a maximum of five simultaneous calls.

Network Call Party Name Display

Network Call Party Name Display is supported on VNS routes. All display information is taken from messages on the VNS D-channel. The VNS Bearer does not drive the display of such information.

Network Distinctive Ringing

For an incoming DID call (without VNS) that tandems to another node using VNS, the feature will be supported as it would have been if an ISDN TIE trunk had been used for the VNS call.

Trunk Barring

Three cases apply for Trunk Barring:

- 1 When the second trunk involved in the call is used by VNS, no trunk barring is applied regardless of the configuration of the first trunk. The call is always allowed to get through.

Note: This implementation completely overrides the Trunk Barring feature.
- 2 When the first trunk involved in the call uses VNS, and the second one is not used by VNS, trunk barring is performed according to the content of the default Access Restriction Table (ART) for the TIE trunk.
- 3 When neither the first trunk nor the second trunk is involved in a VNS call, the usual rules for Trunk Barring apply.

Vacant Number Routing

Calls rerouted by the Vacant Number Routing feature are not allowed to have digit manipulation performed on the DN dialed. Thus, for non VNS calls, no Digit Manipulation Index (DMI) can be associated in the Route List Index (RLI) used by Vacant Number Routing. For VNS calls (in LD 86, the entries on this RLI are defined with the prompt VNS = YES), it is not allowed to associate any manipulation on the digits included in the messages exchanged over the VNS D-channel. In these cases, the prompt VMDI is not displayed, but the prompt DMI is still displayed.

Feature packaging

The Virtual Network Services (VNS) package is 183.

The following software packages are also required for VNS:

- Network Alternate Route Selection (NARS) package 58, dependent on:
 - Basic Routing (BRTE) package 14; and
 - Network Class of Service (NCOS) package 32;
- Integrated Services Digital Network (ISDN) package 145;
- Integrated Services Digital Network Supplementary (ISDNS) package 161;
- ISDN Signaling Link (ISL) package 147; and
- Advanced Network Services (NTWK) package 148.

Feature operation

There are no operating procedures specified for this feature.

Virtual Network Services Virtual Directory Number Expansion

Virtual Network Services (VNS) provides ISDN features to customers when no ISDN Primary Rate Interface (PRI) or ISDN Signaling Link (ISL) Bearer Channels are available between two Meridian 1 switches (Please refer to the VNS feature description module in this NTP for detailed information on VNS).

A requirement of VNS is that customers have to configure VNS DNs (VDNs) as part of their numbering plan. The VNS VDN expansion feature sets a new limit on the number of VDNs at 4000. VDNs are configured on Overlay 79.

The VDNs are defined in sets of blocks. Each block may contain any number of contiguous VDNs, as long as the total number does not exceed 4000. Within a block, it is possible to define a range of VDNs as well as individual VDNs. For example, a customer may define the following VDNs (in this example, the customer is defining a total of 164 VDNs.)

```
7200-7299
7320-7325
7355
7400-7455
7676
```

A customer may remove a block of contiguous VDNs, as long as there is no VNS call using a VDN in the block. To remove a block of contiguous VDNs, the block has to be first disabled in Overlay 79 (by entering DIS against the REQ prompt), to prevent new VNS calls from using any of the VDNs in the block. Once the block has been disabled, the system administrator has to wait until all the VNS calls, using any of the VDNs in the block, are cleared.

After disabling the block, the system administrator can determine the number of VDNs used by VNS calls by printing VNS information (by using the PRT command in response to REQ in Overlay 79). Once all of the VDNs are free, the block may be removed by using the OUT command.

Operating parameters

None applicable.

Feature interactions

None applicable.

Feature packaging

The VNS VDN expansion feature requires the Virtual Network Services (VNS) package 183.

The following software packages are also required:

- Network Alternate Route Selection (NARS) package 58, dependent on:
 - Basic Routing (BRTE) package 14, and
 - Network Class of Service (NCOS) package 32;
- Integrated Services Digital Network (ISDN) package 145;
- Integrated Services Digital Network Supplementary (ISDNS) package 161;
- ISDN Signaling Link (ISL) package 147;
- Advanced Network Services (NTWK) package 148; and
- 1.5 Mbps PRI (PRA) package 146 is required if VNS uses the D-Channel of a PRI trunk for its signaling (USR = SHAV).

Feature operation

No specific operating procedures are required to use this feature.

Chapter 3 — Network Clocking

Clocking in a Digital World

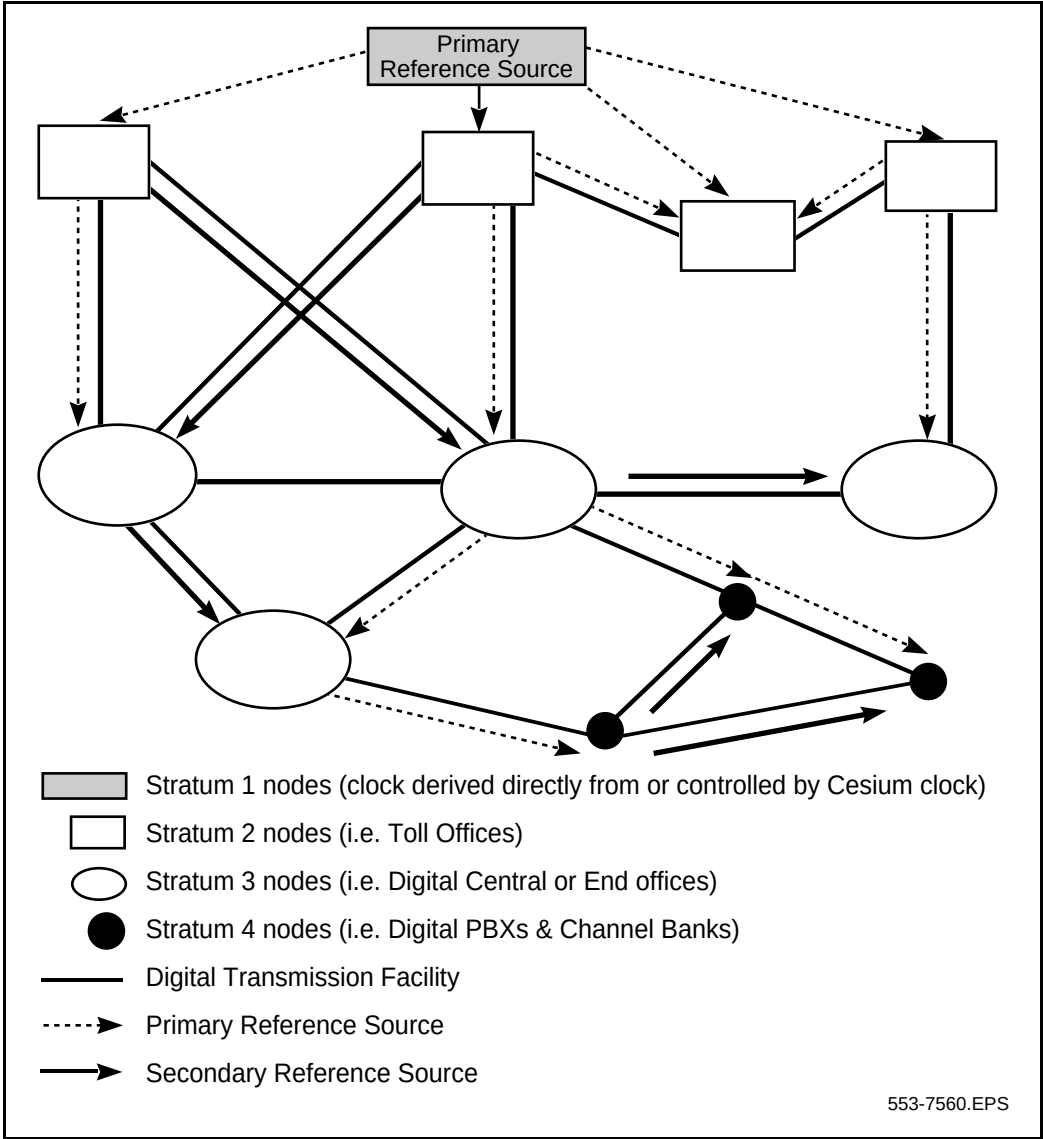
The Need for Synchronization

When digital signals are being transported over a communication link, the receiving end must operate at the same frequency as the originating end to prevent loss of information. This is referred to as link synchronization.

If both ends of a communication link are not in synchronization, data bit slips will occur and therefore a loss of data will result. In general, accurate timing is very important, but more importantly, synchronized timing is a must for reliable data transfer.

When only two Meridian 1 PBX systems are interconnected in an isolated private digital network, synchronization can be achieved by operating the two systems in a master/slave mode whereby one system derives its timing from the other. In a network of digital systems, however, slips can be better prevented by forcing all digital systems to use a common reference clock through a network clocking hierarchy (see Figure 89).

Figure 89
Hierarchical Synchronization



Synchronization Methods

There are two common methods of maintaining timing coordination between switching systems.

- a Plesiochronous operation:** nodal clocks run independently (free run) at the same nominal frequency. There will be frequency differences between clocks resulting in frame slips (see section “Frame Slips”). The magnitude of frame slips will be directly proportional to the frequency difference. Slips are inevitable but can be minimized by using very stable clocks and elastic stores or buffers. These buffers will be capable of absorbing a certain number of data bits to compensate for slight variances in clock frequencies.
- b Mesochronous operation:** nodal clocks are continuously and automatically locked to an external reference clock. With this method, frame slips can be eliminated if elastic stores are large enough to compensate for transmission variances. Mesochronous operation should be virtually slip free.

Whenever possible, the Meridian 1 PBX will operate in the Mesochronous mode by configuring the Clock Controller circuit cards to lock onto an external reference source. The above statement is true unless the Meridian 1 is used as a master in an independent/private network. An independent network has no digital links to a higher Node Category.

In an isolated private network, the Meridian 1 clock controller can operate in free run mode and act as a master clock to be tracked by other PBX systems in the private network.

North American Hierarchical Synchronization

Figure 89 provides a general view of a Digital Network Synchronization of clocks including the four stratum level Node Categories. Stratum 1 is the highest and most accurate, stratum 4 is the lowest. Meridian 1 Option 11 NTAK20AA clocking meets Node Category D Stratum 3 requirements. Option 11 NTAK20BA clocking meets CCITT stratum 4 requirements. Also shown are ways of providing a Secondary Clock Source while preventing timing loops that tend to cause instability in the synchronization of the digital network.

Timing Reference

Primary Timing Reference in the North American network is derived from a cesium beam atomic clock. The Canadian digital network, for example, is divided into two regions which interact plesiochronously, each with its own cesium atomic clock. Their common boundary is between Manitoba Telephone System and Bell Canada. The Eastern Region clock is located in Ottawa, while the Western region is located in Calgary. Any DS-1 signal leaving these switches is synchronized to the cesium oscillators.

Every digital node in Canada whether it is a Central Office, a Digital PBX with CO connectivity, or a digital Multiplexer should be able to trace their clock back to the cesium oscillator located in Ottawa or Calgary. This statement is true unless the Digital System is operating independently as a cell in plesiochronous operation.

In the U.S., a similar arrangement exists. The two primary clocks that support the U.S. network are located in St. Louis, Missouri. and Boulder, Colorado.

Node Categories/Stratum

In the North American digital network, nodes are synchronized using a priority master/slave method. Digital nodes are ranked in Node Categories A to E in Canada, and in Stratum levels 1 to 5 in the U.S. Each node is synchronized to the highest ranking node in its neighborhood with which it has a direct link.

Table 50
Node Categories

	Stratum 2	Stratum 3	Stratum 4
Accuracy	$\pm 1.6 \times 10^{-8}$ Hz	$\pm 4.6 \times 10^{-6}$ Hz	$\pm 3.2 \times 10^{-5}$ Hz
Holdover	1×10^{-10} per day	≤ 255 frame slips in 1st 24 hours	Not Required
Hardware Duplication	Required	Required (Note 1)	Not Required
MTIE During Rearrangement	MTIE ≤ 1 usec Phase Change Slope: ≤ 81 ns in any 1.326 msec	MTIE ≤ 1 usec Phase Change Slope: ≤ 81 ns in any 1.326 msec	No Requirement (Note 2)
Pull-in Range	3.2×10^{-8} Hz	9.2×10^{-6} Hz	6.4×10^{-5} Hz
Dedicated Timing Required	Required	Required	Not required

Note 1: Non-duplicated clock hardware that meets all other stratum 3 requirements is referred to as stratum 3ND.

Note 2: Stratum 4 clock hardware that meets MTIE requirements during rearrangements is referred to as 4E.

The assignment of Node Categories/Stratums is shown in Table 51.

Table 51
Assignment of Node Stratum/Categories

AT&T Stratum	Canadian Node Category	Operating Equipment
1 (Located in St. Louis and Boulder)	A (Located in Calgary and Ottawa)	Regional Master with an associated cesium atomic clock.
2	B,C	International Gateway switch
3	D	Central Office / End Office, or digital PBX
4	E	Digital PBX or Multiplexers

Frame Slip

Digital signals must have accurate clock synchronization for data to be interleaved into or extracted from the appropriate timeslot during multiplexing and de-multiplexing operations. A frame slip is defined as the repetition or deletion of the 193 data bits of a DS-1 frame due to a sufficiently large discrepancy in the read and write rates at the buffer. Frame slips occur when clocks aren't operating at exactly the same speed.

When data bits are written into a buffer at a slightly *higher* rate than that at which they are being read, sooner or later the buffer overflows. This is a slip-frame deletion.

In the opposite situation, when data bits are written into a buffer at a slightly *lower* rate than that at which they are being read, eventually the buffer runs dry or underflows. This is also a slip-frame repetition.

Either occurrence is called a slip or a controlled slip. The Option 11 contains a buffer large enough to hold about 2 full DS-1 frames (193 x 2 = 386). It is normally kept half full (1 frame). Slippage has impact on the data being transferred, as is shown in the table below, and all of the degradations shown in the table can be controlled or avoided with proper clock synchronization.

Table 52
Impact of slip on service types

Service	Potential Impact
Encrypted Text	Encryption key must be present.
Video	Freeze frame for several seconds. Loud pop on audio.
Digital Data	Deletion or repetition of Data. Possible Misframe.
Facsimile	Deletion of 4-8 scan lines. Drop Call.
Voice Band Data	Transmission Errors for 0.01 to 2 s. Drop Call.
Voice	Possible Click

Guidelines

Some key points to keep in mind when designing Network Synchronization:

- Where possible, the Master Clock Source should always be from a Node Category/Stratum with higher clock accuracy. For example, when the PBX is connected to the CO, the CO will be the Master and the PBX will be the Slave.
- The source should not itself be in free-run unless it is operating in a fully independent network where the source acts as a Master (see “Plesiochronous operation” in this chapter).
- When connecting two PBXs together with no CO connections, the most reliable PBX should be the Master. Reliability here refers to Dual CPU/Dual Clock, battery backup, and Stratum level of Clock Controller.

Note: QPC471 and QPC775 are not applicable to the Option 11.

- Avoid timing loops. A timing loop occurs when a clock is using as its reference frequency a signal that is traceable to the output of that same clock. The formation of such a closed timing loop will lead to frequency instability and should be avoided. Timing loops are sometimes unavoidable on the secondary clock reference source.
- Ensure all central offices/PBX links which are used as clock references have a traceable path back to the same stratum 1 clock source.

While it is beyond the scope of this guide to provide detailed Network Synchronization, the following figures will help illustrate some of the basic concepts to achieve stable clocking.

Figure 90
Isolated Private Network

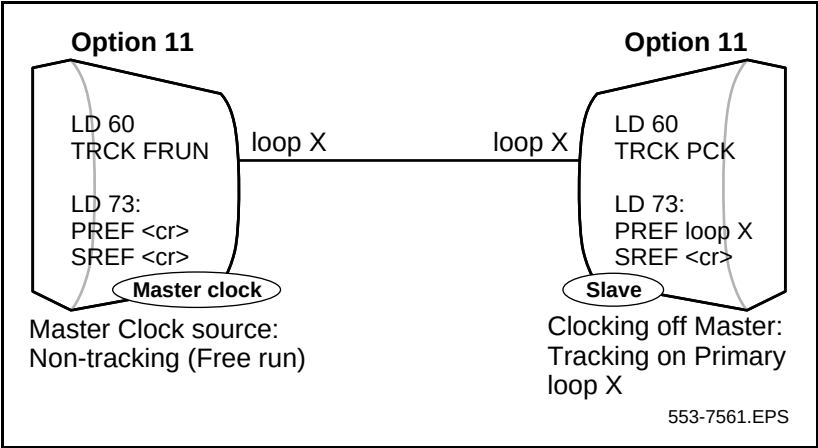
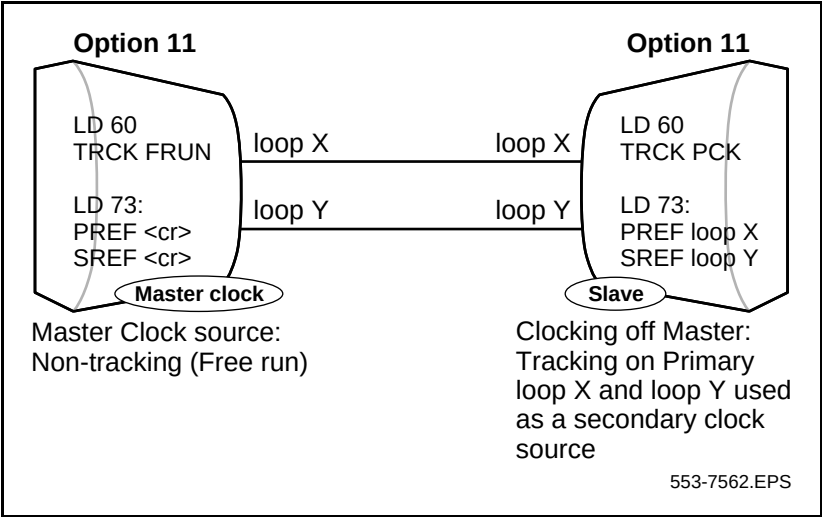


Figure 91
Isolated Private Network with Secondary Reference Clock



Comments:

- For tie lines between PBXs facilitated by a central office, clocking is derived from the PBX, not the CO.
- When a second Digital loop is available, it can be used as a Secondary Clock source in case the Primary Source fails.

Figure 92
Clocking Hierarchy referenced to a Public Network Master Clock

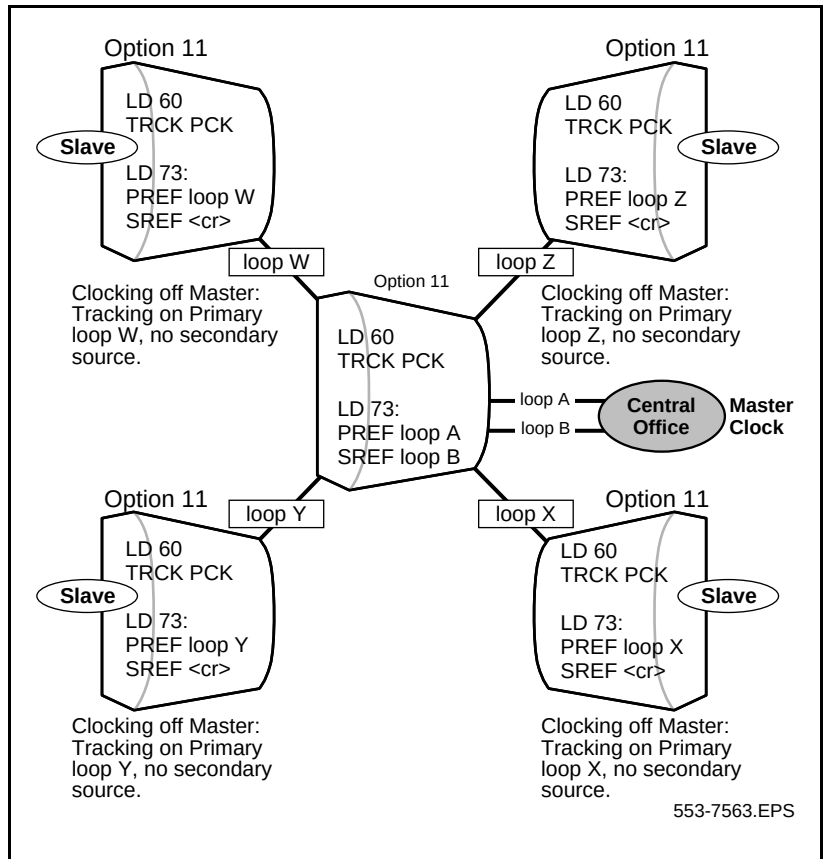
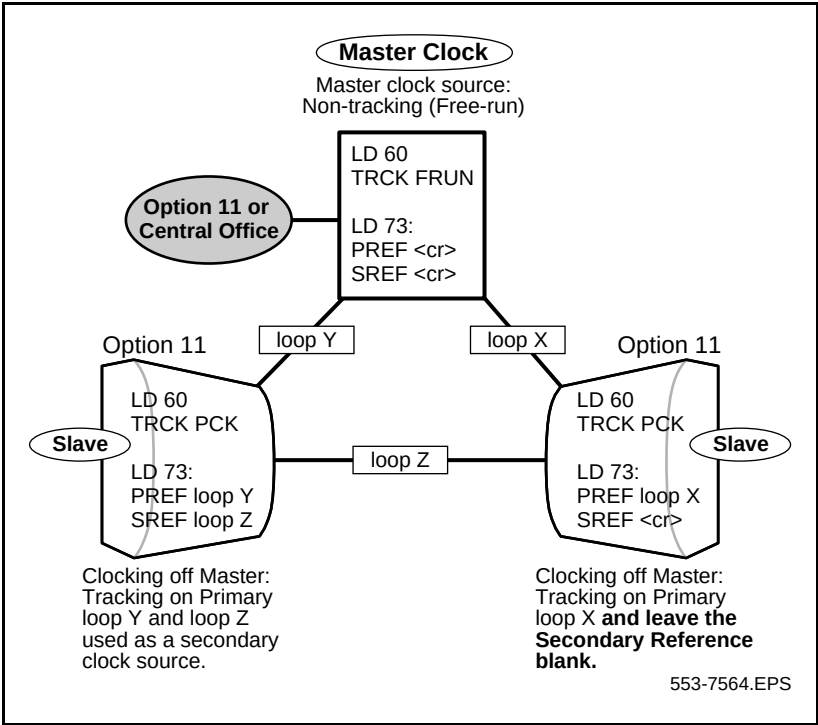


Figure 93 shows a STAR arrangement: one Hub PBX is linked to the Central Office and all other PBXs are connected as slaves. When a second Digital loop from the Option 11 which forms the hub of this network becomes available, it can be used as a Secondary Clock Source in case the Primary Source fails.

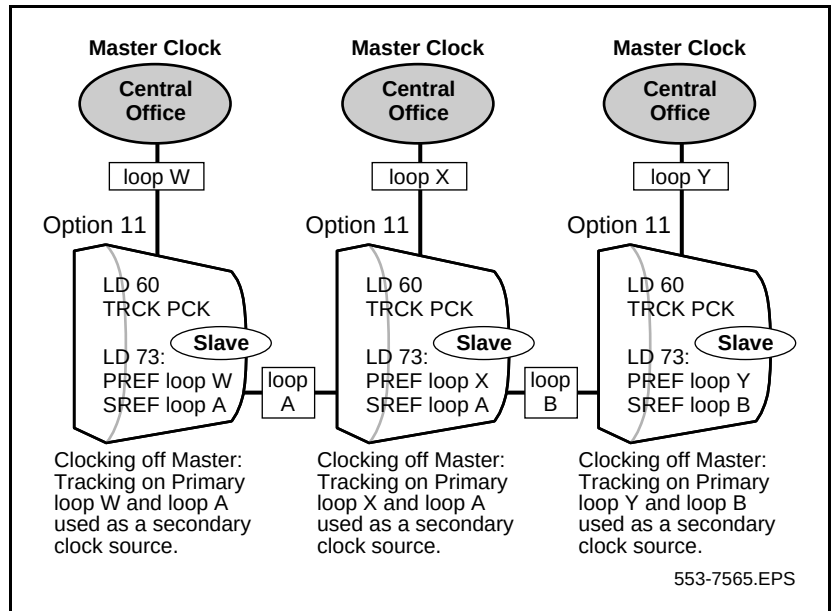
Figure 93
Alternate Clocking from the same CO



A digital connection to the Central Office may exist (i.e. Loops X and Y). When a second Digital loop from the CO or Master Meridian 1 becomes available, it can be used as a Secondary Clock Source in case the Primary Source fails.

To avoid timing loops, the most reliable slave system should not have a Secondary Clock Source (SREF= <cr>). In Figure 94, this is illustrated by the node which supports loops X and Z.

Figure 94

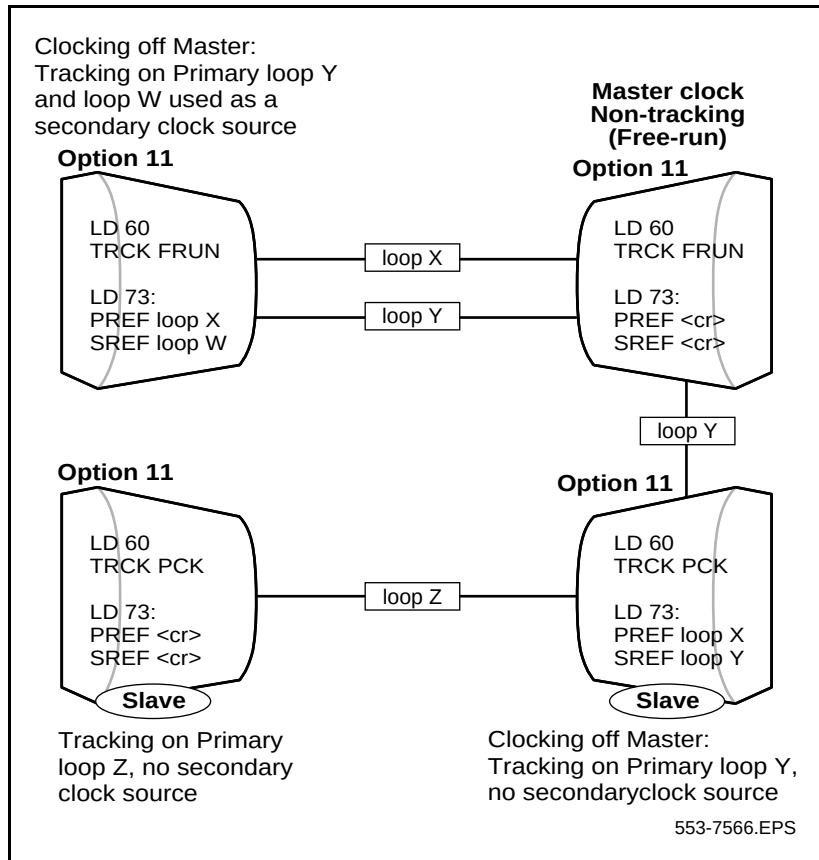


Digital connections to the Central Office do exist. When a second Digital loop from the CO becomes available, it can be used as a Secondary Clock Source in case the Primary Source fails.

Slaves can track on each other as a secondary source since the chances of both links to the Central Offices going down at the same time are very unlikely.

Note: All central offices must have a path back to the same stratum 1 source.

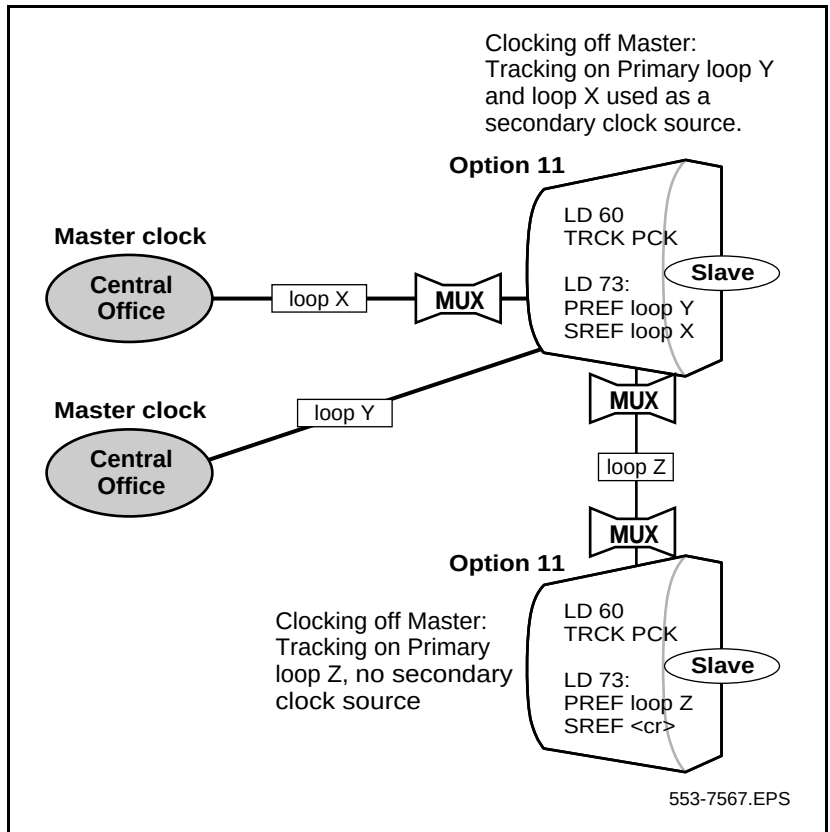
Figure 95
Complex Isolated Private Network



Digital connections to the Central Office do not exist. If it does, the PBX connected to it will track off the C.O. and will in turn be used as a clock source to other nodes.

When a second Digital loop from the Master Meridian PBX becomes available, it can be used as a Secondary Clock Source in case the Primary Source fails.

Figure 96
Network Clocking with MUXs



The direct connection to the CO (without a MUX) should be used as a primary clock reference since there is the least amount of hardware involved. The MUX must pass the clock and not generate its own clock; in other words, it must also be a slave (not Free Run). Synchronized clocking is required.

Chapter 4 — PRI Implementation

Overview

This chapter provides the information required to install PRI on a Meridian 1 Option 11 system:

- hardware and software installation
- programming procedures for basic call service.

While either the hardware or software may be installed first, the PRI cannot be enabled and tested until both are completed.

This chapter covers the most common type of Northern Telecom PRI installations:

- 23B+D Primary Rate Interface (PRI) installation between Meridian 1 PBX systems.
- 23B+D Primary Rate Interface (PRI) installation between a Meridian 1 PBX and DMS-100 (ISA).

This chapter builds on the ESN programming that is assumed to be already in place. The installation technician should have a basic understanding of NARS and CDP. (See Appendix A for additional information on ESN).

The related ISDN features are treated individually in the chapter called *Feature Implementation*.

Hardware Requirements

Circuit cards

To implement PRI on the Meridian 1 Option 11, the following hardware is required:

Circuit card	Description
NTRB21	DTI/PRI TMDI card. Note: This card requires that the Option 11C be equipped with at least Generic X11 Release 24 software.
NTAK09	DTI/PRI circuit card.
NTAK20	Clock-controller daughterboard. Option 11 supports only one active clock controller per system. <i>Note:</i> One clock controller per system is required when using NTAK09 or NTRB21 cards, to provide PRI functionality.
NTAK93	D-Channel-handler interface (DCH) daughterboard.
NTBK51	Downloadable D-Channel daughterboard (DDCH). Connects to the NTAK09 DTI/PRI card.

Cables

The following cables are required for PRI connections:

- PRI to external T1 cable
- NTBK04 - carrier cable
- NT8D97 50 foot extension (if needed)

Channel Service Units

When connecting the DTI/PRI to the public network, CSUs are required by most operating companies. One CSU is required per PRI. Suitable CSUs which support 64 Kbps clear and Bipolar 8 Zero Substitution (B8ZS) are available from vendors such as Verilink, Digitalink, Kentrox and Tellabs.

Note: Contact your Northern Telecom Sales representative for specific local CSU requirements.

Echo Canceller

Echo Cancellers are required for voice calls over direct satellite links using PRI.

Note: Echo Canceller control is currently not supported on Option 11.

Hardware description

NTRB21 TMDI card

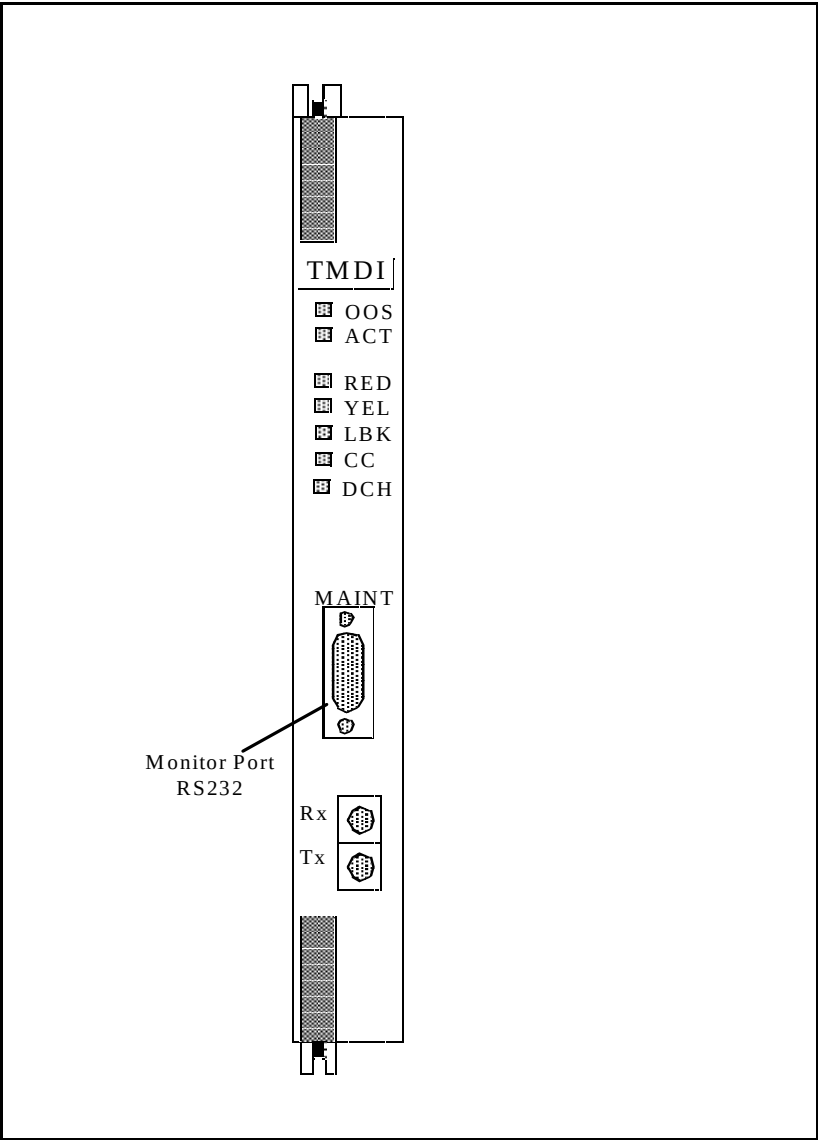
The NTRB21 TMDI card provides 1.5 MBit/s Digital Trunk Interface or Primary Rate Interface functionality on the Option 11C. The NTRB21 has a built-in downloadable D-Channel, and may occupy card slots 1-9 on the Option 11C main cabinet.

Note 1: For CISPR B group cabinets, the active Clock Controller (NTAK20) can only occupy slots 1-3. For FCC and/or CISPR A group cabinets, this limitation does not exist - the Clock Controller can occupy any available slot 1-9.

Note 2: The NTRB21 TMDI card requires that the Option 11C be loaded with at least Generic X11 Release 24 software. If an Option 11C switch is loaded with Release 24 (or later) software, the NTRB21 can be equipped together with the NTAK09 DTI/PRI card (with the NTBK51 downloadable D-Channel daughterboard), and the NTAK93 DCHI daughterboard.

Figure 97 shows a faceplate of the NTRB21 TMDI card.

Figure 97
NTRB21 TMDI card faceplate

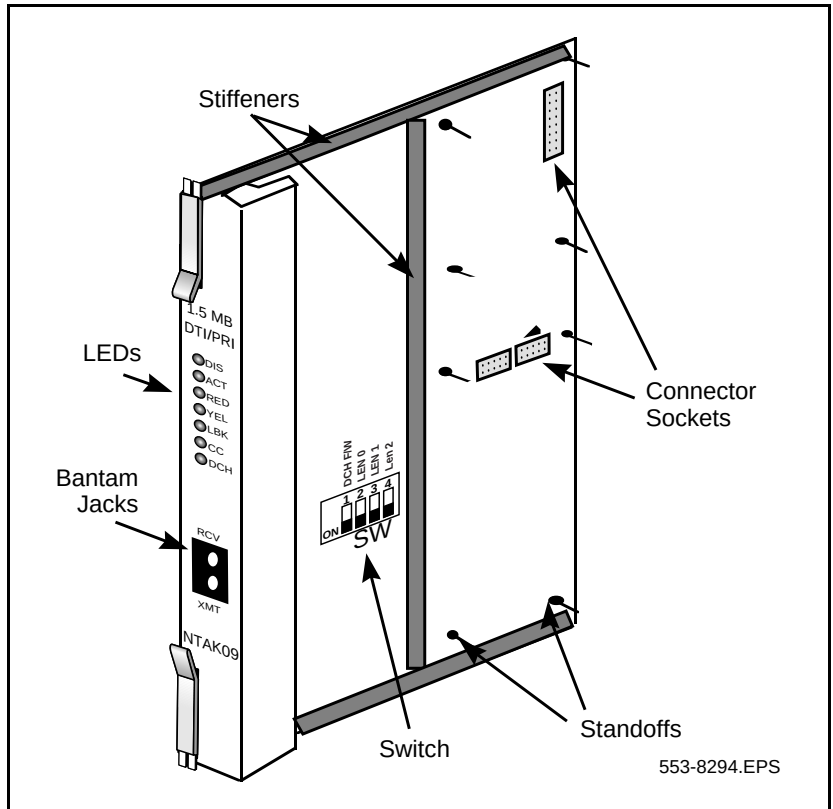


NTAK09 DTI/PRI circuit card

The NTA09 Digital Trunk Interface/Primary Rate Interface (DTI/PRI) card provides the physical interface for the DS-1 facility T-1 carrier on the Meridian 1 Option 11. It is required for PRI and DTI operation and is also used for ISL shared-mode applications.

The DTI/PRI card occupies any single card slot (1-9) in the Option 11 main cabinet. Figure 98 shows the faceplate layout, the location of the switch and the position of the daughterboards and connectors. See the “DTI/PRI maintenance” chapter in this guide for information about the faceplate LEDs.

Figure 98
NTAK09 DTI/PRI circuit card



NTAK20 Clock Controller (CC) daughterboard

Digital Trunking requires synchronized clocking so that a shift in one clock source will result in an equivalent shift of the same size and direction in all parts of the network. On Option 11 systems, synchronization is accomplished with the NTA20 clock controller circuit card. The Clock Controller circuitry synchronizes the Option 11 to an external reference clock, and generates and distributes the clock to the system. Option 11 can function either as a slave to an external clock or as a clocking master. The NTA20AA version of the clock controller meets AT&T Stratum 3 and Bell Canada Node Category D specifications. The NTA20BA version meets CCITT stratum 4 specifications. See the chapter called *Network clocking* for details.

Shelf slot assignment

On non-ECM system cabinets, the NTA20 may be placed in slots 1-9. On cabinets NTA11Dx and NTA11Fx, the active NTA20 must be placed in slots 1-3 (slots 4-10 may not be used.)

Clocking modes

The Option 11 system supports a single clock controller that can operate in one of two modes: tracking or non-tracking (also known as free-run).

Tracking mode

In tracking mode, one or possibly two DTI/PRI cards supply a clock reference to a clock controller daughterboard. When operating in tracking mode, one DTI/PRI is defined as the primary reference source for clock synchronization, while the other is defined as the secondary reference source (PREF and SREF in LD 73).

There are two stages to clock controller tracking:

- tracking a reference, and
- locked onto a reference.

When tracking a reference, the clock controller uses an algorithm to match its frequency to the frequency of the incoming clock. When the frequencies are very near to being matched, the clock controller is locked onto the reference. The clock controller will make small adjustments to its own frequency until both the incoming and system frequencies correspond.

If the incoming clock reference is stable, the internal clock controller will track it, lock onto it, and match frequencies exactly. Occasionally, however, environmental circumstances will cause the external or internal clocks to drift. When this happens, the internal clock controller will briefly enter the tracking stage. The green LED will flash momentarily until the clock controller is locked onto the reference once again.

If the incoming reference is unstable, the internal clock controller will continuously be in the tracking stage, with the LED flashing green all the time. This condition does not present a problem, rather, it shows that the clock controller is continually attempting to lock onto the signal. If slips are occurring, however, it means that there is a problem with the clock controller or the incoming line.

Free-run (non-tracking)

In free-run mode, the clock controller does not synchronize on any source, it provides its own internal clock to the system. This mode can be used when the Meridian 1 is used as a master clock source for other systems in the network. Free-run mode is undesirable if the Meridian 1 is intended to be a slave. It can occur, however, when both the primary and secondary clock sources are lost due to hardware faults or when invoked by using software commands.

Clock controller LED states

The clock controller LED, on the NTAK09 or NTRB21 faceplates, will be in various states, depending on the status of the clock controller:

LED	Clock controller
On (Red)	NTAK20 is equipped and disabled.
On (Green)	NTAK20 is equipped and is either locked to a reference or is in free run mode.
Flashing (Green)	NTAK20 is equipped and is attempting to lock (tracking mode) to a reference. If the LED flashes continuously over an extended period of time, check the CC STAT in LD60. If the CC is tracking this may be an acceptable state. Check for slips and related clock controller error conditions. If none exist, then this state is acceptable, and the flashing is identifying jitter on the reference.
Off	NTAK20 is not equipped.

NTAK93 D-Channel Handler Interface (DCHI) daughterboard

The NTAk93 DCHI daughterboard interfaces with the Meridian 1 Option 11 Central Processing Unit (CPU) and mounts on the NTAk09 DTI/PRI circuit card for PRI or ISL shared mode applications. The DCHI is responsible for performing the Q.921 layer 2 protocol information. It transfers layer 3 signaling information between two adjacent network switches.

The NTAk93 DCH daughterboard, when installed on the NTAk09 circuit card, is addressed in the same slot as the NTAk09. The NTAk93 can use SDI I/O addresses 0 to 15 and port 1.

Note: I/O addresses 0, 1, 2, 8 and 9 are preconfigured on the Option 11 and must not conflict with the I/O addresses on the NTAk93 card.

A minimum of one NTAk93 is required for each PRI link. If more than one PRI link is connected to the same end location, a single DCHI circuit card can support up to a maximum of 8 PRI connections for the Option 11 system. This allows a total of 190 B-Channels or PRI trunks to be supported if a backup D-Channel is also used. A total of 191 B-channels or PRI trunks are supported if a backup channel is not used.

NTBK51 Downloadable D-Channel daughterboard

The NTBK51 DDCH daughterboard interfaces with the Meridian 1 Option 11 Central Processing Unit (CPU) and mounts on the NTAk09 DTI/PRI circuit card for PRI D-Channel applications. The DDCH is equivalent to the MSDL card used on the larger Meridian 1 systems, but it only supports D-channel applications (no SDI or ESDI).

The NTBK51 DDCH daughterboard, when installed on the NTAk09 circuit card, is addressed in the same slot as the NTAk09.

A minimum of one NTBK51 is required for each PRI link. If more than one PRI link is connected to the same end location, a single DDCH circuit card can support up to a maximum of 8 PRI connections for the Option 11 system. This allows a total of 190 B-Channels or PRI trunks to be supported if a backup D-Channel is also used. A total of 191 B-channels or PRI trunks are supported if a backup channel is not used.

Installing PRI hardware

Inserting/removing the NTRB21 TMDI card

Inserting the NTRB21

Insert the NTRB21 TMDI circuit card into card slot 1-9 in the Option11C main cabinet. Check for available card slots in the base cabinet and print the configuration record to determine which slots may be used. To do this, use PRT CFN in LD22. Then, use the following steps:

- 1 If in PRI mode, first S/W disable the associated D-Channel using the following overlay and commands:

LD96 DIS DCH x

(Where x is the DCH port number that was assigned in LD17).

- 2 If the Clock Controller is enabled, first S/W disable it using the following overlay and commands:

LD60 DIS CC 0

- 3 Hold the NTRB21 by the lock latch, unlock the latch and slide the card into the cabinet.

- 4 Enable the TMDI card using the following overlay and commands:

LD96 ENL TMDI x

where x is the NTRB21 TMDI card number (DLOP). The card number associated with a NTRB21 TMDI card is based on the slot in which the card is installed (1-9).

Within about 30 seconds, the D-Channel layer 3 should be established. To confirm, request the current status of the D-Channel by using the LD 60 command **STAT DCH (N)**.

The system should respond **DCH N EST OPER**, meaning that the D-Channel is established and operational.

Removing the NTRB21

- 1 If in PRI mode, first S/W disable the associated D-Channel using the following overlay and commands:

LD96 DIS DCH x

(Where x is the DCH port number that was assigned in LD17).

- 2 If the Clock Controller is enabled, first S/W disable it using the following overlay and commands:

LD60 DIS CC 0

- 3 Disable the NTRB21 TMDI card using the following overlay and commands:

LD96 DIS TMDI x

where x is the NTRB21 TMDI card number (DLOP). The card number associated with a NTRB21 TMDI card is based on the slot in which the card is installed (1-9).

- 4 Hold the NTRB21 by the lock latch, unlock the latch and slide the card out from the cabinet.

Mounting the NTAK20 daughterboard on the NTRB21

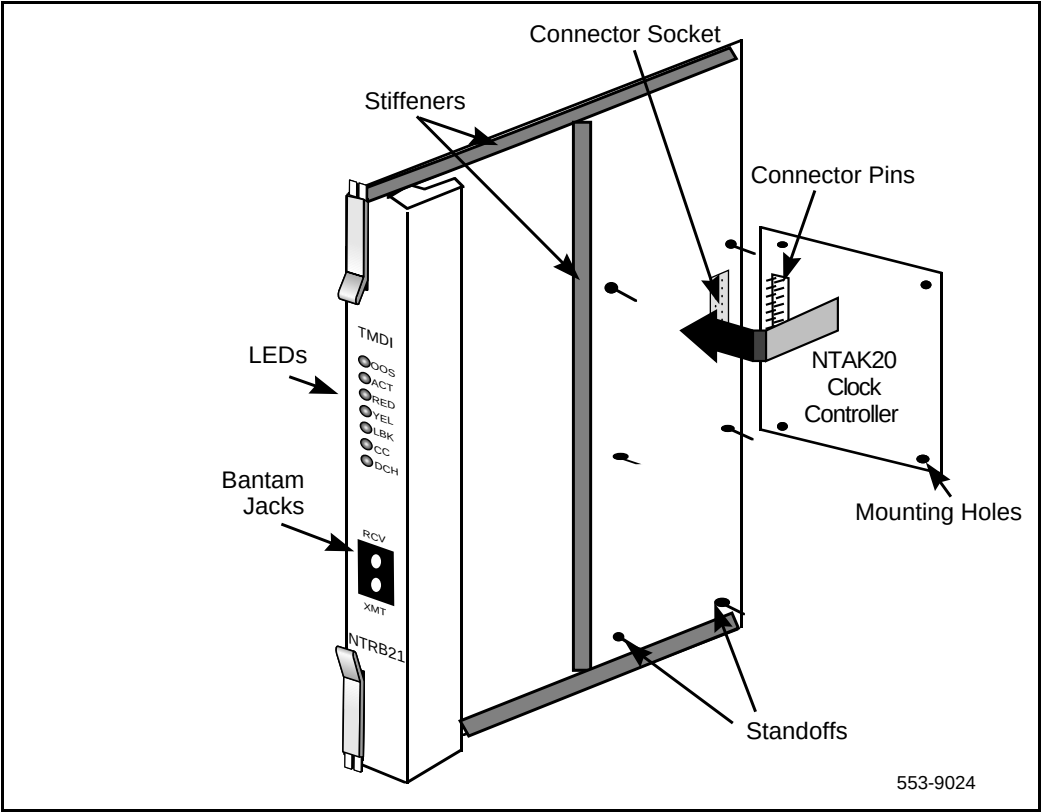
Install the NTAK20 daughterboard on the NTRB21. Work on a flat surface when mounting or removing daughterboards.

- 1 Visually inspect the connector pins on the underside of the daughterboard. Any pins that are bent should be re-aligned prior to mounting.
- 2 Place the NTRB21 down flat on an anti-static pad.
- 3 From an overhead viewpoint, with the daughterboard parallel above the NTRB21 and the connector pins aligned over the connector sockets, line up the mounting holes on the daughterboard (see figure below) with the tops of the standoffs on the NTRB21.
- 4 Slowly lower the daughterboard towards the NTRB21, keeping the standoffs in line with all four holes, until the holes are resting on the tops of the four standoffs.

If more than a very slight amount of pressure is required at this point, the connector pins may not be aligned with the connector socket. If so, lift the daughterboard off the NTRB21 and return to step 2.

- 5 Gently apply pressure along the edge of the board where the connector is located until the STAND OFFS at the two corners adjacent to the connector snap into a locked position. Then press down on the two corners on the opposite side until they also are locked into place.

Figure 99
Daughterboard installation



Mounting the NTAK93 or NTBK51 daughterboards on the NTAK09

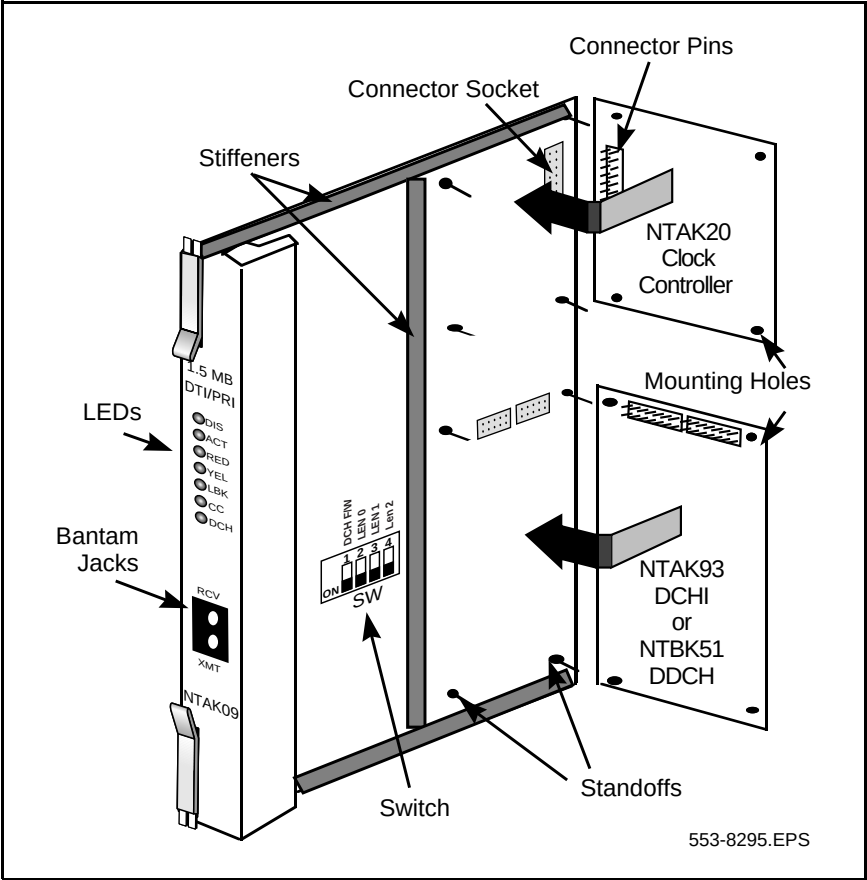
Install the NTAK93 DCHI or NTBK51 DDCH daughterboard before the NTAK20 daughterboard. Work on a flat surface when mounting or removing daughterboards.

- 1 Visually inspect the connector pins on the underside of the daughterboard. Any pins that are bent should be re-aligned prior to mounting.
- 2 Place the NTAK09 down flat on an anti-static pad.
- 3 From an overhead viewpoint, with the daughterboard parallel above the NTAK09 and the connector pins aligned over the connector sockets, line up the mounting holes on the daughterboard (see figure below) with the tops of the standoffs on the NTAK09.
- 4 Slowly lower the daughterboard towards the NTAK09, keeping the standoffs in line with all four holes, until the holes are resting on the tops of the four standoffs.

If more than a very slight amount of pressure is required at this point, the connector pins may not be aligned with the connector socket. If so, lift the daughterboard off the NTAK09 and return to step 2.

- 5 Gently apply pressure along the edge of the board where the connector is located until the STAND OFFS at the two corners adjacent to the connector snap into a locked position. Then press down on the two corners on the opposite side until they also are locked into place.

Figure 100
Daughterboard installation



Removing the daughterboards from the NTA09

Use these guidelines to remove the NTA02 CC, and the NTA93 DCHI or NTB51 DDCH daughterboards from the NTA09 DTI/PRI card. Because of the physical layout of the mother and daughterboards, the NTA02 should be removed before the NTA93 or NTB51.

- 1 Starting at the two corners opposite the connector, gently lift each corner out of the locking groove of the standoff.
- 2 At the two corners adjacent to the connector, gently lift the entire side until the mounting holes are clear of the locking groove of the standoff.
- 3 To remove the connector pins, grasp the edge of the board adjacent to the connector and lift gently.

If more than one NTA09 card is installed, the additional cards may not carry daughterboards, depending on the system configuration. At least one NTA02 (per system) is always required, however.

Setting the switches

Set the switches on the NTA09 DTI/PRI card according to the table below.

Table 53
NTA09 switch settings

Switch Setting	1 DCH F/W	2 (LEN 0)	3 (LEN 1)	4 (LEN 2)
Distance to Digital Cross-Connect				
0 - 133 feet	Off	Off	Off	On
133 - 266 feet	Off	On	On	Off
266 - 399 feet	Off	Off	On	Off
399 - 533 feet	Off	On	Off	Off
533 - 655 feet	Off	Off	Off	Off

Inserting the NTAK09 into the main cabinet

Insert the NTAK09 circuit card into the desired slot in the Option 11 main cabinet. (Card slots 1 through 9 are available).

Check for available card slots in the base cabinet and print the configuration record to determine which slots may be used. To do this, use PRT CFN in LD22.

Connecting the cables

Connect the NTBK04 cable to the 50-pin amphenol below the card slot in which the NTAK09 circuit card is installed. Connect the other end of the cable to the CSU or DSX-1 cross connect.

The NTBK04 is twenty feet long. If additional distance is required, the NT8D97AX fifty-foot extension is available up to a 600 foot maximum. The only cable required to support the NTAK09 circuit card is the NTBK04.

If you require pinout information on the NTBK04 cable, refer to the table below.

Table 54
DS-1 line interface pinout for NTBK04 cable

From 50-pin MDF connector	to DB-15	signal name	description
pin 48	pin 1	T	transmit tip to network
pin 23	pin 9	R	transmit ring to network
pin 25	pin 2	FGND	frame ground
pin 49	pin 3	T1	receive tip from network
pin 24	pin 11	R1	receive ring from network

Software enabling the DTI/PRI cards

Software enabling the NTRB21 TMDI card

- 1 Enable the NTRB21 TMDI card using the following overlay and command:

LD96 ENL TMDI x

where x is the NTRB21 TMDI card number (DLOP). The card number associated with a NTRB21 TMDI card is based on the slot in which the card is installed (1-9).

- 2 If in PRI mode, S/W enable the associated D-Channel using the following overlay and commands:

LD96 ENL DCH y

(Where y is the DCH port number that was assigned in LD17).

Within about 30 seconds, the D-Channel layer 3 should be established. To confirm, request the current status of the D-Channel by using the **LD 60** command **STAT DCH (N)**.

The system should respond **DCH N EST OPER**, meaning that the D-Channel is established and operational.

Software enabling the NTAK09 card

Use step 1 to enable NTAK09 DTI/PRI card. If the clock controller and D-channel interface are not enabled in step 1, go to step 2.

Step 1

- Software enable all NTAK09 DTI/PRI cards using LD 60:
ENLL C

where C is the DTI/PRI card number (DLOP). The card number associated with a DTI/PRI card is based on the slot in which the card is installed.

Note: The DCHI and PRI loops must be programmed prior to software enabling the NTAK09. Refer to the section "Programming Meridian 1 to Meridian 1 PRI" for further information.

- Under normal conditions, this step enables the clock controller and D-Channel interface. If enable fails, go to step 2.

Step 2: (if required):

Software enable the clock controller using overlay 60. Enable clock tracking on primary digital loop by issuing the following command:

ENL CC 0

- Software enable the NTAK93 (DCHI) daughterboard using overlay 96 command

ENL DCHI N

(where N is the DCHI I/O address).

- Within about 30 seconds, the D-Channel layer 3 should be established. To confirm, request the current status of the D-Channel by issuing the command
- The system should respond **DCH N EST OPER**, meaning that the D-Channel is established and operational.

Programming Meridian 1 to Meridian 1 PRI

Use this procedure to configure the PRI loops, DCHI interface, DCH link and ISDN trunk route and trunks (B-channels) that are required to implement PRI between Meridian 1 systems. No feature applications other than Basic Call Service are included in the programming.

Prerequisites

PRI loops must be configured before defining the DCH links or PRI applications. Note that in the following procedure, the bold responses must be entered for proper operation of Meridian 1 to Meridian 1 PRI.

Prompts which do not show a response can be left at default. For more information on any of these prompts, refer to the Option 11 Software Guides—books 1 and 2.

Restrictions and Limitations

The allowable range of main-cabinet slot numbers for the DTI/PRI circuit card is 1-9. Note that slot 0 is preprogrammed for the CPU/Conf card and slot 1 is preprogrammed for the TDS/DTR card, effectively leaving slots 2-9 available for the DTI/PRI card.

Service change and maintenance commands that refer to loop numbers refer to slot numbers in the Option 11 system.

Programming procedure

Programming Meridian 1 to SL-1 to SL-1 PRI involves seven major steps:

- 1 Define error detection thresholds — LD73.
- 2 Add a PRI loop — LD17.
- 3 Add a DCHI card — LD17.
- 4 Define a PRI customer — LD15.
- 5 Define a PRI service route — LD16.
- 6 Define service channels (B-channels) PRI trunks — LD14.
- 7 Define clock synchronization — LD73.

Step 1:

Define the threshold parameters and Clock synchronization. Use Overlay 73. For more detailed information, refer to book 2 of the Option 11 Software Guide.

Prompt	Response	Description
REQ	NEW or CHG	
TYPE	DDB	digital data block
TRSH	0-15	assign a threshold set or table
RALM	1-(3)-128	yellow alarm 24-hour threshold
BIPC	1-(2)-128	24-hour bit rate violation threshold
LFAC	1-(3)-128	24-hour loss of frame alignment threshold
BIPV	1-(3)-4 1-(2)-4	bit rate (bipolar violation and CRC) monitoring limits for maintenance and out-of-service thresholds
SRTK	1-(5)-24 1-(30)-3600	frame slip-tracking-monitoring limits (in hours)
SRNT	1-(15)-1024 1-(3)-1024	non-tracking slip-rate monitoring maintenance and out-of-service thresholds
LFAL	1-(17)-10240 1-(511)-10240	loss of frame alignment monitoring limits
SRIM	(1)-127	slip rate improvement timer
SRMM	1-(2)-127	maximum number of times the slip rate exceeds the maintenance limit

Step 2:

Add a PRI loop. Use Overlay 17. For more detailed information, refer to book 1 of the Option 11 Software Guide.

Prompt	Response	Description
REQ	CHG	
TYPE	CEQU	configuration data block
DLOP	C dd ff	where: • C is the DTI/PRI digital card number (1-9) • dd is the number of data calls allowed (0-24) on this PRI (default 24) • ff is the frame format used (D2,D3,D4,ESF) where default is ESF
MODE	PRI	select Primary Rate Interface mode
- TMDI LCMT	(YES) NO B8S AMI	TMDI Card (Mode set to PRI OR TRK) zero code substitution method — must match the far-end and facility equipment B8S--B8ZS code substitution and AMI--B7 code substitution rule. The preferred method is B8ZS to get 64 K clear channel as long as the T1 carrier equipment supports it.
YALM	DG2 (FDL)	yellow alarm method — prompted only if the frame format is ESF — Must match the far end. Use FDL with ESF and use DG2 with non-ESF. If not prompted, then DG2 is set automatically.
- T1TE	(0) 1, 2	T1 transmit Equalization (0=0-200 ft, 1=200-400 ft, 2=400-700 ft). Only for TMDI = YES.

TRSH	0-31	the maintenance and out-of-service threshold set to be used for this PRI loop, as configured in overlay 73.

Step 3:

Add a D-Channel Interface. Use Overlay 17. For more detailed information, refer to book 1 of the Option 11 Software Guide.

Prompt	Response	Description
REQ	CHG	
TYPE	ADAN	Action Device And Number
ADAN	NEW DCH 1-15	Add a primary D-Channel port number. Any unused SDI port number
	CHG DCH 1-15	Change a primary D-Channel
	OUT DCH 1-15	Out the primary D-Channel
CTYP	DCHI	DCHI for D-Channel configuration for the NTAK09 card or NTAK93.
	MSDL	Enter MSDL for the NTBK51 Downloadable D-channel daughterboard
	TMDI	D-Channel configuration on TMDI (NTRB21) card.
CDNO	1-9	Card slot number to be used as the primary DDCH/DCHI. Do not enter 1.
PORT	1	PORT must be set to "1"
DES	<CR>	Back-up DCHI port number, if required
USR	PRI	D-channel is for ISDN PRI only.
IFC	SL1	Interface type is Meridian 1 - Meridian 1
DCHL	(1-9)	PRI card number which will be carrying the D-channel. Must match entry made for the "CDNO" associated with the "DCHI" prompt above

Prompt	Response	Description
OTBF	1-(16)-127	number of output request buffers. Note: for a single PRI link, leave this prompt at default (16). Add 5 output request buffers per additional link.
SIDE	NET (USR)	Prompted only if IFC is set to SLI. Default is set to slave. NET = network, the controlling switch USR= slave to the controller Note: In X11 release 17 and earlier, enter MAS for NET and SLAV for USR.
RLS	XX	X11 software release of far-end. This is the current software release of the far end. If the far end has an incompatible release of software, it prevents the sending of application messages, i.e. for Network Ring Again.
OVLR	<CR>	Allow or disallow overlap receiving on a D-channel. Default is NO.
LAPD	YES,(NO)	change LAPD parameters. Enter carriage return if timers are to be left at default. The following timers are prompted only if LAPD is set to YES. (They can all be left at default during initial set-up.)
T23	1-(20)-31	interface guard timer checks how long the interface takes to respond. In units of 0.5 seconds (default 20 = 10 seconds).
T200	2-(3)-40	retransmission timer in units of 0.5 seconds (default 3 = 1.5 seconds).
N200	1-(3)-8	maximum number of retransmissions
N201	4(260)	maximum number of octets in information field
K	1-(7)-32	maximum number of outstanding unacknowledged frames (NAKS)

Step 4:

Define a PRI customer. Use Overlay 15. For more detailed information, refer to book 1 of the Option 11 Software Guide.

Prompt	Response	Description
REQ	NEW,CHG	
TYPE	CDB NET	customer data block Networking Data (Release 21 gate opener)
CUST	0-31	customer number
LDN0	xxxx	Listed Directory number 0 must be defined for ISDN PRI DID service. The length of LDN0 determines the number of trailing digits translated as the dialed DN on PRI DID routes. Up to seven digits may be entered if DNXP option 150 is equipped. Otherwise, up to four digits may be entered.
AC2		ESN Access Code 2. Enter incoming ISDN call types (NARS network translation types) for which AC2 must be inserted when INAC = YES in LD 16 Route Data Block. Multiple responses are allowed. Prompted only if NARS is equipped. If a NARS call type is not entered here, it is defaulted to AC1.
	NPA	E.164 National

Prompt	Response	Description
	NXX	E.164 Subscriber
	INTL	International
	SPN	Special Number
	LOC	Location Code
ISDN	YES	customer is equipped with ISDN
PNI	(0), 1-32700	Private Network Identifier. Each customer data block must have a unique PNI when multi-customer option is equipped. PNI = 1 is typical for CUST = 0. It must be matched by the PNI in the far-end RDB. Note: using the default value of PNI = 0, prevents operation of features like NRAG, NACD and NMS.
HNPA	NPA	telephone area code for this Meridian 1. Sent as part of setup message as calling line identification.
HNXX	NXX	telephone local exchange code for this Meridian 1. Sent as part of setup message as calling line identification.
HLOC	XXX	home location code (NARS) -prompted when PRA = YES
LSC	1-9999	One to four digit Local Steering Code, if required in the Coordinated Dialing Plan (CDP). LSCs are required only if the CDP DNs are longer than the local PDNs. The CLID sent for a CDP call is composed of the LSC defined in LD 15 plus the PDN of the calling set. Various ISDN network features depend on the CLID as the "return address" for sending feature control messages. Multiple LSCs can be defined in LD 87 for CDP, but only one LSC can be defined here for CLID.

Step 5:

Configure an ISDN service route. Use Overlay 16. For more detailed information, refer to book 1 of the Option 11 Software Guide.

Prompt	Response	Description
REQ	NEW,CHG	
TYPE	RDB	route data block
TKTP	XXX	TIE trunk only, allowed between MSL-1
DTRK	YES	digital trunk route
DGPT	PRI	ISDN (23B + D)— prompted only if PRA = YES in LD15
ISDN	YES	ISDN option
MODE	PRA	route used for PRA only
PNI	(0), 1-32700	Private Network Identifier. Each customer data block must have a unique PNI when multi-customer option is equipped. PNI = 1 is typical for CUST = 0. It must be matched by the PNI in the far-end RDB. Note: using the default value of PNI = 0, prevents operation of features like NRAG, NACD and NMS.
IFC	SL1	interface type: Meridian 1 to Meridian 1
CHTY	BCH	signalling type - prompted if DTRK is YES. D-Channel signalling for B-channels.
CTYP	<CR>	Call Type. Enter the call type to be associated with the outgoing route for direct dialing using the trunk access code (instead of NARS access code). See the "Option 11 software guide" for a listing of possible responses.

Prompt	Response	Description
INAC	YES	Insert ESN Access Code based on NARS/BARS call type, for incoming calls on TIE routes only. If NARS is equipped, this feature inserts AC1 or AC2, depending on the responses to AC2 in LD 15 Customer Data Block. For NARS/BARS call types, INAC bypasses incoming digit insertion specified by INST in LD 16 Route Data Block. Unknown call types, including CDP steering codes, are not affected by INAC, and do not bypass digit insertion specified by INST. INAC must be set to YES to support features such as Network ACD and Network Message Services, which depend on non-call associated TCAP facility messages.

Step 6:

Configure the ISDN trunks. Use Overlay 14. For more detailed information, refer to book 1 of the Option 11 Software Guide.

Prompt	Response	Description
REQ	NEW,CHG NEW XX	Note: when assigning several members at once (i.e. a full T-1) use the multiple create command NEW XX
TYPE	TIE	only TIE trunk allowed between Meridian 1/SL-1s
TN	C ch	enter the DTI/PRI trunk card (C) and channel number (ch). C = 1-9, ch = 1-24
RTMB	RRR MMM	route (created in step 5) (RRR) and member number (MMM).
INC	(YES), NO	For MULTIPLE NEW command: If yes, channel numbers will be associated with members starting at the TN, both channel and member numbers increasing. If no, member numbers decrease as channel numbers increase.

Step 7:

Assign clock's reference source. Use Overlay 73. For more detailed information, refer to book 2 of the Option 11 Software Guide.

Prompt	Response	Description
REQ	CHG	
TYPE	DDB	Digital Data Block
CLKN	1-9	Card slot number of the NTAK09 circuit card which supports the NTAK20 Clock Controller.
PREF	1-9	This is the PRI T1 which the clock controller will use as it's primary source to synchronize (track) the system network clock. This response must be the same as the response to the CLKN prompt above, otherwise an SCH will be printed. A carriage return <CR> here signifies the system will operate in free-run (non-tracking). Note that free-run is used when this Meridian PBX serves as the clock source master for the private network. See chapter 3 for more details on clocking.
SREF	1-9	Secondary reference source for clock controller -- prompted only if primary source is not free-run. Enter the PRI card number of the DTI/PRI card which is to be used as the secondary clock reference. This is the PRI T1 which the clock controller will use as its secondary source to synchronize (track) the system network clock. Only used when unable to track on the primary source (i.e. too many slips). Note: Prompted only when more than 1 DLOP exists.

Programming Meridian 1 to DMS-100 PRI

Configurations allowed

Connection to the DMS 100 Central Office from the Meridian 1 is allowed in three configurations. See also the ISA feature description in Chapter 1 for ISA release 16 considerations.

Basic PRI

- 1 Dedicated channels similar to Digital Trunk Interface (DTI) but with CLID, speed-of-call-answer and out-of-band signaling. When following the PRI software programming procedure for Meridian 1 to Meridian 1, keep in mind that the connection is now to a Central Office and that other trunk types besides TIE are supported (COT, DID, WATS, and so on).

PRI ISA — No Min/Max

- 2 Dynamically allocating trunk types on a call-by-call basis without reserving a minimum number of channels for any one service. (Network Service Facility — NSF=NO and no MIN and MAX settings).

PRI ISA — Min/Max

- 3 Dynamically allocating trunk types on a call-by-call basis but managed with a minimum and maximum number of channels for every service (i.e. COT, DID, and so on). This is the preferred method and is accomplished with the Network Service Facility (NSF) prompt set to YES and MIN and MAX settings.

Configurations 2 and 3 (ISA) above are explained in detail in this section.

Note: It is important to point out that it is possible for a customer to have a combination of the above configurations. For instance, some channels are dedicated while others are shared and dynamically allocated on a call-by-call basis.

Accessing an ISA Route member

The Integrated Service Access Route simply provides a path for the various service routes using it. (Service routes are COT, WATS, FX, DID, and TIE routes). The ISA route member is never accessed directly. Instead, Service Routes are defined and are accessed through the normal methods (ACOD, ESN).

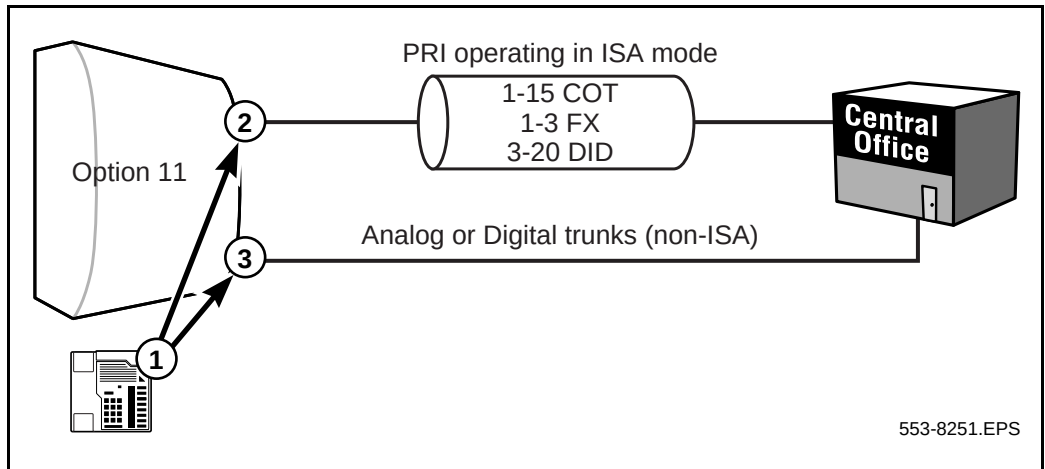
Outgoing Calls

The practical application of ISDN requires some form of ESN (CDP or NARS). The Route List Tables found in LD 86 will include the Service routes. Meridian 1 software automatically performs the digit translation and sends the call out on an ISA route associated with the Service route selected. IAS operation is transparent to end-users. The ESN Route List Block can contain both ISDN and non-ISDN entries.

Incoming Calls

For calls coming into the Option 11, similar translation is performed by the Central Office and an ISA channel is selected based on the Service required. Again, this is transparent to the end-user.

Figure 101
Example of ISA Call Routing



- 1 Callers usually access the PRI Service Route by dialing the usual ESN number (NARS or CDP).
- 2 The Service Route does not have any trunk members of its own and therefore selects an ISA "B" channel.
- 3 In the event that all ISA "B" channels are busy or the Service Route MAX setting has been reached (i.e. 15 outgoing COT calls), stepping to a non-ISA entry in the Route Block List, if so equipped, is possible.

ISA Programming

Basic PRI configuration must be performed before Integrated Services Access (ISA) is defined. An ISA route and associated ISA trunks, followed by service routes, are then defined (Service routes are COT, DID, FEX, WATS, and TIE). Service routes do not have trunk members but use the ISA trunk members. Therefore, the ISA trunks are shared by the various service routes associated with it on a call-by-call basis.

The following few pages identify and provide a short description of some of the most important prompts which are used to control the Dynamic Channel Assignment mechanism. These prompts are:

- a** NSF
- b** MIN and MAX
- c** SID

MIN and MAX

You can control the number of simultaneous calls of a certain type from a certain service route through an ISA route by defining the Maximum and Minimum settings. You can define a maximum number of calls allowed per service route and a minimum number of "B" channels that are ready for use. The MIN and MAX prompts appear when the NSF prompt is set to YES in the ISA route.

The MIN and MAX prompts in LD 16 limit the minimum and maximum simultaneous calls associated with each service route. The rule-of-thumb for setting these two thresholds is as follows:

MIN - The sum of all MIN values of the service routes associated with an ISA route must never exceed the number of "B" channels (ISA trunks) defined for the ISA route.

The sum of all the MIN values are less than or equal to total "B" channels.

MAX - The MAX settings for any service route:

MAX for service route "X" < or = Total "B" channels - (sum of all the MINs except this service route).

If the service route exceeds its maximum number of simultaneous calls allowed, or all the ISA "B" channels are busy, then you can specify an overflow route in LD 16 STEP prompt) for direct access or LD 86 Route List Table Entry for ESN access. The route number for the step prompt is not permitted to be an ISA route number or a service route number.

Service Identifier (SID)

In addition to the call type, each call is identified by a service identifier (SID) which is used by the Meridian 1 and the DMS 100 for routing. The SID prompt is available when the NSF prompt is set to YES. The service identifier must be set up in coordination with the CO on a per route basis. The function of the SID is simply to identify the Service Route being used, since the Service Route number as we know it (programmed in LD 16) does not mean anything to the CO.

Note: what we call SID on the Meridian 1 is referred to as "FACNUM" in the DMS table editor.

Network Service Facility (NSF)**NSF=NO**

Having the Network Service Facility disabled provides the Call-by-Call Pool of trunks as explained earlier without the MIN and MAX settings. No control is provided, therefore, as to the number of "B" channels used for any one service.

Additionally, when you assign NSF to NO in LD 16, a route number for COTR and TIER should also be assigned. The COTR can be a route number for an incoming CO or incoming DID route and is used for public calls. For incoming public calls, if COTR is a CO route, it is routed to the attendant. If it is a DID route, it translates the 3 or 4 digits. For private calls (TIER), the called number is translated based on the programming for the Tie service route in overlay 16 and ESN digit manipulation table if appropriate.

NSF=YES

This is the preferred method of controlling the allocation of ISA "B" channels for the various Service Routes. When the NSF prompt is YES, then a route for COTR and WATR should be assigned. The COTR can be a route number for an incoming CO or incoming DID route, as above. The WATR is the route used for WATS service. The TIER prompt does not appear and TIE calls are handled based on their SID.

Additionally, when NSF is set to YES, the MIN and MAX prompts have to be programmed as explained earlier. When the MAX value is reached in a service route, the All Trunks Busy counter is incremented. (The ATB count is not incremented when NSF is NO). The ATB value is provided during the printing of traffic reports. The ATB counter of an ISA route is also incremented when the last "B" channel of the ISA is busied. This occurs regardless of whether the NSF prompt is YES or NO.

Programming procedure

Use this procedure to configure the Meridian 1 to a DMS 100 PRI or Integrated Service Access (ISA) interface.

Note: NTP 553-2901-300 contains a PRI database correlation for SL-1 to DMS software programming.

Programming a Meridian 1 to DMS 100 interface involves eight major steps:

- 1 Define error detection thresholds—LD73
- 2 Add a PRI loop—LD17.
- 3 Add a DCHI card—LD17
- 4 Define a PRI customer—LD15.
- 5 Define the ISA route—LD16.
- 6 Define the ISA channels (B-channels) or trunks—LD14.
- 7 Define all service routes—LD16.
- 8 Define clock synchronization—LD73.

Step 1:

Define the threshold parameters and Clock synchronization. Use Overlay 73.

Prompt	Response	Description
REQ	NEW	
TYPE	DDB	Digital Data Block
TRSH	0-15	assign a threshold set or table, enter this number in overlay 17 when defining a DTI/PRI digital card
RALM	1-(3)-128	yellow alarm 24-hour threshold
BIPC	1-(2)-128	24-hour bit rate violation threshold
LFAC	1-(3)-128	24-hour loss of frame alignment threshold
BIPV	1-(2 or 3)-4	bit rate (bipolar violation and CRC) monitoring limits. Maintenance and out-of-service threshold.
SRTK	1-(5)-24	frame slip-tracking-monitoring limits in hours
	1-(30)-3600	frame slip-tracking-monitoring limits in seconds
SRNT	1-(15)-1024 1-(3)-1024	non-tracking slip rate monitoring maintenance and out-of-service
LFAL	1-(17)-10240 1-(511)-10240	loss of frame alignment monitoring maintenance and out-of-service
SRIM	(1)-127	slip rate improvement timer
SRMM	1-(2)-127	maximum number of times the slip rate exceeds the maintenance limit

Step 2:

Add a PRI loop. Use Overlay 17.

Prompt	Response	Description
REQ	CHG	
TYPE	CEQU	configuration data block
DLOP	C dd ff	where: • C is the DTI/PRI digital card number (1-9) • dd is the number of data calls allowed (0-24) on this PRI (default 24) • ff is the frame format used (D2,D3,D4,ESF) where default is ESF
MODE	PRI	select Primary Rate Interface mode
- TMDI	(YES) NO	TMDI Card (Mode set to PRI or TRK)
LCMT	(B8S) AMI	code substitution method - must match the far-end. B8S.— B8ZS code substitution and AMI — B7 code substitution rule. The preferred method is B8ZS to get 64 K clear channel as long as the T1 carrier equipment supports it.
YALM	DG2 (FDL)	yellow alarm method — prompted only if the frame format is ESF. Must match the far end. Use FDL with ESF and use DG2 with non-ESF. If not prompted then DG2 is set automatically.
- T1TE	(0) 1, 2	T1 transmit Equalization (0=0-200 ft, 1=200-400 ft, 2=400-700 ft). Only for TMDI = YES.
TRSH	0-15	the maintenance and out of service threshold set to be used for this PRI card, as configured in overlay 73.

Step 3:

Add a D-Channel Interface. Use Overlay 17. For more detailed information, refer to book 1 of the Option 11 Software Guide.

Prompt	Response	Description
REQ	CHG	
TYPE	ADAN	Action Device And Number
ADAN	NEW DCH 1-15 CHG DCH 1-15 OUT DCH 1-15	Add a primary D-Channel port number. Any unused SDI port number Change a primary D-Channel Out the primary D-Channel
CTYP	DCHI MSDL TMDI	DCHI for D-Channel configuration for the NTAK09 card or NTAK93. Enter MSDI for the NTBK51 Downloadable D-channel daughterboard D-Channel configuration on TIMDI (NTBRB21) card.
CDNO	1-9	Card slot number to be used as the primary DDCH/DCHI
PORT	1	PORT must be set to "1"
DES	<CR>	Back-up DCHI port number, if required
USR	PRI	D-channel is for ISDN PRI only.
IFC	(D100) ESS4 ESS5 S100 D250	Meridian 1 to DMS-100 Meridian 1 to AT&T ESS4 Meridian 1 to AT&T ESS5 Meridian 1 to SL-100 Meridian 1 to DMS 250
DCHL	(1-9)	PRI card number which will be carrying the D-channel. Must match entry made for the "CDNO" associated with the "DCHI" prompt above
OTBF	1-(16)-127	number of output request buffers. Note: for a single PRI link, leave this prompt at default (16). Add 5 output request buffers per additional link.

Prompt	Response	Description
RLS	XX	X11 software release of far-end. This is the current software release of the far end. If the far end has an incompatible release of software, it prevents the sending of application messages, i.e. for Network Ring Again.
OVL R	<CR>	Allow or disallow overlap receiving on a D-channel. Default is NO.
LAPD	YES,(NO)	change LAPD parameters. Enter carriage return if timers are to be left at default. The following timers are prompted only if LAPD is set to YES. (They can all be left at default during initial set-up.)
T23	1-(20)-31	interface guard timer checks how long the interface takes to respond. In units of 0.5 seconds (default 20 = 10 seconds).
T200	2-(3)-40	retransmission timer in units of 0.5 seconds (default 3 = 1.5 seconds).
N200	1-(3)-8	maximum number of retransmissions
N201	4(260)	maximum number of octets in information field
K	1-(7)-32	maximum number of outstanding unacknowledged frames (NAKS)

Step 4:

Define a PRI customer. Use Overlay 15.

Prompt	Response	Description
REQ	NEW,CHG	New or change data
TYPE	CDB NET_DATA	customer data block Networking data (Release 21 gate opener)
CUST	0-31	customer number
LDN X	xxxx(xxx)	enter the customer's Listed Directory Number (if DN is EXP equipped then up to 7 digits may be entered). The length of LDN0 determines the number of digits translated on PRI DID routes.

Prompt	Response	Description
AC2	aaa	ESN Access Code 2. Enter call types (type of number) that use access code 2. Multiple responses allowed. Only appears on NARS equipped systems. If a call type is not entered here, it is automatically defaulted to Access Code 1.
	NPA	E.164 National
	NXX	E.164 Subscriber
	INTL	International
	SPN	Special Number
	LOC	Location Code
ISDN	YES	customer is equipped with ISDN
PNI	1-32700	customer private network identifier. This number MUST be unique to this customer in the private network. e.g. it is used as part of the setup message for feature operation such as Network Ring Again, Network ACD. Note that if set to zero (0), NRAG and NACD will not work.
HNPA	NPA	telephone area code for this Meridian 1. Sent as part of setup message as calling line identification.
HNXX	NXX	telephone local exchange code for this Meridian 1. Sent as part of setup message as calling line identification.
HLOC	XXX	home location code (NARS)
LSC	1-9999	one to four digit Local Steering Code established in the Coordinated Dialing Plan (CDP). Required for Calling Line I.D. and Network ACD, only if CDP DNs are longer than the local DNs

Step 5:

Configure the ISA route. Use Overlay 16.

Prompt	Response	Description
REQ	NEW,CHG	
TYPE	RDB	route data block
CUST	0-31	customer number
TKTP	ISA	create an ISA trunk route
DTRK	YES	digital trunk route
DGPT	PRI	
ISDN	YES	ISDN option
MODE	PRA	route used for PRI only
PNI	1-32700	customer private network identifier. This number must be unique to this customer in the private network. e.g. it is used as part of the setup message for feature operation such as Network Ring Again, Network ACD. Note that if set to zero (0), NRAG and NACD will not work.
IFC	(D100)	interface type—Meridian 1 to DMS-100
	ESS4	Meridian 1 to AT&T ESS4
	ESS5	Meridian 1 to AT&T ESS5
	S100	Meridian 1 to SL-100
	D250	Meridian 1 to DMS-250
	D70	Meridian 1 to Japan CO
NSF	YES,(NO)	Network Service facility. See ISA programming
COTR	0-127	incoming or combination DID/CO route number--prompted if NSF is set to YES or NO.
TIER	0-127	incoming or combination TIE route number — prompted if NSF is NO
WATR	0-127	incoming or combination WATS route number — prompted if NSF is YES
CHTY	BCH	signalling type- prompted if DTRK is YES. D-Channel signalling for B-channels

Step 6:

Configure the ISA trunks. Use Overlay 14.

Prompt	Response	Description
REQ	NEW,CHG	
TYPE	ISA	ISA trunk type
TN	C ch	enter the DTI/PRI trunk card (C) and channel number (ch). C = 1-9, ch = 1-24
RTMB	RRR MMM	ISA route (created in step 5) (RRR) and member number (MMM)

Step 7:

Configure the service route. Use Overlay 16.

Prompt	Response	Description
REQ	NEW,CHG	
TYPE	RDB	route data block
TKTP	XXX	types of service routes allowed with ISDN: COT, FEX, WAT, DID and TIE.
DGTP	PRI	
DTRK	YES	digital trunk route
ISDN	YES	ISDN option
MODE	PRA	route used for PRI only
PNI	1-32700	customer private network identifier-must be the same as the PNI at the far end.
IFC	XXX	interface type: must match interface specified in the ISA route data block.
SRVC	(ACC)	Service type for an AT&T connection only
	SDN	Accunet Data Service
	M800	Software Defined Network
	MEG	Megacom 800 service
	MEG	Megacom Service
	IWAT	In-Wats Service (AT&T ESS5)
	WATM	Maximum Subscribed (AT&T ESS5)

Prompt	Response	Description
CHTY	BCH	signalling type- prompted if DTRK is YES. D-Channel signalling for B-channels
INAC	YES	Insert Access Code. Permits the NARS AC1 or AC2 access code to be re-inserted automatically on an incoming ESN call. This prompts only appears on a TIE route and must be set to "YES" in order for features such as Network ACD to function. Note : On an existing ESN network, setting this prompt to "YES" may also require modifying the Digit Manipulation Index (DMI) associated with this route at the far end (so that the Access Code doesn't get inserted twice). The INSERT prompt (INST) is bypassed if INAC is set to YES.
ISAR	YES	stepping to ISA allowed, in other words this is a service route which will be using ISA channels on a call by call basis. Setting this prompt to NO allows this service route to be used with standard dedicated "B" channels. If ISAR is set to YES the following prompts will appear.
RTN	0-127	specify the ISA route to be used by this service route
SID	0-127	service ID for this route. The service route ID must match the far end
MIN	0-191	minimum number of channels reserved on the ISA route (service dependent). See text preceding the programming for details. Coordinate with the far end.
MAX	1-191	maximum number of channels on the ISA route to be used by this service route (service dependent). See text preceding the programming for details. Coordinate with the far end.
CLS	(UNR), SRE	class of service restrictions for TIE routes
IEC	1-999	Inter-exchange Carrier—prompted if TKTP is COT, FEX or WAT. This prompt is only applicable in markets with multiple carriers.

Step 8:

Assign clock's reference source. Use Overlay 73.

Prompt	Response	Description
REQ	CHG	
TYPE	DDB	Digital Data Block
CLKN	1-9	Clock number. This is the DTI/PRI T1 which the clock controller will track as it's primary reference clock to synchronize the system network clock. A carriage return <CR> here signifies the system will operate in free-run (non-tracking). Note that free-run is used when this Meridian PBX serves as the master clock for the private network. See Chapter 3 for more details on clocking.
PREF	1-9	Primary reference source for clock controller. Enter the PRI card number of the PRI card which will have an active clock controller. This is the PRI which the clock controller will use as it's primary source to synchronize (to track) the system network clock. A carriage return <CR> here signifies the system will operate in free-run (non-tracking).
SREF	1-9	Secondary reference clock for clock controller — prompted only if primary source is not free-run. Enter the PRI Card number of the DTI/PRI card which is to provide the secondary reference. This is the PRI T1 which the clock controller will use as it's secondary reference clock to synchronize (to track) the system network clock. The CC switches automatically to SREF when unable to track on the primary source (i.e. too many slips). Reference clock tracking may also be set by maintenance commands. Note: Prompted only when more than 1 DLOP exists.

Chapter 5 — DTI Implementation

Overview

This chapter provides the information required to install DTI on a Meridian 1 Option 11 system:

- hardware and software installation
- programming procedures for basic call service.

This chapter covers the most common type of Northern Telecom DTI installation, a 24-channel Digital Trunk Interface (DTI) installation between two Meridian 1 systems, or a Meridian 1 and a central office.

Hardware Requirements

To implement DTI on the Meridian 1 Option 11, the following hardware is required:

Table 55
DTI hardware

Item	Description
NTRB21	DTI/PRI TMDI card. Note: This card requires that the Option 11C be equipped with at least Generic X11 Release 24 software.
NTAK09	DTI/PRI Circuit card
NTAK20	Clock Controller Daughter board. Note: The Option 11 supports only one active Clock Controller per system
NTBK04	Carrier Cable

Cables

The following cables are required for DTI connections:

- DTI to external T1 cable
- NTBK04 - carrier cable
- NT8D97 50 foot extension (if needed)

Channel Service Units

When connecting the DTI/PRI to the public network, Channel Service Units (CSUs) are required by most operating companies. One CSU is required per DTI. Suitable CSUs which support 64 Kbps clear and Bipolar 8 Zero Substitution (B8ZS) are available from vendors such as Verilink, Digitalink, Kentrox and Tellabs.

Note: Contact your Northern Telecom Sales representative for specific local CSU requirements.

Echo Cancellor

Echo Cancellers are required for voice calls over direct satellite links using DTI.

Note: Echo Cancellor control is currently not supported on Option 11.

NTRB21 TMDI card

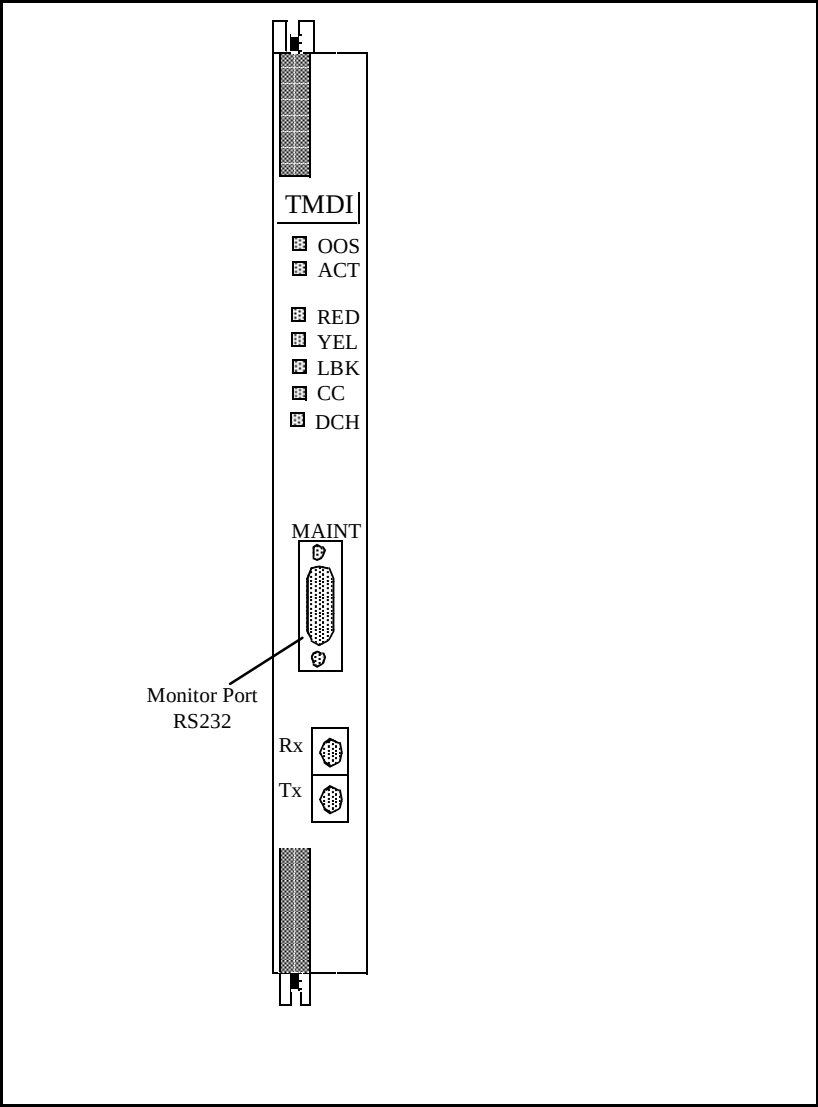
The NTRB21 TMDI card provides 1.5 MBit/s Digital Trunk Interface or Primary Rate Interface functionality on the Option 11C. The NTRB21 has a built-in downloadable D-Channel, and may occupy card slots 1-9 on the Option 11C main cabinet.

Note 1: For CISPR B group cabinets, the active Clock Controller (NTAK20) can only occupy slots 1-3. For FCC and/or CISPR A group cabinets, this limitation does not exist - the Clock Controller can occupy any available slot 1-9.

Note 2: The NTRB21 TMDI card requires that the Option 11C be loaded with at least Generic X11 Release 24 software. If an Option 11C switch is loaded with Release 24 (or later) software, the NTRB21 can be equipped together with the NTAK09 DTI/PRI card (with the NTBK51 downloadable D-Channel daughterboard), and the NTAK93 DCHI daughterboard.

Figure 102 shows a faceplate of the NTRB21 TMDI card.

Figure 102
NTRB21 TMDI card faceplate

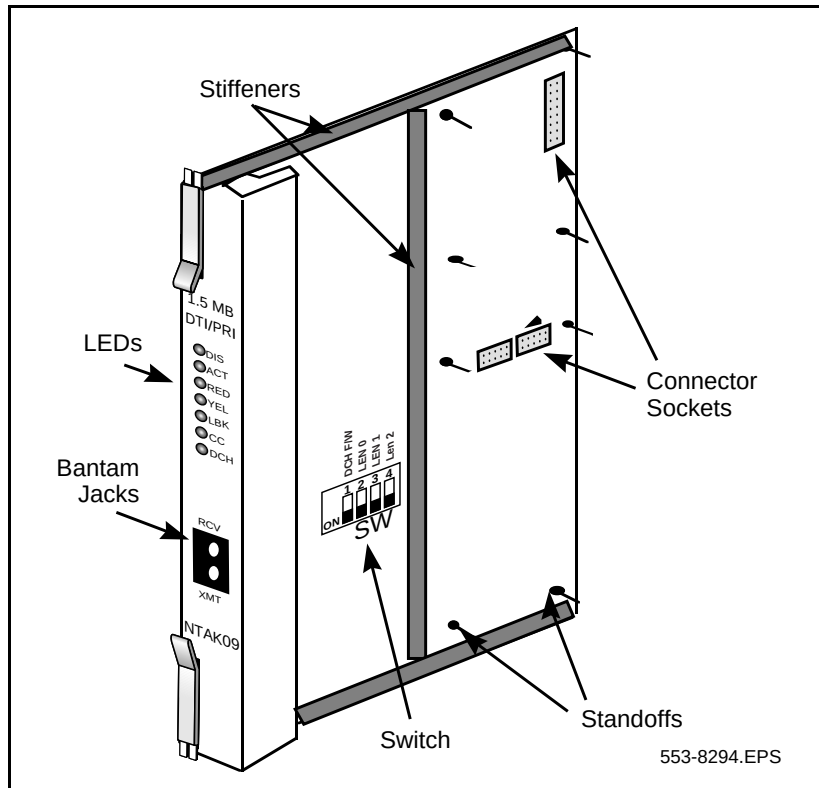


NTAK09 DTI/PRI circuit card

The Digital Trunk Interface/Primary Rate Interface (DTI/PRI) card provides the physical interface for the DS-1 facility T-1 carrier on the Meridian 1 Option 11. It is required for PRI and DTI operation and is also used for ISL shared-mode applications.

The DTI/PRI is made up of a single circuit card which occupies any single card slot (1 through 9) in the Option 11 main cabinet. Figure 103 shows the faceplate layout, the location of the switch and the position of the daughterboards and connectors. See the “DTI/PRI maintenance” chapter in this guide for information about the faceplate LEDs.

Figure 103
NTAK09 DTI/PRI circuit card



NTAK20 Clock Controller (CC) daughterboard

Digital Trunking requires synchronized clocking so that a shift in one clock source will result in an equivalent shift of the same size and direction in all parts of the network. On Option 11 systems, synchronization is accomplished with the NTA20 clock controller daughterboard.

The Clock Controller circuitry synchronizes the Option 11 to an external reference clock and generates and distributes the clock to the system. This enables the Option 11 to function either as a slave to an external clock or as a clocking master. The NTA20AA version of the clock controller meets AT&T Stratum 3 and Bell Canada Node Category D specifications. The NTA20BA version meets CCITT stratum 4 specifications. See the chapter titled *Network clocking* for details.

Clocking modes

The Option 11 system supports a single clock controller that can operate in one of two modes: tracking or non-tracking (also known as free-run).

Tracking mode

In tracking mode, one or possibly two DTI/PRI cards supply a clock reference to a clock controller daughterboard. When operating in tracking mode, one DTI/PRI is defined as the primary reference source for clock synchronization, while the other is defined as the secondary reference source (PREF and SREF in LD 73).

There are two stages to clock controller tracking:

- tracking a reference, and
- locked onto a reference.

When tracking a reference, the clock controller uses an algorithm to match its frequency to the frequency of the incoming clock. When the frequencies are very near to being matched, the clock controller is locked onto the reference. The clock controller will make small adjustments to its own frequency until both the incoming and system frequencies correspond.

If the incoming clock reference is stable, the internal clock controller will track it, lock onto it, and match frequencies exactly. Occasionally, however, environmental circumstances will cause the external or internal clocks to drift. When this happens, the internal clock controller will briefly enter the tracking stage. The green LED will flash momentarily until the clock controller is locked onto the reference once again.

If the incoming reference is unstable, the internal clock controller will continuously be in the tracking stage, with the LED flashing green all the time. This condition does not present a problem, rather, it shows that the clock controller is continually attempting to lock onto the signal. If slips are occurring, however, it means that there is a problem with the clock controller or the incoming line.

Free-run (non-tracking)

In free-run mode, the clock controller does not synchronize on any source, it provides its own internal clock to the system. This mode can be used when the Meridian 1 is used as a master clock source for other systems in the network. Free-run mode is undesirable if the Meridian 1 is intended to be a slave. It can occur, however, when both the primary and secondary clock sources are lost due to hardware faults or when invoked by using software commands.

LED states

The CC LED on the NTAK09 or NTRB21 faceplate, will be in various states, depending on the status of the Clock Controller:

CC LED	CC status
On (Red)	NTAK20 is equipped and disabled.
On (Green)	NTAK20 is equipped and is either locked to a reference or is in free run mode.
Flashing (Green)	NTAK20 is equipped and is attempting to lock (tracking mode) to a reference. If the LED flashes continuously over an extended period of time, check the CC STAT in LD60. If the CC is tracking this may be an acceptable state. Check for slips and related clock controller error conditions. If none exist, then this state is acceptable, and the flashing is identifying jitter on the reference.
Off	NTAK20 is not equipped.

Installing DTI hardware

Inserting/removing the NTRB21 TMDI card

Inserting the NTRB21

Insert the NTRB21 TMDI circuit card into card slot 1-9 in the Option11C main cabinet. Check for available card slots in the base cabinet and print the configuration record to determine which slots may be used. To do this, use PRT CFN in LD22. Then, use the following steps:

- 1 If in PRI mode, first S/W disable the associated D-Channel using the following overlay and commands:

LD96 DIS DCH x

(Where x is the DCH port number that was assigned in LD17).

- 2 If the Clock Controller is enabled, first S/W disable it using the following overlay and commands:

LD60 DIS CC 0

- 3 Hold the NTRB21 by the lock latch, unlock the latch and slide the card into the cabinet.

- 4 Enable the TMDI card using the following overlay and commands:

LD96 ENL TMDI x

where x is the NTRB21 TMDI card number (DLOP). The card number associated with a NTRB21 TMDI card is based on the slot in which the card is installed (1-9).

Within about 30 seconds, the D-Channel layer 3 should be established. To confirm, request the current status of the D-Channel by using the LD 60 command **STAT DCH (N)**.

The system should respond **DCH N EST OPER**, meaning that the D-Channel is established and operational.

Removing the NTRB21

- 1 If in PRI mode, first S/W disable the associated D-Channel using the following overlay and commands:

LD96 DIS DCH x

(Where x is the DCH port number that was assigned in LD17).

- 2 If the Clock Controller is enabled, first S/W disable it using the following overlay and commands:

LD60 DIS CC 0

- 3 Disable the NTRB21 TMDI card using the following overlay and commands:

LD96 DIS TMDI x

where x is the NTRB21 TMDI card number (DLOP). The card number associated with a NTRB21 TMDI card is based on the slot in which the card is installed (1-9).

- 4 Hold the NTRB21 by the lock latch, unlock the latch and slide the card out from the cabinet.

Mounting the NTAK20 daughterboard on the NTAK09 or NTRB21

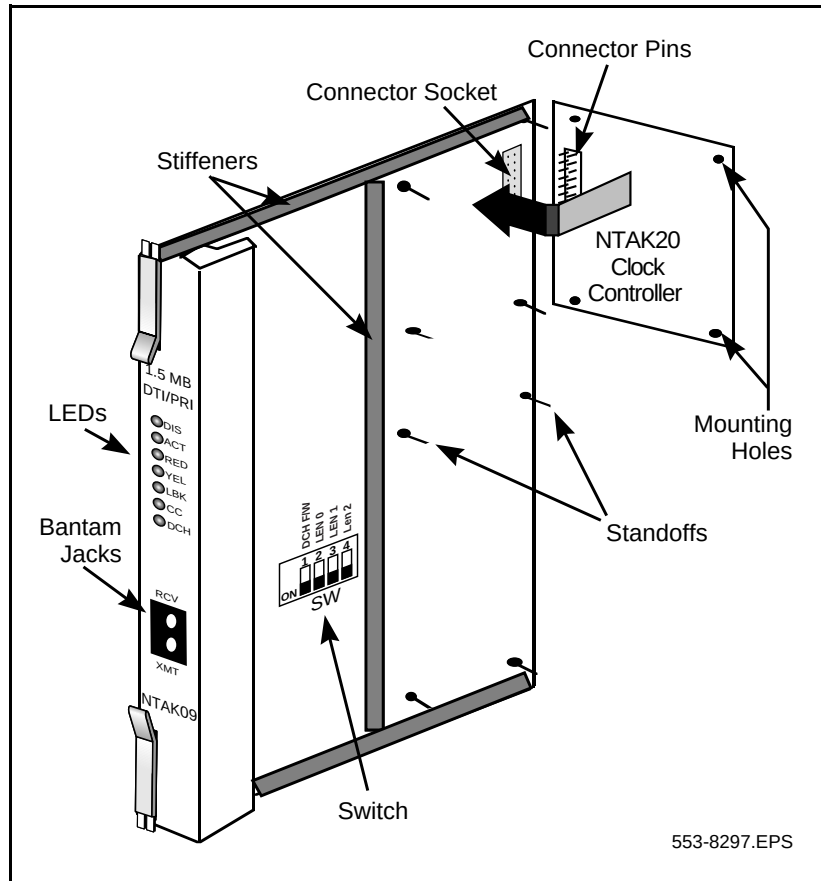
Work on a flat surface when mounting or removing daughterboards.

- 1 Visually inspect the connector pins on the underside of the NTAK20 or NTBR21. Any pins that are bent should be re-aligned prior to mounting.
- 2 Place the NTAK09 or NTBR21 down flat on the anti-static pad.
- 3 From an overhead viewpoint, with the NTAK20 parallel above the NTAK09 or the NTBR21, and the connector pins aligned over the connector sockets, line up the mounting holes of the NTAK20 (see Figure 104) with the tops of the standoffs that are installed on the NTAK09 or the NTRB21.
- 4 Slowly lower the NTAK20 towards the NTAK09 or the NTRB21, keeping the standoffs in line with all four holes, until the holes are resting on the tops of the four standoffs.

Note: If more than a very slight amount of pressure is required at this point, the connector pins may not be aligned with the connector socket. If so, lift the daughterboard off the NTAK09 or the NTRB21 and return to step 2.

- 5 Gently apply pressure along the edge of the board where the connector is located until the STAND OFFS at the two corners adjacent to the connector snap into a locked position. Then press down on the two corners on the opposite side until they also are locked into place.

Figure 104
Daughterboard installation



Removing the NTAk20 daughterboard from the NTAk09

- 1 Starting at the two corners opposite the connector, gently lift each corner out of the locking groove of the standoff.
- 2 At the two corners adjacent to the connector, gently lift the entire side by hand until the mounting holes are clear of the locking groove of the standoff.
- 3 To remove the connector pins, grasp the edge of the board adjacent to the connector by hand and lift gently.

Note: If you are installing more than one NTAk09 card, the additional cards may not carry daughterboards. At least one NTAk20, however, will always be required.

Setting the switches

Set the switches on the NTAk09 DTI/PRI card according to the following table.

Table 56
NTAk09 switch settings

Switch Setting	1 DCH F/W	2 (LEN 0)	3 (LEN 1)	4 (LEN 2)
Distance to Digital Cross-Connect				
0 - 133 feet	Off	Off	Off	On
133 - 266 feet	Off	On	On	Off
266 - 399 feet	Off	Off	On	Off
399 - 533 feet	Off	On	Off	Off
533 - 655 feet	Off	Off	Off	Off

Inserting the NTAK09 into the main cabinet

Insert the NTAK09 circuit card into the desired slot in the Option 11 main cabinet. (Card slots 1 through 9 are available.)

Check for available card slots in the base cabinet and print the configuration record to determine which slots may be used. To do this, use PRT CFN in LD 22.

Connecting the cables

Connect the NTBK04 cable to the 50-pin amphenol below the card slot in which the NTAK09 circuit card is installed. Connect the other end of the cable to the CSU or DSX-1 cross connect.

The NTBK04 is twenty feet long. If additional distance is required, the NT8D97AX fifty-foot extension is available up to a 600 foot maximum. The only cable required to support the NTAK09 circuit card is the NTBK04.

If you require pinout information on the NTBK04 cable, refer to the table below.

Table 57
DS-1 line interface pinout for NTBK04 cable

From 50-pin MDF connector	to DB-15	signal name	description
pin 48	pin 1	T	transmit tip to network
pin 23	pin 9	R	transmit ring to network
pin 25	pin 2	FGND	frame ground
pin 49	pin 3	T1	receive tip from network
pin 24	pin 11	R1	receive ring from network

Software enabling the DTI/PRI cards

Software enabling the NTRB21 TMDI card

- 1 Enable the NTRB21 TMDI card using the following overlay and command:

LD96 ENL TMDI x

where x is the NTRB21 TMDI card number (DLOP). The card number associated with a NTRB21 TMDI card is based on the slot in which the card is installed (1-9).

- 2 If in PRI mode, S/W enable the associated D-Channel using the following overlay and commands:

LD96 ENL DCH y

(Where y is the DCH port number that was assigned in LD17).

Within about 30 seconds, the D-Channel layer 3 should be established. To confirm, request the current status of the D-Channel by using the **LD 60** command **STAT DCH (N)**.

The system should respond **DCH N EST OPER**, meaning that the D-Channel is established and operational.

Software enabling the NTAK09 card

Use step 1 to enable NTAK09 DTI/PRI card. If the clock controller and D-channel interface are not enabled in step 1, go to step 2.

Step 1:

- Software enable all NTAK09 DTI/PRI cards using LD 60:

ENLL C

where C is the DTI/PRI card number (DLOP). The card number associated with a DTI/PRI card is based on the slot in which the card is installed.

Note: The DCHI and PRI loops must be programmed prior to software enabling the NTAK09. Refer to the section "Programming Meridian 1 to Meridian 1 PRI" for further information.

- Under normal conditions, this step enables the clock controller and D-Channel interface. If enable fails, go to step 2.

Step 2: (if required):

Software enable the clock controller using overlay 60. Enable clock tracking on primary digital loop by issuing the following command:

ENL CC 0

- Software enable the NTAK93 (DCHI) daughterboard using overlay 96 command

ENL DCHI N

(where N is the DCHI I/O address).

- Within about 30 seconds, the D-Channel layer 3 should be established. To confirm, request the current status of the D-Channel by issuing the command
- The system should respond **DCH N EST OPER**, meaning that the D-Channel is established and operational.

Programming DTI

Use this procedure to program the DTI software interface between Meridian 1 systems or between a Meridian 1 system and a central office.

Compatibility

The NTAK09 card supports DTI with Extended Superframe Format (ESF). ESF provides a Cyclic Redundancy Check (CRC) which is a block error code comparison for deriving performance measurement. Option 75 (PBXI) must be enabled to provide DTI with ESF. Option 75 (PBXI), option 145 (ISDN) and option 146 (PRA) must be enabled to provide CRC.

Restrictions and Limitations

The allowable range of main-cabinet slot numbers for the DTI/PRI circuit card is 1-9. Note that the CPU/Conf circuit card is provisioned in slot 0, and the TDS card is provisioned in slot 1, effectively leaving slots 2-9 available to these interface cards.

Service change and maintenance commands that refer to loop numbers refer to slot numbers in the Option 11 system.

Programming procedure

- 1 Define error detection thresholds — LD73.
- 2 Add a DTI loop — LD17.
- 3 Define the route data block for the DTI — LD16.
- 4 Define the trunks associated with step 3 — LD14.
- 5 Define clock synchronization — LD73.

Step 1:

Define the threshold parameters. Use Overlay 73.

Prompt	Response	Description
REQ	NEW	

TYPE	DDB	digital data block
TRSH	0-15	assign a threshold set or table, enter this number in overlay 17 when defining a PRI digital loop
RALM	1-(3)-128	yellow alarm 24-hour threshold
BIPC	1-(2)-128	24-hour bit rate violation threshold
LFAC	1-(3)-128	24-hour loss of frame alignment threshold
BIPV	1-(2 or 3)-4	bit rate (bipolar violation and CRC) monitoring limits for maintenance and out-of-service thresholds
SRTK	1-(5)-24	frame slip-tracking-monitoring limits (in hours)
SRNT	1-(15)1024 1-(3)-1024	non-tracking slip-rate monitoring maintenance and out-of-service thresholds
SRIM	(1)-127	slip rate improvement timer
SRMM	(2)-127	maximum number of times the slip rate exceeds the maintenance limit
LFAL	1-(17)-10240 1-(511)-10240	loss of frame alignment monitoring limits

Step 2:

Add a DTI loop. Use Overlay 17.

Prompt	Response	Description
REQ	CHG	
TYPE	CFN	configuration data block
...		
PARM	YES	
...		
PCML	(MU) A	System PCM law. Default is MU law
...		
CEQU	YES	changes to common equipment
DLOP	C dd ff	where : • C is the DTI/PRI digital card number (1-9) • dd is the number of data calls allowed (0-24) on this DTI (default 24) • ff is the frame format used (D2,D3,D4,ESF) where default is ESF
MODE	TRK	select Digital Trunk Interface mode
TMDI	[YES], NO	Is this a TMDI card. Only if mode is PRI or TRK.
YALM	DG2 (FDL)	yellow alarm method — prompted only if the frame format is ESF — Must match the far end. Use FDL with ESF and use DG2 with non-ESF. If not prompted then DG2 is set automatically.
TRSH	0-15	the maintenance and threshold table to be used for this DTI loop, as configured in overlay 73.

T1TE	(0), 1, 2	T1 Transmit Equalization (0=0-200 ft, 1=200-400 ft, 2=400-700 ft). Only for TMDI = YES.

Step 3:

Configure a DTI trunk route. Use Overlay 16.

Prompt	Response	Description
REQ	NEW,CHG	
TYPE	RDB	route data block
TKTP		create a trunk route
	COT	Central Office Trunk data block
	WAT	WATS Trunk data block
	DID	Direct Inward Dial Trunk data block
	TIE	TIE Trunk data block
	FEX	Foreign Exchange= Trunk data block
DTRK	YES	digital trunk route

Step 4:

Configure the trunks. Use Overlay 14.

Prompt	Response	Description
REQ	NEW,CHG	
TYPE	XXX	One of the trunk types defined in step 3
TN	C ch	enter the DTI/PRI trunk card (C) and channel number (ch). C = 1-9, ch = 1-24
RTMB	RRR MMM	route (created in step 3) (RRR) and member number (MMM).

Step 5:

Assign clock's reference source. Use Overlay 73.

Prompt	Response	Description
REQ	CHG	
TYPE	DDB	Digital Data Block
CLKN	1-9	Card slot number of the NTAK09 circuit card which supports the NTAK20 Clock Controller.
PREF	1-9	This is the DTI/PRI T1 which the clock controller will use as its primary source to synchronize (track) the system network clock. A carriage return <CR> here signifies the system will operate in free-run (non-tracking). Note that free-run is used when this Meridian PBX serves as the clock source master for the private network. See the chapter called <i>Network Clocking</i> for more details on clocking.
SREF	1-9	Secondary reference source for clock controller — prompted only if primary source is not free-run. Enter the DTI card number of the DTI/PRI card which is to be used as the secondary clock reference. This is the PRI T1 which the clock controller will use as its secondary source to synchronize (track) the system network clock. Only used when unable to track on the primary source (i.e. too many slips)

Chapter 6 — DTI/PRI Maintenance

Maintenance overview

From a maintenance perspective, Option 11 DTI/PRI operation consists of these major aspects:

- hardware and software states
- near-end and far-end status
- link and/or span integrity
- clocking status
- frame alignment

Option 11 PRI operation is monitored and reported on through maintenance messages, out-of-service alarms, and circuit card faceplate LEDs. Bantam monitor jacks are located on the faceplate of the NTAK09.

Option 11 maintenance provides several tools, either manual or automatic, for maintaining effective PRI operation. These tools are service change and maintenance commands that are accessible through the software overlays and resident diagnostic routines.

Monitoring Option 11 DTI/PRI operation

Maintenance messages

The following sections describe the maintenance messages that may appear on the Option 11 maintenance TTY as a result of DTI or PRI operation.

D-Channel status and error conditions are reported as DCH messages. PRI status and error conditions are shown in Table 58. (Additional information on PRI and DCH messages can be found in the Option 11 Software Guide.)

Table 58
Maintenance messages

Message	Meaning
DTA	Digital Trunk Alarms (Resident Monitor)
DTC	Resident CC Monitor
DTI	Digital Trunk Interface and CC (LD60)
PRI	Primary Rate Interface

Message descriptions

Maintenance messages provide near and far end switch status. Both service and service acknowledge messages are supported on PRI B-channels and ISL channels.

Service and service acknowledge messages for B-channels and ISL channels are supported between:

- Meridian 1 to Meridian 1: ISL and PRI
- Meridian 1 to DMS-100: PRI only
- Meridian 1 to DMS-250: PRI only
- Meridian 1 to AT&T ESS4 and ESS5: PRI only

The statuses reported by the service and service acknowledge messages for B-channels and ISL channels are:

- in-service
- maintenance
- out-of-service.

Near-end and far-end sub-categories are defined for each maintenance status. See the table below for possible combinations of near-end and far-end statuses, and the channel capability for each status. When the near-end and far-end status does not match, the more severe maintenance status takes effect over the less severe maintenance status.

Table 59
Maintenance message and status combinations

Near End Status	Far End Status	B or ISL Channel capability
In-service	In-service	Incoming and outgoing call allowed
In-service	Maintenance	Incoming calls allowed only
In-service	Out-of-service	Not allowed to use
Maintenance	N/A	Not allowed to use
Out-of-service	N/A	Not allowed to use

Note: Enabling/Disabling of Service Messages must be coordinated between the two ends. Enabling Service Messages at one end and not the other will result in B-channels being placed out-of-service.

Message functions

Service messages are used to monitor the following:

- D-Channel establishment
- D-Channel sanity polling
- B-channel or ISL channel status change
- Channel status audit.

D-Channel establishment

When the D-Channel establishes, the B-channel status is supported by sending service messages for each B-channel controlled by a D-Channel. This messaging allows the far end to synchronize its channel states. The service messages are sent when the D-Channel is brought up automatically by the system or manually by using LD 96.

D-Channel sanity polling

If a D-Channel has been idle for 30 seconds, a service message is sent to poll the sanity of the link. The service message is sent regardless of whether the near end is configured as master or slave.

B-channel or ISL channel status change

Whenever there is a status change for a B-channel or an ISL channel, the new status is reported to the far end via a service message. Status change can occur through service change or maintenance operations, such as the addition or deletion of a channel in LD 14, or disabling of the associated loop, shelf, card or unit in LD 30, LD 32, LD 36, LD 41 or LD 60.

Channel status audit

LD 30 is enhanced to allow channel status audit to be initiated. The channels associated with each D-Channel are examined and their status is reported to the far end via service messages.

Activating service messages

You activate the service messages in LD 96 on a per D-Channel basis. The backup D-Channel (if equipped) automatically operates in the same mode as the primary D-Channel. The commands are listed in Table 60.

Table 60
D-Channel messages

Command	Description
ENL SERV N	turns on the support of service and service acknowledge messages for DCH link N.
DIS SERV N	turns off the support of service and service acknowledge messages for DCH link N.
STAT SERV (N)	displays the current service and service acknowledge message SERV setting for individual DCH N or DCH.

When configuring these messages, the SERV command should only be enabled if both switches are equipped with a minimum of X11 release 15 software. The status of Service Messages for each D-Channel is saved by Equipment Data Dump (EDD), and is set automatically after each system load.

Note: D-Channels on each side of the link must be disabled in order to enable service messages.

Alarms

DTI/PRI Yellow Alarm (remote alarm)

A yellow alarm on the Option 11, indicated by the state of the YEL LED on the NTAK09 circuit card, is notification of a red alarm at the far end (remote end). The fact that the NTAK09 is receiving the yellow alarm pattern indicates that there is a T1 connection, but the far end is not ready.

It is possible, however, that the T1 connection is one-way only — that is, receiving only, since this end is receiving the alarm. The yellow alarm is transported in one of two ways: using digit-2 or the facility data link (DG2 or FDL).

When the NTAK09 receives a yellow alarm, the channels are placed into the maintenance busy state.

Each time a yellow alarm is generated, a counter is incremented. When the yellow alarm 24-hour threshold (prompt RALM in LD 73) is reached, the NTAK09 must be restored to service manually.

DTI/PRI Red Alarm (local alarm)

A red alarm (local alarm) indicates that the digital trunks or B-channels have been taken out of service (OOS) due to a loss of frame alignment lasting more than 3 seconds, or due to some facility performance OOS threshold being exceeded.

Maintenance and OOS messages are discussed later in this chapter.

NTAK09 Faceplate LEDs

The NTAk09 circuit card has a total of seven faceplate LEDs. Five of the LEDs are directly associated with the operation of the NTAk09 circuit card.

The remaining two LEDs are associated with the optional daughterboards. The first of these LEDs is used to indicate the status of the NTAk20 Clock Controller daughterboard. The second indicates the state of the NTAk93 D-Channel interface daughterboard, when this board is present.

Table 61 provides a summary of the NTAk09 faceplate LEDs.

Table 61
NTAk09 faceplate LEDs

Affected circuit card	LED	State	Definition
NTAk09	DIS	On (Red)	The NTAk09 circuit card is disabled.
		Off	The NTAk09 is not in a disabled state.
NTAk09	ACT	On (Green)	The NTAk09 circuit card is in an active state. No alarm states exist, the card is not disabled, nor is it in a loopback state.
		Off	An alarm state or loopback state exists, or the card has been disabled. See the other faceplate LEDs for more information.
	RED	On (Red)	A red-alarm state has been detected.
		Off	No red alarm.
	YEL	On (Yellow)	A yellow alarm state has been detected.
		Off	No yellow alarm.
NTAk20	LBK	On (Green)	NTAk09 is in loop-back mode.
		Off	NTAk09 is not in loop-back mode.
NTAk20	CC	On (Red)	NTAk20 is equipped and disabled.

Affected circuit card	LED	State	Definition
		On (Green)	NTAK20 is equipped and is either locked to a reference or is in free run mode.
		Flashing (Green)	NTAK20 is equipped and is attempting to lock (tracking mode) to a reference. If the LED flashes continuously over an extended period of time, check the CC STAT in LD60. If the CC is tracking this may be an acceptable state. Check for slips and related clock controller error conditions. If none exist, then this state is acceptable, and the flashing is identifying jitter on the reference.
		Off	NTAK20 is not equipped.
NTAK93 NTBK51	DCH	On (Red)	NTAK93 or NTBK51 is switched on and disabled.
		On (Green)	NTAK93 or NTBK51 is switched on and enabled, but not necessarily established.
		Off	NTAK93 or NTBK51 is switched off (by switch SW1).

Note: Only one of the five NTAK09 related LEDs should be on at any one time.

Monitor Jacks

The NTAK09 has two bantam jacks (RCV and XMT) located on its faceplate. They may be used to monitor the performance of the carrier in the receive and transmit direction. The jacks allow the convenient connection of external T-1 test equipment and ISDN protocol analyzers. Such external test equipment is not normally required for the operation and maintenance of DTI/PRI.

Using Option 11 DTI/PRI maintenance tools

Maintenance commands

Tables 62, 63 and 67 provide quick reference lists of important DTI/PRI commands. Tables 65 and Tables 66 pertain to the NTRB51 TMDI card.

WARNING

You must disable the D-Channel and clock-controller daughterboards before unseating circuit cards, otherwise the system will INIT and momentarily interrupt call processing.

WARNING

Extreme care must be taken when enabling the D-Channel message monitoring option due to the possible heavy volume of messages during normal traffic. Use this command only during very light or no traffic conditions for trouble-shooting purposes. Remember to disable the monitoring tool when you are finished — it does not time out. Monitor enabled status is saved by EDD and will remain enabled even after a SYSLOAD.

The port (TTY) performing the monitoring **MUST** have MTC and BUG programmed.

Table 62
DTI/PRI commands (LD 60)

Command	Action
DISI C	disable DTI/PRI card when idle
DISL C	force disable DTI/PRI card
ENLL C	enable DTI/PRI card
LCNT (C)	list alarm counters
RCNT (C)	reset alarm counters
SLFT (C)	do DTI/PRI self-test
STAT (C)	list DTI/PRI status
RLBK	remote loopback

Table 63
D-Channel commands (LD 96)

Command	Action
DIS DCH N	disable DCHI port N
DIS MSGI N	disable monitoring of incoming D-Channel messages on link N Monitor remains active until disabled.
DIS MSGO N	disable monitoring of outgoing D-Channel messages on link N Monitor remains active until disabled.
DIS AUTO N	disable autorecovery of the D-Channel. Hardware may still respond to recovery initiated from the far end.
ENL AUTO N	enable autorecovery of the D-Channel. Software will periodically command hardware to attempt to establish the layer 2 link.
ENL DCH N	enable DCHI port N
ENL MSGI N	enable monitoring of incoming D-Channel messages on link N Use only under light traffic.
ENL MSGO N	enable monitoring of outgoing D-Channel messages on link N Use only under light traffic.
EST DCH N	establish D-Channel N
PLOG DCH N	print D-Channel statistics log N

Command	Action
RLS DCH N	release D-Channel N
SDCH	release a D-Channel and switch D-Channels
RST DCH N	reset D-Channel N
STAT DCH (N)	print D-Channel status (link status)
STAT MSGI (N)	print incoming message monitor status
STAT MSGO (N)	print outgoing message monitor status
TEST-100/101/200/201	see DCH tests in NTP
STAT SERV	Print the current service and service acknowledge message for DCHI N
ENL SERV N	enable service messages for DCHI N
DIS SERV N	disable service messages for DCHI N

Table 64
Downloadable D-channel (DDCH) commands (LD 96)

Command	Action
DIS MSDL X (ALL)	disable DCHI card X
ENL MSDL X (FDL, ALL)	enable DCHI card X, with or without Force Download
RST MSDL X	Reset MSDL card X
STAT MSDL X (X (full))	Get MSDL status X, or a "FULL STATUS"
SLFT MSDL X	Execute a self test on MSDL card X
DIS LLB X	Disable local loop back on MSDL DCH X
DIS RLB X	Disable remote loop back on MSDL DCH X
DIS TEST X	Disable Test mode on MSDL DCH X
ENL LLB X	Enable local loop on MSDL DCH X
ENL RLB X	Enable remote loop on MSDL DCH X
ENL TEST X	Enable Test mode on MSDL DCH X
PCON DCH X	Print configuration parameters on MSDL DCH X
PMES DCH X	Print incoming layer 3 messages on MSDL DCH X
PTRF DCH X	Print traffic report on MSDL DCHX

TEST LLB X	Start local loop back test on MSDL DCH X
TEST RLB X	Start remote loop back test on MSDL DCH X

Note: “X” represents the D-Channel device number.

TMDI maintenance commands

Table 65
TMDI maintenance commands

Command	Action
DIS TMDI x	Disable TMDI card x.
ENL TMDI x (FDL)	Enable TMDI card x and force a download.
ENL TMDI x	Enable TMDI card x.
RST TMDI x	Reset TMDI card x.
SLFT TMDI x	Invoke self-test on TMDI card x.
STAT TMDI (x FULL)	Get TMDI status.

D-Channel monitoring on the TMDI card

Table 66
D-Channel monitoring commands

Command	Action
DIS TMDI x MSGI	Disable monitoring of incoming D-Channel messages on TMDI card x.
DIS TMDI x MSGO	Disable monitoring of outgoing D-Channel messages on TMDI card x.
ENL TMDI x MSGI	Enable monitoring of incoming D-Channel messages on TMDI card x
ENL TMDI x MSGO	Enable monitoring of outgoing D-Channel messages on link TMDI card x.
ENL TMDI x DBG	Enable debugging on TMDI card x.
DIS TMDI x DBG	Disable debugging on TMDI card x.
PSWD TMDI	Print passwords.
STAT TMDI x MON	Print monitoring commands for TMDI card x.

D-channel status and error conditions are reported as DCH messages. These messages can be found in the Option 11 *Software guide*.

Table 67
Clock Controller commands (LD 60)

Command	Action
DIS CC N	disable clock controller N
ENL CC N	enable clock controller N
SSCK N	status of clock controller N
TRCK XXXX <i>XXXX can be:</i> PCK SCLK FRUN	set clock controller tracking. track primary clock reference source track secondary clock reference source free run mode

NTAK09 DTI/PRI power on self-test

When power is applied to the NTA09 DTI/PRI circuit card, the card performs a self test. The LEDs directly associated with the NTA09 circuit card are DIS, ACT, RED, YEL, and LBK. The clock controller LED is also included in the power on self test (see below).

Table 68 provides the state of the NTA09 LEDs during the self-test procedure.

Table 68
NTA09 LED states during self-test

Action	LED State
Power up system	Top five LEDs on for eleven seconds
Self-test in progress	Top five LEDs go off for one second If the self-test passes, the top five LEDs flash on and off three times. If the self-test detects a partial failure, the top five LEDs flash on and off five times When the self-test is completed, the LEDs go to their appropriate states (see Table 61)

NTAK20 power on self-test

The clock controller daughterboard LED is the second LED from the bottom on the faceplate of the NTAK09 DTI/PRI card.

When power is applied to the NTAK20 clock controller, the LED is initially off for two seconds. If the self-test passes, the LED turns red and flashes on and off twice.

When the self-test is completed, the LED will remain red until the clock controller is enabled. When enabled, the clock controller LED will turn green or flashing green. (See Table 61).

NTAK93 self-test

The NTAK93 DCHI daughterboard LED is the bottom LED on the faceplate of the NTAK09 DTI/PRI card.

The NTAK93 DCHI daughterboard does not perform a self-test when power is applied to it. When power is applied, it will turn red and remain steadily lit, indicating the DCH is disabled. When the DCH is enabled, the LED will turn green and remain steadily lit.

Self-tests of the NTAK93 daughterboard are invoked manually by commands in LD 96.

DTI/PRI local self-test

The local self-test, also called a local loopback test, checks speech path continuity, zero code suppression, remote alarm detection, and A & B bit signalling. This test is performed manually on a per-loop (or link- 24 channels) or per-channel basis. The local loopback test performs a local logical loopback and does not require any external loopback of the T-1 signal.

Restrictions and limitations

The DCHI and DTI/PRI must be disabled before performing the self-test on the entire DTI/PRI card. Individual channels must be disabled before performing a self test on a particular channel.

Self testing the DTI/PRI card

To perform a self test on the entire DTI/PRI card, do the following:

- 1 Disable the DCHI using LD 96:

LD 96

DIS DCH N

- 2 Disable the DTI/PRI card and run the self-test using LD 60:

LD 60

DISL C

SLFT C (entire card)

Self testing individual channels

Follow the same procedure as above, but use the following commands:

DSCH C CH

SLFT C CH (specific channel)

DTI/PRI automatic local loopback test

There are two types of automatic local loopback tests:

- ATLP 0 (disable auto loop test in daily routine — LD 60)
- ATLP 1 (enable auto loop test in daily routine — LD 60).

The automatic loop test checks the same functions as the manual self test, but runs automatically as part of the midnight routines.

ATLP 0 disables one idle channel at random and performs a single channel self test. This channel cannot be specified — it is selected by software.

ATLP 1 attempts to test the whole DTI/PRI loop. If ATLP 1 finds all channels in the target link idle, it takes the whole link down and tests it. The node where the self test is being performed sends out a Yellow Alarm while the link is down.

Ensure that LD 73 TRSH RALM will not be exceeded at the far end due to automatic running of the loop test. If TRSH RALM (default=3) is exceeded at the far end, trunks will remain out of service.

ATLP 0	AUTO SELF TEST LOOP DISABLE
ATLP 1	AUTO SELF TEST LOOP ENABLE

Remote Loopback and remote self test

The remote loopback and the remote self test are performed manually per loop (or per card in Option 11).

Remote Loopback

The RLBK C command puts the DTI/PRI into loopback towards the far end so a remote self test can be performed on equipment at the far end.

Note: The DTI/PRI loop (card) being tested must be disabled.

Remote loopback test

The remote self test, also called the external loopback test, checks the integrity of the DTI/PRI through an external T-1 loopback. If the Remote Loopback command (RLBK) is executed at the far end Meridian 1/SL-1 prior to executing the Remote Self test command (RMST) at the near end, the integrity of the DS-1 facility is tested from end to end.

Note: The DTI/PRI channel or loop (card) being tested must be disabled.

Coordinating the tests

- 1 When a technician at the far end requests a remote loopback on the local Meridian 1:
 - Disable the DCHI (for PRI DCHL or BCHL) using LD 96:
LD 96

DIS DCH N
 - Disable the DTI/PRI card and activate remote loopback mode using LD 60:

LD 60

DISL C

RLBK C
- 2 To run the remote self test (external loopback test) through a loopback on the far end Meridian 1:
 - Call a technician at the far end. Ask for remote loopback mode on the facility that is to be tested.
 - When loopback mode at the far end is confirmed, disable the DCHI (for PRI DCHL or BCHL) using LD 96:

LD 96

DIS DCH N
 - Disable the DTI/PRI card and run loopback test using LD 60:

LD 60

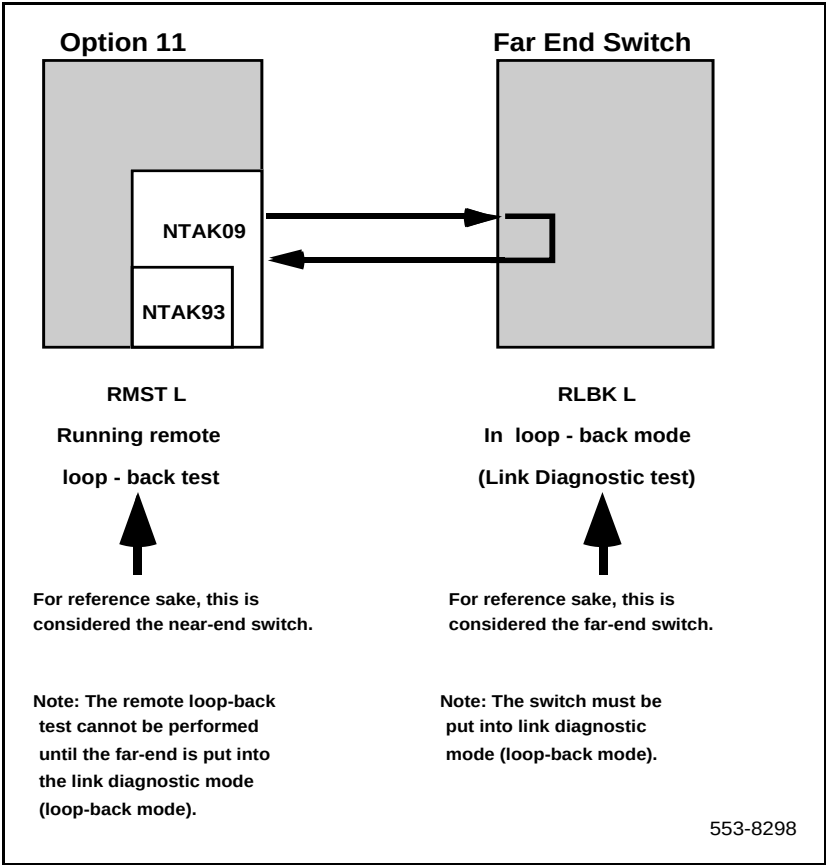
DISL C

RMST C

Note: The Remote Self test (external loopback test) can be run through any loopback that is external to the DTI/PRI card. The loopback can range from a loopback connector plugged into the NTBKO4 cable to a Remote Loopback on the far end DTI/PRI, or at any point in between on the DS-1 facility.

Figure 105 shows the relationship between the remote loopback test and the link diagnostic test.

Figure 105
DTI/PRI link diagnostic and remote loopback tests



DTI/PRI error detection

Bit error rate

Bit error rate monitoring detects errors in transmission. (See Figure 106). There are two methods of bit error monitoring: bipolar violation tracking and Cyclic Redundancy Check (CRC).

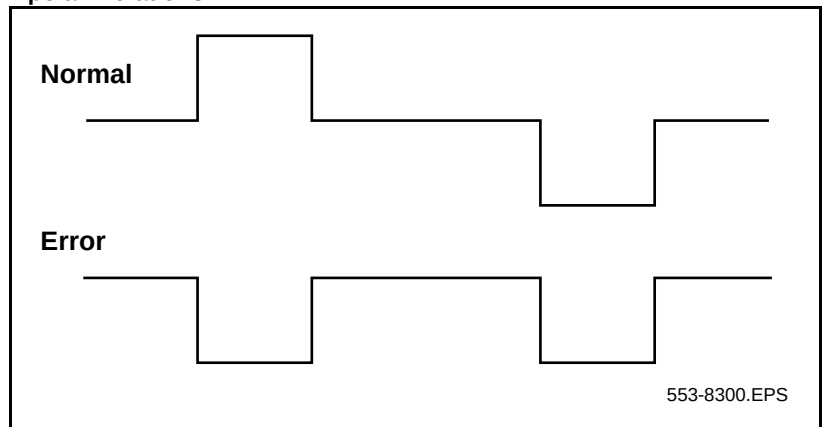
If the D2, D3 or D4 framing format is selected in overlay 17 prompt DLOP, then bipolar violation tracking is implemented. If the Extended Superframe (ESF) format is selected, CRC is implemented.

Bipolar violation (BPV) tracking

In a bipolar pulse stream, pulses alternate in polarity. A bipolar violation has occurred if, after transmission, two pulses of the same polarity are received in succession (this could be caused by an electrical disturbance such as noise).

Note: Bipolar 8 Zero Substitution (B8ZS) introduces intentional bipolar violations. The T1 equipment must treat them as such and disregard them. This explains why B8ZS can only be used if all the equipment on the T1 span (end-to-end) supports it. Otherwise the intentional BPVs take the link down.

Figure 106
Bipolar violations



Cyclic Redundancy Check (CRC)

The Extended Superframe Format (ESF) contains a checksum of all data in the frame. The receiving side uses the checksum to verify the data.

The primary difference between BPV and CRC is that bipolar violation tracking indicates errors in the local span, while CRC indicates errors on an end to end span. For example, on a satellite link, BPV only detects errors in the span between the Meridian 1 and the satellite connection. Since CRC traverses the entire span, it indicates an end-to-end bit error rate.

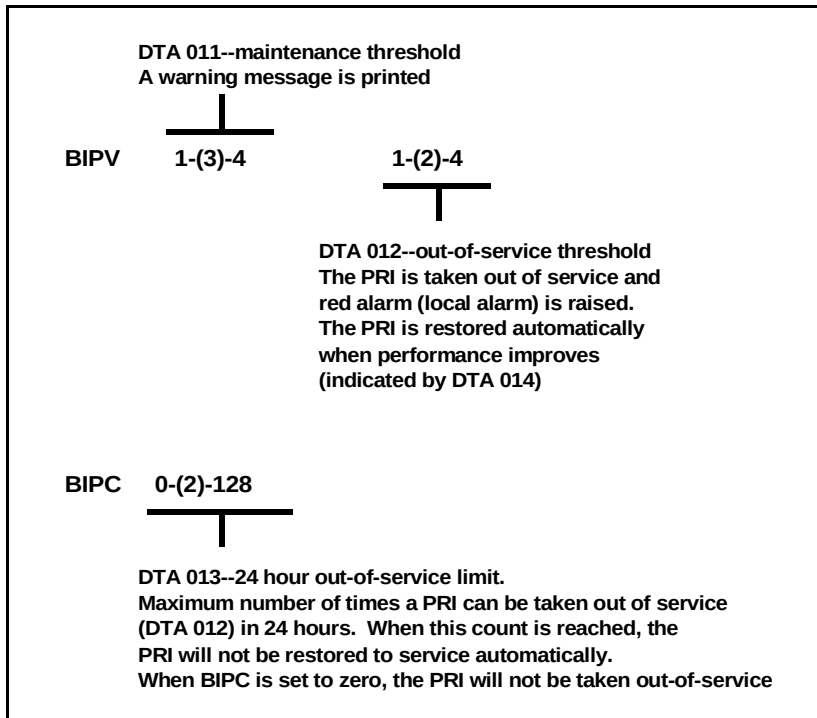
DTI/PRI hardware detects BPV or CRC errors. It sends an overflow (OVFL) message to the Meridian 1 CPU each time 1024 BPV or CRC errors are detected. Running the midnight routines prints the number of overflows and clears the counter.

Bit error rate threshold messages

There are three bit error rate thresholds set in LD 73, using one of two prompts: BIPV or BIPC. When a threshold is reached, a DTA message is produced. (See Figure 107.)

Message	Explanation
DTA011	Bit error rate maintenance threshold has been reached.
DTA012	Bit error rate out of service limit has been reached.
DTA013	Too many bit error rate out of service occurrences in the last 24 hours.

Figure 107
BIPV and BIPC thresholds



Frame slip

Digital signals must have accurate clock synchronization for data to be interleaved into or extracted from the appropriate timeslot during multiplexing and de-multiplexing operations. A frame slip is defined as the repetition of, or deletion of, the 193 data bits of a DS-1 frame due to a sufficiently large discrepancy in the read and write rates at the buffer (clocks aren't operating at EXACTLY the same speed).

When data bits are written into (added to) a buffer at a slightly *higher* rate than that at which they are being read (emptied), sooner or later the buffer overflows. This is a slip-frame deletion.

In the opposite situation, when data bits are written (added) into a buffer at slightly *lower* rate than that at which they are being read (emptied), eventually the buffer runs dry or underflows. This is also a slip-frame repetition.

Either occurrence is called a slip (or a controlled slip). The Option 11 contains a buffer large enough to hold about 2 full DS-1 frames ($193 * 2 = 386$). It is normally kept half full (1 frame). Slippage has impact on the data being transferred, as is shown in the table below, and all of the degradations shown in the table can be controlled or avoided with proper clock (network) synchronization.

Table 69
Impact of slip on service types

Service	Potential Impact
Encrypted Text	Encryption key must be resent.
Video	Freeze frame for several seconds. Loud pop on audio.
Digital Data	Deletion or repetition of Data. Possible Misframe.
Facsimile	Deletion of 4-8 scan lines. Drop Call.
Voice Band Data	Transmission Errors for 0.01 to 2 s. Drop Call.
Voice	Possible Click

Types of synchronization

Clock synchronization can be either tracking on the primary or secondary reference clock or free run (non-tracking). In LD 73 (prompts PREF and SREF), the DTI/PRI which supports the clock controller daughterboard is defined as the primary clock reference.

Another DTI/PRI may be defined as the secondary clock reference. The clock controller will synchronize from the primary or secondary's incoming pulse stream. The clock controller will in turn supply clocking to all the other DTI/PRI loops.

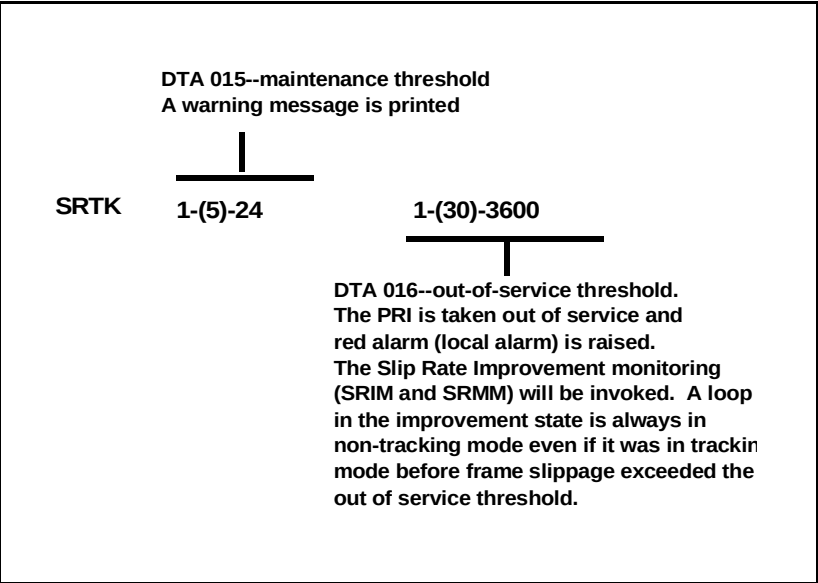
DTI/PRI hardware detects frame slips in tracking and free run modes. For tracking mode, running the midnight routines prints the number of overflows and clears the counter. For free run mode, running the midnight routines prints the number of frame deletions and repetitions and clears the counters.

Tracking mode

There are two thresholds set in LD 73 as described in the table below (see also Figure 108):

Prompt	Value	Meaning
SRTK	1-(5)-24 1-(30)-3600	Slip rate maintenance (in hours) and out-of-service threshold (per hour). These are the frame slip rate thresholds for the tracking mode. The first value is the maintenance threshold; the elapsed time (in hours) in which 2 frame slips occur (default is 2 slips in 5 hours). The second value is the out-of-service threshold; or the number of slips allowed in one hour (default is 30 slips in 1 hour). When a threshold is reached, a DTA messages is output as follows: DTA015:Frame slip --- tracking --- maintenance limit. DTA016:Frame slip --- tracking --- out of service limit.

Figure 108
Frame slip tracking thresholds

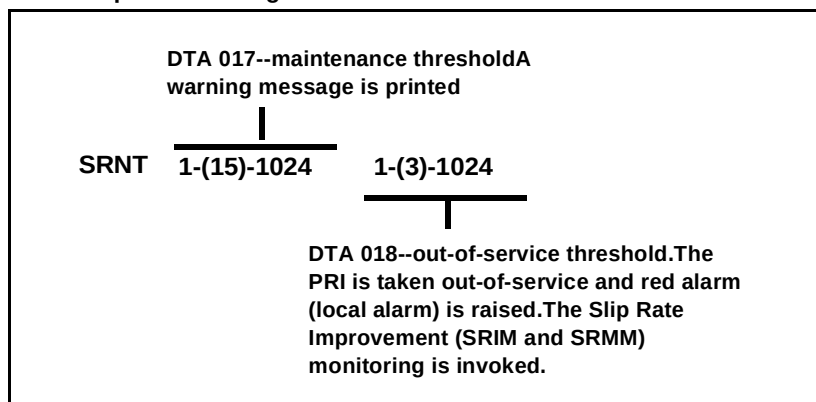


Free run (non-tracking) mode

A maintenance threshold and an out of service threshold are set in LD73 as described below (see Figure 109):

Prompt	Value	Meaning
SRNT	1-(15)-1024 1-(3)-1024	Non-tracking slip rate maintenance and out-of-service thresholds. These are frame slip rate thresholds for the non-tracking mode. The first value is the maintenance threshold in seconds, the amount of time in which 10 slips occur (default is 10 slips in 15 seconds). The second value is the out-of-service threshold in seconds, the amount of time in which 10 slips occur (default is 10 slips in 3 seconds). When these thresholds are reached, DTA messages are output. Related DTA messages are described below. See Figure 109. DTA017:Frame slip --- free run (non-tracking) --- maintenance limit. DTA018:Frame slip --- free run (non-tracking) --- out of service limit.

Figure 109
Frame slip non-tracking thresholds



Frame slippage improvement timers

Once the frame slip out-of-service threshold has been reached, the DTI/PRI software will invoke a Slip Rate Improvement mechanism to monitor the slippage and return the DTI/PRI card to service if some criteria has been met. The criteria used to determine that the slip rate has improved enough to return a DTI/PRI card to service is that the maintenance threshold is exceeded less than M (SRMM — default 2) times in N (SRIM — default 1) minutes.

It is important to realize that this monitoring applies to both tracking and non-tracking modes. Note that a DTI/PRI card in the Slip Rate Improvement state is always in non-tracking mode, even if it was in tracking mode before frame slippage exceeded the out-of-service threshold.

There are two thresholds set in LD 73 as described in Figure 110:

Prompt	Value	Meaning
SRIM	(1)-127	Slip Rate Improvement time in minutes. After the tracking or non-tracking mode frame slippage out-of-service threshold is exceeded, the slip rate is monitored for improvement. If the non-tracking maintenance threshold exceeds SRMM or fewer times in the duration of this timer, then the trunks are returned to service. Otherwise, this timer is reset and monitoring continues.
SRMM	1-(2)-127	Slip Rate exceeded maintenance limit. Number of times the Slip Rate exceeds the maintenance limit while waiting for Slip Rate Improvement during the time window specified at the SRIM prompt. While waiting for Slip Rate Improvement one of three DTA messages is output as shown in Figure 110.

Figure 110
Frame slip improvement timers

SRIM	(1)-127
	DTA 026--frame slip out-of-service limit has been reached while monitoring frame slip improvement. Trunks remain out-of-service, and improvement timer is restarted. DTA 028--frame slip maintenance limit has been reached while monitoring frame slip improvement. Trunks remain out-of-service, and improvement timer is restarted. DTA 029-- frame slip improvement timer has expired, Slip Rate Improvement Criteria has been met. Trunks are being returned to service.
SRMM	1-(2)-127

Frame alignment

Loss of frame alignment occurs when the DTI/PRI card stops receiving the framing pattern on the DS-1 byte stream for a pre-defined period of time (3 seconds). See Figures 111 and 112. This condition can occur as a result of the far end of the T1 span going completely out-of service or any other reason resulting in losing the incoming DS-1 pulse stream.

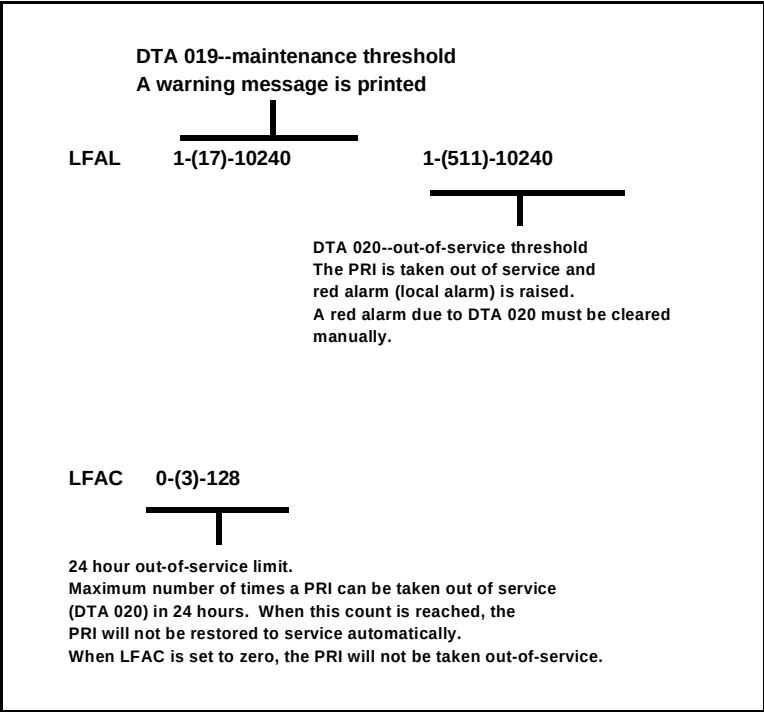
Loss of frame alignment thresholds

DTI/PRI hardware detects out of frame conditions. Running the midnight routines prints the number of occurrences when frame alignment was lost and clears the counters.

There are three frame alignment thresholds set in LD 73. When a maintenance or out of service threshold is reached, a DTA message is output as shown below.

DTA019	frame alignment maintenance limit
DTA020	frame alignment out of service limit

Figure 111
Frame alignment thresholds

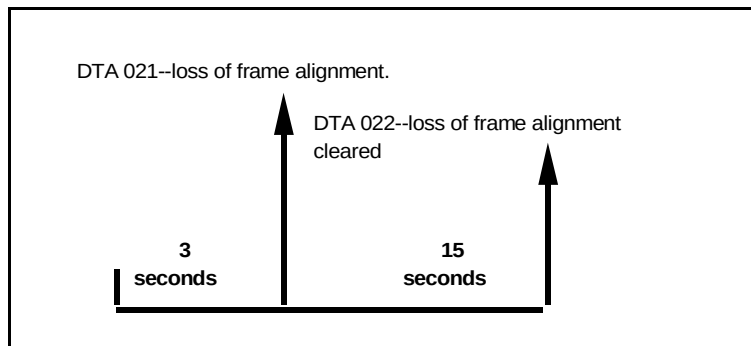


If a loss of frame alignment condition persists for 3 seconds, the affected DTI/PRI card is taken out of service and a red alarm (local alarm) is raised. See Figure 112.

If the loss of frame alignment condition clears at least 15 seconds, the DTI/PRI is automatically restored to service. The following DTA message is generated:

DTA021	loss of frame alignment has persisted for 3 seconds.

Figure 112
Loss of frame alignment



Clock operation

The Option 11 system supports a single clock controller that can operate in one of two modes: tracking or non-tracking (also known as free-run).

Tracking mode

In tracking mode, one or possibly two DTI/PRI cards supply a clock reference to a clock controller daughterboard. When operating in tracking mode, one DTI/PRI is defined as the primary reference source for clock synchronization, while the other is defined as the secondary reference source (PREF and SREF in LD 73).

There are two stages to clock controller tracking:

- tracking a reference, and
- locked onto a reference.

When tracking a reference, the clock controller uses an algorithm to match its frequency to the frequency of the incoming clock. When the frequencies are very near to being matched, the clock controller is locked onto the reference. The clock controller will make small adjustments to its own frequency until both the incoming and system frequencies correspond.

If the incoming clock reference is stable, the internal clock controller will track it, lock onto it, and match frequencies exactly. Occasionally, however, environmental circumstances will cause the external or internal clocks to drift. When this happens, the internal clock controller will briefly enter the tracking stage. The green LED will flash momentarily until the clock controller is locked onto the reference once again.

If the incoming reference is unstable, the internal clock controller will continuously be in the tracking stage, with the LED flashing green all the time. This condition does not present a problem, rather, it shows that the clock controller is continually attempting to lock onto the signal. If slips are occurring, however, it means that there is a problem with the clock controller or the incoming line.

Free-run (non-tracking)

In free-run mode, the clock controller does not synchronize on any source, it provides its own internal clock to the system. This mode can be used when the Meridian 1 is used as a master clock source for other systems in the network. Free-run mode is undesirable if the Meridian 1 is intended to be a slave. It can occur, however, when both the primary and secondary clock sources are lost due to hardware faults or when invoked by using software commands.

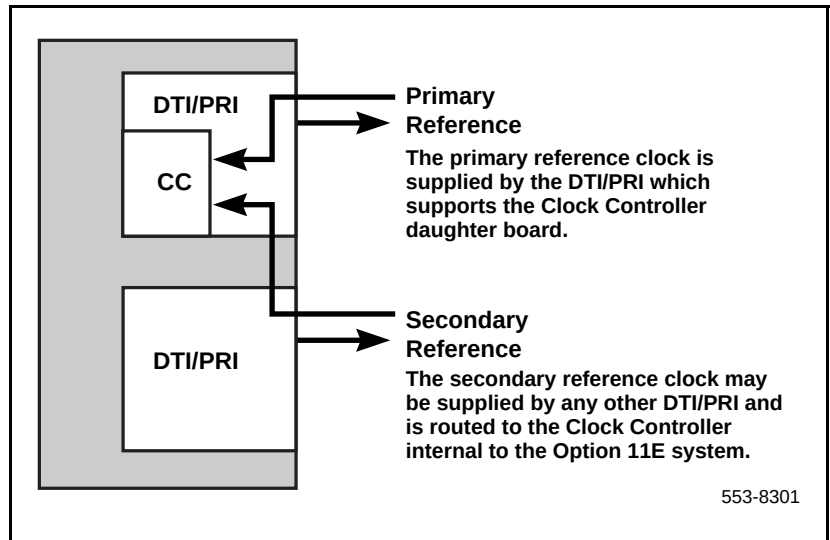
Reference clock errors

Meridian 1 software checks every 15 minutes to see if a clock controller or reference clock error has occurred.

In tracking mode, the clock controller is tracking on one reference clock. If a clock controller error is detected, or there is a problem with the reference clocks, the system will switch to free run mode.

A reference clock error occurs when there is a problem with clock driver or with the reference system clock at the far end. If the clock controller detects a reference clock error, with only one of the reference clocks, the reference clock is switched to the usable clock.

Figure 113
Clock controller primary and secondary tracking



Automatic clock recovery

Automatic switchover of the primary and secondary reference clocks is always *enabled* in the Option 11 system.

Note: EREF and MREF commands in LD 60, which control the enabling and disabling of automatic clock recovery, are not supported on the Option 11.

Replacing Equipment

Use the following procedures to replace the NTAK09, the NTAK20 and the NTAK93:

- 1 If the NTAK93 DCHI daughterboard is installed, first S/W disable the associated D-Channel (DCHI) using the following overlay and commands:

LD96 DIS DCH

Where X is the DCHI port number that was assigned in LD17).

- 2 If the NTAK20 Clock Controller daughterboard is installed, first S/W disable it using the following overlay and commands:

LD60 DIS CC 0

(Where CC is the card slot number of the NTAK09 that was supporting the NTAK20 Clock Controller).

- 3 S/W disable the DTI/PRI card as follows:

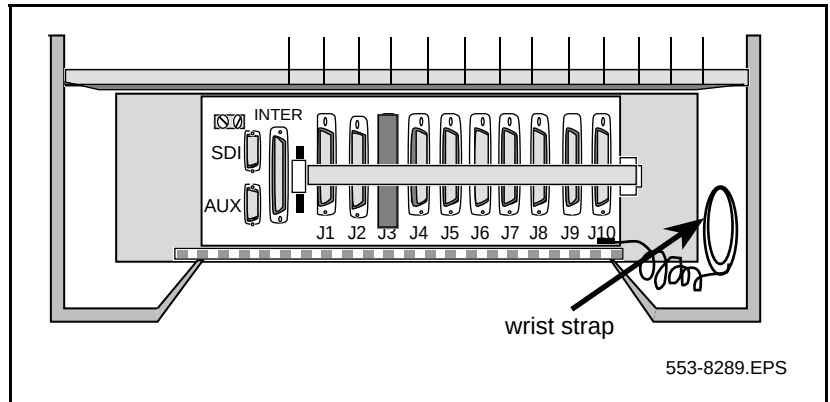
LD60 DISL X

(Where X is the card slot number of the NTAK09 DTI/PRI).

- 4 Hold the NTAK09 by the lock latches, unlock the latches and slide the card out of the cabinet. Once out of the slot you may remove any of the daughterboards.

Note: To avoid damage to the circuit cards from electrostatic discharge, wear the wrist strap connected to the inside of your Option 11 cabinet whenever handling the circuit cards. Figure 114 shows the connection point for the wrist strap.

Figure 114
Wrist strap connection to the Option 11 cabinet



- a** To remove the NTAK20 Clock Controller daughterboard, grasp the NTAK20 at opposite corners and gently “wiggle” it back and forth until all four corners are free. Be careful not to bend the connector pins.
 - b** To remove the NTAK93 Clock Controller daughterboard, grasp the NTAK93 at opposite corners and gently “wiggle” it back and forth until all four corners are free. Once the corners are free of the stand-off, grasp the NTAK93 by its upper and lower right corners and slowly lift the right side of the NTAK93 up and away from the NTAK09 connectors, being careful not to bend any of the pins.
- 5** To replace the NTAK09 DTI/PRI card, NTAK20 Clock Controller or NTAK93 DCHI, refer to Chapter 4 PRI Implementation and Chapter 5 DTI Implementation as required. Be sure to set any switches and install any daughterboards as required.
 - 6** Tag any defective or damaged equipment with a description of the problem and package it for return to a repair center.

TMDI Related System/Alarm Messages

DTI4135

Cannot enable DTI loop unless TMDI card is operational.

Action: Ensure card is plugged in then enable the card in LD 96.

DTI4136

Attempt to enable T1E1 application or port failed.

Action: Try ENLL again or try RST TMDI command in LD 96.

DTI4137

Attempt to enable T1E1 port failed.

Action: Try ENLL again or try RST TMDI command in LD 96.

DTI4138

SET MSDLMISP PTR failed during enable of T1E1 port. Data corruption may have occurred.

Action: Problem may be corrected by system initialization. If not, contact system support.

ERR9036

TMDI output buffer not allocated.

Action: Ensure that some unprotected memory is available, then with LD 17 CHG CEQU (no real changes required) to rebuild output buffer.

The TMDI messages duplicated from MISP messages are as follows:

MSDL0211

Attempt to enable T1E1 application during ENLL timed out.

Action: RST TMDI in LD 96.

MSDL0212

TMDI card could not enable T1E1 application.

Action: RST TMDI in LD 96 then try again.

MSDL0213

T1E1 application is in a transient state and could not be enabled.

Action: Wait, then try again.

MSDL0214

Request to enable DTI port on TMDI failed.

MSDL0215

Request to disable DTI port on TMDI failed.

MSDL0309

TMDI output buffer still in queue.

Action: Try again or RST TMDI in LD 96.

MSDL0310

TMDI output not sent to card.

Action: Try again or RST TMDI in LD 96.

TMDI0100 x

The CSTAT and CSUBSTAT fields on TMDI x (x = card number) indicate that the card is Manually Disabled. The Meridian 1 believes the card is Enabled. The card is placed in the System Disabled - Selftests Passed state, and within the next few minutes, the Meridian 1 will attempt to enable the card. Severity: Critical.

TMDI0101 x

The CSTAT field on TMDI x (x = card number) indicates that the card is no longer Enabled. The Meridian 1 will attempt to return the card to an Enabled state within a few minutes. Under certain conditions, this message is output at the same time as TMDI302. Severity: Critical.

TMDI0102 x

No response was received from TMDI x (x = card number) to a background polling message sent periodically to each TMDI. The purpose of this message is to ensure that the card is capable of receiving and sending messages. Severity: Critical.

TMDI0103 x

An Overlay was waiting for a message from TMDI x (x = card number). Most likely, the Overlay is no longer loaded. The message the Overlay was waiting for was never received. Severity: Critical.

TMDI0104 x

The TMDI background audit sent a message to TMDI x (x = card number) and did not receive a response. Severity: Critical.

TMDI0106 x appl

The TMDI audit detected that there was no response to a maintenance message originated by application “appl” (where appl = the application name) on TMDI x (x = card number). Severity: Critical.

TMDI0107 x appl y

The Meridian 1 was unable to determine if downloading was necessary. Three fields accompany this message: x = TMDI card number, appl = the application name, and the third field (y) contains a value for design use only. An SDL error message should accompany this message and describe the reason for the failure. Severity: Critical.

TMDI0108 x appl

Application “appl” on TMDI card number x needs to be downloaded to the card. Downloading begins as soon as there is no overlay loaded. Severity: Critical.

TMDI0112 x

TMDI card number x has been reset in order to begin automatic recovery. Immediately following this message, the card is executing self tests. When they are finished, provided they pass, the Meridian1 will attempt to enable the card. Severity: Critical.

TMDI0201 x appl

TMDI x sent a message to the Meridian 1 indicating application “appl” data space has been corrupted. Where: x = card number and appl = the application name. Severity: Critical.

TMDI0202 x appl

TMDI x sent a message to the Meridian 1 indicating that application “appl” on the card unexpectedly disabled itself (performed a “close”). Where: x = card number and appl = the application name. Severity: Critical.

TMDI0204 x appl

The Meridian 1 searched the system disk to find a version of an application “appl” for TMDI x, and found none. Where: x = card number and appl = the application name. Severity: Critical.

TMDI0205 x appl y z

An error was encountered when searching the system disk to find a version of application “appl” for TMDI x. Where: x = card number, appl = the application name, y and z are for design use only.

Action: Refer to an accompanying SDL error message for the exact error reason. This message indicates that the Meridian 1 will attempt to enable the application in question if a version exists on the card. Severity: Critical.

TMDI0206 x appl y z

An error was encountered when comparing a version of application “appl” on the system disk with a version on TMDI x. Where: x = card number and appl = the application name, y and z are for design use only.

Action: Refer to an accompanying SDL error message for the exact error reason. This message indicates that the Meridian 1 will attempt to enable the application in question if a version exists on the card. Severity: Critical.

TMDI0207 x appl y z

An error was encountered when downloading application “appl” to TMDI x. Where: x = card number and appl = the application name. y and z are for design use only.

Action: Refer to an accompanying SDL error message for the exact error reason. The entire enable sequence has been aborted. Severity: Critical.

TMDI0208 x

When preparing to download the base software to TMDI x, the card indicated that some kind of fatal error was encountered. Where: x = card number.

Action: Execute selftests before attempting any other action regarding this card. Severity: Critical.

TMDI0209 x y z

Some memory was reclaimed within the MSDL for future use. An application on MSDL x requested that a buffer pool be freed. When this occurred, there was at least one outstanding buffer.

The basecode waited for the buffer(s) to be returned to the pool before freeing the buffers, but it never returned. The buffer pool was forcibly freed by the basecode. Where: x = TMDI card number, y and z are for design use only. Severity: Critical.

TMDI0300 data

The TMDI background audit has changed the state of the card. In the cases where the card was previously enabled and now is no longer enabled, another TMDI message will indicate the reason for the state change. When making a state transition due to a fatal error on the card, the reason for the fatal error is displayed in this message. This is an informational message and requires no action by the craftsperson.

Output data: TMDI300 x FROM: aaaa TO: bbbb TIME time REASON cccc

Where:

x = TMDI card number (in decimal)

aaaa = the status of the TMDI prior to the state change=20

bbbb = the state of the card after the state change=20

time = the time of the state change=20

cccc = reason for the error (only when "TO: SYS DSBL - FATAL ERROR")

Severity: Critical.

TMDI0301 x y z

An expedited data unit (XDU) was received. The Meridian 1 is not expecting TMDI x to generate any messages in its current state. However, immediately following a state transition to a disabled state, a pending message may cause this message to be displayed.

There is no specific action to be taken; however, the message indicates that the incoming message from the card was not processed due to the state change. Severity: Critical.

TMDI0302 x y

Access to the memory space shared by the Meridian 1 and the TMDI (Shared RAM) has been momentarily suspended by TMDI x. There is no specific action to be taken as a result of this message; however, it indicates that message transfer between the Meridian 1 and the card ceased momentarily. Where: x = card number and y = the reason for the suspension. Currently the only reason supported is the value 1, indicating that some kind of buffer corruption was detected. Severity: Critical.

TMDI0303 x y

The Meridian 1 detected corruption in the receive ring, or the transmit ring, or both, causing access to the memory space shared by the Meridian 1 and TMDI x (Shared RAM) to be momentarily suspended.

There is no specific action to be taken as a result of this message; however, it indicates that message transfer between the Meridian 1 and the card ceased momentarily.

Where: x = card number and y = a decimal number indicating where the corruption was detected.

1 = receive ring.

2 = transmit ring.

3 = both receive and transmit rings.

Severity: Critical.

TMDI0305 x y

The Meridian 1 has received 100 or more messages from TMDI x within two seconds. At this level of message transfer, there may be some impact to the overall system performance. The level of message transfer does not warrant removing the card from service.

Where: x = card number and y = the rate of message transfer from the card to the Meridian 1 (in terms of messages per second). Severity: Critical.

TMDI0306 x y

The Meridian 1 has received 100 or more messages from the TMDI x within one second. At this level of message transfer, there may be some impact to the overall system performance. The level of message transfer warrants removing the card from service. Where: x = card number and y = the rate of message transfer from the card to the Meridian 1 (in terms of messages per second). Severity: Critical.

TMDI0307 x data

TMDI x encountered a fatal error. Where: x = card number. The output data is information read from the card regarding the error and is intended for design use only. Severity: Critical.

TMDI0308 x y appl data

TMDI x reported that it received a message with an invalid (bad) Socket ID.

Where:

x = card number.

y = socket ID.

appl = application name.

data = up to eight words of hex data representing the message sent.

Severity: Critical.

TMDI0451 <cardAddress> <cardIndex> <invalidCardstate>

An invalid card state change request from the Meridian 1 task has been detected by the MMIH driver.

Action: If the problem does not clear automatically, disable and then enable the card. Severity: Minor.

TMDI0452 <cardAddress> <cardIndex>

The MMIH driver failed to send an SSD message to the Meridian 1 task.

Action: Check the traffic reports for excessive traffic on the core CPU or check for a system problem. If the condition persists contact your technical support group. Severity: Minor.

TMDI0453 <cardAddress> <cardIndex>

The MMIH driver failed to send an RFC message to the Meridian 1 task.

Action: Check the traffic reports for excessive traffic on the core CPU or check for a system problem. If the condition persists contact your technical support group. Severity: Minor.

TMDI0454 <cardAddress> <cardIndex>

The MMIH driver failed to place a transmit expedited message in the expedited interface.

Action: Disable and then enable the TMDI card. If the problem persists, contact your technical support group. Severity: Minor.

TMDI0455 <cardAddress> <cardIndex>

The MMIH driver failed to send the Start UIPE Call Rebuild message through RFC to the Meridian 1 task.

Action: The call rebuild operation for that TMDI will fail. If necessary disable and then enable the TMDI card. If the problem persists, contact your technical support group. Severity: Major.

TMDI0456 <blockSize>

The MMIH driver failed when it allocated memory of the size blockSize for the buffer pool. The system is probably out of memory and cannot communicate with the TMDI card.

Action: Contact your technical support group. Severity: Critical.

TMDI0457 <first 16 words of msg>

The MMIH has found a buffer in the Rx Ring message queue with an expired timestamp. The Meridian 1 application has not processed the buffer's content promptly or the SSD message to the Meridian 1 task was lost. The buffer's timestamp is reset and the buffer is returned as a free buffer. The first 16 words (32 bytes) of the discarded message are printed, 8 words to a line.

Action: Check the traffic report. Excessive traffic can cause a delay in the core CPU. Severity: Minor.

TMDI0458 <first 16 words of msg>

The MMIH has found a buffer in the Tx Exp message queue with an expired timestamp. The message timed out while being sent to the card. The buffer is overwritten with the new message data. The first 16 words (32 bytes) of the discarded message are printed, 8 words to a line.

Action: Disable and then enable the card. If the problem persists replace the card. Severity: Minor.

TMDI0459

The MMIH has found a null physical I/O block pointer. The I/O pointer is corrupted and will prevent the system from communicating with the TMDI card.

Action: Contact your technical support group. Severity: Critical.

TMDI0460 <cardIndex>

The MMIH driver has found that the card index is out of range. The card index is corrupted and will prevent the system from communicating with the TMDI card.

Action: Contact your technical support group. Severity: Major.

TMDI0461 <cardAddress> <rtclock> <maintenancePegs>

A query base code message was sent by the MMIH after finding the SRAM suspended, where “maintenancePegs” is a list of peg counts kept by the Meridian 1’s maintenance task.

Action: Information only. If the problem persists disable and then enable the card. Severity: Information only.

TMDI0462 <cardAddress> <rtclock> <msl1Pegs>

This message is printed in series with TMDI0461, where “msl1Pegs” is a list of peg counts kept by the Meridian 1’s messaging interface task.

Action: Information only. If the problem persists disable and then enable the card. Severity: Information only.

TMDI0463 <cardAddress> <rtclock> <debugPegs>

This message is printed in series with TMDI0462, where “debugPegs” is a list of peg counts kept by the card’s debug task. Action: Information only. If the problem persists disable and then enable the card. Severity: Information only.

TMDI0464 <cardAddress> <rtclock> <utilityPegs>

This message is printed in series with TMDI0463, where “utilityPegs” is a list of pegs kept by the card’s Layer 1 task.

Action: Information only. If the problem persists disable and then enable the card. Severity: Information only.

TMDI0465 <cardAddress> <rtclock> <returnCode>

This message is printed in series with MSDI0464, where “utilityPegs” is a list of pegs kept by the card’s utility task.

Action: Information only. If the problem persists, disable and then enable the card. Severity: Information only.

TMDI0466 <cardAddress> <rtclock> <returnCode>

The Interface Audit's polling message cannot be sent to the card's ring interface. The returnCode is the reason why the message has not been sent. The following returnCode values can appear:

- 0 - request failed (null message pointer, empty data socket)
- 1 - request succeeded
- 2 - no operation (invalid card state)
- 4 - flow control
- 5 - no buffer
- 6 - socket ID is suspended
- 7 - ring is not operational
- 8 - invalid socket ID

Action: Information only. If the problem persists disable and then enable the card. Severity: Minor.

TMDI0467 <cardAddress> <cardIndex> <rtclock>

The SRAM Suspend message cannot be sent to the card through the expedited interface in response to two or more no buffer conditions being detected in a timespan greater than 100 msec.

Action: Information only. If the problem persists disable and then enable the card or replace the card. Severity: Minor.

**TMDI0468 <cardAddress> <cardIndex> <rtclock> <returnCode>
<socketId> <applicationID 'First 8 words of the msg'>**

The application's message cannot be sent to the ring and the reason code is other than no buffer.

Where:

socketId is the socket for the message to be sent.

applicationID identifies the transmitting application.

The first 8 words of the message are displayed in hex.

returnCode contains the actual value returned by the procedure and contains one of the following values:

0 - request failed (null message pointer, empty data socket).

1 - request succeeded

4 - flow control

5 - no buffer

6 - socket ID is suspended

7 - ring is not operational

8 - invalid socket ID

Action: Information only. If the problem persists disable and then enable the card. Severity: Minor.

TMDI0469 <cardAddress> <cardIndex> <rtclock>

A no buffer condition occurred because the transmit ring is in the interface full state.

Action: Check whether the traffic flow is excessive. If the problem persists disable and then enable the card. Severity: Information only.

TMDI0470 <cardAddress> <cardIndex> <rtclock>

A no buffer condition occurred because the card has not yet sent an initialization acknowledgment response.

Action: Check whether the traffic flow is excessive. If the problem persists disable and then enable the card. Severity: Information only.

TMDI0471 <cardAddress> <cardIndex> <rtclock> <messageSize>

A no buffer condition occurred because a single buffer message is larger than the size of a single buffer.

Action: Contact your technical support group. The buffer's data could be corrupted. Severity: Major.

TMDI0472 <cardAddress> <cardIndex> <rtclock> <messageSize>

Insufficient buffers available in the transmit ring for the message.

Action: Check whether the traffic flow is excessive. If the problem persists, disable and then enable the card. Severity: Information only.

**TMDI0474 <cardAddress> <cardIndex> <rtclock> <socketId>
<applicationId> <'First 8 words of the msg'>**

A no buffer condition has been encountered while attempting to send a message to the transmit ring. The first 8 words of the message are displayed in hex. The socketID is the socket for the message to be transmitted. The applicationID is the application sending the message.

Action: Check whether the traffic flow is excessive. If the problem persists disable and then enable the card. Severity: Information only.

**TMDI0475 <cardAddress> <cardIndex> <rtclock>
<tempNoBufferCount total/NoBufferCount
rtclockOfFirstNoBuffer> <'60 Tx descriptor words'>**

This message is printed when the first line of corrective action (suspending the transmit ring) is taken. It displays the contents of the error detection variables and the descriptor words of all buffers in the transmit ring. It is printed in series with TMDI0476 and TMDI0477. The variables are:

tempNoBuffercount - number of consecutive no buffer occurrences since the last successful write to the transmit ring.

totalNoBufferCount - total number of no buffer occurrences for the card.

rtclockOfFirstNoBuffer - rtclock value at the time of the first no buffer occurrence following the last successful write to the transmit ring.

descriptor words - all 60 descriptor words are printed (in hex), six to a line.

Action: Information for debugging only. The problem will clear automatically. If this does not happen, disable and then enable the card.
Severity: Minor.

**TMDI0476 <cardAddress> <cardIndex> <rtclock> <currentIndex>
descriptorBlockAddress> <bufferSize> <numberOfBuffers>
<transmitRingAddress> <transmitRingState>**

This message displays pertinent variables kept by the MMIH driver for the transmit ring. It is printed in series with TMDI0475 and TMDI0477. The variables printed are:

currentIndex - the MMIH's current index into the transmit ring's buffers (head pointer)

descriptorBlockAddress - offset of the descriptor block in the SRAM.

bufferSize - size of the buffers in the transmit ring.

numberOfBuffers - number of buffers in the transmit ring.

transmitRingAddress - address of the transmit ring in the card's SRAM.

transmitRingState - current state of the transmit ring.

Action: Information for debugging only. Problem will clear automatically. If this does not happen, disable and then enable the card. Severity: Minor.

**TMDI0477 <cardAddress> <cardIndex> <rtclock> <'44 SRAM
configuration block words'>**

This message displays the contents of the SRAM configuration block. It is printed in series with TMDI0457 and TMDI0476, where "configuration block words" = all 44 descriptor words are printed (in hex), four to a line.

Action: Information, for debugging only. Problem will clear automatically. If this does not happen disable and then enable the card. Severity: Minor.

Chapter 7 — ISL Implementation

Overview

This chapter contains the information required to implement ISL on the Meridian 1 Option 11 system. It provides:

- hardware and software installation
- programming the hardware and software components necessary to provide basic call service

ISDN-related features are treated individually in the chapter titled "Feature Implementation."

Note: This chapter builds on the ESN programming that is assumed to be already in place. It is also assumed that the installation technician has a basic understanding of NARS and CDP. (See Appendix A for additional information on ESN).

Two modes of ISL are available: shared and dedicated. This chapter covers the most common type of Northern Telecom ISL installation, an ISDN Signaling Link (ISL) installation in dedicated mode using dedicated and leased lines. For shared mode implementation, the instructions supplied in the PRI chapter apply except as where noted.

Hardware Requirements

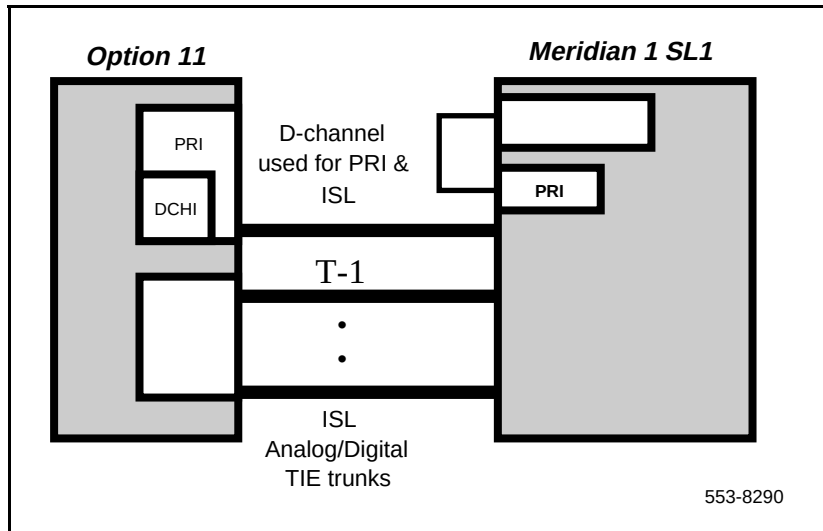
To implement ISL regardless of the mode of operation, analog or digital TIE lines are used as B-Channels:

- NT8D15 or NT8D14 Analog tie trunk cards
- NTAK09 Digital trunk cards (for shared mode)
- NTAK02 SDI/DCH card (for dedicated mode)

Shared Mode

In shared mode, PRI hardware plus the existing TIE line interface card is required.

Figure 115
ISL Shared Mode



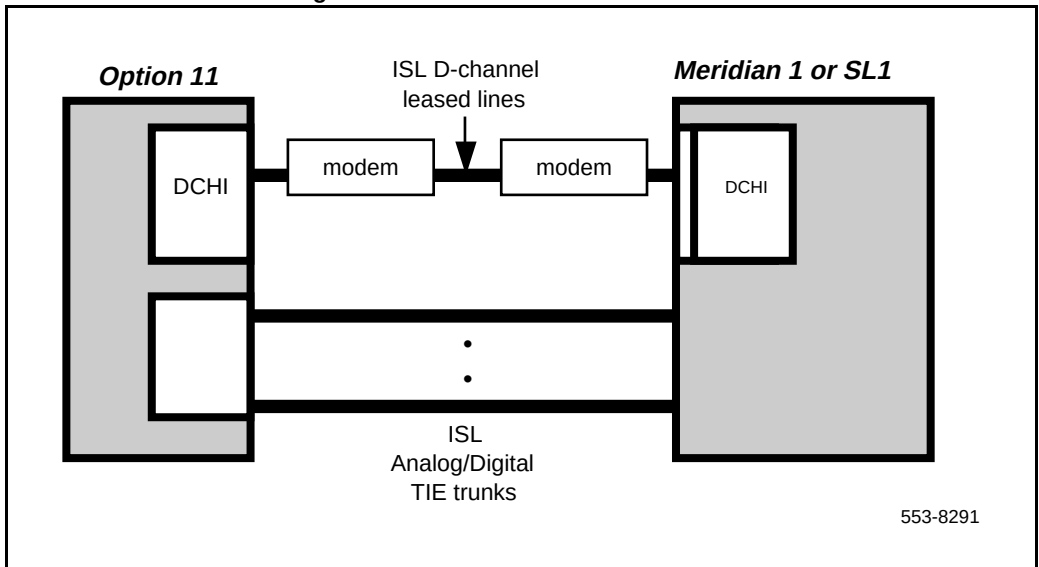
Dedicated Mode

Dedicated mode requires modems (see Figures 116 and 117 for details).

Using Leased Line, the requirements are:

Hardware	Comments
NTAK02	D-Channel Handler Interface (DCHI) Card for ISL mode
Modem	Modem capable of the following: (such as Ventel 2400-33 or 2400 Plus II) -minimum of 2400 baud -synchronous operation -must support leased line (also known as private line or point-to-point) operation
NTAK19BA	Four port break out cable

Figure 116
ISL in Dedicated Mode using Leased Line

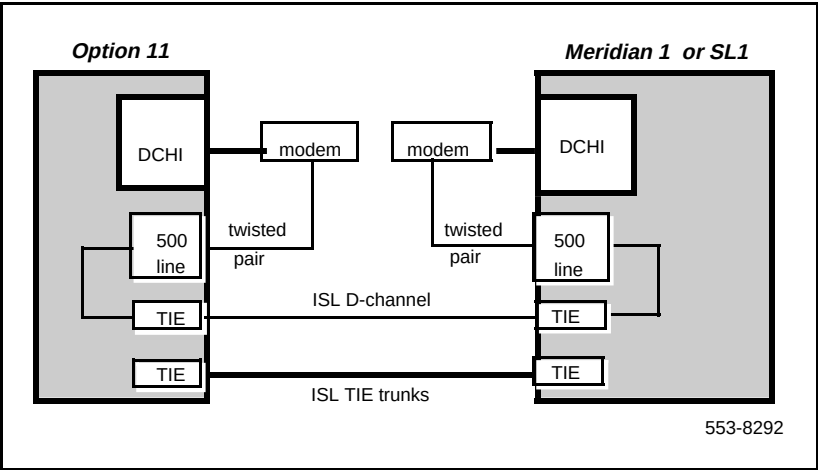


Using Dial-up modems

The requirements are:

Hardware	Comments
NT8D09	500 set line card
NTAK02	D-Channel Handler Interface (DCHI) Card (for ISL mode)
Modem	Modem capable of the following: (such as Ventel 2400-33 or 2400 Plus II) -minimum of 2400 baud -synchronous operation -Modems are programmed such that one modem originates the call while the other auto-answers -auto-dial capability
NTAK19BA	Four port break out cable

Figure 117
ISL in Dedicated Mode using Dial-up Modem



ISL Hardware Installation (Dedicated mode)

Use this procedure to install hardware for an ISDN Signaling Link (ISL) in dedicated mode using dedicated leased lines.

For shared mode, the hardware installation is identical to the PRI installation found in the *PRI implementation* chapter, with the addition of analog or digital TIE trunks or both.

Restrictions and limitations

The NTAK02 connects to a modem via the NTAK19BA four-port cable. Only ports 1 and 3 are available for use as DCHIs.

Installation procedure

- 1 Set option switches/jumpers on the NTAK02 card as per the following tables (70 and 71) for mode of operation (RS232 or RS422 and DTE or DCE)

Table 70
NTAK02 switch setting

Port 0	Port 1	SW 1-1	SW 1-2
SDI	DCH	OFF	OFF
SDI	DPNSS	OFF	ON
—	ESDI	ON	ON

Port 2	Port 3	SW 1-3	SW 1-4
SDI	DCH	OFF	OFF
SDI	DPNSS	OFF	ON
—	ESDI	ON	ON

Table 71
NTAK02 Jumper settings

Unit	Jumper location	Strap for DTE	Strap for DCE
Unit 0	J10	C - B	B - A
Unit 1	J7	C - B	B - A
	J6	C - B	B - A
Unit 2	J5	C - B	B - A
Unit 3	J4	C - B	B - A
	J3	C - B	B - A

Unit	Jumper location	RS422	RS232
Unit 0	—	—	—
Unit 1	J9	C - B	B - A
	J8	C - B	B - A
Unit 2	—	—	—
Unit 3	J2	C - B	B - A
	J1	C - B	B - A

- 2 Install the NTAK02 in any available slot 1-10 of the main cabinet.
- 3 Install the NTAK19BA four port cable on the 50 pin Amphenol connector associated with the slot the NTAK02 is installed in.
- 4 If the installation is a dedicated mode using leased line modem configuration, the D Channel connects the DCHI with the far-end modem over a dedicated leased line. The modems must have a minimum transmission rate of 2400 baud and MUST support leased line capability and synchronous mode, 2 or 4 wire operation.

Modems such as Ventel 2400 Plus II may be used. You must specify 4 wire operation when ordering, otherwise the modem is factory shipped for two wire operation.

Note: The Hayes Smartmodem 2400 cannot be used on leased lines.

- 5 If the installation is a dedicated mode using dial-up modem (such as Hayes 2400, Ventel 2400 or Gandalf 2400) configuration, the DCHI is connected to a modem that is connected to a 500 set line card. The call is connected to the far-end via the 500 set-to-TIE trunk path.

Note: Dedicated mode using leased line modems is the preferred method.

- 6 Set up the D-Channel. Program the modem at one end in the auto-dial mode, so it will automatically initiate a call to the other end at power up. The auto-dial number must be coordinated with the far end switch. The originating modem will have this auto-dial number stored internally as part of the modem configuration routine. The far-end modem needs only to be set-up for auto-answer.

Software Programming

Programming Meridian 1 to Meridian 1 ISL

ISL is supported only on Meridian 1 to Meridian 1 connections.

There are two modes of ISDN Signaling Link (ISL) operation: Shared mode and Dedicated mode.

Shared mode

The NTAK93 DCHI supports ISDN PRI signaling and ISL trunks. The configuration is basically the same as the PRI D-Channel, with the D-Channel also supporting ISL trunks.

The DTI/PRI software programming sequence can be used with the following exceptions:

In LD17:

Prompt	Response	Description
USR	SHA	D-Channel for ISL in "shared" mode, used for both ISDN PRI and ISL.
ISLM	1-192	number of ISL B-channel (trunks) controlled by the D-Channel (no default value)

In LD16:

Prompt	Response	Description
IFC	SL1	interface type must be SL1 (this is the only type supported for ISL).
MODE	ISLD	TIE route used for ISL members.
DCHI	0-15	DCHI port number

In LD14:

Prompt	Response	Description
CHID	1-192	channel identifier for ISL channels. Must be coordinated with the far-end.

Programming Dedicated mode

Use this procedure to configure basic ISL capability.

The following programming applies to analog TIE trunks being used as B-channels. When DTI/PRI trunks are also used, LD17 digital loop (DLOP) and LD73 (digital data block-DDB) must also be configured with the appropriate clocking and threshold settings.

Restrictions and limitations

The DCHI in this case uses the NTAK02 circuit card and does not support ISDN PRI signaling. The DCHI is reserved for ISL use only. The D-Channel can communicate with the far end by means of a dedicated leased line modem or dial-up modem.

For ISL dedicated mode using a dial-up modem, a 500 set, TIE trunk route and member will have to be programmed (used for D-Channel).

Programming procedure

Programming dedicated mode involves four major steps:

- 1 Configure the D-Channel for ISL — use LD17
- 2 Enable ISDN option — use LD15.
- 3 Enable the ISL option on a per route basis, assigning a D-Channel for each route — use LD16.
- 4 Assign a channel identification to each trunk with the ISL option — use LD14.

Step 1

Configure the D-Channel for ISL. Use LD17)

Prompt	Response	Description
REQ	CHG	
TYPE	CFN	configuration data block
ADAN	NEW DCH 1-15	add primary D-channel
CTYP	DCHI	D-channel card type
CDNO	1-9	Card slot in which the card supporting the DCHI resides
PORT	1	must be set to 1
USR	PRI	D-channel for ISDN PRI only
IFC	SL1	Interface type
DCHL	1-9	PRI2 card number. (Must match entry for CDNO.)
SIDE	NET (USR)	Net: network, the controlling switch User: slave to controller
RLS	XX	X11 software release of far-end. This is the current software release of the far end. If the far end has an incompatible release of software, it prevents the sending of application messages, i.e. for Network Ring Again.
CLOK		D-channel clock type for signaling

Prompt	Response	Description
	EXT	source of D-channel clock is external to DCHI card (in this case the DTI/PRI circuit card). Normally, EXT is used for PRI/ISL. Note: do not confuse this clock with the E1 span Clock Controller found on the NTAK10/79. This clock is in reference to the DCHI synchronous mode of operation. (Note: If directly connecting two DCHI ports with out the use of modems, set "CLOK" to "EXT" on one side and "INT" on the other).
LAPD	YES,(NO)	change LAPD parameters. Simply carriage return if timers are to be left at default value. The following timers are prompted only if LAPD is set to YES. The following can all be left at default during initial set-up.
T23	1-(20)-31	interface guard timer checks how long the interface takes to respond. In units of 0.5 seconds (default 20 = 10 seconds).
T200	2-(3)-40	retransmission timer in units of 0.5 seconds (default 3 = 1.5 seconds).
N200	1-(3)-8	maximum number of retransmissions
N201	4(260)	maximum number of octets in information field
K	1-(7)-32	maximum number of outstanding unacknowledged frames (NAKS)

Step 2

Enable ISDN option. Use LD15.

Prompt	Response	Description
REQ	NEW,CHG	
TYPE	CDB NET_DATA	customer data block Release 21 gate opener
CUST	0-31	customer number
ISDN	YES	customer is equipped with ISDN
PNI	1-32700	customer private network identifier. This number MUST be unique to this customer in the private network. e.g. it is used to as part of the setup message for feature operation such as Network Ring Again and Network ACD.
HNPA	NPA	telephone area code for this Meridian 1. Sent as part of setup message as calling line identification.
HNXX	NXX	telephone local exchange code for this Meridian 1. Sent as part of setup message as calling line identification.
HLOC	XXX	home location code (NARS)
LSC	1-9999	one to four digit Local Steering Code established in the Coordinated Dialing Plan (CDP). The LSC prompt is required for Calling Line I.D. and Network ACD.
AC2		Access Code 2. Enter call types (type of number) that use access code 2. Multiple responses are permitted. This prompt only appears on NARS equipped systems. If a call type is not entered here, it is automatically defaulted to access code 1
	NPA	E.164 National
	NXX	E.164 Subscriber
	INTL	International
	SPN	Special Number
	LOC	Location Code

Step 3

Enable the ISL option on a per route basis, assigning a D-Channel for each route. Use LD16.

Prompt	Response	Description
REQ	NEW,CHG	
TYPE	RDB	route data block
CUST	0-31	customer number
ROUT	0-30,32-127	route number
TKTP	TIE	TIE trunk route
DTRK	YES/NO	enter YES if this is a Digital Trunk Interface (DTI or PRI)
ISDN	YES	ISDN option
MODE	ISLD	Route for ISL application
DCHI	XX	DCHI port no. in CFN which will carry the D-Channel for this TIE trunk route.
PNI	1-32700	customer private network identifier- must be the same as the CDB PNI at the far end.
IFC		interface type
	SLI	select Meridian 1 to Meridian 1
CTYP	<CR>	Call Type. Enter the call type to be associated with the outgoing route for direct dialing using the trunk access code (instead of NARS access code) See the Option 11 Software Guide for a list of valid responses
INAC	YES	Insert Access Code. Permits the NARS AC1 or AC2 access code to be re-inserted automatically on an incoming ESN call.

Step 4

Assign a channel identification to each trunk with the ISL option. Use LD14.

Prompt	Response	Description
REQ	NEW,CHG	
TYPE	TIE	TIE trunk type
TN	CC UU	Card (CC) and Unit (UU) to be associated with this trunk data
RTMB	RRR MMM	route (created in step 3) (RRR) and member number (MMM)
CHID	1-192	channel identifier for ISL channels (remove with Xnn)—must be coordinated with far end (no default value)

Chapter 8 — ISL Maintenance

Maintenance overview

From a maintenance perspective, Option 11 ISL operation consists of these major aspects:

- hardware and software states
- near-end and far-end status
- link and/or span integrity

Option 11 ISL operation is monitored and reported on through service messages.

Option 11 maintenance provides several tools, either manual or automatic, for maintaining effective ISL operation. These tools are service commands (accessible through the software overlays), and diagnostic routines.

Maintenance messages

The following sections describe service messages that may appear on the Option 11 maintenance TTY as a result of ISL operation.

D-Channel status and error conditions are reported as DCH messages. PRI status and error conditions are reported in the messages found in Table 72. (Additional information on DCH and PRI messages can be found in the Option 11 Software Guide.)

Table 72
Status messages

Message	Meaning
DTA	Digital Trunks
DTI	Digital Trunk Interface
PRI	Primary Rate Interface

Message descriptions

Service messages provide near and far end switch status. Both service and service acknowledge messages are supported on PRI B-channels and ISL channels.

Service and service acknowledge messages for B-channels and ISL channels are supported between:

- Meridian 1 to Meridian 1: ISL and PRI
- Meridian 1 to DMS-100: PRI only
- Meridian 1 to DMS-250: PRI only
- Meridian 1 to AT&T ESS4 and ESS5: PRI only.

Service and service acknowledge messages for B-channels and ISL channels report the following statuses:

- in-service
- maintenance
- out-of-service

Near-end and far-end sub-categories are defined for each maintenance status. See the table below for possible combinations of near-end and far-end statuses and the channel capability for each status. When the near-end and far-end statuses do not match, the more severe maintenance status takes effect over the less severe maintenance status.

Table 73
Maintenance message and status combinations

Near End Status	Far End Status	B or ISL Channel capability
In-service	In-service	Incoming and outgoing call allowed
In-service	Maintenance	Incoming calls allowed only
In-service	Out-of-service	Not allowed to use
Maintenance	N/A	Not allowed to use
Out-of-service	N/A	Not allowed to use

Message functions

Service messages are used to monitor the following:

- D-Channel establishment
- D-Channel sanity polling
- B-channel or ISL channel status change
- Channel status audit.

D-Channel establishment

When the D-Channel establishes, the B-channel status is supported by sending service messages for each B-channel controlled by a D-Channel. This allows the far end to synchronize its channel states. These services messages are sent when the D-Channel is brought up automatically by the system or manually by using LD 96.

D-Channel sanity polling

If a D-Channel has been idle for 30 seconds, a service message is sent to poll the sanity of the link. The service message is sent regardless of whether the near end is configured as master or slave.

B-channel or ISL channel status change

Whenever there is a status change for a B-channel or an ISL channel, the new status is reported to the far end via a service message. Status change can occur through service change or maintenance operations, such as the addition or deletion of a channel in LD 14, or disabling of the associated loop, shelf, card or unit in LD 30, LD 32, LD 36, LD 41 or LD 60.

Channel status audit

LD 30 is enhanced to allow channel status audit to be initiated. The channels associated with each D-Channel are examined and their status is reported to the far end via service messages.

Activating service messages

You activate the service messages in LD 96 on a per D-Channel basis. The commands are:

Table 74
D-Channel messages

Command	Description
ENL SERV N	turns on the support of service and service acknowledge messages for DCH link N.
DIS SERV N	turns off the support of service and service acknowledge messages for DCH link N.
STAT SERV (N)	displays the current service and service acknowledge message SERV setting for individual DCH N or DCH.

When configuring these messages, the SERV command should only be enabled if both switches are equipped with a minimum of X11 release 15 software.

Using Option 11 ISL maintenance tools

Maintenance commands

Table 75 provides a quick reference lists of important ISL commands.

WARNING

Ensure that other TTYs and/or D-Channels residing on the NTAK02 are disabled.

IMPORTANT

Extreme care must be taken when enabling the D-Channel message monitoring option due to the possible heavy volume of messages during normal traffic. Use this command only during very light or no traffic conditions for trouble-shooting purposes. Remember to disable the monitoring tool when you are finished.

The port (TTY) performing the monitoring **MUST** have MTTC programmed.

Table 75
D-Channel commands (LD 96)D 96)

Command	Action
DIS DCH N	disable DCHI port N
DIS MSGI N	disable incoming D-Channel messages on link N *
DIS MSGO N	disable outgoing D-Channel messages on link N *
DIS AUTO ON	disable the D-Channel
ENL AUTO ON	auto enable the D-Channel after SYSLOAD
ENL DCH N	enable DCHI port N
ENL MSGI N	enable incoming D-Channel messages on link N *
ENL MSGO N	enable outgoing D-Channel messages on link N *
EST DCH N	establish D-Channel N
PLOG DCHI N	print D-Channel statistics log N
RLS DCH N	release D-Channel N
SDCH	release a D-Channel and switch D-Channels
RST DCH N	reset D-Channel N
STAT DCH (N)	print D-Channel status (link status)
STAT MSGI (N)	print incoming message monitor status
STAT MSGO (N)	print outgoing message monitor status
TEST-100/101/200/201	see DCH tests in NTP
Command	Action
STAT SERV	Print the current service and service acknowledge message for DCHI N
ENL SERV N	enable service messages for DCHI N
DIS SERV N	disable service messages for DCHI N

Maintenance messages

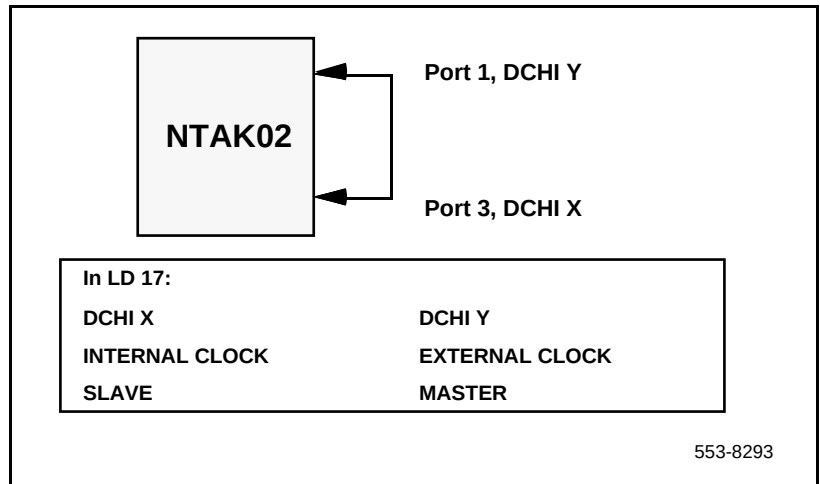
D-Channel status and error conditions are reported as DCH messages. These messages can be found in the Option 11 Software Guide - Maintenance Messages.

Maintenance testing

ISL Back to Back (without Modems)

For maintenance reasons or testing purposes it is sometimes necessary to connect ISL back to back (without modems). Use the following diagram to accomplish the connection. This connection is normally done within the same Meridian 1 system in a lab environment.

Figure 118
ISL back-to-back connection



Chapter 9 — ISDN Feature Implementation

Overview

This chapter provides detailed information on the implementation of ISDN related features. The programming information provided is based on the assumption that the basic PRI/ISL installation and programming has been completed and is functional. If this is not the case, see the appropriate chapters in this manual.

Configuring applications and features

Procedures are provided in for configuring the following applications and features:

- 1.5/2.0 Mbps Gateway
- 510 Trunk Route Member Expansion
- Activity Codes for Not Ready State
- Attendant and Network Wide Remote Call Forward
- Attendant Blocking of DN
- B-Channel Overload Control
- Backup D-Channel
- Bearer Capability in Call Detail Recording
- Call Forward, Break-In and Hunt Internal or External Network Wide
- Call Page Network Wide
- Call Park Network Wide

- Call Pickup Network Wide
- Calling Line Identification (CLID and CLID in CDR)
- Calling Party Privacy
- Calling Party Privacy Override
- Display of Calling Party Denied
- Display of Access Prefix on CLID
- E.164./ESN Numbering Plan Expansion
- Electronic Lock Network Wide/Electronic Lock on Private Lines
- Error Handling on ISL Analog and E&M TIE Trunks
- Flexible Numbering Plan Enhancement
- Incoming Trunk Programmable CLID
- International 1.5/2 Mb/s Gateway
- ISDN Calling Line Identification Enhancements
- ISDN QSIG Alternate Routing
- ISDN QSIG Basic Call
- ISDN QSIG Call Completion
- ISDN QSIG Call Completion Enhancement
- ISDN QSIG Call Diversion Notification
- ISDN QSIG Call Diversion Notification Enhancements
- ISDN QSIG Call Transfer Notification
- ISDN QSIG Generic Functional Transport
- ISDN QSIG Name Display
- ISDN QSIG Name Display Enhancement
- ISDN QSIG Call Path Replacement
- ISDN Signaling Link
- MCDN Alternate Routing
- MCDN End to End Transparency

- Meridian Mail Trunk Access Restriction
- Message Waiting Indication (MWI) Interworking
- National ISDN-2 TR-1268 PRI
- Network Attendant Service
- Network Call Party Name Display (NCPND) and Network Name Delivery (NND)
- Network Call Redirection
- Network Intercom
- Network Wide Listed Directory Number
- Network Message Services
- Network Ring Again (NRAG)
- NI-2 Call By Call Service Selection
- NPI and TON in CDR Tickets
- Remote Virtual Queuing (RVQ)
- TMDI on Option 11C
- Trunk Anti-Tromboning
- Trunk to Trunk Connection
- Virtual Network Services
- Virtual Network Services Virtual Directory Number Expansion

Network ACD is treated separately in other Northern Telecom Practices.

Features not listed above do not require additional ISDN programming to be implemented and are part of the basic PRI and/or ISL operation (such as Basic Call Service, 64 KBPS Clear Data Transport). Additionally, the ESN software programming is assumed to be in place. This programming is covered in Appendix A.

1.5/2.0 Mbps Gateway

PRI2 implementation

To configure PRI2 on a Meridian 1 large system or small system PBX, use the following steps:

- Configure the Pulse Code Modulation Conversion value, using LD 15.
- Configure a PRI2 interface, using LD 17.
- Configure a the Pulse Code Modulation Companding Law on the PRI2 D-Channel, using LD 17.

Please note the following additional steps when using a Meridian M2317 set on a Meridian switch configured as A-Law:

- Configure the CODEC coding law for the set, using LD 17
 - Configure Multifrequency Sender parameters, using LD 97
 - Configure the system parameters for peripheral equipment, using LD 97
 - Initialize the Meridian 1 switch, to download all parameters to the line cards. This initialization has to be performed only once.
- Configure a Primary D-Channel for the PRI2 interface, using LD 17.
 - Configure a Back-up D-Channel, if required, using LD 17.
 - Configure nB+D, using LD 17. The International nB+D (INBD) package 255 must be equipped and enabled on the Meridian 1 to configure nB+D.
 - Configure a PRI2 pad tables, using LD 73.
 - Configure a PRI2 route, using LD 16.
 - Configure a PR2 trunk, using D 14.

LD 15 - Configure the Pulse Code Modulation Conversion value on the Meridian 1 PBX.

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE:	NET	Make changes to networking data.
CUST	xx	Customer number. xx = 0-99 for large systems (51C, 61C, 81, and 81C). xx = 0-31 for the small system (Option 11C).
...		
ISDN	YES	Integrated Services Digital Network.
...		
- RCNT	0-(5)	Redirection Count for ISDN calls.
- - PCMC	0-(15)-31	The number of Pulse Code Modulation Conversions allowed, from u-Law to A-Law or A-Law to u-Law, in a network connection.
...		

LD 17 - Configure a PRI2 interface on the Meridian 1 PBX.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	CEQU	Make changes to Common Equipment parameters.
...		
- PRI2	0-159	PRI2 loop number.
...		

LD 17 - Configure the Pulse Code Modulation Companding Law.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	PARM	Make changes to system parameters.
...		
- PCML		Pulse Code Modulation Law. Enter the appropriate value, based on which companding law is being used on the Meridian 1.
	(MU) A	MU = u-Law. A = A-Law.
...		

Please note the following additional steps when using a Meridian M2317 set on a Meridian switch configured as A-Law:

- Configure the CODEC coding law for the set, using LD 17
- Configure the Multifrequency Sender parameters, using LD 97
- Configure the system parameters for peripheral equipment, using LD 97
- Initialize the Meridian 1 switch, to download all parameters to the line cards. This initialization has to be performed only once.

LD 17 - Configure the CODEC coding law for the set.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	ATRN	ARIES (M2317) Transmission.
- CODE	2	CODEC coding law.
...		

LD 97 - Configure the Multifrequency Sender parameters.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	XCTP	Conference/TDS/Multifrequency Sender parameters.
...		
DTMF	138	Dual Tone Multifrequency.
...		

LD 97 - Configure the system parameters for peripheral equipment.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	SYSP	System parameters for peripheral equipment..
INTN	YES	International companding law.
...		
FDLC	P ALL	Fast Download parameters to all line cards.

Initialize the Meridian 1 switch, to download all parameters to the line cards.
This initialization has to be performed only once.

For the Meridian 1 programmed as U-Law, use the default values, that is:

- LD 17, when configuring the CODEC coding law, use CODE = 0
- LD 97, when configuring the Multifrequency Sender parameters, use DTMF = 14
- LD 97, when configuring the system parameters for peripheral equipment, use INTN = NO

LD 17 - Configure the Primary D-channel.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	ADAN	Action device and number.
- ADAN	NEW DCH xx	Add a D-channel on logical port 0-63, for large systems (51C, 61C, 81, and 81C).
	NEW DCH xx	Add a D-channel on logical port 0-15, for the small system (Option 11C).
- CTYP	TMDI MSDL	The NTRB21 TMDI card (Release 24 and later). The NTBK51BA D-Channel Daughterboard.
- CDNO	1 2 3	Card number of TMDI card.
- PORT	xx	Port number.
- DES	aaa...a	Designator. DES is used to identify the link and can be up to 16 alphanumeric characters: 0-9, and upper case A-Z. Characters "*" and "#" are not allowed.
- USR	PRI	This D-channel is used for Primary Rate only.
- IFC	SL1 SL100 D100 D250 ETSI ESIG ISIG	Interface type. MCDN SL100 DMS-100 DMS-250 European Telecommunications Standard Institute ETSI QSIG International Standards Organization QSIG

- - DCHL	0-159	PRI2 loop number for the D-channel, for large systems (Options 51C, 61C, 81, 81C). If the NTBK51AA is used for D-Channel handling, only loop 0 or 1 can be configured.
	1-9	PRI2 loop number for D-channel, for small system (Option 11C).
- PRI2		Secondary PRI2 loops and sequence, for nB+D configuration.
	0-159 (0)-15 1-9 (0)-15	For large systems (Options 51C, 61C, 81, 81C). For small system (Option 11C). Enter 0, the default.
- OTBF	0-(32)-127	Output Request Buffers. Enter 32, the default.
- SIDE	(USR) NET	Meridian 1 is network side.
- RLS	24	Software release of the far end switch. For a Meridian 1 to Meridian 1 connectivity, both switches must be running Release 24 software.
- RCAP	aaa	Remote capabilities. Enter <cr> when finished entering values.
- OVLR	(NO) YES	Allow Overlap Receiving. Enter NO, the default.
- OVLS	(NO) YES	Allow Overlap Sending. Enter NO, the default.
- MBGA	(NO) YES	Allow Multilocation Business Group. Enter NO, the default.
- NASA	(NO) YES	Allow Network Attendant Service. Enter NO, the default.
- TIMR	(NO) YES	Change Protocol Timer values. Enter NO, the default.

- LAPD	(NO) YES	Change Link Access Protocol for D-Channel parameters. Enter NO, the default.

LD 17 – Configure a Back-up D-channel.

This step is optional, and performed only if a Back-up D-Channel is required. Please note that Back-up D-Channel is supported in an MCDN environment (IFC must be set to SL1).

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	ADAN	Action device and number.
- ADAN	NEW BDCH xx	Add a Back-up D-channel on logical port 0-63, for large systems (51C, 61C, 81, and 81C).
	NEW BDCH xx	Add a D-channel on logical port 0-15, for the small system (Option 11C).
- PDCH	0-63 0-15	0-63 = Primary D-Channel associated with the Backup D-Channel (for large systems (51C, 61C, 81, and 81C). 0-15 = for the small system (Option 11C).
- CTYP	TMDI MSDL	The NTRB21 TMDI card (Release 24 and later). The NTBK51BA D-Channel Daughterboard.
- CDNO	1 2 3	Card number of TMDI card.
- PORT	xx	Port number.
...		
- RCVF	YES	Auto-recovery to primary D-Channel.
- BCHL	0-159	PRI2 loop number for the Back-up D-channel, for large systems (Options 51C, 61C, 81, 81C). If the NTBK51AA is used for D-Channel handling, only loop 0 or 1 can be configured.
	1-9	PRI/PRI2 loop number for D-channel (Option 11C).
...		

LD 17 – Configure nB+D on the Meridian 1.

This step is optional, and requires the International nB+D (INBD) package 255 to be equipped and enabled on the Meridian 1. Also, please note that nB+D is only supported in an MCDN environment (IFC must be set to SL1).

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	ADAN	Action device and number.
- ADAN	NEW DCH xx	Add a D-channel on logical port 0-63, for large systems (51C, 61C, 81, and 81C).
	NEW DCH xx	Add a D-channel on logical port 0-15, for the small system (Option 11C).
- CTYP	TMDI MSDL	The NTRB21 TMDI card (Release 24 and later). The NTBK51BA D-Channel Daughterboard.
- CDNO	1 2 3	Card number of TMDI card.
- PORT	xx	Port number.
...		
- DES	aaa...a	Designator. DES is used to identify the link and can be up to 16 alphanumeric characters: 0-9, and upper case A-Z. Characters "*" and "#" are not allowed.
- USR	PRI	This D-channel is used for Primary Rate only.
- IFC	SL1	MCDN interface (nB+D is only supported in an MCDN environment).
- - DCHL	LOOP ID 0-159 (0)-15	Primary PRI2 loop number and interface identifier, for the D-channel. When INBD package 255 is enabled values for both the PRI loop number (LOOP) and the D-channel interface identifier (ID) must be entered. For large systems (Options 51C, 61C, 81, 81C).

- PRI	LOOP ID 1-9 (0)-15	Primary PRI2 loop number and interface identifier for the D-channel, for the small system (Option 11C). When INBD package 255 is enabled values for both the PRI loop number (LOOP) and the D-channel interface identifier (ID) must be entered.
	0-159 1-126 (LOOP) (ID)	Secondary PRI loop number and interface identifier, for nB+D (prompted if INBD package 255 is enabled). The values entered must be different than those entered for the loop number and interface identifier at the DCHL prompt. For large systems (Options 51C, 61C, 81, 81C). The PRI prompt is generated until <CR> is entered.
	LOOP ID 1-9 (0)-15	Secondary PRI loop number and interface identifier (prompted if INBD package 255 is enabled). The values entered must be different than those entered for the loop number and interface identifier at the DCHL prompt. For the small system (Option 11C).
PRI	<CR>	Secondary PRI loop and interface identifier (prompted if INBD package 255 is enabled). The values entered must be different than those entered for the loop number and interface identifier at the DCHL prompt.
...		

LD 73 – Define the digital pad tables, per country requirement.

Prompt	Response	Description
REQ	NEW CHG OUT END PRT	NEW = Add new data. CHG = Change existing data. OUT = Remove existing data. END = Exit LD 73. PRT = Print specified data.
TYPE	PRI2	2.0 MBit Primary Rate Interface.
FEAT	PAD	Feature is digital pad.
PDCA	(1)-16	Pad category table number.
TNLS	YES NO	Print TN list (if REQ = PRT).
DFLT	(1)-16	Default table (when REQ = NEW).

For the following prompts, **x = Rx code (receive)** and **y = Tx code (transmit)**. You may assign receive and transmit dB values to the prompts by entering a code which corresponds to a dB value.

Note: For North America, use the following values.

ONP	Rx Tx	On Premise Extension. Rx = 8 Tx = -4
DSET	Rx Tx	Meridian Digital Set. Rx = 8 Tx = -4
OPX	Rx Tx	Off Premise Extension. Rx = 8 Tx = -4
DTT	Rx Tx	Digital TIE trunks. Rx = 0 Tx = 0
SDTT	Rx Tx	Digital Satellite Tie trunks. Rx = 6 Tx = 0

DCO	Rx Tx	1.5 MBit DTI/PRI Digital COT, FEX, WAT, DID trunks. Rx = 3 Tx = 3
VNL	Rx Tx	Via Net Loss Analog TIE trunk. Rx = 3 Tx = 0
SATT	Rx Tx	Analog Satellite TIE trunk. Rx = 6 Tx = 0
ACO	Rx Tx	Analog CO trunk. Rx = 6 Tx = -3
PRI	Tx Rx	1.5 MBit PRI trunk. Applicable when Port Type at far end is PRI for the route (PTYP prompt = PRI in LD 16). Rx = 0 Tx = 0
PRI2	Tx Rx	2.0 MBit DI/PRI trunk. Rx = 0 Tx = 0
XUT	Rx Tx	Extended Peripheral Equipment Universal trunk. Rx = 6 Tx = -3
XEM	Rx Tx	Extended Peripheral Equipment E&M trunk. Rx = 6 Tx = 0

LD 16 – Configure a PRI2 route.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number, as already defined in LD 15. xx = 0-99 for large systems (Options 51C, 61C, 81, 81C). xx = 0-31 for the small system (Option 11C).
ROUT	xxx	Route number. xxx = 0-511 for large systems (Options 51C, 61C, 81, 81C). xxx = 0-127 for the small system (Option 11C).
DES	PRI2	Designator field for trunk.
TKTP	TIE	TIE trunk type (this is the only type allowed).
...		
DTRK	YES	Digital trunk route.
- DGTP	PRI2	2.0 MBit/s PRI digital trunk.
ISDN	YES	Integrated Services Digital Network.
- MODE	PRA	ISDN PRI route.
- IFC	SL1	SL-1 interface (Meridian 1 to Meridian 1 connectivity).
- - PNI	(0)-32700	Private Network identifier.
- NCNA	YES	Network Calling Name allowed.
- NCRD	YES	Network Call Redirection allowed.
...		
ICOG	IAO	Incoming and Outgoing trunks.
SRCH	(LIN) RRB	Search method for outgoing trunk member. LIN = Linear Hunt search method. RRB = Round Robin search method.
...		

ACOD	xxx..x	One-seven-digit access code for the trunk route.
...		
SIGO	aaaa	Signaling Arrangement. aaaa = (STD), ESN2, ESN3, ESN5, ETN, EN19.
...		

LD 14 – Configure PRI2 trunks.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	TIE	TIE trunk data block.
TN	l ch	Loop and channel for digital trunks, where: l = Previously defined PRI2 loops. ch = channel 1-30.
		For large systems (Options 51C, 61C, 81, 81C).
	c u	c = card. u = unit.
		For the small system (Option 11C).
DES	PRI2	Designator field for trunk.
PDCA	(1)-16	Pad category table number.
PCML		Pulse Code Modulation Law. Enter the appropriate value, based on which companding law is being used on the Meridian 1.
	A MU	A = A-Law. MU = u-Law.
CUST	xx	Customer number, as already defined in LD 15. xx = 0-99 for large systems (Options 51C, 61C, 81, 81C). xx = 0-31 for the small system (Option 11C).
NCOS	(0)-99	Network Class of Service group.
RTMB	0-511 1-510 0-127 1-510	Route number and member number. For Option 11C.

MNDN	xxx..x	One-seven digit manual Directory Number.
TGAR	0 - (1) - 31	Trunk Group Access Restriction. The default of 1 automatically blocks direct access.
CLS	aaaa	Class of Service.
...		

DTI2 implementation

To implement DTI2 on the Meridian 1, use the following steps:

- Configure the Pulse Code Modulation Conversion value, using LD 15.
- Configure a DTI2 interface, using LD 17
- Define the DTI2 pad tables, using LD 73
- Configure a DTI2 route, using LD 16.
- Configure a DTI2 trunk, using D 14.
- Define the ABCD (signaling category) table, using LD 73. ABCD tables apply to DTI/DTI2 interfaces only.

LD 15 - Configure the Pulse Code Modulation Conversion value on the Meridian 1 PBX.

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE:	NET	Make changes to networking data.
CUST	xx	Customer number. xx = 0-99 for large systems (51C, 61C, 81, and 81C). For the small system (Option 11C).
...		
ISDN	YES	Integrated Services Digital Network.
...		
- RCNT	0-(5)	Redirection Count for ISDN calls.

-- PCMC	0-(15)-31	The number of Pulse Code Modulation Conversions allowed, from u-Law to A-Law or A-Law to u-Law, in a network connection.
...		

LD 17 – Configure a DTI2 interface on the Meridian 1 PBX.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	CEQU	Make changes to Common Equipment parameters.
...		
- DTI2	0-159	DTI2 loop number.
...		

LD 16 – Configure a DTI2 route.

Prompt	Response	Description
REQ	NEW	Add new data.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number, as already defined in LD 15. xx = 0-99 for large systems (Options 51C, 61C, 81, 81C). xx = 0-31 for the small system (Option 11C).
ROUT	xxx	Route number. xxx = 0-511 for large systems (Options 51C, 61C, 81, 81C). xxx = 0-127 for the small system (Option 11C).
DES	DTI2	Designator field for trunk.
TKTP	TIE	TIE trunk type (this is the only type allowed).
...		
DTRK	YES	Digital trunk route.
- DGTP	DTI2	2.0 MBit/s digital trunk.

ISDN	YES	Integrated Services Digital Network.
...		
ICOG	IAO	Incoming and Outgoing trunks.
SRCH	(LIN) RRB	Search method for outgoing trunk member. LIN = Linear Hunt search method. RRB = Round Robin search method.
...		
ACOD	xxx..x	One-seven-digit access code for the trunk route.
...		
SIGO	aaaa	Signaling Arrangement. aaaa = (STD), ESN2, ESN3, ESN5, ETN, EN19.
...		

LD 14 – Configure DTI2 trunks.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	TIE	TIE trunk data block.
TN	l ch	Loop and channel for digital trunks, where: l = Previously defined PRI2 loops. ch = channel 1-30. For large systems (Options 51C, 61C, 81, 81C).
	c u	c = card. u = unit. For the small system (Option 11C).
DES	DTI2	Designator field for trunk.
PDCA	(1)-16	Pad category table number.

PCML		Pulse Code Modulation Law. Enter the appropriate value, based on which companding law is being used on the Meridian 1.
	A MU	A = A-Law. MU = u-Law.
CUST	xx	Customer number, as already defined in LD 15. xx = 0-99 for large systems (Options 51C, 61C, 81, 81C). xx = 0-31 for the small system (Option 11C).
NCOS	(0)-99	Network Class of Service group.
RTMB	0-511 1-510 0-127 1-510	Route number and member number. For Option 11C.
MNDN	xxx..x	One-seven digit manual Directory Number.
TGAR	0 - (1) - 31	Trunk Group Access Restriction. The default of 1 automatically blocks direct access.
CLS	aaaa	Class of Service.
...		

LD 73 – Define the digital pad tables, per country requirement.

Prompt	Response	Description
REQ	NEW CHG OUT END PRT	NEW = Add new data. CHG = Change existing data. OUT = Remove existing data. END = Exit LD 73. PRT = Print specified data.
TYPE	DTI2	2.0 MBit Digital Trunk Interface.
FEAT	PAD	Feature is digital pad.
PDCA	(1)-16	Pad category table number.
TNLS	YES NO	Print TN list (if REQ = PRT).
DFLT	(1)-16	Default table (when REQ = NEW).

For the following prompts, **x = Rx code (receive)** and **y = Tx code (transmit)**. You may assign receive and transmit dB values to the prompts by entering a code which corresponds to a dB value.

Note: For North America, use the following values.

ONP	Rx Tx	On Premise Extension.
ONP	Rx Tx	On Premise Extension. Rx = 8 Tx = -4
DSET	Rx Tx	Meridian Digital Set. Rx = 8 Tx = -4
OPX	Rx Tx	Off Premise Extension. Rx = 8 Tx = -4
DTT	Rx Tx	Digital TIE trunks. Rx = 0 Tx = 0
SDTT	Rx Tx	Digital Satellite Tie trunks. Rx = 6 Tx = 0
DCO	Rx Tx	1.5 MBit DTI/PRI Digital COT, FEX, WAT, DID trunks. Rx = 3 Tx = 3
VNL	Rx Tx	Via Net Loss Analog TIE trunk. Rx = 3 Tx = 0
SATT	Rx Tx	Analog Satellite TIE trunk. Rx = 6 Tx = 0
ACO	Rx Tx	Analog CO trunk. Rx = 6 Tx = -3
PRI	Tx Rx	1.5 MBit PRI trunk. Applicable when Port Type at far end is PRI for the route (PTYP prompt = PRI in LD 16). Rx = 0 Tx = 0

PRI2	Tx Rx	2.0 MBit DI/PRI trunk. Rx = 0 Tx = 0
XUT	Rx Tx	Extended Peripheral Equipment Universal trunk. Rx = 6 Tx = -3
XEM	Rx Tx	Extended Peripheral Equipment E&M trunk. Rx = 6 Tx = 0

LD 73 – Configure an ABCD (signaling category table). ABCD tables apply only to DTI/DTI2 interfaces. This step is optional.

Before configuring the ABCD tables, you may refer to the section “Signaling category (ABCD tables) assignment and modification” on page 644, which explains ABCD tables assignment and modification.

Please refer to the following tables when configuring the ABCD table values:

- Table 76, “Default values for Signaling Categories 1 and 16 (In/Out Calls),” on page 642.
- Table 77, “Default values for Signaling Categories 1 and 16 (Incoming Calls),” on page 642.
- Table 78, “Default values for Signaling Categories 1 & 16 (Outgoing Calls),” on page 643.

Prompt	Response	Comment
REQ	aaa	Request (aaa = CHG, END, NEW, OUT, or PRT).
TYPE	aaa	Type of data block.
FEAT	ABCD	Feature = ABCD.
SICA	2-16	Signaling Category.
TNLS	(NO) YES	Terminal Number List.
DFLT	(1)-16	Default signaling category to be used for Default values.
Prompts for Incoming/Outgoing Calls		
IDLE (S)	abcd	Idle.

IDLE (R)	abcd	Idle.
FALT (S)	abcd	Fault (DTI out-of-service).
FALT (R)	abcd	Fault (DTI out-of-service).
P RRC (S)	abcd	Register Recall.
- TIME	10-(100)-630	Time of RRC (S) in milliseconds.
TIME	(0)-1920	Persistence Time required before signal is accepted.
Prompts for Incoming Calls		
SEZ (R)	abcd	Seize for voice or data calls from a non-SL-1.
E SEZ (R)	abcd	Seize for voice or data calls from a non-SL-1.
- TIME	16-(56)-1000	16-(296)-1000.
		Minimum and maximum acceptable pulse duration.
SEZD (R)	abcd	Seize for data calls between SL-1s.
- SEZV (R)	abcd	Seize for voice calls.
P CALL (R)	abcd	Signal sent during seize by an incoming CO trunk.
- TIME	1-(2)-15	1-(8)-15
		Pulse on time, pulse off time.
SEZA (S)	abcd	Seize Acknowledgment.
- TIME	50-80-90	Time delay prior to sending SEZA.
PRCS (S)	abcd	PRCS.
WNKS (S)	abcd	Wink Start.
P WNKS (S)	abcd	Wink Start.
- TIME	10-(220)-630	Time for P WNKS (S).
P DIGT (R)	abcd	Decadic pulses.
NRCV (S)	abcd	Number Received.
P EOSF (S)	abcd	End of Selection Free.
- TIME	(100)-150	Time for EOSF (S).
- P EOSB (S)	abcd	End of Selection Busy.
- - TIME	(100)-150	Time for EOSB (S).

P OPC (R)	abcd	Operator Calling.
- TIME	64-(128)-192	Time of OPCA (R) pulse.
- TIME	16-(96)-1000	16-(160)-1000
		Minimum and maximum acceptable pulse duration.
- REPT	(1)-5	Number of OPCA (R) pulses.
CONN (S)	abcd	Connect.
E CON (S)	abcd	Connect.
- TIME	10-(150) 630	Time of pulse length in 10 ms increments.
CONN (R)	abcd	Connect.
P BURS (S)	abcd	Bring Up Receiver for L1 networking.
P BURS (R)	abcd	Bring Up Receiver for L1 networking.
- TIME	64-(128)-192	Time for BURS (R) pulse.
CLRB (S)	abcd	Clear Back.
C CLRB (S)	abcd	Clear Back.
- TIME	10-(600)-2000	Time of pulse length in 10 ms increments.
- P RCT (S)	abcd	Release Control.
- - TIME	100-(150) 300	Time value is stored in 10 ms increments.
- - P RCOD (S)	abcd	Release Control Originating party Disconnect.
- - - TIME	150	Timer value in milliseconds is fixed.
P OPRS (R)	abcd	Operator manual recall.
- TIME	xxxx yyyy	Minimum and maximum time range for OPRS (R).
P NXFR (S)	abcd	Network Transfer.
P ESNW (S)	abcd	ESN Wink.
P CAS (S)	abcd	Centralized Attendant.
CLRF (R)	abcd	Clear Forward.
- SOS	abcd	Special Operator Signal.
P BRLS (S)	abcd	Backward Release.
- TIME	10-(600)-2000	Time of pulse length in 10 ms increments.

P FRLS (R)	abcd	Forward Release.
- TIME	16-(296)-2000 16-(960)-2000	Minimum and maximum acceptable pulse duration.
Prompts for Outgoing Calls		
SEZ (S)	abcd	Seize for voice or data calls to a non-SL-1.
E SEZ (S)	abcd	Seize for voice or data calls to a non-SL-1.
- TIME	10-(150)-630	Time of pulse length in 10 ms increments.
SEZD (S)	abcd	Seize for Data calls.
- SEZV (S)	abcd	Seize for Voice calls.
SEZA (R)	abcd	Seize Acknowledgment.
- TIME	xxx	Delay time for the SEZA signal (xxx = 50, 80, 90, (150), or 800).
WNKS (R)	abcd	Wink Start.
- TIME	20-(140)-500 20-(290)-500	Minimum and maximum length of WNKS (R) pulse.
P WNKS (R)	abcd	Wink Start.
- TIME	16-(136)-504 16-(288)-504	Minimum and maximum length of P WNKS (R) pulse.
P EOS (R)	abcd	End of Selection.
- TIME	(64)-320 64-(256)-320	Length of EOS (R) pulse.
CONN (S)	abcd	Connect.
CONN (R)	abcd	Connect.
E CONN (R)	abcd	Connect.
- TIME	16-(56)-1000 16-(296)-1000	Time of pulse length in 8 ms increments.
P OPRC (R)	abcd	Operator Recall for special services.
P BURS (S)	abcd	Bring Up Receiver for L1 networking.

P BURS (R)	abcd	Bring Up Receiver for L1 networking.
- TIME	64-(128)-192	Time for BURS (R) pulse.
CLRB (R)	abcd	Clear Back.
C CLRB (R)	abcd	Clear Back.
- TIME	16-(296)-2000	16-(960)-2000
		Time of pulse length in 8 ms increments.
- P RCTL (R)	abcd	Release Control.
- - TIME	96-(128)-320	96-(256)-320
		Time stored in 8 ms increments.
P NXFR (R)	abcd	Network Transfer.
P ESNW (R)	abcd	ESN Wink.
P CAS (R)	abcd	Centralized Attendant Service.
CLRF (S)	abcd	Clear Forward.
- TIME	(0)-800	Time in milliseconds.
- SOS	abcd	Special Operator Signal.
P FRLS (S)	abcd	Forward Release.
- TIME	10-(600)-2000	Only prompted for pulsed signals.
P BRLS (R)	abcd	Backward Release.
- TIME	16-(296)-2000	16-(960)-2000
		Time of pulse length in 8 ms increments.
C SUPO (S)	abcd	Complex Supervision to Operator Signal used for KD3 signaling. Note that the input for a must be C.

Table 76
Default values for Signaling Categories 1 and 16 (In/Out Calls)

In/Out Calls	SICA 1	SICA 16
IDLE (S)	1001	1101
IDLE (R)	1001	1101
FALT (S)	1101	0101
FALT (R)	1101	0101
TIME	0	0
P RRC (S)	UNUSED	UNUSED

Table 77
Default values for Signaling Categories 1 and 16 (Incoming Calls)

Incoming Calls	SICA 1	SICA 16	Incoming Calls	SICA 1	SICA 16
E SEZ (R)	0001	0101	CONN (R)	0001	0101
SEZD (R)	UNUSED	UNUSED	P BURS (S)	UNUSED	UNUSED
SEZV (R)	UNUSED	UNUSED	P BURS (R)	UNUSED	UNUSED
P CALL (R)	UNUSED	UNUSED	C CLR (S)	1101	1101
SEZA (S)	1101	UNUSED	P RCTL (S)	UNUSED	UNUSED
TIME	150		P RCD (S)	UNUSED	UNUSED
PRCS (S)	UNUSED	UNUSED	P OPRS (R)	UNUSED	UNUSED
P WNKS (S)	UNUSED	PXXX	P NXFR (S)	UNUSED	UNUSED
TIME		220	P ESNW (S)	UNUSED	UNUSED
P DIGT (R)	UNUSED	PXXX	P CAS (S)	UNUSED	UNUSED
NRCV (S)	UNUSED	UNUSED	CLRF (R)	UNUSED	UNUSED
P EOSF (S)	UNUSED	UNUSED	SOS (R)	UNUSED	UNUSED
P EOSB (S)	UNUSED	UNUSED	P BRLS (S)	UNUSED	UNUSED
P OPCA (R)	UNUSED	UNUSED	P FRLS (R)	UNUSED	UNUSED
E CONN (S)	0101	0101			

Table 78
Default values for Signaling Categories 1 & 16 (Outgoing Calls)

Outgoing Calls	SICA 1	SICA 16
E SEZ (S)	0001	0101
SEZD (S)	UNUSED	UNUSED
SEZV (S)	UNUSED	UNUSED
SEZA (R)	1101	UNUSED
P WNKS (R)	UNUSED	PXXX
TIME		136 288
P EOS (R)	UNUSED	UNUSED
CONN (S)	0001	0101
E CONN (R)	0101	0101
P OPRC (R)	UNUSED	UNUSED
P BURS (S)	UNUSED	UNUSED
P BURS (R)	UNUSED	UNUSED
C CLRB (R)	1101	1101
P RCTL (R)	UNUSED	UNUSED
P NXFR (R)	UNUSED	UNUSED
P ESNW (R)	UNUSED	UNUSED
P CAS (R)	UNUSED	UNUSED
CLRF (S)	UNUSED	UNUSED
SOS (R)	UNUSED	UNUSED
P FRLS (S)	UNUSED	UNUSED
P BRLS (R)	UNUSED	UNUSED

Signaling category (ABCD tables) assignment and modification
What can be entered for the abcd response?

Prompts which show the response abcd, such as IDLE (S), require a four field response to indicate the status of four bits: a, b, c and d. The abcd response represents a trunk supervisory message. The bit states within the message are determined by using the appropriate input. Allowable inputs for each bit are: 0, 1, C, P, U, X, N. These input options are explained as follows:

- 0 - Bit is a steady state 0 (LOW) e.g. 0000 bits abcd are all steady state 0.
- 1 - Bit is a steady state 1 (HIGH) e.g. 0101 bits b and d are steady state 1 while bits a and c are steady state 0.
- C - Bit is pulsed and present continuously (Continuous pulsing of two or more bits is not allowed.).
 - “C” can only be entered for signals that have “C” in front of them when the signal is prompted; the signals are: “C CLRB (S), C CLRB (R) and C SUPO (S) UNUSED”
 - “C” cannot be mixed with 0 or 1 or P in the ABCD pattern. Therefore, the entry must look like CXXX, XCXX, etc.
 - “C” can only be entered once in the ABCD pattern
- C cannot be entered for the CLRB (R) or CLRB (S) prompts if the pulsed E&M package (232) PEMD is equipped - Bit is pulsed. e.g. PC10 bit a is pulsed, bit b is pulsed and sent continuously, bit c is steady state 1 and bit d is steady state 0.
- U - Bit is a don't-care bit (for received signals only) e.g. U10U bits a and d are don't-care bits, bit b is steady state 1 and bit c is steady state 0.
- X - Bit is not to be changed (used in conjunction with Pulsed or Continuously pulsed bit) e.g. XPXX bits a, c and d are unchanged, bit b is set to steady state 1 and bit c is set to steady state 0.

Another input to the signal name prompt is allowed. The other allowable input is:

- N - The signal is not required.

How to tell if the signal is pulsing, pulsed or steady?

The signal type is identified by a single character followed by a blank space preceding the signal name. For example, the prompt E SEZ(R) indicates that the Seize signal may be either Pulsed or steady state. The signal type identifiers are:

- C - Continuous Pulsing, Pulsed or steady state
- E - Pulsed or steady state
- P - Pulsed (single pulse unless otherwise indicated)
- No preceding character indicates the signal is steady state only

Pulsed signals will output the TIME prompt. This prompt is described for each of the signals that may prompt it.

How to determine signal direction?

The direction of the signal is indicated by a single character in brackets at the end of the signal name:

- (R) - Indicates that the signal is to be received by the switch
- (S) - Indicates that the signal is to be sent by the switch

For example, E SEZ (R) indicates that the Seize signal may be either Pulsed or steady state and that the signal is to be received by the switch.

How to tell if the prompt incoming or outgoing, or both

ABCD prompts correspond to incoming calls, outgoing calls or both incoming and outgoing calls. Prompts IDLE (S) to P RRC correspond to incoming/outgoing calls. Prompts E SEZ (R) to P FRLS (R) correspond to incoming calls. Prompts E SEZ (S) to C SUPO (S) correspond to outgoing calls.

510 Trunk Route Member Expansion

This section has been organized as follows:

For supported trunks other than ISA and NI-2 CBC trunks

LD 16 - Define the trunk route.

LD 14 - Define the trunk type, and the route member number.

For ISA trunks

LD 16 - Define the ISA master route.

LD 14 - Define the trunk type as ISA, and the route member number.

LD 16 - Define the maximum and minimum number of channels per ISA service route.

For NI-2 CBC trunks

LD 16 - Define the NI-2 CBC master route.

LD 14 - Define the trunk type as NI-2 CBC, and the route member number.

LD 16 - Define the maximum number of channels per NI-2 service route.

For supported trunks other than ISA and NI-2 CBC trunks**LD 16 - Define the trunk route.**

Prompt	Response	Description
REQ	NEW CHG	Add a new data. Change existing data.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number, as already defined in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
ROUT	0 - 511 0-127	Route Number for Options 51C-81C. Route Number for Option 11C.
DES	x...x	Designator field for trunk (0-16 alphanumeric characters).
TKTP		Supported trunk type (other than ISA or CBC).
	COT TIE DID FEX WAT FGDT	Central Office. TIE Direct Inward Dial. Foreign Exchange. Wide Area Telecommunications Service. Feature Group D.
...		
DTRK	(NO) YES	Define whether or not the trunk route is digital. Enter NO for analog, YES for digital.
- DGTP	PRI	For digital trunks, enter PRI as the digital trunk type. This prompt appears only if DTRK = YES.
...		
ISDN		Integrated Services Digital Network option.
	(NO) YES	Enter NO for analog trunks or YES for digital trunks.
- MODE	aaaa	Mode of operation, where aaaa can be: APN = Analog Private Network. ISLD = ISDN Signaling Link. PRA = Primary Rate Access (ISDN must be YES).

- IFC	aaaa	Interface type, where aaaa can be: D100 = DMS-100. D250 = DMS-250. SL1 = Meridian 1 (the default value).
...		
NSF	YES	Network Service Facility option. This option is used to indicate to the Meridian 1 whether it is to expect a Network Service Facility (NSF) Information Element (IE) from the DMS. The NSF information dictates which service route the Meridian 1 will use to terminate a call. Enter YES. The default value is NO.
...		
ICOG	aaa	Incoming or outgoing trunk type, where aaa can be: ICT = Incoming only. OGT = Outgoing only. IAO = Both incoming and outgoing.
...		

LD 14 - Define the trunk type, and the route member number.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE		Trunk type.
	COT	Central Office.
	TIE	TIE.
	DID	Direct Inward Dial.
	FEX	Foreign Exchange.
	WAT	Wide Area Telecommunications Service.
	FGDT	Feature Group D.
...		
TN		TN address, for Options 51C-81C, where: l = loop s = shelf c = card u = unit.
	l s c u	
	c u	TN address, for Option 11C, where: c = card u = unit.
...	l ch	Loop and channel for digital trunks, for Options 51C-81C, where: l = loop ch = channel.
	c ch	Card and channel for digital trunks, for Option 11C. c = card ch = channel.
CUST	xx	Customer number, as already defined in LD 15. xx = 0-99 for Options 51C-81C xx = 0-31 for Option 11C.
...		
RTMB	0-511 1-510 0-127 1-510	Route number and member number, for Options 51C-81C. Route number and member number, for Option 11C.
...		

For ISA trunks**LD 16** – Define the ISA master route.

Prompt	Response	Description
REQ	NEW CHG	Add a new data. Change existing data.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number, as already defined in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
ROUT	0 - 511 0-127	Route Number for Options 51C-81C. Route Number for Option 11C.
TKTP	ISA	Create an ISA master route.
...		
DTRK	YES	The trunk route is digital.
- DGTP	PRI	For digital trunks, enter PRI as the digital trunk type. This prompt appears only if DTRK = YES.
...		
ISDN	YES	Integrated Services Digital Network option.
- MODE	PRA	Mode of operation is Primary Rate Access.
- IFC	aaaa	Interface type, where aaaa can be: D100 = DMS-100. D250 = DMS-250. SL1 = Meridian 1 (the default value).
...		
ICOG	aaa	Incoming or outgoing trunk type, where aaa can be: ICT = Incoming only. OGT = Outgoing only. IAO = Both incoming and outgoing.
...		

LD 14 - Define the trunk type as ISA, and the route member number.

Prompt	Response	Description
REQ	NEW xxx	Add new data. Follow NEW with xxx = 1-510, to create that number of consecutive trunks.
TYPE	ISA	ISA trunk type.
TN	l s c u	TN address, for Options 51C-81C, where: l = loop s = shelf c = card u = unit.
	c u	Card and unit, for Option 11C, where: c = card u = unit.
...	l ch	Loop and channel for digital trunks, for Options 51C-81C, where: l = loop ch = channel.
	c ch	Card and channel for digital trunks, for Option 11C. c = card ch = channel
...		
CUST	xx	Customer number, as already configured in LD 15. xx = 0-99 for Options 51C-81C xx = 0-31 for Option 11C.
...		
RTMB	0-511 1-510 0-127 1-510	Route number and member number, for Options 51C-81C. For Option 11C.
...		

LD 16 - Define the maximum and minimum number of channels per ISA service route.

Prompt	Response	Description
REQ	NEW CHG	Add a new data. Change existing data.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number, as already defined in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
ROUT	0 - 511 0-127	Route Number for Options 51C-81C. Route Number for Option 11C.
TKTP	aaaa	Type of ISA service route.
...		
DTRK	YES	The trunk route is digital.
- DGTP	PRI	For digital trunks, enter PRI as the digital trunk type. This prompt appears only if DTRK = YES.
...		
ISDN	YES	Integrated Services Digital Network option.
- MODE	PRA	Mode of operation is Primary Rate Access.
- IFC	aaaa	Interface type, where aaaa can be: D100 = DMS-100. D250 = DMS-250. SL1 = Meridian 1 (the default value).
...		
- ISAR	YES	ISA service route.
- - MIN	0-510	Minimum number of channels allowed on an ISA service route.
- - MAX	0-510	Maximum number of channels allowed on an ISA service route.
...		

ICOG	aaa	Incoming or outgoing trunk type, where aaa can be: ICT = Incoming only. OGT = Outgoing only. IAO = Both incoming and outgoing.
...		

For NI-2 CBC trunks**LD 16** – Define the NI-2 CBC master route.

Prompt	Response	Description
REQ	NEW CHG	Add a new data. Change existing data.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number, as already defined in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
ROUT	0 - 511 0-127	Route Number for Options 51C-81C. Route Number for Option 11C.
TKTP	CBCT	Trunk type is NI-2 Call By Call.
...		
DTRK	YES	Define whether or not the trunk route is digital. Enter YES for digital.
- DGTP	PRI	For digital trunks, enter PRI as the digital trunk type. This prompt appears only if DTRK = YES.
...		
ISDN	YES	Integrated Services Digital Network option.
- MODE	PRA	Mode of operation is Primary Rate Access.
- IFC	NI2	Interface type is NI-2.
- IPUB	0-511 0-127	Service route to be used for incoming network calls, for Options 51C-81C. For Option 11C.

...		
ICOG	aaa	Incoming or outgoing trunk type, where aaa can be: ICT = Incoming only. OGT = Outgoing only. IAO = Both incoming and outgoing.
...		

LD 14 - Define the trunk type as NI-2 CBC, and the route member number.

Prompt	Response	Description
REQ	NEW xxx	Add new data. Follow NEW with xxx = 1-510, to create that number of consecutive trunks.
TYPE	CBCT	NI-2 Call By Call trunk type.
TN	l s c u	TN address, for Options 51C-81C, where: l = loop s = shelf c = card u = unit.
	c u	Card and unit, for Option 11C, where: c = card u = unit.
...	l ch	Loop and channel for digital trunks, for Options 51C-81C, where: l = loop ch = channel.
	c ch	Card and channel for digital trunks, for Option 11C. c = card ch = channel.
...		
CUST	xx	Customer number, as already defined in LD 15. xx = 0-99 for Options 51C-81C xx = 0-31 for Option 11C.
...		
RTMB	0-511 1-510 0-127 1-510	Route number and member number, for Options 51C-81C. For Option 11C.
...		

LD 16 - Define the maximum number of channels per NI-2 service route.

Prompt	Response	Description
REQ	NEW CHG	Add a new data. Change existing data.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number, as already defined in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
ROUT	0 - 511 0-127	Route Number for Options 51C-81C. Route Number for Option 11C.
TKTP		CBCT service route trunk type.
	COT TIE DID FEX WAT	Central Office. TIE Direct Inward Dial. Foreign Exchange. Wide Area Telecommunications Service.
...		
ISDN	YES	ISDN route.
- IFC	NI2	Interface type is NI-2.
- CBCR	YES	NI-2 Cal By Call Service route indicator.
-- RTN	0-511 0-127	Master route number, as previously defined, for Options 51C-81C. For Option 11C.
-- SRVC	(0)-31	Decimal value identifying the type of service provisioned for the NI-2 service route.
...		
-- MAX	0-510	Maximum number of channels allowed on an CBCT service route.
...		

Activity Codes for Not Ready State

LD 11- Specify an Activity Code key for the set.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	a...a	Set type. Where a...a = Meridian 1 proprietary set with display capabilities (2006, 2008, 2009, 2016, 2018, 2112, 2216, 2616, and SL1).
TN	l s c u c u	Terminal Number. l = loop, s = shelf, c = card, u = unit for Option 51C-81C. c = card, u = unit for Option 11C.
CUST	xx	Customer Number as defined in LD 15.
...	...	
KEY	xx ACNT	xx = Key number (the ACNT key cannot be configured as 0).
KEY	<cr>	KEY is prompted until a carriage return is entered.
...	...	

LD 23 - Enable Activity Codes in the Not Ready State for an ACD queue.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	ACD	Automatic Call Distribution data block. Requires Basic Automatic Call Distribution (BACD) package 40.
...	...	
ACNT	x...x	Account (Default activity code). Maximum four digits. Prompted if the ADS data block is built and the DCUS (Maximum number of ACD customers) setting in LD 17 is greater than one.
NRAC	YES	Enable Not Ready Activity Codes. (NO) = default.
- NDFL	xxxx	Not Ready Default code. Must be equipped with ACD D or NGCC package.

Attendant and Network Wide Remote Call Forward

Set-based Configuration

LD 15 – Set the Station Control Password Length.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	CDB FFC_DATA	Customer data block. Release 21 gate opener
CUST	0-31	Customer number.
...		
-SCPL	0-8	Station Control Password Length (must be consistent network wide).
...		

LD 15 – Configure a Special Prefix Number (SPRE) for the customer.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	CDB FTR_DATA	Customer data block. Release 21 gate opener.
CUST	0-31	Customer number.
...		
- SPRE	xxxx	Special Prefix Number.
...		

LD 10 – Set the Station Control Password and allow Call Forward.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	500	Telephone type.
TN	c u	Card, and unit (Option 11).
SCPW	xxxxxxx	Station Control Password (0 to 8 digits, defined in LD 15).
KEY	xx CFW 4-(16)-23	Assign Call Forward key (xx) and set the forwarding DN length.

LD 11 – Set the Station Control Password and allow Call Forward.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	aaaa	Telephone type, where aaaa = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616, or 3000.
TN	c u	Card, and unit (Option 11).
SCPW	xxxxxxx	Station Control Password (0 to 8 digits, defined in LD 15).
KEY	xx CFW 4-(16)-23	Assign Call Forward key (xx) and set the forwarding DN length.

LD 57 – Define Remote Call Forward FFCs and set FFCT.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	FFC	Flexible Feature Codes.
CUST	0-31	Customer number.
FFCT	(NO), YES	Confirmation tone is (is not) to be given after an FFC.
CODE	RCFA	Remote Call Forward Activate.
RCFA	xx	xx = RCFA code.
CODE	RCFD	Remote Call Forward Deactivate.
RCFD	xx	xx = RCFD code.
CODE	RCFV	Remote Call Forward Verify.
RCFV	xx	xx = RCFV code.

Attendant-based Configuration

LD 12 – A new Flexible Attendant feature key, RFW, has been added to this overlay. Configuration of the key on the Attendant Console is required to allow attendant access to the RCFW feature. Configuration of the RFW key is only allowed if the ARFW package is equipped.

Prompt	Response	Description
REQ	NEW,CHG	New, or change.
TYPE	ATT, 1250, 2250	Attendant type – the RFW key can be configured on QCW4, M1250, and M2250 Attendant Consoles.
TN	c u	Card, and unit.
...		
KEY	xx RFW	Key number assigned as Attendant Remote Call Forward key.

LD 15 – Configure the Attendant RCFW password.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	CDB ATT_DATA	Customer data block. Release 21 gate opener.
CUST	0-31	Customer number.
...		
- IRFR	(NO), YES	Internal Remote Call Forward Password required.
-- IRFP	xxxxxxx	Internal RCFW Password (only prompted if the response to IRFR is YES). The password length is one to eight digits; the password is numeric only.
- XRFR	(NO), YES	External Remote Call Forward Password required.
-- XRFP	xxxxxxx	External RCFW password (only prompted if the response to XRFR is YES). The password length is one to eight digits; the password is numeric only.
...		

Attendant Blocking of DN

LD 12 – Configure the SACP key on the Attendant Console.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ATT, 1250, 2250	Attendant Console type.
TN	c u	Terminal Number for the Option 11.
...		
KEY	xx SACP	Semi-automatic Camp-on key.

LD 15 – Enable the Attendant Blocking of DN feature.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	CDB ATT_DATA	Customer Data Block. Release 21 gate opener.
CUST	0-31	Customer number.
...		
ATT	YES	Change Attendant Console options.
...		
- SACP	(NO), ALL, SNGL	Semi-automatic Camp-on not allowed. Semi-automatic Camp-on for all Camp-on occurrences. Semi-automatic Camp-on an a per call basis.
- ABDN	(NO), YES	Activation of the Attendant Blocking of DN feature is (not) allowed. The ABDN prompt only appears when the SACP package is equipped.

B-Channel Overload Control

LD 16 – Configure the B-Channel Overload Control timer (in response to the BCOT prompt).

Prompt	Response	Description
REQ	NEW CHG	Add new data Change existing data.
TYPE	RDB	Route Data Block.
...		
ISDN	YES	Integrated Services Digital Network.
...		
- IFC		Supported interface types.
	D100 D250 S100 ESS4 ESS5 NI2	D100 = DMS-100 D250 = DMS-250 S100 = SL100 ESS4 = Lucent 4ESS ESS5 = Lucent E5SS NI2 = National ISDN-2
...		
- - BCOT	(0)-4000	The value for the B-Channel Control timer, in milliseconds. This value indicates the delay that the Meridian 1 will impose on a B-Channel before starting the disconnect sequence. A value of 256 is recommended. The entered value is rounded down to multiples of 128. After a value has been entered and rounded down (if necessary), the (rounded down) value is autoprinted on the screen before the next prompt is displayed. Note: In the case of Integrated Services Access (ISA) Call By Call Type and NI-2 Call By Call Service Selection, BCOT is prompted only for Service Routes.
....		

Backup D-Channel

Use this procedure to configure Backup D-Channel on an Option 11 system.

Restrictions and limitations

Once the backup D-Channel is configured, you must recover the primary D-Channel in the last part of the prompt-response sequence below. The following paragraphs explain the significance of either possible response in that sequence.

Recovery to primary D-Channel

It is important to understand the impact of the RCVP prompt. The following chart describes the scenarios possible when RCVP is YES and when RCVP is NO.

RCVP = YES	RCVP = NO
primary D-channel up-- active backup D-channel up	primary D-channel up-- active backup D-channel up
primary D-channel down backup D-channel-- active See below	primary D-channel down backup D-channel-- active See below
primary D-channel up-- active backup D-channel up	primary D-channel up backup D-channel up-- active

Two of the above scenarios are of particular interest.

- a** When RCVP is YES, the primary D-Channel is down, and the backup D-Channel is up, the following occurs: first the system tries to re-establish the primary D-Channel connection. If this cannot be done successfully, then the backup D-Channel is switched to off. When the primary D-Channel is brought up again, the primary D-Channel becomes the active D-Channel.
- b** When RCVP is NO, the primary D-Channel is down, and the primary D-Channel is brought up, the backup D-Channel remains active. It is important to note that the backup D channel remains the active D-Channel.

When connecting to a DMS-100 it is recommended that RCVP = NO.

Programming procedure

This procedure contains one major step:

- Configure the backup D-Channel and activate the recovery to primary D-Channel. Use LD17 and perform one of the following procedures depending on your software version.

Prior to X11 release 18

Follow this procedure and use LD 17 to configure the backup D-channel for prior to X11 release 18 software.

Prompt	Response	Description
BCHI	1-15	backup DCHI port number
BCHL	1-9	backup DCHI loop number
CDNO	C	Slot number of the circuit card which supports the BCHI port
RCVP	YES (NO)	Recovery to Primary D-Channel option. When RCVP is YES, the primary D-Channel becomes the active D-Channel. Defining this prompt has to be coordinated with the far end. Both sides either have to be YES or NO. If the two sides do not match, both sides default to NO.

X11 release 18 and later

Follow this procedure and use LD17 to configure the backup D-channel for X11 release 18 and later.\

Prompt	Response	Description
REQ	CHG	Change
TYPE	CFN	Configuration Record
ADAN	NEW BDCH 0-63	Add a backup D-channel (also CHG, MOV, and OUT BDCH)
PDCH	0-63	Primary D-channel
- CTYP	TMDI MSDL	The NTRB21 TMDI card (Release 24 and later). The NTBK51BA D-Channel Daughterboard.
- CDNO	1 2 3	Card number of TMDI card.
- PORT	xx	Port number.
USR	PRI, ISLD, SHA	D-channel mode
- ISLM	1-382	Prompted if USR is ISLD or SHA. Number of ISL trunks controlled by the D-Channel
DCHL	0, 2, 4,...9	PRI loop number for DCHI
OTBF	1-(32)-127	Number of output request buffers
- BPS	xxxx	Baud rate for ISL D-channel on MSDL port (default 64000)
- PARM	R232,(R422) DCE, (DTE)	ISL D-channel interface and transmission mode (MSDL port only)
BCHL	0,2,4,...9	PRI loop number for back-up D-channel
RCVP	Yes, (No)	Auto-recovery to primary D-channel option
ADAN	<cr>,****	Go on to next prompt or exit overlay

Bearer Capability in Call Detail Recording

Follow these steps to configure Bearer Capability in CDR:

- Configure the new format for CDR records in LD 17.
- Enable printing of Bearer Capability in CDR information in LD 15.

LD 17 – Configure the CDR records.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	PARM	Add system parameters data.
...		
FCDR	NEW	Enable new format for CDR record. (OLD) = Do not enable new format for CDR record.

LD 15 – Enable printing of Bearer Capability information in the CDR ticket.

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE:	CDR	CDR and Charge Account options.
CUST	xx	Customer number defined for this feature as defined in LD 15.
CDR	YES	Allow CDR records for the customer.
...		
PORT	0-15	Serial Data Interface Port Monitor.
CNI	a..a	Calling Number Identification. The response determines which field of the CDR record will contain the Calling Number Identification for this customer. • (DGTS) - CNI is recorded in the digits field. • NONE - CNI is not recorded in CDR.
- BCAP	YES	Enable Bearer Capability in CDR ticket. (NO) = Disable Bearer Capability in CDR ticket.

Call Forward, Break-In and Hunt Internal or External Network Wide

LD 15 – Define Network Wide definition of Internal/External Calls in Customer Data Block.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	FTR	Customer Features and options.
CUST	0-31	Customer number.
- IDEF	YES	Network-wide internal or external definition for Call Forward/Hunt by Call Type, Internal Call Forward and Break-In Indication Prevention. Calls will be treated as internal or external according to the network-wide definition. NO = call will be treated as internal or external as it was previously programmed.

LD 16 – Modify Route Data Block to Define Internal/External Calls.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	RDB	Route data block.
CUST	0-31	Customer number.
ROUT	0-511	Route number.
...		
RCLS	(EXT), INT	Route Class marked as External or Internal.

IDEF	(NET), LOC	Internal/External Definition. If NET is entered, any call over the selected route will receive network treatment according to available network information. If LOC is entered, the route class of the selected route will supercede any other information. A call over this route will receive internal treatment if the route class is set to internal, otherwise it will receive external.
Note: The prompt IDEF will output only if IDEF = YES in the Customer Data Block. If IDEF = NO, any information that was entered previously at the IDEF prompt will not influence the treatment received by a call.		

Call Page Network Wide

Feature implementation

LD 16 – Configuring Paging Route.

Prompt	Response	Description
REQ	NEW	New.
TYPE	RDB	Route data block.
CUST	0-31	Customer Number associated with route.
...		
TKTP	PAG	Paging Route.
NACC	(PGNR)	Call Page Network Wide Restricted (default). PGNC = Call Page Network Wide controlled (ISDN only) PGNU = Call Page Network Wide uncontrolled (PGNU is equivalent to ISDN/Analog media.)
ICOG	OGT	Outgoing trunk.
TARG	1-15	Trunk Access Restriction Group.

LD 14 – Paging Trunk Configuration.

Prompt	Response	Description
REQ	NEW	New.
TYPE	PAG	Trunk type.
TN	c u	Terminal number.
RTMB	0 - 511 1- 254	Route number, Member number.

LD 10 – Assign Class of Service to Analog (500/2500 type) telephones.

Prompt	Response	Description
REQ	NEW, CHG	New, or Change.
TYPE	500	Type telephone.
...		
CLS	PGNA	Call Page Network Wide Allowed. (PGND) = Call Page Network Wide Denied (default).

LD 11 – Assign Class of Service to Meridian 1 Proprietary Telephones.

Prompt	Response	Description
REQ	NEW, CHG	New, or Change.
TYPE	xxxx	Telephone type, where xxxx= SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616, or 3000.
...		
CLS	PGNA	Call Page Network Wide Allowed. (PGND) = Call Page Network Wide Denied (default).

LD 27 – Assign Class of Service to ISDN BRI sets.

Prompt	Response	Description
REQ	NEW, CHG	New, or Change.
TYPE	DSL	Type of data block.
DSL	l s c dsl	Digital Subscriber Loop address.
CLS	PGNA	Call Page Network Wide Allowed. (PGND) = Call Page Network Wide Denied (default).

LD 17 – D-channel Message Configuration.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ADAN	Input or Output Devices.
ADAN	CHG DCH x	Change D-channel.
- CTYP	TMDI MSDL DCHI	The NTRB21 TMDI card (Release 24 and later). The NTBK51BA D-Channel Daughterboard with PRI. The NTBK51BA D-Channel Daughterboard with ISL/VNS.
RCAP	NAC	Remote capability where: NAC= Class of Service data. XNAC = removes Class of Service as a remote capability (default).

Call Park Network Wide

Feature implementation

LD 15 – Enable Call Park Network Wide.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	FTR	Customer Features and options.
CUST	0-31	Customer number.
- OPT	CPN	Enable Call Park Network Wide. CPA = Enables Call Park. CPD = Disables Call Park (default).

LD 50 – Add/Change Customer Call Park Data.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	CPK	Call Park data block.
CUST	0-31	Customer number.
BLOC	1-5	Call Park data block number. Primary Call Park (block 1) must be defined for Call Park operation. Block 1 must be initially defined before attempting to remove.
CPTM	30-(45)-480	Call Park Timer (in seconds).
RECA	(NO), YES	Call Park Recall to Attendant.
SPDN	(0)-100 xx...x	Number of contiguous system park DNs and first DN.
MURT	0-511	Music Route number for parked call.

LD 10 – Enable Call Park for Analog (500/2500 type) telephones.

Prompt	Response	Description
REQ	NEW, CHG	New, or Change.
TYPE	500	Telephone type.
TN	c u	Terminal Number.
CLS	XFA	Call Transfer Allowed. XFD = Call Transfer Denied.

LD 11 – Add/Change Call Park Key on Meridian 1 proprietary telephones.

Prompt	Response	Description
REQ	NEW, CHG	New, or Change.
TYPE	xxxx	Telephone type where: aaaa = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616 or 3000.
TN	c u	Terminal Number.
KEY	xx PRK xx TRN xx AO3 xxAO6	Key assignment for Call Park. Key number, Transfer. Three Party Conference. Six Party Conference.

LD 12 – Add/Change Call Park Key on Attendant Consoles.

Prompt	Response	Description
REQ	NEW, CHG	New, or Change.
TYPE	xxxx	Console type.
TN	c u	Terminal Number
KEY	xx PRK	Key number, Call Park.

LD 17 – D-channel Message Configuration.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ADAN	Input or Output Devices.
ADAN	CHG DCH x	Change D-channel.
...		
RCAP	CPK	Remote capability. CPK = enable Network Call Park. XCPK = disable Network Call Park.
...		

Call Pickup Network Wide

Use the following procedure to configure Call Pickup Network Wide.

Note: minimum software vintage of Generic X11 Release 21 in order for Call Pickup Network Wide to be functional. The software Release ID is defined in LD 17.

LD 10 – Assign a Ringing Pickup Group number to an analog (500/2500 type) telephone, and define with the Class of Service which of the Call Pickup features are allowed to be activated from this station.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	500	Telephone type.
TN	c u	Terminal Number for the Option 11.
...		
RNPG	(0)-4095	Ringing Number Pickup Group (RNPG). If the RNPG is set to 0 (the default) on a station, it is not possible to pick up any call ringing this station from any other set. Enter 0 to remove a station from the RNPG. Note: If the RPNG is two or more digits in length, it must be configured in the Customer Data Block (LD 15), so that it may use the Group Pickup key. See the procedure which follows LD 11.
...		
CLS	(PUD), PUA	Ringing Number Pickup (denied) allowed.
	(DPUD), DPUA	DN pickup (denied) allowed.
	(GPUD), GPUA	Group pickup (denied) allowed.

LD 11 – Assign a pickup group to a Meridian 1 proprietary telephone. Define with the Class of Service which of the Call Pickup features are allowed to be activated from this station.

The configuring of different pickup keys is optional, since the Call Pickup and Directed Call Pickup features can be activated by dialing the SPRE + xx or by dialing a Flexible Feature Code. The Digit Display key is needed for the Display Call Pickup feature.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	aaaa	Telephone type, where: aaaa = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616, and 3000.
TN	c u	Terminal Number for the Option 11.
...		
RNPG	(0)-4095	Ringing Number Pickup Group (RNPG). If the RNPG is set to 0 (the default) on a station, it is not possible to pick up any call ringing this station from any other set. Enter 0 to remove a station from the RNPG. Note: If the RPNG is two or more digits in length, it must be configured in the Customer Data Block (LD 15), so that it may use the Group Pickup key. See the procedure which follows.
...		
CLS	(PUD), PUA	Ringing Number Pickup (denied) allowed.
	(DPUD), DPUA	DN pickup (denied) allowed.
	(GPUD), GPU A	Group pickup (denied) allowed.
...		
KEY	xx RNP yyyy	Key number, Ringing Number Pickup, Pickup Group number (optional). If the Group number is not entered, the key will pick up calls in the group assigned to the station. If the Group number is entered, the key will pick up calls in the specified group yyyy.

KEY	xx GPU	Key number, Group Number Pickup.
KEY	xx DPU	Key number, DN Pickup.
...		
KEY	xx DSP	Key number, Digit Display.

LD 15 - If the customer's Ringing Number Pickup Group is two or more digits in length (as configured in LD10/11, in response to the RNPG prompt), it must be configured in the Customer Data Block (in response to the PKND prompt); otherwise the Group Pickup key cannot be used by the group.

Prompt	Response	Comment
REQ:	CHG	Change existing data block
TYPE:	FTR	Customer Features and options
CUST	0-31	Customer number
- OPT	aaa	Options
- DGRP	(0)-2046	Maximum number of Dial Intercom Groups
- IRNG	(NO) YES	Intercom Ring
- PKND	(1)-4	Number of digits Dialed for Group Pickup
...		

LD 57 – Define the Flexible Feature Codes (FFCs) used to activate Call Pickup and Directed Call Pickup from a an analog (500/2500 type) telephone. The FFCs may also be used on Meridian 1 proprietary telephone sets.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	FFC	Flexible Feature Code.
CUST	0-31	Customer number.
...		

CODE	mmmm	Specific FFC type.
- PURN	xxxx	Pickup Ringing Number code.
- PUGR	xxxx	Pickup Group code.
- PUDN	xxxx	Pickup DN code.

LD 18 – Configure a Speed Call List. This Speed Call List will be used by a Ringing Number Pickup Group (RNPG) or a set of RNPGs as a search list to scan the MCDN network.

The Speed Call List entries should contain digits which can be used to route a network Call Pickup request to a remote node (e.g., mainly the ISDN PINX DNs of the remote nodes which will be scanned after a network Call Pickup request). There must be no gaps in the Speed Call List (i.e., each Speed Call List entry should be present).

Due to the time it takes to scan the remote node, it is strongly recommended to configure less than six entries in the Speed Call List.

Prompt	Response	Description
REQ	NEW, CHG, OUT	New, change, or remove.
TYPE	SCL	Speed Call List.
LSNO	0-8190	Speed Call List number
...		
DNSZ	4-(16)-31	Maximum size of DNs allowed for Speed Call list.
SIZE	1-1000	Maximum number of DNs allowed in Speed Call list. Note: The size cannot be greater than the value entered against the STOR prompt below.
...		
STOR	000-319 xxxx	Speed Call List entry number and digits (PINX DN) stored against it. Note: The STOR entry cannot be blank.

LD 18 – On a per customer basis, define the Ringing Number Pickup Groups that are network wide by linking them to one of the previous defined Speed Call Lists. Different RNPGs may be linked to different Speed Call Lists.

Prompt	Response	Description
REQ	NEW, CHG, OUT	New, change, or remove.
TYPE	CPNW	Call Pickup Network Wide data.
CUST	0-31	Customer number.
LSNO	0-8190	A Speed Call List associated with Call Pickup network wide groups.
- GRP	0-4095	Ringing Number Pickup Group (RNPG) using this Speed Call List. Repeat for all groups sharing the same list. Enter <CR> to reprompt LSNO.
	X0-4095	Enter X to remove an RNPG.

LD 17 – Define the software Release ID at the far end of the D-Channel. Both the target and destination switches must be equipped with a minimum software vintage of Generic X11 Release 21 in order for Call Pickup Network Wide to be functional.

Prompt	Response	Description
REQ	CHG	Change I/O device.
TYPE	ADAN	Action Device And Number.
...		
- RLS	21	Release ID of the switch at the far end of the D-channel.
...		Note: Both the target and destination switches must be equipped with a minimum software vintage of Release 21.

LD 15 – Define the customer’s Private Integrated Network Identifier (PNI) and Private Integrated Services Network Exchange (PINX) DN.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	NET	Networking data.
CUST	0-31	Customer number.
...		
ISDN	YES	Allow ISDN for this customer.
- PNI	1-32700	Define the Private Network Identifier.
- PINX_DN	xx...x	Node DN, up to seven digits with DN Expansion package 150.
	X	Enter X to remove.

LD 15 – Define the special prefix code (SPRE) to be able to activate the Call Pickup features by dialing SPRE + xx.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	FTR	Customer Features and options
CUST	0-31	Customer number.
...		
- SPRE	xxxx	Special Prefix number for this customer.
...		

LD 16 – Configure the PNI on the route. This PNI must correspond to the one configured in LD 15 on the target (remote) node.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	RDB	Route data block.
ROUT	0-511	Route number.
...		
ISDN	YES	ISDN is allowed on this route.
- PNI	1-32700	Define the Private Network Identifier.

Calling Line Identification (CLID)

Use this procedure to configure Calling Line Identification on an Option 11 system.

Restrictions and limitations

Basic PRI or ISL administration must be performed before CLID is defined

The calling line ID for a private-type call over a TIE route is always the set’s prime DN, regardless of the customer data block and sets program. If CDB CNTP = LDN, then LDN is sent for all sets. If CDB CNTP = PDN then either PDN or LDN is sent depending on COS assigned to the sets. For explanation, see the Option 11 software guide.

Programming procedure

This procedure contains three major steps:

- 1 Allow CLID in CDR. Use LD17.
- 2 Select default class of service for sets, for calling number type to be sent for CLID. Use LD15.
- 3 Configure set's display number differently than the class of service in LD15 (CNTP). Use LD10 / LD11.

Step 1

Allow CLID in CDR. Use LD17.

Prompt	Response	Description
CLID	YES,(NO)	Enable CLID in CDR. This prompt will only appear if the response to the CDR prompt in LD15 is YES.

Step 2

Select default class of service for sets, for calling number type to be sent for CLID. Use LD15.

Prompt	Response	Description
CNTP		Calling no. type
	(PDN)	CLID display the set's Prime DN
	LDN	CLID display customer Listed DN

Step 3

Configure set's display number differently than the class of service in LD15 (CNTP). Use LD10 / LD11.

Prompt	Response	Description
REQ	NEW,CHG	
TYPE		set type as appropriate
TN	c u	terminal number address
CLS	(PDN)	the set's Prime Directory Number
	LDN	the customer's Listed Directory Number

Calling Party Privacy

LD 57 – Define the FFC for CPP Code.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change.
TYPE	FFC	Flexible Feature Code.
CUST	0-31	Customer number.
FFCT	(NO), YES	Flexible Feature Confirmation Tone.
...		
CODE	CPP	FFC type to be altered. CPP entry is only allowed if the CPP package is equipped. <CR> means that no FFC types are prompted.
...		
CPP	(*67), nnnn	Calling Party Privacy code. CPP is prompted only if the CPP package is equipped. Any arbitrary digit sequence up to four digits can be specified. For Meridian 1 proprietary set, an "*" can be entered as the first digit. CPP will be prompted until a <CR> is entered.

LD 16 – Define Privacy Indicators.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change.
TYPE	RDB	Route Data Block.
CUST	0-31	Customer number.
TKTP	COT, DID, FEX, WAT	Trunk Route Type.
...		
DTRK	YES	Digital trunk route.
DGTP	DTI	Digital trunk type.

ISDN	YES	ISDN PRI option.
...		
ACOD	nnnn	Trunk Access Code.
CPP	YES	Calling Party Privacy. YES = This trunk route is enabled for the recognition of the Calling Party Privacy feature. CPP is only prompted if the following conditions are met: the CPP package is equipped, the OPAO package is not equipped, OGT (outgoing) or IAO (incoming and outgoing) trunk, non ISDN option and trunk route type is COT/DID/FEX/WAT. The default value for the CPP prompt is NO.
TCPP	(NO), YES	CPP for an incoming trunk call tandemed to this trunk route. YES = An incoming non-ISDN trunk call tandemed to this trunk route will carry the Privacy Indicator. The default value for the TCPP is NO.
- DTPI	nnnn	Privacy Indicator for a digitone trunk. DTPI is prompted only if CPP is set to "YES" and the trunk route is non-ISDN. If CPP is changed from NO to YES, the default is *67. Any arbitrary digit sequence (0-9) up to four digits can be specified. An asterisk "*" is allowed to be the first digit only if the outgoing call goes to a Public Network.
- DPPI	nnnn	Privacy Indicator for a dial pulse trunk. DPPI is prompted only if CPP is set to "YES" and the trunk route is non-ISDN. If CPP is changed from NO to YES, the default is 1167. Any arbitrary digit sequence (0-9) up to four digits can be specified.
- PII	(NO) YES	Calling Party Privacy Indicator is honored. Calling Party Privacy Indicator is ignored. PII is prompted with X11 Release 23 and later. Note: PII is only prompted when the CPP package is equipped; the trunk route type is COT, DID, FEX, or WAT; the ISDN option is set to YES; the ISDN Interface (IFC) is D100, D250, ESS4, ESS5, or NI2; and the route is Incoming and Outgoing (IAO) or Incoming Only Trunk (ICT).

LD 10/11 – Activate Calling Party per-line blocking.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change.
TYPE	nnnn	Type of telephone.
TN	c u	Terminal Number.
...		
CLS	CLBA	Activate Calling Party per-line blocking. Enter CLBD to deactivate Calling Party per-line blocking. CLBD is the default.

Calling Party Privacy Override

LD 16 – For an ISDN trunk route set the TCPPO flag in RDB to tandem non-ISDN calls on to this route. Configuration procedures require that the following conditions are met:

- The CPP package 301 is equipped.
- Route is either OGT (outgoing) or IAO (incoming and outgoing).

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number as defined in LD 15.
ROUT	xxx	Route number. xxx = 0-127 for Option 11C. Note: All ISDN trunk routes are CPPO configurable.
...		
CPP	YES	Calling Party Privacy/Privacy Override (CPP/CPPO) flag. Enable CPP/CPPO feature and configure parameters. (NO) = CPP/CPPO feature is disabled is the default.
- TCPPO	(NO) YES	CPP/CPPO flag treatment for an incoming non-ISDN trunk call tandemed to this trunk route. Outgoing call will carry the Privacy Override Indicator (default). Outgoing call will carry the Privacy Indicator.

LD 57 – Define the Flexible Feature Code for the Calling Party Privacy Override feature.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	FFC	Flexible Feature Code.
CUST	xx	Customer number as defined in LD 15.
FFCT	(NO) YES	Flexible Feature Confirmation Tone denied. Flexible Feature Confirmation Tone allowed.
...		
CODE	CPP	CPP Flexible Feature Code
- CPP	xxxx	Calling Party Privacy code xxxx = 0-9999, an asterisk (*) can be entered as the first digit. The Flexible Feature Code may be up to 4 digits, or up to 7 digits with the Directory Number Expansion (DNXP) package (150).
- CPP	xxxx	Change the CPP code or enter a <CR> to accept.
CODE	CPPO	CPPO Flexible Feature Code
- CPPO	xxxx	Calling Party Privacy Override code xxxx = 0-9999, an asterisk (*) can be entered as the first digit. The Flexible Feature Code may be up to 4 digits, or up to 7 digits with the Directory Number Expansion (DNXP) package (150).
- CPPO	xxxx	Change the CPPO code or enter a <CR> to accept.

LD 10/11 – Activate Calling Party Number and Name per-line blocking.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	aaaa	Type of set.
TN	c u	Terminal Number. c = card, u = unit for Option 11C.
DES	d...d	Designator The response d...d represents an Office Data Administration System (ODAS) Station Designator of 1-6 alphanumeric characters.
CUST	xx	Customer number as entered in LD 95.
...		
CLS	CLBA	Activate Calling Party Number and Name per-line blocking. CLBD = Deactivate Calling Party Number and Name per-line blocking (default).

Display of Access Prefix on CLID

The following procedures are required to configure the Display of Access Prefix on CLID feature:

- Enable the Display of Access Prefix on CLID feature for digital sets in LD 11.
- Enable the Display of Access Prefix on CLID for attendant consoles in LD 12.
- Configure the access prefix table in LD 15.
- Enable the Display of Access Prefix on CLID feature in LD 16.

LD 11 - Enable the Display of Access Prefix on CLID feature for digital sets.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	aaaa	Type of Meridian 1 proprietary set.
TN	l s c u c u	Terminal Number. l = loop, s = shelf, c = card, u = unit for Options 51C-81C. c = card, u = unit for Option 11C.
DES	x...x	Office Data Administration System Designator.
CUST	xx	Customer Number as defined in LD 15.
...	...	
CLS	(DAPA)	Status of Display of Access Prefix on CLID. (DAPA) = Default enables the Display of Access Prefix on CLID. DAPD = Disable Display of Access Prefix on CLID.

LD 12 - Enable the Display of Access Prefix on CLID for attendant consoles.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	aaaa	Attendant type. Where aaaa = 1250 or 2250.
TN	l s c u c u	Terminal Number. l = loop, s = shelf, c = card, u = unit for Options 51C, 61C, 81, 81C. c = card, u = unit for Option 11C.
SETN	l s c u c u	Second Terminal Number. l = loop, s = shelf, c = card, u = unit for Options 51C, 61C, 81, 81C. c = card, u = unit for Option 11C.
CUST	xx	Customer Number as defined LD 15.
ANUM	1-63	Attendant Number.
...	...	
DAPC	(DAPA)	Status of Display of Access Prefix on CLID. (DAPA) = Enable Display of Access Prefix on CLID. DAPD = Disable Display of Access Prefix onCLID.

LD 15 - Configure the access prefix table.

Prompt	Response	Description
REQ:	CHG	Change existing data block.
TYPE:	FTR	Customer Features and options.
CUST	xx	Customer Number associated with this feature.
...	...	
DAPC	YES	Configure Display of Access Prefix table entry option. (NO) is the default.
-TBL	1-15	Table number. Table 0 is non configurable. Precede table number with "X" to remove.

--NPI	aaaa	Numbering Plan Identification. Valid entries for aaaa include: UNKN = Unknown. E164 = Numbering Plan based on E164. PRIV = Private. E163 = Numbering Plan based on E163. TELX = Telex. X121 = Data X121. NATL = National.
--TON	aaaa	Type of number. Valid entries for aaaa include: UNKN = Unknown. INTL = International. NATL = National. ESPN = ESN_SPN. LOCL = Local. ELOC = ESN_LOC. ECDP = ESN_CDP.
---PREFIX	0-9999	Up to four digit Access Prefix for a unique NPI/TON combination in the table. Carriage return is taken as NIL Access Prefix value.
	#	Wild Character for replacement of any digit. The entry of “#” for wild card character is stored and displayed as “*”. Note: The entry of “*” would be misinterpreted by the overlay supervisor for the standard overlay operation.)
	X	Reset the access prefix value to NIL.
--TON	...	Repeat for every value of TON for the particular NPI.
--NPI	...	Repeat for every value of NPI.

LD 16 - Enable the Display of Access Prefix on CLID feature.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	RDB	Route Data Block.
CUST	xx	Customer Number as defined in LD 15.
ROUT	xxx	Route number. xxx = 0-511 for Options 51C, 61C, 81, and 81C. xxx = 0-127 for Option 11C.
...	...	
ISDN	YES	Integrated Services Digital Network route.
...	...	
DAPC	YES	Enable feature at the route data block Level. YES = Enable Display Access Prefix CLID. (NO) = (default) Disable feature at the route data block level.
-TBL	1-15	Prefix table number as defined in LD 15.

Note 1: Set related printing is done in Overlay 20. Overlay 20 is modified to allow the printing of the Class of Service for Access Prefix display allowed or denied.

Note 2: To print the table number associated with the route data block, the feature is enabled at the route data block level.

LD 21- Print the table number associated with the route data block.

Prompt	Response	Description
REQ	PRT	Print route/customer data block.
TYPE	FTR_DATA/FTR	Route data block/Prefix table
TBL	0-15	Prefix table number. When a <CR> is entered all the configured tables for that customer are printed.

Display of Calling Party Denied

LD 10 – Allow Directory Number Display and Name Display for Analog (500/2500) type sets.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	500	500/2500 type set data block.
TN	c u	Terminal Number.
...		
CLS	DDGA	Directory Number Display Allowed (default). DDGD = Directory Number Display Denied.
CLS	NAMA	Name Display Allowed (default). NAMD = Name Display Denied.

LD 11 – Allow Directory Number Display and Name Display for Meridian 1 proprietary sets.

Prompt	Response	Description
REQ	CHG.	Change.
TYPE	xxxx	Telephone type, where: xxxx = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616 or 3000.
TN	c u	Terminal Number
...		
CLS	DDGA	Directory Number Display Allowed (default). DDGD = Directory Number Display Denied.
CLS	NAMA	Name Display Allowed (default). NAMD = Name Display Denied.

E.164/ESN Numbering Plan Expansion

Feature implementation

The following steps are used to configure the E.164/ESN Numbering Plan Expansion enhancements:

- In LD 10, for analog (500/2500 type) sets, configure the expansion pertaining to the maximum length of Autodial, Call Forward All Calls, Default Call Forward (for Phantom TNs), and Internal Call Forward DNs;
- In LD 11, for Meridian 1 proprietary sets, configure the expansion pertaining to the maximum length of Autodial, Conference-Autodial, Call Forward All Calls, and Internal Call Forward DNs;
- In LD 12, for attendant consoles, configure the expansion pertaining to the maximum length of the Autodial DN;
- In LD 15, configure the expansion pertaining to the maximum length of the Customer Call Forward DN;
- In LD 23, configure the expansion pertaining to the maximum length of the ACD Night Call Forward DN and the ACD Interflow DN;
- In LD 86, for the ESN data block, configure the expansion pertaining to the maximum number of Digit Manipulation tables, and maximum number of Supplemental Digit Restriction and Recognition blocks;
- In LD 86, for the Digit Manipulation data block, configure the expansion pertaining to the maximum number of leading digits to be deleted and inserted;
- In LD 87, for a Free Special Number Screening Index, configure the expansion pertaining to the maximum number of Special Numbers to be screened;
- In LD 87, for a Trunk Steering Code, configure the expansion pertaining to the maximum number of Flexible Numbers;

- In LD 90, for Network Translation tables, configure the expansion pertaining to the maximum number of Special Numbers digits, the maximum number of digits for Flexible Numbers, the maximum number of Supplemental Digit Restriction and Recognition digits per entry, and the addition of “allow” as a new Supplemental Digit Restriction and Recognition type.

LD 10 — For analog (500/2500 type) sets, configure the expansion pertaining to the Autodial, Call Forward All Calls, Default Call Forward (for Phantom TNs), and Internal Call Forward DN.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
TYPE	500	Type of telephone set.
TN	c u	Card and unit.
...		
FTR		Special features for telephone sets.
	CFW (4)-31	Enter the maximum number of digits in the Call Forward All Calls DN. Note that there is no default value.
	DCFW ll xxx...x	Enter the maximum number of digits in the Default Call Forward DN for a Phantom DN. ll = 4,8,12,16,20,24,28,31 (entries are rounded up to the next valid length.) xx...x = the Default Call Forward All Calls DN.
	ICF (4)-31	Enter the maximum number of digits in the Internal Call Forward DN for a Phantom DN.
	...	

LD 11 – For Meridian 1 proprietary sets, configure the expansion pertaining to the Autodial, Call Forward All Calls, Default Call Forward (for Phantom TNs), and Internal Call Forward DN.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
TYPE	xxxx	Type of telephone set. xxxx = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2116, 2317, 2616, M3000.
TN	c u	Card and unit.
KEY		Telephone function key assignments.
	nn ADL ll xxx...x	Enter the maximum number of Autodial digits that may be stored. nn = Key number ll = 4, 8, 12, (16), 20, 24, 28, 31, NUL (for M3000 sets, the accepted range is (4)-28) Entries are rounded up to the next valid length. An entry of NUL will disable the Autodial feature xx...x = the Autodial target DN (this is an optional entry.)
	nn CA ll xxx...x	Enter the maximum number of digits that may be stored for the combined Conference-Autodial DN. nn = Key number ll = 4, 8, 12, (16), 20, 24, 28, 31 (entries are rounded up to the next valid length.) xx...x = the Conference-Autodial target DN (this is an optional entry.)
	nn CFW ll xxx...x	Enter the maximum number of digits that may be stored for the Call Forward All Calls DN. nn = Key number ll = (4)-31 (for M2317 and M3000 sets, the accepted range is (4)-23) xx...x = the Call Forward All Calls DN (this is an optional entry.)
	nn ICF ll xx...x	Enter the maximum number of digits that may be stored for the Internal Call Forward DN. nn = Key number ll = (4)-31 xx...x = the Internal Call Forward DN (this is an optional entry.)

LD 12 – For attendant consoles, configure the expansion pertaining to the maximum length of the Autodial DN.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
TYPE	xxxx	Type of attendant console xxxx = 1250, 2250.
TN	c u	Card and unit.
KEY	nn ADL xxx...x	Attendant console function key assignments. Enter the maximum number of Autodial digits that may be stored. nn = Key number xxx...x = the Autodial DN, up to 31 digits (this is an optional entry.)
	...	

LD 15 - Configure the expansion pertaining to the Customer Call Forward DN.

Prompt	Response	Description
REQ:	NEW, CHG	Add new data, or change existing data.
TYPE	RDR	Redirection data.
CUST	0-31	Customer Number.
...		
- CCFWDN	xxx...x X	Enter the Customer Call Forward DN, up to 23 digits (this entry is made for a new CCFWDN, or if the length of an existing CCFWDN has been expanded.) Enter X for no entry.
...		

LD 23 - Configure the expansion pertaining to the ACD Night Call Forward DN and the ACD Interflow DN.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
TYPE	RDR	Call Detail Recording data.
CUST	0-31	Customer Number.
ACDN	xxx...x	ACD DN.
...		
NCFW	xxx...x	Enter the ACD Night Forward DN, up to 31 digits (this entry is made for a new Night Forward DN, or if the length of an existing Night Forward DN has been expanded.)
...		
IFDN	xxx...x	Enter the ACD Interflow DN, up to 31 digits (this entry is made for a new Interflow DN, or if the length of an existing Interflow DN has been expanded.)

LD 86 - For the ESN data block, configure the expansion pertaining to the maximum number of Supplemental Digit Restriction and Recognition blocks, and the maximum number of Digit Manipulation tables.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
CUST	0-31	Customer Number.
FEAT	ESN	ESN data block feature.
...		
MXSD	(0)-1500	Enter the maximum number of Supplemental Digit Restriction and Recognition (SDRR) blocks, for BARS or NARS. Enter 0 (the default) if no SDRR blocks are required.
...		

MXDM	(0)-1000 (0)-256 (0)-32	Enter the maximum number of Digit Manipulation tables. (0)-1000 = for Flexible Numbering Plan (0)-256 = for BARS/NARS (0)-32 = for Coordinated Dialing Plan Enter 0 (the default) if no Digit Manipulation tables are required.
...		

LD 86 - For the Digit Manipulation data block, configure the expansion pertaining to the maximum number of leading digits to be deleted and inserted.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
CUST	0-31	Customer Number.
FEAT	DGT	Digit Manipulation data block feature.
...		
DMI	1-999 1-255 1-31	Enter the Digit Manipulation table. 1-999 = for Flexible Numbering Plan 1-255 = for BARS/NARS 1-31 = for Coordinated Dialing Plan. The maximum number of Digit Manipulation tables is defined using prompt MXDM, in the ESN data block.
DEL	(0)-19	Enter the number of leading digits to be deleted. Enter 0 (the default) for none.
INST	x...x x...x*y...y X	Enter the number of leading digits to be inserted. x...x = 1-31 x...x*y...y = for Special Common Carriers (SCCs), 1-30, including access number (x...x), delimiter (*), and authorization code (y...y) Enter X for none.
...		

LD 87 - For a Free Special Number Screening Index, configure the expansion pertaining to the maximum number of Special Numbers to be screened.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
CUST	0-31	Customer Number.
FEAT	FSNS	Free Special Number Screening.
FSNI	1-255	Free Special Number Screening Index.
SPN	1-19	Special Number to be screened.
...		

LD 87 - For a Trunk Steering Code, configure the expansion pertaining to the maximum number of Flexible Numbers.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
CUST	0-31	Customer Number.
FEAT	CDP	Coordinated Dialing Plan.
TYPE	TSC	Trunk Steering Code.
TSC	1-7	Trunk Steering Code.
- FLEN	0-24	Flexible Number.
...		

LD 90 - For Network Translation tables, configure the expansion pertaining to the maximum number of Special Numbers digits, the maximum number of digits for Flexible Numbers, the maximum number of Supplemental Digit Restriction and Recognition digits per entry, and the addition of “allow” (ALLOW) as a new Supplemental Digit Restriction and Recognition type.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
CUST	0-31	Customer Number.
FEAT	NET	Network Translation Tables data.
...		
TYPE	SPN	Special Number Translation.
SPN	xxxx xxxx x...x	Enter the Special Number Translation digits. Up to 19 digits may be entered. The SPN digits must be entered in groups of at most four digits, separated by a space. Up to five groups can be entered. The restriction is removed of allowing one less digit if the first digit of a digit string is not “1”.
- FLEN	(0)-24	Enter the number of Flexible Digits (the number of digits that the system expects to receive before accessing a trunk, and outputting the digits.)
...		
- SDRR	DENY LDID LDDD DID DDD ITED ARRN STRK ALLOW	Type of Supplemental Digit Restriction and Recognition. DENY = restricted codes LDID = recognized local DID codes LDDD = recognized local DDD codes DID = recognize remote DID codes DDD = recognize remote DDD codes ITED = incoming trunk group exclusion digits ARRN = alternate routing remote number STRK = allowed codes for ADM/MDM ALLOW = allowed codes

		The maximum number of digits entered in response to the DENY, LDID, LDDD, DID, DDD, and ALLOW prompts, which follow, must be lesser than 10, or 7-m (8-m for 1+ dialing) for Central Office translation data (NXX), 10-m (11-m for 1= dialing) for Numbering Plan Area Code translation data (NPA), or 19-m for Special Numbers Translation data (SPN), where m = the number of digits entered for the prompt NXX, NPA, or SPN. These numbers are no longer required to be leftwise unique. For non leftwise unique numbers, the longer number takes precedence over the shorter number. However, the exact same numbers (non leftwise unique and the same length) are still blocked.
-- DENY	x...x	Restricted number to be denied.
-- LDID	x...x	Local DID number to be recognized.
-- LDDD	x...x	Local DDD number to be recognized.
-- DID	x...x	Remote DID number to be recognized.
-- DDD	x...x	Remote DDD number to be recognized.
-- ALLOW	x...x	Code to be allowed.

Electronic Lock Network Wide/Electronic Lock on Private Lines

Electronic Lock Network Wide

Use the following overlays to implement Electronic Lock Network Wide.

LD 15 – Modify Customer Data Block for Controlled Class of Service data as follows

Prompt	Response	Description
REQ:	CHG	Change existing data block.
TYPE:	CCS	Controlled Class of Service data.
CUST	0-31	Customer number.
- CCRS	aaa	Controlled class of service (CCOS) Restricted Service.
- ECC1	aaa	Enhanced Controlled Class of Service level 1.
- ECC2	aaa	Enhanced Controlled Class of Service level 2.
- CNCS	0-99	Network Controlled Class Of Service for Electronic Lock.
- PELK	YES (NO)	Enter YES for Electronic Lock on a private line; otherwise, enter NO.

LD 15 – Modify Customer Data Block for Flexible Feature Code data as follows:

Prompt	Response	Description
REQ:	CHG	Change existing data block.
TYPE:	FFC	Flexible Feature Code data.
CUST	0-31	Customer number.
- CCRS	aaa	Controlled class of service (CCOS) Restricted Service.
- SCPL	0-8	Station Control Password Length.
- SBUP	(YES) NO	Enable use of station control passwords for set based administration user level access

- - PWD2	xxxx	PWD2 password for confirmation
- FFCS	(NO) YES	Change Flexible Feature Code end-of-dialing indicator
- - STRL	1-3	String Length of end-of-dial indicator
- - STRG	xxx	String to indicate end-of-dialing
- ADLD	(0)-20	Auto Dial Delay in seconds
- SCPL	0-8	Station Control Password Length

LD 10 – Set the Station Control Password and Controlled Class of Service Allowed for each analog (500/2500 type) telephone.

Prompt	Response	Description
REQ	NEW,CHG	Add, Change.
TYPE	500	Telephone type.
CUST	0-31	Customer Number.
TN	c u	Card, and unit (Option 11).
SCPW	xxxxxxx	Station Control Password (1 to 8 digits, as defined in LD 15).
CLS	CCSA	Controlled Class of Service Allowed.

LD 11 – Set the Station Control Password and Controlled Class of Service Allowed for each Meridian 1 proprietary telephone.

Prompt	Response	Description
REQ	NEW,CHG	Add, Change.
TYPE	aaaa	Telephone type, where aaaa = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616, or 3000.
CUST	0-31	Customer Number.
TN	c u	Card, and unit (Option 11).
SCPW	xxxxxxx	Station Control Password (1 to 8 digits, as defined in LD 15).

CLS	CCSA	Controlled Class of Service Allowed.

LD 57 – Configure the Flexible Feature Codes for Electronic Lock.

Prompt	Response	Description
REQ	NEW/CHG	Enter new/change data.
TYPE	FFC	Flexible Feature Codes.
CUST	0-31	Customer Number.
FFCT	YES	Provide FFC confirmation tone.
CODE	ELKA	New/change Electronic Lock Activate FFC.
ELKA	xxxx	Enter the new or changed Electronic Lock Activate FFC
ELKA	<cr>	
CODE	ELKD	New/change Electronic Lock Deactivate FFC.
ELKD	xxxx	Enter the new or changed Electronic Lock Deactivate FFC
ELKD	<cr>	

LD 87 – In the ESN 2 overlay, define all NCOS to be used.

Prompt	Response	Description
REQ	NEW/CHG	Enter new/change data.
CUST	0-31	Customer Number.
FEAT	NCTL	Network Control.
...		
NRNG	0-99	NCOS range.
NCOS	0-99	Network Class of Service group number.
...		
– FRL	(0)-7	Facility Restriction level.

Electronic Lock on Private Lines

Use the following overlays to implement Electronic Lock Network on Private Lines.

LD 15 – Modify Customer Data Block for Controlled Class of Service data as follows

Prompt	Response	Description
REQ:	CHG	Change existing data block.
TYPE:	CCS	Controlled Class of Service data.
CUST	0-31	Customer number.
- CCRS	aaa	Controlled class of service (CCOS) Restricted Service.
- ECC1	aaa	Enhanced Controlled Class of Service level 1.
- ECC2	aaa	Enhanced Controlled Class of Service level 2.
- CNCS	0-99	Network Controlled Class Of Service for Electronic Lock.
- PELK	YES	Electronic Lock on Private Lines.

LD 15 – Modify Customer Data Block for Flexible Feature Code data as follows

Prompt	Response	Description
REQ:	CHG	Change existing data block.
TYPE:	FFC	Flexible Feature Code data.
CUST	0-31	Customer number.
- CCRS	aaa	Controlled class of service (CCOS) Restricted Service.
- SCPL	0-8	Station Control Password Length.
- SBUP	(YES) NO	Enable use of station control passwords for set based administration user level access
- - PWD2	xxxx	PWD2 password for confirmation

- FFCS	(NO) YES	Change Flexible Feature Code end-of-dialing indicator
- - STRL	1-3	String Length of end-of-dial indicator
- - STRG	xxx	String to indicate end-of-dialing
- ADLD	(0)-20	Auto Dial Delay in seconds
- SCPL	0-8	Station Control Password Length

LD 16 – Set the Facility Restriction Level (FRL) number and the New Flexible Code Restriction (NFCR) tree number for private lines.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	RDB	Route Data Block.
...		
PRIV	YES	Private Line Route.
...		
FRL	0-7 0-254	Facility Restriction Level (FRL) and New Flexible Code Restriction (NFCR) tree number.

LD 10 – Set the Station Control Password and Controlled Class of Service Allowed for each analog (500/2500 type) telephone.

Prompt	Response	Description
REQ	NEW,CHG	Add, Change.
TYPE	500	Telephone type.
CUST	0-31	Customer number.
TN	c u	Card, and unit.
SCPW	xxxxxxx	Station Control Password (1 to 8 digits, as defined in LD 15).
CLS	CCSA	Controlled Class of Service Allowed.

LD 11 – Set the Station Control Password and Controlled Class of Service Allowed for each Meridian 1 proprietary telephone.

Prompt	Response	Description
REQ	NEW,CHG	Add, Change.
CUST	0-31	Customer number.
TYPE	aaaa	Telephone type, where aaaa = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616, or 3000.
TN	c u	Card, and unit.
SCPW	xxxxxxxx	Station Control Password (1 to 8 digits, as defined in LD 15).
CLS	CCSA	Controlled Class of Service Allowed.
...		
KEY	xx PVR yyyy(yyy)	Key number and DN for Private Line Ringing, where xx = the key number and yyyy(yyy) = the Private Line Ringing DN (up to four digits; up to seven digits if the Directory Number Expansion (DNXP) package 150 is equipped). Private Line Directory Number (PRDN) must be defined in LD 14.

Error Handling on ISDN Signaling Link Analog E&M Tie Trunks

LD 16 – Configure ISL on Analog Trunks.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change.
TYPE	RDB	Route data block.
...		
DTRK	NO	Digital trunk route.
ISDN	YES	ISDN Primary Rate Interface option.
MODE	ISLD	Mode of D-channel controlling the route.
...		
FALT	YES	Enables the error handling and recognition of E lead error for ISL E&M Tie Trunks. If FALT= NO, then no error handling with occur.

Flexible Numbering Plan Enhancement

LD 15 – Enable/disable the Flexible Numbering Plan feature.

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE:	NET	Networking data.
CUST	xx	Customer number.
...		
AC2	NPA NXX INTL SPN LOC	Access Code 2. E.164 National E.164 Subscriber International Special Number Location Code
FNP	YES	Enable the Flexible Numbering Plan feature (default).
ISDN	(NO) YES	ISDN option.
...		
VNR	(NO) YES	Vacant Number Routing enabled (disabled). VNR is only prompted when FNP = YES. When FNP = NO, VNR is automatically set to NO and is, therefore, restricted.
- RLI	0-999	Route List Index. Enter the route list, defined in LD 86, to be used by Vacant Number Routing.
- FLEN	1-(16)	Flexible length of digits expected.
- CDPL	1-(10)	Coordinated Dialing Plan Length. Enter the maximum number of Coordinated Dialing Plan (CDP) digits expected by Vacant Number Routing.
- LOCL	1-(10)	Location Code Length. Enter the maximum number of Location (LOC) digits expected by Vacant Number Routing.

Incoming Trunk Programmable Calling Line Identification

Use the following procedure to configure Incoming Trunk Programmable Calling Line Identification.

Procedure 1 Configure Electronic Lock Network Wide/Electronic Lock on Private Lines

Step	Overlay	Action
1	LD 16 Route Data Block	Configure incoming route.
2	LD 16 Route Data Block	Configure outgoing route.

Step 1 - Use **Overlay 16** to configure the incoming route.

Prompt	Response	Description
REQ	NEW, or CHG	New, or Change.
TYPE	RDB	Route data block.
...		
BILN	(NO), YES	Billing number (is not) is required.
BLN	1-(10)-16	Billing number length. The default is 10 digits.
BNUM	x...x	Billing number (1 to 16 digits).
BDSP	(NO), YES	(Do not) display Billing Number.

Step 2 - Use Overlay 16 to configure outgoing route.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	RDB	Route data block.
...		
ISDN	(NO), YES	ISDN route must be YES.
...		
IFC	xxxx	Select the appropriate interface type for route (cannot be SL1 or IDA).
SBN	(NO), YES	(Do not) send billing number. Must be set to YES.

IISDN CLID enhancements**Feature implementation**

The following steps are required to configure the ISDN CLID enhancements:

- In LD 15, construct the CLID table for a customer;
- In LD 21, print the CLID table (to verify CLID entries);
- In LD 10, define the CLID entry for analog (500/2500 type) sets;
- In LD 11, define the CLID entry for DN keys for Meridian 1 proprietary sets;
- In LD 27, define the CLID entry for ISDN BRI sets.

LD 15 — Construct the CLID entry for a customer.

Prompt	Response	Description
REQ:	NEW, CHG	Add new data, or change or delete existing data.
TYPE	NET	Networking data (if REQ = CHG only.)
CUST	0-31	Customer Number.

...		
ISDN	YES	Integrated Services Digital Network.
- PNI	1-327000	Private Network Identifier.
- CLID	YES (NO)	CLID option. YES = configure a CLID table for the customer. NO = (the default) do not configure a CLID table. In this case, the remaining prompts are not generated, and no CLID is sent for the customer.
-- SIZE	0-(256)-4000	The maximum number of CLID entries needed for a customer. If REQ = NEW, you may select the default value (256) by entering <CR> in response to this prompt. It is advised that you not define a size much larger than actually needed. This entry may be increased or decreased as required.
-- INTL	0-9999 X	Country code, for international number. Enter X to delete digits.
-- ENTRY	aaaa Xaaaa Xaaaa Xbbbb <CR>	aaaa = CLID entry to be configured. Xaaaa = CLID entry to be deleted. Xaaaa Xbbbb = CLID entries to be deleted. aaaa and bbbb must be a value between 0 and (SIZE-1). The ENTRY prompt is repeated until <CR> is entered as a response. If REQ = NEW, only one new entry may be created. The entry will be saved to system memory when the configuration for the entire overlay is completed. If REQ = CHG, as many entries as needed may be created, changed or deleted. The action for the entry will be saved to system memory after the CLID entry has been completely configured, that is, after the LSC prompt has been answered. If a new CLID entry is created, or an existing CLID entry is changed, the message "ENTRY aaaa SAVED" is displayed after the LSC prompt. If a CLID entry or CLID entries is/are deleted, the message "ENTRY aaaa DELETED" or "ENTRIES aaaa-bbbb DELETED" is displayed after the LSC prompt.

--- HNTN	0-999999 X	National code for home national number (1-6 digits). X = delete digits.
--- HLCL	0-999..9 X	Local code for home local number or Listed Directory Number (1-12 digits). X = delete digits.
--- DIDN	(YES) NO SRCH	How to use the DN as a DID when constructing a CLID national or local number. YES = The default. The CLID is constructed using the digits defined in HLCL followed by the DN of the active key. NO = Construct the CLID using the digits defined in HLCL. SRCH = Search on the set, from key 0 - upwards, to find a CLID entry which has the DIDN set to YES. Use the found CLID to construct the local number.
--- HLOC	0-9999999 X	Home location code (ESN), 1-7 digits. X = delete digits.
--- LSC	0-9999999 X	Local steering code, 1-7 digits. X = delete digits.
ENTRY aaaa SAVED ENTRY aaaa DELETED ENTRIES aaaa-bbbb DELETED		Displayed message. Refer to Note 3 for the ENTRY prompt.

It is advised that after the CLID table has been built in LD 15, a printout be generated, using LD 21, to verify the table entries defined in LD 15.

LD 21 — Print the CLID table for a customer.

Prompt	Response	Description
REQ	PRT	Print the customer data block.
TYPE	CLID	CLID entry data.
CUST	0-31	Customer Number.
SIZE	0-4000	The value that was defined for SIZE in LD 15 is printed automatically after the customer number has been entered.

RNGE	aaaa aaaa bbbb <CR>	CLID entry to be printed. Range of CLID entries to be printed (from aaaaa to bbbbb), aaaa and bbbb must be between 0 and the value defined for SIZE-1 in LD 15. Printing begins when <CR> is entered.
INTL	0-9999	Country code, for international number, is printed.
ENTRY	aaaa	CLID entry number in CLID table is printed. If a range of entries is entered in the RNGE prompt, all of the entries in the specified range are printed in sequence.
- HNTN	0-999999	National code for home national number, 1-6 digits, is printed.
- HLCL	0-999..9	Local code for home local number or Listed Directory Number, 1-12 digits, is printed.
- DIDN	YES NO SRCH	The desired choice of how to use the DN as a DID, when constructing a CLID national or local number, will be printed.
- HLOC	0-9999999	Home location code (ESN), 1-7 digits, is printed
- LSC	0-9999999	Local steering code, 1-7 digits, is printed.
...		

LD 10 — Define the CLID entry for analog (500/2500 type) sets.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
TYPE	500	500 set.
TN	c u	Terminal Number address card and unit.
...		
DIG	xx yy	Dial Intercom group number and member number.
DN	xxxx (0)-N	DN and CLID entry. N = CLID SIZE-1 (SIZE defined in LD 15).
...		

LD 11 — Define the CLID entry for DN keys for Meridian 1 proprietary sets.

Note: When assigning a CLID entry to an ACD set, you cannot use the same position ID already on the set. The set must be first outted, or the ACD key must be nulled and then rebuilt with the table entry number.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
TYPE	xxxx	Type of telephone set.
TN	c u	Card and unit.
...		
KEY	xx MCN yyyy (0)-N/D xx MCR yyyy (0)-N/D xx PVN yyyy (0)-N/D xx PVR yyyy (0)-N/D xx SCN yyyy (0)-N/D xx SCR yyyy (0)-N/D	Telephone function key assignments. xx = key number. MCN = Multiple Call Non-ringing key. MCR = Multiple Call Ringing key. PVN = Private Line Non-Ringing key PVR = Private Line Ringing key SCN = Single Call Non-ringing key. SCR = Single Call Ringing key. yyyy = DN. (0)-N = CLID entry, with N = CLID SIZE-1 (SIZE defined in LD 15). D = CLID entry. Search for a CLID entry from key 0 upwards, to find a DN key. The found CLID is used as the CLID entry for the active DN key.

KEY	xx HOT D dd yyy...y zzzz m (0)-N/D	Two-way Hotline Direct key, where: xx = key number. dd = number of digits dialed. yyy...y = target number (terminating DN, maximum of 31 digits). zzzz = two-way hotline DN. m = one of the following Terminating Modes: H = Hotline (default) N = Non-ringing R = Ringing V = Voice (0)-N = CLID entry, with N = CLID SIZE-1 (SIZE defined in LD 15). D = CLID entry. Search for a CLID entry from key 0 upwards, to find a DN key. The found CLID is used as the CLID entry for the active DN key.
KEY	xx HOT L bbb zzzz (0)-N/D	Two-way Hotline List key, where: xx = key number. bbb = Hot Line List entry (0-999). zzzz = two-way hotline DN. (0)-N = CLID entry, with N = CLID SIZE-1 (SIZE defined in LD 15). D = CLID entry. Search for a CLID entry from key 0 upwards, to find a DN key. The found CLID is used as the CLID entry for the active DN key.

KEY	xx ACD aaaa 0-N/D bbbb	ACD key, where: xx = key number. aaaa = ACD DN or Message Center DN. 0-N = CLID entry, with N = CLID SIZE-1 (SIZE defined in LD 15). D = CLID entry. Search for a CLID entry from key 0 upwards, to find a DN key. The found CLID is used as the CLID entry for the active DN key. bbbb = ACD agent's position ID. Please refer to the note at the top of the overlay table, on page 717, that pertains to assigning a CLID entry to an ACD set.

LD 27 — Define the CLID entry for ISDN BRI sets.

Prompt	Response	Description
REQ:	NEW, CHG	Add new data, or change existing data.
TYPE	TSP	Administer the Terminal Service Profile on the Digital Subscriber Loop.
...		
- SPID	xxxxxxx	Service Profile Identifier.
DN	xxxx (0)-N	xxxx = DN to be associated with the TSP. (0)-N = CLID entry, with N = CLID SIZE-1 (SIZE defined in LD 15).
...		

ISDN QSIG Alternate Routing

LD 86 – Configure the ISDN QSIG Alternate Routing options.

QSIG Alternate Routing may be configured for each of the 512 different routes.

Prompt	Response	Description
REQ	CHG	Change existing data.
CUST	xx	Customer number, as configured in LD 15. xx = 0-99 for Options 51C-81C xx = 0-31 for Option 11C.
FEAT	RLB	Configure the Route List as a feature.
MXLC	0-1000	Maximum number of NARS Location Codes.
RLI	xxx	Route List Index to be accessed. xxx = 0-127 if a Coordinated Dialing Plan is used. xxx = 0-255 if NARS is configured. xxx = 0-999 if the Flexible Numbering Plan is configured.
ENTR	0-63	Entry number for the NARS route list.
ROUT	0 - 511 0-127	Route Number for Options 51C-81C. Route Number for Option 11C.
...		
SBOC		Step Back On Congestion option.
	(NRR)	No re-routing.
	RRO	Re-route if congestion is encountered at the originating node; if congestion is encountered at a transit node, drop-back to the originating node, so that the originating node decides if re-routing is needed (the IDBB prompt in this LD 86 must be set to DBA or DBI).
	RRA	Re-route whether congestion is encountered at the originating or tandem node.

- COPT		Conditions that may cause QSIG Alternate Routing. These values are contained in signaling messages that trigger alternate routing. The COPT prompt is generated only if SBOC = RRO or RRA.
	(1)	QSIG Alternate Routing is supported due to the following causes: — Cause 34, “No Channel or Circuit Available” — Cause 38, “Network Out of Order” — Cause 42, “Congestion”
	2	QSIG Alternate Routing is supported due to the following causes: — Cause 27, “Destination is Out of Service” — Cause 34, “No Channel/Circuit Available” — Cause 38, “Network Out of Order” — Cause 42, “Congestion”
IDBB	(DBD)	ISDN Drop Back Busy options.
	DBA	Deny Drop Back Busy.
	DBI	Allow Drop Back Busy on, if all route sets are busy.
...		Allow Drop Back Busy, if all Initial route sets are busy.

ISDN QSIG Basic Call

LD 17 – Assign Configuration Record.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ADAN	Action Device and Number.
- ADAN	CHG DCH x	Change input/output device.
...		
-- IFC	ISIG	Interface ID for ISO QSIG download table.
...		
TIMR	(NO), YES	NO = skip timer prompt. YES = change timer value.
T310	110 - (120)	The timer is used to define how long Meridian 1 can wait for the response message when the QSIG outgoing call is in an outgoing call proceeding state.

LD 16 – Define Route Data Block.

Prompt	Response	Description
REQ	NEW, CHG	New, or Change.
TYPE	RDB	Route Data Block.
...		
DGTP	PRII	Digital Route Type
IFC	ISIG	New DCH interface identification as entered in LD 17.

LD 97 – System Configuration.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	SYSM	System parameters for Multi-purpose Serial Data Link (MSDL) or Multi-purpose ISDN Signaling Processor (MISP).
...		
FDLC	p1 p2 p3 p4	Fast download control parameters. p1 = Application will be set to PRIE or BRIE. p2 = Specifies conditional (C) or forced downloading (F). p3 = Specifies current (C), latest (L) and specified (S) version. p4 = xx (version number if p3 = S).

ISDN QSIG Call Completion

LD 17– Configure Remote Capabilities to Call Completion for the QSIG interface.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ADAN	Configuration Record.
- ADAN	CHG DCH x	Change D-channel.
...		
- IFC	ISGF	Interface type for route where ISGF = Interface ID for ISO QSIG with GF capability
...		
- RCAP	CCBS	Add Call Completion to Busy Subscriber as remote capability.
- RCAP	CCNR	Add Call Completion No Response. This prompt is only applicable to QSIG interfaces.

LD 10 – Add or Change Ring Again on Analog (500/2500 type) telephones.

Prompt	Response	Description
REQ:	CHG, NEW	Change, or Add.
TYPE:	500	Telephone type.
TN	c u	Terminal Number.
...		
CLS	XRA	Ring Again allowed. XRD = Ring Again denied (default).

LD 11 – Add or Change Ring Again on Meridian 1 proprietary telephones.

Prompt	Response	Description
REQ:	CHG, NEW	Change, or Add.
TYPE:	aaaa	Telephone type where aaaa = SL1, 2006, 2008, 2009, 2016, 1018, 2112, 2216 2317, 2616 or 3000.
TN	c u	Terminal Number.
...		
KEY	xx RGA	Assign Ring Again key where xx = key number. On M2317 and M3000 telephones xx = 27.

LD 57 – Define Ring Again Flexible Feature Codes (FFCs) and FFC Confirmation Tone.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	FFC	Flexible Feature Code.
CUST	xx	Customer number.
FFCT	YES	Confirmation tone provided after FFC is activated. NO = Confirmation tone not provided.
CODE	RGAA	Ring Again activate.
RGAA	xx	Ring Again code.
CODE	RGAD	Ring Again deactivate.
RGAD	xx	Ring Again deactivation code.
CODE	RGAV	Ring Again verification.
RGAV	xx	Ring Again verification code.

LD 15 – Configure a Private Integrated Services Network Exchange (PINX) DN.

Prompt	Response	Description
REQ:	CHG	Change.
TYPE:	NET	Networking.
CUST	xx	Customer number.
- PINX_DN	xx...x	Node DN to a maximum of seven digits with DN extension.

ISDN QSIG Call Completion Enhancement

To configure the Call Completion to a Busy Subscriber (CCBS) and Call Completion on No Response (CCNR) over a QSIG network, on a Meridian 1 PBX:

- Configure the method of Operation Coding for the Call Completion to a Busy Subscriber supplementary service, for the associated QSIG D-Channel, using LD 17.
- Configure the method of Operation Coding for the Call Completion on No Reply supplementary service, for the associated QSIG D-Channel., using LD 17.
- Configure Ring Again Class of Service on analog (500/2500) sets, using LD 10.
- Configure a Special Prefix Number (SPRE) for a customer, using LD 15.
- Configure the Ring Again on No Answer and Call Completion on No Response (CCNR) option, and a Private Integrated Services Network Exchange (PINX) node Directory Number, using LD 15.
- Configure the Flexible Feature Code for Calling Private Privacy, and define whether Flexible Feature Code confirmation tone is to be provided, using LD 57.
- Configure Network Attendant Service on an MCDN D-Channel, using LD 17.

LD 17 - Configure the method of Operation Coding for the Call Completion to a Busy Subscriber supplementary service, for the associated QSIG D-Channel.

Note: Consider the following when configuring the method of Operation Coding for a QSIG interface. When the QSIG interface is ISO (IFC = ISGF), operations are mostly coded with Integer Values (RCAP = CCBI or CCNI). For ETSI interfaces (IFC = ESGF), the operation coding depends on the standard version. The current versions are likely to use Integer Values (RCAP = CCBI or CCNI), whereas some older versions may use Object Identifies (RCAP = CCBO or CCNO).

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	ADAN	Action Device and Number.
- ADAN	NEW DCH xx	Add a D-Channel on port 0-63, for Options 51C-81C.
	NEW DCH xx	Add a D-Channel on port 0-14, for Option 11C.
...		
- IFC	ESGF	ETSI QSIG interface with GF platform.
	ISGF	ISO QSIG interface with GF platform.
...		
- RCAP		Enter the Operation Coding method for the QSIG/ETSI CCBS supplementary service.
	CCBO	Coding by Object ID.
	CCBI	Coding by Integer Value.
	XCCB	Remove the CCBO or CCBI value.
		Note: CCBO and CCBI are mutually exclusive.
...		

LD 17 - Configure the method of Operation Coding for the Call Completion on No Reply supplementary service, for the associated QSIG D-Channel.

The value is configured as a remote capability. It may be either by Object Identifier, used for ETSI, or by Integer Value, used for ISO.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	ADAN	Action Device and Number.
- ADAN	NEW DCH xx	Add a D-Channel on port 0-63, for Options 51C-81C.
...	NEW DCH xx	Add a D-Channel on port 0-14, for Option 11C.
- IFC	ESGF	ETSI QSIG interface with GF platform.
...	ISGF	ISO QSIG interface with GF platform.
- RCAP		Enter the Operation Coding method for the QSIG CCNR supplementary service.
...	CCNO	Coding by Object ID.
	CCNI	Coding by Integer Value.
	XCCN	Remove the CCBO or CCBI value.
		Note: CCNO and CCNI are mutually exclusive.
...		

LD 10 - Configure Ring Again Class of Service on analog (500/2500) sets.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	500	Type of set.
TN	l s c u	Terminal Number address, for Option 51C-81/81C. l = loop, s = shelf, c = card, u = unit.
	c u	Terminal Number address, for Option 11C. c = card, u = unit.
DES	d...d	Office Data Administration System (ODAS) Station Designator, 1-6 alphanumeric characters.
CUST	xx	Customer number, as defined in LD 15. xx = 0-99 for Option 51C-81/81C. xx = 0-31 for Option 11C.
CLS	(XRD) XRA	Deny or allow Ring Again Class of Service.
...		

LD 15 - Configure a Special Prefix Number (SPRE) for a customer.

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE	FTR_DATA	Features and options data.
CUST	xx	Customer number. xx = 0-99 for Options 51C-81/81C. xx = 0-31 for Option 11C.
...		
SPRE	xxxx	Special Prefix Number (xxxx = 1-4digits).
...		

LD 15 - Configure the Ring Again on No Answer and Call Completion on No Response (CCNR) option, and a Private Integrated Services Network Exchange (PINX) node Directory Number.

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE	NET	Networking data.
CUST	xx	Customer number. xx = 0-99 for Options 51C-81/81C. xx = 0-31 for Option 11C.
OPT	(RND) RNA	Deny or allow Ring Again on No Answer or Call Completion on No Response.
ISDN	YES	Integrated Services Digital Network.
...		
- PINX_DN	xx...x	Private Integrated Services Network Exchange node Directory Number (up to seven digits). Precede the existing value with an X to delete it. If the Call Completion to a Busy Subscriber (CCBS) service does not provide CLID to the MCDN or DPNSS1 gateway, the PINX_DN is used to build the calling number. On an incoming CCBS request, the PINX_DN is used to determine the length of the DN extension.
...		

LD 57 - Configure the Flexible Feature Code for Calling Private Privacy, and define whether Flexible Feature Code confirmation tone is to be provided.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	FFC	Flexible Feature Code data.
CUST	xx	Customer number, as defined in LD 15. xx = 0-99 for Options 51C-81/81C. xx = 0-31 for Option 11C.
FFCT	(NO) YES	(Do not) provided FFC confirmation tone after the FFC is dialed.
CODE	RGAA	The type of FFC is Ring Again Activate.
- RGAA	xxxx	Enter the Ring Again Activate FFC.
CODE	RGAA	The type of FFC is Ring Again Activate.
- RGAD	xxxx	Enter the Ring Again Deactivate FFC.
CODE	RGAA	The type of FFC is Ring Again Activate.
- RGAU	xxxx	Enter the Ring Again Verify FFC.
...		

LD 17 - Configure Network Attendant Service on an MCDN D-Channel.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	ADAN	Action device and number.
- ADAN	CHG DCH xx	Change a D-channel on logical port 0-63, for Options 51C-81C.
	CHG DCH xx	Change a D-channel on logical port 0-15, for Option 11C.
...		
- IFC	SL1	MCDN interface.
...		
- NASA	YES	Allow Network Attendant Service.
...		

ISDN QSIG Call Diversion Notification

The ISDN QSIG Call Diversion Notification feature requires the configuration of one of the following call redirection features: Call Forward All Calls, Call Forward/Hunt Override Via Flexible Feature Codes, Call Forward Remote (Attendant and Networkwide), Call Forward No Answer/Flexible Call Forward No Answer, Call Forward No Answer Second Level, Call Forward Internal Calls and User Selectable Call Redirection. The implementation of these features is not modified.

Remote Capability Meanings

Table 79 indicates the remote capabilities meanings for D-channel routes. When using Table 79 consider the following:

- Only nodes subject to be Originating, Served, Diverted or Rerouting nodes with respect to QSIG Call Diversion Notification need to have diversion remote capability configured. Transmit nodes pass the information transparently.
- When choosing the Operation Coding Choice, the interface type should be considered. When the QSIG interface used is ISO (IFC ISGF), operations are mostly coded with Integer Values.

Only one remote capability allows the QSIG Diversion configuration on a D-channel route. This remote capability gathers the three following possibilities for the D-channel route:

- 1 coding of operations sent to the remote switch, which can be coded as either as Object Identifier or as Integer Value. If coded as Object Identifier, the remote capability ends with an 'O', whereas for Integer Value, the remote capability ends with an 'I'. This means that remote capabilities explained below in 2 and 3 are defined twice.
- 2 sending of QSIG Diversion Notification Information to the remote switch: this information is sent only if the remote capability is of first or third type, i.e. DV1x or DV3x, where the x is either 'I' or 'O' as explained in 1.
- 3 treatment of Rerouting requests received from the remote switch: a rerouting request is only processed if the remote capability is of second or third type, i.e. DV2x or DV3x, where x is either 'I' or 'O' as explained above in 1.

Table 79
Remote Capability Meanings

Remote capability	Meaning for Operation Coding	Meaning for Notification Information	Meaning for Rerouting request
None of the following remote capabilities.	Not applicable (nothing sent)	Not <u>sent</u>	Not processed when <u>received</u>
DV1O	<u>Sent</u> coded as Object Identifier	<u>Sent</u>	Not processed when <u>received</u>
DV1I	<u>Sent</u> coded as Integer Value		
DV2O	<u>Sent</u> coded as Object Identifier	Not <u>Sent</u>	Processed when <u>received</u>
DV2I	<u>Sent</u> coded as Integer Value		
DV3O	<u>Sent</u> coded as Object Identifier	<u>Sent</u>	Processed when <u>received</u>
DV3I	<u>Sent</u> coded as Integer Value		

LD 17 – Configure or remove remote capabilities D-channel for QSIG Call Diversion Notification.

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE:	ADAN	Action device and number.
ADAN	CHG DCH x	Configure new remote capabilities on D-channel x.
...		
IFC	ISGF	QSIG Interface ID for ISO with GF capability.
...		
RLS	23	Release 23 and later.
...		
RCAP		QSIG SS Call Diversion Notification remote capability. Configure sending of QSIG Diversion Notification Information, treatment of Rerouting request and coding of operations. If coded as Object Identifier, the remote capability ends with 'O', whereas for Integer Value, the remote capability ends with 'I'. Only one remote capability is allowed. Refer to Table 1 for further information.
	DV1I	Diversion information is sent to remote switch.
	DV1O	Diversion information is sent to remote switch.
	DV2I	Rerouting requests from remote switch are processed.
	DV2O	Diversion information is sent to remote switch. Rerouting requests from remote switch are processed.
	DV3I	Diversion information is sent to remote switch.
	DV3O	Rerouting requests from remote switch are processed.
		Precede with 'X' to remove capability.

LD 16 – Configure Remote Capability for a QSIG ISGF interface.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number.
ROUT	0-127	Route Number.
...		
IFC	ISGF	QSIG Interface ID for ISO with GF capability.
...		
RCAP		QSIG SS Call Diversion Notification remote capability. Configure sending of QSIG Diversion Notification Information, treatment of Rerouting request and coding of operations. If coded as Object Identifier, the remote capability ends with 'O', whereas for Integer Value, the remote capability ends with 'I'. Only one remote capability is allowed. Refer to Table 1 for further information.
	DV1I	Diversion information is sent to remote switch.
	DV1O	Diversion information is sent to remote switch.
	DV2I	Rerouting requests from remote switch are processed.
		Rerouting requests from remote switch are processed.
	DV2O	Diversion information is sent to remote switch. Rerouting requests from remote switch are processed.
	DV3I	Diversion information is sent to remote switch.
	DV3O	Rerouting requests from remote switch are processed.
		Precede with 'X' to remove capability.

LD 10 – Configure QSIG Diversion Notification on analog (500/2500 type) telephones

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	500	Telephone type.
...		
TN	c u	Terminal Number.
...		
DN	x...x yyy	Directory Number and Calling Line Identification entry (Range is (0) - value entered for SIZE prompt in LD 15 minus one).
...		
- CPND	aaa	Calling Party Name Display where: NEW = Add data block. CHG = Change existing data block. OUT = Remove existing data block.
--CPND_LANG	aaa	Calling Party Name Display Language where: (ROM) = Roman. KAT = Katakana.
-- NAME	aaaa bbbb	Calling Party Name Display Name where: First name Last name.
...		
CLS	(DNO3) DNO1 DNO2	QSIG Call Diversion Notification options for calling party. Notification with diverted-to party's number and name. No notification. Notification without diverted-to party's number and name.

	(DNDY) DNDN	QSIG Call Diversion Notification options concerning forwarded- to party. Notification with Called party's number and name. Notification without Called party's number and name.
	CNDA	Call Party Name Display Allowed
	CFXA	Call Forward to External DN Allowed.
	CFTA	Call Forward by Call Type Allowed.
	DDGA	Directory Number Display on other set Allowed.
	FNA	Call Forward No Answer Allowed.
	HTA	Hunting Allowed.
	NAMA	Name Display on other set Allowed or (Denied).

LD 11– Configure QSIG Diversion Notification on Meridian 1 proprietary telephones.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	xxxx	Telephone type, where: xxxx = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616 or 3000.
...		
TN	c u	Terminal Number.
...		
FDN	x...x	Flexible Call Forward No Answer DN for an Internal Directory Number.
...		
CLS	(DNO3) DNO1 DNO2	QSIG Call Diversion Notification options for calling party. Notification with diverted-to party's number and name. No notification. Notification without diverted-to party's number and name.

	(DNDY) DNDN	QSIG Call Diversion Notification options concerning forwarded- to party. Notification with Called party's number and name. Notification without Called party's number and name.
	CNDA	Call Party Name Display Allowed
	CFXA	Call Forward to External DN Allowed.
	CFTA	Call Forward by Call Type Allowed.
	DDGA	Directory Number Display on other set Allowed.
	FNA	Call Forward No Answer Allowed.
	HTA	Hunting Allowed.
	NAMA	Name Display on other set Allowed or (Denied).
...		
RCO	(0) - 2	Ringing Cycle Option for Call Forward No Answer.
EFD	x...x	Call Forward No Answer Directory Number for external calls
...		
- CPND	aaa	Calling Party Name Display where: NEW = Add data block. CHG = Change existing data block. OUT = Remove existing data block.
- -CPND_LANG	aaa	Calling Party Name Display Language where: (ROM) = Roman. KAT = Katakana.
- - NAME	aaaa bbbb	Calling Party Name Display Name where: First name Last name.

LD 95 – Modify Call Party Name Display data block.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	CPND	Call Party Name Display data block.
CUST	xx	Customer number.
...		
RESN	YES	Display Redirection reason allowed. (NO) = Display Redirection reason denied (default).
- CFWD	aaaa	Mnemonic for Call Forward All Call display. (F) = default
- CFNA	aaaa	Mnemonic for Call Forward No Answer display (N) = default.
- HUNT	aaaa	Mnemonic for Call Forward Busy display. (B) = default

LD 95 – Define Name for telephones.

Prompt	Response	Description
REQ	NEW	Add new data.
TYPE	NAME	Name.
CUST	xx	Customer number.
...		
DN	x..x	Directory Number.
- NAME	a..a	Calling Party Name Display in ASCII characters.

LD 11 – Configure the name that is to be displayed on the Forwarded-to (diverted) Party's set.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	xxxx	Telephone type, where: xxxx = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616 or 3000.
TN	c u	Terminal Number.
...		
CLS	DNDA	Dialed Name Display Allowed. (DNDD)= Dialed Name Display Denied (default).

Note: LD 81 may be used to print counting or listing queries pertaining to the new Classes of Service, by entering CNT or LST against the REQ prompt, and the appropriate COS against the FEAT prompt.

Note: LD 83 may be used may be used to print the new Classes of Service in the TN blocks, by entering TNB against the REQ prompt, and the appropriate COS against the CLS prompt.

ISDN QSIG Call Diversion Notification Enhancements

Remote Capability Meanings, for PRI D-Channels

Table 79 indicates the remote capabilities meanings for PRI D-Channels. When using Table 79 consider the following:

- Only nodes subject to be Originating, Served, Diverted or Rerouting nodes with respect to QSIG Call Diversion Notification need to have diversion remote capability configured. Transmit nodes pass the information transparently.
- When choosing the Operation Coding Choice, the interface type should be considered. When the QSIG interface used is ISO (IFC ISGF), operations are mostly coded with Integer Values. For ETSI interfaces (IFC ESGF), the operation coding depends on the standard version: the last ones are likely to use Integer Values, whereas some older ones may use Object Identifiers.

Only one remote capability allows the QSIG Diversion configuration on a D-Channel. This remote capability gathers the three following possibilities for the D-Channel:

- 1 coding of operations is sent to the remote switch, which can be coded as either as Object Identifier or as Integer Value. If coded as Object Identifier, the remote capability ends with an 'O', whereas for Integer Value, the remote capability ends with an 'I'. This means that remote capabilities explained below in 2 and 3 are defined twice.
- 2 sending of QSIG Diversion Notification Information to the remote switch: this information is sent only if the remote capability is of first or third type, i.e. DV1x or DV3x, where the x is either 'I' or 'O' as explained in 1.
- 3 treatment of Rerouting requests received from the remote switch: a rerouting request is only processed if the remote capability is of second or third type, i.e. DV2x or DV3x, where x is either 'I' or 'O' as explained above in 1.

Table 80
Remote Capability Meanings

Remote capability	Meaning for Operation Coding	Meaning for Notification Information	Meaning for Rerouting request
None of the following remote capabilities.	Not applicable (nothing sent)	Not <u>sent</u>	Not processed when <u>received</u>
DV1O	<u>Sent</u> coded as Object Identifier	<u>Sent</u>	Not processed when <u>received</u>
DV1I	<u>Sent</u> coded as Integer Value		
DV2O	<u>Sent</u> coded as Object Identifier	Not <u>Sent</u>	Processed when <u>received</u>
DV2I	<u>Sent</u> coded as Integer Value		
DV3O	<u>Sent</u> coded as Object Identifier	<u>Sent</u>	Processed when <u>received</u>
DV3I	<u>Sent</u> coded as Integer Value		

Implementation procedures

- Configure the QSIG Call Diversion Notification emote Capability for the associated D-Channel, using LD 17.
- Configure QSIG Diversion Notification Class of Service, on analog (500/2500 type) sets, using LD 10.
- Configure QSIG Diversion Notification Class of Service, on Meridian proprietary sets, using LD 11.
- Configure the QSIF Call Diversion Notification mnemonics, for Call Forward All Calls, Call Forward No Answer, and Call Forward Busy, using LD 95.
- Define a Calling Party Name Display name string for a set, using LD 95.
- On a Meridian proprietary set, configure whether or not the name of the originally-called party is to be displayed on the set, if is a diverted-to set, using LD 11.

Note 1: LD 81 may be used to print counting or listing queries pertaining to the new Classes of Service, by entering CNT or LST against the REQ prompt, and the appropriate COS against the FEAT prompt.

Note 2: LD 83 may be used to print the new Classes of Service in the TN blocks, by entering TNB against the REQ prompt, and the appropriate COS against the CLS prompt.

LD 17 - Configure or remove remote capabilities D-Channel for QSIG Call Diversion Notification.

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE	ADAN	Action Device and Number.
- ADAN	NEW DCH xx	Add a D-Channel on port 0-63 (Options 51C-81C).
	NEW DCH xx	Add a D-Channel on port 0-14 (Option 11C).
...		
- IFC	ESGF	ETSI QSIG interface with GF platform.
	ISGF	ISO QSIG interface with GF platform.
...		
RLS	23	Release 23 and later.
...		
RCAP		QSIG SS Call Diversion Notification remote capability. Configure sending of QSIG Diversion Notification Information, treatment of Rerouting request and coding of operations. If coded as Object Identifier, the remote capability ends with 'O', whereas for Integer Value, the remote capability ends with 'I'. Only one remote capability is allowed. Refer to Table 1 for further information.
	DV1I	Diversion information is sent to remote switch.
	DV1O	Diversion information is sent to remote switch.
	DV2I	Rerouting requests from remote switch are processed.
		Rerouting requests from remote switch are processed.
	DV2O	Diversion information is sent to remote switch. Rerouting requests from remote switch are processed.
		Diversion information is sent to remote switch.
	DV3I	Diversion information is sent to remote switch.
	DV3O	Rerouting requests from remote switch are processed.
		Precede with 'X' to remove capability, but do not specify the coding type . For example, XDV3 or XDV1 (and not XDV3I or XDV1O).

LD 10 - Configure QSIG Diversion Notification Class of Service, on analog (500/2500 type) sets.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	500	Set type.
...		
TN	l s c u c u	Terminal Number, for Options 51C-81C. l = loop, s = shelf, c = card, u = unit. Terminal Number for Option 11C. c = card, u = unit.
...		
DN	xx...x yyy	Directory Number and Calling Line Identification entry (yyy range is (0) - value entered for SIZE prompt in LD 15 minus one).
...		
- CPND	aaa	Calling Party Name Display where aaa can be: NEW = Add data block. CHG = Change existing data block. OUT = Remove existing data block.
--CPND_LANG	aaa	Calling Party Name Display Language where: (ROM) = Roman. KAT = Katakana.
-- NAME	aaaa bbbb	Calling Party Name Display Name where: aaaa = First name bbbb = Last name.
...		
CLS	(DNO3) DNO1 DNO2	QSIG Call Diversion Notification options for calling party. Notification with diverted-to party's number and name. No notification. Notification without diverted-to party's number and name.

	(DNDY) DNDN	QSIG Call Diversion Notification options for diverted-to party. DNDY = Notification with called party's number and name. DNDN = Notification without called party's number and name.

LD 11 - Configure QSIG Diversion Notification Class of Service, on Meridian 1 proprietary sets.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	xxxx	Set type, where: xxxx = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616 or 3000.
...		
TN	l s c u c u	Terminal Number, for Options 51C-81C. l = loop, s = shelf, c = card, u = unit. Terminal Number for Option 11C. c = card, u = unit.
...		
FDN	x...x	Flexible Call Forward No Answer DN for an Internal Directory Number.
...		
CLS	(DNO3) DNO1 DNO2 (DNDY) DNDN	QSIG Call Diversion Notification options for calling party. Notification with diverted-to party's number and name. No notification. Notification without diverted-to party's number and name. QSIG Call Diversion Notification options for diverted-to party. Notification with called party's number and name. Notification without called party's number and name.

...		
- CPND	aaa	Calling Party Name Display where aaa can be: NEW = Add data block. CHG = Change existing data block. OUT = Remove existing data block.
- -CPND_LANG	aaa	Calling Party Name Display Language where aaa can be: (ROM) = Roman. KAT = Katakana.
- - NAME	aaaa bbbb	Calling Party Name Display Name where: aaaa = first name bbbb = last name.

LD 95 - Configure the QSIF Call Diversion Notification mnemonics, for Call Forward All Calls, Call Forward No Answer, and Call Forward Busy, in the Call Party Name Display data block.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	CPND	Call Party Name Display data block.
CUST	xx	Customer number, as defined in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		
RESN	YES	Display Redirection reason allowed. (NO) = Display Redirection reason denied (default).
- CFWD	aaaa	Mnemonic for Call Forward All Call display. (F) = default
- CFNA	aaaa	Mnemonic for Call Forward No Answer display (N) = default.
- HUNT	aaaa	Mnemonic for Call Forward Busy display. (B) = default

LD 95 – Define a Calling Party Name to be displayed on a receiving set.

Prompt	Response	Description
REQ	NEW	Add new data.
TYPE	NAME	Name.
CUST	xx	Customer number, as defined in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		
DN	x..x	Directory Number.
- NAME	a..a	Calling Party Name Display in ASCII characters.

LD 11 - On a Meridian proprietary set, configure whether or not the name of the originally-called party is to be displayed on the diverted-to set.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	xxxx	Telephone type, where: xxxx = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616 or 3000.
TN	l s c u	Terminal Number, for Options 51C-81C. l = loop, s = shelf, c = card, u = unit.
	c u	Terminal Number, for Option 11C. c = card, u = unit.
...		
CLS	(DNDD)	DNDD = Dialed Name Display Denied (the name of the originally-dialed party is not displayed on the set).
	DNDA	DNDA = Dialed Name Display Allowed (the name of the originally-dialed party is displayed on the set).

ISDN QSIG Call Transfer Notification

To configure the ISDN QSIG Call Transfer Notification feature on a Meridian 1 PBX:

- Configure a Private Integrated Services Network Exchange (PINX) DN for a customer, using LD 15.
- Configure the method of Operation Coding for the QSIG Call Transfer Notification for the associated D-Channel, using LD 17.
- Configure the Reason for Redirection, and the Call Transfer mnemonic, for a customer, using LD 95.
- Define a name string for a customer, using LD 95.
- Configure an analog (500/2500) transferring set, using LD 10, so that after Call Transfer, the originating set display and the transferred-to set display show the name and number associated with the transferred-to set and originating set, respectively.
- Configure a Meridian 1 proprietary transferring set,using LD 11, so that after Call Transfer, the originating set display and the transferred-to set display show the name and number associated with the transferred-to set and originating set, respectively.
- Configure a Meridian 1 proprietary set, using LD 11, so that if it originates or receives a transferred call over a QSIG link, it displays the redirected/connected name and number, after it is received.

LD 15 - Configure a Private Integrated Services Network Exchange (PINX) DN for a customer.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	NET	Networking data.
...		
CUST	xx	Customer number, as deined in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		

- PINX_DN	xx...x	Private Integrated Services Network Exchange DN (1-7 digits).
...		

LD 17 – Configure the method of Operation Coding for the QSIG Call Transfer Notification feature, for the associated QSIG D-Channel.

The value is configured as a remote capability. It may be either by Object Identifier, used for ETSI, or by Integer Value, used for ISO.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	ADAN	Action Device and Number.
- ADAN	NEW DCH xx	Add a D-Channel on port 0-63, for Options 51C-81C.
	NEW DCH xx	Add a D-Channel on port 0-14, for Option 11C..
...		
- IFC	ESGF	ETSI QSIG interface with GF platform.
	ISGF	ISO QSIG interface with GF platform.
...		
- RCAP		Enter the Operation Coding method for the QSIG Call Transfer Notification feature.
	CTI	Call Transfer Operation Coding method is by Integer Value.
	XCTI	Remove the Call Transfer Coding by Integer Value.
	CTO	Call Transfer Operation Coding method is by Object ID.
	XCTO	Remove the Call Transfer Coding by Object ID.
		Note: CTO and CTI are mutually exclusive.
...		

LD 95 – Configure the Reason for Redirection, and the Call Transfer mnemonic, for a customer.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	CPND	Configure the Calling Party Name Display data block.
CUST	xx	Customer number, as defined in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		
RESN	(NO) YES	(Do not) display the reason for redirection. Enter YES.
- XFER	(T) aaaa	1-4 character mnemonic for Call Transfer. The default is T.

LD 95 – Define a name string for a customer.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	NAME	Create a new Calling Party Name string.
CUST	xx	Customer number, as previously entered in LD 95 when configuring the CPND data block. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		
DN	xxx...x	Directory Number (1 to 7 digits) to which the name string is associated.
- NAME	a...a	CPND name, in ASCII characters.

LD 10 - Configure an analog (500/2500) transferring set, using LD 10, so that after Call Transfer, the originating set display and the transferred-to set display show the name and number associated with the transferred-to set and originating set, respectively.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	aaa	Type of analog set. aaa = 500 or 2500.
TN	l s c u	Terminal Number, for Options 51C-81C. l = loop, s = shelf, c = card, u = unit.
	c u	Terminal Number for Option 11C. c = card, u = unit.
...		
CUST	xx	Customer number associated with this set, as previously entered in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		
DN	xxxx yyy	Directory Number and CLID entry (range for yyy is 0 - value entered in the SIZE prompt in LD 15).
- CPND	NEW CHG OUT	Add new Calling Party Name Display data. Change existing Calling Party Name Display data. Remove Calling Party Name Display data.
-- CPND_LAN	aaa	Calling Party Name Display language.
-- NAME	aaaa bbbb	Calling Party Name Display name. aaaa = first name, bbbb = last name.
...		
CLS		Class of Service.
	(XFD) XFA	Transfer (denied) allowed on this set.
	(CNDD) CNDA	Name Display (denied) allowed on this set.

CLS	(NAMD) NAMA (DDGD) DDGA <CR>	Name Display (denied) allowed on other sets. DN display (denied) allowed on other sets. The CLS prompt is generated until <cr> is entered.
...		

LD 11 - Configure a Meridian 1 proprietary transferring set,using LD 11, so that after Call Transfer, the originating set display and the transferred-to set display show the name and number associated with the transferred-to set and originating set, respectively.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	aaa	Type of Meridian 1 proprietary set.
TN	l s c u c u	Terminal Number, for Options 51C-81C. l = loop, s = shelf, c = card, u = unit. Terminal Number for Option 11C. c = card, u = unit.
...		
CUST	xx	Customer number associated with this set, as defined in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		
DN	xxxx yyy	Directory Number and CLID entry (range for yyy is 0 - value entered in the SIZE prompt in LD 15).
- CPND	NEW CHG OUT	Add new Calling Party Name Display data. Change existing Calling Party Name Display data. Remove Calling Party Name Display data.
-- CPND_LAN	aaa	Calling Party Name Display language.

-- NAME	aaaa bbbb	Calling Party Name Display name. aaaa = first name. bbbb = last name.
...		
KEY	xx TRAN	Assign the Transfer key.
...		
CLS		Class of Service.
	(CNDD) CNDA	Name Display (denied) allowed on this set.
	(NAMD) NAMA	Name Display (denied) allowed on other sets.
	(DDGD) DDGA	DN display (denied) allowed on other sets.
CLS	<CR>	The CLS prompt is generated until <cr> is entered.
...		

LD 11 - Configure a Meridian 1 proprietary set, using LD 11, so that if it originates or receives a transferred call over a QSIG link, it displays the redirected/connected name and number, after it is received.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	aaa	Type of Meridian 1 proprietary set.
TN	l s c u	Terminal Number, for Options 51C-81C. l = loop, s = shelf, c = card, u = unit.
	c u	Terminal Number for Option 11C. c = card, u = unit.
...		
CUST	xx	Customer number associated with this set, as defined in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		

DN	xxxx yyy	Directory Number and CLID entry (range for yyy is 0 - value entered in the SIZE prompt in LD 15).
- CPND	NEW CHG OUT	Add new Calling Party Name Display data. Change existing Calling Party Name Display data. Remove Calling Party Name Display data.
- - CPND_LAN	aaa	Calling Party Name Display language.
- - NAME	aaaa bbbb	Calling Party Name Display name. aaaa = first name. bbbb = last name.
...		
CLS		Class of Service.
	(CNDD) CNDA	Name Display (denied) allowed on this set.
	(NAMD) NAMA	Name Display (denied) allowed on other sets.
	(DDGD) DDGA	DN display (denied) allowed on other sets.
CLS	<CR>	The CLS prompt is generated until <cr> is entered.
...		

ISDN QSIG Generic Functional Transport

Feature implementation

LD 16 – Configure Automatic Trunk Maintenance in Route Data Block.

Prompt	Response	Description
REQ	NEW, or CHG	New, or change.
TYPE	RBD	Route Data Block.
...		
DGTP	PRI	Digital Route type.
IFC	ISGF	ISGF = ISO QSIG interface with GF platform. The ESIG and ISIG prompt can be entered if both QSIG and QSIGGF packages are included.

LD 17 – Configuration Record.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	CFN	Configuration Record.
ADAN	aaa aaa x	Add, Move or Change Input/Output Device
...		
- IFC	ISGF	ISGF = ISO QSIG interface with GF platform.
PINX-CUST	0-99	Customer number.
ISDN_MCNT	60-(300)-350	Layer 3 call control message count five per second time interval.

ISDN QSIG Name Display

Feature implementation

LD 95 – Modify the Call Party Name Display (CPND) data block.

Prompt	Response	Description
REQ	NEW	Create Call Party Name Display data block.
TYPE	CPND	Call Party Name Display data block.
CUST	0-31	Customer number.
....		
REQ	NEW	Create new name strings.
TYPE	NAME	Name Strings.
CUST	0-31	Customer number.
...		
DN	xxxx	Directory Number.

LD 10 – Define Class of Service Name Display Allowed on Analog (500/2500 type) sets.

Prompt	Response	Description
REQ:	NEW, CHG	Add, or Change.
TYPE:	500	Type of telephone.
CUST	0-31	Customer number.
...		
CLS	CNDA	Called Party Number Display Allowed. Allows called/connected party name to be viewed by calling party. (CNDD) = Call Number Display Denied (default).
CLS	NAMA	Name Display Allowed on the far end. (NAMD) = Name Display Denied (default).
FTR	CPND	Allow Call Party Name Display name assignment.

LD 11 – Define Class of Service Name Display Allowed on Meridian 1 proprietary sets.

Prompt	Response	Description
REQ:	NEW, CHG	Add, or Change.
TYPE:	xxxx	Telephone type, where: xxxx = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616 or 3000.
CUST	0-31	Customer number.
...		
CLS	CNDA	Call Party Name Display Allowed. Allows display of original DN name on redirection. (CNDD) = Call Party Name Display Denied (default).
CLS	DNDA	Dialed Name Display Allowed. This displays the originally dialed DN Name on redirected calls. (DNDD) = Dialed Name Display Denied.
CLS	NAMA	Name Display Allowed on the far end (default). (NAMD) = Name Display Denied.

LD 12 – Define Class of Service Name Display Allowed on Attendant Consoles.

Prompt	Response	Description
REQ	NEW, CHG	Add, or Change.
TYPE	xxxx	Console type where xxxx =1250 or 2250.
TN	c u	Terminal Number.
...		
CPND	CNDA	Call Party Name Display Allowed. (CNDD) = Call Party Name Display Denied (default).

LD 17 – Configure Remote Capability for QSIG D-channel.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ADAN	Action Device and Number.
- ADAN	aaa dch x	Change or New D-channel where aaa = NEW or CHG.
...		
- IFC	SL1	Interface type for D-channel.
...		
- RCAP	NDS	Allow Name Display Services (NDS) as new remote capability.

LD 17 – Configure Remote Capability for MCDN D-channel.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ADAN	Action Device and Number.
- ADAN	aaa dch x	Change Input/Output Device.
...		
- IFC	SL1	Interface type for D-channel.
...		
- RCAP	ND3	Allow Name Display 3 (ND3) as new remote capability.

LD 57 – Define the Calling Party Privacy Flexible Feature Code for Meridian 1 proprietary and Analog (500/2500 type) sets.

Prompt	Response	Description
REQ	NEW, CHG	Add, or Change.
TYPE	FFC	Flexible Feature Code data block.
CUST	0-31	Customer number.
FFCT	YES	Flexible Feature Confirmation Tone.
...		
CPP	xxxx	Calling Party Privacy Flexible Feature Code (typically *67). CPP is only prompted if the CPP package is equipped.

ISDN QSIG Name Display Enhancement

To configure the QSIG Supplementary Services - Name Display Enhancement feature on a Meridian 1 PBX:

- Configure Calling Party Name Display data block for a customer, using LD 95.
- Define a name string for a customer, using LD 95.
- Define the Calling Name Class of Service for analog (500/2500) sets, using LD 10.
- Define the Calling Name Class of Service for Meridian 1 proprietary sets, using LD 11.
- Define the Calling Name Class of Service for attendant consoles, using LD 12.
- Configure the method of Operation Coding for the Name Display supplementary services, for the associated D-Channel, using LD 17. The value is configured as a Remote Capability. It may be either by Object Identifier, used for ETSI, or by Integer Value, used for ISO.
- Configure the Flexible Feature Code for Calling Private Privacy, using LD 57.

LD 95 – Configure Calling Party Name Display data block for a customer.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	CPND	Configure the Calling Party Name Display data block.
CUST	xx	Customer number, as defined in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		

LD 95 – Define a name string for a customer.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	NAME	Create a new Calling Party Name string.
CUST	xx	Customer number, as previously entered in LD 95 when configuring the CPND data block. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		
DN	xxx...x	Directory Number (1 to 7 digits) to which the name string is associated.
...		

LD 10 - Define the Calling Name Class of Service for analog (500/2500) sets.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	500	Type of analog set.
TN	l s c u	Terminal Number, for Options 51C-81C. l = loop, s = shelf, c = card, u = unit.
	c u	Terminal Number for Option 11C. c = card, u = unit.
...		
DES	d...d	Designator The response d...d represents an Office Data Administration System (ODAS) Station Designator of 1-6 alphanumeric characters.
CUST	xx	Customer number, as previously entered in LD 95. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		
DN	x...x	Directory Number.
- CPND	NEW CHG OUT	Calling Party Name Display Add data block. Change existing data block. Remove existing data block.
- NAME	aaaa yyyy	Calling Party Name Display name. aaaa = first name, yyyy = last name.
- XPLN	xx	Expected name length.
...		
CLS	NAMA	Allow calling name display at the far end. (NAMD) = Name Display Denied is the default.
...		

LD 11 - Define the Calling Name Class of Service for Meridian 1 proprietary sets.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	aaaa	Type of set.
TN	l s c u	Terminal Number, for Options 51C-81C. l = loop, s = shelf, c = card, u = unit.
	c u	Terminal Number for Option 11C. c = card, u = unit.
...		
DES	d...d	Designator The response d...d represents an Office Data Administration System (ODAS) Station Designator of 1-6 alphanumeric characters.
CUST	xx	Customer number, as previously entered in LD 95 when configuring the CPND data block. xx = 0-99 for Options 51C-81C xx = 0-31 for Option 11C.
...		
CLS		Enter each non-default Class of Service entry separated by a space.
	CNDA	Allow the calling name to be displayed on this set. (CNDD) = Deny calling name display is default.
	DNDA	Allow the name of the original caller to be displayed on this set, for redirected calls. (DNDD) = Dialed Name Display Denied is default.
	NAMA	Allow calling name display at the far end. (NAMD) = Name Display on other set Denied is default.
KEY	xx aaa yyyy	Telephone function key and assignments.

- CPND	NEW CHG OUT	Calling Party Name Display Add data block. Change existing data block. Remove existing data block.
- NAME	aaaa yyyy	Calling Party Name Display name. aaaa = first name, yyyy = last name.
...		

LD 12 – Define the Calling Name Class of Service for attendant consoles.

Prompt	Response	Description
REQ:	NEW CHG	Add new data Change existing data.
TYPE:	aaaa	Type of attendant console.
TN	l s c u	Terminal Number, for Options 51C-81C. l = loop, s = shelf, c = card, u = unit.
	c u	Terminal Number for Option 11C. c = card, u = unit.
SETN	l s c u	Second Terminal Number. Must have same loop, shelf and card as Terminal Number. l = loop, s = shelf, c = card, u = unit for Option 51-81C.
	c u	c = card, u = unit for Option 11C.
CUST	xx	Customer number, as previously entered in LD 95 when configuring the CPND data block. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		
ANUM	1-63	Attendant Number.
...		
CPND	CNDA	Allow the calling name to displayed on this console. (CNDD) = Call Party Name Display feature Denied is the default.
...		

LD 17 – Configure the method of Operation Coding for the Name Display supplementary services, for the associated QSIG D-Channel.

The value is configured as a remote capability. It may be either by Object Identifier, used for ETSI, or by Integer Value, used for ISO.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	ADAN	Action Device and Number.
- ADAN	CHG DCH xx	Change a D-Channel on port 0-63 (Options 51C-81C).
...	CHG DCH xx	Change a D-Channel on port 0-15 (Option 11C).
- IFC	ESGF ISGF	ESGF = ETSI QSIG interface with GF platform. ISGF = ISO QSIG interface with GF platform.
...		
- RCAP	NDO NDI	Enter the Operation Coding method for the QSIG Name Display supplementary services. NDO = Coding by Object ID (IFC should be set to ESGF). NDI = Coding by Integer Value (IFC should be set to ISGF). Precede the entry with an 'X' to delete it. Note: NDO and NDI are mutually exclusive.
...		

LD 57 – Configure the Flexible Feature Code for Calling Private Privacy.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	FFC	Flexible Feature Code data.
CUST	xx	Customer number, as previously entered in LD 95 when configuring the CPND data block. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		
CODE	CPP	Configure a Flexible Feature Code for Calling Party Privacy.
CPP	xxxx	Enter the Flexible Feature Code for Calling Party Privacy.
...		

ISDN QSIG Path Replacement

LD 15 – Configure Private Integrated Services Network Exchange Directory Number.

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE:	NET	Networking.
CUST	xx	Customer number.
...		
ISDN	YES	Integrated Services Digital Network.
...		
- PINX_DN	xx...x	Private Integrated Services Network Exchange Directory Number, up to seven digits.

LD 16 – Configure New Path Replacement parameters for a QSIG ISGF interface.

Prompt	Response	Description
REQ	CHG NEW	Change existing data. Add new data.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number.
ROUT	0-127	Route Number.
...		
DTRK	YES	Digital Trunk Type.
- DGTP	PRI	PRI trunk.
- IFC	ISGF	QSIG Interface ID for ISO with GF capability.
...		

RCAP	PRI PRO	Add Path Replacement as a remote capability. PRI = The encoding method uses Integer values. PRO = The encoding method uses Object Identifier. PRI and PRO are mutually exclusive, and cannot be configured together at the same time on the same link. Precede PRI and PRO with X to remove. The previously configured PR parameters will be valid, if PR is deactivated and then reactivated.
...		
PR_TRIGS	<CR>	Path Replacement Triggers. <CR> = If REQ = NEW, the parameters are set to the default values, which are: DIV 2 3 (two PR attempts, with a three minute delay for Diversion triggers) CNG 2 3 (two PR attempts, with a three minute delay for Congestion triggers) XCON (Connected Number is not a trigger). If REQ = CHG, the Path Replacement parameters are not modified.
	DIV xx-y CNG xx-y CON xx-y	DIV = Diversion is used to trigger Path Replacement. CNG = Congestion is used to trigger Path Replacement. A Connected number different from a called number is used to trigger Path Replacement. where: xx = 0-(2)-15, the number of Path Replacement attempts (the default is two). If 0 is entered, the number will be set to infinite. yy = 1-(3)-7, the delay, in minutes, between two consecutive Path Replacement attempts (the default is three minutes). Precede DIV, CNG, and CON with X to remove the Path Replacement trigger.
PR_RTN	YES (NO)	Retain option is (is not) supported by the far end PINX.
...		

LD 17 – Configure QSIG Path Replacement for a QSIG ISGF interface.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	CFN	Configuration Record.
ADAN	CHG DCH X	Change D-Channel number.
...		
- IFC	ISGF	QSIG Interface ID for ISO with GF capability.
...		
- RCAP	aaa	Add Path Replacement as remote capability where: PRI = Integer values as encoding method. PRO = Object identifier as encoding method. Precede with X to remove.
...		
PR_TRIGS	<CR>	Path Replacement Triggers. <CR> = If REQ = NEW, the parameters are set to the default values, which are: DIV 2 3 (two PR attempts, with a three minute delay for Diversion triggers) CNG 2 3 (two PR attempts, with a three minute delay for Congestion triggers) XCON (Connected Number is not a trigger). If REQ = CHG, the Path Replacement parameters are not modified.
	DIV xx-y CNG xx-y CON xx-y	DIV = Diversion is used to trigger Path Replacement. CNG = Congestion is used to trigger Path Replacement. CON = A Connected number different from a called number is used to trigger Path Replacement. where: xx = 0-(2)-15, the number of Path Replacement attempts (the default is two). If 0 is entered, the number will be set to infinite. yy = 1-(3)-7, the delay, in minutes, between two consecutive Path Replacement attempts (the default is three minutes).
PR_RTN	YES (NO)	Retain option is (is not) supported by the far end PINX.

ISDN Signaling Link

Configuring ISL

To configure ISL, perform the following steps:

- LD17 Configuration Record
Configure the D-channel for ISL use.
X11 RELEASE 17 AND EARLIER
- OR*
- LD17 Configuration Record
Configure the D-channel for ISL use.
X11 RELEASE 18 AND LATER
- LD15 Customer Data Block
Define a PRI customer
- LD16 Route Data Block
Enable the ISL option on a per route basis
- LD 14
Assign a D-channel for each route

LD 17 – Configure the D-Channel for ISL (X11 Release 17 and earlier).

Prompt	Response	Description
REQ	CHG	Configuration record
TYPE	CFN	
...		
PAM		
ISDN	YES, (NO)	DCHI port number (remove with Xnn)—only odd numbers allowed
DCHI	1-15	
BCHI	1-15	
USR		
	PRA	D-channel for ISDN PRI only

	ISLD	D-channel for ISL in “dedicated” mode
	SHA	D-channel for ISL in “shared” mode, used for both ISDN PRI and
DCHL		Note 1: One of the above responses is mandatory and there is no default. Note 2: Package 147, ISDN Signaling Link, is required.
	0-159	PRI loop for DCHI, not prompted with D-channel in dedicated mode (D-channel does not require a channel on the PRI)
	BCHL	PRI loop number for BCHI
	OTBF	Number of output request buffers—use default (16)
	DRAT	D-channel transmission rate
	56K	56 Kbps, default when LCMT (LD17) is AMI
	64KC	64 Kbps clear, default when LCMT (LD17) is B8S
	64KI	64 Kbps inverted HDLC (64 Kbps restricted)
		In X11 release 15 and later DRAT is not prompted when configuring ISL D-channels because the speed is controlled by the modem baud rate
	PRI	Not prompted if the D-channel is in dedicated mode (the D-channel does not require a channel on the PRI card)
	ISLM	Number of ISL trunks controlled by the D-channel (no default value)
	CLOK	D-channel clock type EXT = Source of primary clock is external to DCHI card. Normally, EXT is used with PRI/ISL. INT = Source of primary clock is internal to DCHI card. INT is used only during DCHI loop back testing, where one side is set to INT, the other side is set to EXT.

LD 17 – Configure the D-Channel for ISL (X11 Release 18 and later).

Prompt	Response	Description
REQ	CHG	Change
TYPE	CFN	Configuration Record
ADAN	NEW DCH 0-63	Add a primary D-channel (can also CHG and OUT DCH)
CTYP	TMDI MSDL DCHI	The NTRB21 TMDI card (Release 24 and later). The NTBK51BA D-Channel Daughterboard with PRI. The NTBK51BA D-Channel Daughterboard with ISL/VNS.
- CDNO	1 2 3	Card number of TMDI card.
- PORT	xx	Port number.
USR	PRI, ISLD, SHA	D-channel mode
- ISLM	1-382	Number of ISL trunks controlled by the D-Channel
DCHL	0, 2, 4,...159	PRI loop number for DCHI
OTBF	1-(32)-127	Number of output request buffers
- BPS	xxxx	Baud rate for ISL D-channel on MSDL port (default 64000)
- PARM	R232,(R422) DCE, (DTE)	ISL D-channel interface and transmission mode (MSDL port only)
PRI	0-159 2-15	Additional PRI loops using the same D-channel, and interface ID
DRAT	(56K), 64KC, 64KI	D-channel transmission
IFC	aaa	Interface type: (D100), D250, ESS4, ESS5, SL1, S100
SIDE	NET, (USR)	Meridian 1 node type
RLS	xx	Release ID of the switch at the far end of the D-Channel
RCAP	aaa	Remote D-channel capabilities: MSL, NCT, ND1, ND2, RVQ
- CLOK	INT, (EXT)	Internal or external clock on ISL D-channels
LAPD	Yes, (No)	D-channel LAPD parameters

- T23	1-(20)-31	Interface guard timer (DCHI only)
- T200	2-(3)-40	Retransmission timer
- N200	1-(3)-8	Maximum number of retransmissions
- N201	4-(260)	Maximum number of octets in information field
- T203	2-(10)-40	Maximum time (in seconds) without frames being exchanged
- K	1-(7)	Maximum number of outstanding frames
ADAN	NEW BDCH 0-63	Add a backup D-channel
PDCH	0-63	Primary D-channel
CTYP	TMDI MSDL DCHI	The NTRB21 TMDI card (Release 24 and later). The NTBK51BA D-Channel Daughterboard with PRI. The NTBK51BA D-Channel Daughterboard with ISL/VNS.
- CDNO	1 2 3	Card number of TMDI card.
- PORT	xx	Port number.
BCHL	0,2,4,...,-159	PRI loop number for back-up D-channel
RCVP	Yes, (No)	Auto-recovery to primary D-channel option
ADAN	<cr>,***	Go on to next prompt or exit overlay

LD 15 – Define a PRI customer and networking data.

Prompt	Response	Description
REQ	NEW, CHG	Add or change a customer
TYPE	CDB NET_DATA	Customer data block Networking Data (Release 21 gate opener)
CUST	0-31	Customer number
...		
- ISDN	YES	ISDN
- PNI	1-32700	Private Network Identifier (for CLID)

- PFX1	xxxx	Prefix (area) code for International PRA (for CLID)
- PFX2	xxxx	Central Office Prefix for IPRA (for CLID)
- HNP	100-319	Home Number Plan Area code (for CLID)
- HNXX	100-319	Prefix for Central Office (for CLID)
- HLOC	100-3199	Home Location Code (ESN) (for CLID)
- LSC	xxxx	Local steering code (for CLID)
- CNTP	LDN, (PDN)	Default for Calling Line ID (CLID)
- RCNT	0-(5)	Maximum inter-node hops in a network redirection call

LD 16 – Enable ISL on a per route basis.

Prompt	Response	Description
REQ	NEW	Add a PRI trunk route
TYPE	RDB	Type of data
CUST	0-31	Customer number
ROUT	0-511	Route number
TKTP	ISL	Trunk route type:
ESN	Yes, (No)	ESN signaling
BRIP	Yes, (No)	ISDN BRI packet handler route
ISDN	Yes, (No)	ISDN PRI option
- MODE	ISLD	Mode of D-Channel that controls the route
- DCHI	1-15	DCHI port number Prompted if Mode = ISLD
- PNI	0-32700	Customer Private ID (unique to a customer)
- IFC	SL1	Interface machine type for this PRI route
- NCNA	Yes	Network call name allowed
- NCRD	Yes	Network Call Redirection

- TRO	(No), Yes	Trunk optimization allowed (denied) on the route
- NSF	(No), Yes	Network Service Facility
- TIER	0-511	Incoming Tie route number
- CHTY	ABCH, (BCH)	Signaling type for B-channel digital routes
- CTYP	aaa	Call type for outgoing direct dialed Tie route
- INAC	Yes, (No)	Insert ESN access code to incoming private network call
- NCOS	(0)-99	Network Call Of Service
- CLS	aaa	Class of service restriction for tie route
- TGAR	0-31	Trunk group access restrictions
- IEC	000-319	Interexchange carrier ID
PTYP	aaa	Port type at far end
ICOG	IAO, ICT, OGT	Incoming and/or outgoing trunk
SIGO	aaa	Signaling arrangement
NEDC	ORG, ETH	Near end disconnect control
FEDC	ETH, FEC, JNT,(ORG)	Far end disconnect control
CPDC	Yes, (No)	Meridian 1 is the only controlling party on incoming calls
DLTN	Yes, (No)	Provide dial tone to the far-end
PSEL	TLNK, (DMDM)	T-link or DM-DM protocol selection
EQAR	Yes, (No)	Enable Equal Access on this route
- GCR	(Yes), No	Use General Carrier Restriction for Equal Access calls
- NTOL	ALLOW, (DENY)	Allow or deny North American toll calls (1+ calls)
- ITOL	ALLOW, (DENY)	Allow or deny international toll calls (011+ calls)
- SCR	Yes, (No)	Use Selective Carrier Restriction for Equal Access calls
AUTH	Yes, (No)	Authcode to be prompted for incoming tie callers

LD 14 – Assign a channel identification to each trunk with the ISL option.

Prompt	Response	Description
REQ	NEW	
TYPE	TIE	Trunk type allowed
TN	loop ch	Use loop number created in LD17
RTMB	0-511 1-254	The route defined as an ISA route in LD16
CHID	1-382	Channel identifier for ISL channels (remove with Xnn)—must be coordinated with far end (no default value)

MCDN Alternate Routing

LD 86 – Configure the MCDN Alternate Routing options.

Note: To ensure that MCDN Alternate Routing occurs for all nodes in a system, define all nodes as SBOC = RRA. Conversely, to prevent MCDN Alternate Routing from occurring on any nodes, define all nodes as SBOC = NRR.

Prompt	Response	Description
REQ	CHG	Change existing data.
CUST	xx	Customer number, as configured in LD 15. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
FEAT	RLB	Configure the Route List as a feature.
RLI	xxx	Route List Index to be accessed. xxx = 1-127 if a Coordinated Dialing Plan or Basic Alternate Route Selection is used. xxx = 1-255 if Network Alternate Route Selection is configured. xxx = 0-999 if the Flexible Numbering Plan is configured.
ENTR	0-63	Entry number for the NARS or BARS route list.
ROUT	0-511 0-127	Route Number for Options 51C-81C. Route Number for Option 11C.
SBOC		Step Back On Congestion option. (NRR) = No re-routing
	RRO	Re-route at the originating node if congestion is encountered. If congestion is encountered at a transit node, drop back to the preceding node so that the preceding node determines if re-routing is needed.
	RRA	Re-route at any node, originating or transit (tandem), when congestion is encountered.
..		

ISET	(0)-64	Initial Set. Number of entries in Initial Set for route list block.
NALT	1-(5)-10	Number of alternate routing attempts. Prompt appears once per RLI.
MFRL	(MIN)0-7	Set Minimum Facility Restriction Level used to determine autocode prompting. Use default of MIN to set to the minimum FRL value.

MCDN End to End Transparency

To implement the MCDN End to End Transparency feature, follow these steps:

- Configure a D-Channel for a PRI interface using the QSIG transport and select the NAS, NACD and/or NMS MCDN features in LD 17.

After selecting NAS in LD 17, to configure NAS for a QSIG link, follow these steps:

- Configure attendant consoles with NAS key in LD 12 (optional).
- Enable or disable network attendant control, NAS control and define trunk ICI keys and NAS routing thresholds in LD 15.
- Define the NAS routing table in LD 86.

After selecting NACD in LD 17, to configure NACD for a QSIG link, follow these steps:

- Define a CDP or UDP between the two nodes in LD 87 and LD 90.
- Configure a CLID table in LD 15.
- Configure the ACD DN queue at source and target nodes in LD 23.
- Configure the NACD routing table in LD 23.
- Define a Meridian 1 proprietary ACD set at source and/or target node in LD 11.

After selecting NMS in LD 17, to configure NMS-MC for a QSIG link, follow these steps:

- Define a CDP (DSC or LSC) or UDP between the two nodes in LD 87 and LD 90.
- Allow Message Waiting Center access in LD 15.
- Define a Meridian 1 proprietary set at source and/or target node in LD 11.
- Define a Meridian 1 proprietary NMS-MC user set in LD 11.

After selecting NMS in LD 17, to configure NMS-MM for a QSIG link, follow these steps:

- Configure the primary voice messaging ACD queue at the prime location (where Meridian Mail is installed) in LD 23.
- Add agents to the primary agent queue in LD 11.
- Configure ACD parameters for all voice service queues in LD 23.
- Configure the Voice Services DN (VSDN) table in NMS-MM administration terminal. Refer to Meridian Mail documentation for this configuration information.

ISDN PRI implementation using the QSIG transport

LD 17 – Configure a D-Channel for an ISDN PRI interface using the QSIG transport and add MCDN features.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	CFN	Configuration database.
...		
ADAN	CHG DCH aaa	Change D-Channel information.
...		
- IFC	ESGF ISGF	ESGF = ETSI QSIG interface with GF platform. ISGF = ISO QSIG interface with GF platform.
...		
- RCAP	MQC	Add MCDN QSIG Conversion as a new remote capability. XMQC removes MCDN QSIG Conversion as a remote capability.
-- MQC_FEAT		MCDN QSIG feature type. Prompted if RCAP = MQC.
	NAS	Enable NAS on QSIG. XNAS disables NAS on QSIG.
	NACD	Enable NACD on QSIG. XACD disables NACD on QSIG.
	NMS	Enable NMS on QSIG. XNMS disables NMS on QSIG.

NAS implementation using the QSIG transport

To configure NAS using the QSIG transport, follow these steps:

- Configure an ISDN PRI interface using the QSIG transport and select NAS as an MCDN feature in LD 17.
- Configure NAS for a QSIG link:
 - Configure attendant consoles with NAS key (optional) in LD 12.
 - Enable or disable network attendant control, NAS control and define trunk ICI keys and NAS routing thresholds in LD 15.
 - Define the NAS routing table in LD 86.

LD 12 – Configure Attendant Consoles with NAS keys. (optional)

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change data.
TYPE	ATT aaaa	Type of console. aaaa = 1250 or 2250.
TN	l s c u	Terminal Number. l = loop, s = shelf, c = card, u = unit for Options 51-81C. c = card, u = unit for Option 11C.
...		
KEY	xx NAS	xx = the key number assigned the NAS function. Each attendant console can have only one NAS key defined. This key is optional.

LD 15 – Enable or disable network attendant control, NAS routing, and define a trunk ICI key.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	CDB	Customer Data Block.
TN	l s c u	Terminal Number. l = loop, s = shelf, c = card, u = unit for Options 51-81C. c = card, u = unit for Option 11C.
...	...	...
- ISDN	YES	Integrated Services Digital Network.
...	...	...
- ICI	0-19 NCO NDID NTIE NFEX NWAT	Key number. Followed with a space and the trunk type. Network CO trunk. Network DID trunk. Network TIE trunk. Network FEX trunk. Network WAT trunk.
...	...	...
- CWCL	(0)-255 (0)-255	Call Waiting Call Limit. Lower and upper thresholds.
- CWTM	(0)-511 (0)-511	Call Waiting Time. Lower and upper thresholds (in seconds).
...	...	...
- NAS ATCL	YES (NO)	Allow/deny attendant control for call extension.
- NAS ACTV	YES (NO)	Allow/deny NAS routing.

LD 86 – Define NAS routing tables.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
CUST	xx	Customer number. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
FEAT	NAS	Type of data.
TBL	0-63	Routing table number. Without Multi-Tenant Service, 0 is the customer routing table. With Multi-Tenant Service enabled, NAS tables 1-63 may be associated with Console Presentation Groups (CPGs) 1-63.
ALT	1-7	An alternative attendant or routing table. (To clear an old number, type an X before typing the new number. The old number cannot be cleared if it is associated with a schedule period. Reach TODS by pressing the return key.)
ID	xx...X <CR>	The dialed digits (including the network access code) needed to reach an attendant associated with the alternative number. Respond with a string of up to 16 digits to change the attendant ID. Press the return key to leave the ID unchanged, exit the prompt, and return to ALT.
TODS	0-31	Time of Day schedule where; 0 = default to handle all time periods not defined in 1 through 31. Press the return key to continue the NAS feature setup process.

- PER	hr: mm hr: mm	Specify start and stop times for the period using 24-hour format. Start time must be before stop time. mm = 00 or 30 only.
	<CR>	<CR> = leave times unchanged; move to the DAYS prompt.
- DAYS	a,a...a	Specify applicable days of the week for the time period. Input a number representing each day for which the schedule is active (where 1=Monday, 2=Tuesday... 7=Sunday).
ALST	1-7	Alternatives list to be used for the schedule period.
DBK	(NO) YES	Disable/enable Drop Back busy option.
QUE	(NO) YES	Disable/enable queuing to a route.

NACD implementation using the QSIG transport

To configure NACD using the QSIG transport, follow these steps:

- Configure an ISDN PRI interface using the QSIG transport and select NACD as an MCDN feature in LD 17.
- Configure NACD for a QSIG link:
 - Define a CDP or UDP between the two nodes.
 - Configure a CLID table in LD 15.
 - Configure the ACD DN queue at source and target nodes in LD 23.
 - Configure the NACD routing table in LD 23.
 - Define a Meridian 1 proprietary ACD set at source and/or target node in LD 11.

LD 15 – Configure a CLID table.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	NET	Networking data (if REQ = CHG only).
CUST	xx	Customer number. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		
- CLID	YES (NO)	CLID option. YES = configure a CLID table for the customer. NO = (the default) do not configure a CLID table. Remaining prompts are not generated and no CLID is sent for the customer.
...		
-- ENTRY	y	CLID entry number.

LD 23 – Configure ACD Directory Number queues at source and target nodes.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	ACD	Automatic Call Distribution data block.
CUST	xx	Customer number. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
...		
ACDN	xxxx	ACD Directory Number.

LD 23 – Configure an NACD Routing Table.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	aaaa	Type of data block. Enter NACD for Network ACD.
CUST	xx	Customer number. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
ACDN	xxxx	ACD Directory Number.
TABL	a	Day or Night Table. a = D or N.
- OUTS	xxxx xxxx	Routing Table entries to be removed.
- TRGT	xxxx tttt	Target ACD DN and the timer in seconds.

LD 11 – Define a Meridian 1 proprietary ACD set at source and/or target node.

Note: When assigning a CLID entry to an ACD set, you cannot use the position ID already on the set. You must out the set first or null the ACD key and then rebuild with the table entry number.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change data.
TYPE:	aaaa	Type of set. aaaa = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616, 3000.
TN	l s c u	Terminal Number. l = loop, s = shelf, c = card, u = unit for Options 51-81C. c = card, u = unit for Option 11C.
...		
CLS	(AGN) SPV	Class of Service group. AGN = (default) ACD Agent. SPV = ACD Supervisor.
...		
KEY	xx ACD yyyy 0-N/D zzzz	ACD key, where: xx = key number (<i>must be key 0</i>). yyyy = ACD DN or Message Center DN. 0-N = CLID entry, with N = CLID SIZE-1 (SIZE defined in LD 15). D = CLID entry, Search for a CLID entry from key 0 upwards, to find a DN key. the found CLID is used as the CLID entry for the active DN key. zzzz = ACD agent's position ID. Please refer to the note at the top of LD 11 on assigning a CLID entry to an ACD set.
KEY	xx MSB yyyy (0)-N/D xx NRD yyy (0)-N/D	Telephone function key assignments. xx = key number. MSB = Make Set Busy key. NRD = Not Ready key.

LD 10 – Define an analog (500/2500) set at source and/or target node.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	aaaa	Type of set. aaaa = analog (500 or 2500) set.
TN	l s c u	Terminal Number. l = loop, s = shelf, c = card, u = unit for Options 51-81C. c = card, u = unit for Option 11C.
...		
CLS	AGTA	ACD services for analog (500/2500) sets allowed.
...		
FTR	ACD xxxx 0-N/D zzzz	ACD feature where: aaa = ACD. xxxx = ACD DN. 0-N/D = CLID entry. zzzz = ACD agent's position ID.

NMS implementation using the QSIG transport

To configure NMS-MC using the QSIG transport, follow these steps:

- Configure an ISDN PRI interface using the QSIG transport and select NMS as an MCDN feature in LD 17.
- Configure NMS-MC for a QSIG link:
 - Define a CDP (DSC or LSC) or UDP between the two nodes.
 - Allow Message Waiting Center access in LD 15.
 - Define a Meridian 1 proprietary ACD agent set at source and/or target node in LD 11.
 - Define a Meridian 1 proprietary NMS-MC user set in LD 11.

LD 15 – Allow Message Waiting Center access.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	FTR_DATA	Feature data.
CUST	xx	Customer number. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
OPT	(MCX) MCI	Message Center excluded. Message Center included.
	(MWUD) MWUA	Message Waiting Unconditional Denied. Message Waiting Unconditional Allowed.

LD 11 – Define a Meridian 1 proprietary set at source and/or target node.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	aaaa	Type of set. aaaa = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616, 3000.
TN	I s c u	Terminal Number. I = loop, s = shelf, c = card, u = unit for Options 51-81C. c = card, u = unit for Option 11C.
...		
CLS	(MWD) MWA	Class of Service options. MWD = Message Waiting Denied MWA = Message Waiting Allowed.
...		
KEY	xx MIK xx MCK	Telephone function key assignments. xx = key number. MIK = Message Indication Key. MCK = Message Cancellation Key.

LD 11 – Define a Meridian 1 proprietary NMS-MC user set.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	aaaa	Type of set. aaaa = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616, 3000.
TN	l s c u	Terminal Number. l = loop, s = shelf, c = card, u = unit for Options 51-81C. c = card, u = unit for Option 11C.
CLS	AGTA	ACD services for analog (500/2500) sets allowed.
KEY	xx MWK x...x	Telephone function key assignments where: xx = key number. MWK = Message Waiting Key. x...x = NMS-MC DN.

To configure NMS-MM on QSIG, follow these steps:

- Configure an ISDN PRI interface using the QSIG transport and select NMS as an MCDN feature in LD 17.
- Configure NMS-MM for a QSIG link:
 - Configure the primary voice messaging ACD queue at the prime location (where Meridian Mail is installed) in LD 23.
 - Add agents to the primary agent queue in LD 11.
 - Configure ACD parameters for all voice service queues in LD 23.
 - Configure the Voice Services DN (VSDN) table in NMS-MM administration terminal.

LD 23 – Create primary voice messaging ACD queue.

Prompt	Response	Description
REQ	NEW	Add new data.
TYPE	ACD	Type of data block. ACD = Automatic Call Distribution data block.
CUST	xx	Customer number. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
ACDN	xxxx	ACD DN = Express Messaging DN (the DN which users dial to access their mailboxes).
MWC	YES	ACD DN is a message center DN.
.		
NCFW	xx...x	Night Call Forward DN (up to 23 digits).
...		

LD 11 – Add agents to the primary agent queue.

Note: When assigning a CLID entry to an ACD set, you cannot use the position ID already on the set. You must out the set first or null the ACD key and then rebuild with the table entry number.

Prompt	Response	Description
REQ:	NEW	Add new data.
TYPE:	SL1	ACD data block.
TN	I s c u	Terminal Number. I = loop, s = shelf, c = card, u = unit for Options 51-81C. c = card, u = unit for Option 11C.
...		
CLS	VMA	Allow voice messaging.
...		
KEY	xx ACD yyyy 0-N/D zzzz	Telephone function key assignments. ACD key, where: xx = key number (<i>must be key 0</i>). yyyy = ACD DN or Message Center DN. 0-N = CLID entry, with N = CLID SIZE-1 (SIZE defined in LD 15). D = CLID entry, Search for a CLID entry from key 0 upwards, to find a DN key. the found CLID is used as the CLID entry for the active DN key. zzzz = ACD agent's position ID. Please refer to the note at the top of LD 11 on assigning a CLID entry to an ACD set.

xx SCN yyyy (ccc or D).	Single Call Non-Ringing DN where: yyyy = DN ccc = CLID entry of (0)-N, where N = the value entered at the SIZE prompt in LD 15 minus 1. D = the character D may be entered to search a CLID entry from key 0 and up to find a DN key. The CLID associated with the found DN key will then be used. The DN can be up to 4 digits, up to 7 digits with Directory Number Expansion (DNXP) package 150. With X11 Release 18 and later, once the SCN key has been defined, MARO is prompted.
xx MSB	Make Set Busy key.
xx NRD	Not Ready key.
xx TRN	Call Transfer key.
xx A03	A03 = Three-Party Conference key.
xx A06	A06 = Six-Party Conference key.
xx RLS	Release key. Requires CLS = LUXA. Key/lamp pair is not required.

LD 23 – Configure ACD parameters for all voice service queue.

Prompt	Response	Description
REQ	NEW	Add new data.
TYPE	ACD	Automatic Call Distribution data block.
CUST	xx	Customer number. xx = 0-99 for Options 51C-81C. xx = 0-31 for Option 11C.
ACDN	x...x	ACD Directory Number.
MWC	(NO) YES	Message Waiting Center.
...		
MAXP	xxxx	Maximum number of positions. Enter 1.
...		
NCFW	xx...x	Night Call Forward DN = DN of the primary voice messaging queue in network format. xx...x = up to 23 digits.

Meridian Mail Trunk Access Restriction

Feature implementation

Meridian Mail Trunk Access Restriction feature requires prior installation of Meridian Mail. The implementation of this feature, therefore, assumes that Meridian Mail has been properly configured.

LD 15 – Enable Meridian Mail Trunk Access Restriction.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	FTR	Customer Features and Options.
CUST	0 - 31	Customer Number.
- OPT	MCI	Message Centre Included.
...		
- MTAR	YES	Trunk to Mail Access Allowed. NO = Restricted.

Message Waiting Indication (MWI) Interworking with DMS

Response to the following prompts in the listed overlays activates MWI Interworking.

LD 17—Configuring MWI remote D channel capability

Prompt	Response	Description
REQ	CHG	Change system data
TYPE	CFN	Configuration record
ADAN	CHG DCH 0-63	Change Primary D-Channel
RLS	19, 36	Release ID of the switch at the far end of the D-channel interface. 19 is Meridian 1, 36 is DMS.
RCAP	MWI XMWI	Add remote D-channel capabilities for MWI Remove remote D-channel capabilities for MWI

LD 15—Enable Message Services.

Prompt	Response	Description
REQ	CHG	Customer Data Block Message Center is included. This prompt must be set to include the message center feature for both the user's telephone and the message center if the message center is on M-1.
TYPE	CDB	
OPT	MCI	

LD 23—Configuring a Message Center DN.

Prompt	Response	Description
REQ	NEW, CHG	Add or change system data
TYPE	ACD	Automatic call distribution
CUST	0–99	Customer number
ACDN	xxxx	ACD Directory Number
MWC	YES	ACD DN message center DN
NCFW	xx ... xx	Message Center DN: — a public DN (10 digits) prefixed by an ESN access code. — an ESN number prefixed by an ESN access code Note: Do not define an agent for this ACD group to allow for the automatic call redirection to the ACD Night Call Forward DN where the Message Center DN is defined.

LD 11—Define the ACD Group as the Message Center DN for each telephone.

Prompt	Response	Description
REQ	NEW, CHG	Add or change system data
TYPE	ACD	Automatic call distribution
CUST	0–99	Customer number
ACDN	xxxx	ACD Directory Number
MWC	YES	ACD DN message center DN
NCFW	xx ... xx	Message Center DN: — a public DN (10 digits) prefixed by an ESN access code. — an ESN number prefixed by an ESN access code Note: Do not define an agent for this ACD group to allow for the automatic call redirection to the ACD Night Call Forward DN where the Message Center DN is defined.

LD 15—Configure AC2 to insert ESN Access Code and PNI.

Prompt	Response	Description
REQ	NEW, CHG, END	
TYPE	CDB	Customer Data Block
...	NET_DATA	Networking Data (Release 21 gate opener)
- AC2		Access code 2. Enter call types (type of number) that use access code 2. Multiple call types can be entered. Default is to access code 1.
	NPA	E.164 National
	NXX	E.164 Subscriber

Prompt	Response	Description
	INTL	International
	SPN	Special number
	LOC	Location code
- ISDN	YES	Change ISDN options
- PNI	1-32700	Customer private identifier—unique to a customer. Within one network, use the same value for PNI in both the Customer Data Block (LD 15) and the Route Data Block (LD 16) in all PBXs.
...		
- HNPA	200- 999 1200- 1999	Home Number Plan Area code defined in LD 90
- HNXX	100-9999	Prefix for the central office
- HLOC	100-999	Home location code (NARS)
- LSC	1-9999	1- to 4-digit Local Steering Code established in the Coordinated Dialing Plan (CDP). The LSC prompt only appears if user has a 5- or 6-digit dialing plan.

LD 16—Configure PNI and INAC or INST.

Prompt	Response	Description
REQ	NEW,CHG,OUT	
TYPE	RDB	Route Data Block
...		
- PNI	1-32700	Customer private identifier—unique to a customer. Within one network, use the same value for PNI in both the Customer Data Block (LD 15) and the Route Data Block (LD 16) in all PBXs.
- INAC	(NO), YES	Insert access code. Permit an ESN access code to be automatically added to an incoming ESN call from a private network. If INAC is YES, the digit insertion option (INST) is bypassed. This prompt only appears if the route type is a TIE trunk.
- INST	(0)-99999999	Digits to be inserted in front of leading digits. Use this prompt if route is used for connection to DMS.

LD 90—Configure Home Location Code.

Prompt	Response	Description
REQ	NEW, CHG	Add or change
CUST	xx	Customer number (0-99)
FEAT	NET	Network translation tables
TRAN	AC1, AC2	Access code 1 or 2
TYPE	HLOC	Home location code
HLOC	xxx	Home location code (3-7 digits)

LD 90—Configure Home NPA.

Prompt	Response	Description
REQ	NEW, CHG	Add or change
CUST	xx	Customer number (0–99)
FEAT	NET	Network translation tables
TRAN	AC1, AC2	Access code 1 or 2
TYPE	HPNA	Home NPA Translation
HNPA	xxx	Home NPA

LD 90—Configure Central Office Translation.

Prompt	Response	Description
REQ	NEW, CHG	Add or change
CUST	xx	Customer number (0–99)
FEAT	NET	Network translation tables
TRAN	AC1, AC2	Access code 1 or 2
TYPE	NXX	Central Office Translation
NXX	xxx	Office code translation
RLI	0–255	Route list index
SDRR	LDID	Recognized local DID codes
DMI	1–255	Digit manipulation table index. DMI should delete 3 digits.
LDID	xxx	Local DID number recognized within the NPA and NXX.

National ISDN 2 TR-1268 Primary Rate Interface

LD 17 – Configure the primary D-channel.

Prompt	Response	Description
REQ	NEW/CHG	Add/change configuration information.
TYPE	CFN	Configuration Record.
ADAN	NEW, CHG, OUT, DCH xx	Add, change, or remove primary D-channel data where: xx = 0,1, ... 63.
CTYP	TMDI MSDL	The NTRB21 TMDI card (Release 24 and later). The NTBK51BA D-Channel Daughterboard.
- CDNO	1 2 3	Card number of TMDI card.
- PORT	xx	Port number.
...		
USR	PRI	D-channel mode.
IFC	NI2	NI-2 TR-1268 interface type.
PRI	III nn	III = PRI loop using the same D-channel (0,1,...159) nn = Interface identifier (2,3,...15)
...		

LD 17 – Configure the backup D-channel.

Prompt	Response	Description
REQ	NEW/CHG	Add/change configuration information.
TYPE	CFN	Configuration Record.
ADAN	NEW, CHG, OUT, BDCH yy	Add, change or remove backup D-channel data, where: yy= 0,1, ... 63.
PDCH	xx	Associated primary D-channel, where: xx = 0,1, ... 63.
CTYP	TMDI MSDL	The NTRB21 TMDI card (Release 24 and later). The NTBK51BA D-Channel Daughterboard.
...		

LD 16 – Use this overlay to define a route data block (for ISDN PRI).

Prompt	Response	Description
REQ	NEW, CHG	New or change.
TYPE	RDB	Route data block.
...		
DGTP	PRI	Digital route type.
IFC	NI2	New DCH interface ID.
...		

Network Attendant Service

Use this procedure to configure *Network Attendant Service (NAS)* on an Option 11 system.

Programming procedure

- 1** LD 12 – Configure Attendant Consoles with NAS keys.
- 2** LD 15 – Enable or disable network attendant control, Recall to Same Attendant, NAS routing, and define a TRK ICI key.
- 3** LD 17 – Configure the D-channel interface (DCHI) for NAS.
- 4** LD 86 – Configure NAS routing.
- 5** LD 93 – Assign a NAS routing table to Console Presentation Groups.
- 6** LD 16 – Allow or deny pre-answer tromboning (allow or deny an incoming call to be directly routed back on the same route).

Step 1 - Use LD 12 to configure attendant consoles with NAS keys.

Prompt	Response	Description
TYPE	ATT,1250,2250	Type of console
TN	c u	TN address of attendant
KEY	xx NAS	xx (0-19) is the key number assigned to NAS. Each console can have only one NAS key defined. Note: This key assignment is optional.

Step 2 - Use LD 15 to enable or disable network attendant control, Recall to Same Attendant, NAS routing, and define a TRK ICI key.

Prompt	Response	Description
ICI	xx NCO/NDID/NTIE/ NFEX/NWAT	Enter the key number xx (0-19) assigned to NAS, followed by a space, followed by the trunk type (NCO, NDID, NTIE, NFEX, or NWAT)
RTSA	(RSAD),RSA,RSA X	RSAD = Recall to Same Attendant denied (the default); RSAA = Recall to Same Attendant allowed RSAX = Recall to Same Attendant allowed, with queuing to a specific attendant if the same attendant is busy.
NAS ATCL	(YES),NO	YES = allow attendant control for call extension (the default) NO = deny attendant control for call extension
NAS ACTV	(YES),NO	YES = allow NAS routing (the default) NO = deny NAS routing

Step 3 - Use LD 17 to configure the D-channel interface (DCHI) for NAS.

Prompt	Response	Description
DCHI	xxx	Respond with DCHI number for which NAS signaling is to be allowed or restricted
NASA	(YES),NO	YES = allow DCHI for NAS signaling (the default) NO = deny DCHI for NAS signaling

Step 4 - Use LD 86 to configure NAS routing

Prompt	Response	Description
FEAT	NAS	Specifies type of data to be changed
TBL	0-63	Routing table number, from 0 to 63. Without Multi-Tenant Service, 0 is the customer routing table. With Multi-Tenant Service enabled, NAS tables 1-63 may be associated with CPGs 1-63.
ALT	0-7	An alternative attendant or routing table, from 1 to 7. (To clear an old number, type an X before typing the new number. The old number cannot be cleared if it is associated with a schedule period. Reach TODS by pressing the return key.)
ID	XXXXXXXXXXXXXXXXX	The dialed digits (including the network access code) needed to reach an attendant associated with the alternative number. Respond with a string of up to 16 digits to change the attendant ID; press the return key to leave the ID unchanged, exit the prompt, and return to ALT

Prompt	Response	Description
TODS	0-31	Specifies a schedule period, from 0 to 31, where 0 is the default to handle all time periods not defined in 1 through 31. Type an X before a period number to remove the schedule period. (Typing an X before a 0 clears all associated alternatives, leaving the default treatment as local attendant treatment.) Press the return key to continue the NAS feature setup process
PER	HR:MIN HR:MIN	Specifies the start and stop times for the period using 24hour format. Start time must be before the stop time, and minutes can be only 00 or 30. Press the return key to leave times unchanged and move to the DAYS prompt
DAYS	D, D, ... D	Specifies applicable days of the week for the time period. Respond by inputting a number representing each day for which the schedule is active (where 1=Monday, 2=Tuesday,...7=Sunday). Type an X before the day number to deactivate the schedule period for that day. No more than seven entries are permitted on an input line. Press the return key to leave this schedule unchanged and move to the next prompt. (If not otherwise specified, a schedule period is assumed valid for all days.
ALST	XXXX	Alternative list to be used for the schedule period. Respond with up to four alternative numbers in the order in which they are to be attempted. (These numbers are defined using ALT.)

Prompt	Response	Description
DBK	zzzz	Alternatives for which “drop back busy” is to be active during this period. Respond with four entries of Y (allow) or N (deny) for the alternative evoked by the previous prompt. Responses are applied in sequence.
QUE	zzzz	Specifies alternatives for which queuing to a route is to be allowed during this period. Respond with four entries of Y (allow) or N (deny) for the alternatives evoked by ALST. Responses are applied in sequence. If the response is Y, off-hook queuing must already be configured for calls to be queued on this route

Step 5 - Use LD 93 to assign a NAS routing table to Console Presentation Groups.

Prompt	Response	Description
TYPE	CPG	Console Presentation Group
NTBL	(0)-63	NAS routing table to be used for calls directed to this Attendant Console Group(ACG)/ Console Presentation Group (CPG)

Step 6 - Use LD 16 to allow or deny pre-answer tromboning (allow or deny an incoming call to be directly routed back on the same route).

Note: The Tromboning feature programmed in LD 16 also affects non-NAS calls.

NAS performs tromboning when required regardless of the LD 16 programming. However, if redundant (or tromboned) trunk connections are to drop after the telephone is answered, this prompt must be set to NO across the network where this might occur.

Prompt	Response	Description
TYPE	RDB	Route Data Block
TRMB	(YES),NO	YES = Tromboning allowed (the default). Incoming trunk call on route may be routed back on the same route. Note: Only applies to calls routed using NARS/BARS or CDP. Does not apply to calls redirected by Hunt, Forward All Calls, or Forward No Answer. NO = Tromboning denied. Incoming trunk call on route may not be routed back on same route.

Network Call Party Name Display (NCPND) and Network Name Delivery (NND)

Use this procedure to configure Network Call Party Name Display (NCPND) and Network Name Delivery (NND) on an Option 11 system.

Restrictions and limitations

The Network Call Party Name Display was enhanced to allow names to be transported across the private network. Both the calling and called party names can be sent or received and displayed on the destination set equipped with an alpha-numeric display.

The names are programmed against the DN in LD 95, and the feature allows the sending of names to be controlled on a trunk route basis.

Programming procedure

This procedure contains two major steps:

Step 1: Assign names to DN. Use LD95.

Step 2: Allow Network Call Party Name Display messages on a route basis. Use LD16.

Step 3: Indicate which Network Name Delivery protocol is supported by the remote node/switch on this DCH interface. Use LD 17.

Step 1

Assign names to DN. Use LD95.

Prompt	Response	Description
REQ	NEW, CHG	
TYPE	NAME	Call Party Name Display name entry
CUST	0-31	Customer number
DN	xxxx	DN of eligible type
NAME	aaa...a	CPND name using ASCII characters. The DIG prompt is re-prompted. Enter <CR> to get the DN prompt.

Step 2

Allow Network Call Party Name Display messages on a route basis. Use LD16.

Prompt	Response	Description
REQ	NEW, CHG	
TYPE	RDB	
CUST	0-31	
ISDN	YES	change ISDN option
NCNA	(YES), NO	Network Call Party Name (is) is not allowed on this route. When connected to a DMS set this prompt to NO

Step 3

Indicate which Network Name Delivery protocol is supported by the remote node/switch on this DCH interface. Use LD 17.

Prompt	Response	Description
REQ	CHG	
TYPE	CFN	
ADAN	NEW,CHG	
RCAP	ND1 ND2	Network Name Delivery method 1 Network Name Delivery method 2

Network Call Redirection (NCRD)

Use this procedure to configure Network Call Redirection (NCRD) on an Option 11 system.

Restrictions and limitations

The Network Call Redirection (NCRD) feature has three components:

- Network Call Forward All Calls (**NCFAC**)
- Network Call Forward No Answer (**NCFNA**).
- Network Hunt (**NHNT**)

The various types of call redirection allowed use all of the basic programming already in place in the Meridian 1 database. For example the Call Forward No Answer feature uses the FNAD, FNAT and FNAL programming to determine which destination DN to use (FDN or HUNT DN) based on the type of incoming calls (DID, External or Internal respectively). The called set must have the proper class of service (FNA, HTA, FBA) as well as Hunt DN and FDN to the appropriate destination and a Call Forward key (or dial access from regular set) for call forward all calls (CFW).

ISDN allows call redirection to take place across the private network instead of being limited to the set's home PBX. Presently supported between Meridian 1/SL-1 and to Centrex via TIE lines.

By allowing call redirection across the network, it becomes important to limit the number of steps that a call can take while hopping from switch to switch. This is achieved by a prompt in the customer data block (**RCNT**) which sets the maximum of inter-node hops allowed for NCRD.

Optionally, the reason for call redirection can be displayed using the call party name display feature (CPND in overlay 95) in the same fashion as before.

Basic PRI or ISL administration must be performed before Network Call Redirection is implemented.

Programming procedure

This procedure contains three major steps:

- 1 Set the number of inter-node hops allowed. Use LD15.
- 2 Allow Network Call Redirection messages on a route. Use LD16.
- 3 Display the reason calls are redirected. Use LD95.

Step 1

Set the number of inter-node hops allowed. Use LD 15.

Prompt	Response	Description
REQ	CHG	
TYPE	CDB NET_DATA	Customer data block Release 21 gate opener
CUST	0-31	Customer number
...		
- RCNT	0-(5)	Maximum number of inter-node hops allowed in a network redirection call. This field must be set to greater than 0 for a network redirection to take place
...		

Step 2

Allow Network Call Redirection messages on a route. **Use LD16.**

Prompt	Response	Description
REQ	CHG	
TYPE	RDB	Route data block
CUST	0-31	Customer number
ISDN	yes	Modify ISDN parameters
NCNA	yes	Network Call Name is (is not) allowed. Only required if the name and/or the reason for call redirection is to be displayed. Make sure the Call Party Name Display (CPND) block in overlay 95 is programmed. When connected to a DMS set this prompt to NO.
NCRD	yes	Network Call Redirection. Allows network call redirection reason to be sent (or blocks messages if NCRD =no). Note: Network Call Redirection can occur without answering "yes" to the NCRD prompt. This prompt only controls the sending of Network Call Redirection reason messages for display purposes, not the actual redirection of the call. The message supplied when NCRD = yes provides the information for the CLID display. When NCRD is NO, the call is redirected without the CLID redirection information.
TRO	YES,(NO)	Trunk Optimization

Step 3

Display the reason calls are redirected. Use **LD95**.

Prompt	Response	Description
TYPE	CPND	Call Party Name Display data block
CUST	0-31	Customer number
RESN	yes	Allow display of reason for redirecting calls
CFWD	xxxx, (F)	Display mnemonic for (Network) Call Forward All Calls. Default is "F."
CFNA	xxxx, (N)	Display mnemonic for (Network) Call Forward No Answer display. Default is "N."
HUNT	xxxx, (B)	Display mnemonic for Hunt/Call Forward Busy. Default is "B".
PKUP	xxxx, (P)	Display mnemonic for Call Pickup. Default is "P".
XFER	xxxx, (T)	Display mnemonic for Call Transfer. Default is "T"
AAA	xxxx, (A)	Display mnemonic for Attendant Alternative Answering. Default "A".

Network Intercom (Hot Type D and Hot Type I Enhancements)

Use the following procedure to configure Network Intercom.

Step 1 – Use **Overlay 11** to define Network Intercom Hot Type D and I keys, and Classes of Service.

Prompt	Response	Description
REQ	NEW, CHG, OUT	Configure, change or remove.
TYPE	aaaa	Telephone type where aaaa cannot = M3000.
TN	c u	Terminal Number for the Option 11.
...		
CLS	FICA FICD NAIA NAID	Forward Hot Type I allowed. Forward Hot Type I denied. No Answer indication allowed. No Answer indication denied.
...		
KEY	nn HOT D dd target_num hot_dn R/V/N/(H)	Two-way Hot Line Key. dd = number of digits dialed. target_number = terminating DN (31 digits maximum). Hot_dn = two-way Hot Line DN. Termination mode: R = Ringing V = Voice N = Non-ringing, and H = Hot Line (the default).
KEY	nn HOT I dd target_number (V)/N/R	Hot Line key. dd = number of digits dialed. target_number = terminating DN (31 digits maximum). Termination mode: V = Voice (the default) N = Non-ringing, and R = Ringing.

Step 2 – Use **Overlay 95** to configure the Calling Party Name Display information for Network Intercom.

Prompt	Response	Description
REQ	NEW, CHG	Configure or change.
TYPE	CPND	Calling Party Name Display.
CUST	0-31	Customer Number.
...		
NITC	aaaa (NI)	Non-Hot Line call. Indicates that the Hot Line call terminated as a normal call.

Network Message Services - Message Center (NMS-MC)

Use this procedure to configure *Network Message Services-- Message Center*; (NMS-MC)) on an Option 11 system.

Restrictions and limitations

Basic PRI and / or ISL programming must be in place before implementing Network Message Services. This feature is similar to the existing Message Center feature.

The only difference is the fact that the Call Forward No Answer DN (FDN), Hunt DN and the Message Waiting key (MWK) on telephone sets can now be a Message Center DN (MCDN) located on another Meridian PBX within the private network. This feature supports the Uniform Dialing Plan (UDP), the public numbering plan, and the Coordinated Dialing Plan (CDP). See below for examples of the Message Center DN for these dialing plans.

Call type	Network Message Center DN	Number of Digits
private call using UDP	ACC + LOC + XXXX	8 (9 with 2 digit access code)
private call using CDP	DSC + X..X	10 maximum
public numbering plan	ACC + (1) + NPA + NXX + XXXX ACC + (1) + NXX + XXXX	14 maximum

Make sure that the following prompts are set properly as described in the chapters describing PRI and ISL software programming:

- the Private Network Identifier (PNI) is properly set in Overlay 15 (CDB) and Overlay 16 (RDB).
- the Release ID prompt (RLS) in Overlay 17 (CFN) is properly set (this is the current software release of the far end).

Requires X11 release 15 software or later.

Programming procedure

This procedure contains two major steps:

- 1 Program a Message Center as described in the Option 11 Software Guide (Message types available are: Set, Attendant or ACD).
- 2 Assign Hunt and FDN to Message Center DN. Assign Message Waiting key on Multi-line sets. Use LD10/11.

Prompt	Response	Description
REQ	CHG	
TYPE		appropriate set type
FDN	X..X	Flexible CFNA DN where XX is the MCDN (UDP or CDP format). The FDN value should include AC1/AC2 when applicable. Enter the same number as it would be manually dialed to reach the message center.
HUNT	X..X	change ISDN option
KEY	xx MWK X..X	The Message Waiting key on multi-line set followed by the MCDN. It should include the same digits as FDN and Hunt explained above.

Network Ring Again (NRAG)

Use this procedure to configure Network Ring Again (NRAG); on an Option 11 system.

Restrictions and limitations

NRAG requires that every switch in the network be equipped with either NARS or CDP software. The Network Ring Again feature will operate as part of basic PRI/ISL capability between Meridian 1 and Meridian 1 and DMS-100 via Centrex TIE lines. Besides the administration of NARS or CDP, the only prompt unique to the NRAG feature is the ability to control a duration timer which controls the amount of time between placing a call on ring again and timeout. The value of the duration timer can be changed with the following procedure.

Note: It is important to have the Private Network Identifier (PNI) set properly in order for NRAG to function.

Programming procedure

This procedure contains one major step:

- Change the duration timer on a route basis. Use LD16.

Prompt	Response	Description
REQ	NEW,CHG,	
TYPE	RDB	route data block
CNTL	YES	changes to controls or timers
NRAG	(30)-240	Network Ring Again duration timer —time is in minutes

Network Wide Listed Directory Numbers

LD 15 – Activate Network Wide LDN in CDB.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	CDB LDN_DATA	Customer data block Release 21 gate opener
CUST	0-31	Customer number
...		
- DLDN	YES	Departmental Listed Directory Numbers. Enter YES if no Console Presentation Group (CPG) is configured.
...		
LDN4	xxxx(xxx)	Listed Directory Number 4. If the DN Expansion (DNXP) package is equipped, up to seven digits are allowed; otherwise, only four digits are allowed.
LDA4	xx xx..., ALL	Attendant Consoles associated with LDN4.
LDN5	xxxx(xxx)	Listed Directory Number 5. If the DNXP package is equipped, up to seven digits are allowed; otherwise, only four digits are allowed.
LDA5	xx xx..., ALL	Attendant Consoles associated with LDN5.
OPT	NLDN, (XLDN)	Enable network wide LDN, Exclude LDN.

LD 15 – Add or change LDN keys.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	CDB LDN_DATA	Customer data block Release 21 gate opener
CUST	0-31	Customer number
...		
...		
- ICI	0-19 aaa	Attendant Incoming Indicators.

LD 93 – Add or change LDN keys in CPG.

Prompt	Response	Description
REQ	NEW, CHG	New or change
TYPE	CPGP	Changes affect the Console presentation group parameters.
CUST	x	Customer number
CPG	x	CPG number
LDN4	xxxx(xxx)	Listed Directory Number 4. If the DNXP package is equipped, up to seven digits are allowed; otherwise only four can be entered.
LDN5	xxxx(xxx)	Listed Directory Number 5. If the DNXP package is equipped, up to seven digits are allowed; otherwise only four can be entered.
...		
ICI	x LD4	x is the key number for listed DN 4.
ICI	x LD5	x is the key number for listed DN 5

NI-2 Call By Call Service Selection

To configure NI-2 CBC, the following implementation must be performed:

- Load Overlay 17 and configure the NI-2 Basic Call Service.
- Load Overlay 16 and configure a trunk route as an NI-2 Call By Call Service Selection master route.
- Load Overlay 14 and define the associated list of trunks (B-channels) that are to be shared by the NI-2 CBC service routes.
- Load Overlay 16 and define the NI-2 CBC service routes.

LD 17 – Configure the primary D-channel for the NI-2 Basic Call Service.

Prompt	Response	Description
REQ	NEW	Add new data.
TYPE	CFN	Configuration Record.
ADAN	NEW DCH xx	Add a primary D-channel where: xx = 0-63.
CTYP	MSDL TMDI	On Option 11C, supported only on Downloadable D-channel cards. For TMDI, Release 24 or later software is required.
...		
USR	PRI	D-channel mode.
IFC	NI2	NI-2 TR-1268 interface type.
CO_TYPE	(STD) ATT	Central Office switch type (prompted only if IFC = NI2). STD = Totally compatible with Bellcore standard. ATT = Lucent 5ESS.
PRI	l n	l = PRI loop using the same D-channel. n = Interface identifier.
...		

LD 16 – Configure the NI-2 Call By Call Service master route.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	RDB	Route Data Block.
DMOD	1-127	Default Model number for this route (Option 11)
CUST	xx	Customer number.
ROUT	0-127	Master route number.
TKTP	CBCT	The trunk type is a Call By Call master route.
...		
ISDN	YES	ISDN route.
- IFC	NI2	Interface type is NI-2.
- IPUB	0-127	Service route to be used for incoming network calls.
...		
- - PNI	1-32700	Private Network Identifier.
...		
ICOG	IAO ICT OGT	IAO = The trunk is incoming and outgoing. ICT = The trunk is incoming only. OGT = The trunk is outgoing only.
...		

LD 14 – Define the associated list of trunks (B-channels) that are to be shared by the NI-2 CBC service routes

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	CBCT	Call By Call trunk.
TN	l ch	Loop and channel for digital trunks.
CUST	xx	Customer number.
RTMB	0-127 1-510	CBC master route and member number.
...		

LD 16 – Configure the NI-2 CBC service routes.

Note: Up to 128 service routes can be configured using this procedure.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number.
ROUT	0-127	Service route number, must be different than the value enters for the master route.
...		
TKTP	TIE COT DID WAT FEX	Service trunk type. TIE Central Office Direct Inward Dial Wide Area Telecommunications Service Foreign Exchange
...		
ISDN	YES	ISDN route.

- IFC	NI2	Interface type is NI-2.
- CBCR	YES	Service route indicator.
- - RTN	0-127	Master route number, as previously defined in LD 16.
- - SRVC	(0)-31	Decimal value of the service provisioned for NI-2. Prompted only if IFC = NI2. 0 = Public call service 19 = FX (Foreign Exchange) service 20 = TIE service 17 = Inward Wide Area Telecommunications Service (INWATS) service 18 = Outward Wide Area Telecommunications Service (OUTWATS) service. Lucent proprietary call by call services may also be defined here.
- - FACN	(0)-99999	TIE or FX facility number. Prompted only if IFC = NI2, and SRVC = 19 (FX) or 20 (TIE).
- - BAND	(0)-99	OUTWATS band number. Prompted only if IFC= NI2 and SRVC = 18 (OUTWATS).
- - IEC	(0)-xxx (0)-xxxx	Inter-Exchange Carrier providing the service. Prompted if IFC = NI2 and SRVC = 0-16, 18, or 21-31.
- - MAX	xxx	Maximum number of trunks for the service route. This value must be the same as the value assigned by the Central Office at the time of subscription.
...		

NPI and TON in CDR Tickets

LD 17 – Configure the NPI and TON fields.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	PARM	System parameters.
...		
FCDR	NEW	New Format CDR. OLD = Old CDR format (default).
...		
CLID	YES	TON and NPI fields, in addition to CLID, are included.
...		

Note 1: For the NPI and TON in CDR Tickets feature, existing CDR implementation procedures must be performed.

Note 2: CLID must be configured for the NPI and TON in CDR Tickets feature. Refer to the “Calling Line Identification” and “ISDN Calling Line Identification Enhancements” feature modules in this document.

Remote Virtual Queuing (RVQ)

Feature implementation

All nodes supporting RVQ must have it enabled. Perform these procedures to configure RVQ on the originating node, and to check for RVQ on the tandem and terminating nodes.

LD 86 — Configure the originating node for RVQ.

Prompt	Response	Description
REQ	CHG	Change
CUST	nn	Customer number
FEAT	RLB	Route List data block
RLI	nn	Route List Index
ENTRY	nn	Route List entry number
ROUT	nnn	Route number
...		
IDBB	(DBD) DBI DBA	Enter DBD (Drop Back Busy Disabled). This will disable Drop Back Busy, and enable Remote Virtual Queuing for the customer. DBI = Drop Back if Initial set is busy. DBA = Drop Back if all routes are busy.
...		
CBQ	YES	Allow Call Back Queuing.
...		

LD 87 — Configure originating node for CBQ.

Prompt	Response	Description
REQ	CHG	Change
CUST	nn	Customer number
FEAT	NCTL	Network Control
...		
SCBQ	YES	Allow system Call Back queueing for the customer.
NCOS	nn	Network Class of Service number. The originating telephone must have the same value.
...		
CBQ	YES, (NO)	Call Back Queuing allowed (not allowed) for this NCOS
RETT	2–(10)–30	Remote Virtual Queuing Retry Timer (Time between searches, in seconds).
RETC	4–(5)–16	Remote Virtual Queuing Retry Counter (Number of times RVQ searches the initial set before moving on to the extended set).

LD 86— Configure the outgoing routes of the originating nodes for CBQ (at least one entry of the Initial set of the outgoing route has to allow CBQ).

Prompt	Response	Description
REQ	CHG	Change
CUST	nn	Customer number
FEAT	RLB	Route List data block
RLI	nn	Route List Index
ENTRY	nn	Route List entry number
- ROUT	0-511	Route number
...		
- CBQ	YES	Allow Call Back Queuing.
...		
ENTRY	<cr>	
ISSET	nn	Size of Initial set

LD 16 — Allow CBQ for the incoming non-ISDN routes on the originating nodes (for RVQ at a conventional Main operation).

Prompt	Response	Description
REQ	CHG	Change
TYPE	RDB	Route data block
CUST	0-511	Customer number
ROUT	nnn	Route number
...		
CBQ	YES	Allow Call Back Queuing.
...		

TMDI on Option 11C

Implementing the NTRB21 for PRI

- 1 Configure the NTRB21 TMDI card and the T1 Transmit Equalization value on the Option 11C, using LD17.
- 2 Configure a D-Channel on the NTRB21 TMDI card, using LD17.

LD 17 - Configure the NTRB21 TMDI card and the T1 Transmit Equalization value on the Option 11C.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	CEQU	Make changes to Common Equipment parameters.
...		
- DLOP	c dd ff	where: c is the card number (1-9). dd is the number of data calls allowed (0-24, default is 24). f is the frame format used (D2,D3,D4,ESF, default is ESF).
- MODE	PRI	Select Primary Rate Interface mode.
- TMDI	YES	Configure the NTRB21 TMDI card.
...		
-- YALM	(FDL) DG2	Yellow alarm method, prompted only if the frame format is ESF. The entered value must match the far end. Use FDL with ESF and use DG2 with non-ESF.
- T1TE	(0) 1 2	T1 Transmit Equalization, prompted only if TMDI = YES. 0 (default) = 0-200 ft. 1 = 200-400 ft. 2 = 400-700 ft.

LD 17 - Configure a D-Channel on the NTRB21 TMDI card.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	ADAN	Action device and number.
- ADAN	NEW DCH xx	Add a D-Channel port number. Any unused SDI port number can be used.
- CTYP	TMDI	The D-Channel is configured on the TMDI card.
- CDNO	xx	Card number, where xx = 1-9.
- PORT	1	Port number must be set to 1.
...		
- CUST	0-31	Customer number.
...		
- USR	PRI	User is an ISDN PRI interface.
- IFC	aaa	Interface type.
...		
- RLS	xx	Software release of the far-end switch.
...		

Implementing the NTRB21 for DTI

LD 17 - Configure the NTRB21 TMDI card and the T1 Transmit Equalization value on the Option 11C, using LD 17..

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	CEQU	Make changes to Common Equipment parameters.
...		
- DLOP	c dd ff	where: c is the card number (1-9). dd is the number of data calls allowed (0-24, default is 24). f is the frame format used (D2,D3,D4,ESF, default is ESF).
- MODE	TRK	Select Digital Trunk Interface mode.
- TMDI	YES	Configure the NTRB21 TMDI card.
...		
- - YALM	(FDL) DG2	Yellow alarm method, prompted only if the frame format is ESF. The entered value must match the far end. Use FDL with ESF and use DG2 with non-ESF.
...		
- T1TE	(0) 1 2	T1 Transmit Equalization, prompted only if TMDI = YES. 0 (default) = 0-200 ft. 1 = 200-400 ft. 2 = 400-700 ft.
...		

Software enabling the NTRB21 card

- 1 Enable the NTRB21 TMDI card using the following overlay and command:

LD96 ENL TMDI x

where x is the NTRB21 TMDI card number (DLOP). The card number associated with a NTRB21 TMDI card is based on the slot in which the card is installed (1-9).

- 2 If in PRI mode, S/W enable the associated D-Channel using the following overlay and commands:

LD96 ENL DCH y

(Where y is the DCH port number that was assigned in LD17).

Within about 30 seconds, the D-Channel layer 3 should be established. To confirm, request the current status of the D-Channel by using the **LD 60** command **STAT DCH (N)**.

The system should respond **DCH N EST OPER**, meaning that the D-Channel is established and operational.

Trunk Anti-Tromboning

Feature implementation

LD 17 — Configure TAT functionality to be performed at the far-end switch.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	ADAN	Type of change.
- ADAN		Action Device and Number.
	NEW DCH x	Add D-channel x.
	CHG DCH x	Change D-channel x.
CTYP	TMDI	The NTRB21 TMDI card (Release 24 and later).
	MSDL	The NTBK51BA D-Channel Daughterboard with PRI.
	DCHI	The NTBK51BA D-Channel Daughterboard with ISL/VNS.
- CDNO	1 2 3	Card number of TMDI card.
- PORT	xx	Port number.
...		
- IFC		Interface type for D-channel.
	SL1	SL1.
	S100	SL-100,
	D100	DMS-100.
	D250	DMS-250.
...		
- RLS	xx	Release ID of the switch at the far end of the D-channel. Release 21 or higher must be entered.
- RCAP	TAT	Remote Capabilities. TAT must be entered to enable Trunk Anti-Tromboning.

Virtual Network Services

Feature implementation

LD 17 – Configure Virtual Network Services.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	ADAN aaa xx	Release 19 gate opener. DCH 0 - 15
...		
- USR	VNS SHAV	To define a D-channel used for Virtual Network Services (or ISLD). To define a D-channel shared between PRI and VNS (and ISLD).
- VNSM	0-100	Define the maximum number of VNS channels over the D-channel.
- VNSC	0-31	Virtual Network Services Customer number.
- VNSP	0-32700	Private Network Identifier (PNI) of the far end customer.
- VNCA	YES	Network Call Party Name Display is available over this D-channel for VNS.
- VCRD	YES	Network Call Redirection is available over this D-channel for VNS.
- VTRO	YES	Trunk Route Optimization before answer is available over this D-channel for VNS. This prompt is optional and is not a prerequisite for VNS.

The following steps describe how to:

- Add or create a new single VDN or a block of contiguous VDNs
- Remove a single VDN or a block of contiguous VDNs
- Disable or enable a block of VDNs, or print VNS information for a customer

LD 79 - Add or create a new single VDN or a block of contiguous VDNs.

Prompt	Response	Description
REQ	NEW	Add or create a new single VDN or a block of contiguous VDNs. Note: The CHG command is not supported; you must use the NEW command to enter information.
TYPE	VNS	Virtual Network Services.
CUST	0-31	Customer number.
VNDN	xx...x 1-4000 xx...x <CR>	Individual VDN to be added. 1-4000 = number of contiguous VDN to be added xx...x = first VDN to be added. You may add another single VDN or a block of contiguous VDNs by entering <CR> after the VNDN entry. VNDN is prompted until <CR> is entered. In this case, the REQ prompt will appear again. Note: For the above entries, the VDNs must be part of the customer's numbering plan.

LD 79 - Remove a single VDN or a block of contiguous VDNs, or remove all existing VDN data blocks.

Prompt	Response	Description
REQ	OUT	Remove a single VDN or a block of contiguous VDNs, or remove all existing VDN data blocks. Note: You cannot remove only certain VDNs from a block; you have to remove the entire block.
TYPE	VNS	Virtual Network Services.
CUST	0-31	Customer number. At least one D-Channel must be configured with USR = VNS or USR = SHAV and having VNS = customer number.
VNDN	XALLVDNS xx...x <CR>	Remove all VNS data blocks. Remove an individual VDN, or the first VDN of a block of contiguous VDNs. You may remove another single VDN, or a block of contiguous VDNs, by entering <CR> after the VNDN entry. VNDN is prompted until <CR> is entered. In this case, the REQ prompt will appear again. If XALLVDNS is entered, the message REMOVE ALL VDN BLOCKS? is then output, followed by the CONF prompt.
CONF	YES	To confirm the removal of all VDN blocks.

LD 79 – Disable or enable single VDN, or a block of contiguous VDNs.

Prompt	Response	Description
REQ	DIS ENL	Disable a single VDN or a block of contiguous VDNs Enable a single VDN or a block of contiguous VDNs
TYPE	VNS	Virtual Network Services.
CUST	0-31	Customer number. At least one D-Channel must be configured with USR = VNS or USR = SHAV and having VNS = customer number.
VNDN	xx....x <CR>	Individual VDN, or first VDN of a block of contiguous VDNs to be disabled or enabled. You may enable or disable another single VDN, or a block of contiguous VDNs, by entering <CR> after the VNDN entry. VNDN is prompted until <CR> is entered. In this case, the REQ prompt will appear again.

LD 79– Print VNS information for a customer.

The information is output after the customer number is entered in response to the CUST prompt.

Prompt	Response	Description
REQ	PRT	Print VDN information.
TYPE	VNS	Virtual Network Services.
CUST	0-31	Customer number. At least one D-Channel must be configured with USR = VNS or USR = SHAV and having VNS = customer number. The VNS information is output for the customer. For a range of VDNs, the first VDN is displayed, followed by “—” and the last VDN of the block. On the same line, the number of VDNs in the block is displayed in brackets. For a single VDN, the VDN is displayed followed by “(1)”. If a block is disabled, the above indication is followed by the number of VNS calls still using a VDN in the block. These calls have to be cleared before the VDN block can be removed. At the end, the total number of VDNs configured for the customer is output. A sample output could be: <pre>7676 (1) 8100–8199 (100) TOTAL NUMBER OF VDN FOR CUST 2: 101</pre> If the VDN block 8100-8199, containing 100 VDNs, is disabled, the output would be: <pre>7676 (1) 8100–8199 (100) *DISABLED - VDN USED: 2* TOTAL NUMBER OF VDN FOR CUST 2: 101</pre> In this case, the VDN block is disabled and two VNS calls are still using two VDNs. These two calls must first be cleared before the VDN block 8100-8199 can be removed.

LD 86 – Assign D-channel number and VNS digit manipulation index to be used when signaling on the Bearer trunk and on the D-channel.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
...		
ENTR	0-63	Entry number for NARS/BARS Route List.
ROUT	0-511	The number of the route to be associated with the VNS Bearer channel.
VNS	YES	Virtual Network Services.
VDCH	0-15	The D-channel used for these VNS calls (must be configured in LD 17).
VDMI	xxx	The Digit Manipulation Table to be used on the VNS D-channel.
	(0)	No digit manipulation required.
	1-31	For Coordinated Dialing Plan feature.
	1-255	For NARS/BARS.
VTRK	1-(20)-100	Number of VNS trunks allowed on the route.
DMI	xxx	The Digit Manipulation table to be used on the VNS Bearer.
	(0)	No digit manipulation required.
	1-31	For Coordinated Dialing Plan feature.
	1-255	For NARS/BARS.

LD 16 – The following TIMR, TIMR, and VRAT prompts have been added to this overlay:

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	RDB	Route Data Block.
CUST	0-31	Customer number.
ROUT	0-511	The number of the route to be associated with the incoming VNS Bearer channel.
CNTL	YES	Change control of timers.
- TIMR	VSS (0) 1 2-1023	VNS Set Speechpath Timer 0 = Do not answer the bearer channel until the terminating party answers. 1 = Answer the Bearer channel immediately on arrival. 2-1023 = Answer the Bearer channel after specified seconds (rounded down to two-second multiples) if the terminating party has not already answered.
- TIMR	VGD 0-(6)-31	VNS Guard Timer The time allowed for the Bearer trunk call to disconnect, in seconds. This is a guard timer on the associated VNS DN.
...		
VRAT	(NO) YES	VNS Return Attendant Tones Option Do (not) answer an attendant extended call over VNS immediately on the incoming Bearer trunk.

Virtual Network Services Virtual Directory Number Expansion

Feature implementation

The following steps describe how to:

- Add or create a new single VDN or a block of contiguous VDNs;
- Remove a single VDN or a block of contiguous VDNs;
- Disable or enable a block of VDNs, or print VNS information for a customer.

LD 79 - Add or create a new single VDN or a block of contiguous VDNs.

Prompt	Response	Description
REQ	NEW	Add, or create a new single VDN or a block of contiguous VDNs. Note: The CHG command is not supported; you must use the NEW command to enter information.
TYPE	VNS	Virtual Network Services.
CUST	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C. At least one D-Channel must be configured with USR = VNS or USR=SHAV and having VNS = customer number.
VNDN	xx...x 1-4000 xx...x <cr>	Individual VDN to be added. 1-4000 = number of contiguous VDN to be added xx...x = first VDN to be added. You may add another single VDN or a block of contiguous VDNs by entering <cr> after the VNDN entry (VNDN is prompted until <cr> is entered.) In this case, the REQ prompt will appear again. Note: For the above entries, the VDNs must be part of the customer's numbering plan.

LD 79 - Remove a single VDN or a block of contiguous VDNs, or remove all existing VDN data blocks.

Prompt	Response	Description
REQ	OUT	Remove a single VDN or a block of contiguous VDNs, or remove all existing VDN data blocks. Note: You cannot remove only certain VDNs from a block; you must remove the entire block.
TYPE	VNS	Virtual Network Services.
CUST	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C. At least one D-Channel must be configured with USR = VNS or USR = SHAV and having VNS = customer number.
VNDN	XALLVDNS xx...x <cr>	Remove all VNS data blocks. Remove an individual VDN, or the first VDN of a block of contiguous VDNs. You may remove another single VDN, or a block of contiguous VDNs, by entering <cr> after the VNDN entry (VNDN is prompted until <cr> is entered.) In this case, the REQ prompt will appear again. If XALLVDNS is entered, the message REMOVE ALL VDN BLOCKS? is then output, followed by the CONF prompt.
CONF	YES	To confirm the removal of all VDN blocks.

LD 79 – Disable or enable single VDN, or a block of contiguous VDNs.

Prompt	Response	Description
REQ	DIS ENL	DIS = disable a single VDN or a block of contiguous VDNs ENL = enable a single VDN or a block of contiguous VDNs
TYPE	VNS	Virtual Network Services.
CUST	0-31	Customer Number for Option 11C. At least one D-Channel must be configured with USR = VNS or USR = SHAV and having VNS = customer number.
VNDN	xx....x <cr>	Individual VDN, or first VDN of a block of contiguous VDNs to be disabled or enabled. You may enable or disable another single VDN or a block of contiguous VDNs, by entering <cr> after the VNDN entry (VNDN is prompted until <cr> is entered.) In this case, the REQ prompt will appear again.

LD 79— Print VNS information for a customer.

The information is output after the customer number is entered in response to the CUST prompt.

Prompt	Response	Description
REQ	PRT	PRT = print VDN information.
TYPE	VNS	Virtual Network Services.
CUST	0-31	Customer Number for Option 11C. At least one D-Channel must be configured with USR = VNS or USR = SHAV and having VNS = customer number. The VNS information is output for the customer. For a range of VDNs, the first VDN is displayed, followed by “—” and the last VDN of the block. On the same line, the number of VDNs in the block is displayed in brackets. For a single VDN, the VDN is displayed followed by “(1)”. If a block is disabled, the above indication is followed by the number of VNS calls still using a VDN in the block. These calls have to be cleared before the VDN block can be removed. At the end, the total number of VDNs configured for the customer is output. A sample output could be: <pre>7676 (1) 8100-8199 (100) TOTAL NUMBER OF VDN FOR CUST 2: 101</pre> If the VDN block 8100-8199, containing 100 VDNs, is disabled, the output would be: <pre>7676 (1) 8100-8199 (100) *DISABLED - VDN USED: 2* TOTAL NUMBER OF VDN FOR CUST 2: 101</pre> In this case, the VDN block is disabled and two VNS calls are still using two VDNs. These two calls must first be cleared before the VDN block 8100-8199 can be removed.

LD 17 – Define the maximum number of VNS channels supported by a D-Channel.

Prompt	Response	Description
REQ	CHG, END	Change, or exit LD 17.
TYPE	ADAN	Action Device and Number.
- ADAN	CHG DCH 0-63 CHG DCH 0-15	The D-Channel number for Options 51C, 61C, 81, 81C. D-Channel number for Option 11C.
...		
- USR	VNS, SHAV	VNS = dedicated VNS D-Channel SHAV = shared VNS D-Channel
...		
- - VNSM	1-300	Maximum number of VNS channels supported by the D-Channel. Note: This is the potential VNS capability for the D-Channel and is not associated with other restrictions placed on VNS capability, such as the number of VDNs.

LD 86 – Define the maximum number of VNS trunks allowed on the route list entry.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
CUST	0-31	Customer Number.
FEAT	RLB	Route list data block feature.
RLI	0-MXRL	The Route List Index to be associated with the VNS Bearer Channel.
ENTR	0-63	The entry within the Route List Index to be associated with the VNS Bearer Channel.
ROUT	0-511	The number of the Route to be associated with the VNS Bearer Channel.
VNS	YES	Virtual Network Services.
...		
VTRK	1-(20)-254	Number of VNS Trunks allowed on the route.

Appendix A — Basic and Network Alternate Route Selection (BARS/NARS)

Introduction

This appendix describes the Basic Alternate Route Selection (BARS) and Network Alternate Route Selection (NARS) features for X11 software on a Meridian 1 system. BARS/NARS is considered one package; BARS is not offered as a standalone package in Canada. For more information on the BARS/NARS package, contact a Northern Telecom representative.

The BARS or NARS feature enables a customer with a number of switches in different locations to "Tie together" these switches to create a private telecommunications network (See Figure 119). When implemented, the BARS or NARS feature functions to direct a call from a switch in one geographical location to a switch in any other geographical location in a cost-efficient and easy-to-use manner by:

- eliminating long, complex dialing plans and replacing them with an abbreviated Uniform dialing plan (UDP) common to all switches which are part of the network
- providing a means of controlling the number and type of trunks that are available to each network caller, and a method of controlling the time of day that access to a trunk (or group of trunks) is allowed
- selecting automatically the least-cost trunk route available to complete a call between network switches
- providing uniform network access to stations served directly at a Meridian 1 node (see Note) and stations served at SL-1 mains or conventional mains (see Note) connected to a Meridian 1 node by Tie trunks

- providing the call originator with the option to either accept or refuse call completion over an expensive trunk, if less expensive trunks are not currently available
- providing optional queuing features which enable a call originator (when all trunks are busy) to either remain off-hook until a trunk becomes idle, or hang-up and receive a callback from the SL-1 when a trunk becomes idle.

Note: Terminology used in this publication is based on the following definition of switch types:

SL-1 ESN Node

An SL-1 equipped with the NARS or BARS feature.

SL-1 ESN Main

An SL-1 connected by Tie trunks to an SL-1 node and equipped with the Network Signaling (NSIG) feature package. (The connected SL-1 Node must also be equipped with the NSIG feature package.)

Conventional Main

An SL-1 switch connected by Tie trunks to an SL-1 node, but not equipped with the Network Signaling feature package. Conventional Main also applies to any other switch type (for example, step-by-step) connected by Tie trunks to an SL-1 node.

Whether the BARS or NARS feature is used depends on the number and placement of switches within the customer's private network, as well as the volume of traffic the network is to carry. NARS has the ability to translate location codes while BARS translates codes used for on-net dialing as special numbers. Refer to the section on on-net to off-net automatic overflow.

When used in large widely-dispersed applications, NARS forms an integral part of Northern Telecom's Electronic Switched Network (ESN) product. For more complete details, refer to *Electronic Switched Network description* (309-3001-100).

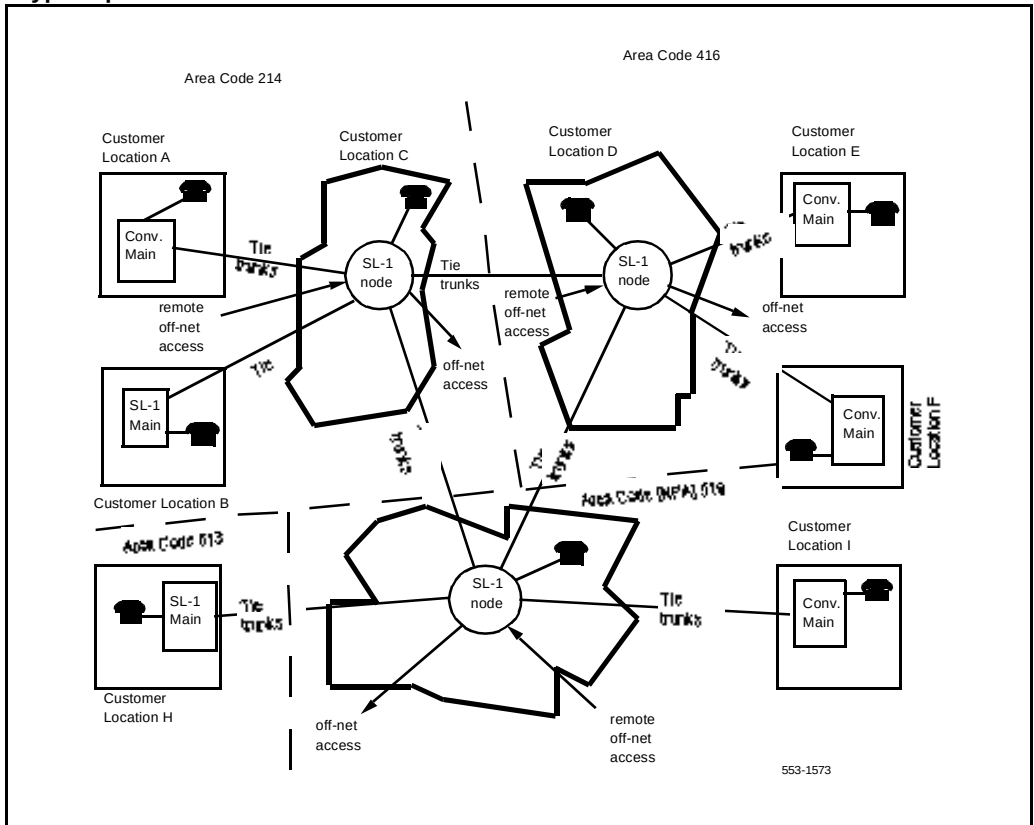
Other optional features that enhance the capabilities of BARS or NARS (Off-Hook Queuing, Network Authorization Codes, for example) are mentioned briefly in this publication. The following publications describe these optional features:

Network Queuing description (552-2751-101)

Coordinated Dialing Plan description (553-2751-102)

Basic and Network Authorization Code description (553-2751-103)

Figure 119
A typical private telecommunications network



Network class of service

Network Class of Service (NCOS) is an integral part of the BARS and NARS features at an SL-1 node, and of the Network Signaling feature at an SL-1 ESN Main.

NCOS provides the means to control:

- which trunk routes are eligible to be accessed to attempt call completion
- whether or not queuing is offered to a call originator
- whether or not the call originator receives a warning tone when an expensive trunk is selected to complete a call
- whether or not the user is allowed to access the Network Speed Call feature.

Table 81 summarizes the NCOS and other parameters for SL-1 nodes and mains.

Table 81
Summary of node and Main parameters Summary of node and Main parameters (continued)

Parameter (Note 2)	BARS node	NARS node	ESN main
NCOS Groups (Note 3)	0 - 7 (0-99)	0 - 15 (0-99)	0 - 15 (0-99)
Facility Restriction Levels	0 - 7	0 - 7	0 - 7
Digit Manipulation Tables	1 - 255	1 - 255	—
Route Lists	0 - 127	0 - 255	—
Route List Entries	0 - 7 (0-31)	0 - 7 (0-31)	
FCAS Tables (Note 1)	1 - 127	1 - 255	—
SDR Tables (Note 1)	0 - 255	0 - 511	—
SDRR ⁵¹ Tables (Note 1)	0 - 255	0 - 511	—
TOD Schedules (Note 1)	0 - 7	0 - 7	—
Note 1: The values in parentheses () are for X11 release 13 and later.			

Note 2: FCAS

= Free Calling Area Screening

SDR = Supplemental Digit Restriction

SDRR = Supplemental Digit Restriction/Recognition

TOD = Time-Of-Day

Note 3: If the NARS and BARS features are equipped in the same switch but for different customers, the highest parameter values apply to that switch. For example, if one customer has NARS and another customer has BARS, the NARS parameters apply to the BARS customer.

Note 4: If the New Flexible Code Restriction (NFCR) feature is equipped in conjunction with BARS or CDP, the number of available NCOSs is 8. With X11 release 13 and later, this number is expanded to 100. NFCR is described in *X11 features and services* (553-3001-305).

Once each NCOS group is defined through SL-1 service change, then line, trunk, and attendant groups are assigned to the NCOS group which best serves its requirements. The NCOS group to which each line, trunk, or attendant group is assigned is independent of the assigned SL-1 class of service. Tie trunks incoming from SL-1 mains or conventional mains are also assigned to an NCOS group (at the node) which determines their level of access to the network facilities at the node. See *X11 features and services* (553-3001-305) and *X11 input/output guide* (553-3001-400) for more information.

Facility Restriction Level

Included as part of each NCOS group is a Facility Restriction Level (FRL) number which ranges from 0 (low-privilege) to 7 (high-privilege). The FRL is used by the SL-1 software to determine the alternate route selection choices available for network call attempts by users within an NCOS group.

Example

A user assigned to an NCOS group with an FRL of 3 would be allowed access only to alternate route selection choices that have an assigned FRL of 3 or less; access to route choices with an FRL greater than 3 would be denied. Thus, by assigning low-privilege users to an NCOS group with a low FRL, and high-privilege users to an NCOS group with a higher FRL, the customer can control worker/management access to all network facilities.

Expensive Route Warning Tone

In some instances, expensive trunk routes may be assigned an FRL that would enable them to be accessed by certain network users. When this occurs, the originator of the call may be sent an optional Expensive Route Warning Tone (ERWT). (ERWT eligibility is defined through the user's assigned NCOS group.) NCOS groups must have CBQ type A in order to hear ERWT.

The ERWT alerts the user that expensive facilities have been selected to complete the call. The caller may opt to either accept or reject call completion over the expensive facilities. The caller must make this choice within a customer-programmable time. Refer to SL-1 service change programs in the *X11 input/output guide* (553-3001-400), specifically LD86 the ERDT timer, for more information.

Queuing features

Eligibility for the Off-Hook Queuing (OHQ) or Call-Back Queuing (CBQ) features is defined through the user's assigned NCOS group. See *Network Queuing description* (553-2751-101).

Basic/Network Alternate Route Selection

The NARS and BARS features provide comprehensive and flexible networking packages that can be configured to satisfy the specific requirements of a customer's private network. The BARS or NARS packages provide benefits to users through simplified dialing plans and reduced communications costs. Prime elements of the BARS or NARS features are:

- Simple network access codes
- Uniform dialing plan
- Dialing transparency
- Automatic least-cost routing

- Time-of-Day (TOD) routing
- Network controls through Network Class of Service (NCOS), Traveling Class of Service (TCOS), FRL, and regular SL-1 COS
- Routing control through NCOS alterations based on a special TOD schedule
- 1-4 digit translation and 1-7 digit restriction (X11 release 4)
- 1-4 digit translation, 1-7 digit restriction, and 1-7 digit recognition (X11 release 5)
- 1-11 digit translation, restriction, recognition (X11 release 8)
- Free Calling Area Screening (FCAS)
- Expensive Route Warning Tone (ERWT)

Uniform dialing plan

The Uniform dialing plan (UDP) is not a feature of BARS or NARS, but is an operation that enables users at an SL-1 node, SL-1 main, or conventional main to dial all calls in a uniform manner regardless of the location of the calling party or the route which the call will take. (UDP now applies to BARS on X11 release 5 using off-net number recognition and calling HLOC and SPN or NXX codes.) LOCs are programmed as NXXs or SPNs.

UDP for on-net calling

An on-net call is one which terminates at a customer-owned location. To reach any on-net location, the user dials the NARS or BARS on-net access code (AC1), followed by seven digits. The dialing format for this call would be:

AC1 * LOC + XXXX (For NARS)

AC1 * SPN + XXXX (For BARS)

Legend:

AC1 = the 1-digit or 2-digit NARS on-net access code

* = NARS dial tone (optional)

LOC = a 3-digit location code assigned for the destination location

SPN = a 3-digit code assigned for the destination location

XXXX = the extension number of the party to be reached
at the destination location.

Each switch which is part of the BARS or NARS network is referenced by a unique three-digit location (LOC) SPN or NXX code assigned at the SL-1 Node. There must be no conflict between the location code number assigned for a switch and Number Plan Area (NPA) codes.

A customer-owned location can be either physically connected to the network (by means of private trunk facilities) or virtually connected to the network (by means of public facilities). If a location is virtually connected to the network, the dialed LOC code is translated and converted by the SL-1 Node into the public number for the virtual location; for example, the Direct Distance Dialing (DDD) number or the Direct Inward Dialing (DID) number. Using digit manipulation for BARS, an SPN can be changed into the public network LDN.

Figure 120 illustrates a private network with a typical UDP. A user at LOC 776 (customer location I) wishing to call extension number 3283 at LOC 777 (customer location H) would first dial 8 (AC1), pause for NARS dial tone (optional), then dial 777-3283. A user at any other customer location that is part of the network would dial these same numbers to reach extension 3283.

UDP for off-net calling

An off-net call is one that does not terminate at a customer-owned location, even though some on-net facilities may be used to complete a portion of the call routing. Referring to Figure 120, a call would be termed off-net if a user at LOC 776 called a station number associated with CO 758-XXXX in the foreign area code 214.

Tables 82 and 83 list the dialing formats for the various types of NARS and BARS UDP calls respectively.

Figure 120
Example of a network with a typical NARS Uniform dialing plan

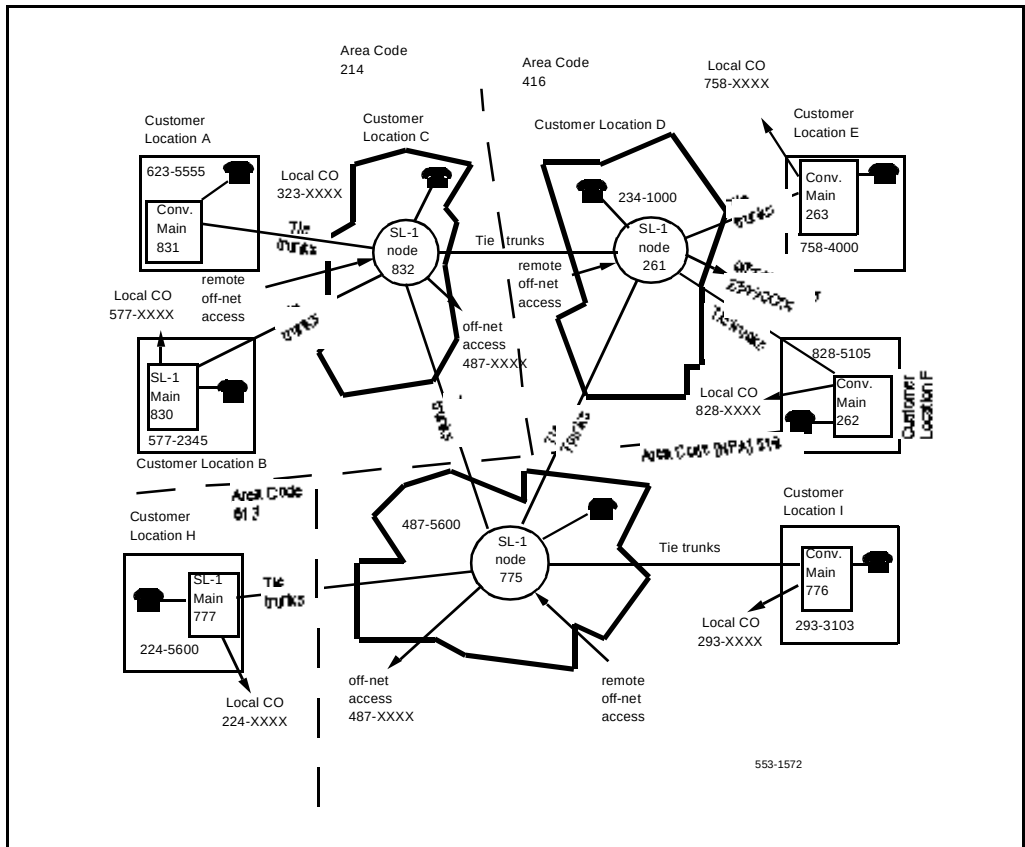


Table 82
Dialing formats for NARS UDP callsDialing formats for NARS UDP calls (continued)

Call type	Dialing format	Code capacity
On-Net (Notes 1, 2, and 3)	AC1 * LOC + XXXX	640
DDD FNPA (Note 1)	AC1 * 1 + NPA + NXX + XXXX	160
Network Speed Call	AC1 * LA + LN	1 - nn
Operator-assisted DDD	AC1 * 0 + NPA + NXX + XXXX	160
International DDD	AC1 * 011 + CC + NN	99
Operator-assisted International DDD	AC1 * 01 + CC + NN	99
DDD HNPA (Note 1)	AC1 or AC2 * 1 + NXX + XXXX	1
DDD Operator	AC2 * 0	1
Local Calls (Note 1)	AC2 * NXX + XXXX	640
Special Local Services	AC2 * SPN	8
Toll-free Calls	AC2 * 800 + NXX + XXXX	1
Toll-free Calls (Note 1)	AC2 * 1 + 800 + NXX + XXXX	1
Toll Special Numbers	AC2 * 900 + NXX + XXXX	1
Toll Special Numbers (Note 1)	AC2 * 1 + 900 + NXX + XXXX	1
Note 1: If 1+ Dialing is used, the On-Net and Local Calls code capacities are increased to 800 and 792 respectively.		
Note 2: If the code 1XX is reserved for future 1+ Dialing use, and not for Network Speed Call codes, then the location code capacity will be reduced to 639 if a three-digit Network Speed Call (NSC) code is used, 632 if a two-digit NSC code is used, or 560 if a one-digit NSC code is used.		
Note 3: When 1+ Dialing is used, Network Speed Call access will be in the form of 2XX-9XX as a subset of the location codes utilized in the UDP. The location code capacity will be reduced to 799 if a three-digit NSC code is used, 792 if a two-digit NSC code is used, or 720 if a one-digit NSC code is used.		
Note 4: See following page for legend of acronyms and dialing format abbreviations.		
- Continued -		

Legend	
AC1	Access code for on-net, long distance and Network Speed Calls. Typically the digit "8" but can be either one or two digits in length.
AC2	Access code for local calls. Typically the digit "9" but can be either one or two digits in length.
*	Symbol meaning NARS dial tone (optional).
NPA	Numbering Plan Area (NPA) code. Any number of the form N0X or N1X.
HNPA	Home Numbering Plan Area (HNPA) code. Any number of the form N0X or N1X.
FNPA	Foreign Numbering Plan Area (FNPA) code. Any number of the form N0X or N1X.
CC	Country code. Any one, two, or three digits from 2 to 9.
NN	National Number. Depends on national dialing plan; maximum 12 digits including the Country Code.
N	Any of the digits from 2 to 9.
X	Any of the digits from 0 to 9.
LA	List access code. Any one, two, or three digits from 0 to 9.
LN	List element number. Any one, two, or three digits from 0 to 9 and up to a maximum of 1000 element numbers.
LOC	Three-digit location code for each UDP network location.
NXX	Local Exchange Code.
XXXX	Four-digit directory (extension) number.
SPN	Special numbers for example, 411, 611 or may be XXXX.

Table 83
Dialing formats for BARS calls

Call type		Dialing format
On-Net		(1) AC1 * SPN + XXXX (2) AC1 * NXX + XXXX
DDD FNPA		AC1 * 1 + NPA + NXX + XXXX
Operator-assisted DDD		AC1 * 0 + NPA + NXX + XXXX
International DDD		AC1 * 011 + CC + NN
Operator-assisted International DDD		AC1 * 01 + CC + NN
DDD HNPA (if applicable)		(1) AC1 * 1 + NXX + XXXX (2) AC1 * 1 + NPA + NXX-XXXX (see note)
DDD Operator		AC1 * 0
Local Calls		AC1 * NXX + XXXX
Special Local Services		AC1 * 411, 611 etc.
Toll-free Calls		AC1 * 1 + 800 or 1 + 900 + NXX + XXXX
Note: 1 + dialing is optional; you can simply enter 1 NPA.		
Legend		
AC1	Access code for on-net, long distance and Network Speed Calls. Typically the digit "9" but can be either one or two digits in length.	
*	Symbol meaning wait for BARS dial tone (optional).	
NPA	Numbering Plan Area (NPA) code. Any number of the form N0X or N1X.	
HNPA	Home Numbering Plan Area (HNPA) code. Any number of the form N0X or N1X.	
FNPA	Foreign Numbering Plan Area (FNPA) code. Any number of the form N0X or N1X.	
CC	Country code. Any one, two, or three digits from 2 to 9.	
SPN	Special Number. Code used to identify other office locations on the network, or a number such as 411 or 611.	
NN	National Number. Depends on national dialing plan; maximum 12 digits including the Country Code.	
N	Any of the digits from 2 to 9.	
X	Any of the digits from 0 to 9.	

BARS access code

Long distance calls and calls to distant company locations ("on-network" calls) from the SL-1 Node are made by dialing the BARS access code (AC1) followed by the desired number. The BARS access code (AC1) is typically the digit 8, but is a customer defined one or two-digit number.

There can be no conflict between the BARS access code and any other part of the dialing plan at the node. Dial tone may or may not be provided to a caller after the BARS access code is dialed at the option of the customer.

Dialing the BARS AC1 triggers the BARS software to perform the call-processing and routing required for call completion. This is accomplished by means of a network translation table associated with the BARS access code. Normal SL-1 translation is used for all other call type; local or off-network calls made by dialing the digit 9.

NARS access codes

To access NARS, the user dials either one of the two customer defined NARS access codes: AC1 or AC2. These access codes are typically 8 for on-net and long distance calls (AC1); and 9 for off-net and local calls (AC2). However, any one-digit or two-digit access codes can be used, provided that AC1 is different from AC2 and there is no conflict with any other part of the dialing plan. Dial tone may or may not be provided to a caller after either NARS access code is dialed, at the option of the customer.

Dialing either of the NARS access codes triggers the NARS software to perform the call-processing and routing required for call completion. This is accomplished by means of network translation tables. There is a network translation table associated with each NARS access code. This translation mechanism is used to implement the NARS Uniform dialing plan for private networks.

Network translation

The normal SL-1 digit translator reads the dialed network access code, determines if the call is to be processed by BARS or NARS, and selects the appropriate Network Translation (See Table 84). BARS or NARS translation determines the method to be used to process the call, refers to Supplementary Digit Restriction and Recognition tables if required, and applies digit restriction or recognition where it is specified. The result of translation is to invoke either route selection with a specified route list, standard call blocking, queuing, or internal recognition.

Any SL-1 switch running a version of X11 software prior to X11 release 8 will translate the first 3 digits after the access code—first 4 digits with 1+ dialing or 4-digit SPN codes. (SPNs can be 1, 2, 3, or 4 digits.)

Only one Route List Index is used for routing NPA/NXX/SPN/LOC codes. In a network with multiple switches sharing DID numbers within the same NXX, Coordinated Dialing Plan is needed to route the calls properly.

11-digit BARS or NARS translation

With 11-digit translation introduced in X11 release 8, the ESN BARS or NARS translation capabilities are expanded from four digits to a maximum of 11 digits for route selection. This means more digits are translated and therefore make similar codes translate differently. This increases the flexibility for network routing, including International calls. For example, NXX1363 becomes 13634, or 13635. More than one code can be handled by the same route list.

By allowing translation of more than four leading digits, unique unconflicted routing to a destination is possible. More than one Route List can exist for each specific code of a type. For example, the NXX 727 could only translate into one Route List previously. With 11-digit translation, as many Route Lists as are needed to eliminate code conflict or achieve network requirements can be defined by extending translation deeper into the dialed code. Table 84 compares the number of digits that can be translated prior to X11 release 8 with present capabilities.

Table 84
Digit translation

Type	Before X11 release 8	X11 release 8 and later
LOC	3	3 - 7
HLOC	3	3 - 7
NPA	3- 4	3 - 11
HNPA	3- 4	3 - 11
NXX	3- 4	3 - 8
SPN	1- 4	1- 11

Dialing transparency

Extending network access to an SL-1 Main or Conventional Main is accomplished by forming a single Tie trunk access group from the Main to the Node. Users at Main switches access the trunk group to the Node by dialing the BARS or NARS on-net access code (AC1). The SL-1 Node is arranged to insert the digit(s) for AC1 on each incoming call from the Main, thus enabling access to the network facilities of the Node in a transparent fashion. Local calling is arranged through conventional dial "9" CO trunks at the Main.

Note: If an SL-1 node replaces a tandem switch in a Tandem Tie Trunk Network (TTTN), other tandem switches in the network can "tandem through" the SL-1 Node using the same access codes as before. This requires that there be no conflicts between the access codes for the TTTN trunks and the dialing plan implemented at the SL-1 Node.

Automatic least-cost routing

For each network call translated at an SL-1 node, BARS or NARS selects a route from a list of up to eight outgoing alternate routes to complete the call. A list of alternate routes to a particular destination is called a route list and each route specified in the list is termed an entry. Any combination of trunks; for example, Central Office (CO), Foreign Exchange (FX), or Tie can be specified in a route list.

Note 1: With X11 release 13 and later, BARS or NARS can select a route from a list of up to 32 outgoing alternate routes.

Note 2: Use of the Bandwidth Controller (DCA System 9000) improves the capacity of T1 based tandem networks. Its dynamic alternate routing capability can independently choose the optimum path for a voice or data call. However, it will be necessary to coordinate the Bandwidth Controller routing lists with the ESN routing lists.

Typically, the first entries (routes) in a route list are the less expensive routes to a destination and comprise the initial set (I set) of routes in the list. The remaining routes in the list (if any) are the more expensive routes to a destination and comprise the extended set of routes in the list. An initial set marker, defined through service change, determines which routes comprise the initial route set. Refer to *Electronic Switched Network description* (309-3001-100) for more information on I set and extended set routes.

An SL-1 Node equipped with NARS can accommodate 256 (0-255) route lists. An SL-1 node equipped with BARS can accommodate 128 (0-127) route lists.

Associated with each entry in a route list is information relevant to:

- the route number (0-511) (depending on the release)
- the minimum FRL required for access
- the time-of-day the route can be accessed
- whether or not queuing (OHQ or CBQ) is allowed on the route
- whether or not the route is to receive ERWT treatment
- a digit manipulation table index number
- a Free Calling Area Screening (FCAS) table index number
- activation/deactivation of conversion from an on-net number to an off-net number (NARS only)

Route eligibility

BARS or NARS translates the number dialed (1-11 digits) after an access code into a route list, and searches sequentially the routes in the list for an available route. Route eligibility for a given call is based on the caller's NCOS, the NCOS-defined FRL, the current time of day, and SL-1 COS.

Because each entry in a route list has a minimum FRL required for access and all network users are assigned an FRL through their NCOS, the network communications manager can restrict the type of calls allowed to particular users. For example, if the minimum FRL for all calls is 1, except for special local services numbers which are assigned an FRL of 0, then a user assigned to an NCOS group with an FRL of 0 would only be able to make calls to the special numbers. In addition, the communications manager can restrict the use of high-cost facilities by assigning a high FRL to the expensive routes in a route list and a lower FRL to a user's NCOS.

Digit manipulation

As mentioned previously, any trunk type can be specified in a route list. However, when certain trunk types are accessed, the digits dialed by the user must be manipulated to conform to the dialing requirements of the trunk. To do this, BARS or NARS uses digit manipulation tables to modify the dialed digits. There can be a maximum of 256 digit manipulation tables, each referenced by a digit manipulation index number, defined at each SL-1 Node. Digit manipulation can delete up to 15 leading digits, and insert up to 20 leading digits.

Example

A user at customer location I (See Figure 120) dials 8-613-596-9084 to reach an off-net station in the 613 NPA associated with customer location H. At the SL-1 Node, BARS or NARS selects the appropriate route list for call completion to NPA 613 and finds that the only available route to that NPA is a local CO trunk which requires the insertion of the leading digit "1" for long distance calls. The route list entry for this route specifies a digit manipulation index number (0-255). "0" means no digit manipulation is required. BARS or NARS references the digit manipulation table indicated by the index number, deletes digits as specified in the table (none in this case), and inserts the required digits ("1" in this case), and completes the call on this route.

Time-of-Day routing

BARS or NARS provides for up to eight (0-7) Time-of-Day (TOD) schedules. Each entry (route) in a route list is assigned to the TOD schedule which specifies the hour(s) that the particular entry can be accessed. Thus, based on the current time of day, the most cost-effective route alternatives can be specified. A typical TOD schedule is shown in Table 85.

Table 85
A typical TOD schedule

TOD schedule	Time period
2	00:00 to 07:44 17:30 to 23:59
1	07:45 to 08:59 12:00 to 13:14 16:00 to 17:29
0	09:00 to 11:59 13:15 to 15:59
Note 1: A TOD schedule can be associated with any number of arbitrarily selected 15-minute periods. However, any one 15-minute period can appear only in one TOD schedule.	
Note 2: Normally, the user does not define 0, but lets the SL-1 define it by calculating times of day not mentioned in schedules 1-7.	

Based on the TOD schedule shown in Table 85, a route list entry assigned to TOD schedule 2 would be accessed only between the hours of 00:00 to 07:44 and 17:30 to 23:59. Access to the route at any other time would be denied. TOD schedules can be turned "on" or "off" through SL-1 service change, as traffic conditions warrant. A TOD schedule is turned on for an entry by turning off all other TOD. An X beside the schedule number turns that number off.

Flexible ESN “0” Routing

Flexible ESN “0” Routing (an X11 release 16 feature) allows routing of calls on different routes based on a few predefined non-leftwise unique dialing sequences. This means that each entry in the table cannot match the leftmost portion of any other entry in the table. For example, if “123” is an entry in the table, then no other entry may begin with “123.”

The ESN translation table will allow any or all of the following non-leftwise unique numbers (along with their associated route list) to be entered into the ESN translation table:

- 0
- 00
- 01
- 011

Flexible ESN “0” Routing is part of the existing BARS (57) and NARS (58) packages and has no interaction with other features besides these. Since NARS has two translation tables, two Flexible ESN “0” Routing datablocks will be included in NARS. This means that a call could be configured to route in two different ways.

This feature is applicable to all route types and network types that are supported by ESN. For information on the appropriate prompts and responses in service change (LD90), refer to Northern Telecom Publication *X11 input/output guide* (553-3001-400).

Automatic on-net to off-net overflow

If all on-net facilities to a location are busy or blocked, NARS can convert a dialed NARS UDP number to the Listed Directory Number (LDN) or DID number of the destination location, and use off-net facilities to complete the call. If the SL-1 Node is equipped with BARS, digit manipulation tables can be used to convert the dialed number to the off-net number (LDN or DID) of the destination location.

Example

A user at customer location I (See Figure 121) dials 8-777-3283 to reach a party with extension number 3283 at customer location H. At the SL-1 Node, NARS translates the dialed LOC number (777) into a route list, and searches all eligible routes in the list. Failing to find an available Tie trunk route, NARS then seizes local off-net facilities and, to complete the call, outpulses one of two possibilities:

- 224-3283, if customer location H is arranged for DID
- 224-5600, if customer location H is not arranged for DID

Requirements

Prior to X11 release 5, only one contiguous DID DN range can be defined per location. DNs which lie outside the range are converted to the LDN.

The capability of this feature has been enhanced in X11 release 5 software by "Multiple DID Office Code Screening" and in X11 release 8 by 11-digit translation.

Multiple DID Office Code Screening (X11 release 5+)

Multiple DID Office Code Screening is an enhancement to the On-Net to Off-Net Overflow capability of the NARS feature. This enhancement permits on-net calls which are routed through the public network using on-net to off-net conversion, to terminate at any DN which has been defined in the Location Code data block of memory. For each LOC defined, Multiple DID Office Code Screening will:

- allow the definition of multiple NXX codes,
- allow the definition of multiple ranges of DN within each NXX.

The following arrangements of multiple office codes (NXX) and multiple DN ranges are possible:

- single office code with a single DN range (the only alternative prior to generic X11 release 5)
- single office code with multiple DN ranges
- multiple office codes with a single DN range
- multiple office codes with multiple DN ranges

Requirements

- Prior to X11 release 5, only one NPA per LOC code is allowed.
- Prior to X11 release 5, ranges defined within a LOC code must be unique. Overlapping or duplication of ranges is not permitted.
- The number of digits in each DID range must be 4.
- A maximum of 20 DID ranges may be defined per location code regardless of the number of office codes.

Incoming trunk group exclusion (X11 release 5+)

Incoming Trunk Group Exclusion is an enhancement to the BARS or NARS feature which blocks calls from SL-1 and Conventional Main users who use the network to reach destinations in the home NPA, or other restricted NPAs, NXXs, LOCs and SPNs. When the feature is configured, users cannot use the network to circumvent the restrictions. Instead, they are forced to dial off-net from their own switch and become subject to whatever restrictions are imposed at the Main.

Standard call blocking is applied on outgoing calls to specific NPAs, NXXs, SPNs or LOCs at the SL-1 Node if the call is from a specific incoming trunk group. Two advantages result.

- Loopback routing through the caller's home switch (home NPA, NXX) is prevented. Calls which should have been made off-net from the caller's home switch are blocked outgoing at the node.
- Main users are prevented from using BARS or NARS to make calls to certain NPA, NXX, SPN or LOC that they are restricted from making at the home switch.

Sets of restricted trunk routes to specific NPAs, NXXs, SPNs or LOCs are defined in SL-1 Service Change. There is one Incoming Trunk Group Exclusion Index (maximum 255) for each defined NPA, NXX, SPN or LOC. Each index points to an Incoming Trunk Group Exclusion (ITGE) table. A maximum of 128 restricted routes can be defined in each ITGE table. Incoming Trunk Group Exclusion provides full 10-digit restriction for NPA and SPN codes, seven-digit restriction for NXX codes and three-digit restriction for LOC codes. The code itself may be restricted also.

When a call is received, BARS or NARS tests to see if the dialed code is a restricted type (Supplemental Digit Restriction). If it is, BARS or NARS checks whether or not it has an ITGE restriction and if there is an ITEI number (1-255) associated with it. If an ITEI is defined, the ITGE table corresponding to the dialed code is searched. If the incoming trunk route is a member of the ITGE, the BARS or NARS process is terminated and the call is blocked. Otherwise, call processing continues.

Off-net number recognition (X11 release 5+)

Off-Net Number Recognition eliminates the need for using two extra CO trunks, when a subscriber, using the private network, dials a DID or DDD number that terminates at a BARS or NARS location. Calls are routed directly to the dialed DN (DID calls) or to the LDN (DDD calls), rather than being switched from the terminating switch to the CO and back again.

Off-net number recognition parameters for local and remote DDD and DID locations are defined by the customer in the Network Translation tables and Supplemental Digit Recognition/Restriction blocks (SDRR). Recognition of up to 10 digits can be defined for SL-1 with X11 release 5 or 7 software as follows:

Table 86
SDRR (X11 release 5 or 7

Call type	Network translation table (number of digits)	SDRR block (number of digits)
NPA	3	1 - 7
1NPA	4	1 - 7
NXX	3	1 - 4
1NXX	4	1 - 4
SPN	4	1 - 6
ISPN	4	1 - 7

With 11-Digit Translation, available on X11 release 8 and later, up to 11 digits can be defined in the following table.

Table 87
SDRR (X11, release 8 and up)

Call type	Network translation table (number of digits)	SDRR block (number of digits)
NPA	3 - 10	1 to (10 - N)
1NPA	4 - 11	1 to (11 - N)
NXX	3 - 7	1 to (7 - N)
1NXX	4 - 8	1 to (8 - N)
SPN	1 - 11	1 to (10 - N)
ISPN	1 - 4	1 to (11 - N)
Note: The value N is equal to the number of digits defined in the Network Translation table.		

Up to 512 SDRR blocks can be defined for NARS (256 for BARS). Each table can contain up to 64 entries.

Off-Net numbers are recognized at the last intelligent BARS or NARS switch. Translation of the NPA, NXX or SPN identifies the method of treatment for the call. If the data type is SDRR and the index is an SDRR table index, supplemental digit recognition/restriction is applied by comparing the dialed digits with the numbers declared in the SDRR block.

- If no match is found in the SDRR, route selection is called, call processing resumes and the call is routed to the CO of the terminating off-net number.
- If a match is found and the number is in the "denied" block, standard call blocking takes place.

- If a match is found and the number is recognized as a terminating number at the local switch (for example, the last intelligent BARS or NARS switch), the call is terminated at the station DN (DID calls) or at the attendant DN (DDD calls).
- If a match is found and the dialed number is a recognized number terminating at a remote switch, route selection is called, the special digit manipulation takes place and the call is routed directly to the main. DID calls terminate at the dialed station and DDD calls terminate at the attendant DN.

Note: Remote recognition applies to Tie trunks only.

Supplemental digit restriction (release dependent)

Supplemental digit restriction blocks (see Table 88) function as follows:

- block (deny) access to certain telephone numbers
- recognize Off-Net calls dialed to On-Net locations
- prevent routing of calls to the home switch of the originating trunk group by either on-net or off-net facilities.

The customer can also specify through SL-1 service change the treatment that blocked calls receive; for example, overflow tone, intercept to attendant, or recorded announcement.

Table 88
Supplemental digit restriction blocks per NARS or BARS

Network package	X11 release 4 and earlier maximum	X11 release 5 and later maximum
NARS	256	512
BARS	32	256
Note: For X11 release 4 and earlier, one block can restrict up to 16 numbers. For X11 release 5 and later software, one block can recognize or restrict up to 64 numbers.		

Digit translation / restriction / recognition

BARS and NARS provide a 1-digit through 10-digit (11-digit with 1+ dialing) translation/restriction/recognition capability through the use of network translation tables and Supplemental Restriction/Recognition tables. There are two network translation tables with NARS; one associated with each of the network access codes (AC1 and AC2).

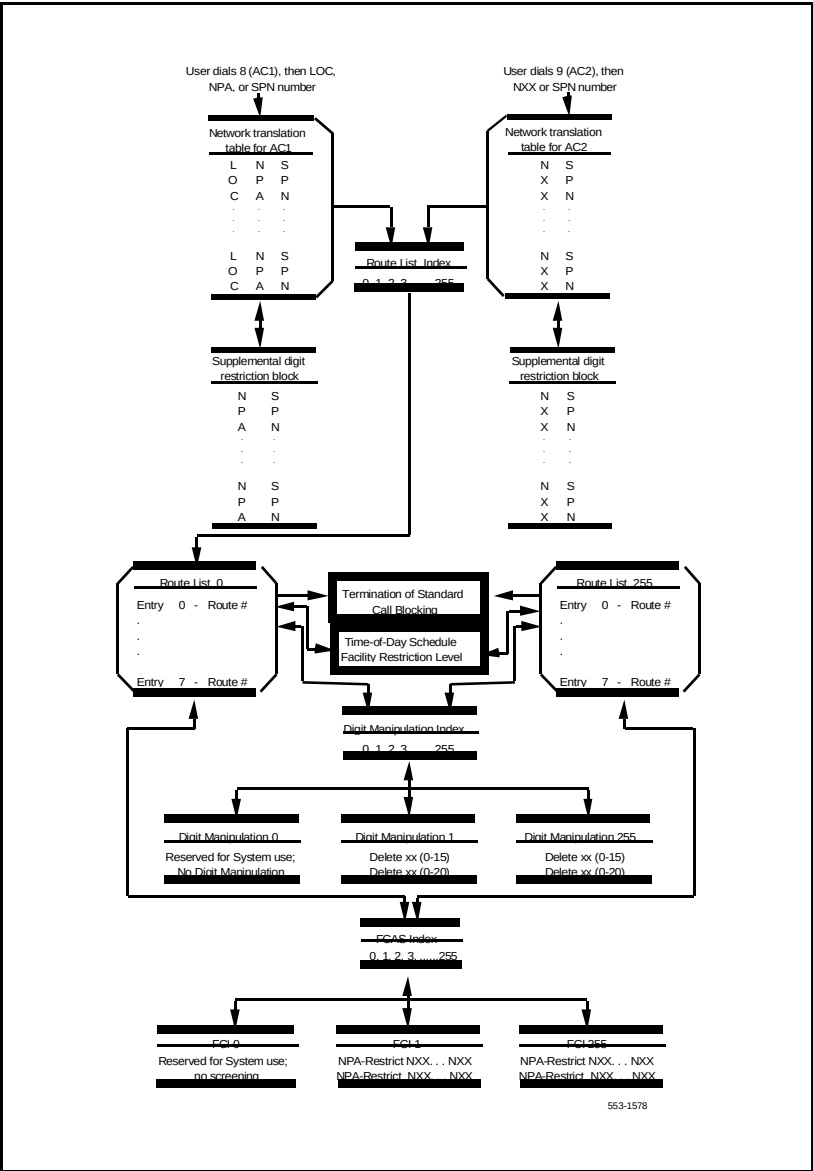
Information contained in the network translation tables is as follows:

- For each NPA entry, excluding the Home NPA (HNPA):
 - a route list index number (0-255 with NARS, 0-127 with BARS) that indicates which route list to use in processing a call to this NPA entry
 - whether or not there are telephone numbers within this NPA entry to which network calls are to be blocked; for example, “denied”
 - whether or not there are telephone numbers within this NPA entry to which network calls are to be blocked because of ITGE restrictions (X11 release 5+)
 - whether or not there are numbers under this NPA entry that are to be recognized as DID or DDD codes to an On-Net location (X11 release 5+)
 - a list (up to 64) of 1- to 7-digit numbers that follow the NPA and are to be blocked or recognized in this NPA.

- For each NXX entry:
 - a route list index number (0-255 with NARS; 0-127 with BARS) that indicates which route list to access in processing a call to this NXX entry
 - whether or not there are telephone numbers within this NXX entry to which network calls are to be blocked
 - whether or not there are telephone numbers within this NXX entry to which network calls are to be blocked because of ITGE restrictions (X11 release 5+)
 - whether or not there are numbers under this NXX entry that are to be recognized as DID or DDD codes to an On-Net location (X11 release 5+)
 - a list of up to 64, 1- to 4-digit numbers that follow the NXX and are to be blocked or recognized in this NXX
- For each LOC entry, excluding the Home LOC code (not applicable to a BARS-equipped switch):
 - a route list index number (0-255) that indicates which route list to access in processing a call to this LOC entry
 - the Listed Directory Number (LDN) to which the LOC entry is to be converted when using off-net DDD facilities
 - the range of DID numbers to which the LOC entry can be converted when using DID facilities
 - whether or not there are LOC entries to which network calls are to be blocked because of ITGE restrictions (X11 release 5+)

- For each SPN (special number) entry:
 - a route list index number (0-255 with NARS; 0-127 with BARS) that indicates which route list to access in processing a call to this SPN
 - whether or not there are digits following SPN numbers to which network calls are to be blocked
 - whether or not there are SPN numbers to which network calls are to be blocked because of ITGE restrictions (X11 release 5+)
 - whether or not there are numbers under this SPN that are to be recognized as DID or DDD codes to an On-Net location (X11 release 5+)
 - a list of up to 64, 1 to 7 numbers that are to be blocked or recognized when following the SPN

Figure 121
NARS elements accessed at an SL-1 node to process a network call



Free Calling Area Screening

Free Calling Area Screening (FCAS) is a BARS or NARS feature which provides the customer with the capability of full six-digit (NPA-NXX) screening to determine the route choice for completion of off-net calls. With FCAS, a customer can allow calls to NXX codes within the "free calling area" surrounding a particular on-net location, and restrict (deny) calls to those NXX codes that would incur long distance charges.

FCAS is implemented in a way similar to the method used for digit manipulation (for example, through FCAS tables). There can be up to 255 FCAS tables defined at an SL-1 node equipped with NARS (BARS can accommodate 127 FCAS tables). Each table can contain up to 15 NPA codes (only 7 NPA codes with BARS). Up to 800 NXX codes can be restricted or allowed within each NPA code. Each FCAS table is referenced by a Free Calling Index (FCI) number (0-255 with NARS, 0-127 with BARS); "FCI = 0" is a system default meaning no Free Calling Area Screening is required. The appropriate FCI number is then assigned to the applicable route list entries.

Whenever a route list entry is being considered for an off-net call (for example, 8-NPA-NXX-XXXX), BARS or NARS checks to see if there is an FCI number (other than "0") referred to by the entry. If an FCI number other than "0" is defined, the appropriate FCAS table for the dialed NPA is found and used for NXX screening. If the dialed NXX is denied in the table, BARS or NARS will not use the route list entry for call completion, but will continue to search for another eligible route list entry. If the dialed NXX is not denied, or specifically allowed in the table, the route list entry is eligible for the call. Calls to the LDN of a location are screened only if the NPA is included as part of the LDN. NXXs allowed in an FCI table are the only ones allowed for that route list entry.

Expensive Route Warning Tone

This feature enables the network communications manager to select certain users to receive an Expensive Route Warning Tone (ERWT). Eligibility for this tone is based on the user's NCOS. The tone (three 256-ms bursts of 440 Hz) notifies the user that BARS or NARS has selected facilities designated as expensive to complete the call. The user then has the choice of either allowing the call to complete over the expensive facilities, or going on-hook to avoid the increased expense, or queuing on the I set routes. (The user must make this choice within a programmable time of 0 to 10 seconds.) The tones must be activated for the customer group and the expensive route cannot be part of the I set in the route list.

If the call originator is located at an SL-1 node or SL-1 Main and the Ring Again feature is defined for the user and the user is CBQ(a) eligible, then Ring Again may be activated to queue the call. See *Network Queuing description* (553-2751-101).

If the SL-1 Node is equipped for Call Detail Recording (CDR), acceptance of an expensive route after ERWT is received is noted in the CDR record.

BARS or NARS bypass control

A customer can allow selected users to bypass the BARS or NARS feature for call completion between any two locations; for example, two locations which share a high community of interest. To do this, routes and trunks are set up between the two locations, and assigned an access code distinct from the AC1 and AC2 codes used to access BARS or NARS. The normal SL-1 trunk controls, like Trunk Group Access Restriction (TGAR), class of service, and code restriction, are then used to enable access only to the selected users. All other users are denied access to the trunk group, and thus, are forced to use BARS or NARS for all calls.

Network Speed Call

The Network Speed Call (NSC) feature enables a user at an SL-1 node who is normally restricted from making certain types of BARS or NARS calls to make such a call if the destination is a company-approved number defined in a System Speed Call (SSC) list. This feature requires that the System Speed Call feature (see *X11 features and services* [553-3001-305]) be equipped, in addition to Network Speed Call. NSC can also be accessed by users at an SL-1 Main or Conventional Main, provided a BARS or NARS access code is used to initiate the call.

Access to the NSC feature is allowed after a NARS or BARS access code is dialed. Upon receipt of BARS or NARS dial tone (optional), the user dials a Network Speed Call access code (one to three digits). The NSC access code must be unique from all LOC, NPA and NXX codes, and special numbers defined in the translator for the BARS or NARS access code.

The NSC access code is associated with a previously defined System Speed Call list (0-253) through service change in the network translation load. If the SCC list has its length (size) changed, the list access code and list number must be deleted and reentered into the NARS translator. Associated with the SSC list is an NCOS number. The NCOS assigned to the SSC list is applied to the call only if the FRL (0-7) is greater than that associated with the call originator's assigned NCOS.

Note: With X11 release 13 and later, the number of SSC lists has expanded from 254 (0-253) to 4096 (0-4095), depending on available system memory and other speed call usage.

If 1+ Dialing is specified for an NPA, NXX or SPN number in a translator, the digit "1" must not be used as the leading digit for Network Speed Call list codes in that translator.

The user then dials the number of the desired entry (1-1000) in the SSC list. Upon completion of dialing, the digits defined for the list entry are passed to BARS or NARS translation for processing. Route and feature (OHQ, CBQ) eligibility for call completion are based on the NCOS associated with the SSC list, if the FRL of the user's assigned NCOS is lower than that of the list.

Network Call Transfer

This feature improves the operation of the existing Call Transfer (XFER) feature between two SL-1s when a call is transferred back to the originating switch. The regular XFER feature requires two Tie trunks to complete the call. With Network Call Transfer (NXFER), if the call is transferred back to the originating switch by means of the same Tie trunk group, the originating switch completes the transfer within itself and the Tie trunks are dropped.

Note: Both SL-1 switches must be equipped with NSIG and NXFER software for this feature to operate.

The benefits derived from the NXFER feature include:

- minimal use of access Tie lines
- improved transmission performance since Tie lines are not used for the completed connection
- operation of NXFER is the same as for the existing XFER feature.

As shown in Figure 122, the NXFER feature allows station A at one ESN switch (I) to transfer the Tie trunk call from station B (switch II) to a third party, station C (switch II). In addition to NXFER software, NSIG software is needed at both ends of Tie trunk. If the transfer is allowed, stations B and C are connected on switch II and the Tie trunks are dropped (see Figure 124). In comparison, regular SL-1 Call Transfer (XFER) requires two Tie trunks and both switches to transfer and connect stations B and C.

Figure 122
Connection during NXFER

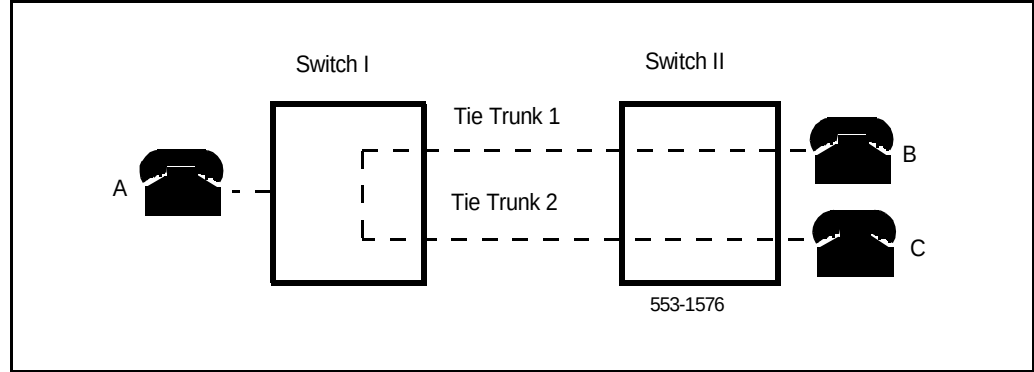


Figure 123
Connection after NXFER

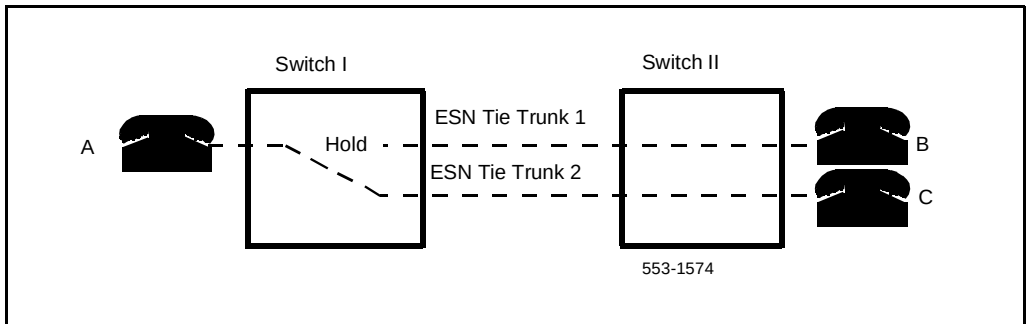
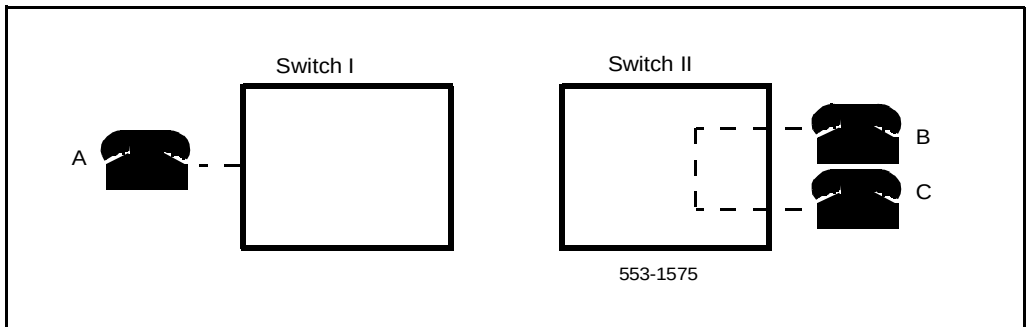


Figure 124
Connection after XFER



1 + dialing

Translation tables With 1+ dialing, the BARS or NARS translation tables are equipped for 4-digit translation (based on the first 1, 2, 3, or 4 digits), or 11-digit translation with X11 release 8 on, thus allowing BARS or NARS access code for long distance calls. NARS provides two translation tables and BARS provides one. Refer to Table 82 for dialing formats for NARS Uniform dialing plan (UDP) calls and Table 83 for BARS calls.

Code ambiguity The 1+ dialing capability also eliminates ambiguity between identical originating and terminating 3-digit NPA, NXX and LOC codes for BARS or NARS-originated calls. Thus, the BARS or NARS customer can route calls to any NPA, NXX or LOC code that conflicts with one of his 3-digit codes.

Limitation If 1+ dialing is specified for an NPA, NXX or SPN number in a translator, the digit "1" must not be used as the leading digit for Network Speed Call list codes in that translator.

Network control

Network control is an enhancement to the Network Class of Service (NCOS) feature that extends NCOS controls to users located at an SL-1 Main. Network control requires that the SL-1 Main and serving SL-1 Node be equipped with the NSIG feature. The SL-1 Main must also be equipped with the NCOS feature.

SL-1 Main NCOS

Users (lines, trunks, attendants) at an SL-1 Main are assigned an NCOS that is used to determine their level of access to network facilities at the serving SL-1 Node. When a user at an SL-1 Main initiates a call to (or through) an SL-1 node, the user's assigned NCOS or TCOS, depending on Tie trunk settings (ESN or ESN2, for example), can be transmitted.

If the user's NCOS is transmitted to the serving node and the node is equipped with BARS, only NCOS 0 through 7 can be assigned at the node. Therefore, only NCOS 0 through 7 should be assigned at the ESN Main even though an ESN Main equipped with NSIG can have an NCOS of 0 through 15. If the node is equipped with NARS, then an NCOS of 0 through 15 can be assigned both at the node and at the ESN Main.

The transmitted NCOS or TCOS overrides the NCOS or FRL assigned to the incoming Tie trunk group at the node, and is used to determine the user's eligibility for network resources/features at the SL-1 Node. Thus, a user at an SL-1 Main has the same network-access capabilities as a user at the SL-1 Node who is assigned the same NCOS.

Note: If the user at the SL-1 Main enters a valid authorization code prior to placing a BARS or NARS call, the NCOS associated with the authorization code is transmitted to the SL-1 Node in place of the user's assigned NCOS.

Calls from a Conventional Main to the SL-1 Node are controlled by the NCOS assigned to the incoming trunk group at the SL-1 Node, since the Conventional Main has no NSIG.

SL-1 node TCOS

Network Control at an SL-1 node can provide a Traveling Class of Service (TCOS) mechanism. TCOS controls route access and Off-Hook Queuing (OHQ) eligibility for calls placed to (or through) another SL-1 node or an associated SL-1 Main. It also enables the SL-1 Node to interface with switches that are part of an Electronic Tie Network (ETN) as long as the SIGO setting on the Tie trunk route is set for ETN at both ends. Nodes can send NCOS if SIGO is set for ESN2, for example, at both ends of the Tie trunk group.

The Traveling Class of Service is, in effect, the Facility Restrictions Level (FRL) of a user's assigned NCOS. When a user at an SL-1 node initiates a call to another SL-1 Node (or an SL-1 ESN Main), the TCOS (for example, the FRL of the user's assigned NCOS) is transmitted to the other SL-1 Node. At the receiving SL-1 Node, the TCOS (0-7) replaces the FRL of the NCOS assigned to the incoming trunk group. Route access and OHQ eligibility for the call are, therefore, based on the NCOS of the incoming trunk group with the modified FRL (for example, TCOS).

Note: The Network Control (NCTL) data block (LD87) is used to define OHQ eligibility on a per FRL (TCOS) basis (for example, if FRL 4 is defined as OHQ eligible, then all users with an NCOS with an FRL of 4 are eligible for OHQ on calls placed to another SL-1 Node or to an associated SL-1 Main).

If a user at an SL-1 Main or conventional main initiates a call that tandems through the serving SL-1 node to another SL-1 node or SL-1 Main, TCOS applies to the call as if the call originated at the serving SL-1 node.

Compatibility with ETN switches

The SL-1 TCOS is equivalent to the Traveling Class Mark (TCM) used at ETN switches. (See Technical Publication 42709, "Tie Trunk Signaling Compatibility for Connecting to a DIMENSION PBX", July 1979.)

When a seven-digit/ten-digit UDP call or a DSC (Distant Steering Code) (CDP) call is made from an SL-1 node to an ETN switch, the dialed digits together with the TCOS number (0-7) are sent to the connected ETN switch. At the ETN switch, the TCOS number received from the SL-1 Node is used as a TCM to determine route access and off-hook queuing eligibility at the ETN switch.

Similarly, when a call is made from an ETN switch to an SL-1 node, the dialed digits together with the TCM number (0-7) are sent to the connected SL-1 node. The SL-1 node interprets the received TCM number as a TCOS number. The received TCM (for example, TCOS) replaces the FRL of the NCOS assigned to the incoming trunk group from the ETN switch. This new FRL (for example, TCM) is then used to determine route access and off-hook queuing eligibility for the call. However, if a DSC (CDP) call is terminated on an SL-1 switch as a Local Steering Code (LSC) call, the TCOS value transmitted by the connected switch will not be collected and saved by this switch.

Network signaling

The Network Signaling (NSIG) feature provides the required signaling protocol to interface SL-1 nodes with SL-1 ESN Mains, SL-1 nodes with other SL-1 nodes, SL-1 nodes with conventional mains, and SL-1 nodes with Electronic Tie Network (ETN) switches.

When equipped with NSIG, an SL-1 Conventional Main is enhanced and becomes an ESN Main. When callers at an ESN Main place calls through a node or nodes with NSIG, their NCOS or TCOS travel with the call and are interpreted at other SL-1 switches that are equipped with NSIG. The Tie trunk settings determine and control the operation of this feature.

When the NSIG feature is equipped at a switch, options are available (route data block, LD16) to define the signaling arrangements between that switch and any other switch that may be connected to it by means of Tie trunks. These options define what call information is to be transmitted to a connected switch and what call information is to be received from a connected switch. The option selected depends on the type of connected switch (node, main, conventional main, ETN) and the options (for example, CCBQ, CBQCM) that are available to the connected switch.

The signaling options are: STD (standard), ESN, ESN2, ESN3, ESN5 (Electronic Switched Network), and ETN (Electronic Tie Network).

STD Arranges the Tie trunk group for transmission/reception of the called number between switches. Sends outpulsed digits.

ESN (X11 release 2 only) Arranges the Tie trunk group for transmission/reception of the call type, NCOS/TCOS, and called number between switches.

ESN2 (X11 release 3 and later) Arranges the Tie group as described for ESN in X11 release 2. Used unless switch has NXFER or Satellite Link Control (SAT).

ESN3 (X11 release 3 or 4) Arranges the Tie group as described for ESN in X11 release 2 and is required on systems equipped with the Network Call Transfer (NXFER) or Satellite Link Control features.

ESN5 (X11 release 5 and later) Arranges the Tie trunk group as described for ESN in X11 release 2; needed with DTI.

ETN Arranges the Tie trunk group for transmission/reception of the called number and TCOS/TCM between switches and is used when connected to an ETN switch. Sends outpulsed digits and TCOS.

Application

Following is a description of how these options would be applied to accommodate the different switch types that can be connected to an SL-1 Main or SL-1 Node that is equipped with the NSIG feature.

SL-1 Node An SL-1 Node can be connected by means of Tie trunks to: another SL-1 Node, an SL-1 Main, a Conventional Main, and/or an ETN Switch.

- If the SL-1 Node connects to another SL-1 Node, both ends of the connecting Tie trunk group are defined with the ETN option (called number plus TCOS/TCM), ESN2, ESN3, or ESN5.
- If the SL-1 Node connects to an SL-1 Main, both ends of the connecting Tie trunk group are defined with the ESN option (call type plus NCOS/TCOS plus called number).
- If the SL-1 Node connects to a Conventional Main, the node-end of the Tie trunk group is defined with the STD option (called number).
- If the SL-1 Node connects to an ETN switch, the node-end of the Tie trunk group is defined with the ETN option (called number plus TCOS-TCM).

SL-1 ESN Main An SL-1 Main can be connected by means of Tie trunks to an SL-1 node and satellite switches.

- For connection to an SL-1 node, both ends of the connecting Tie trunk group are defined with the ESN option (call type plus NCOS/TCOS plus called number).
- If there are satellite switches connected to the SL-1 Main, the main-end of the Tie trunk groups from the satellite switches are defined with the STD option (called number).

Requirements

The following requirements apply:

- As SL-1 Main can connect to only one SL-1 node, both switches must be equipped with the NSIG feature for NSIG-related features.
- Tie trunks between SL-1 nodes and SL-1 mains must be arranged for DTMF sending/receiving and wink-start operation.
- SL-1 Node compatibility with ETN switches is limited to seven-digit on-network, ten-digit off-network and DSC (CDP) calls.

Satellite Link Control

Tandem trunk calls, when connected through more than one communications satellite trunk, are subject to transmission distortion due to propagation to and from communications satellites. The Satellite Link Control feature ensures that the configuration of a call does not include more than one communications satellite trunk.

Requirements

- This feature applies to ESN network calls (BARS or NARS/CDP) only.
- ESN Proprietary Signaling (NSIG) is required among ESN switches.
- Routes which receive digits from satellites or send digits to satellites have to be marked as SATELLITE routes for this feature to operate.

Example

When accessing an SCC, the SL-1TD is instructed to look for one of the following tones:

- Busy or overflow tone
- SCC dial tone or regular dial tone
- Ringback tone

Simultaneously a timer is started whose value is an approximation of the period in which ringback tone is normally received. When the timer expires prior to a response from the SL-1TD, a status request message is sent to the SL-1TD by software. The response from the SL-1TD indicates that a tone has been detected but is not yet identified. Based on the sequence in which tones are checked, the software assumes the tone under investigation is ringback tone and can continue the SCC call processing.

Routing control

The Routing Control feature provides a mechanism for changing a user's network-access capabilities when a special TOD schedule is in effect, or when an extended TOD is in effect, or when the user presses a Routing Control key on the console.

NCOS map

With the NARS or BARS feature, TOD schedule 7 is the special TOD schedule. Associated with the special TOD schedule is a Network Class of Service (NCOS) map. The NCOS map lists all NCOS numbers. Associated with each listed NCOS is an alternate NCOS number (greater than, equal to, or smaller than) that replaces the original NCOS number when the special TOD schedule is in effect. Table 89 illustrates a typical NCOS map.

Table 89
A typical NCOS map for special TOD schedule 7

Original NCOS	Alternate NCOS (Note)	Original NCOS	Alternate NCOS (Note)
0	0	8	2
1	0	9	3
2	0	10	3
3	1	11	4
4	1	12	4
5	2	13	5
6	2	14	5
7	2	15	5

Note: When TOD schedule 7 is in effect, the alternate NCOS replaces the user's original NCOS.

Invoking Routing Control

The alternate NCOS numbers associated with special TOD schedule 7 are normally invoked when the time specified for TOD schedule 7 corresponds to the time in the SL-1 system clock. Additionally, the alternate NCOS numbers can be scheduled for implementation (through SL-1 service change) for the full 24-hour period of specified days of the week. This capability enables network-access capabilities to be changed automatically on weekends or company holidays.

The SL-1 attendant can also manually invoke the special TOD schedule through use of a routing control (RTC) key on the console. Pressing the RTC key lights the associated lamp, and invokes the special TOD schedule. To deactivate routing control, the RTC key is pressed again. The associated lamp goes dark and normal TOD schedules are once again in effect.

Note: Authorization code can be used to override the restrictions imposed through routing control. If a user enters a valid Authorization code (AUTH), the NCOS number associated with the AUTH is applied for the duration of the call.

Network traffic measurements

The Network Traffic (NTRF) feature provides traffic measurement data related to network performance and network traffic at each SL-1 Node and SL-1 Main. Effective use of this data enables the network communications manager to assess the effectiveness of the network, and to identify specific areas of network operation where improvements are warranted.

Areas of network operation that are measured include NCOS, OHQ, CBQ, and routing. These measurements are provided in addition to existing non-network traffic data in *Traffic measurement formats and output* (553-2001-450).

TFN001 routing measurements

The routing measurements provide data related to route list utilization. A route list is a list of alternate trunk routes which are identified through interpretation of the dialed number. For each defined route list, these measurements show:

- how often the list was used
- which routes in the list were used
- the number of calls that were unsuccessful in completing a route list selection or connection
- queuing (OHQ and CBQ) information

These data comprise both the usage and average duration of each call against the route list. Data is output only for route lists upon which calls were attempted during the traffic study interval.

OHQ measurements

The OHQ measurements are associated with route lists, NCOS, and incoming trunk groups. OHQ enables a user to wait off-hook for a network facility to become available. The network communications manager can control the conditions for, and the duration of, the wait. The measurements present both the usage and average duration if the OHQ feature. This data comprises part of the routing measurements.

CBQ measurements

The CBQ measurements are associated with route lists, NCOS, and incoming trunk groups. If the system cannot select a route, the caller may opt to have the system establish the call at a later time when a route becomes available. The measurements indicate usage and the length of time a caller waits for an established call. The communications manager can control the conditions for CBQ and the advancement of a call within the queue. This data comprises part of the routing measurements.

TFN002 NCOS measurements

The network class of service (assigned through service change) indicates the network facilities available to the user. Traffic measurements are accumulated for each NCOS and indicate the grade of service (queuing and blocking delay, for example) provided by the system. The communications manager can change the NCOS if a grade of service is inappropriate for a user category, the definition of the NCOS is inaccurate, or the routing parameters need updating.

TFN003 incoming trunk group measurements

These measurements relate to the incremental traffic that was imposed on the incoming trunk groups by network queuing features (for example, OHQ, CBQ, CCBQ, CBQCM).

The measurements show:

- how often the incoming trunk group was offered OHQ
- the average time in the OHQ
- how often the incoming trunk group was offered CCBQ or CBQCM, and the number of acceptances

- the average time in CCBQ or CBQCM
- how often an access line was blocked when attempting a CCBQ or CBQCM callback
- how often CCBQ or CBQCM callbacks were not answered or were canceled

BARS implementation

This section provides the procedures necessary to configure Basic Alternate Route Selection (BARS). Only the service change information for BARS is shown here. For a complete discussion of prompts and responses, see *X11 input/output guide* (553-3001-400). The following procedure shows the steps that must be performed to correctly implement your BARS system.

Procedure 1: Implementing BARS

- 1 Gather data for each NCOS group (LD87)
- 2 Gather data to define BARS feature parameters (LD86)
- 3 Gather data for each Digit Manipulation index (LD86)
- 4 Gather data for each Route list associated with a Digit Manipulation table (LD86)
- 5 Gather data for each Incoming Trunk Group Exclusion List (LD86)
- 6 Gather BARS translation data (LD90)
- 7 Gather data to configure a Conventional Main for Off-Net Number Recognition (LD16)
- 8 Gather data to assign a Network Class of Service group number to a list of items (LDs 10, 12, 14, 24, 88)
- 9 Enter data into the database

Configuring BARS

Step 1: Gather data for each NCOS group. Access LD87

REQ	NEW, CHG, OUT	Create, change, or remove data
CUST	0-99	Customer number
FEAT	NCTL	Network control
NCOS	0-7 0-99	NCOS group to be added, changed, or removed
FRL	0-7	Facility restriction level
RWTA	Yes, (No)	Expensive route warning tone

Step 2: Gather data to define BARS feature parameters. Access LD86

REQ	NEW, CHG, OUT	Create, change, or remove data
CUST	0-99	Customer number
FEAT	ESN	Electronic Switched Network data block
MXSD	0-512	Maximum number of supplemental digit restriction blocks
MXIX	0-127	Maximum number of incoming trunk group exclusion tables that can be defined
MXDM	0-256	Maximum number of digit manipulation tables
MXRL	0-128	Maximum number of route lists
AC1	xx	One- or two-digit BARS access code one
DLTN	No, (Yes)	Dial tone after dialing AC1 or AC2
ERWT	No, (Yes)	Expensive route warning tone is not (is) provided
ERDT	0-(6)-10	Time in seconds that a user has to accept or reject an expensive route after ERWT is given; default is 6 s; range is in 2-second intervals
TODS	x hh mm hh mm	Start and end time-of-day schedules; BARS or NARS = 0-7 x = schedule number hh = hour mm = minutes

TGAR	Yes, (No)	Check for Trunk Group Access Restrictions Yes = examine TGAR/TARG when call is placed No = ignore TGAR/TARG when call is placed

Step 3: Gather data for each Digit Manipulation index (DGT). Access LD86

REQ	NEW, CHG, OUT	Create, change, or remove data
CUST	0-99	Customer number
FEAT	DGT	Digit manipulation index
DMI	1-255	Digit manipulation table index (see note below)
DEL	(0)-15	Number of leading digits to be deleted from the dialed number; default is 0
INST	x...x	Up to 24 leading digits to be inserted
Note: The maximum number of Digit manipulation tables is defined by prompt MXDM		

Step 4: Gather data for each Route List associated with A DGT . Access LD86

REQ	NEW, CHG, OUT	Create, change, or remove data
CUST	0-99	Customer number
FEAT	RLB	Route list data block
RLI	0-127	Route list index number
ENTR	0-7 0-99	Route list entry number
RTNO	0-511	Route number associated with the index
TDET	Yes, (No)	Tone detector is (is not) used
TYPE	TIE, (CC1), CC2	TIE = Tone detector for on-net calls (CC1) = Tone detector for Special Common Carrier, (SCC) Type 1 CC2 = Tone detector for Special Common Carrier, (SCC) Type 2
TONE	DIAL, (SCC)	Type of tone expected from SCC DIAL = normal dial tone SCC = SCC dial tone

REQ	NEW, CHG, OUT	Create, change, or remove data
TOD	0-7 X0-7	Time-of-Day schedule associated with the entry Turn off a time-of-day schedule
EXP	Yes, (No)	Entry is (is not) classed as expensive
FRL	(0)-7	Minimum Facility Restriction Level a user must have to access the entry
DMI	(0)-255	Index number of the digit manipulation table to be used for the entry; default is 0, no digit manipulation required
FCI	1-127	Free calling area screening table index number (FCAS) (0) = no FCAS required
OHQ	Yes, (No)	Off Hook Queuing is (is not) allowed on the entry
CBQ	Yes, (No)	Call Back Queuing is (is not) allowed on the entry
ISET	(0)-32	Number of entries in the initial route set
MFRL	(MIN), 0-7	Minimum FRL used to determine autocode prompting

Step 5: Gather data for each Incoming Trunk Group Exclusion Index (ITGE). Access LD86

REQ	NEW, CHG, OUT	Create, change, or remove data
CUST	0-99	Customer number
FEAT	ITGE	Incoming trunk group exclusion data block
ITEI	1-127	Incoming trunk group exclusion index number; if REQ was "OUT" all route entries defined for the entered index are removed
	<return>	Return to REQ prompt
RTNO	0-511	Route number associated with index; precede with an X to delete an existing route
	<return>	Return to REQ prompt

Step 6: Gather BARS translation data. Access LD90

REQ	NEW, CHG, OUT	Create, change, or remove data
CUST	0-99	Customer number
FEAT	NET	Network translation tables
TRAN	AC1, AC2, SUM	Access code 1, 2, or summary tables

REQ	NEW, CHG, OUT	Create, change, or remove data
TYPE	LOC HNPA NPA HLOC NXX SPN NXCL	Location code Home NPA translation code Number plan area translation code Home location code Central Office translation code Special Number translation code Speed call
	<return>	Return to REQ
The following prompt occurs if TYPE is LOC:		
LOC	x...x	Location code (3 digits) or extended LOC (3 to 7)
RLI	0-255	Route list index
ITEI	(0)-255	Incoming trunk group exclusion index
LDN	xx...xx	Up to ten-digit listed directory number including NPA
DID	Yes, (No)	This location arranged for DID
MNXX	Yes, (No)	Multiple NXX codes and ranges
SAVE	1-4	Number of trailing digits to be saved in dialed extension number; must be 4 if MNXX = Yes
OFFC	xxx	NXX of the DID number; prompted if MNXX = Yes
RNGE	0-9999 0-9999	Bottom and top of range of DID numbers
The following prompt occurs if TYPE is HNPA:		
HNPA	xxx	Home NPA
The following prompts occur if TYPE is NPA:		
NPA	xxx, xxx yyy	Area code translation, extended NPA code translation
RLI	0-255	Route list index
SDRR	aaa	Type of supplemental restriction or recognition
DMI	1-255	Digit manipulation table index
DENY	x...x	Number to be denied within the HNPA, NPA, NXX, SPN, or SDRR

REQ	NEW, CHG, OUT	Create, change, or remove data
LDID	x...x	Local DID number recognized within the HNPA, NPA, NXX, or SPN. The maximum number of digits allowed is 10-m (11-m for 1 + dialing).
LDDD	x...x	Local DDD number recognized within the HNPA, NPA, NXX, or SPN. The maximum number of digits allowed is 10-m (11-m for 1 + dialing).
DID	x...x	Remote DID number recognized within the HNPA, NPA, NXX, or SPN. The maximum number of digits allowed is 10-m (11-m for 1 + dialing).
DDD	x...x	Remote DDD number recognized within the HNPA, NPA, NXX, or SPN. The maximum number of digits allowed is 10-m (11-m for 1 + dialing).
ITED	x...x	Incoming trunk group exclusion codes for HNPA, NPA, NXX, or SPN. The maximum number of digits allowed is 7-m.
ITEI	x...x	Incoming trunk group exclusion index
Legend: m = the number of digits entered for the prompt NPA X = a command used to clear a recognized xxx code <return> = A return after each subprompt takes you back to SDRR		
The following prompts appear if TYPE is NXX		
NXX	xxx, xxx yyy	Office code translation, extended NXX codes translation
RLI	0-255	Route list index
SDRR	aaa	Type of supplemental restriction or recognition
DMI	1-255	Digit manipulation table index
DENY	x...x	Number to be denied within the HNPA, NPA, NXX, SPN, or SDRR. The maximum number of digits allowed is 7-m.
LDID	x...x	Local DID number recognized within the HNPA, NPA, NXX, or SPN
LDDD	x...x	Local DDD number recognized within the HNPA, NPA, NXX, or SPN

REQ	NEW, CHG, OUT	Create, change, or remove data
DID	x...x	Remote DID number recognized within the HNPA, NPA, NXX, or SPN
DDD	x...x	Remote DDD number recognized within the HNPA, NPA, NXX, or SPN
ITED	x...x	Incoming trunk group exclusion codes for HNPA, NPA, NXX, or SPN
ITEI	(0)-255	Incoming trunk group exclusion index
The following prompts appear if TYPE is SPN:		
SPN	xxxx xxxx x..	Special number translation
RLI	0-255	Route list index
SDRR	aaa	Type of supplemental restriction or recognition
DMI	1-255	Digit manipulation table index
DENY	x...x	Number to be denied within the HNPA, NPA, NXX, SPN, or SDRR
LDID	x...x	Local DID number recognized within the HNPA, NPA, NXX, or SPN
LDDD	x...x	Local DDD number recognized within the HNPA, NPA, NXX, or SPN
DID	x...x	Remote DID number recognized within the HNPA, NPA, NXX, or SPN
DDD	x...x	Remote DDD number recognized within the HNPA, NPA, NXX, or SPN
ITED	x...x	Incoming trunk group exclusion codes for HNPA, NPA, NXX, or SPN
ITEI	(0)-255	Incoming trunk group exclusion index
The following prompts appear if TYPE is NSCL:		
NSCC	xxx	One- to three-digit network speed call access code
SSCL	0-4095	System speed call list number

REQ	NEW, CHG, OUT	Create, change, or remove data
The following prompts appear if TYPE is NSCL:		
NSCC	xxx	One- to three-digit network speed call access code
SSCL	0-4095	System speed call list number
The following prompts appear if TYPE is NSCL:		
NSCC	xxx	One- to three-digit network speed call access code

Step 7: Gather data to configure a Conventional Main for Off-Net Number Recognition.
Access LD16

REQ	NEW, CHG	Add or change a route
TYPE	RDB	Route data block
CUST	0-99	Customer number
ROUTE	0-511	Route number
TKTP	TIE	Tie trunk
• • •		
CNVT	Yes, (No)	Route to conventional switch (prompted if the response to TKTP is Tie)
DDMI	(0)-127	Digit manipulation index (prompted if the response to CNVT is Yes)
ATDN	xxxx	Attendant DN of conventional main (prompted if the response to CVNT is Yes)
Note: If the DN expansion package is equipped, the attendant DN can have up to 7 digits.; otherwise, only 4 digits can be entered.		

The following procedure involves several load programs. In all cases, the prompt is NCOS; the range is 0-99 (or 0-7 with X11 release 12 and earlier); the default is 0.

Step 8: Gather data to assign a Network Class of Service group number to a list of items

Gather data to assign a Network Class of Service group number to each of the following items:

- 500/2500 sets (LD10)
- SL-1 telephones, M1000 series telephones, M2000 series digital telephones, M3000 Touchphones (LD12)
- Attendant consoles (LD12)
- Trunks (LD14)
- Direct Inward System Access directory number See LD24)
- Authorization code (LD88)

Step 9: Enter data into the database

The final step in configuring Basic Alternate Route Selection is to enter the data gathered into the database:

- 1** Login.
- 2** Load the appropriate load program.
- 3** Enter data requested by prompts until REQ prompt returns.
- 4** More data to be added/removed?

Yes = go to Step 2

No = perform data dump

Note: A data dump takes approximately 3 minutes to complete. If large amounts of data are being added, perform a data dump periodically. This ensures that entered data is not lost should a system reload occur.

- 5** Print data (respond with PRT to prompt REQ) and verify against data forms.

6 Corrections required?

Yes = go to Step 2

No = Refer to 553-2YY1-230 and perform applicable tests.

NARS implementation

This section provides the procedures necessary to configure Network Alternate Route Selection (NARS). Only the service change information for BARS is shown here. For a complete discussion of prompts and responses, see *X11 input/output guide* (553-3001-400). The following procedure shows the steps that must be performed to correctly implement your NARS system.

Procedure 1: Implementing NARS

- 1 Gather data for each NCOS group (LD87)
- 2 Gather data to define NARS feature parameters (LD86)
- 3 Gather data for each Digit Manipulation index (LD86)
- 4 Gather data for each Route list associated with a Digit Manipulation table (LD86)
- 5 Gather data for each Incoming Trunk Group Exclusion List (LD86)
- 6 Gather NARS translation data (LD90)
- 7 Gather data to configure a Conventional Main for Off-Net Number Recognition (LD16)
- 8 Gather data to assign a Network Class of Service group number to a list of items (LDs 10, 12, 14, 24, 88)
- 9 Enter data into the database

Configuring NARS

Step 1: Gather data for each NCOS group. Access LD87

REQ	NEW, CHG, OUT	Create, change, or remove data
CUST	0-99	Customer number
FEAT	NCTL	Network control
NCOS	0-99	NCOS group to be added, changed, or removed
FRL	(0)-7	Facility restriction level
RWTA	Yes, (No)	Expensive route warning tone

Step 2: Gather data to define NARS feature parameters. Access LD86

REQ	NEW, CHG, OUT	Create, change, or remove data
CUST	0-99	Customer number
FEAT	ESN	Electronic Switched Network data block
MXLC	0-999	Maximum number of supplemental digit restriction blocks
MXSD	0-512	Maximum number of incoming trunk group exclusion tables that can be defined
MXIX	0-256	Maximum number of incoming trunk group exclusion tables
MXDM	0-256	Maximum number of digit manipulation tables
MXRL	0-256	Maximum number of route lists
MXFC	0-256	Maximum number of free calling area screening tables
AC1	xx	One or two digit NARS/BARS access code one
AC2	xx	One or two digit NARS access code two
DLTN	No, (Yes)	NARS/BARS dial tone after dialing AC1 or AC2
ERWT	No, (Yes)	Expensive route warning tone is not (is) provided
ERDT	0-(6)-10	Time in seconds that a user has to accept or reject an expensive route after ERWT is given; default is 6 s; range is in 2-second intervals
TODS	x hh mm hh mm	Start and end time-of-day schedules; BARS or NARS = 0-7 x = schedule number hh = hour mm = minutes
TGAR	Yes, (No)	Check for Trunk Group Access Restrictions Yes = examine TGAR/TARG when call is placed No = ignore TGAR/TARG when call is placed

Step 3: Gather data for each Digit Manipulation index (DGT). Access LD86

REQ	NEW, CHG, OUT	Create, change, or remove data
CUST	0-99	Customer number
FEAT	DGT	Digit manipulation index
DMI	1-255	Digit manipulation table index (see note below)
DEL	(0)-15	Number of leading digits to be deleted from the dialed number; default is 0

REQ	NEW, CHG, OUT	Create, change, or remove data
INST	x...x	Up to 24 leading digits to be inserted
Note: The maximum number of Digit manipulation tables is defined by prompt MXDM		

Step 4: Gather data for each Route List associated with A DGT. Access LD86

REQ	NEW, CHG, OUT	Create, change, or remove data
CUST	0-99	Customer number
FEAT	RLB	Route list data block
RLI	0-255	Route list index number
ENTR	0-63	Route list entry number (release 15 +)
RTNO	0-511	Route number associated with the index
TDET	Yes, (No)	Tone detector is (is not) used
TYPE	TIE, (CC1), CC2	TIE = Tone detector for on-net calls (CC1) = Tone detector for Special Common Carrier, (SCC) Type 1 CC2 = Tone detector for Special Common Carrier, (SCC) Type 2
TONE	DIAL, (SCC)	Type of tone expected from SCC DIAL = normal dial tone SCC = SCC dial tone
TOD	0-7 X0-7	Time-of-Day schedule associated with the entry Turn off a time-of-day schedule
EXP	Yes, (No)	Entry is (is not) classed as expensive
FRL	(0)-7	Minimum Facility Restriction Level a user must have to access the entry
DMI	(0)-255	Index number of the digit manipulation table to be used for the entry; default is 0, no digit manipulation required
FCI	(0)-255	Free calling area screening table index number (FCAS) (0) = no FCAS required
OHQ	Yes, (No)	Off Hook Queuing is (is not) allowed on the entry
CBQ	Yes, (No)	Call Back Queuing is (is not) allowed on the entry
ISSET	(0)-32	Number of entries in the initial route set
MFRL	(MIN), 0-7	Minimum FRL used to determine autocode prompting

Step 5: Gather data for each Incoming Trunk Group Exclusion Index (ITGE). Access LD86

REQ	NEW, CHG, OUT	Create, change, or remove data
CUST	0-99	Customer number
FEAT	ITGE	Incoming trunk group exclusion data block
ITEI	1-127	Incoming trunk group exclusion index number; if REQ was "OUT" all route entries defined for the entered index are removed
RTNO	0-511	Route number associated with index; precede with an X to delete an existing route

Step 6: Gather NARS translation data. Access LD90

REQ	NEW, CHG, OUT	Create, change, or remove data
CUST	0-99	Customer number
FEAT	NET	Network translation tables
TRAN	AC1, AC2, SUM	Access code 1, 2, or summary tables
TYPE	LOC HNPA NPA HLOC NXX SPN NXCL	Location code Home NPA translation code Number plan area translation code Home location code Central Office translation code Special Number translation code Speed call
	<return>	Return to REQ

The following prompt occurs if TYPE is LOC:

LOC	x...x	Location code (3 digits) or extended LOC (3 to 7)
RLI	0-255	Route list index
ITEI	(0)-255	Incoming trunk group exclusion index
LDN	xx...xx	Up to ten-digit listed directory number including NPA
DID	Yes, (No)	This location arranged for DID
MNXX	Yes, (No)	Multiple NXX codes and ranges

REQ	NEW, CHG, OUT	Create, change, or remove data
SAVE	1-4	Number of trailing digits to be saved in dialed extension number; must be 4 if MNXX = Yes
OFFC	xxx	NXX of the DID number; prompted if MNXX = Yes
RNGE	0-9999 0-9999	Bottom and top of range of DID numbers
The following prompt occurs if TYPE is HNPA:		
HNPA	xxx	Home NPA
The following prompts occur if TYPE is NPA:		
NPA	xxx, xxx yyy	Area code translation, extended NPA code translation
RLI	0-255	Route list index
SDRR	aaa	Type of supplemental restriction or recognition
DMI	1-255	Digit manipulation table index
DENY	x...x	Number to be denied within the HNPA, NPA, NXX, SPN, or SDRR
LDID	x...x	Local DID number recognized within the HNPA, NPA, NXX, or SPN. The maximum number of digits allowed is 10-m (11-m for 1 + dialing).
LDDD	x...x	Local DDD number recognized within the HNPA, NPA, NXX, or SPN. The maximum number of digits allowed is 10-m (11-m for 1 + dialing).
DID	x...x	Remote DID number recognized within the HNPA, NPA, NXX, or SPN. The maximum number of digits allowed is 10-m (11-m for 1 + dialing).
DDD	x...x	Remote DDD number recognized within the HNPA, NPA, NXX, or SPN. The maximum number of digits allowed is 10-m (11-m for 1 + dialing).
ITED	x...x	Incoming trunk group exclusion codes for HNPA, NPA, NXX, or SPN. The maximum number of digits allowed is 7-m.
ITEI	(0)-255	Incoming trunk group exclusion index

REQ	NEW, CHG, OUT	Create, change, or remove data
Legend: m = the number of digits entered for the prompt NPA X = a command used to clear a recognized xxx code <return> = A return after each subprompt takes you back to SDRR		
The following prompts appear if TYPE is NXX		
NXX	xxx, xxx yyy	Office code translation, extended NXX codes translation
RLI	0-255	Route list index
SDRR	aaa	Type of supplemental restriction or recognition
DMI	1-255	Digit manipulation table index
DENY	x...x	Number to be denied within the HNPA, NPA, NXX, SPN, or SDRR. The maximum number of digits allowed is 7-m.
LDID	x...x	Local DID number recognized within the HNPA, NPA, NXX, or SPN
LDDD	x...x	Local DDD number recognized within the HNPA, NPA, NXX, or SPN
DID	x...x	Remote DID number recognized within the HNPA, NPA, NXX, or SPN
DDD	x...x	Remote DDD number recognized within the HNPA, NPA, NXX, or SPN
ITED	x...x	Incoming trunk group exclusion codes for HNPA, NPA, NXX, or SPN
ITEI	(0)-255	Incoming trunk group exclusion index
The following prompts appear if TYPE is SPN:		
SPN	xxxx xxxx x..	Special number translation
RLI	0-255	Route list index
SDRR	aaa	Type of supplemental restriction or recognition
DMI	1-255	Digit manipulation table index
DENY	x...x	Number to be denied within the HNPA, NPA, NXX, SPN, or SDRR

REQ	NEW, CHG, OUT	Create, change, or remove data
LDID	x...x	Local DID number recognized within the HNPA, NPA, NXX, or SPN
LDDD	x...x	Local DDD number recognized within the HNPA, NPA, NXX, or SPN
DID	x...x	Remote DID number recognized within the HNPA, NPA, NXX, or SPN
DDD	x...x	Remote DDD number recognized within the HNPA, NPA, NXX, or SPN
ITED	x...x	Incoming trunk group exclusion codes for HNPA, NPA, NXX, or SPN
ITEI	(0)-255	Incoming trunk group exclusion index
The following prompts appear if TYPE is NSCL:		
NSCC	xxx	One- to three-digit network speed call access code
SSCL	0-4095	System speed call list number

**Step 7: Gather data to configure a Conventional Main for Off-Net Number Recognition.
Access LD16**

REQ	NEW, CHG	Add or change a route
TYPE	RDB	Route data block
CUST	0-99	Customer number
ROUTE	0-511	Route number
TKTP	TIE	Tie trunk
• • •		
CNVT	Yes, (No)	Route to conventional switch (prompted if the response to TKTP is Tie)
DDMI	(0)-255	Digit manipulation index (prompted if the response to CNVT is Yes)
ATDN	xxxx	Attendant DN of conventional main (prompted if the response to CVNT is Yes)
Note: If the DN expansion package is equipped, the attendant DN can have up to 7 digits.; otherwise, only 4 digits can be entered.		

The following procedure involves several load programs. In all cases, the prompt is NCOS; the range is 0-99 (or 0-7 with X11 release 12 and earlier); the default is 0.

Step 8: Gather data to assign a Network Class of Service group number to a list of items

Gather data to assign a Network Class of Service group number to each of the following items:

- 500/2500 sets (LD10)
- SL-1 telephones, M1000 series telephones, M2000 series digital telephones, M3000 Touchphones (LD12)
- Attendant consoles (LD12)
- Trunks (LD14)
- Direct Inward System Access directory number See LD24)
- Authorization code (LD88)

Step 9: Enter data into the database

The final step in configuring Basic Alternate Route Selection is to enter the data gathered into the data base:

- 1 Login.
- 2 Load the appropriate load program.
- 3 Enter data requested by prompts until REQ prompt returns.
- 4 More data to be added/removed?

Yes = go to Step 2

No = perform data dump

Note: A data dump takes approximately 3 minutes to complete. If large amounts of data are being added, perform a data dump periodically. This ensures that entered data is not lost should a system reload occur.

- 5 Print data (respond with PRT to prompt REQ) and verify against data forms.

6 Corrections required?

Yes = go to Step 2

No = Refer to 553-2YY1-230 and perform applicable tests.

Appendix B — Network Queuing

Introduction

This appendix describes the queuing features and options that are available to switches which operate in a private network environment. The queuing features are:

- Off-Hook Queuing (OHQ)
- Call-Back Queuing (CBQ)
- Coordinated Call-Back Queuing (CCBQ)
- Call-Back Queuing to Conventional Mains (CBQCM)

Customer benefits from the queuing features include increased trunk group efficiency, facility cost-savings and user convenience through elimination of numerous redialing attempts.

A private network consists of one or more of the following types of switch.

Meridian 1 Node

A Meridian 1 switch that is equipped with either the Basic Alternate Route Selection (BARS) or Network Alternate Route Selection (NARS) software feature packages. NARS and BARS features are described in *Basic and network alternate route selection description* (553-2751-100).

Meridian 1 Main

A Meridian 1 switch that is connected via tie trunks to a Meridian 1 Node and is equipped with the Network Signaling (NSIG) and Network Class of Service (NCOS) software packages. A Meridian 1 Main can be connected to only one Meridian 1 Node. A Meridian 1 Main may also be equipped with the BARS and OHQ features.

Conventional Main

A switch (Meridian 1 or any other type) that is connected via tie trunks to a Meridian 1 Node and is not equipped with any network-related features.

Note: Information presented in this practice assumes the reader is familiar with the terminology and concepts of the alternate route selection capabilities as described in Basic and network alternate route selection description (553-2751-100).

Off-Hook Queuing

Off-Hook Queuing (OHQ) is a software feature that can be equipped at a Meridian 1 Node and/or Meridian 1 Main. The feature enables a call originator to remain off-hook for a short time (customer programmable) until a network facility for call completion becomes available at the Node or Main.

OHQ eligibility

Network calls may be placed in an OHQ if all trunk routes (entries) in the initial route set of a route list (see Note) are busy and the following criteria are met.

- At least one of the trunk routes in the initial route set of a route list is defined as being eligible for OHQ.
- The Network Class of Service (NCOS) of the call originator (at a Node or a Main) is defined to permit OHQ.
- The incoming trunk group at the Node or the Main is defined in software to permit OHQ for incoming calls.
- The Traveling Class Mark (TCM) received at the Node from an Electronic Tie Network (ETN) switch is compatible with a Facility Restriction Level (FRL) that is defined to permit OHQ.
- The Traveling Class of Service (TCOS) received at the Node from another Node is compatible with an FRL that is defined to permit OHQ.
- The probability that the call will timeout in the OHQ before a trunk becomes available is below a specific threshold.
- The OHQ feature is enabled for the customer.

Note: A Meridian 1 defined initial set “marker” determines which route list entries are in the initial route set. Typically, the initial route set contains the cheaper routes to a particular destination. The remaining routes in the route list (if any) comprise the extended route set and are usually the more expensive routes to the destination. Only routes in the initial route set should be defined to allow OHQ. OHQ will not be offered by routes in the extended route set even if they are defined to allow OHQ.

Calls which do not meet the preceding requirements for OHQ eligibility may be offered CBQ at this point.

OHQ availability

The OHQ software performs an “availability” test to prevent calls from entering the OHQ when there is a high probability that the call will timeout before a trunk becomes available. The following procedure is used to make this test.

- For each trunk route, a counter is maintained which reflects the current number of calls with the maximum queue priority of 3 queued against it. (This includes all calls in OHQ and those CBQ and Ring Again calls that are currently at priority 3.)
- Each trunk route has a threshold value which indicates the maximum number of priority 3 calls that can be queued against it before OHQ timeout becomes a high probability. Before a call is placed in the OHQ the current queue count is compared with the threshold value for each eligible trunk route in the initial set of routes. If at least one of the trunk routes has a count which is less than or equal to the threshold value, the call is allowed to OHQ against all OHQ-eligible routes.

OHQ offer

If all eligibility and availability checks are successful, the call originator is given a distinctive OHQ offer tone (a 1s burst of 440 Hz tone) when the call enters the OHQ. The call originator either accepts the OHQ offer by remaining off-hook, or declines the offer by going on-hook.

OHQ calls are placed in a priority-ordered queue with all other calls waiting for trunks. OHQ calls are assigned maximum priority (3) because other network facilities may be held while the call is queued. A timer with an initial value equal to the software-defined OHQ time limit is started to limit the duration of the OHQ. (The OHQ time limit is service changeable within the range of 2 to 60 s.)

The queue is examined whenever a trunk becomes idle in a trunk route on which one or more calls are queued. If a call is found which can be terminated on an idle trunk, the available trunk is seized and the call terminated.

If the OHQ timer expires before the call can be terminated, the call is removed from the OHQ. At this time, the remaining eligible routes in the route list (the extended set) are examined and the call is either terminated or given standard blocking treatment if no facilities are available. (CBQ will not be offered at this point as OHQ was already offered.) Expensive Route Warning (ERWT) is not given to calls which have been queued even if terminated on expensive facilities.

OHQ can be offered to call originators located at a Node, Main, Conventional Main or ETN switch. Also, as a call progresses through the network, OHQ can be offered to the call originator from any of the Nodes or Mains that are used to process the call (i.e., OHQ can be offered more than once for a given call).

OHQ traffic measurements

Traffic measurement data related to usage of the OHQ feature is accumulated at a Node or Main that is equipped with Network Traffic (NTRF) feature. Data for OHQ usage is available in the publication *Traffic measurement* (553-2001-450).

Routing measurements (TFN001)

Available at a Node or Main. Reflects on a route list basis the number of calls placed in the OHQ, the average time a call waited in the OHQ and the number of calls abandoned while in the OHQ.

NCOS measurements (TFN002)

Available at a Node or Main. Reflects on a NCOS basis the number of call placed in the OHQ and the average time a call waited in the OHQ.

Incoming trunk group measurements (TFN003)

Available at a Node. (The measurements are also available at a Main if the OHQ feature is equipped and some incoming trunk groups are defined as OHQ eligible.) Reflects on an incoming trunk (or two-way) trunk group basis the number of calls placed in the OHQ and the average time a call waited in the OHQ.

Feature interactions

The OHQ feature has the following interactions with existing Meridian 1 features.

Call modification

Station users are not allowed to activate call modification features (hold, call transfer, conference) while waiting in the OHQ. Switchhook flash used to activate features from 500/2500 sets is ignored. Similarly, operation of SL-1 or digital set feature keys is ignored.

Camp-on, call waiting

If the attendant extends a call to a station that is in the OHQ, the call-waiting tone is not offered to the station. If the attendant releases, the call is camped-on the OHQ station but no warning tone is given. When the camp-on call is recalled to the attendant console, the attendant can repeat the camp-on procedure. Once the OHQ call is in an established state, the camp-on tone is provided.

Attendant functions

- Attendant cannot barge-in during trunk seizure for OHQ calls.
- If the attendant extends a network call for a station user and the call is offered OHQ, the attendant must inform the caller of the OHQ offer before releasing from the call.
- The attendant is not allowed to operate the release key or another loop key if the source call is in conference and the destination call is in the OHQ. Operation of the release destination key is permitted, however, and causes the OHQ call to be abandoned.

Call-Back Queuing

Call-Back Queuing (CBQ) is a Node feature which provides queuing for network calls which encounter busy or blocked facilities at the Node. CBQ enables the calling party to go on-hook after activation of the Ring Again feature [see *Features and services* (553-3001-305)] and receive a callback from a Node when a network facility becomes available.

The CBQ feature is available only to stations located at a Node. Unlike OHQ, CBQ is offered only at the originating Node. Access to CBQ is accomplished through the existing Ring Again feature.

CBQ options

Two options for CBQ eligibility are defined by the call originator's NCOS. The first option, CBQ(i), means the CBQ may be offered after only the initial route set of a route list has been examined for an available route. The second option, CBQ (a), means that CBQ may be offered after both the initial and extended (i.e. all) route sets of a route list have been examined. In either case, a call offered CBQ is queued initially against only the initial route set.

CBQ eligibility

Before offering CBQ to a call originator, the following eligibility tests are performed.

- At least one of the routes in the initial route set is defined as CBQ eligible.
- The user's NCOS is defined as permitting CBQ, either CBQ(i) or CBQ(a).
- The call is not eligible for OHQ. Calls that are eligible for both OHQ and CBQ will be offered OHQ.
- The user's telephone is allowed access to the Ring Again feature and does not have another CBQ or Ring Again call already in the queue.
- The CBQ feature is enabled for this customer.

CBQ(i) eligible

For call originations by a caller defined as CBQ(i) eligible, the system searches the initial route set for an available route. If no available route is found, CBQ is offered to the caller subject to the CBQA eligibility tests.

CBQ(a) eligible

For call originations by a caller defined as CBQ(a) eligible, the system examines the initial route set for an available route. If no available route is found, the extended route set is then searched for an available route. If an available route is not found in the extended set, then CBQ is offered, subject to the CBQ eligibility tests. However, if an available route in the extended route set is found that is designated as expensive, and the user's NCOS allows ERWT, the tone is given and the system delays terminating the call. During this delay the user has the following options.

- Refuse the expensive route by abandoning the call.
- Wait, and allow the call to complete over the expensive route.
- Activate the Ring Again feature (feature key or access code) to place the call in the CBQ. The user must be CBQ(a) eligible; otherwise, operation of the Ring Again feature is ignored.

CBQ offer

The CBQ offer consists of an optional recorded announcement followed by overflow tone. If the station user wishes to accept the CBQ offer, Ring Again must be activated within 30 s. Ring again activation follows present feature operation for SL-1 or digital and 500/2500 sets [see *Features and services* (553-3001-305)]. The CBQ offer can be refused by going on-hook. If the station user neither accepts nor refuses the CBQ offer within 30 s, the call is force disconnected.

CBQ calls are placed in a priority-ordered trunk queue (together with OHQ calls, if any) with a starting priority and maximum priority defined by the call originator's NCOS. At the same time, two timers are started — a queue promotion timer and a route advance timer — each with values defined through the originator's NCOS. At intervals defined by the queue promotion timer, the priority of the call is incremented until it reaches its maximum priority. Each time the call priority is incremented, its position in the CBQ is advanced. If the route advance timer reaches its maximum value before the call can be terminated on a route in the initial set, the extended set or routes is added to the routes that the call is currently queued against.

Expensive route warning tone is not given to calls which have been queued, even if terminated on expensive facilities. Unless canceled by the call originator, CBQ calls remain in the queue until they have been offered a trunk; there is no time limit on CBQ calls.

CBQ callback

When a trunk becomes available for a CBQ call, it is seized to prevent incoming originations during the CBQ callback period. Outpulsing of digits (either those originally dialed by the user or those required as a result of digit manipulation) is started at a slow, fixed rate. The number of digits to be outpulsed determines how long the trunk can be held while CBQ callback is being offered to the originating station. The system computes this time by allowing 10 s before the first digit is outpulsed at 2.56 s between subsequent digits.

The originator of the call is alerted to the CBQ callback by either tone buzzing and winking ring again feature lamp (SL-1 or digital set) or short bursts of ringing (500/2500 set). The set user must accept the callback within the computed value of outpulse time or the service-changeable CBQ time limit of 10 to 30 s, whichever is less. A user with a 500/25000 set must accept the callback within 6 s. Acceptance of the CBQ callback is performed with present Ring Again operating procedures. (When a CBQ callback is answered at a digit display set, the original dialed digits are displayed.) If the user does not answer the callback within the time limit, the call is removed from the queue and discarded. If the user accepts the callback within the time limit, the call is terminated. A CBQ call can be canceled by the originating station via the existing procedures for Ring Again cancellation.

CBQ traffic measurements

Traffic measurement data related to the usage of the CBQ feature is accumulated at a Node or Main equipped with the Network Traffic (NTRF) feature. Data for CBQ usage is available in the publication *Traffic measurement* (553-2001-450).

Routing measurements (TFN001)

Available at a Node or Main. Reflects on a route list basis the number of CBQ offers, the number of CBQ callbacks, the average time in the CBQ and the number of CBQ cancellations.

NCOS measurements (TFN002)

Available at a Node or Main. Reflects on an NCOS basis the number of CBQ calls and the average time in the CBQ.

Feature interactions

The CBQ feature interacts with the following features.

Barge-In, force disconnect

Between the time a trunk is seized for a CBQ call and the user accepts the CBQ callback, the trunk can be stolen by the attendant or force disconnected through service change. If this occurs, there is no guarantee that the call can be terminated when the user accepts the CBQ callback. Under these circumstances, the call is treated like a new origination and NARS/BARS is used to re-attempt termination. This can result in the call being blocked and being offered CBQ a second time.

Hunting, call forward, multiple appearance DN

CBQ callbacks to stations at a Node are offered only to the originating station, regardless of the hunting or call forwarding which may be in effect. Other appearances of a station's Directory Number (DN) are not offered the callback.

Coordinated Call-Back Queuing

The Coordinated Call-Back Queuing (CCBQ) feature enables stations at a Meridian 1 Main to be offered CBQ when network calls are blocked at the serving Meridian 1 Node. When facilities become available at the Node, the call originator at the Main is alerted by a callback from the Node. (This feature requires that Main and associated Node be equipped with the network signalling feature).

CCBQ eligibility

When a station at a Main originates a network call through a Node, the NCOS of the call originator, call type, and whether the station is allowed access to the ring again feature is transmitted to the Node. (If an authcode is entered at the Main prior to dialing a network call, the NCOS associated with the authcode is transmitted to the Node.) When received by the Node, this NCOS is used to determine CCBQ eligibility and is used for the duration of the call, unless further modified by the Authcode Conditionally Last feature [see *Basic and network authorization code description* (553-2751-103)].

The CBQ eligibility tests are performed. In addition, a check is made that the incoming trunk group from the Main is defined (at the Node) to permit CBQ and that the type allows CBQ. CCBQ is offered to the user at the Main if the eligibility tests are successful. If the tests are unsuccessful, standard call blocking is applied to the call.

As for stations at a Node, the call originator at a Main can invoke Ring Again upon receipt of ERWT if the originator's NCOS is defined at the Main as CBQ (a) eligible.

CCBQ offer

The CCBQ offer and acceptance sequences are identical to those for stations at the Node (SBQ offer). The optional recorded announcement and overflow tone are provided by the Node. The offer cannot be accepted until the recorded announcement is completed and the offer tone is started. In addition, after the recorded announcement is provided, the Node transmits a signal to the Main. This signal indicates that the call is in a state which allows Ring Again.

When the call originator at the Main activates ring again the Main assigns a unique "queue identification" number to the call. This number is transmitted to the Node to indicate CCBQ acceptance. At the Main, the call is placed in a holding queue. At the Node, the call (together with the queue identification number) is placed into the trunk queue. The Main to Node tie trunk is released.

CCBQ callback

When an outgoing trunk is seized by the Node for a CCBQ call, slow outpulsing is started to hold the trunk while a callback is made to the call originator at the Main. The Node seizes an available (note) tie trunk to the Main and transmits the "queue identification" number of the call to the Main. The Main then initiates a callback to the call originator. Callback presentation to the call originator is as for standard ring again (CBQ callback).

Note: If no tie trunks to the Main are available, the outgoing trunk is released and can be offered another call. The CCBQ call retains its position in the queue but is not offered another trunk until a tie trunk to the Main becomes available.

When the call originator at the Main accepts the CCBQ callback, answer supervision is sent from the Main to the Node. The Node then completes the call.

If the call originator is equipped with a 500/2500 set and is engaged in a call when the Node initiates a CCBQ callback, a signal is transmitted from the Main to the Node. The Node releases the outgoing trunk and places the CCBQ call into a holding queue for 5 min. No attempt is made to seize another outgoing trunk for the call until the holding time expires. This process occurs only once.

If the originating station is still busy after the holding time has expired, the CCBQ is canceled automatically at the Node. No indication is given to the call originator of the CCBQ cancellation.

To prevent the CCBQ call from remaining indefinitely in the holding queue at the Main, the Main sets a time limit of one hour for CCBQ calls. When this time limit expires, the CCBQ call is canceled automatically. (CCBQ callback to a busy station is as for normal Ring Again).

The call originator at the Main can cancel the CCBQ call at any time. The Node is not aware of the cancellation until the CCBQ callback is attempted.

CCBQ traffic measurements

Traffic measurement data related to usage of the CCBQ feature are accumulated at the Node. The data is reflected in the Incoming Trunk Group Measurements (TFN003). The measurements reflect, on an incoming trunk group basis, the number of CCBQ offers, the number of CCBQ offers that are accepted and the number of CCBQ callbacks not answered or CCBQ cancellations. [Refer to *Traffic measurement* (553-2001-450).]

Feature interactions

The CCBQ feature interacts with the following Meridian 1 features.

Initialization

If the Main initializes while calls are queued at the Node, CCBQ callbacks from the Node are not answered because the initialization has cleared the holding queue at the Main. The Node treats these calls as callback-no-answer calls and cancels the CCBQ automatically. If the Node initializes, CCBQ calls in the trunk queue are lost. The Main cannot detect this situation. To prevent calls from remaining indefinitely in the holding queue at the Main, Main sets a time limit of one hour for CCBQ calls. If a call back from the Node is not received within one hour, the Main cancels the CCBQ calls automatically.

Attendant functions

Attendants at a Main are not offered CCBQ. Attendant barge-in on trunks involved in CCBQ operations results in cancellation of the CCBQ call.

AIOD and ANI

Automatic Identification of Outward Dial (AIOD) and Automatic Number Identification (ANI) facilities can be used to complete CCBQ calls from a Node. The outgoing toll call is billed to the access tie trunk rather than the station at the Main.

Coordinated Dialing Plan

If CCBQ is offered to a CDP call as a result of trunk blocking at the Node, the optional recorded announcement is not given before the CCBQ offer tone.

Call transfer, conference

Stations at a Main can be offered CCBQ when initiating transfer or conference calls. CCBQ is not offered to 500/2500 stations performing these operations.

Feature limitations

A station at a Main is only allowed 10–12 s to activate ring again after the CCBQ offer (or ERWT) rather than the 30 s allowed for stations at the Node. Accordingly, the time interval of the recorded announcement (if provided) must be properly engineered to ensure that the station at the Main has time to activate CCBQ when it is offered.

The time available to answer a CCBQ callback at stations at a Main is 2–3 s less than the time available to stations at the Node, due to the time required for access trunk seizure and signaling.

Tie trunk groups used to provide CCBQ to a Main cannot be arranged for loop start dial repeating signaling and cannot have joint far-end disconnect control as these arrangements do not allow the call to be disconnected after a CCBQ callback.

Tones and recorded announcements used for CCBQ to users at a Main are provided by the Node. Traffic loads imposed on these facilities at the Node must be considered when engineering Nodes.

Call-Back Queuing to Conventional Mains

The Call-Back Queuing to Conventional Mains (CBQCM) feature enables call originators at a Conventional Main to access the CBQ feature at a Node.

CBQCM eligibility

When a station at a Conventional Main originates a network call through a Node, the NCOS assigned to the incoming trunk group is used to determine the CBQCM eligibility. This NCOS, as well as the incoming trunk group, must be defined as CBQ eligible.

Note: If the call originates from an ETN switch, the Traveling Class Mark (TCM) transmitted to the Node, by the ETN switch, must be compatible with a CBQ-eligible Facility Restriction Level (FRL) at the serving Node.

CBQCM offer

The CBQCM offer to call originator at a Conventional Main consists of an optional recorded announcement, followed by special (interrupted) dial tone. (The announcement and tones are provided from the Node.) To accept the CBQCM offer, the call originator dials the extension number associated with the telephone being used for the call. When the last digit of the extension number is dialed, a confirmation tone (three 256 ms bursts of dial tone) is sent from the Node to the call originator. The call is placed in the CBQ at the node when the call originator goes on hook.

The CBQCM offer can be refused by going on-hook any time before the last digit of the extension number is dialed or by remaining off-hook for longer than 30 s after receipt of the confirmation tone. If the CBQCM is neither accepted nor rejected within 30 s, the caller is given overflow tone (from the Node) and the call is disconnected.

CBQCM callback

When an outgoing trunk becomes available at the Node, it is seized and slow outpulsing is started. The Node then seizes a tie trunk (See Note) to the conventional main and outpulses the extension number of the call originator. The call originator must answer the callback before slow outpulsing is completed; otherwise, the callback is canceled and the outgoing trunk is released.

Note: If no tie trunks are currently available to the conventional main, the Node releases the outgoing trunk. The CBQCM call retains its position in the queue but is not offered another outgoing trunk until a tie trunk to the Conventional Main becomes available.

When the call originator answers the CBQCM callback, answer supervision must be transmitted from the Conventional Main to the Node. Upon receipt of answer supervision from the Conventional Main, the Node transmits a tone (three 256 ms bursts of dial tone) to notify the call originator that the call is a CBQCM callback, and completes the call.

If the call originator's station is busy, or the originator does not answer when the callback is placed, the Node places the call in a suspended state for 5 min. After 5 min, another callback is attempted if the outgoing trunk is free. If the station which originated the call is still busy or does not answer, the Node cancels the call.

No provision is made for CBQCM cancellation by a call originator at a Conventional Main. Once the CBQCM offer is accepted, the call remains in the queue until the Node initiates a callback.

CBQCM traffic measurements

Traffic measurement data related to usage of the CBQCM feature are accumulated at the Node. This data is outputted as part of the Incoming Trunk Group Measurements (TFN003). The data reflects on an incoming trunk group basis the number of the CBQCM offers and acceptances, average time in CBQCM, number of blocked CBQCM callbacks and the number of CBQCM callbacks not answered.

Feature limitations

Station users at Conventional Mains cannot activate Ring Again to refuse expensive routes after the Expensive Route Warning Tone (ERWT) is given.

The Node seizes the same tie trunk group that was used to initiate CBQCM for the CBQCM callback. Thus, these trunk groups must be two-way (incoming/outgoing).

Conventional Mains must provide answer supervision on tie trunks connected to the Node. These switches must also permit transmission or repetition of station dial pulses for CBQCM operation. This feature cannot be used with systems that operate in senderized mode. Operation may require adjustment of the interdigit timeout on systems that employ simulated cut-through operation.

Conventional Mains must not allow CBQCM callback calls to be modified by call transfer or call forward. Such call modification can result in the tie line not being released upon call completion.

The station user at a Conventional Main must dial the internal DN of his/her station to accept a CBQCM offering, rather than the CDP-DN, if the Node is equipped for the Coordinated Dialing Plan.

Tie trunk groups used to provide CBQCM to a Conventional Main cannot be arranged for loop start dial repeating signaling and cannot have joint far-end disconnect control as these arrangements do not allow the call to be disconnected after a CBQCM callback.

Because tones and recorded announcements for CBQCM are provided by the Node, traffic loads on these facilities at the Node must be considered when engineering Nodes.

Coordinated Call-Back Queuing Against Mains

The Coordinated Call-Back Queuing Against Mains (CCBQAM) feature enables stations at Nodes to be offered CBQ for network calls which are blocked at a Main. When facilities become available at the Main, the call originator at the Node is alerted by a callback from the Main. The CCBQAM otherwise functions identically to CCBQ at the Node.

Meridian 1

Option 11C

1.5 Mb DTI/PRI Administration and Maintenance guide

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