
Meridian 1

ISDN Primary Rate Interface

Description and administration

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About this document

Document overview

This document provides an introduction to the Integrated Services Digital Network (ISDN) and a description of the features available on the Meridian 1 with ISDN Primary Rate Interface (PRI). The chapters of this document cover the following topics:

- “About this guide” lists Meridian 1 reference documents and explains the format of this document.
- “ISDN product overview” provides a functional overview of ISDN, as applied to the Meridian 1 environment.
- “Coordinating PRI parameters” gives an overview of PRI parameters such as framing formats, line encoding, and error detection that must be coordinated with the far end PRI facility
- “Correlation tables” provides correlation tables for Meridian 1 to Meridian 1, Meridian 1 to DMS-100, and Meridian 1 to DMS-250.
- “Configuring PRI” shows how to configure ISDN PRI and the D-channel.
- The ISDN feature descriptions provide a detailed description of PRI services and features. The feature modules are arranged alphabetically by feature name. The table of contents lists these modules.
- “Engineering guidelines” lists Meridian 1 ISDN requirements.
- “Glossary” lists acronyms.

References

For a reference of all Northern Telecom Publications, see:

- *Library navigator* (553-3001-000)

Refer to the following documents for system information:

- *Multi-purpose Serial Data Link description* (553-3001-195)
- *Meridian 1 system installation procedures* (553-3001-210)
- *Circuit card installation and testing* (553-3001-211)
- *Telephone and attendant console installation* (553-3001-215)
- *Upgrade system installation* (553-3001-250)
- *Disk drive upgrade procedures* (553-3001-251)

For ISDN documentation, see:

- *ISDN Primary Rate Interface installation* (553-2901-200)
- *ISDN Primary Rate Interface maintenance* (553-2901-500)

For software documentation, see:

- *Software conversion procedures* (553-2001-320)
- *X11 features and services* (553-3001-305)
- *X11 input/output guide* (553-3001-400)

For traffic reports documentation, see:

- *Traffic measurement formats and output* (553-2001-450)

For networking documentation, see:

- *Meridian Networking Feature Document* (P0710203)
- *Electronic Switched Network description* (309-3001-100)
- *Basic and Network Alternate Route Selection description* (553-2751-100)
- *Coordinated Dialing Plan description* (553-2751-102)
- *Network Queuing description* (553-2751-101)
- *MCDN Basic Call Service* (555-8001-101)
- *MCDN Integrated Services Access* (555-8001-102)
- *MCDN Network Ring Again* (555-8001-103)

Note 1: Throughout this document Meridian 1 refers to Meridian SL-1 ST, STE, NT, RT, and XT, and Meridian 1 system options 21, 21E, 51, 61, 71, and 81 unless otherwise noted.

Note 2: ISDN is an evolving product. Features and connectivities improve with each software release. To plan your system for future expansions, please consult with your Northern Telecom representative.

ISDN product overview

What is ISDN?

Integrated Services Digital Network (ISDN) is a set of recommendations developed by the International Telegraph and Telephone Consultative Committee (CCITT). These recommendations form a standard in digital communications, providing digital interfaces between telephones, terminals, and telecommunications networks.

ISDN uses a single transport to carry multiple information types. What once required separate networks for voice, data, images, or video conferencing is now combined onto one common high-speed transport.

User voice and data information is carried over bearer channels, or B-channels. The standard signaling protocol is transmitted over a dedicated data channel called the D-channel. The D-channel carries call setup and feature activation information to the destination.

ISDN and the Meridian 1 environment

Meridian networking supplements the currently defined CCITT ISDN recommendations with network functions, like alternate route selection, private numbering plans, class of service, and network access security. Also, Meridian networking extends the CCITT ISDN network functions defined for the interface to public ISDN connections into the private network environment.

Network interfaces

The initial step in building a network is to define the network interfaces that physically and logically connect the switches in the network.

A network interface is physically composed of a collection of trunks, each of which carries signaling and/or user data information. Trunks are transmission channels that carry voice and data traffic, together with signaling information, between switching systems in the network.

Trunks can be classified based on two parameters:

- the type(s) of service supported on the trunk
- the nature of the signal that is transmitted on the trunk, either digital or analog

There are a number of trunk types classified by the type of service they can provide. For example:

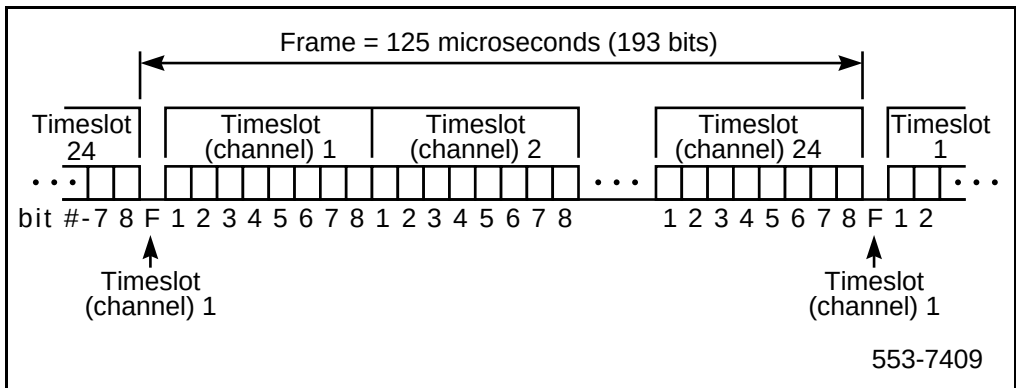
- PBX-to-Public Exchange trunks (also referred to as central office trunks or COTs) provide public switched telephone service to the PBX.
- TIE trunks connect PBXs directly without being switched at the intermediate Public Exchange(s) (although they can be).
- Foreign Exchange (FX) trunks provide the PBX with the equivalent of a local connection to a “foreign” or distant Public Exchange, bypassing switching at the local Public Exchange.
- Wide Area Telecommunications Services (WATS) trunks permit the PBX to receive (INWATS or “800” service) or originate (OUTWATS) long-distance calls at a lower rate than regular long distance service, based on a bulk pricing arrangement with the long distance service provider.
- Direct Inward Dial (DID) trunks provide a portion of the called party’s number, signaled from the local Public Exchange to the PBX, enabling the call to be delivered without private network attendant intervention.

Note: Due to CCITT regulations, any DID/COT connection by means of ISDN is two-way. There is no distinction between the two trunk types. The central office views them as public trunks and will not throttle.

Analog trunks are provided on voice-frequency (VF) facilities that operate in either a 2-wire or 4-wire transmission mode. In the 2-wire mode, both transmit and receive signals are carried on the same pair of wires. Four-wire mode uses separate wire pairs for each direction of transmission. The information-bearing capability of these trunks is sufficient to support speech or voice-grade data. A voice-grade channel is one with sufficient bandwidth to pass an analog voice signal, or approximately 3.1 kilohertz (kHz). Voice-grade data is a data signal that can be successfully passed through the same 3.1 kHz channel (for example, a modem).

A digital trunk is a 56 kbps data channel that can carry either voice or data information. In North America and some other international countries, the digital trunk is carried on the T-1 digital transmission facility. The T-1 carrier has a data rate of 1.544 Mbps and can support up to 24 digital trunks. The digital trunk signal transmitted on these carriers is represented by a sequence of 8-bit digital words. Each word occupies one channel (called a “timeslot”) in a larger structure called a “frame.” The frame structure of the T-1 carrier’s signal is shown in Figure 1.

Figure 1
The frame structure of the T-1 digital carrier (from CCITT G.704)

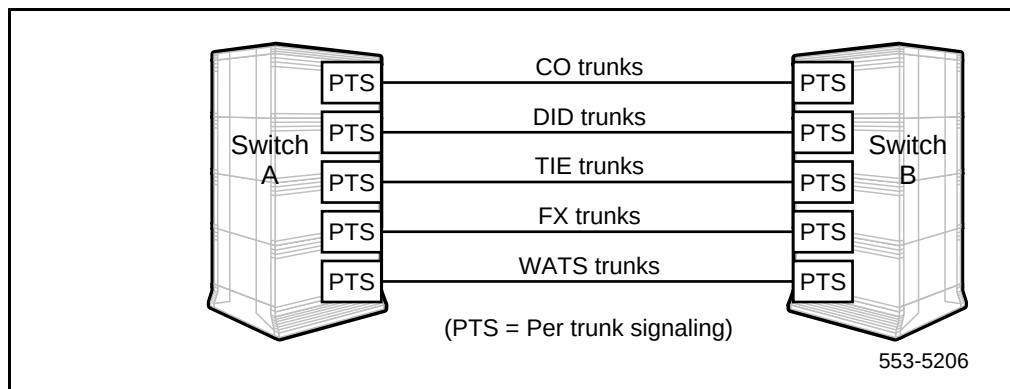


Signaling

Trunks provide the communication channels for the network interface; signaling permits these channels to be used effectively. Signaling is the process of transferring information between two or more switches of a communications network in order to control the establishment of connections and related operations.

Each trunk type (CO, TIE, FX, WATS, DID) requires its own particular form of signaling (loop start, 2-wire duplex, 4-wire duplex, E and M 2-wire, E and M 4-wire, loop dial repeating). Pre-ISDN trunks (that is, analog or digital) carry this signaling information together with the user's information. This scheme, illustrated in Figure 2, is commonly referred to as per trunk signaling (PTS), or in-band signaling.

Figure 2
A functional view of per trunk signaling



Meridian networking uses ISDN's common channel signaling capability to replace per trunk signaling with an out-of-band computer-to-computer signaling channel, which carries the signaling information for a number of trunks. This concept is illustrated in Figure 3.

Primary Rate Interface (PRI) integrates the signaling requirements of all the public exchange trunk types. Meridian networking supports this functionality, as illustrated in Figure 4. This is referred to as out-of-band signaling.

Figure 3
A functional view of ISDN's common channel signaling capability

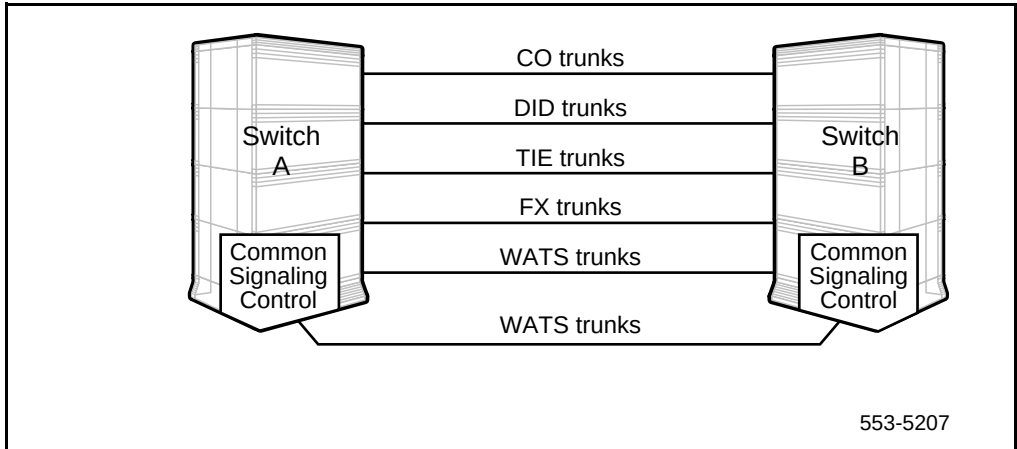
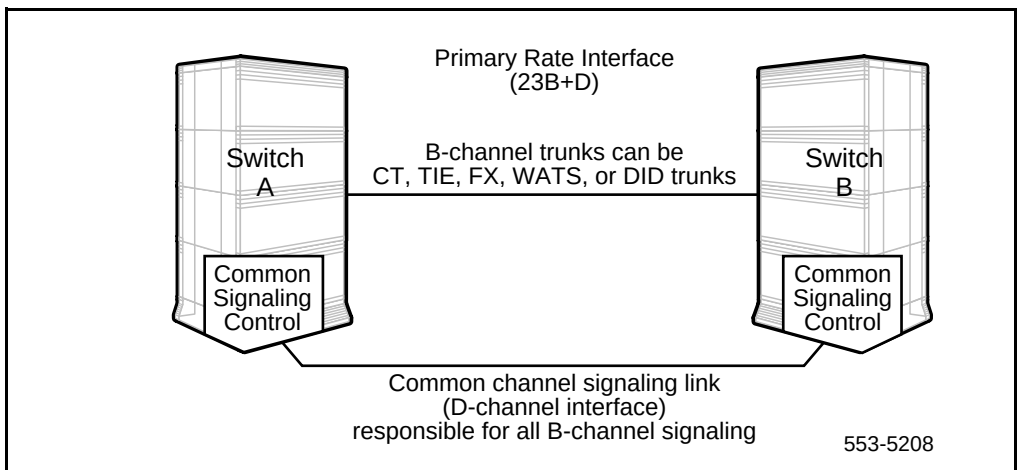


Figure 4
ISDN PRI's common channel signaling capability



Signaling protocols

Signaling protocols govern the format, timing, sequencing, and control of the exchange of signaling information between switches in the network.

Meridian networking uses the ISDN D-channel, out-of-band signaling protocols as defined by CCITT. These protocols are based on a model containing seven layers that was developed by the International Standards Organization (ISO). This seven-layer model, called the Open Systems Interconnection (OSI) model, was adopted by the CCITT and used as the basis for building sets of protocols for ISDN.

A detailed description of the OSI model and how it is applied in the Meridian networking signaling system is found in the *Meridian Networking Feature Document*.

Types of ISDN network interface

Meridian networking currently supports three forms of ISDN network interface:

- Primary Rate Interface (PRI 23B+D)
- nB+D Primary Rate Interface (nonassociated signaling)
- ISDN Signaling Link (ISL) interface

Primary Rate Interface (PRI 23B+D)

The Primary Rate Interface (PRI) is structured as a collection of 24 digital, 56 kbps/64 kbps channels. One of these channels is used to carry the D-channel signaling information. The other channels are for user voice and data transport and are referred to as bearer channels, or B-channels.

The physical (layer 1) specification for the PRI is defined in CCITT Recommendation I.431. This specification supports the standard electrical characteristics and frame structures of the 1.544 Mbps T-1 digital carrier. PRI can therefore only support up to 23 B-channels and one D-channel.

nB+D Primary Rate Interface (nonassociated signaling)

Although the CCITT currently specifies the PRI layer 1 protocol for 23B+D interface structures, CCITT layer 3 (Q.931) supports the D-channel messages for call setup, feature activation, and call tear down. Meridian networking can also support a feature called nonassociated signaling (nB+D). In this configuration, one active D-channel can provide signaling support for all the B-channels contained on up to 16 digital carriers. This translates to support for 382 B-channels and one D-channel and one backup D-channel with T-1 carriers.

ISDN Signaling Link (ISL) interface

The CCITT currently limits the layer 1 ISDN protocols to digital facilities only. Analog facilities can meet some customer applications more effectively. Meridian networking offers this flexibility in the form of the ISDN Signaling Link (ISL) interface.

The ISL interface is a configuration unique to Meridian networking for Meridian 1 to Meridian 1 systems. It extends the advantages of ISDN signaling to locations served by analog or digital facilities. The ISL interface can contain analog and/or digital trunks. The signaling information is carried on one of these trunks, called the ISDN Signaling Link, which is a D-channel. The other trunks are for user voice and data transport.

The signaling connection is a separate or synchronous data circuit, which can be established over a leased line, or an existing trunk circuit using standard data communications equipment (DCE) interfaces (such as modems, multiplexers, or Meridian 1 data adapters). In the case of a failure on this link, signaling operation reverts to conventional, per trunk signaling.

ISL modes of operation

There are two modes of ISL operation: shared and dedicated.

Shared mode requires a PRI (either 23B+D or nB+D) between originating and terminating Meridian 1 systems. The ISDN D-channel is used as the vehicle to provide out-of-band signaling for the non-ISDN trunks. Since the PRI D-channel is shared between the PRI B-channels and the analog/digital trunks, this ISL configuration is called shared mode.

Dedicated mode is appropriate when no PRI exists between originating and terminating Meridian 1 systems or when it is not desirable to share an ISDN D-channel as described above. A dedicated signaling link (ISL) is established between originating and terminating Meridian 1 systems. The signaling information for the selected, analog/digital ISDN trunks is transported over the ISDN signaling link.

Backup D-channel

The signaling reliability on each of these ISDN network interfaces can be enhanced by adding the backup D-channel function.

In situations where the reliability of the D-channel signaling is critical, each of the PRI and the nB+D PRI interfaces can be configured to use one active and one backup D-channel. If the active D-channel fails, then D-channel processing switches to the backup D-channel. When dealing with standard 23B+D PRI structures, it is necessary to have at least two T-1 spans in order to provide a backup D-channel.

Integrated Trunk Access

Integrated Trunk Access (ITA) allows in-band A and B bit signaling trunks and out-of-band common channel signaling trunks to share the same digital carrier. ITA provides trunking efficiency when accessing a mix of ISDN and non-ISDN services from a Meridian 1 or an ITA-compatible public exchange switch (such as DMS-100).

Integrated Services Access

Integrated Services Access (ISA) allows different service or trunk types to be routed over any B-channel, on a call-by-call basis, rather than dedicating each B-channel to a specific service or trunk type. This is referred to as dynamic allocation of B-channels.

Trunk type or service designation is made by means of the Network Specific Facilities information element in the call setup message. ISA service routes are configured through service change. An ISA master route contains a list of B-channels that can be shared. Different service route types, such as WATS, DID/CO, Foreign Exchange (FX), and TIE, are then created and associated with an ISA service route. These service routes are not allowed to have private B-channel members.

Note: Due to CCITT regulations, any DID/COT connection by means of ISDN is two-way. There is no distinction between the two trunk types. The central office views them as public trunks and will not throttle.

The number of simultaneous calls using an ISA route can be controlled by defining a maximum threshold for calls allowed for each service route type. Also, a minimum threshold can be defined for the number of B-channels that are ready for use by a service route.

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 interface, 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.

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.

Coordinating PRI parameters

This chapter describes the major parameters that must be coordinated with the far end facility. These parameters are:

- Frame format
 - Superframe format
 - Extended superframe format
- Line encoding
 - B7 coding
 - B8ZS coding
- Error detection
 - Yellow alarm (remote alarm)
 - Bit error rate
 - Frame alignment
 - Frame slip
- Data rate parameters
 - 56 kbps inverted
 - 64 kbps clear and restricted
- Channel parameters
 - B-channels
 - D-channels
- Interface protocols
 - User to network
 - Symmetric

Frame format

The DS-1 basic format consists of 24 8-bit bytes with one byte per channel and one framing bit, or F-bit. This makes a total of 193 bits per frame. The nominal bit rate of the DS-1 signal is 1.544 Mbps and the sampling rate for each channel is 8000 Hz.

Superframe format

A superframe format, the standard format, consists of 12 DS-1 frames (see Table 1). It is consistent with the channel bank formats D2, D3, and D4. The signaling bit is time-shared to identify both the channel and the signaling frame. The framing pattern is the repeated sequence 100011011100.

Channel framing identifies the location of timeslot 1. The signaling frame identifies those frames in which two signaling states, A and B, are transmitted on a time-shared basis. The assignments of the F-bit and the A and B bits in the superframe format are shown in Table 1.

Table 1
The superframe format table

Frame number	F-Bit		PCM coding bits	Signaling bit	Signal channel
	Terminal framing	Signaling framing			
1	1	—	1–8		
2	—	0	1–8		
3	0	—	1–8		
4	—	0	1–8		
5	1	—	1–8		
6	—	1	1–7	8	A
7	0	—	1–8		
8	—	1	1–8		
9	1	—	1–8		
10	—	1	1–8		
11	0	—	1–8		
12	—	0	1–7	8	B
Note: The most significant bit is defined as bit 1 and the least significant bit as bit 8.					

Extended superframe format

The Extended superframe format (ESF) consists of 24 frames. The 8 kbps F-bit channel is divided into three separate channels:

- Framing Pattern Sequence (FPS)—Beginning with frame 4 or ESF bit 579, the framing bit of every fourth frame forms FPS 001011, which is used to determine the mainframe, superframe, and robbed bit signaling synchronization. This sequence is a 2 kbps channel.
- Facility Data Link (FDL)—This is a 4 Kbps channel, used to turn on a yellow alarm. Meridian 1 system software uses FDL to convey yellow alarm (remote alarm) information or to transmit all 1s, as selected in service change.
- Cyclic Redundancy Check (CRC)—The CRC sequence is a 2 kbps channel. CRC indicates one or more bit errors in a block, or bits from the received bit stream. CRC can be used as an end-to-end bit error rate indicator.

The assignments of the F-bit and the A, B, C, and D bits in ESF are shown in Table 2.

Table 2
Extended superframe format table (Part 1 of 2)

Frame number	F-Bit				Robbed bit signaling
	Bit number	Assignments			
		FPS	FDL	CRC	
1	0	—	m	—	A
2	193	—	—	CB1	
3	386	—	m	—	
4	579	0	—	—	
5	772	—	m	—	
6	965	—	—	CB2	
7	1158	—	m	—	
8	1351	0	—	—	
9	1544	—	m	—	B
10	1737	—	—	CB3	
11	1930	—	m	—	
12	2123	1	—	—	
13	2316	—	m	—	
14	2509	—	—	CB4	

Table 2
Extended superframe format table (Part 2 of 2)

Frame number	F-Bit				Robbed bit signaling
	Bit number	Assignments			
		FPS	FDL	CRC	
15	2702	—	m	—	C
16	2895	0	—	—	
17	3088	—	m	—	
18	3281	—	—	CB5	
19	3474	—	m	—	
20	3667	1	—	—	
21	3860	—	m	—	
22	4053	—	—	CB6	D
23	4246	—	m	—	
24	4439	1	—	—	

Line encoding

Line coding for DS-1 is bipolar, Alternate Mark Inversion (AMI). The general requirements for DS-1 code suppression are:

- a maximum of 15 consecutive zero binary bits
- a minimum average of 12.5 percent density of one binary bit over any 192 consecutive bits

To meet the maximum and minimum requirements, PRI provides B7 and B8ZS zero code substitution techniques as options.

B7 coding

B7 coding restricts the D-channel operating modes to 56 kbps or 64 kbps inverted (64 KI).

When all eight PCM bits in a channel are 0 and the eighth bit is not a signaling bit in state one, the seventh bit is substituted by a 1. This means zero code suppression is done on a per byte basis.

Note: Do not invoke the seventh bit substitution when digital data is being transmitted as this causes data corruption.

B8ZS coding

The B8ZS coding format supports 64 kbps clear channel (64 KC) or 64 kbps inverted HDLC (64 KI).

When eight consecutive 0s appear on a channel and the last bit transmitted is positive, the eight bits are substituted by the following pattern:

Substituted word 0 0 0 +1 -1 0 -1 +1

If the last bit was negative, the polarity is reversed. This results in the following substituted word:

Reverse polarity 0 0 0 -1 +1 0 +1 -1

Bipolar violations occur in the fourth and seventh bit positions of the inserted code. Therefore, B8ZS coding can be used only when the receiving end is capable of recognizing that these are not bipolar violations or bit errors.

Error detection

This section describes the ISDN error detection. There are four types of error detection:

- yellow (remote) alarm
- bit error rate
- frame alignment
- frame slip

Yellow alarm (remote alarm)

A yellow alarm signal (received by the near end) indicates that the far end (the remote end) is not ready. If the PRI is receiving the yellow alarm pattern, it indicates that there is a T1 connection. When the PRI receives a yellow alarm signal from the far end, all 24 channels are disabled.

The yellow alarm method used depends on the framing format (D2, D3, D4, or ESF) selected. If D2, D3, or D4 framing formats are chosen, Digit 2 yellow alarm is automatically selected by software. If the ESF framing format is chosen, the yellow alarm method must be set through service change.

- Digit 2 (DG2) yellow alarm signaling is provided by external circuitry. This alarm is detected when each digit 2 in 63 contiguous channels is logic zero. Use DG2 yellow alarm signaling with D2, D3, and D4 frame formats in Canada and the U.S. Also use DG2 yellow alarm signaling with the ESF frame format in Canada, in compliance with Canadian standard CS03.
- Facility Data Link (FDL) yellow alarm signaling is a 4 kbps channel. In the U.S., use FDL yellow alarm signaling when the ESF frame format is selected.

When the PRI stops receiving the yellow alarm, channels are placed into the idle state and made available for calls. (In comparison, TIE trunks using A&B bit signaling are made to match the state of the far end, as presented by the T1 port.)

Each time a yellow alarm is generated, a counter is incremented. When the remote alarm 24-hour threshold (prompt RALM in LD 73) is reached, the PRI must be restored to service manually.

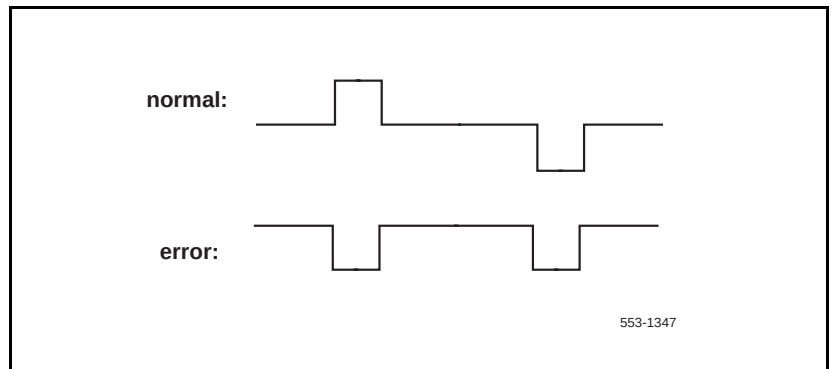
Bit error rate

Bit error rate monitoring detects errors in transmission. There are two methods of bit error rate monitoring: bipolar violation tracking and cyclic redundancy check (CRC). If the D2, D3, or D4 framing format is selected in LD 17, prompt DLOP, bipolar violation tracking is implemented. If the extended superframe format (ESF) is selected, CRC is implemented.

Bipolar violations (BPV) 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). See Figure 5.

Note: Some bipolar violations are normal when using the B8ZS coding.

Figure 5
Bipolar violations



Cyclic redundancy check (CRC) The extended superframe (ESF) format contains a checksum of all the data in the frame. The receiving side uses the checksum to verify that the data is correct.

The primary difference between BPV and CRC is that bipolar violations indicate errors on 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 system and the satellite connection. Since CRC traverses the entire span, it detects errors from the Meridian 1 system to the satellite connection, then to the far end connection, indicating an end-to-end bit error rate.

Bit error rate thresholds 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.

There are three bit error rate thresholds set in LD 73. Setting BIPC to zero enables automatic recovery.

BIPV	1–(3)–4	maintenance threshold
	1–(2)–4	out-of-service threshold
BIPC	0–(2)–128	maximum number of times a DTI/PRI loop can be taken out of service in 24 hours

Note: The BIPV values determine the sensitivity of the loop to errors, where BIPV = 1 is the least tolerant to errors, and BIPV = 4 is the most tolerant.

Frame alignment

Loss of frame alignment monitoring detects out-of-frame conditions on the DS-1 bit stream.

Loss of frame alignment thresholds PRI hardware detects out-of-frame conditions. Running the midnight routines prints the number of loss of frame alignment occurrences and clears the counters.

If a loss of frame alignment condition persists for 3 seconds, the affected PRI loop is taken out of service and a red alarm (local alarm) is raised. If the loss of frame alignment condition clears for at least 15 seconds, the PRI is automatically restored to service. Three frame alignment thresholds are set in LD 73. Setting LFAC to 0 enables automatic recovery.

LFAL	1–(17)–10240	maintenance threshold
	1–(511)–10240	out-of-service threshold
LFAC	0–(3)–128	24-hour out of service limit

Frame slip

Digital signals must have accurate clock synchronization for data to be interleaved into or extracted from the appropriate timeslot during multiplexing and demultiplexing operations. Frame slip monitoring detects frame deletion and repetition errors in clock synchronization.

Clock synchronization can either track on a primary or secondary reference clock, or operate in free run (nontracking) mode. In LD 73 (prompts PREF and SREF), one PRI can be defined as the primary clock reference. Another can be defined as the secondary clock reference.

Tracking mode

PRI hardware detects frame slips in a tracking reference clock. Running the midnight routines prints the number of overflows and clears the counters.

There are two thresholds set in LD 73.

SRTK	1–(5)–24	maintenance threshold (elapsed time in hours between frame slips)
	1–(30)–3600	out-of-service threshold (number of slips per hour)

Automatic recovery

After the tracking mode (SRTK) or nontracking mode (SRNT) out-of-service thresholds (the second value for these prompts) are exceeded, the slip rate is monitored for improvement. When the slip rate has improved, the trunks are returned to service.

There are two parameters set in LD 73:

SRIM	(1)–127	improvement timer in minutes
SRMM	1– (2)–127	improvement criteria

If the nontracking mode maintenance threshold (the first value for SRNT) does not exceed SRMM in the duration of SRIM, then the trunks are returned to service. If not, the timer is restarted and monitoring continues.

Frame slippage is considered less important than alarms for loss of frame alignment persisting for 3 seconds, remote alarm, and bipolar violations exceeding the out-of-service threshold. If any of these alarms are reported while the slip rate is being monitored for improvement, then the monitoring stops. The trunks are returned to service only when the more serious alarm clears.

Free run (nontracking) mode

PRI hardware detects frame slips in the free run mode. Running the midnight routines prints the number of frame deletions and repetitions and clears the counters.

Data rate parameters

ISDN uses three types of data rates 56 kbps inverted, 64 kbps clear, and 64 kbps restricted.

56 kbps inverted

A 56 kbps channel is specified with the Bearer Capability Information Element (IE).

- The information transfer capability is set to restricted digital information.
- The information rate is set to 56 kbps.
- The layer and protocol identification in octet 5 is set to user information layer 1 protocol, rate adaptation, and the rate is encoded as 56 kbps.

64 kbps clear and restricted

The 64 kbps restricted (inverted HDLC), or 64 kbps clear (64C) is specified in the Bearer Capability IE in the SETUP message.

The 64 kbps restricted switched connections are supported by the Meridian 1 to DMS-100 protocol.

The Meridian 1 to Meridian 1 protocol supports 64 kbps clear transmission.

Channel parameters

There are two types of ISDN channels B-channels and D-channels.

B-channels

To minimize glare situations, Meridian 1 allocates B-channels from channel 23 down to channel 1; DMS-100 begins at channel 1 and goes up to channel 23.

Set outgoing trunk hunting on B-channels for the round robin searching method, rather than the linear method. Thus, when the system looks for an outgoing idle trunk, it looks for the next lower available trunk member, rather than the last member that was used.

The B-channel network loop, 0–511, and the PRI channel number, 1–23, are defined in LD 14.

D-channels

The D-channel location must be coordinated with the far end. See the correlation tables in this guide for specific information.

To establish the PRI link, the D-channel interface port number and PRI loop numbers are associated in LD 17. The DCHI port number must be an odd number between 1 and 15. PRI loop numbers may be between 0 and 511.

The D-channel can operate at 56 or 64 kbps data rate. It can be 64 kbps clear, 64 kbps restricted (inverted HDLC), or 56 kbps. The selection of data rate is on a per PRI basis and is determined by service change. The B8ZS zero code suppression method is used to achieve 64 kbps clear channel for the D-channel.

For incoming PRI messages, the printout of the D-channel monitor message differs from the actual message received by the Meridian 1. This is due to the fact that layer 2 preprocesses the message before sending it to layer 3. Outgoing PRI messages appear exactly as sent.

Interface protocols

User-to-network

The interface protocol between Meridian 1 and central office (CO) PRI equipment is a user-to-network protocol. If the far end is identified as a CO in service change (LD 17), the Meridian 1 system is automatically designated as the “user.”

The user-to-network protocol does not employ the same call states and state transactions at each end, and does not always send the same response to a given protocol message. In addition, the user-to-network protocol has an implicit master-slave relationship, relinquishing control to the network in cases such as glare resolution.

Symmetric

The interface protocol between a Meridian 1 and another Meridian 1 is a symmetric protocol. Call processing uses a master-slave relationship for glare resolution.

One PBX must be designated as the network (master), the other as the user (slave) (in LD 17). If the master side of the interface sends a SETUP message as the slave initiates an outgoing call, priority is given to the call sent from the master switch. The outgoing call on that channel, the call initiated by the slave, is dropped and another virtual B-channel is selected for call origination.

Correlation tables

The correlation tables are used to coordinate the software features between two switches.

The following correlation tables are contained in this module:

- Meridian 1 switch to another Meridian 1 switch
- Meridian 1 switch to DMS-100 switch
- Meridian 1 switch to DMS-250 switch

Note 1: The Meridian 1 to SL-100 datafill is the same as the Meridian 1 to DMS-100 datafill.

Note 2: Due to proprietary constraints, the Meridian 1 to AT&T 4ESS and AT&T 5ESS datafill is not available for publication in this document.

The following tables are provided for Meridian 1 to Meridian 1:

- Table 3 PRI database correlation (protocol layer 1)
- Table 4 DCH database correlation (protocol layer 2)
(X11 release 17 and earlier)
- Table 5 DCH database correlation (protocol layer 2)
(X11 release 18 and later)
- Table 6 Facility database correlation (protocol layer 3)
(X11 release 17 and earlier)
- Table 7 Facility database correlation (protocol layer 3)
(X11 release 18 and later)

The following tables are provided for Meridian 1 to DMS-100:

- Table 8 PRI database correlation (protocol layer 1)
- Table 9 DCH database correlation (protocol layer 2)
(X11 release 17 and earlier)
- Table 10 DCH database correlation (protocol layer 2)
(X11 release 18 and later)
- Table 11 Facility database correlation (protocol layer 3)

The following tables are provided for Meridian 1 to DMS-250:

- Table 12 PRI database correlation (protocol layer 1)
- Table 13 DCH database correlation (protocol layer 2)
(X11 release 17 and earlier)
- Table 14 DCH database correlation (protocol layer 2)
(X11 release 18 and later)
- Table 15 Facility database correlation (protocol layer 3)

Meridian 1 to Meridian 1 correlation tables

Tables 3 through 5 describe how to coordinate the software features between two Meridian 1 switches. The tables consist of three columns. The description column lists the software feature to be coordinated. The first Meridian 1 column lists the Meridian 1 software prompts and the proper responses for a corresponding feature. The second Meridian 1 column lists the software tables and the correct values for the fields in these tables. The Meridian 1 system information also corresponds to a particular feature.

Each of the tables corresponds to one of three protocol layers.

Note: Both the near and the far ends must match the parameters. For example, DLOP, LCMT, and YALM responses must be the same for both ends. This applies to all the following tables for Meridian 1 to Meridian 1 configuration.

Meridian 1 to DMS-100 correlation tables

Tables 8 through 11 describe how to coordinate the software features between a Meridian 1 switch and a DMS-100 switch. The tables consist of three columns. The description column lists the software feature to be coordinated. The Meridian 1 column lists the Meridian 1 software prompts and the proper responses for a corresponding feature. The DMS-100 column lists the software tables and the correct values for the fields in these tables. The DMS-100 information also corresponds to a particular feature.

Each of the tables corresponds to one of three protocol layers.

Table 3
PRI database correlation (protocol layer 1) for Meridian 1 to Meridian 1 (Part 1 of 2)

Description	Meridian 1	Meridian 1
CARD TYPE	Program: LD 17 Prompt: MODE Response: PRI	Program: LD 17 Prompt: MODE Response: PRI
FRAME FORMAT Superframe Extended Superframe (ESF)	Program: LD 17 Prompt: DLOP (field ff) Response: D3 ESF	Program: LD 17 Prompt: DLOP (field ff) Response: D3 ESF
LINE ENCODING Zero code suppression Bit 8 zero suppression	Program: LD 17 Prompt: LCMT Response: AMI B8S	Program: LD 17 Prompt: LCMT Response: AMI B8S
BIT ERROR RATE BASE Bipolar violations CRC	Program: LD 73 Prompt: n/a (preset to four classes of error rates)	Program: LD 73 Prompt: n/a (preset)

Table 3**PRI database correlation (protocol layer 1) for Meridian 1 to Meridian 1 (Part 2 of 2)**

Description	Meridian 1	Meridian 1
DATA LINK (yellow alarm method)	Program: LD 17 Prompt: YALM Response: DG2 FDL	Program: LD 17 Prompt: YALM Response: DG2 FDL
INHIBIT ALARM TRANSMISSION	Program: LD 60 Prompt: DISY L (disable yellow alarm for loop L)	Program: LD 60 Prompt: DISY L (disable yellow alarm for loop L)
BIT ERROR RATE maintenance threshold	Program: LD 73 Prompt: BIPV Response: 1-(3)-4	Program: LD 73 Prompt: BIPV Response: 1-(3)-4
BIT ERROR RATE out of service threshold	Program: LD 73 Prompt: BIPC Response: 1-(2)-4	Program: LD 73 Prompt: BIPV Response: 1-(2)-4
BIT ERROR RATE 24-hour threshold (errored second threshold)	Program: LD 73 Prompt: BIP Response: 0-(3)-128	Program: LD 73 Prompt: BIPC Response: 0-(3)-128
FRAME ALIGNMENT maintenance threshold	Program: LD 73 Prompt: LFAL Response: 1-(17)-10240	Program: LD 73 Prompt: LFAL Response: 1-(17)-10240
FRAME ALIGNMENT out of service threshold	Program: LD 73 Prompt: LFAL Response: 1-(511)-10240	Program: LD 73 Prompt: LFAL Response: 1-(511)-10240
FRAME SLIP maintenance threshold	Program: LD 73 Prompt: SRNT Response: 1-(15)-1024	Program: LD 73 Prompt: SRNT Response: 1-(15)-1024
FRAME SLIP out of service threshold	Program: LD 73 Prompt: SRNT Response: 1-(3)-1024	Program: LD 73 Prompt: SRNT Response: 1-(3)-1024

Table 4

DCH database correlation (protocol layer 2) for Meridian 1 to Meridian 1
X11 release 17 and earlier

Description	Meridian 1	Meridian 1
Associate D-channel with PRI	Program: LD 17 Prompt: DCHI, DCHL Response: D-channel, PRI loop	Program: LD 17 Prompt: DCHI, DCHL Response: D-channel, PRI loop
Associate backup D-channel with PRI	Program: LD 17 Prompt: BCHI Response: BCHL RCVP BCHI is the D-channel (or DCHI port number); BCHL is the associated PRI card (or PRI loop); RCVP requests recovery to the primary D-channel.	Program: LD 17 Prompt: BCHI Response: BCHL RCVP BCHI is the D-channel (or DCHI port number); BCHL is the associated PRI card (or PRI loop); RCVP requests recovery to the primary D-channel.
Data rate of D-channel	Program: LD 17 Prompt: DRAT Response: 64KC 56KI	Program: LD 17 Prompt: DRAT Response: 64KC 56KI
DCHI mode	Program: LD 17 Prompt: USR Response: PRA, SHA ISLD	Program: LD 17 Prompt: USR Response: PRA, SHA ISLD

Table 5
DCH database correlation (protocol layer 2) for Meridian 1 to Meridian 1
X11 release 18 and later

Description	Meridian 1	Meridian 1
Associate D-channel with PRI	Program: LD 17 Prompt and Response: ADAN DCH xx DCHL PRI loop	Program: LD 17 Prompt and Response: ADAN DCH xx DCHL PRI loop
Associate backup D-channel with PRI	Program: LD 17 Prompt and Response: ADAN BDCH x is the backup D-channel number BCHL xx is the associated PRI card (or PRI loop) RCVP Yes requests recovery to the primary D-channel	Program: LD 17 Prompt and Response: ADAN BDCH x is the backup D-channel number BCHL xx is the associated PRI card (or PRI loop) RCVP Yes requests recovery to the primary D-channel
Data rate of D-channel	Program: LD 17 Prompt and Response: DRAT 64KC, 56KI	Program: LD 17 Prompt and Response: DRAT 64KC, 56KI
DCH mode	Program: LD 17 Prompt and Response: USR PRA, SHA, ISLD	Program: LD 17 Prompt and Response: USR PRA, SHA, ISLD

Table 6

**Facility database correlation (protocol layer 3) for Meridian 1 to Meridian 1
X11 release 17 and earlier**

Description	Meridian 1	Meridian 1
B-channel selection	Program: LD 16 Prompt: SRCH Response: RRB	Program: LD 16 Prompt: SRCH Response: RRB
Loss and level	preset	preset
User-user interface	Program: LD 17 Prompt: SIDE Response: MAS	Program: LD 17 Prompt: SIDE Response: SLAV
B-channels defined	Program: LD 14 Prompt: TN Response: network loop and channel	Program: LD 14 Prompt: TN Response: network loop and channel
Interface type	Program: LD 17 Prompt: IFC Response: SL1	Program: LD 17 Prompt: IFC Response: SL1
DCHI mode route	Program: LD 16 Prompt: MODE Response: PRA, ISLD	Program: LD 16 Prompt: MODE Response: PRA, ISLD

Table 7

**Facility database correlation (protocol layer 3) for Meridian 1 to Meridian 1
X11 release 18 and later**

Description	Meridian 1	Meridian 1
B-channel selection	Program: LD 16 Prompt: SRCH Response: RRB	Program: LD 16 Prompt: SRCH Response: RRB
Loss and level	preset	preset
User-user interface	Program: LD 17 Prompt: SIDE Response: NET	Program: LD 17 Prompt: SIDE Response: USR
B-channels defined	Program: LD 14 Prompt: TN Response: network loop and channel	Program: LD 14 Prompt: TN Response: network loop and channel
Interface type	Program: LD 17 Prompt: IFC Response: SL1	Program: LD 17 Prompt: IFC Response: SL1
DCH mode route	Program: LD 16 Prompt: MODE Response: PRA, ISLD	Program: LD 16 Prompt: MODE Response: PRA, ISLD

Table 8
PRI database correlation (protocol layer 1) for Meridian 1 to DMS-100 (Part 1 of 2)

Description	Meridian 1	DMS-100
Card type	Program: LD 17 Prompt: MODE Response: PRI	Table: CARRMTC Field: CARD Value: NT6X50AA NT6X50AB
Frame format	Program: LD 17 Prompt: DLOP (field ff) Response: D3	Table: CARRMTC Field: FF Value: SF
Superframe Extended Superframe	Response: ESF	Value: ESF
Line encoding	Program: LD 17 Prompt: LCMT Response: AMI	Table: CARRMTC Field: ZLG Value: ZCS
Zero code suppression Bit 8 zero suppression	Response: B8S	Value: B8ZS
Bit error rate base	Program: LD 73 Prompt: n/a (preset to four classes of error rates)	Table: CARRMTC Field: BERB Value: BPV
Bipolar violations CRC		Value: CRC
Data link (yellow alarm method) No data link	Program: LD 17 Prompt: YALM Response: DG2 (Note) FDL	Table: CARRMTC Field: DLK Value: NILDL
Note: When the DMS-100 CARRMTC table has Field = FF and Value = SF, configure the Meridian 1 with DG2. When the DMS-100 CARRMTC table has Field = FF and Value = ESF, configure the Meridian 1 with FDL.		
Inhibit alarm transmission	Program: LD 60 Prompt: DISY L (disable yellow alarm for loop L)	Table: CARRMTC Field: IAT Value: Y N
Bit error rate maintenance threshold	Program: LD 73 Prompt: BIPV Response: 1–(3)–4	Table: CARRMTC Field: BERML Value: 6
Bit error rate out of service threshold	Program: LD 73 Prompt: BIPV Response: 1–(2)–4	Table: CARRMTC Field: BEROL Value: 3 (exponent)

Table 8**PRI database correlation (protocol layer 1) for Meridian 1 to DMS-100 (Part 2 of 2)**

Description	Meridian 1	DMS-100
Bit error rate 24-hour threshold (errored second threshold)	Program: LD 73 Prompt: BIPC Response: 0–(3)–128	Table: CARRMTC Field: ES Value: 864
Frame alignment maintenance threshold	Program: LD 73 Prompt: LFAL Response: 1–(17)–10240	Table: CARRMTC Field: FRAMEML
Frame alignment out of service threshold	Program: LD 73 Prompt: LFAL Response: 1–(511)–10240	Table: CARRMTC Field: FRAMEOL Value: 511 (exponent)
Frame slip maintenance threshold	Program: LD 73 Prompt: SRNT Response: 1–(15)–1024	Table: CARRMTC Field: SLIPML Value: 4
Frame slip out of service threshold	Program: LD 73 Prompt: SRNT Response: 1–(3)–1024	Table: CARRMTC Field: SLIPOL Value: 255 (exponent)

Table 9

DCH database correlation (protocol layer 2) for Meridian 1 to DMS-100
X11 release 17 and earlier (Part 1 of 2)

Description	Meridian 1	DMS-100 IAC hardware	DMS-100 DTCI hardware
Associate D-channel with PRI	Program: LD 17 Prompt: DCHI DCHL Response: DCHI sets D-channel; DCHL is the associated PRI card.	Table: TRKSGRP Field: DCHNL Value: same as DS1 end point in table SPECCONN	Table: TRKSGRP Field: PMTYPE Value: DTCI Field: DTC INO Value: Nil Field: DTCICKTNO Value: 16 Field: DTCICKTTS Value: 24
Associate backup D-channel with PRI	Program: LD 17 Prompt: BCHI BCHL RCVP Response: BCHI is the D-channel (or DCHI port number); BCHL is the associated PRI card (or PRI loop); RCVP requests recovery to the primary D-channel.	Table: TRKGRP Field: DCHBCKUP Value: Same as DS1 end point in table SPECCONN	Table: TRKMEM Field: PMTYPE Value: DTCI Field: DTC INO Value: Nil Field: DTCICKTNO Value: 16 Field: DTCICKTTS Value: 5

Table 9

**DCH database correlation (protocol layer 2) for Meridian 1 to DMS-100
X11 release 17 and earlier (Part 2 of 2)**

Description	Meridian 1	DMS-100 IAC hardware	DMS-100 DTCI hardware
Data rate of D-channel	Program:	LD 17	Table: STINV
	Prompt:	DRAT	Field: CONTYPE
	Response:	64KC	Value: PRIBAUD
		56KI	Field: BAUD
			Value: 64 kbps 56 kbps

Table 10
DCH database correlation (protocol layer 2) for Meridian 1 to DMS-100
X11 release 18 and later

Description	Meridian 1	DMS-100
Associate D-channel with PRI	Program: LD 17 Prompt and Response: ADAN DCH xx DCHL PRI loop	Table: TRKSGRP Field: DCHNL Value: same as DS1 end point in table SPECCONN
Associate backup D-channel with PRI	Program: LD 17 Prompt and Response: ADAN BDCH x is the backup D-channel number BCHL xx is the associated PRI card (or PRI loop) RCVL Yes requests recovery to the primary D-channel	Table: TRKGRP Field: DCHBCKUP Value: Same as DS1 end point in table SPECCONN
Data rate of D-channel	Program: LD 17 Prompt and Response: DRAT 64KC, 56KI	Table: STINV Field: CONTYPE Value: PRIBAUD Field: BAUD Value: 64 kbps 56 kbps

Table 11
Facility database correlation (protocol layer 3) for Meridian 1 to DMS-100

Description	Meridian 1	DMS-100
Q.931 Interface identifier (used in CID IE)	n/a	Table: IACPSINV Field: IID Value: 0
Q.931 Call Reference Value Length	n/a	Table: TRKSGRP Field: CRLNGTH Value: 2
B-channel selection	Program: LD 16 Prompt: SRCH Response: RRB LIN	Table: TRKGRP Value: SELSEQ Field: MIDL ASEQ
Billing at Primary Rate Interface (PRI)	n/a	Table: TRKGRP Field: BILLDN Value: N
loss and level	preset	Table: TRKGRP Field: PADGRP Value: PRAC
User-network interface	Program: LD 17 Prompt: IFC Response: D100 (sets user)	Table: TRKSGRP Field: IFCLASS Value: NETWORK
Q.931 progress indicator location	n/a	Table: TRKSGRP Field: LOCATION Value: USER
B-channels defined	Program: LD 14 Prompt: TN Response: 0–159 = network loop 1–23 = channel	Table: TRKMEM Field: EXTTRKMEM Value: IACCKTTS

Meridian 1 to DMS-250 correlation tables

Tables 12 through 15 describe how to coordinate the software features between a Meridian 1 switch and a DMS-250 switch. The tables consist of three columns. The description column lists the software feature to be coordinated. The Meridian 1 column lists the Meridian 1 software prompts and the proper responses for a corresponding feature. The DMS-250 column lists the software tables and the correct values for the fields in these tables. The DMS-250 information also corresponds to a particular feature.

Each of the tables corresponds to one of three protocol layers.

Table 12
PRI database correlation (protocol layer 1) for Meridian 1 to DMS-250 (Part 1 of 2)

Description	Meridian 1	DMS-250
Card type	Program: LD 17 Prompt: MODE Response: PRI	Table: CARRMTC Field: CARD Value: NT6X50AA NT6X50AB
Frame format Superframe Extended Superframe	Program: LD 17 Prompt: DLOP Response: D3 ESF	Table: CARRMTC Field: FF Value: SF ESF
Line encoding Zero code suppression Bit 8 zero suppression	Program: LD 17 Prompt: LCMT Response: AMI B8S	Table: CARRMTC Field: ZLG Value: ZCS B8ZS
Bit error rate base Bipolar violations CRC	Program: LD 73 Prompt: n/a (preset to four classes of error rates)	Table: CARRMTC Field: BERB Value: BPV CRC
Data link (yellow alarm method) No data link	Program: LD 17 Prompt: YALM Response: n/a DG2 FDL	Table: CARRMTC Field: DLK Value: NILDL FDL1 FDL2

Table 12**PRI database correlation (protocol layer 1) for Meridian 1 to DMS-250 (Part 2 of 2)**

Description	Meridian 1	DMS-250
Inhibit alarm transmission	Program: LD 60 Prompt: DISL/X (disable yellow alarm for loop L)	Table: CARRMTC Field: IAT Value: YN
Bit error rate maintenance threshold	Program: LD 73 Prompt: BIPV Response: 1–(3)–4	Table: CARRMTC Field: BERML Value: 6
Bit error rate out of service threshold	Program: LD 73 Prompt: BIPV Response: 1–(2)–4	Table: CARRMTC Field: BEROL Value: 3 (exponent)
Bit error rate 24-hour threshold (errored second threshold)	Program: LD 73 Prompt: BIPC Response: 0–(3)–128	Table: CARRMTC Field: ES Value: 864
Frame alignment maintenance threshold	Program: LD 73 Prompt: LFAL Response: 1–(17)–10240	Table: CARRMTC Field: FRAMEML Value: 17
Frame alignment out of service threshold	Program: LD 73 Prompt: LFAL Response: 1–(511)–10240	Table: CARRMTC Field: FRAMEOL Value: 511 (exponent)
Frame slip maintenance threshold	Program: LD 73 Prompt: SRNT Response: 1–(15)–1024	Table: CARRMTC Field: SLIPML Value: 4
Frame slip out of service threshold	Program: LD 73 Prompt: SRNT Response: 1–(3)–1024	Table: CARRMTC Field: SLIPOL Value: 255 (exponent)

Table 13
DCH database correlation (protocol layer 2) for Meridian 1 to DMS-250
X11 release 17 and earlier

Description	Meridian 1	DMS-250
Associated D-channel with PRI	Program: LD 17 Prompt: DCHI DCHL PRI Response: loop and Interface ID	Table: TRKSGRP Field: PMTYPE Value: DTCI Field: DTCINO Value: Nil Field: DTCICKTNO Value: 16 Field: DTCICKTTS Value: 24
Data rate of D-channel	Program: LD 17 Prompt: DRAT Response: 64KC, 56KI	Table: TRKSGRP Field: DCHRATE Value: 56 kbps Value: 64 kbps

Table 14
DCH database correlation (protocol layer 2) for Meridian 1 to DMS-250
X11 release 18 and later

Description	Meridian 1	DMS-250
Associated D-channel with PRI	Program: LD 17 Prompt and Response: ADAN DCH xx DCHL PRI loop	Table: TRKSGRP Field: PMTYPE Value: DTCI Field: DTCINO Value: Nil Field: DTCICKTNO Value: 16 Field: DTCICKTTS Value: 24
Data rate of D-channel	Program: LD 17 Prompt and Response: DRAT 64KC, 56KI	Table: TRKSGRP Field: DCHRATE Value: 56 kbps Value: 64 kbps

Table 15
Facility database correlation (protocol layer 3) for Meridian 1 to DMS-250

Description	Meridian 1	DMS-250
Q.931 Interface identifier (used in CID IE)	n/a	Table: LTCTSINV Field: PSLNKTAB Value: O/DSIPRA/ Default/N/Nil
Q.931 Call Reference Value Length	n/a	Table: TRKSGRP Field: CRLNGTH Value: 2
B-channel selection	Program: LD 16 Prompt: SRCH Response: RRB/LIN	Table: TRKGRP Value: SELSEQ Field: MIDLASEQ
Billing at PRI interface	n/a	Table: TRKGRP Field: BILLDN Value: N
Loss and level	preset	Table: TRKGRP Field: PADGRP Value: PRAC
User-network interface	Program: LD 17 Prompt: IFC Response: D250 (sets user)	Table: TRKSGRP Field: IFCLASS Value: NETWORK
Q.931 progress indicator location	n/a	Table: TRKSGRP Field: LOCATION Value: USER
Backup D-channels defined	Program: LD 14 Prompt: TN Response: 0–159 = network loop 1–23 = channel	Table: TRKMEM Field: PMTYPE Value: DTCI Field: DTCINO Value: Nil Field: DTCICKTNO Value: 16 Field: DTCICKTTS Value: 5

Configuring PRI

Basic PRI configuration

PRI loops must be configured before defining DCH links or ISDN features. The following procedure outlines configuring the PRI loops, DCHI interface, DCH link and applications that are enabled as part of the overall configuration. These include:

- Basic Call Service
 - setting up and tearing down
- Electronic Switched Network (ESN) interworking

Default call types

When an ISDN call is made, a default call type is set initially. See Table 16. The call type is set depending on the dialing method used.

Modification of call types

The call type of an ISDN call can be modified automatically by software or you can use service change. See Table 16.

- Outgoing default UKWN or SPN call types over central office trunks go through automatic digit analysis of the final called number. This determines the call type according to North American Dialing Plans E.163 and E.164.
- For outgoing ISDN calls over CO trunks with LOC, CDP, SPN, and UKWN, a 10- or 11-digit dialing plan, the CLID automatically reflects 10 digits.

- The final call type of a direct dialed ISDN call (over a TIE trunk) can be modified in LD 16. The CTYP prompt in LD 16 permits you to modify the outgoing call types of PRI/ISL routes. This prompt, which is applicable only to TIE trunks, can have one of the aforementioned call types with UKWN as default.

Note: The CTYP prompt applies to Direct Trunk Access only.

Table 16
Default call types

Dial method	Default call type	Comment
Direct dial	UKWN (unknown)	Direct dial to trunks using Trunk Access Code
CDP (DSC/TSC)	CDP (Coordinated Dialing Plan)	Dial CDP number using DSC/TSC code
CDP (LSC)	UKWN	Dial CDP number using LSC code
ESN (LOC)	LOC (location code)	Dial NARS location code
ESN (HLOC)	UKWN	Dial ESN HLOC number
ESN (NPA)	NPA (national)	Dial ESN NPA number
ESN (NXX)	NXX (local)	Dial ESN NXX number
ESN (SPN)	SPN (special number)	Dial ESN SPN number

Configuring PRI capability and applications

Features enabled as part of basic PRI configuration, or provided directly by DMS-100 are not included in this document. These include the following:

- Basic Call Service: configured as part of basic PRI
- Call Redirection and Call Forwarding: configured as part of basic PRI
- Private Network Hopoff: provided by DMS-100
- Private Network Overflow: provided by DMS-100
- Public Switched Telephone Network Equal Access and Special Number Service: provided by DMS-100

Descriptions for the following are given in the ISDN features description modules:

- Attendant and Network Wide Remote Call Forward
- Attendant Blocking of DN
- Backup D-channel
- Basic Call Service
- BRI/PRI Basic Call interworking
- Call Forward/Hunt Override via Flexible Feature Code
- Call Pickup Network Wide
- Calling Line Identification
- Calling Party Privacy
- Data Packet Network access
- Digital Trunk Interface replacement
- Electronic Lock Network Wide/Electronic Lock on Private Lines
- Electronic Switched Network interworking
- Incoming Trunk Programmable Calling Line Identification
- Integrated Services Access
- ISDN Signaling Link
- Integrated Trunk Access

- Meridian Network Services Drop Back Busy/Off-Hook Queuing
- MWI internetworking with DMS
- National ISDN 2 TR-1268 Primary Rate Interface
- Network Attendant Service
- Network Call Party Name Display/Network Name Delivery
- Network Call Redirection
- Network Intercom (Hot Type D and Hot Type I Enhancements)
- Network Message Services
- Network Ring Again
- Remote Virtual Queuing/Originating Routing Control
- Software Defined Network access
- Software Release ID
- T309 Timer
- Trunk Optimization (before answer)

Note 1: Some networking features require a numbering plan in order to operate. Network Message Services, Network Attendant Service, Network Ring Again, and Network ACD must be used with a Universal or Coordinated Dialing Plan (UDP or CDP).

Note 2: The tariff is approved for ISDN PRI as of 1992.

PRI configuration

The following procedures show how to configure PRI only. For specific features (ISA or ISL, for example) refer to the individual feature modules found later in this document.

X11 release 18 and later requirements

X11 release 18 changes LD 17 prompt and response sequences. The introduction of the MSDL card adds new options to LD 17. Be sure to use the correct procedure to configure PRI for your system (X11 release 18 and later, or X11 release 17 and earlier). Pay close attention to the following guidelines:

- The primary and backup D-channels must be on the same card type (DCHI QPC757 or MSDL NT6D80).

- The parameters defined for the primary D-channel are automatically copied to the backup D-channel (except for BCHL and RCVP).
- The D-channels must be disabled before making any changes.
- Changes to the D-channel pair should be made to the primary D-channel first (except for BCHL and RCVP).
- The backup D-channel must be removed prior to removing the primary D-channel.
- When a backup D-channel is configured for a primary D-channel, the USR of the primary can be changed from SHA to ISLD or PRI, but not from ISLD to PRI or SHA.

Use the following procedures to configure PRI capability and applications:

- 1** LD 73 Digital Data Block
Set error detection thresholds and clock synchronization control.
Required only when configuring PRI for the first time. Optional for subsequent configurations.
- 2** LD 17 Configuration Record
Add a PRI loop
- 3** LD 73 Digital Data Block
Change existing thresholds, or change tracking modes.
This can be done any time after Procedures 2 or 2.
- 4** LD 17 Configuration Record
Add a DCHI card and the D-channel link.
X11 release 17 and earlier

OR

- 5** LD 17 Configuration Record
Add a DCHI card, or an MSDL card and the D-channel link.
X11 release 18 and later
- 6** LD 15 Customer Data Block
Define a PRI customer.
Required only when configuring a new PRI customer. If PRI is already defined, skip this procedure.

- 7 LD 16 Trunk Route Administration
 Configure PRI trunk routes.
- 8 LD 14 Trunk Administration
 Add PRI trunks.

Procedure 1

The following prompts in LD 73 require a response before adding PRI loops (Part 1 of 2)

Prompt	Response	Description
REQ	NEW	Create a PRI data block
TYPE	DDB	Digital data block
PREF	loop	Primary reference source for clock controller (0–511)
		Free run mode
	<cr>	No primary or secondary reference source assigned X preceding the number deletes existing primary reference source
SREF	loop	Secondary reference source for clock controller (0–511) prompted only if PREF is not free run
		Free run mode
	<cr>	No primary or secondary reference source assigned X preceding the number deletes existing secondary reference source
TRSH	0–15	Create or change a PRI threshold set Enter this number in LD 17 when defining the PRI loop
		X preceding number deletes threshold set
RALM	1–(3)–128	Yellow alarm (remote alarm) 24-hour threshold Number of remote alarm clear signals received in 24 hours
		If the threshold is reached, the PRI must be restored to service manually
BIPC	0–(2)–128	24-hour bit rate violation threshold If zero is entered, trunks are restored to service automatically
		With D2, D3, or D4 framing format, bipolar violation threshold With ESF, Cyclic Redundancy Check (CRC) threshold

Procedure 1**The following prompts in LD 73 require a response before adding PRI loops (Part 2 of 2)**

Prompt	Response	Description
LFAC	0-(3)-128	24-hour loss of frame alignment threshold If zero is entered, trunks are restored to service automatically
BIPV		Bit rate (bipolar violation and CRC) monitoring limits
	1-(3)-4	Maintenance threshold
	1-(2)-4	Out-of-service threshold
SRTK		Frame slip tracking monitoring limits
	1-(5)-24	Maintenance threshold, the minimum time, in hours, between slips
	1-(30)-3600	Out-of-service threshold, the maximum number of slips per hour
SRNT		Frame slip free run (nontracking) monitoring limits
	1-(15)-1024	Maintenance threshold, the minimum time, in seconds, between 10 consecutive slips
	1-(3)-1024	Out-of-service threshold, the minimum time, in seconds, between 10 consecutive slips. See "Coordinating PRI parameters" and <i>ISDN Primary Rate Interface maintenance</i> (553-2901-500) for a description of the automatic recovery sequence.
LFAL		Loss of frame alignment monitoring limits
	1-(17)-10240	Maintenance threshold
	1-(511)-10240	Out-of-service threshold
SARR	YES-(NO)	Automatic recovery allowed after out-of-service condition
SRGT	1-(15)-30	Auto recovery guard timer in minutes (X11 release 14 and earlier only)
SRMM	1-(2)-127	Slip rate exceeded maintenance limit

Procedure 2

Use LD 17 to add a PRI loop (Part 1 of 2)

Prompt	Response	Description
REQ	CHG	Change parameters in LD 17
TYPE	CFN	Configuration data block
CEQU	YES	Change common equipment options
DLOP	loop dd ff	PRI loop parameters: loop = Network loop number (0–159) dd = Number of data calls (0–24) ff = Frame format: D2, D3, D4, (ESF) Frame format must match the far end.
MODE	PRI	Primary Rate Interface mode
LCMT	(B8S), AMI	Line encoding method must match the far end B8S = B8ZS coding format AMI = B7 coding format (Alternate Mark Inversion)
YALM	FDL, DG2	Yellow alarm (remote alarm) method Prompted only if the frame format is ESF must match the far end. If NOT prompted, DG2 was set automatically Use FDL with ESF in the U.S. FDL or DG2 can be used in Canada

Procedure 2**Use LD 17 to add a PRI loop (Part 2 of 2)**

Prompt	Response	Description
TRSH	0–15	The maintenance and performance threshold set for this PRI, as defined by prompt TRSH in LD 73
DTIC	0–159	Starting network loop slot for the PRI card This prompts asks the technician to tell the system what card slot is used by the T1. This makes these loops unavailable for other use. X preceding the loop number returns the loops for system use. The loop number must be even. In system option 21, each network slot has one superloop (four loops). Since the PRI card takes two slots, eight loops are used per PRI, and therefore are unavailable. When installed on a network expansion shelf, enter carriage return and ignore the SCH2035 message. This indicates that the T1 is not in an intelligent bus. Do not input loop numbers that take the system out of its bounds.

Procedure 3

The following prompts in LD 73 require a response to change tracking or thresholds
(Part 1 of 2)

Prompt	Response	Description
REQ	CHG	Change a PRI data block
TYPE	DDB	Digital data block
PREF	loop	Primary reference source for clock controller (0–511)
	<cr>	Free run mode No primary or secondary reference source assigned X preceding the number deletes existing primary reference source
SREF	loop	Secondary reference source for clock controller (0–511) Prompted only if PREF is not free run
	<cr>	Free run mode No primary or secondary reference source assigned X preceding the number deletes existing secondary reference source
TRSH	0–15	Create or change a PRI threshold set Enter this number in LD 17 when defining the PRI loop X preceding number deletes threshold set.
RALM	1–(3)–128	Yellow alarm (remote alarm) 24-hour threshold Number of remote alarm clear signals received in 24 hours If the threshold is reached, the PRI must be restored to service manually
BIPC	0–(2)–128	24-hour bit rate violation threshold If zero is entered, trunks are restored to service automatically With D2, D3, or D4 framing format, bipolar violation threshold With ESF, Cyclic Redundancy Check (CRC) threshold
LFAC	0–(3)–128	24-hour loss of frame alignment threshold If zero is entered, trunks are restored to service automatically

Procedure 3

The following prompts in LD 73 require a response to change tracking or thresholds
(Part 2 of 2)

Prompt	Response	Description
BIPV		Bit rate (bipolar violation and CRC) monitoring limits
	1-(3)-4	Maintenance threshold
	1-(2)-4	Out-of-service threshold
SRTK		Frame slip tracking monitoring limits
	1-(5)-24	Maintenance threshold, the minimum time, in hours, between slips
	1-(30)-3600	Out-of-service threshold, the maximum number of slips per hour
SRNT		Frame slip free run (nontracking) monitoring limits
	1-(15)-1024	Maintenance threshold, the minimum time, in seconds, between 10 consecutive slips
	1-(3)-1024	Out-of-service threshold, the minimum time, in seconds, between 10 consecutive slips. See "Coordinating PRI parameters" and <i>ISDN Primary Rate Interface maintenance</i> (553-2901-500) for a description of the automatic recovery sequence.
LFAL		Loss of frame alignment monitoring limits
	1-(17)-10240	Maintenance threshold
	1-(511)-10240	Out-of-service threshold
SRIM	(1)-127	Slip rate improvement time in minutes
SRMM	1-(2)-127	Slip rate exceeded maintenance limit

Procedure 4

Use LD 17 to add a DCHI card and the D-channel interface (X11 release 17 and earlier)
(Part 1 of 3)

Prompt	Response	Description
REQ	CHG	
TYPE	CFN	Configuration data block
ISDN	YES	Change DCHI parameters
DCHI	1–15	DCHI port number, only odd numbers are allowed
BCHI	(0)–1–15	Backup DCHI port number
USR	PRA	D-channel is for ISDN PRI only
	ISLD SHA	D-channel is for ISL in dedicated mode D-channel is for ISL in “shared” mode
IFC	aaaa	Interface type aaaa = (DMS1), D250, ESS4, ESS5, SL-1, S100
RCVP	YES, (NO)	Recovery to primary D-channel option prompted only when BCHI has a number entered. When RCVP=YES, the primary D-channel automatically returns as the active D-channel when it recovers.
		When RCVP = NO, the backup D-channel remains active even after the primary D-channel recovers.
		Both sides must be either YES or NO. If the two sides do not match, both sides default to NO.
		If IFC = D100, D250, SL100, or ESS4, RCVP defaults to NO.
DCHL	0–159	PRI loop number for DCHI One DCHI card can support up to 15 PRIs when backup D-channel is configured
BCHL	0–159	PRI loop number for BCHI <cr> when BCHI = 0
OTBF	1–(16)–127	Number of output request buffers

Procedure 4**Use LD 17 to add a DCHI card and the D-channel interface (X11 release 17 and earlier)
(Part 2 of 3)**

Prompt	Response	Description
DRAT	56K 64KC 64KI	D-channel transmission rate must match the far end 56 kbps, default when LCMT is AMI 64 kbps clear, default when LCMT (LD 17) is B8S 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	loop id	Additional loops using the same D-channel loop = loop number (0–159) id = interface ID (2–15) Up to 16 loops can be supported, including the 14 loops that can be entered here and the primary and backup D-channel loops that are assigned automatically. The primary and backup D-channels are assigned to ID 0 and 1, respectively. This cannot be changed.
SIDE	MAS, (SLAV)	Prompted only if IFC is set to Meridian 1. One side of the PBX-to-PBX interface must be set as the “master,” the other must be set as the “slave.”
RLS	xx	X11 or BCS release of far end. Enter release only, not issue. For example, acceptable responses are 14, 15, 16, 17, 29, 30, 31, 32.
RCAP	aaa	Remote D-channel capability aaa = NCT, ND1, ND2 NCT = Network Call Trace ND1 = Network Name Delivery method 1 (X11 release 13 and greater) ND2 = Network Name Delivery method 2 (X11 release 17 and greater) Xaaa removes the capability.
CLOK	EXT	D-channel clock type Source of primary clock is external to DCHI card Always use EXT for PRI.

Procedure 4**Use LD 17 to add a DCHI card and the D-channel interface (X11 release 17 and earlier)
(Part 3 of 3)**

Prompt	Response	Description
LAPD	YES, (NO)	Change LAPD parameters Select YES to activate timers during system set up. The following prompts appear when LAPD = YES. <i>Note:</i> When adding a D-channel the MEM AVAIL data is output after this prompt, indicating the channel has been added. You can therefore abort the program without going to the REQ prompt.
_T23	1–(20)–31	Interface guard timer Checks how long the interface takes to respond In units of 0.5 seconds, default of 20 = 10 seconds
_T200	2–(3)–40	Retransmission timer In units of 0.5 seconds, default of 3 = 1.5 seconds
_T203	2–(10)–40	Maximum time allowed without frames being exchanged in seconds
_N200	1–(3)–8	Maximum number of retransmissions
_N201	4–(260)	Maximum number of octets in information field
_K	1–(7)–31	Maximum number of outstanding unacknowledged frames (NAKS)

Procedure 5

Use LD 17 to add a DCHI card, or an MSDL card and the D-channel interface (X11 release 18 and later) (Part 1 of 2)

Prompt	Response	Description
Note: With X11 release 19, ADAN is prompted in two ways: Type = ADAN, or Type = CFN. For purposes of consistency, we show one sequence here. Refer to <i>X11 input/output guide</i> (553-3001-400) for complete prompt/response sequences.		
TYPE	CFN	Configuration Record
ADAN	NEW DCH 0–63	Add a primary D-channel (can also CHG and OUT DCH)
CTYP	DCHI, MSDL	Card type
DNUM	0–15	Device number: physical port (odd) for D-channel on DCH, physical card address for MSDL
_PORT	0–3	Port number on MSDL card
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
PRI	0–159 2–15	Additional PRI loops using the same D-channel, and interface ID
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)
DRAT	(56K), 64KC, 64KI	D-channel transmission
IFC	aaa	Interface type: SL1, S100, (D100), D250, ESS4, ESS5
SIDE	NET, (USR)	Meridian 1 node type
RLS	xx	Release ID of the switch at the far end of the D-channel
RCAP	MSL, NCT, ND1, ND2, RVQ, BRI	Remote D-channel capabilities

Procedure 5**Use LD 17 to add a DCHI card, or an MSDL card and the D-channel interface (X11 release 18 and later) (Part 2 of 2)**

Prompt	Response	Description
Note: With X11 release 19, ADAN is prompted in two ways: Type = ADAN, or Type = CFN. For purposes of consistency, we show one sequence here. Refer to <i>X11 input/output guide</i> (553-3001-400) for complete prompt/response sequences.		
_CLOCK	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	DCHI, MSDL	Card type (automatically printed because it must be the same as primary D-channel)
DNUM	0–15	Physical port (odd) for D-channel, card number for MSDL
_PORT	0–3	Port number on MSDL card
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

Procedure 6**Use LD 15 to define a PRI customer (Part 1 of 2)**

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	0-99	Customer number
LDN0	xxxx . . x	Listed Directory Number 0 length This value must be set to terminate all incoming ISDN/DID calls. Determines the number of digits to translate.
ANAT	xxxx . . x	Attendant billing number ANAT and ANLD combined must be 7 digits.
ANLD	xxxx . . x	ANI listed DN ANLD and ANAT combined must be 7 digits.
AC2		Access Code 2 Enter call types (type of number) that use access code 2. This relates to ESN dialing plans. If you do not have a dialing plan, <cr> past this prompt. Multiple responses are permitted. If a call type is not entered here, it automatically defaults to access code 1.
	NPA NXX INTL SPN LOC	E.164 National E.164 Subscriber International Special number Location code (prompted only for NARS)
ISDN	Yes	Change ISDN options
- PNI	1-32700	Private Network Identifier (for CLID)

Procedure 6

Use LD 15 to define a PRI customer (Part 2 of 2)

Prompt	Response	Description
- PFX1	xxxx	Prefix (area) code for International PRA (for CLID)
- PFX2	xxxx	Central Office Prefix for IPRA (for CLID)
- HNPA	100–999	Home Number Plan Area code (for CLID)
- HNXX	100–999	Prefix for Central Office (for CLID)
- HLOC	100–9999	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 internode hops in a network redirection call

Procedure 7

Use LD 16 to define a PRI trunk route (Part 1 of 4)

Prompt	Response	Description
REQ	NEW	Add a PRI trunk route
TYPE	RDB	Type of data
CUST	0–99	Customer number
ROUT	0–511	Route number
TKTP	aaa	Trunk route type: DID, FEX, FGDT, ISA, ISL, RLM, RLR, TIE, WATS
PRIV	Yes, (No)	Route is (is not) a private line route
ESN	Yes, (No)	ESN signaling
CNVT	Yes, (No)	Route to conventional switch
DDMI	xxx	Digit manipulation index
ATDN	(0)–xxxxxxx	Attendant DN of conventional main, ESN main, ESN node, or ETN node

Procedure 7**Use LD 16 to define a PRI trunk route (Part 2 of 4)**

Prompt	Response	Description
SAT	Yes, (No)	Trunk route via earth orbiting satellite transmission
RCLS	INT, (EXT)	Route classmarked as internal, (external)
DTRK	Yes, (No)	Digital trunk route
BRIP	Yes, (No)	ISDN BRI packet handler route
DGTP	aaa	Digital trunk type
ISDN	Yes, (No)	ISDN PRI option
_MODE	PRA, 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	xxxx	Interface machine type for this PRI route
_SRVC	aaa	Service provisioned for AT&T ESS connections: (NSF), ACC, I800, LDS, M800, MEG, SDN, IWAT, WATM, WATB Note: NSF = services provided on a call-by-call basis.
_SRPM	0–(15)–255	Service parameter prompted if SRVC = WATB
_NCNA	(Yes), No	Network call name allowed
_NCRD	(No), Yes	Network Call Redirection
_TRO	Yes, (No)	Trunk optimization allowed (denied) on the route
_NSF	Yes, (No)	Network Service Facility
_COTR	0–511	Incoming DID/CO route number
_TIER	0–511	Incoming TIE route number
_WATR	xxx	WATS route number
_CHTY	ABCH, (BCH)	Signaling type for B-channel digital routes
_CTYP	aaa	Call type for outgoing direct dialed TIE route

Procedure 7**Use LD 16 to define a PRI trunk route (Part 3 of 4)**

Prompt	Response	Description
_INAC	Yes, (No)	Insert ESN access code to incoming private network call
NCOS	(0)–99	Network Class Of Service
CLS	aaa	Class of service restriction for tie route
TGAR	0–31	Trunk group access restrictions
IEC	000–999	Interexchange carrier ID
PTYP	aaa	Port type at far end
AUTO	Yes, (No)	Auto-terminate trunks
ICOG	IAO, ICT, OGT	Incoming and/or outgoing trunk
SRCH	RRB, (LIN)	Round robin or linear outgoing trunk search
ACOD	xxx ... x	Trunk route access code
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
SPCT	DLY, (IMM)	Delayed or immediate cut-through speech path control
DLTN	Yes, (No)	Provide dial tone to the far-end

Procedure 7**Use LD 16 to define a PRI trunk route (Part 4 of 4)**

Prompt	Response	Description
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
FGNO	(0)–127	Feature Group D block number
TDET	Yes, (No)	Tone detector required
TTBL	(0)–31	Tone table number

Procedure 8

Use LD 14 to define a PRI trunk (Part 1 of 2)

Prompt	Response	Description
REQ	New	Create a PRI trunk Note: When assigning several numbers at once—i.e., a full T-1—use the multiple create command New XXX. The maximum number is 255.
TYPE	aaa	Trunk type DID, FEX, FGDT, ISA, ISL, RLM, RLR, TIE, WATS Note: Per FCC regulations, DID trunks must be designated for answer supervision. Refer to “FCC compliance for DID answer supervision” in <i>X11 features and services</i> (553-3001-305).
TN	I s c u, I ch	Terminal Number, or loop and channel
XTRK	XUT, XEM	Universal trunk card, Enhanced E&M trunk card
SFEX	Yes, (No)	Special digital FEX trunk
CUST	0–99	Customer number
NCOS	xx	Network Class of Service group number
RTMB	rrr mmm	Route number and member number
CHID	xx	Channel ID for this trunk
MNDN	xxxx	Manual Directory Number
PRDN	xxxx	Private line Directory Number
CMF	Yes, No	Call modification for private lines
RLDN	xxxx	Release Link trunk Directory Number
NITE	xxxx	Night Service Directory Number
TGAR	(0)–31	Trunk group access restriction
SIGL	aaa	Trunk signaling
CDEN	SD, DD	Single or double card density
EMTY	TY1, (TY2)	4-wire E&M type 1 or 2

Procedure 8**Use LD 14 to define a PRI trunk (Part 2 of 2)**

Prompt	Response	Description
CPAD	CIN, (COUT)	Carrier interface pad in (out) for 4-wire E & M TIE trunks
LDOP	bop, (loop)	Loop Dial Outpulsing
TIMP	(600), 900, 1200	Termination impedance
BIMP	600, (3com)	Balance impedance 3-component or 600 ohms
CDEN	SD, DD	Single or double density card
STRI	aaa	Incoming start arrangement
STRO	aaa	Outgoing start arrangement
SUPN	Yes, No	Answer and disconnect supervision required
FCAR	Yes, (No)	Forced Charge account
CLS	aaa	Class of service options

Asynchronous port configuration (X11 release 17 and earlier)

The following procedure describes how to configure the asynchronous port of the QPC757 or the NT6D11AB D-channel card as a Serial Data Interface (SDI) port. This SDI port is able to serve as a QPC139 circuit. As defined here, the asynchronous port is only an even numbered port.

Note: The port should be set for DCE and RS-232-C interface options. See *ISDN Primary Rate Interface installation* (553-2901-200) for the socket locations.

Procedure 9

Respond to the following prompts in LD 17 (Part 1 of 2)

Prompt	Response	Description
REQ	CHG	Change the configuration
TYPE	CFN	Configuration record
IOTB	YES	Change input/output device
ADAN	NEW TTY x	New TTY number x = TTY port address as set by the card switch settings
ESDI	YES	This port uses an ESDI card
SYNC	NO	This port is not in synchronous mode
_DUPX	HALF, (FULL)	Duplex rate
_BPS	1200, 2400, (4800), 9600, 19200, 48000, 56000, 64000	Baud rate
_BITL	7, (8)	7 or 8 data bit length
_STOP	(1), 1.5, 2	Number of stop bits Enter 1x5 for 1.5
_PRTY	ODD, EVEN, (NONE)	Parity
_FLOW	CTS, XON, (NONE)	Flow control
_USER	aaa	Output message types

Procedure 9**Respond to the following prompts in LD 17 (Part 2 of 2)**

Prompt	Response	Description
		aaa = BUG, CDL, CTY, MTC, SCH, TRF (among others, see <i>X11 input/output guide</i> (553-3001-400))

Asynchronous port configuration (X11 release 18 and later)

The following procedure describes how to configure the asynchronous port on the QPC757 DCHI card as a Serial Data Interface (SDI) port. This SDI port is able to serve as a QPC139 circuit. As defined here, the asynchronous port is only an even numbered port.

Note: The port should be set for DCE and RS-232-C interface options. See *ISDN Primary Rate Interface installation* (553-2901-200) for the socket locations.

Procedure 10

Respond to the following prompts in LD 17

Prompt	Response	Description
REQ	CHG	Change the configuration
TYPE	CFN	Configuration record
ADAN	NEW TTY x CHG TTY x	New or changed TTY number x = TTY port address as set by the card switch settings (even number)
CTYP	DCHI	This port uses a QPC757 DCHI card
DNUM	x	Device number automatically printed when ADAN = CHG
BPS	110, 150, 300, 600, (1200), 2400, 4800, 9600, 19200	Baud rate
PRTY	ODD, EVEN, (NONE)	Parity
STOP	(1), 2	Number of stop bits
BITL	7, (8)	7 or 8 data bit length
USER	aaa	Output message types aaa = BUG, CDL, CTY, MTC, SCH, TRF (among others, see <i>X11 input/output guide</i> (553-3001-400))

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 17
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 18
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 19
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 20
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 implementation

This section contains procedures on how to configure DTI2 or PRI2 on a Meridian 1, as required for the implementation of the North America 1.5/2.0 Mbps Gateway feature functionality.

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 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.
- Configure a Primary D-Channel for the PRI2 interface, using LD 17.
 - Configure a the Pulse Code Modulation Companding Law on the PRI2 D-Channel, 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 table, using LD 73.
 - Configure a PRI2 route, using LD 16.
 - Configure a PR2 trunk, using D 14.

DTI2 implementation

To configure DTI2 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 DTI2 interface, using LD 17.
- Define the DTI2 pad tables, using LD 73.
- Configure a PRI2 route, using LD 16.
- Configure a PR2 trunk, using D 14.
- Define the ABCD (signaling category) table, using LD 73. ABCD tables apply to DTI/DTI2 interfaces only.

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)	MU = u-Law.
	A	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	MSDL	Card type where: MSDL = NT6D80 Multi-purpose Serial Data Link, or the NTBK51AA Downloadable D-Channel Daughterboard, for large systems (Options 51C, 61C, 81, or 81C). MSDL = The NTBK51BA Downloadable D-Channel Daughterboard for the small system (Option 11C).
- GRP	0-4	Network group number for Option 81/81C systems.
- DNUM	0-15	Device number for I/O ports. All ports on the MSDL card share the same DNUM. The MSDL card address settings must match the DNUM value.
- PORT	0-3	Port number on the NT6D80 MSDL card, if the MSDL is used for D-Channel handling on large systems (Options 51C, 61C, 81, 81C).
	0-1	Port number of the NTBK51AA, if the NTBK51AA is used for D-Channel handling on large systems (Options 51C, 61C, 81, 81C). Port 0 of the NTBK51AA can only be defined to work with Loop 0 of the NT5D97AA DDP2 card, and Port 1 of the NTBK51AA can only be defined to work with Loop 1 of the NT5D97AA. This relationship must be reflected in the DCHL prompt, which follows later (either 0 or 1 must be entered when specifying the loop number used by the D-Channel).
	1	Port number of the NTBK51BA, for the small system (Option 11C).

- 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).
- CTYPE	MSDL	Card type where: MSDL = NT6D80 Multi-purpose Serial Data Link, or the NTB51AA Downloadable D-Channel Daughterboard, for large systems (Options 51C, 61C, 81, or 81C). MSDL = The NTB51BA Downloadable D-Channel Daughterboard for the small system (Option 11C).
- GRP	0-4	Network group number for Option 81/81C systems.
- DNUM	0-15	Device number for I/O ports. All ports on the MSDL card share the same DNUM. The MSDL card address settings must match the DNUM value.
- PORT	0-3	Port number on the NT6D80 MSDL card, if the MSDL is used for D-Channel handling on large systems (Options 51C, 61C, 81, 81C).

	0-1	Port number of the NTB51AA, if the NTB51AA is used for D-Channel handling on large systems (Options 51C, 61C, 81, 81C). Port 0 of the NTB51AA can only be defined to work with Loop 0 of the NT5D97AA DDP2 card, and Port 1 of the NTB51AA can only be defined to work with Loop 1 of the NT5D97AA. This relationship must be reflected in the DCHL prompt, which follows later (either 0 or 1 must be entered when specifying the loop number used by the D-Channel).
	1	Port number of the NTB51BA, for the small system (Option 11C).
- RCVF	YES	Auto-recovery to primary D-Channel.
- BCL	0-159	PRI2 loop number for the Back-up D-channel, for large systems (Options 51C, 61C, 81, 81C). If the NTB51AA 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	MSDL	Card type where: MSDL = NT6D80 Multi-purpose Serial Data Link, or the NTBK51AA Downloadable D-Channel Daughterboard, for large systems (Options 51C, 61C, 81, or 81C). MSDL = The NTBK51BA Downloadable D-Channel Daughterboard for the small system (Option 11C).
- GRP	0-4	Network group number for Option 81/81C systems.
- DNUM	0-15	Device number for I/O ports. All ports on the MSDL card share the same DNUM. The MSDL card address settings must match the DNUM value.
- PORT	0-3	Port number on the NT6D80 MSDL card, if the MSDL is used for D-Channel handling on large systems (Options 51C, 61C, 81, 81C).
	0-1	Port number of the NTBK51AA, if the NTBK51AA is used for D-Channel handling on large systems (Options 51C, 61C, 81, 81C). Port 0 of the NTBK51AA can only be defined to work with Loop 0 of the NT5D97AA DDP2 card, and Port 1 of the NTBK51AA can only be defined to work with Loop 1 of the NT5D97AA. This relationship must be reflected in the DCHL prompt, which follows later (either 0 or 1 must be entered when specifying the loop number used by the D-Channel).

	1	Port number of the NTB51BA, for the small system (Option 11C).
- 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).
	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.
- PRI	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 116, which explains ABCD tables assignment and modification.

Please refer to the following tables when configuring the ABCD table values:

- Table 21, “Default values for Signaling Categories 1 & 16 (In/Out Calls),” on page 114.
- Table 22, “Default values for Signaling Categories 1 & 16 (Incoming Calls),” on page 114.
- Table 23, “Default values for Signaling Categories 1 & 16 (Outgoing Calls),” on page 115.

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 CLR(B) (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 BRSL (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 21
Default values for Signaling Categories 1 & 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 22
Default values for Signaling Categories 1 & 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 CLRB (S)	1101	1101
SEZA (S)	1101	UNUSED	P RCTL (S)	UNUSED	UNUSED
TIME	150		P RCOD (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 23
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.

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 6. 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 7.

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

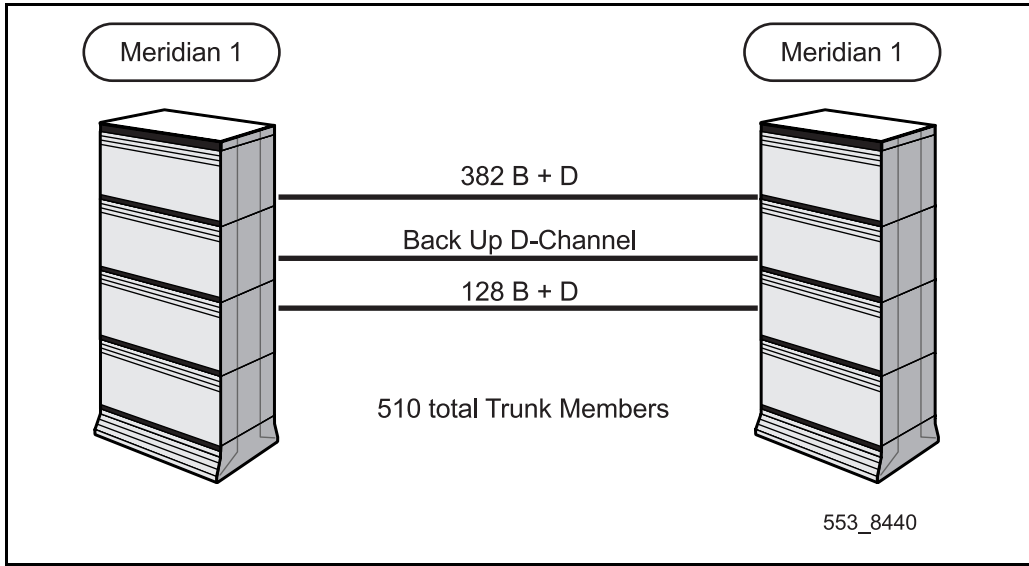
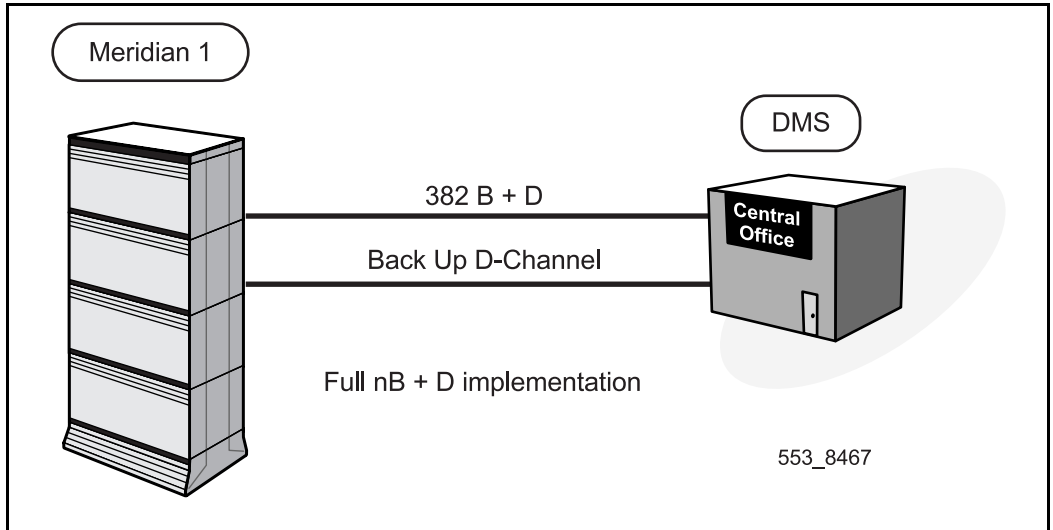


Figure 7
510 trunk members expansion configured for a Meridian 1 to DMS connectivity



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 implementation

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.
...		

Feature operation

No specific operating procedures are required to use this feature.

Analog Semi-permanent Connections

The Analog Semi-permanent Connections (ASPC) feature provides the capability to automatically re-establish any disconnected ASPC call that the Meridian 1 system detects. The user configures the ASPC feature for a trunk and sets a re-connection timer defined at the customer level.

The XFEM card in a Meridian 1 system controls incoming and outgoing manual trunks. Each trunk is dedicated to a single piece of equipment. When equipment linked to an incoming trunk wants to establish a communication with equipment on an outgoing manual trunk, both trunks have to be linked in a software manner using the Manual Directory Number (MNDN) prompt. The originating equipment has to connect the E-lead of the trunk on its side to the ground. This connection is seen as a seize message on the PBX side; both trunks are then linked together. The configuration can also involve calls across intermediate TIE trunks.

If communication is broken after an ASPC call is established between two systems, the incoming trunk is left in the busy state. A message is then printed along with the date, time, manual incoming trunk TN and its corresponding MNDN on the TTY. This message indicates that the call has been disconnected. Re-connection is attempted at regular intervals based on the ASPC timer. The call is re-established once the connection is made again. The call can also be re-established when the IPE manual incoming E&M TIE trunk is disabled and enabled in Overlay 36. Another message is printed on the TTY when the call is re-established.

When the Meridian 1 system detects a disconnected ASPC call, the ASPC re-connection Timer (ASPCT) starts. When the ASPCT time expires, re-connection of the call is attempted. If the call is not established, the ASPCT time is reset and the process repeats until the call is re-established.

To enable/disable this feature, the Analog Semi-permanent Connections Allowed (SPCA) or Analog Semi-permanent Connections Denied (SPCD) Class of Service must be defined in Overlay 14 for incoming manual trunks.

Operating parameters

The ASPC feature is only applicable to IPE 2/4 E&M manual incoming trunks. It does not apply to trunks that are Incoming and Outgoing (IAO). Set up ASPC over IPE 2/4 wire E&M analog trunks with the Manual Incoming Service Allowed (MIA) Class of Service on XFEM trunk cards.

ASPC trunks must have ASPC Class of Service on each switch on which incoming manual trunks are terminating. Therefore, such switches must be C machines only. However, Omega machines can be present on any other node of the network, including tandem nodes and outgoing nodes.

If system initialization occurs during reconnection, the ASPC reconnection mechanism fails and the call is not re-established.

The incoming manual trunk, when seized at the far end, is automatically terminated on the MNDN. The manual outgoing trunk service dials the outgoing route access code to complete an outgoing call after ringing the trunk. Therefore, an incoming seizure from the manual trunk (performed as soon as one piece of equipment connects the E-lead to the ground), configured to terminate on a second piece of equipment, using the outgoing manual route access code, ends up as an established tandem connection between the two pieces of equipment.

The MNDN of the incoming trunk can provide access to a private network route, and then to another manual outgoing E&M route. In this event, the MNDN cannot be the collation of the two access codes, because of the resulting conflict between the first access code and the MNDN. One solution is to define a Trunk Steering Code with Digit Manipulation. The digits related with the MNDN are defined to give access to the private route, then deleted to be replaced by the access code of the E&M route.

Feature interactions

There are no feature interactions associated with this feature.

Feature packaging

The Analog Semi-permanent Connection (ASPC) feature is included in base X11 system software.

Feature implementation

LD 15 – Configure ASPC reconnection timer.

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE:	FTR	Customer features and options.
CUST	xx	Customer number.
....		
BSFE	(NO) YES	Boss Secretary Filtering Enhancement
ASPCT	(10)–180	ASPC reconnection Timer (in seconds).

LD 16 – Configure Outgoing Manual Route.

Prompt	Response	Description
REQ	CHG	Change route data.
TYPE	RDB	Route data block.
CUST	xx	Customer number associated with this route.
....		
TKTP	a..a	Outgoing manual trunk type
...		
ICOG	OGT	Outgoing route.
ACOD	xxx	Access code for the trunk route.
NEDC	ETH	Near End Disconnect Control. If the far end goes on-hook for either incoming or outgoing calls, the on-hook condition is recognized and the call is disconnected.

FEDC	ETH	Far End Disconnect Control. Conditions at the near end are recognized for both incoming and outgoing calls.
MANO	YES	Manual Outgoing trunk route.

LD 16 – Configure Incoming Manual Route.

Prompt	Response	Description
REQ	CHG	Change route data.
TYPE	RDB	Route data block.
CUST	xx	Customer number associated with this route.
....		
TKTP	a..a	Outgoing manual trunk type
....		
ICOG	ICT	Incoming route.
NEDC	ETH	Near End Disconnect Control on either side.
FEDC	ETH	Far End Disconnect Control on either side.

LD 14 – Configure Incoming Manual Trunk.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	TIE	TIE trunk data block.
TN	l s c u c u	Terminal number. Option 11C format
...		
CUST	xx	Customer number associated with this route.
....		

RTMB	0-511 1-510 0-127 1-510	Route Number and Member Number Option 11C format
...		
MNDN	xx...x	Manual Directory Number xx...x is the access code of the outgoing manual route or is the DN of the terminating set.
CLS	MIA SPCA	Manual Incoming Allowed. ASPC allowed. SPCD = ASPC denied (default).

Feature operation

No specific operating procedures are required to use this feature.

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.

No new hardware is required for this feature.

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).

ISDN Basic Rate Interface (BRI) Trunk Access

It is possible to use the Attendant Blocking of DN feature in an ISDN MCDN based on BRI TIE trunks if Network Attendant Service (NAS) is configured in the network.

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.

Ring 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 Implementation

LD 12 – Configure the SACP key on the Attendant Console.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ATT, 1250, 2250	Attendant Console type.
TN	I s c u c u	Terminal Number. Terminal Number for the Option 11E.
...		
KEY	xx SACP	Semi-automatic Camp-on key.

LD 15 – This overlay has been modified to enable the Attendant Blocking of DN feature.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	CDB ATT	Customer Data Block. Release 21 gate opener.
CUST	0-99	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.

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.

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.

The feature capabilities of the set-based (FFC 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. New ISDN FACILITY messages are used to facilitate the RCFW feature operation in an MCDN.

Attendant RCFW does not require a station password to activate call forward for a station. An optional, customer-based, password can be configured for attendant operation of the RCFW feature.

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

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 (FCCs), Remote Call Forward is not applicable to BRI sets.

Multiple Appearance DNs

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

Network operation of the RCFW feature simply provides network access to the standalone RCFW feature, therefore the requirement that only one prime DN per Multiple Appearance DN also applies to the network-based RCFW feature.

However, with the standalone set-based RCFW feature, there is no code in place to explicitly prohibit the configuration of Multiple Appearance DN with the same prime DN and Station Controlled Passwords (SCPWs) on different stations. No code is added for the network or attendant implementation of this feature. As such, in the event that multiple stations are configured with the same prime DN, the set-based network RCFW feature operation will be the same as that for standalone RCFW feature operation.

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.

If none of the stations having the DN and SCPW assigned are configured as the MARF TN for that DN, the RCFA and RCFD will apply to all stations matching the DN and SCPW. RCFW will apply to the station with MADN call presentation priority (i.e., the station with the last service change is placed at the end of the list).

The attendant-based RCFW feature will only apply to 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 allows users to configure the CFW DN of Phantom TNs to their current location. 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 PBX sets configured within the Meridian 1, the operation of the RCFA and RCFD features on Phantom TNs is applicable 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.

Feature packaging

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

Set-based RCFW requires the following software packages: Optional Features (OPFT) package 1; Flexible Feature Codes (FCC) package 139; and Controlled Class of Service (CCOS) package 81.

The following software packages are required for implementation on PBX sets: Special Service for 2500 Sets (SS25) package 18; and 500 Set Dial Access to Features (SS5) package 73.

For network operation the following software packages are required: Integrated Services Digital Network (ISDN) package 145; Network Alternate Route Selection (NARS) package 58; and Coordinated Dialing Plan (CDP) package 59.

Implementation

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	0-99	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	0-99	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	l s c u c u	Loop, shelf, card, and unit. Card, and unit (Option 11).
SCPW	xxxxxxxx	Station Control Password (0 to 8 digits, defined in LD 15).
FTR	CFW (4)-31	Assign Call Forward 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	l s c u c u	Loop, shelf, card, and unit. Card, and unit (Option 11).
SCPW	xxxxxxx	Station Control Password (0 to 8 digits, defined in LD 15).
FTR	CFW (4)-31	Assign Call Forward DN length.

LD 57 – Define Remote Call Forward FFCs and set FFCT.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	FFC	Flexible Feature Codes.
CUST	0-99	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, M2250 and Swedish CD Attendant Consoles.
TN	l s c u c u	Loop, shelf, card, and unit. Card, and unit (Option 11).
...		
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	0-99	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.
...		

Feature operation

Network Wide Set-based Remote Call Forward

From the remote set dial:

- 1 FCC RCFA code.
- 2 SCPW for the set to be forwarded.
- 3 The complete DN of the set to be forwarded. This DN is the full DN required to call the set to be forwarded from the user's present location.

Expected Result: Provided everything is correct, confirmation tone is delivered to the user.

From the remote set continue dialing:

- 4 The CFW DN to be activated followed by the end of dial indicator (#).

Expected Result: Provided everything is correct, confirmation tone is delivered to the user.

Network Wide Attendant-based Remote Call Forward

From the Attendant Console, perform the following:

- 1 Press an idle loop key followed by the RFW key.

Expected Result: The RFW key is flashing and the Loop key is steady lit.

- 2 Dial the DN of the set to be forwarded.

Expected Result: If a password is required, the RFW key is winking, and the console display shows “PWD –”. If the console does not support alpha characters, the display will be blank.

If a password is not required, the console display will show the DN of the set to be forwarded followed by the CFW DN stored on that set. The RFW key lamp will display the status of the CFW DN. If the RFW lamp is flashing, CFW is not active; if the RFW lamp is steady lit, CFW is active. Proceed to Step 4.

- 3 Dial the password followed by #.

Expected Result: The console display will show the DN of the set to be forwarded followed by the CFW DN stored on that set. The RFW key lamp will display the status of the CFW DN. If the RFW lamp is flashing, CFW is not active; if the RFW lamp is steady lit, CFW is active.

- 4 The user can now enter a new CFW DN or press the RFW key to activate or deactivate the stored CFW DN.

Expected Result: The console display will show the DN of the set to be forwarded followed by the CFW DN. If the RFW lamp is flashing, CFW is not active; if the RFW lamp is steady lit, CFW is active.

- 5 When RCFW operation is in this state, the user has the following three options:
 - Press the Release or Release Source key to terminate RCFW operation.
 - Press the RFW key to reverse the CFW status.
 - Enter a new CFW DN to begin the task of changing the CFW DN programmed. The new CFW DN is not active until the RFW key is pressed again.

Automatic Redial

Automatic Redial (ARDL) extends the redialing capabilities of the Ring Again and Network Ring Again features. The redialing capabilities of this feature reside at the system level. The system generates redialing attempts that allow the calling party to redial a busy public network subscriber using analog or digital trunks.

This feature is applicable when a calling party dials a public network subscriber number and receives a busy indication. Instead of attempting repeated redial efforts, the calling party can activate ARDL by pressing the Ring Again (RGA) key.

Once activated, the ARDL feature requests the Meridian 1 to automatically redial the attempted dialed number until a successful call termination is completed or until the configured number of redial attempts is reached. A successful call termination is determined when one of the following occurs: a tone detector attached to the call detects a ringback tone, an answer signal is received or an ISDN signaling trunk indicates call termination.

When a successful call termination is detected from the far end, the calling party hears the called party through the set's loudspeaker. The calling party must accept the redialed call within a specified time limit. If not, the redialed call is dropped and not redialed.

Multi-Automatic Redial permits simultaneous activation of the Automatic Redial feature on several RGA keys. This allows more than one number to be redialed in succession. Each Automatic Redial call is attempted once and then another number is attempted. Multi-ARDL numbers are dialed in order of activation.

One set of ARDL calls can be associated with one DN key. Another set of ARDL calls can be associated with a different DN key. This option facilitates the use of ARDL feature by a secretary who works for several managers. Each manager's DN could be on the secretary's set. A secretary activates the ARDL feature to call different calling groups on both DNs. After a successful call termination, the accepted call is easily accessed by the appropriate manager.

All ARDL requests are associated with the calling party's DN key. Therefore, when the called party is being redialed the calling party's DN key is busy. If the calling party is busy on another DN, the ARDL attempts are redialed on hold. When a successful call termination is completed, the Meridian 1 alerts the calling party by buzzing the set. While ARDL is activated, the calling party's set can be used for incoming/outgoing calls.

ARDL can be activated on a call that has originated from a Single Call Ringing (SCR), Single Call Non Ringing (SCN), Multiple Call Ringing (MCR), Multiple Call Non Ringing (MCN), Private Line key or Hot Line key. The ARDL request is associated with the key from which the call was made. If this key is free, the system attempts to dial the number until a successful call termination is detected and provided a free trunk is available.

Operating parameters

The Ring Again feature must be enabled to operate the ARDL feature.

This feature is only supported on Central Office (CO) and TIE trunks.

The ARDL is supported on Meridian 1 proprietary sets, excluding the M3000 and M2317 sets. It is recommended that sets be equipped with display, handsfree and loudspeaker. Analog (500/2500) type sets do not support this feature.

The ARDL feature cannot be activated on data calls.

ARDL can only redial if the Directory Number (DN) key on the calling party's set is idle. For this feature application, only a single external number can be stored against the Ring Again key.

Network Ring Again features do not interfere with the ARDL feature. ARDL is only activated after all Network Ring Again attempts have failed. When ARDL is activated, redial attempts continue with the ARDL feature.

The ARDL feature does not impact the operation of the Ring Again feature on internal calls.

The tone detector is not allocated to detect non-busy tones for off network trunks that have on-board busy tone detectors such as an Extended Flexible Central Office Trunk (XFCOT). Only a busy tone is detected. Accordingly, an Automatic Redial call is considered a successful call even though an overflow tone is sent from the far end.

With the exception of trunks that have on-board busy detectors or an end-to-end Integrated Services Digital Network (ISDN) call, a tone detector is required for all ARDL calls.

If a trunk is not equipped with answer supervision, an ARDL call is redialed once only and then the redial request is cancelled.

The busy tone detector capability is limited to the current tone detector hardware.

This feature introduces the following three timers that control the operation of ARDL:

- The Automatic Redial Acceptance Timer is the maximum allotted time that the calling party has to respond to an ARDL call;
- The Automatic Redial Retry Timer controls the time between successive ARDL retries; and
- The Tone Detector Response Timer controls the tone detector response and is defined in LD 16.

Feature interactions

Access Restrictions

Trunk Group Access Restrictions

The Access Restriction/Trunk Group Access Restrictions of an ARDL redialed call are those restrictions that were applied when the call was initiated. These initial restrictions are not changed.

Attendant Barge-In

Attendant Barge In is not allowed to a trunk that is currently used for the ARDL call redialing. This is done to avoid creating a conference when the tone detector is involved.

Attendant Break-In

Attendant Busy Verify

Attendant Break-In and Attendant Busy Verify are not permitted on a Meridian 1 proprietary set that is used for an ARDL call. These restrictions avoid creating a conference when the tone detector is involved in the call.

Attendant Blocking of Directory Number

An ARDL redialed call is blocked from the calling party if an attendant uses the Attendant Blocking of Directory Number feature on the calling party's DN.

Attendant Recall

Call Park

Call Transfer

Conference

No Hold Conference

Privacy Release

When an Automatic Redial (ARDL) call is not accepted by the calling party, the following keys are ignored if pressed: Attendant Recall (ARC), Call Park (PRK), Call Transfer (TRN), Conference (A03 or A06), No Hold Conference (NHC) and Privacy Release (PRS).

Autodial

ARDL can be activated on a dialed number using the Autodial (ADL) key.

Automatic Line Selection

Manual Line Selection, Outgoing Line Selection or Prime Line Selection is interpreted as accepting the ARDL by the calling party.

Automatic Preselection of Prime Directory Number

If a call is processed on key 0 and the calling party lifts the handset and selects the Prime Directory Number (PDN), this is interpreted as accepting a redialed call.

Automatic Set Relocation

If the calling party's set is relocated, the ARDL request is cancelled.

Call Detail Recording

The calling party's DN is charged even though a call is not accepted. This occurs because the resources are booked for ARDL attempts.

If Call Detail Recording (CDR) is configured on external calls, additional CDR records are produced. This occurs because each redial attempt produces a CDR record.

Calling Party Privacy

The calling party and called party have the same Calling Party Privacy considerations.

Digit Display

Dialed numbers are displayed when the ARDL feature is activated. The calling party can dial digits even though a busy tone indication is given.

Digits dialed while on hold are not displayed. When the calling party accepts a redialed call, the dialed numbers are displayed. If the Display (DSP) key and appropriate RGA key are pressed while a call is on hold, the number redialed is displayed.

Directory Number - Multiple Appearance

An ARDL call from a Single Call Ringing (SCR) or Single Call Non Ringing (SCN) is only redialed when all sets that have the same DN are free.

An ARDL call from a Multiple Call Ringing (MCR) or Multiple Call Non Ringing (MCN) is only redialed when the originating key is free.

Enhanced Hot Line

An ARDL call can be activated from an Enhanced Hot Line key. However, the call is only redialed when the calling party's HOT key is free.

Last Number Redial

An ARDL call can be activated on a number dialed using the Last Number Redial (LNK) key or by pressing the DN key twice. The ARDL number is saved as the last number redialed.

Line Load Control

ARDL attempts are controlled and restricted by Line Load Control.

Network Alternate Route Selection

Network Speed Call

ARDL can be activated on a Network Alternate Route Selection DN or Network Speed Call.

New Flexible Code Restriction

ARDL calls must pass New Flexible Code Restriction (NFCR) checks. If the redialed number is restricted, the ARDL request is cancelled.

Override

An ARDL call cannot be overridden. This is done to avoid creating a conference when a tone detector is involved.

Pretranslation

ARDL can be activated on a number that has passed the Pretranslation process. However, on an ARDL call the Pretranslation process is not used.

Privacy

If the ARDL call is redialed on a number that is shared with any single line telephone, the ARDL call is accepted when the single line telephone goes off-hook.

Privacy Override

When the Privacy Override feature is activated on the MADN key and the one set activates ARDL, this call can be accepted by other sets.

Private Line Service

ARDL call can be activated on a Private Line Service key. The call can only be redialed when the calling party's PVR or PVN key is free.

Speed Call**System Speed Call****Stored Number Redial**

The Automatic Redial (ARDL) feature can be activated on a call using Speed Call (SCL), System Speed Call (SSU/SSC) or Stored Number Redial (RDL) keys.

Speed Call on Private Lines

The ARDL feature is activated on a number dialed using the Private Line (PVR/PVN) key and then making a speed call by pressing the Speed Call (SCL) key.

Feature packaging

Automatic Redial (ARDL) requires the following packages:

- Automatic Redial (ARDL) package 304;
- Ring Again (RGA) package 1; and
- Tone Detector (TDET) package 65.

Note: Outpulsing of Asterisk and Octothorpe (OPAO) package 104 and Automatic Redial (ARDL) package 304 are mutually exclusive. The ARDL package is turned off automatically if both packages are equipped.

Feature implementation

LD 13 – Define Tone Detector Units.

Prompt	Response	Description
REQ	NEW	Add.
TYPE	TDET	Tone Detector data block.
TN	I s c u c u	Terminal Number. For Option 11C.

LD 15 – Define Automatic Redial.

Prompt	Response	Description
REQ:	CHG	Change.
TYPE:	FTR	Change features and options.
CUST	xx	Customer number.
...		
-ARDL_ATTEMPT	1-(30)-60	Number of Automatic Redial attempts.
REQ:	CHG	Change.
TYPE:	TIM	Change Timers.
CUST	xx	Customer number.
...		
- ARDL_ACCEPT	0-(20)-60	Automatic Redial Acceptance Timer in seconds. Odd number entries are rounded up to the next even number and echoed back with a message.
- ARDL_RETRY	10-(30)-60	Automatic Redial Retry Timer in seconds. Odd number entries are rounded up to the next even number and echoed back with a message.

LD 16 – Define Automatic Redial Tone Detector Response Timer.

Prompt	Response	Description
REQ	NEW, CHG	Add, or Change.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number.
ROUT	0-511	Route number.
...		
CNTL	YES	Changes to controls or timers.
TIMR	RTD 0-(12)-60	Tone Detector Response Timer in seconds. Odd number entries are rounded up to the next even number.

LD 87– Define Automatic Redial Network Route Selection.

Prompt	Response	Description
REQ	NEW, CHG	Add, or Change.
CUST	xx	Customer number.
FEAT	NCTL	Network Control Feature.
...		
NCOS	(0) - 99	Network Class of Service group number.
- ARDL	(A), I	A = Automatic Redial network route selection allowed from all route sets (initial and extended). I = Automatic Redial network route selection allowed from initial set of routes only.

LD 11 – Assign Automatic Redial Class of Service and Key.

Prompt	Response	Description
REQ:	NEW, CHG	Add, or Change.
TYPE:	xxxx	Telephone type, where: xxxx = SL1, 2006, 2008, 2016, 2216, or 2616.
...		
CLS	RDLA	Automatic Redial allowed (default). RDLD = Automatic Redial denied.
KEY	xx RGA	Ring Again key assignment.
KEY	xx RGA	Ring Again key assignment for Multi-Automatic Redial capability.

Feature operation

Enabling Automatic Redial

- 1 Press an idle DN key, handsfree key or go off-hook. Dial desired public network number. The DN lamp is lit.
- 2 The calling party hears busy, overflow, ringback tone, etc.
- 3 Press the Ring Again (RGA) key.
 - For a non-ISDN call, the RGA key lamps lights, the tone stops and the DN lamp goes dark.
 - For ISDN call, the RGA key lamps initially flashes while the system attempts to activate the Network Ring Again features. If these features cannot be activated, the RGA lamp is steadily lit and the ARDL feature is activated.

Automatic Redialing - External Number

After ARDL is activated the following possibilities can occur:

- 1 The call is answered by the called party and accepted by the calling party. In this case, both parties are connected.
- 2 The call is answered by the called party, but the calling party does not accept the call within the predefined time limit. The call is dropped and not redialed again.
- 3 The called party's number is occupied. The call is dropped and redialed later according to the timer configuration.
- 4 The call is blocked for some reason such as trunks or network congestion. The call is dropped and redialed later according to the timer configuration.

If the calling party presses another DN key while ARDL is activated, the ARDL attempt continues redialed on hold. If the Release (RLS) key is pressed when an ARDL call is attempted and is the active call, the redial attempt is dropped and redialed later after the predefined allotted time.

Automatic Redial - Originating Telephone is Idle on Another Number

- 1 The calling party's DN is idle.
- 2 The RGA key lamp winks. The DN lamp is lit and the called number appears on the set's display. A connection is made to the loudspeaker of calling party's set.
- 3 One of the following occurs:
 - If the called party's number is busy, the call is dropped when a busy tone is detected. The DN goes dark, the RGA lamp is steadily lit and the loudspeaker is deactivated.
 - Otherwise, the calling party hears ringback or answer through the loudspeaker.
- 4 If the calling party accepts the call by going off-hook, pressing DN key or pressing the handsfree, both parties are connected and the RGA lamp goes dark.

- 5 If the calling party does not accept the call within the predefined time limit, the DN key goes dark and one of the following occurs:
 - If the called party answers the call the following occurs: the RGA key goes dark, the redial call is disconnected and the ARDL request is cancelled. The display returns to an idle state.
 - If the called party does not answer the call, the following occurs: the call disconnected and the RGA lamp is steadily lit. The ARDL request is not cancelled and is ready for another redial attempt. The display returns to an idle state.

Accepting an Automatic Redial Call

To accept an ARDL call, the calling party performs one of the following:

- 1 If the ARDL call is the active call on the set, then the calling party must lift handset, press handsfree or press the key on which the ARDL call is active; or
- 2 If the ARDL call is dialed on hold the calling party must press the associated DN key.

Cancelling Automatic Redial

Automatic Recall is canceled in the following cases:

- The calling party presses the lit or winking RGA key (the cancellation request can be activated between ARDL attempts or during a redial attempt);
- The calling party accepts the ARDL call;
- The ARDL call is redialed the predefined number of call retries; or
- The calling party does not accept a successful ARDL call within the predefined time limit.

At cancellation of the ARDL request, the RGA key lamp goes dark.

Backup D-channel

A second D-channel can be added to a Primary Rate Interface (PRI) link to provide a backup as shown in Figure 8. When the active D-channel goes down, two things automatically occur: the standby D-channel is brought into the In-service (active) state and the auto-recovery on the failed D-channel starts.

The backup D-channel is installed and configured the same way as the primary D-channel. See *ISDN Primary Rate Interface installation* (553-2901-200) for installation procedures.

In X11 releases 14 through 16, the backup D-channel supports Meridian 1 to Meridian 1 connectivity only. With X11 release 17 software, the backup D-channel provides connections from Meridian 1 to the following systems:

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

In X11 release 17, the backup D-channel conforms to the Meridian Customer Defined Networking (MCDN) protocol and AT&T's TR41449 and TR41459.

Backup D-channel capacity per PRI link

The maximum number of network loops per PRI link is 16. With 24 channels per loop, 16 network loops provide a maximum of 382 B-channels ($[16 \times 24] - 2$) and 2 D-channels per PRI link. Using the maximum number of 16 network loops requires the ISDN backup D-channel functionality. With 15 or fewer network loops, the backup D-channel is not required but it is recommended. Without a backup D-channel, 15 network loops provide a maximum of 359 B-channels ($[15 \times 24] - 1$) and 1 D-channel.

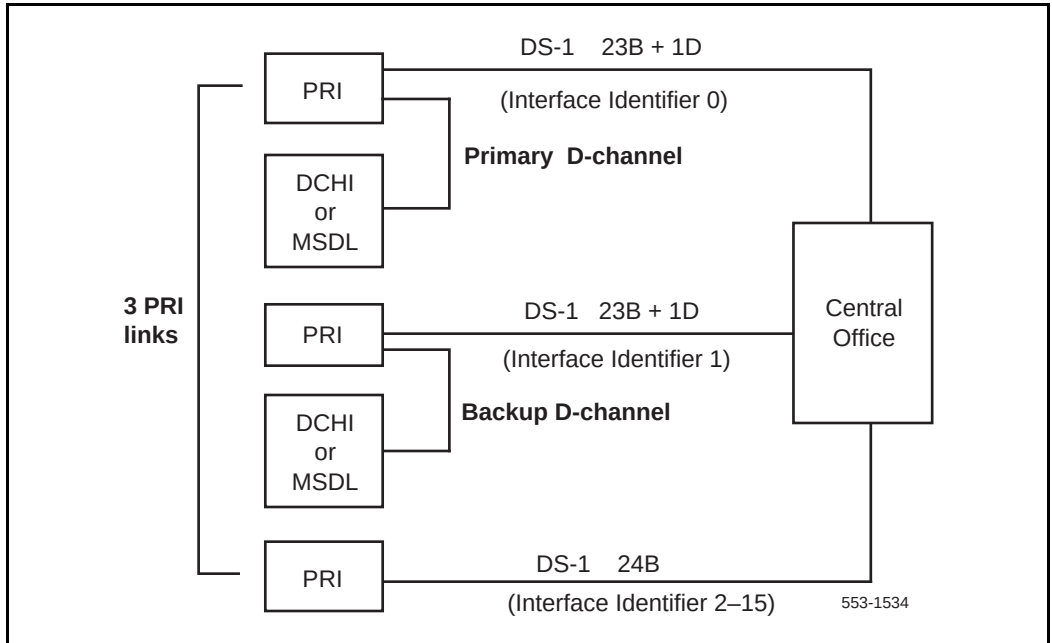
Total backup D-channel capacity

With X11 release 17 and earlier, a maximum of eight D-channels are allowed per system with the QPC757 a total of four active D-channels per system and four backup D-channels are available. This allows four PRI links per system, or $4 \times 382 = 1,528$ B-channels. With the NT6D11AB, you can have up to 15 D-channels in your system. Seven can be used as primary, and seven as the backup D-channels. You can have seven PRI links per system (when all have a backup D-channel). You can, therefore, have $7 \times 382 = 2,674$ B-channels.

X11 release 18 supports up to 64 D-channels with the MSDL card, providing a maximum of 32 active D-channels and 32 backup D-channels. This capacity allows for a great deal of system flexibility since some D-channels may require backup D-channels and others may not due to customer traffic configurations.

Note: With X11 release 18 and later, primary and backup D-channels must be the same card type.

Figure 8
PRI with backup D-channel



Operating parameters

The active D-channel is responsible for call processing signaling for all B-channels in the route.

The backup D-channel does not perform any call processing signaling until it is active. Load sharing between the two D-channels is not allowed.

A switchover from the active D-channel to the backup D-channel is allowed only when the active D-channel goes down or is disabled.

Channel 24 of the first PRI loop is reserved for the primary D-channel. Channel 24 of the second PRI loop is reserved for the backup D-channel, if provisioned. The assignment of the primary and secondary D-channels must match at both ends to ensure that they try to bring up the primary D-channel first at start-up.

During the switchover from the active D-channel to the standby, call control messages received by the D-channel before it becomes active are ignored. Therefore, the calls that are in a transient state are not guaranteed completion. Established calls remain in active state. Some portion of the established calls, for example, the message associated user-to-user information element, may be lost.

With a Meridian 1 to Meridian 1 interface, the active D-channel switches to the standby D-channel when a Service message is received in either of the following formats:

- the MCDN format
- the X11 release 13 format, even though it does not have the Channel Identification Information Element

With X11 release 16 and later, the backup D-channel attempts to bring the primary D-channel to the In-service state first during the start-up period. If the backup D-channel is established first, the X11 release 17 backup D-channel sends a Service message and enters into the WAIT state. During this time, if the primary D-channel is established, the primary D-channel of the X11 release 17 sends a Service message and it enters the WAIT state. The backup D-channel enters the Maintenance Busy state where it does not process or receive any messages. Thus, only the primary D-channel can receive the Service ACK message to become the active D-channel first. The backup D-channel is established as the standby D-channel afterward.

Feature interactions

- Timer 309
Timer 309 specifies a 90-second wait interval after a failure of layer 2 before the active calls are removed from service. For Meridian 1 to Meridian 1, active calls remain whether the D-channel goes down or not. If the T309 expires for both the primary D-channel and the backup D-channel, active calls are terminated on the SL-100, DMS-100, DMS-250, and AT&T 4ESS interfaces.
- Integrated Services Access
Integrated Services Access (ISA) in the Meridian 1 manages Call-by-Call (CBC) service selection. After the switchover, transient calls might be lost, but the integrity of the minimum and maximum counters for each service route is maintained in the ISA.
- D-channel establishment
Enter the ENL SERV command in LD 96 when the associated D-link is not established. After the D-link is established, the Service message for B-channels is exchanged between the near end and the far end switch. This is recommended for all CO interfaces.
- D-channel sanity polling
For the Meridian 1 interface only, if the active D-channel has been idle for 30 seconds, a Service message for the D-channel is sent to the far end to poll the sanity of the D-channel. If the far end does not return Service Ack message, the near end tears down this D-channel and switches to the backup D-channel. It then reestablishes the torn down D-channel. This function is invoked by using the ENL SERV command in LD 96. If there is a mismatch of the active and backup D-channel at the two ends of the PRI, this function can be turned on to synchronize the D-channel state.

Note: Both the D-channel establishment and the D-channel sanity polling are addressed in LD 96. Enable the SERV command only when both D-channels are not established. Regardless of the IFC, the SERV option should always be enabled.

Feature operation

The switchover from the primary D-channel to the backup D-channel is initiated when the backup D-channel receives either Release indication or Release confirmation from the active D-channel. A Service message is sent on the standby D-channel and the T321 timer (40 seconds) starts running. During this time, the system only processes Service messages and Service Ack messages, ignoring call control messages (for example, restart message or status inquiry message).

If the far end responds with a Service Ack message on the backup D-channel, then the backup D-channel becomes the active D-channel. If the T321 timer expires, the system tries to bring the inactive D-channel into the In-service state.

Automatic switchover occurs in the following situations:

- The PRI loop of the active D-channel issues a red alarm or yellow alarm.
- The D-channel Interface card of the active D-channel fails, is unplugged, or is hardware disabled.
- The cable connection between the QPC720 and the QPC757 of the active D-channel is disconnected.

Manual switchover involves issuing the DIS or RST DCH commands in LD 96 to the active D-channel. When this is done, the Primary Rate Interface (PRI) establishes the backup D-channel as the active D-channel.

When one D-channel is in the In-service state and the other D-channel is in the standby state, the active D-channel carries all call control messages. The standby D-channel ignores all messages other than Service and the Service Ack messages for the D-channel.

When using the QPC757 DCHI card, disable the backup D-channel software before disabling its hardware. This ensures that the QPC757 is in the reset condition before restoring it as the backup D-channel.

For Meridian 1 to Meridian 1 interfaces, RCVP can be set to YES or NO in LD 17 as long as the near and the far ends match. When interfacing to anything other than a Meridian 1, set RCVP = NO in LD 17.

Feature packaging

Backup D-channel is included in basic ISDN PRI/ISL functionality. No additional packages are required.

Feature implementation

Basic PRI or ISL administration must be performed before the backup D-channel is defined. The PRI loop must already be defined in LD 17.

Procedure 11

Use LD 17 to configure the backup D-channel (X11 release 17 and earlier) (Part 1 of 2)

Prompt	Response	Description
REQ	CHG	Change configuration record
TYPE	CFN	Configuration record
PWD2	xxxx	Password
ISDN	YES	Change ISDN options
DCHI	1–15	Primary D-channel port number
BCHI	1–15	Backup D-channel port number
USR	PRA, ISLD, SHA	D-channel mode PRA = D-channel for ISDN PRI only ISLD = D-channel for ISL only, in dedicated mode, without using the PRI channel SHA = Shared mode. D-channel used for both ISDN PRI and ISL. One of the above responses is required. There is no default.
RCVP	YES, (NO)	Recover to primary D-channel. When RCVP = YES, the primary D-channel is automatically forced to be the active channel after it is brought up from a released state. Both sides must be either YES or NO. If the two sides do not match, both sides default to NO. This prompt applies to Meridian 1 interfaces only. When IFC = D100, D250, SL100, or ESS4, set the RCVP prompt to NO.
DCHL	0–159	PRI loop number for primary D-channel

Procedure 11**Use LD 17 to configure the backup D-channel (X11 release 17 and earlier) (Part 2 of 2)**

Prompt	Response	Description
BCHL	0–159	PRI loop number for backup D-channel
RLS	xx	Release ID for D-channel. This is the current software release of the far end (X11 or BCS). If the far end has an incompatible release of the software, it prevents the sending of application messages. Refer to <i>X11 input/output guide</i> (553-3001-400) for compatible releases.

Table 24**Use LD 17 to configure the backup D-channel (X11 release 18 and later) (Part 1 of 2)**

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	DCHI, MSDL	Card type
DNUM	0–15	Device number: physical port (odd) for D-channel on DCH, physical card address for MSDL

Table 24**Use LD 17 to configure the backup D-channel (X11 release 18 and later) (Part 2 of 2)**

Prompt	Response	Description
_PORT	0–3	Port number on MSDL card
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)
BCHL	0, 2, 4, ...159	PRI loop number for backup D-channel
RCVP	Yes, (No)	Auto-recovery to primary D-channel option
ADAN	<cr>,****	Go on to next prompt or exit overlay

Basic Call Service

Basic Call Service permits the transmission of the ISDN call. Basic Call Service consists of call progress signaling and voice and data transmission. Basic Call Service is supported for the following switch configurations:

- Meridian 1 to Meridian 1
- Meridian 1 to SL-100
- Meridian 1 to DMS-100
- Meridian 1 to DMS-250
- Meridian 1 to AT&T 4ESS
- Meridian 1 to AT&T 5ESS

See Figure 9 for an example of these configurations.

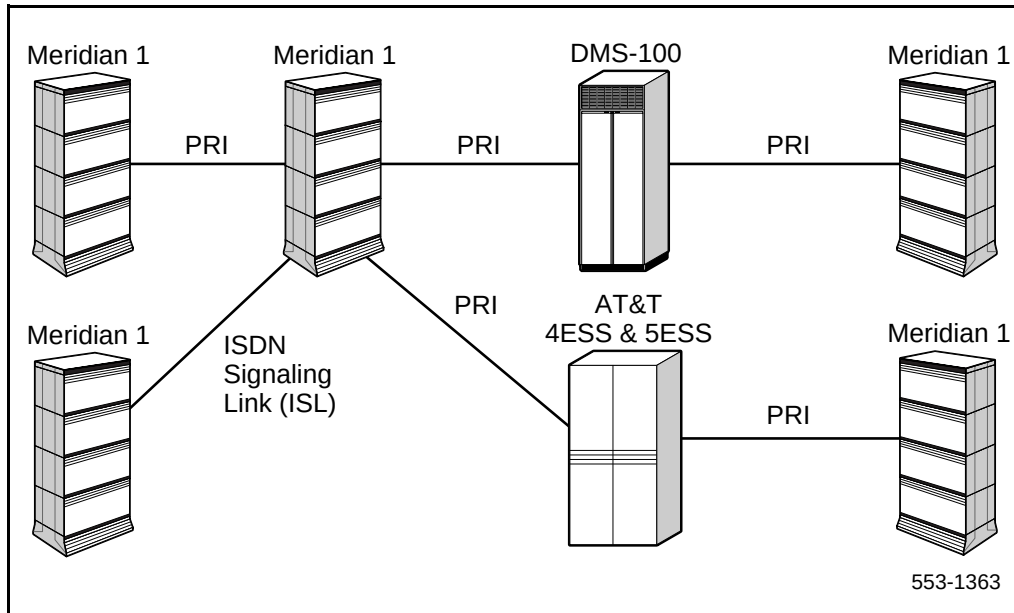
Call progress signaling

PRI supports 56 and 64 kbps out-of-band signaling (on the D-channel) for:

- call setup
- call tear down
- feature activation
- local busy and reorder (overflow supplied locally)

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

Figure 9
ISDN Basic Call Service connections



Voice and data transmission

High-speed voice and 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 and data transmission
- 64 kbps packet data transmission

Numbering plans

Three numbering plans are supported:

- Coordinated Dialing Plan (CDP) of 3 to 10 digits
- North American 10-digit numbering plan
- Electronic Switched Network (ESN) 7-digit private numbering plan

Typically, the numbering plan for a customer's private network consists of a 3-digit location code (such as the LOC code) 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.

Note: When using ISDN (without ESN), the caller dials a trunk access code without waiting for a second (or third) dial tone. However, NRAG, NACD, and NMS require dialing plans. They are not supported using Direct Trunk Access.

PSTN Equal Access and Special Number Services

Public Switched Telephone Network (PSTN) Equal Access Service (EAS) allows a customer to select available carriers for long distance telephone service on a call-by-call basis. See Figure 10.

Inter-Exchange Carrier (IEC)

The IEC access code can be defined for a trunk route that is part of the PRI.

When the IEC is not specified in Meridian 1 software, the DMS-100 examines the Called Party Number and selects an appropriate outbound route.

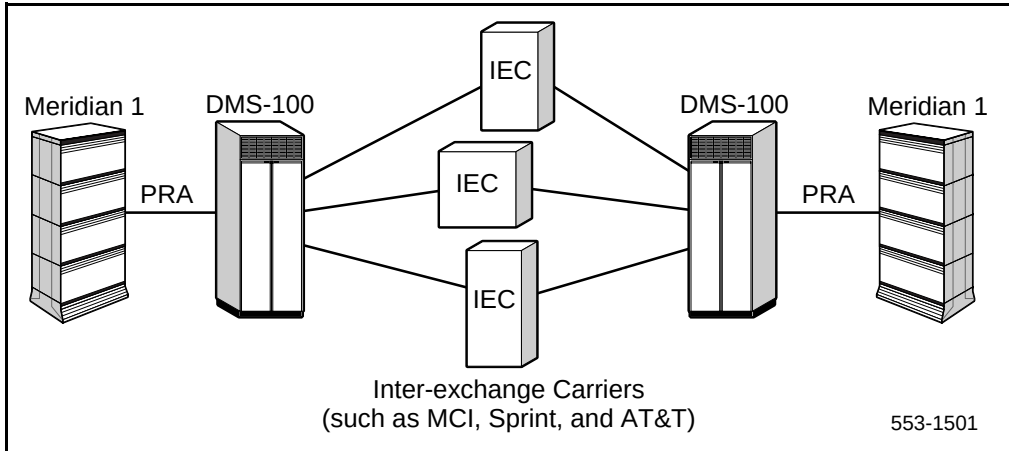
PSTN Special Number Services

These allow access to public network numbers such as:

- 411 for directory assistance
- 911 for emergencies

The user dials a public network access code followed by the special number.

Figure 10
Equal Access Service



64K Clear Data

64K Clear Data allows a customer to send 64 kbps of clear data from the Meridian 1 to the following systems:

- Meridian 1
- SL-100
- DMS-100

64 kbps of clear data can also pass through the AT&T 4ESS and DMS-250 switch as long as the AT&T tandem switch is transparent. See Figure 11 and Table 25 for an example of a configuration that permits the flow of 64 kbps of clear data.

The version IDs of both the originating and the terminating systems must be 2 in order to transmit data at speeds of 64 kbps through the T-Link version 2 protocol.

Selecting the B8ZS line coding method allows the B-channel to transport 64 kbps of clear data. The selection is made in LD 17, the Configuration Record.

On the Meridian 1 side, the 64K Clear Data can only pass through the QMT21 High Speed Data Module MCA or MCU. Therefore, one of these data modules must be connected to each system configured. In addition, 64K Clear Data allows connection to High Speed Data Units (HSDU) through a DMS-100.

64K Clear Data supports ISDN data applications that require a clear 64 Kbps channel, such as communications between two Group IV facsimile machines set for that data rate.

Figure 11 shows the connection options for 64K Clear Data.

Note: 64K Clear Data requires a B8ZS-compatible facility format from the Telco and T1 B8ZS repeaters.

Figure 11
Connection options for 64K Clear Data

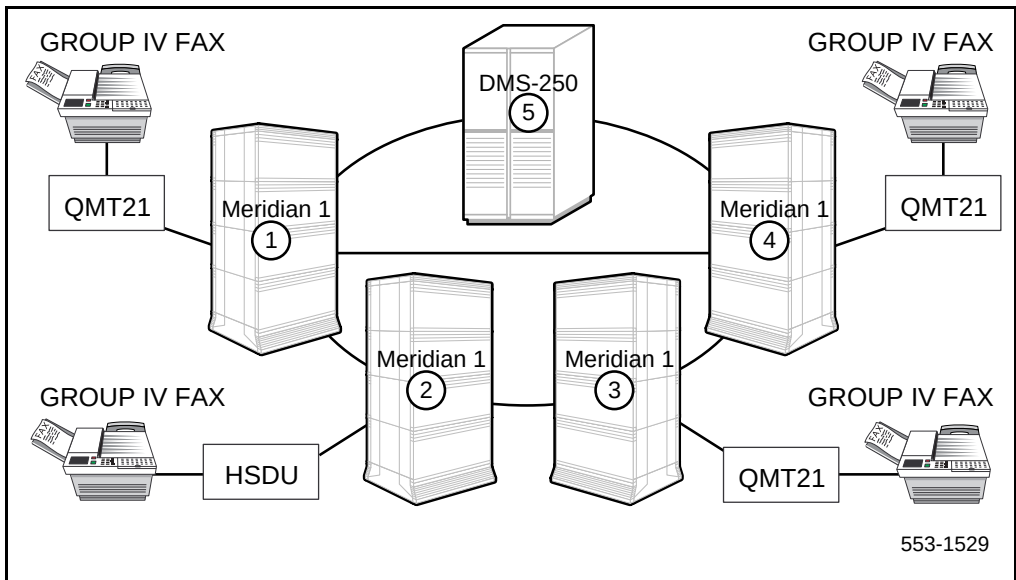


Table 25
Connection options for 64K Clear Data

Path	Originating	Terminating	See Note below
1-2	1	2	1
1-4	1	4	3
1-2-3	1	3	1
1-4-3	1	3	1
1-5-4	1	4	1, 2
Note 1: Requires equivalent Release of software. For example, Release 17 is equivalent to BCS Release 32.			
Note 2: This connection only occurs if AT&T tandem switch is transparent.			
Note 3: Requires X11 release 13 software or later.			

Flexible Numbering Plan

Flexible numbering permits a private network to use up to ten digits for station numbers and up to seven digits for location codes. The total number of digits that need to be dialed can differ from station to station. Flexible Numbering Plan dialing procedures vary, depending on whether calls are made inside or outside the network. In either situation, calls can be handled according to a defined plan.

Local network dialing

Flexible numbering can be used with one of the following plans to create a variety of different network configurations:

- Coordinated Dialing Plan (CDP). Stations on any node have unique 1- to 10-digit numbers. You can transfer 1-digit to 7-digit numbers. Within the CDP group, a caller can reach a station directly without having to input an access code or pause for a dial tone.

- Universal Numbering Plan (UNP). This provides 3- to 7-digit numbers that can be transferred across the network. If a caller dials a vacant number on any node, the call reroutes to a common location, where a list is consulted to determine if there is an alternate location for the called Directory Number. If so, the call is routed to the alternate location. Otherwise, the call is treated as if the dialed number were nonexistent.
- Group Dialing Plan. With group dialing, CDP groups can exist independently within a network. The number used to dial a station varies depending on the location of the calling station. A caller within the CDP group dialing a station on another node must use the steering code followed by the Directory Number. Callers outside the CDP group must precede the Directory Number with the location code. The maximum number of digits permitted for either the location code and Directory Number, the local steering code and Directory Number, or the distant steering code and Directory Number cannot exceed ten digits.

External dialing

Callers who dial another private network or a public exchange station can be subject to one of the following procedures:

- Special number treatment. When FNP is enabled, the outgoing trunk is not seized immediately upon call completion. Instead, trunk seizure occurs when the expected number of digits (maximum of 16) have been dialed, the Fast Connect key has been pressed, or the interdigit timer expires. The Free Special Number Screening (FSNS) capability screens 1- to 11-digit Special Numbers (SPNs) against 3-digit routing codes to allow or restrict calls traveling via those routing codes.
- Universal numbering plan. The maximum number of route-list blocks and digit-manipulation tables allowed is 1000 to support Global Networking and Universal Numbering Plan requirements.

Flexible Numbering Plans do not affect Numbering Plan Area or Office Translation Code dialing.

Fast Connect

With flexible numbering, the system cannot determine instantly when digit dialing is complete. Call connection occurs immediately only if the number dialed has the maximum number of digits. Otherwise, the interdigit timer must expire, triggering automatic call connection. To speed up connections to stations with short numbers, callers can press the Fast Connect key, the octothorpe (#), to force immediate call connection.

Implementation

The Supplemental Digit Restriction and Recognition (SDDR) feature is modified to allow up to seven digits in the digit restriction table. (This is independent of the number of digits entered in response to the NPA, NXX, or LOC service change prompts.)

LD 15, LD 86, LD 90, and LD 87 must be modified as shown in the following tables.

LD 15—Enable or disable Vacant Number Routing

VNR	YES/NO	Enable or disable Vacant Number Routing.
RLI	0–99	Route List Index used for Vacant Number Routing. Prompt appears only if VNR is YES.
CDPL	0–(10)	Flexible length of VNR CDP digits expected. (Set to length of longest number used.) Prompt appears only if VNR is YES.
LOCL	0–(10)	Flexible length of VNR LOC digits expected. (Set to length of longest number used.) Prompt appears only if VNR is YES.
NIT	2–(8)	Value, in seconds, of Network Interdigit Timer.

LD 86—Configure routing

RLI	0–999	Route List Index.
DMI	0–999	Digit Manipulation Index
FSNS	(0)–255	Free Special Number Screening Index
AC1	1–4 digits	Access Code 1
AC2	1–4 digits	Access Code 2

LD 90—Configure translation table data

RLI	0–999	Route List Index for each of TYPE=LOC, TYPE=NPA, TYPE=NXX, and TYPE=SPN.
FLEN	(0)–16 for Special Number (0)–10 for Location Code	Digits expected.

LD 87—Specify routine

DMI	0–999	Digit Manipulation Index
RLI	0–999+	Route List Index. Set separately for distant steering code and trunk steering code (under TYPE=DSC and TYPE=TSC, respectively).
FLEN	(0–16 for Trunk Steering Code (0)–10 for Distant Steering Code	Number of digits expected.
DSP	LSC/HLOC/DN	Specifies that either the Local Steering Code, Home Location Code, or Directory Number is to be used for the Calling Station ID in Group Dialing Plans.
FSNS	1–255	Free Special Number Screening Index (prompted if TYPE=FSNS).
SPN	1–11 digits	Special Number code to be screened.
XXX	DENY/ALLOW	Deny or allow routing codes.
DENY	routing codes or range of routing codes	Codes to be denied; prompted if XXX=DENY.
ALLOW	routing codes or range of routing codes	Codes to be allowed; prompted if XXX=ALLOW.

Equal Access (Carrier Access Code)

A Carrier Access Code (CAC) gives a caller access to any interexchange carrier or Operator Service Provider (OSP). FCC regulations require that Call Aggregators, such as hotels, motels, hospitals, universities, airports, gas stations, and pay telephone owners, provide selective access to the public. Callers dial the CAC to reach their desired carrier or OSP before dialing the telephone number.

Aggregators, although they must allow callers access to any long distance caller, are permitted to block calls *selectively*. Selective equal access lets aggregators choose to block direct-dialed calls that result in charges to the originating telephone. Aggregators cannot block operator-assisted calls.

Northern Telecom provided an up-issue of X11 release 14 in 1992 to conform to FCC Equal Access requirements. Beginning with X11 release 17, all software releases support Equal Access. (X11 releases 15 and 16 do not support Equal Access.) Support for expanded codes, as described in the following paragraph, is available beginning with X11 release 19.

The CAC has included a “10” identifying prefix followed by a three-digit Carrier Identification Code (CIC) for a total of five digits. New FCC regulations, reflected in X11 release 19, require that the CAC expand to seven digits: a “101” identifying prefix followed by a four-digit CIC. The regulations require that both the old five-digit format and the new seven-digit format be supported for an 18 month permissive period during 1995 and 1996. After this period, only the longer format will be supported.

X11 software allows the following operator-assisted North American and international dialing:

- CAC + 0
- CAC + 0 + (NPA) + NXX + XXXX
- CAC + 0 + SAC + NXX + XXXX
- CAC + 01 + CC + NN

X11 software allows or denies the following direct North American and international dialing:

- CAC + 1 + (NPA) + NXX + XXXX
- CAC + 011 + CC + NN

where:

CAC = Carrier Access Code: 10XXX or 101XXXX

NPA = Numbering Plan Area (area code)

NXX = Central office code

(N = any digit except 0 or 1; X = any digit [0–9])

XXXX = any four digits

CC = Country Code

NN = National number

Implementation

Current users who install new software prior to the end of the 1995/1996 FCC transition period must set the Original Carrier Access Code (OCAC) flag in LD 17 to YES.

For complete information on implementation and configuration, refer to “Equal Access Compliance” in *X11 features and services* (553-3001-305).

Interchangeable Numbering Plan Areas

Prior to 1995, all area codes had an N(0/1)X format, where N was any digit from 2 to 9 inclusive and X was any digit, 0 to 9. As of January 1995, area codes have an NXX format, increasing the available codes to 640.

It is important to avoid conflicts among NPAs, central office prefixes, and LOCs. It is recommended that customers implement 1+ dialing to eliminate ambiguity.

Customers who use the Autodial feature, Speed Call, or the Hot Line feature may need to modify the lists and tables associated with these features to accommodate the new prefixes or to reflect changes to numbers resulting from implementation of 1+ dialing.

A detailed summary of this change appears in the North American Numbering Plan chapter of *X11 features and services* (553-3001-305).

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.

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 12 and Figure 13 represent a “before-and-after” representation of the B-Channel Overload Control feature application.

Figure 12
Before the B-Channel Overload Control Timer has been applied

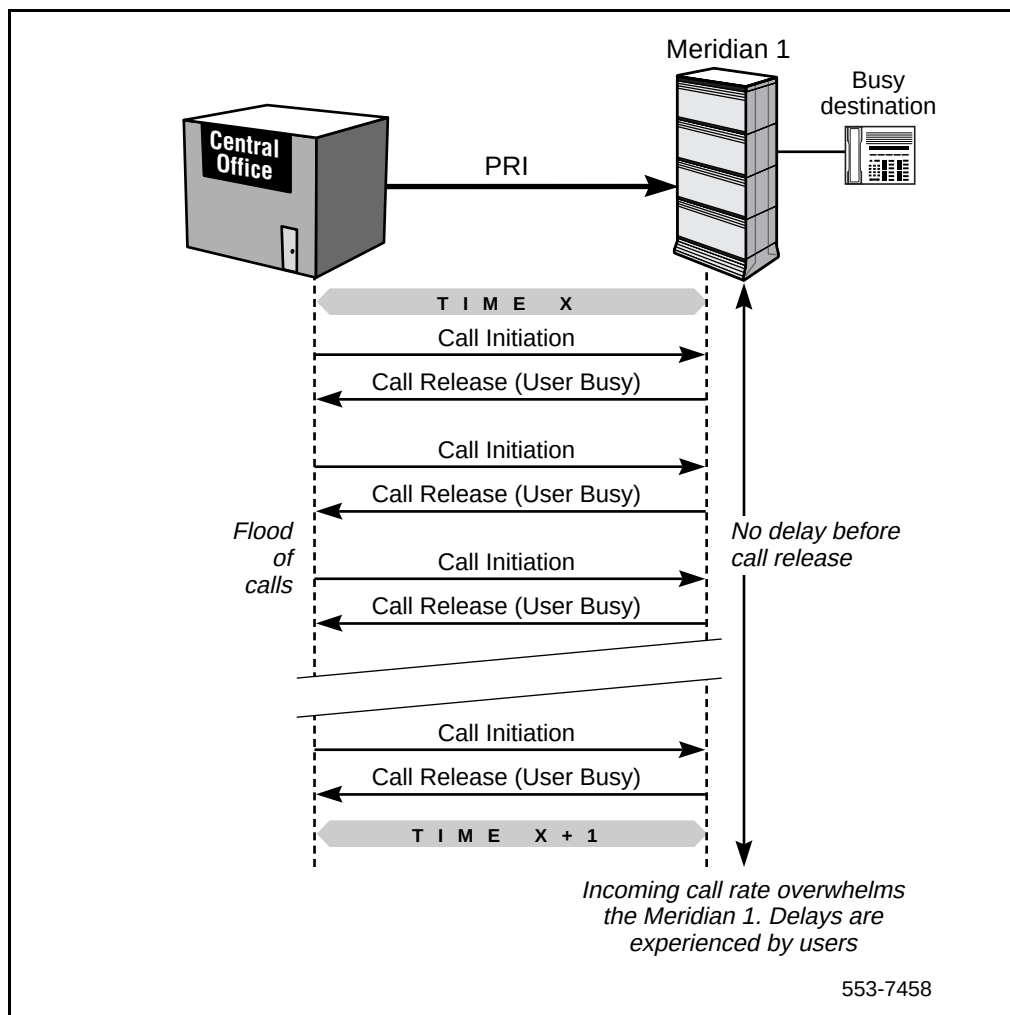
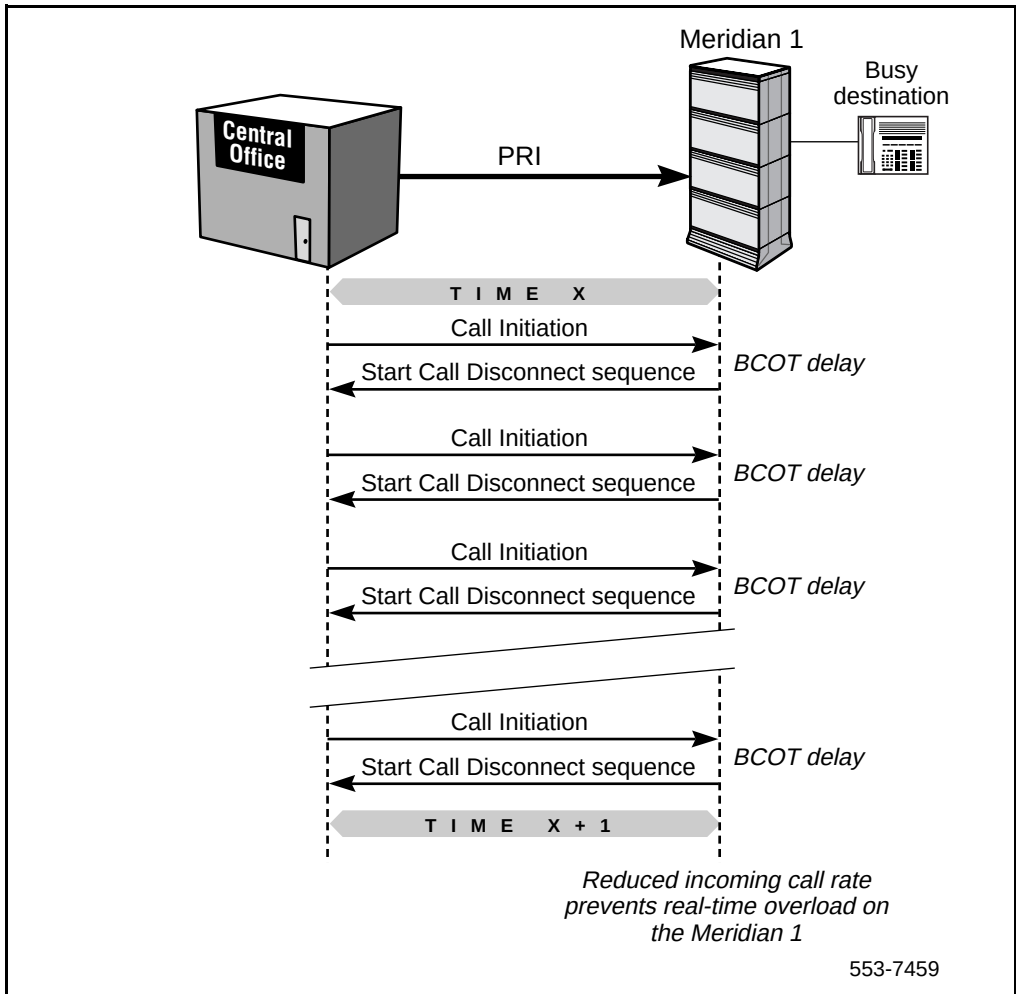


Figure 13
After the B-Channel Overload Control Timer has been applied



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 Tables and Table 27 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 26.

Table 26**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 27.

Table 27
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 14 on page 206); or incoming calls from a Central Office being tandemmed to a private network and presented on a busy set (see Figure 15 on page 206)
- 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 tandemmed to a route whose trunk members are all busy

Figure 14
Busy set is a on node interfacing directly to a Central Office

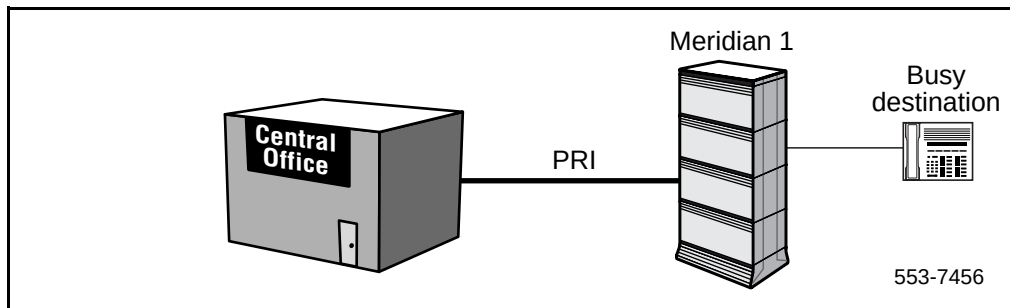
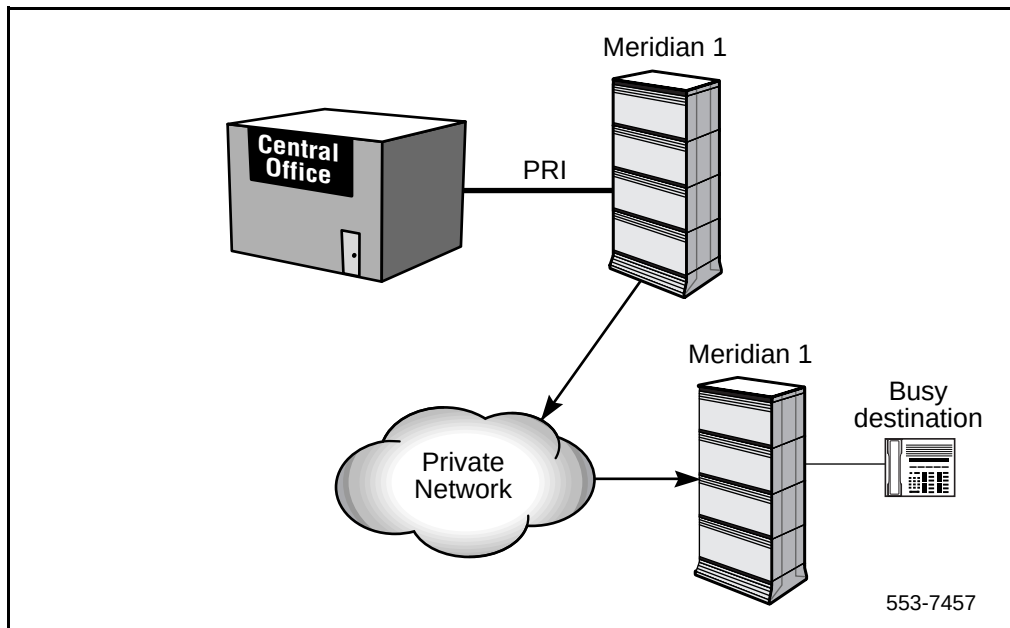


Figure 15
Busy set is a on node tandemed to a Central Office



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 DN's 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 implementation

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	D100 D250 S100 ESS4 ESS5 NI2	Supported interface types. 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. Refer to "B-Channel Overload Control Timer (BCOT) considerations" on page 202 for more information. Note: <i>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.</i>
....		

Note: You may print the BCOT timer value that was entered in LD 16 by using LD 21.

Feature operation

No specific operating procedures are required to use this feature.

BRI/PRI Basic Call Interworking

Overview

BRI/PRI Basic Call Interworking provides data connectivity between ISDN BRI and ISDN PRI. It does the following:

- allows better high- and low-level compatibility checking between the calling and terminating equipment
- supports the V.120 protocol between BRI TEs over PRI
- supports a greater range of Bearer Capability, which is the network data transmission rate
- allows end users to support many terminals on the same BRI DSL, such as Group IV fax, data monitor
- propagates existing IEs with existing encodings over tandem PRIs between BRI TEs

The affected IEs are:

- Bearer Capability
BRI and PRI propagate octet 4ab without modification.
- Called party subaddress
Meridian 1 decodes and saves the called party subaddress when it is received from PRI, passing it to the terminating BRI. The system also sends the subaddress to PRI when the originating BRI or PRI includes it.
- Calling party subaddress
Meridian 1 decodes and saves the calling party subaddress when it is received from PRI, passing it to the terminating BRI. The system also sends the subaddress to PRI when the originating BRI or PRI includes it.

- Cause
BRI and PRI propagate octet 4 without modification.
- High layer compatibility
Meridian 1 decodes and saves high-layer compatibility information received from PRI and passes it to the terminating BRI. The system also sends the information element, without interpreting it, to PRI after receiving it from the originating BRI or PRI.
- Low layer compatibility
Meridian 1 decodes and saves low-layer compatibility information received from PRI and passes it to the terminating BRI. The system also sends the information element, without interpreting it, to PRI after receiving it from the originating BRI or PRI.

BRI/PRI supports these interfaces:

- Meridian 1 PRI
- Japan D70 PRI
- 4ESS and 5ESS PRI

Operating parameters

New IEs and IEs with new encodings are only supported when the RCAP is configured in LD 17. Existing IEs and encodings are supported end-to-end regardless of the RCAP value.

A call with new Bearer Capability encodings will only terminate to a BRI terminal. If the terminating terminal is not a BRI terminal, the call is blocked.

Voice calls are successful between BRI and PRI with no restrictions.

Feature interactions

The following feature interactions are unique to BRI/PRI basic data call interworking.

- ISDN BRI Data Call
Added IEs (such as LLC and HLC) and the expanded set of supported data values for the Bearer Capability IE enhance BRI's ability to support a variety of circuit switched data calls.
- ISDN PRI D-channel Error Reporting and Monitor
The DCH table supports the new IEs in the PRI call messages. The DCH monitor displays the new IEs and a label for monitor level 2.
- Incoming Digit Conversion
If an incoming SETUP message with the new Bearer Capability encodings goes through incoming digit conversion, it must be translated to a BRI DN. If the terminating DN is not a BRI DN, the call will be blocked.
- Network Alternate Route Selection
If an outgoing call contains a SETUP with a new Bearer Capability encoding, it can only be terminated on PRA/ISL trunks with RCAP configured. This means that at least one entry in the RLB must be PRA/ISL and have the DCH RCAP configured for BRI. NARS will continue to search the RLB until it finds RCAP=BRI. An outgoing call is blocked if RCAP is not configured, or if all trunks with RCAP configured are busy.

Feature packaging

BRI/PRI, as a feature, has no packaging requirements. However, the requirements for ISDN BRI and ISDN PRI must be met.

Feature implementation

Procedure 12

Use LD 17 to configure far-end BRI support

Prompt	Response	Description
REQ	CHG	Change system data
TYPE	CFN	Configuration record
ADAN	CHG DCH X	
CTYP		
DNUM		
SIDE		
RLS	19	Release ID of the switch at the far end of the D-channel interface is Meridian 1
RCAP	BRI XBRI	Add far-end BRI support Remove far-end BRI support
Valid only for IFC=SL1, D70, ESS4, ESS5		

Procedure 13

Use LD 22 to print the configuration record

Prompt	Response	Description
REQ	PRT	Print system data
RCAP	BRI	Far-end BRI support
Valid only for IFC=SL1, D70, ESS4, ESS5		

Feature operation

This feature operates in the background according to how the BRI TEs are configured and the RCAP value in LD 7.

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

Table 28
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 29. When the received BCAP fields do not match the values shown in Table 29, 99 is output.

Table 29
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 30 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 30
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 implementation

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.

Feature operation

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

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 implementation

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	0-99	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	0-99	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.		

Feature operation

No specific operating procedures are required to use this feature.

Call Forward/Hunt Override via Flexible Feature 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.

BRIT

BRI TIE trunks in a Meridian Customer Defined Network (MCDN) are supported.

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.

Digital Private Network Signaling System One (DPNSS1)

DPNSS1 is only supported as an incoming trunk transferred to a MCDN environment using Call Forward/Hunt Override Via FFC.

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 implementation

LD 57 – Define FFC for Call Forward/Hunt Override.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	FFC	Flexible Feature Code.
...		
CODE	CFHO	Call Forward/Hunt Override Via FFC.
CFHO	nnnn	Call Forward/Hunt Override FFC.

LD 10 – Set Class of Service for the Forward/Hunt Override Via FFC feature for analog (500/2500 type) sets.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	500	Type of telephone set.
...		
CLS	(CFHD), CFHA	Call Forward/Hunt Override Via FFC is (denied) or allowed.

LD 11 – Set Class of Service for the Forward/Hunt Override Via FFC feature for Meridian 1 proprietary sets.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	xxxx	Type of telephone set.
...		
CLS	(CFHD), CFHA	Call Forward/Hunt Override Via FFC is (denied) or allowed.

LD 18 – Configure ABCD key for the Forward/Hunt Override Via FFC feature.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	ABCD	Modifying 16-button DTMF.
...		
PRED	YES	Function table for pre-dial.
A	CFHO*FFC*	CFHO is assigned to key A.
B	CFHO*FFC*	CFHO is assigned to key B.
C	CFHO*FFC*	CFHO is assigned to key C.
D	CFHO*FFC*	CFHO is assigned to key D.

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

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 administration

LD 16 – Configure a Paging Route.

Prompt	Response	Description
REQ	NEW	New.
TYPE	RDB	Route data block.
CUST	xx	Customer Number associated with route.
...		
TKTP	PAG	Paging Route.
NACC	(PGNR) PGNC PGNU	Call Page Network Wide Restricted (default). Call Page Network Wide controlled (ISDN only) 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	l s c u	Terminal number.
	c u	For Option 11C.
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	Add new Data. Change existing data.
TYPE:	500	Type of 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	Add new Data. Change existing data.
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 17 – D-channel Configuration.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ADAN	Input or Output Devices.
ADAN	CHG DCH x	Change D-channel. x = 0-63.
- CTYP	DCHI	D-channel interface card. For Option 11C, enter MSDL for Multi-purpose Serial Data Link.
RCAP	NAC	Remote capability where: NAC = Class of Service data. XNAC = removes Class of Service as a remote capability (default).

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:

- 1 Route Access Code (ACOD) that connects user to Paging node and Paging route ACOD;
- 2 BARS/NARS; or
- 3 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 DN's 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 implementation

LD 15 – Enable Call Park Network Wide.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	FTR	Customer Features and options.
CUST	0-99	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	0-99	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 of that range.
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	l s c u c u	Terminal Number. For Option 11C.
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	l s c u c u	Terminal Number. For Option 11C.
KEY	xx PRK xx TRN xx AO3 xxAO6	Key assignment for Call Park. Key number for 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	l s c u c u	Terminal Number For Option 11C.
KEY	xx PRK	Key number, Call Park.

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 Pickup Network Wide

Large installations exceeding the capacity of a single private exchange, or requiring network solutions to security requirements (as in the case of hospitals, chemical companies, nuclear power plants, etc.) have presented the possible circumstance of their employees working in close proximity to each other, but not sharing the same telephone switch. This raises the need to make available network-wide those features that were previously only required locally; Call Pickup is one such feature.

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., PBX (500/2500), 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 implementation

Note: 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. 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	I s c u c u	Terminal Number. 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 RNPG 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	l s c u c u	Terminal Number. 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 (DPUD), DPUA (GPUD), GPU A	Ringing Number Pickup (denied) allowed. DN pickup (denied) allowed. 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_DATA	Customer Features and options
CUST	0-99	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/NEW	Change/add.
TYPE	FFC	Flexible Feature Code.
CUST	0-99	Customer number.
FFCT	(NO) YES	Flexible Feature Confirmation tone.
CODE	mmmm	Specific FFC type.
...		
	PUDN	Pickup DN code.
- PUDN	xxxx	Enter the Flexible Feature Code.
	PUGR	Pickup Group code.
- PUGR	xxxx	Enter the Flexible Feature Code.
	PURN	Pickup Ringing Number code.
- PURN	xxxx	Enter the Flexible Feature 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 DN's 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	000-999 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	0-99	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.
ADAN	CHG DCH 0-63	Change D-channel information
...		
- 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_DATA	Networking data.
CUST	0-99	Customer number.
...		
ISDN	YES	Allow ISDN for this customer.
- PNI	1-32700	Define the Private Network Identifier.
- PINX_DN	xx...x X	Node DN, up to seven digits with DN Expansion package 150. 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_DATA	Customer Features and options
CUST	0-99	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.

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 setp 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.

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.

Calling Party Privacy Enhancement

The X11 Release 23 Calling Party Privacy Enhancement (CPPE) feature provides a route option to ignore the Calling Party Privacy Indicator on incoming calls received from the North American public ISDN network.

When the Privacy Indicator Ignore (PII) prompt is set to YES in Overlay 16, the Calling Line Identification (CLID) Presentation Indicator and the Calling Party Name Display (CPND) Indicator (if it exists) are changed from restricted/denied to allowed. If the CLID and CPND information is available, it is displayed on the terminating set, and the CLID is passed to the Auxiliary processor. It is recommended that the PII prompt be set to YES for 800, 888, 900, and 911 call types. When PII is set to NO (default) in Overlay 16, the Calling Party Privacy Indicator is honored, and the existing functionality is maintained.

The following parameters apply to the PII route option:

- The PII route option is applicable to the CLID Presentation Indicator in the Calling Number Information Element (IE) and the CPND Indicator in the Display IE in incoming SETUP messages only.

- The PII route option is not applicable to the CLID Presentation Indicator in the Redirecting Number IE of a SETUP message for call redirection.
- The PII route option is not applicable to the CLID Presentation Indicator in the Connected Number IE of a NOTIFY message for call modification.

The Calling Party Privacy Enhancement is included in Calling Party Privacy (CPP) package 301.

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 outpulsing the Privacy Indicator will include the Privacy Indicator in the outpulsed digits field when generating the CDR records if the outgoing non-ISDN trunk route has Outpulsed 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 tandemed 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 implementation

If the CPP package is equipped in the Meridian 1 system, the following steps illustrate how to configure Calling Party Privacy.

- 1** Define the FFC for the CPP feature. FFC package 139 is required for loading LD 57.

LD 57 – Define the FFC for CPP Code.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change.
TYPE	FFC	Flexible Feature Code.
CUST	0-99	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	0-99	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.
TCP	(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 TCP 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: <i>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).</i> For further details on the PII route option, refer to the Calling Party Privacy Enhancement section on page 276.

- 2 CPP is only prompted if the CPP package is equipped, the OPAO package (104) is not equipped, the trunk is outgoing (OGT) or incoming and outgoing (IAO), non-ISDN option and the trunk route type is COT, DID, FEX or WAT.
- 3 CLBA Class of Service activates Calling Party per-line blocking. CLBD Class of Service deactivates Calling Party per-line blocking; however, the user can still request Calling Party Privacy by dialing the CPP code.

LD 10/11 – Activate Calling Party per-line blocking.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change.
TYPE	nnnn	Type of telephone.
TN	l s c u c u	Terminal Number. Terminal Number for the Option 11.
...		
CLS	CLBA	Activate Calling Party per-line blocking. Enter CLBD to deactivate Calling Party per-line blocking. CLBD is the default.

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 outputted 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 outputted, 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 implementation

LD 16 – Configure Privacy Override Indicators for a Non-ISDN route.
Configuration procedures require that the following conditions are met:

- CPPO is configurable on COT, DID, FEX, WAT and ISA routes.
- OAPO package 104 is restricted or unequipped.
- 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 = 0-511 for Options 51C, 61C, 81 and 81C. xxx = 0-127 for Option 11C.
...		
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.
- TCPP	(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.
- DTPI	(*67) nnnn	Digitone Trunk Privacy Indicator nnnn = 0-9999, an asterisk (*) can be entered as the first digit.
- DPPI	0-(1167)-9999	Dial-pulse Trunk Privacy Indicator
- DTPO	(*82) nnnn	Digitone Trunk Privacy Indicator nnnn = 0-9999, an asterisk (*) can be entered as the first digit.
- DPPO	0-(1182)-9999	Dial-pulse Trunk Privacy Indicator

LD 16 – For an ISDN trunk route set the TCPP 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 = 0-511 for Options 51C, 61C, 81 and 81C. 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.
- TCPP	(NO) YES	CPP/CPPO flag treatment for an incoming non-ISDN trunk call tandemmed 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	l s c u c u	Terminal Number. l = loop, s = shelf, c = card, u = unit for options 51C, 61C, 81 and 81C. 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).

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.

Digital Trunk Interface replacement

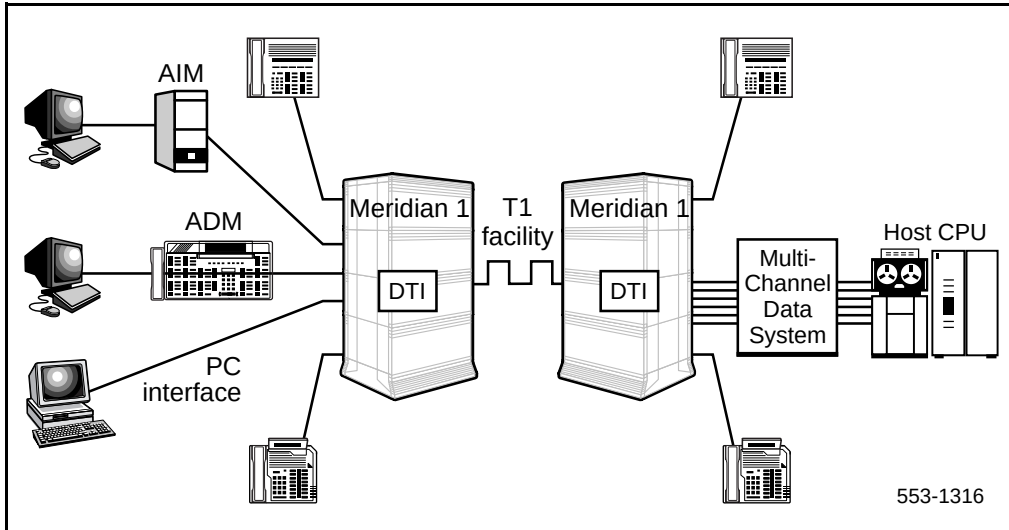
Digital Trunk Interface (DTI) provides the means for transmitting digital voice and data between a network loop and a DS-1 digital carrier terminal (see Figure 16). DTI interfaces to DS-1/D3 digital carriers, which may use infrared, fiber optic, microwave radio, satellite link, or leased T1 facilities. See *Digital Trunk Interface/Computer-to-PBX Interface description* (553-2811-100) for a detailed description of the DTI feature.

The QPC720 PRI circuit card can replace the QPC472 DTI card for DTI applications. The QPC720 PRI can work with X11 release 5 and later software. However, with Extended superframe (ESF) format and DTI, the QPC720 PRI requires X11 release 14 software and above.

X11 release 15 and later software provides an option for the following recoveries:

- automatic recovery from bit error rate occurrences
- automatic recovery from loss of frame alignment occurrences
- automatic recovery from frame slips (free-run nontracking mode only)
- automatic clock recovery after a red alarm (local alarm) condition
- channel recovery set to the same state as the far end (TIE trunks only)

Figure 16
Digital Trunk Interface communication



Feature implementation

Use the following steps to configure PRI as a DTI replacement.

- 1** LD 60 DTI Diagnostic
Disable existing DTI loop.
- 2** LD 14 Trunk Data Block
Remove all trunks.
- 3** LD 16 Route Data Block
Remove route data block.
- 4** LD 17 Configuration Record.
Remove loop.
- 5** LD 73 Digital Data Block
Set error detection thresholds and clock synchronization control.
Required only when configuring PRI for the first time. Optional for subsequent configurations.
- 6** LD 17 Configuration Record
Add a PRI loop.
- 7** LD 73 Digital Data Block
Change existing thresholds, or change tracking modes.
This can be done any time after step 2.
- 8** LD 17 Configuration Record
Add a DCHI card and the D-channel link.
(X11 release 17 and earlier)

OR

- 9** LD 17 Configuration Record
Add a DCHI card, or an MSDL card and the D-channel link.
(X11 release 18 and later)

10 LD 15 Customer Data Block

Define a PRI customer.

Required only when configuring a new customer. If a customer is already defined, skip this procedure.

11 LD 16 Trunk Route Administration

Configure PRI trunk routes.

12 LD 14 Trunk Administration

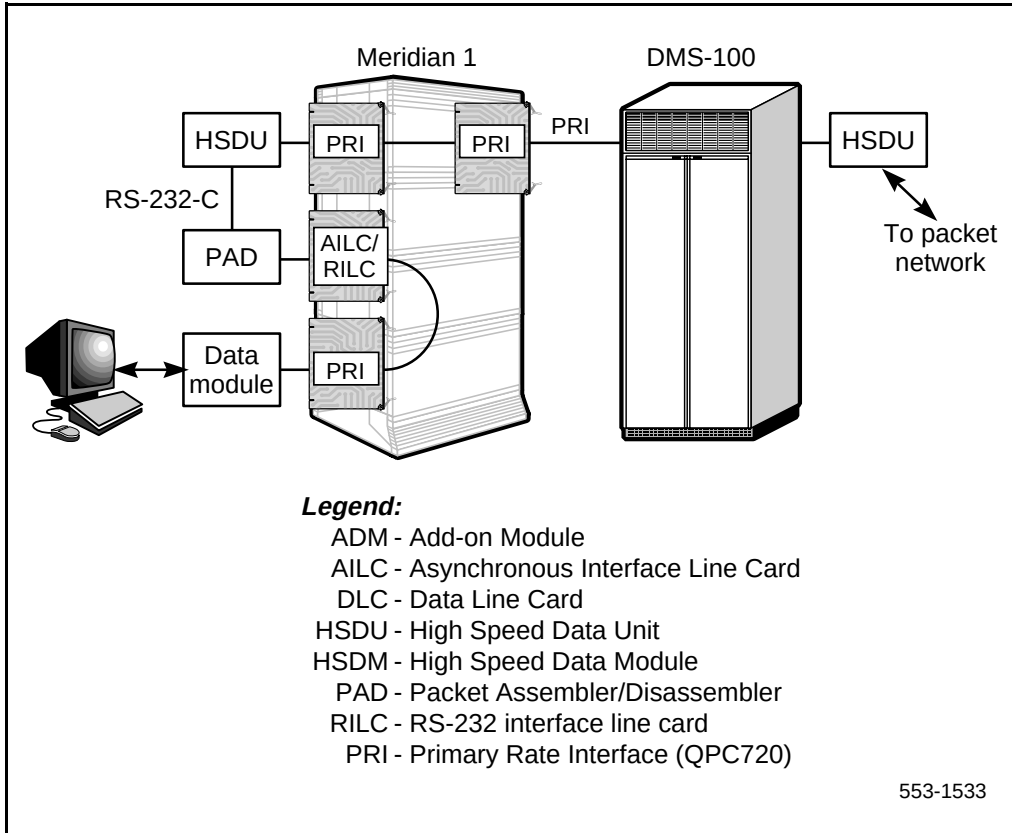
Add PRI trunks.

Data Packet Network access

PRI connections to DMS-100 allow Meridian 1 users to access Data Packet Networks (DPNs) connected to the central office. The steps involved are listed below. Equipment configuration is shown in Figure 17.

- 1 In coordination with DMS-100 maintenance personnel, a Meridian 1 DN associated with a High Speed Data Module (HSDM) is specified as the port for DPN access.
- 2 Meridian 1 software initiates a hot line call through the specified HSDM to a High Speed Data Unit (HSDU) connected to the DMS-100. The HSDU communicates with the Meridian 1 HSDM through the T-Link version 2 protocol. This requires the QPC720 PRI card.
- 3 Data is sent from the PRI through the B-channel. The call is set up using standard ISDN D-channel messaging.
- 4 The HSDU and HSDM go through T-Link protocol exchange.
- 5 The DN of a Packet Assembler/Disassembler (PAD) output port is associated with the HSDM. The Meridian 1 user accesses the Data Packet Network by dialing the DN of the PAD.

Figure 17
Meridian 1 PRI to DMS-100 Data Packet Network



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:

- 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

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 implementation

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	Allow Display of Access Prefix on CLID. (DAPD) = Deny 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	Allow Display of Access Prefix on CLID. (DAPD) = Deny Display of Access Prefix on CLID.

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.
---PREF	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. Entry of Carriage return prompt is 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. (NO) = Disable feature at the route data block level.
- TBL	1-15	Prefix table number as defined in LD 15. Prompted only when ADDP is answered as YES.

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 number 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). Display of Calling Party Denied Class of Service options are programmed on a per set basis.

DPD uses the following Class of Service options in LD 10 and LD 11: Display Digits Allowed/Denied (DDGA/DDGD) and Name Display Allowed/Denied (NAMA/NAMD).

Display of Digits Denied (DDGD) Class of Service restricts digits from being displayed on another set when involved in a call. However, on the calling party's set, the dialed digits are always displayed regardless of the Class of Service assigned to the called party's set. Display of Digits Allowed (DDGA) allows the number associated with a set to be displayed when that set is involved in a call.

Display of Name Denied (NAMD) Class of Service restricts the name associated with a set from being displayed on another set when involved in a call. Display of Name Allowed (NAMA) allows the name associated with a set to be displayed when that set is involved in a call.

Table 31 outlines the possible configurations and the resulting display on both the calling and called parties' displays.

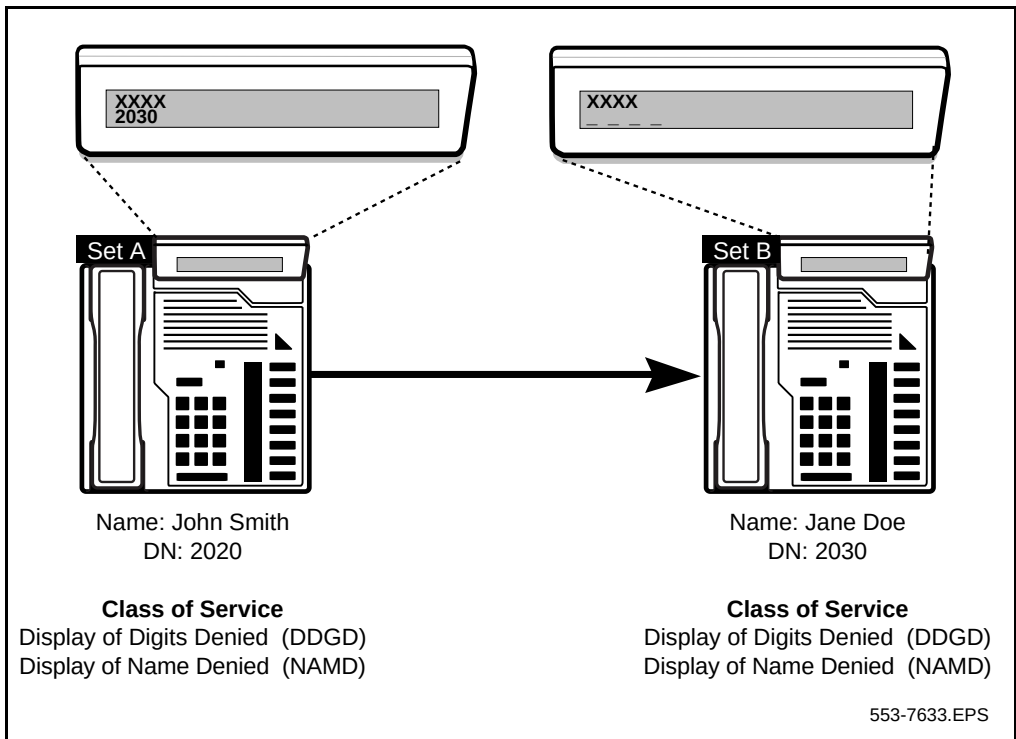
Table 31
Display Scenarios on Calling and Called Party's Sets

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

Figure 18 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. The display of the calling party's associated name and number is restricted on the called party's set. The calling party's number is replaced by a string of dashes (----), where each "-" represents a suppressed digit. The associated name is replaced by a string of four Xs (XXXX).

On the calling party's set, the name associated with the called party is replaced by a string of four Xs (XXXX). However, the dialed digits remain displayed on the calling set.

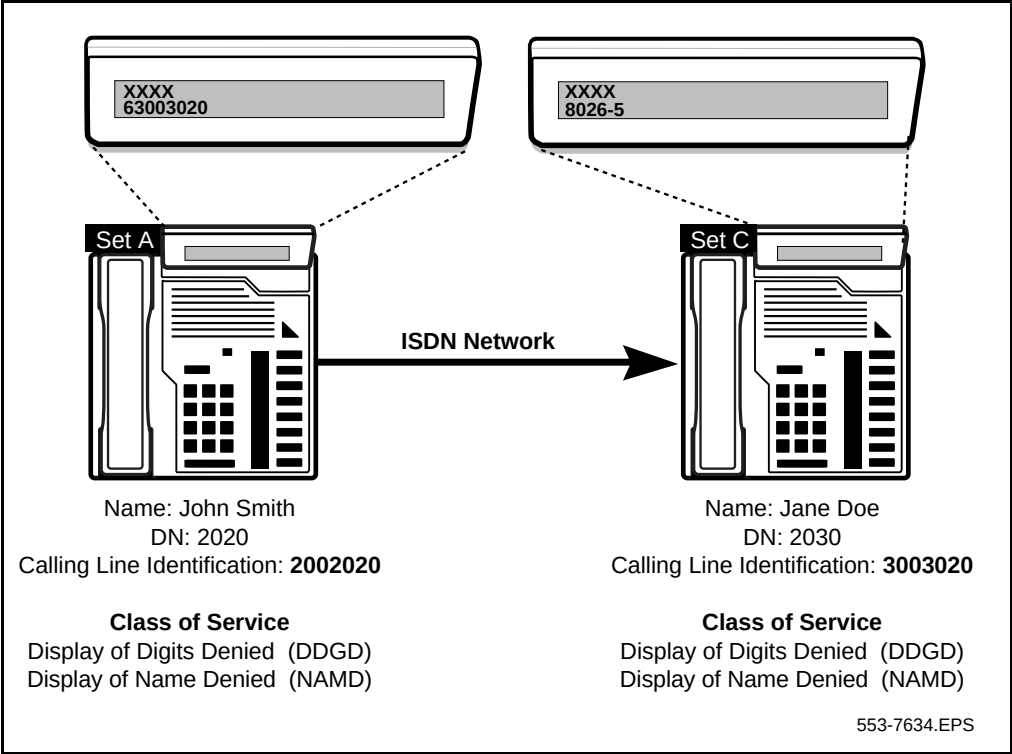
Figure 18
Calling Party and Called Party on the Same Node



As illustrated in Figure 19, for calls placed over a MCDN ISDN network, Display Digits Denied (DDGD) Class of Service 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 (NAMDD), the calling party's associated name is not displayed on the called party's set. The associated name is replaced by a string of four Xs (X X X X).

On the calling party's set, the name associated with the called party is replaced by a string of four Xs (X X X X). However, the dialed digits remain displayed on the calling set.

Figure 19
ISDN Network Calls



Operating parameters

Display of Calling Party Denied (DPD) is only supported on internal calls, Meridian Customer Defined Network (MCDN) ISDN networks and the interface to the public network.

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

The dialed digits 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. However, if the dialed digits represent a Multiple Appearance Directory Number (MADN), the calling party's display reflects the Class of Service of the answering set.

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. In order to allow calls placed over an ISDN network to be displayed on the Attendant Console, 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 regardless of the set's Class of Service. For MCDN ISDN network calls, the calling party's or connected party's number 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, the displays given on the calling set and the terminating set are in accordance with the Class of Service of the sets involved in the call.

If the terminating set has Dialed Name Display Denied (DNDD), the display on the terminating set reflects the name and number of the calling party and the name and the number of the forwarding set.

If the terminating set has Dialed Name Display Allowed (DNDA), the display on the terminating set reflects the number of the calling party and the name and number of the forwarding set. In both cases, the terminating set's display is in accordance with the DPD Class of Service options of the calling and forwarding sets.

For a MCDN ISDN call, the 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 name is replaced by a string of four Xs (X X X X).

The display given on the calling set of an internal call, which has been forwarded to a set within the same switch, includes the name and number of the terminating set along with the number of the forwarding set. If the DPD Class of Service options, which are specified for the terminating set, indicate that the display of the name and number of the terminating set be denied, then on the calling set, the name of the terminating set is replaced by a string of four Xs (X X X X). The number is replaced by dashes (- - -). If the number of the terminating set is blocked from being displayed on the calling set, the number of the forwarding set is also blocked from being displayed on the calling set, regardless of the DPD Class of Service options of the forwarding set. Conversely, if the display of the terminating set's number is allowed in the calling set, then the number of the forwarding set is also displayed on the calling set, irrespective of the DPD Class of Service options of the forwarding set.

Call Hold

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

Call Park

When the Call Park timer expires on a parked call, a set's display reflects the Directory Number the call is parked against. The 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 DPD Class of Service of the 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 the dialed and calling 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 dialed and terminating sets' DNs are blocked from the calling party's display. The same occurs when Digit Display Allowed (DDGA) is configured on the terminating set. Both the dialed and terminating sets' DNs are displayed on the calling party's set, regardless of the Class of Service of the dialed set.

Call Transfer

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

If an unsupervised call transfer occurs on an internal call, the DN of the terminating set is displayed to the calling party regardless of the DPD Class of Service options that are configured on the terminating set.

Calling Party Name Display

If Calling Party Name Display Denied (CNDD) is configured for a set, then the name associated with that set is not displayed when it is involved in a call. This is so regardless of the DPD Class of Service Options of that set.

Calling Party Privacy

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

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

Conference

For internal 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 the Class of Service of the individual sets.

For network conference calls, display is provided. This is in accordance with the DPD Class of Service options of the individual sets.

Dial Intercom

Display information on sets that are 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 set displays 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 Name Display Denied (NAMDD) Class of Service. Once a call is answered, the calling party's set reflects the DPD Class of Service options of the answering set.

The called party's display reflects the DPD Class of Service options of the calling party's set.

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 call is 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.

For ISDN Network calls the following packages and their dependencies are also required:

- Calling Party Name Display (CPND) package 95;
- Integrated Service Digital Network (ISDN) package 145; and
- Network Attendant Services (NAS) package 159.

Note: The NAS package is required to display a calling party's name and DN on the attendant console, when using the Display of Calling Party Denied feature within an ISDN PRI private network. With NAS configured and Calling Party Name Display equipped, the attendant console will display the calling party's name and DN, regardless of the Display of Calling Party Denied Class of Service of the calling party's set. Without NAS, if the Display of Calling Party Denied Class of Service of the calling party's set is Denied, the name and DN of the calling party will not be displayed on the attendant console.

Feature implementation

LD 10 – Deny 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	I s c u c u	Terminal Number. For Option 11.
...		
CLS	DDGD	Digit Display Denied DDGA = Digit Display Allowed (default).
CLS	NAMD	Name Display Denied NAMA = Name Display Allowed (default).

LD 11 – Deny Digit 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	I s c u c u	Terminal Number For Option 11.
...		
CLS	DDGD	Digit Display Denied DDGA = Digit Display Allowed (default).
CLS	NAMD	Name Display Denied NAMA = Name Display Allowed (default).

Feature operation

No specific operating procedures are required to use this feature.

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 match 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 in the tables that follow.

Summary of new ESN functionalities

Table 32 summarizes the changes made to the ESN functionality. Please note that the components that are not affected are not listed.

Table 32
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).
Restriction imposed on Supplemental Digit Restriction and Recognition (SDRR) entry codes.	Leftwise Unique.	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. 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 33 summarizes the changes made to the base Meridian 1 features functionality. Please note that the components that are not affected are not listed.

Table 33
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 36 summarizes the changes made to the ACD functionality. Please note that the components that are not affected are not listed.

Table 34
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 35 summarizes the changes made to the Customer Controlled Routing functionality. Please note that the components that are not affected are not listed.

Table 35
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 36 summarizes the changes made to the ISDN functionality. Please note that the components that are not affected are not listed.

Table 36
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 DN's do not pertain to the M5317 and M5209 ISDN BRI terminals.

The 31-digit expansion, pertaining to the Call Forward All Calls DN, does not apply to Meridian M2317 and M3000 sets, since 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 outpulse 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) DN's 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 32 to Table 36 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; and
- 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;
- Multi-purpose Serial Data Link (MSDL) package 222;
- Basic Rate Interface Line Application (BRIL) package 235; and
- 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; and
- Phantom Terminal Numbers (PHTN) package 254.

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 DNs.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
TYPE	500	Type of telephone set.
TN	l s c u c u	Loop, shelf, card and unit for Options 51C, 61C, 81, 81C. Card and unit for Option 11C.
...		
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	l s c u c u	Loop, shelf, card and unit for Options 51C, 61C, 81, 81C. Card and unit for Option 11C.
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	l s c u c u	Loop, shelf, card, and unit for Options 51C, 61C, 81, 81C. Card and unit for Option 11C.
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	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
...		
- 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	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
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	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
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	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
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	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
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	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
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	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
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.

Feature operation

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

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 DN's 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 (2500/500 type) set with a private line DN or a Meridian digital set with a private line on the Prime DN cannot be locked.

The following hardware is required:

- Primary Rate Interface – D-channel Handler Interface (DCHI)/ Multipurpose Serial Data Link (MSDL) and PRI/PRI2 cards.
- Integrated Services Digital Network Signaling Link (ISL) – DCHI cards and TIE trunks.

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 DN's 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.

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 implementation

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_DATA	Controlled Class of Service data.
CUST	0-99	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 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_DATA	Flexible Feature Code data.
CUST	0-99	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	0-99	Customer Number.
TN	l s c u c u	Loop, shelf, card, and unit. Card, and unit (Option 11).
SCPW	xxxxxxxx	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	0-99	Customer Number.
TN	l s c u c u	Loop, shelf, card, and unit. Card, and unit (Option 11).
SCPW	xxxxxxxx	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	0-99	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	0-99	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_DATA	Controlled Class of Service data.
CUST	0-99	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_DATA	Flexible Feature Code data.
CUST	0-99	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	0-99	Customer number.
TN	l s c u c u	Loop, shelf, card, and unit. Card, and unit (Option 11).
SCPW	xxxxxxxx	Station Control Password (1 to 8 digits, as defined in LD 15).
CLS	CCSA	Controlled Class of Service Allowed.

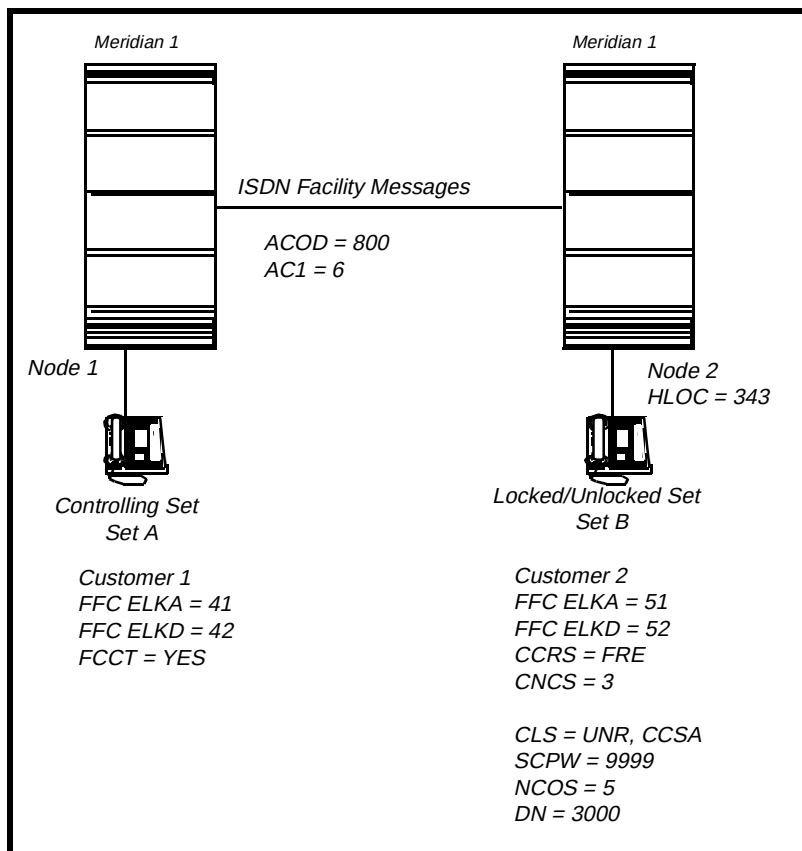
LD 11 – Set the Station Control Password and Controlled Class of Service Allowed for each Meridian 1 proprietary telephone.

Prompt	Response	Description
REQ	NEW,CHG	Add,Change.
CUST	0-99	Customer number.
TYPE	aaaa	Telephone type, where aaaa = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616, or 3000.
TN	l s c u c u	Loop, shelf, card, and unit. 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.
...		
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.

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.



To lock set B (in Node 2) from set A (in Node 1), 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 2) from set A (in Node 1), 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.

Electronic Switched Network interworking

The Electronic Switched Network (ESN) operates within ISDN, supporting Network Class of Service (NCOS) capability. The tables in this module describe which ESN features are available over ISDN and illustrate ESN capabilities over ISDN.

Network Class Of Service (NCOS) information is embedded in SETUP messages, and provides the means to control a user's eligibility for the following:

- access routes
- access queuing
- receive Expensive Route Warning Tone (ERWT)
- access network speed call

When NCOS information, which includes Traveling Class of Service (TCOS) information, is sent to a DMS-100, the DMS switch can provide access to AT&Ts Electronic Tandem Network (ETN).

For a general description of ESN operations and features, see *Meridian 1 system overview* (553-3001-100) or *X11 features and services* (553-3001-305).

ESN translation

Currently, a Meridian 1 switch with a BARS or NARS package can have two (or one) separate ESN translators for handling BARS/NARS calls. NARS can have two translators and BARS can have only one translator (AC1). This is in addition to its standard translator, which handles all other call types. Each NARS/BARS translator has its access code (ESN AC1/AC2), which is defined on the standard translator. The remaining digits, for example, NPA, NXX, LOC, and SPN, are defined on the NARS/BARS translator.

Therefore, a receiving switch must determine which translator to use and insert the needed NARS/BARS access code (unless the receiving number is complete, that is, it includes the proper NARS/BARS access code in its digit stream already). This can be done by configuring an ESN digit manipulation to insert the ESN access code in the sending switch.

To insert the needed BARS/NARS access code in the receiving switch, two route options in LD 16 can be used:

- INST: An incoming route option that inserts the specified digit(s) to the incoming digit stream for all the calls received on that route.
- INAC: An incoming ISDN route option that inserts the needed NARS/BARS access code to the incoming digit stream. The insertion is based on the Type of Number of the received Called Number Information Element, bypassing the digit insertion (INST) of the route. The AC2 option in LD 15 provides a mapping between the incoming Type of Number and the desired translator. This is used to determine which NARS/BARS access code is inserted.

ESN access code configuration with X11 release 14 and earlier

With Meridian 1 ISDN network configurations prior to X11 release 14, the ESN access code is inserted in one of the following ways:

- The originating PBX is configured with Digit Manipulation Index (DMI, LD 86) to insert and send the ESN access code.
- The receiving PBX inserts the ESN access code in the Route Data Block (RDB, LD 16) under the INST (Insert) prompt.

ESN access code configuration with package 148 and X11 release 15 and later

For Meridian 1 configurations of X11 release 15 and later that utilize ISDN networking features, ESN access code insertion must be performed on the receiving Meridian 1. The originating Meridian 1 must not use digit manipulation to insert and send the ESN access code to the terminating Meridian 1.

Therefore, in order to accomplish networking feature transparency (requiring package 148), the ESN access code insertion must be performed in the receiving Meridian 1, either by means of the INST prompt (X11 release 14 and earlier) or the INAC prompt (X11 release 15 and later) in LD 16. Although the INST or the INAC prompt can be used in X11 release 15 and later, the INAC prompt is the recommended method.

When the PBX is upgraded from X11 release 14 to X11 release 15 or later, the above database conversion is required to allow networking applications (such as NRAG) to function properly.

Figure 20 summarizes these database configuration rules. Figure 21 shows the ESN capability within an ISDN network.

Figure 20
INAC configuration rules

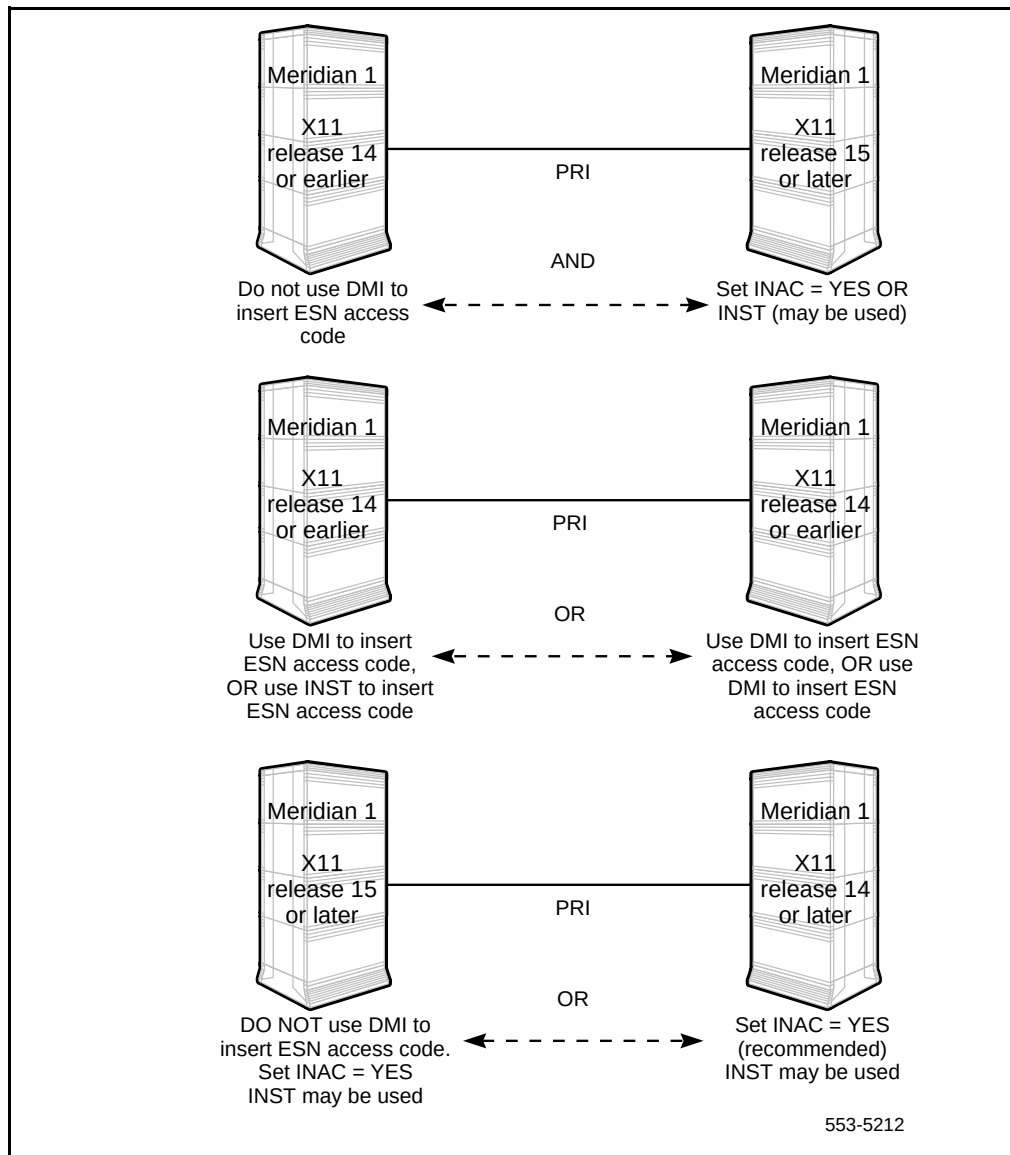
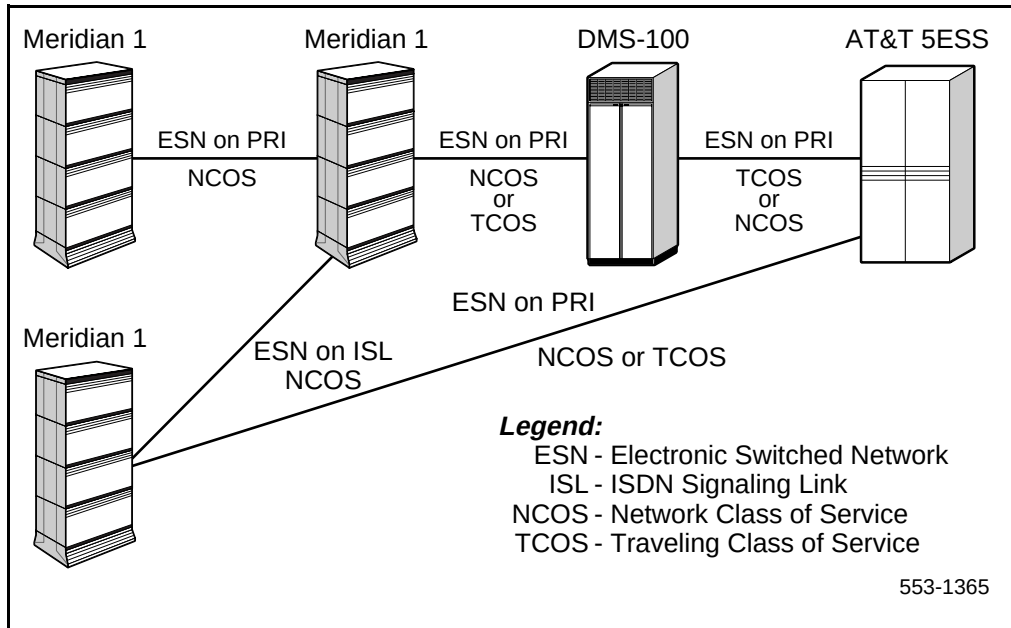


Table 37
ESN features available with ISDN

ESN features	X11 Release 21 ISDN
Network Class of Service	yes
Network Control	
—NCOS	yes
—TCOS (ETN)	yes
Network Alternate Route Selection	
—NARS Access Codes	yes
—Time of Day Routing	yes
—Network Routing Controls	yes
—Satellite Link Control	yes
—Digit Screening	yes
—Digit Manipulation	yes
—Auto on-net to off-net overflow	yes
—Automatic Least Cost Routing	yes
—Network Speed Call	yes
—Automatic OCC Access	yes
—Expensive Route Warning Tone	yes
ESN Queuing	
Local queuing	
—Off-hook queuing	yes
—Call back queuing	yes
Network Queuing	
—Coordinated Call Back Queuing	yes (Note)
—Coordinated Call Back Queuing to Conventional Main	yes (Note)
—Remote Virtual Queuing	yes
Network Authorization Codes	yes
Coordinated Dialing Plan for up to 10 digits	yes
Network Call Transfer	no
Note: CCBQ and CCBQCM are available with Remote Virtual Queuing with X11 release 18 and later.	

Figure 21
INAC configuration rules



Feature implementation

ESN default call types

When an ISDN call is made, a default Electronic Switched Network (ESN) call type is set initially. The call type is set depending on the dialing method used (that is, how the call is made). Table 38 shows the ISDN default call types. Procedure 14 describes how to define the default call types.

Note: When a trunk access code is used to dial on an ISDN route, the caller dials all digits without waiting for subsequent dial tones.

Table 38
Default Call Types

Dial method	Default call type	Comment
Direct dial	UKWN (unknown)	Direct dial to trunks via access code
CDP (DSC/TSC)	CDP (Coordinated dialing plan)	Dial CDP number via DSC/TSC code
CDP (LSC)	UKWN	Dial CDP number via LSC code
ESN (LOC)	LOC (location code)	Dial NARS location code
ESN (HLOC)	UKWN	Dial ESN HLOC number
ESN (NPA)	NPA (national)	Dial ESN NPA number
ESN (NXX)	NXX (local)	Dial ESN NXX number
ESN (SPN)	SPN (special number)	Dial ESN SPN number

Procedure 14

Respond to the following prompts in LD 86

Prompt	Response	Description
REQ	NEW, CHG	
CUST	0–99	Enter customer number
FEAT	DGT	Digit manipulation data block
DMI	1–255	Digit manipulation table index numbers for NARS/BARS
CTYP		Call type. Enter the call type to the manipulated digits. This call type must be recognized by the far end switch.
	(NCHG)	The call type will not be changed
	INTL	Special number in international format
	NPA	NPA
	NXX	NXX
	LOC	Location Code
	CDP	Coordinated Dialing Plan
	SPN	Special number
	UKWN	Unknown call type

ESN access code insertion

Procedures 15 and 16 describe how to automatically insert the needed NARS/BARS access code to the incoming digit stream. This is required for ISDN networking features such as Network Ring Again (NRAG) and Network Message Services (NMS).

ESN access code insertion is performed in the receiving switch either by the INST or INAC option in LD 16. The INAC option is recommended. In other words, the called number may go through ESN digit manipulation, which must not include the ESN access code in the sending switch. This rule applies to systems with X11 release 15 and higher.

Procedure 15 Enable INAC option in LD 16

Prompt	Response	Description
REQ	NEW, CHG, END	
TYPE	RDB	Route data block
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.

Procedure 16

Map NARS/BARS access code to the incoming call types in LD 15

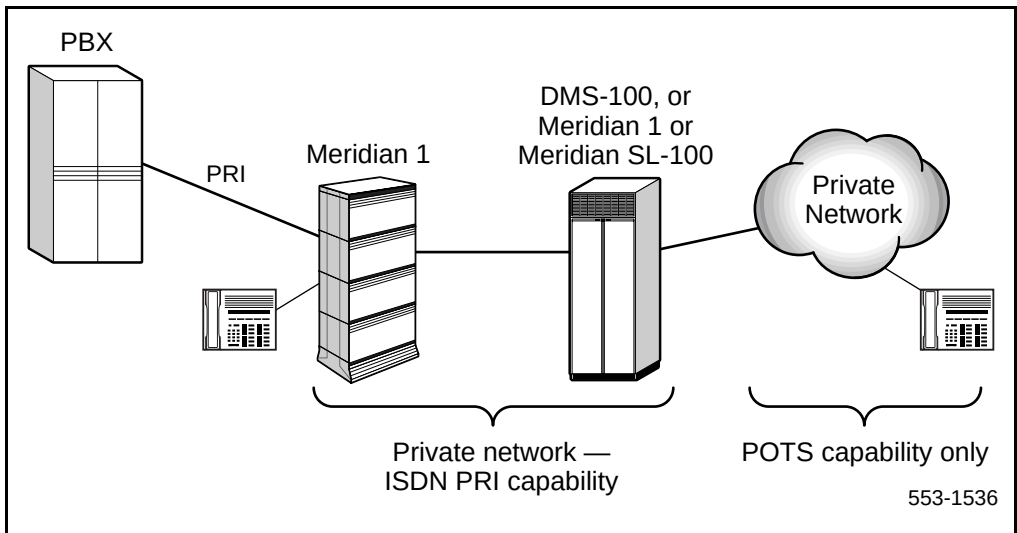
Prompt	Response	Description
REQ	NEW, CHG, END	
TYPE	CDB	Customer data block
AC2		Access code 2. Enter call types (type of number) that use access code 2. Multiple responses are permitted. If a call type is not entered here, it is automatically defaulted to access code 1.
	NPA	E.164 National
	NXX	E.164 Subscriber
	INTL	International
	SPN	Special number
	LOC	Location code
ISDN	YES	
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). For different customers, the PNI in LD 15 should match the PNI in LD 16 at the far end switch (M1/SL-1 only).

Private Network Hopoff

Private Network Hopoff is provided by the ESN feature. Private Network Hopoff allows ISDN callers to use the private network to complete public calls. The call is routed through the private network as far as possible before “hopping off” onto the public lines (see Figure 22).

Users select this service, on a per call basis, by dialing the private network facilities prefix digit, followed by the public network number. For example, the number 9 is often used as a private network facilities prefix digit before dialing a local number.

Figure 22
Private Network Hopoff

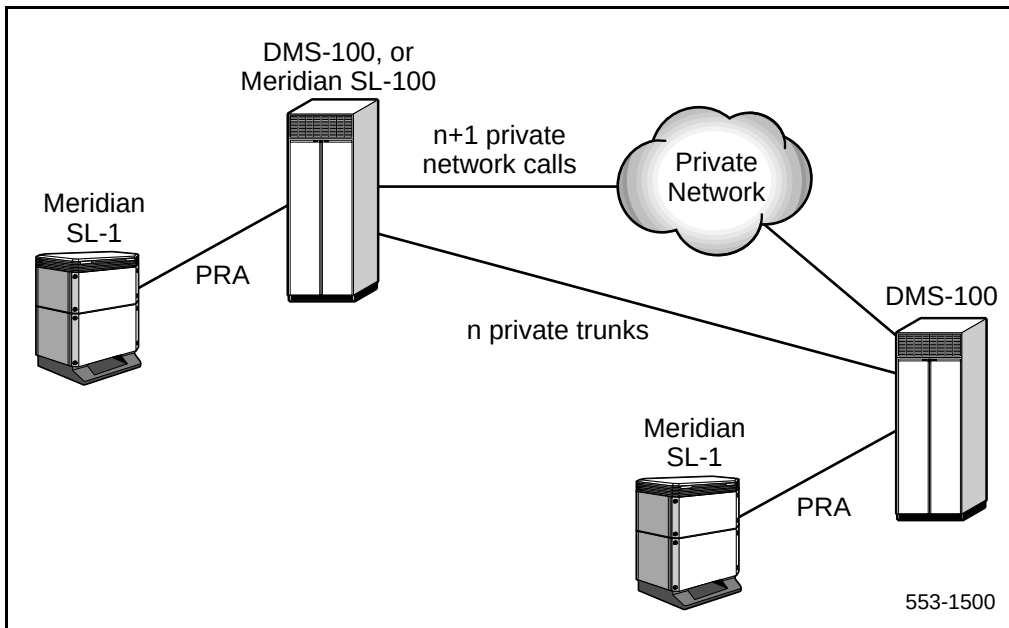


Private Network Overflow

This service allows overflow from a private network onto public network facilities (see Figure 23). On outgoing calls over a DMS-100 PRI connection, the DMS provides network overflow when all of a customer's private trunks are busy.

For outgoing calls that encounter blocking (all B-channels are busy), the network provides the capability to overflow to alternate trunks. This is provided by the Electronic Switched Network (ESN) feature. This access can be restricted using a trunk or set class of service.

Figure 23
Private Network Overflow



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 (as outlined in the Feature implementation section on page 382).

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.

Feature implementation

The following steps are required to implement ESA:

- 1 Modify the customer CLID database to allow ESA calling number composition, using Overlay 15.
- 2 Configure CLID entries for non-ISDN routes, so that when an incoming non-ISDN trunk initiates a tandem ESA call, the ESA Calling Terminal Identification function will compose an ESA calling number to identify the incoming trunk. This is done using Overlay 16.
- 3 Configure a CLID entry for analog (500/2500 type) sets, Meridian 1 proprietary sets, and Basic Rate Interface (BRI) sets, using Overlays 10, 11, and 27 respectively.
- 4 Configure OSN Notification data:
 - Configure an OSN output device using Overlay 17.
 - Configure an OSN set using Overlay 11.
 - Configure terminal designator (DES) data for (500/2500 type) sets, Meridian 1 proprietary sets, and BRI sets, using Overlays 10, 11, and 27 respectively.
- 5 Configure ESA:
 - Configure ESA data using Overlay 24.
 - Configure ESA route data using Overlay 16.
 - If BARS/NARS is used, configure ESA digit manipulation and call routing using Overlay 86, and ESA call recognition using Overlay 90. This is to allow Access Code + Emergency Services Directory Number (ESDN) dialing to be recognized and treated as an ESA call.

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 implementation

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.

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 in 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.

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 implementation

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.

Feature operation

No specific operating procedures are required to use this feature.

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 implementation

LD 16 – 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.

LD 16 – Configure the 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.

Feature operation

No specific operating instructions are required to use this feature.

ISDN Calling Line Identification

Calling Line Identification (CLID) sends a telephone's designated number through the ISDN PRI network to the Digit Display on a receiving device. Both outgoing and incoming calls are supported. The CLID display lasts for the duration of the call.

CLID display is supported over Meridian 1 to the following switches:

- Meridian 1 and SL-100
- DMS-100 and DMS-250
- Meridian 1 tandem through AT&T 4ESS and AT&T 5ESS

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

- Attendant consoles
- Meridian 1 telephones with Digit Display
- Digital telephones (M2317)
- Meridian 1 Touch Sets (M3000)
- Meridian 1 Display telephones
- ASCII terminals with an Add-on Data Module (ADM)
- M2008, M2016S, M2216ACD, M2616 when equipped with displays

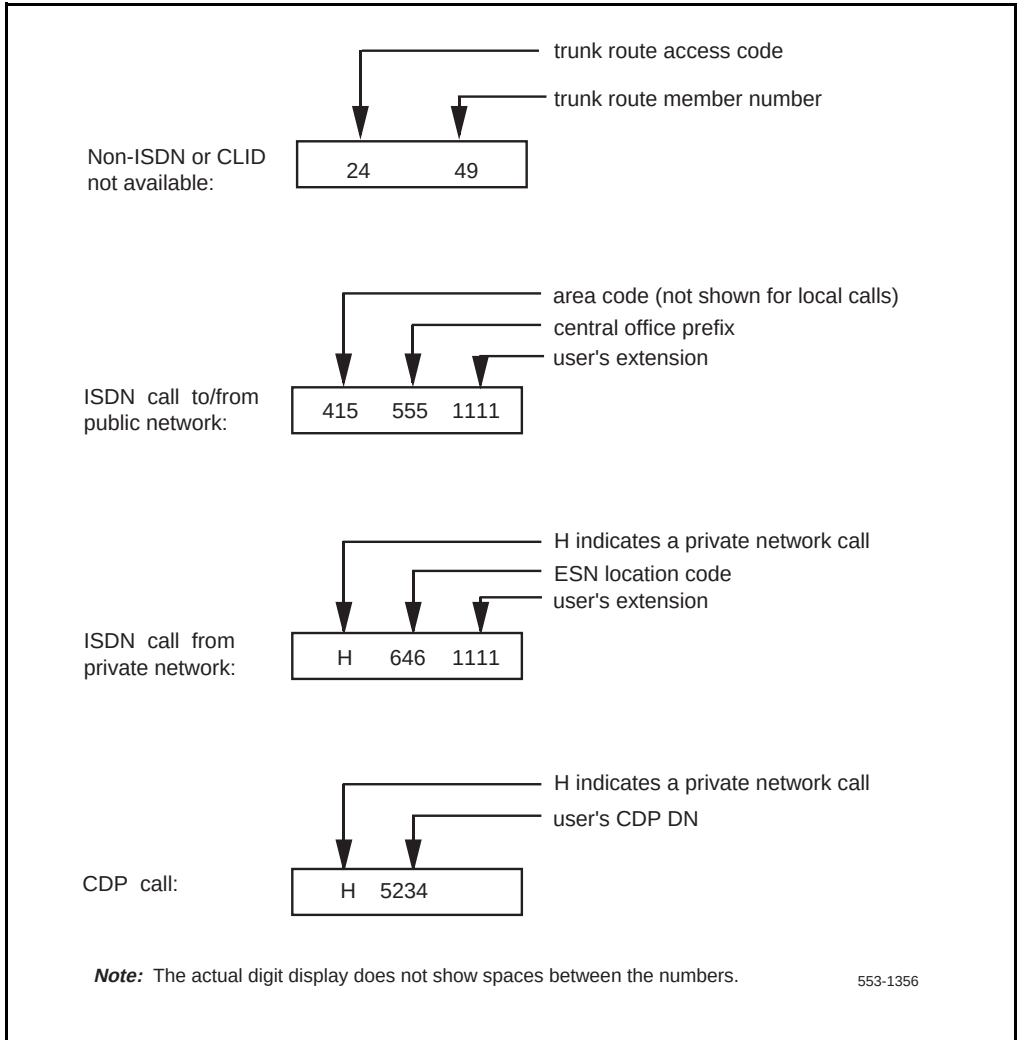
Display contents

Display contents are summarized below.

- If the CLID display is unavailable because the call was not routed on ISDN routes for the entire call, the trunk route access code and trunk route member number are displayed.
- For public networks, CLID displays the standard North American Numbering Plan 7- or 10-digit number, depending on the number dialed.
- For a private network over ESN, the CLID displays an “H” followed by xxxx yyyy, where xxxx = a four digit Home Location Code (HLOC) and yyyy = a four digit DN.
- For a private network over CDP, the CLID displays a four digit LSC (Local Steering Code) followed by one of the following:
 - the extension’s trailing digits (forming the CDP DN) when CDP is equipped
 - the calling telephone’s extension

Figure 24 shows digit display formats for CLID.

Figure 24
Digit display formats for CLID



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 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 Directory is sent;
- if the customer option is set to PDN, either the Prime Directory Number or Listed Directory Directory Number is sent, depending on the class of service (COS) assigned to the calling set in LD 10 (BCS Set Administration) or LD 11 (SL-1 and Digital Set Administration).

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.

CLID with SID/ANI

AT&T can pass the Service Identifier (SID) and Automatic Number Identification (ANI) from the originating network switch to the Meridian 1.

The SID is the number provided by the user (for example, a Meridian 1 switch) in the address digits field of the Calling Party Number. The ANI number is a customer billing number stored at a local switch or within the AT&T network.

If a customer subscribes to the AT&T services, either SID or ANI information is delivered on all incoming calls. The user can request that SID or ANI be provided on either an exclusive or preferred basis. Whether SID or ANI is requested, Meridian 1 CLID displays the digits passed in the Calling Party Number identification.

Note: AT&T's ANI is comparable to Northern Telecom's CLID.

CLID in CDR

If this feature is enabled, the CLID number is included in Call Detail Recording (CDR) records. This gives customers the calling telephone's ID, even through a tandem node. This information allows customers to charge the calling party for services rendered in connection with an incoming call. For example, calls to an attorney can be accurately charged to the client.

The CLID information in the Q.931 call SETUP message is added to all applicable CDR message types, in both TTY message format and the compressed binary formats for downstream processing. If the CLID information is not included in the SETUP message, it cannot be printed.

In the TTY output, the CLID information is printed on the second line, as shown in Table 39. The field is always 16 characters: the actual CLID digits, followed by Xs to total 16. For detailed information on CDR records, see *Call Detail Recording description and formats* (553-2631-100).

In the Electronic Switched Network (ESN), calls made from mains through the node can be tracked on CDR at the node. This eliminates the need for CDR hardware and software at all mains and allows an accurate billing of callers using the node’s trunks, even when the calls are made from the attached mains. See *Meridian 1 system overview* (553-3001-100) for more information about ESN.

Table 39
 Calling Line Identification number in the TTY output

Rec Type	Rec No	Cust No	OrigID	TerID	AuxID Ill.s.cc.uu	Date mm/dd	Time hh:mm	Duration hh:mm:s	Digits
N	001	05	DN499	A001000	027.1.02.1	06/28	10:14	00:00:20	95559124
			042	000	95552222xxxxxxxx				
N	001	04	T002001	DN5000		06/28	10:15	00:00:40	
					95552222xxxxxxxx				
Note: The CLID field always displays 16 characters. The feature inserts an “x” for each missing character.									

Incoming Digit Conversion

Incoming Digit Conversion (IDC) is compatible with ISDN PRI. IDC allows the user to dedicate a translation table to a DID route so that the DNs received from the CO can be converted to related extension numbers within the Meridian 1. Each translation table is defined on a DID route basis. Digits dialed on ISDN calls with CLID are converted if IDC is active on that route.

Feature implementation

Basic PRI configuration must be performed before Calling Line Identification (CLID) is defined (see “Configuring PRI”).

CAUTION

Third-party software is not guaranteed if this feature is activated. If the third-party software does not recognize the CLID field, it may shut down.

Use LD17 to enable CLID.

Prompt	Response	Description
REQ	NEW CHG	Add or change existing data.
TYPE	PARM	Change system parameters.
...		
CLID	YES	Enable CLID.
...		

Use LD15 to configure CLID.

Prompt	Response	Description
REQ	NEW CHG	Add or change a customer
TYPE	CDB NET	Customer data block Networking Data (Release 21 gate opener)
CUST	0-99	Customer number
ISDN	YES	Change ISDN options
- PNI	1-32700	Private Network Identifier
...		
- PFX1	xxxx	Prefix (area) code for International PRI

Prompt	Response	Description
- PFX2	xxxx	Central Office Prefix for IPRA
- HNPA	100-999	Home Number Plan Area code
- HNXX	100-999	Prefix for Central Office
- HLOC	100-9999	Home Location Code (ESN)
- LSC	xxxx	Local steering code
- CNTP	LDN, (PDN)	Default for Calling Line ID
- RCNT	0-(5)	Maximum inter-node hops in a network redirection call

Use LD17 to allow CDR to be printed on the TTY terminal.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	ADAN	Action Device And Number.
- ADAN	CHG TTY xx	Change TTY terminal 0-15.
...		
- USER	CTY	Use the TTY for CDR records
...		

Use LD15 to allow CDR to be printed for the customer.

Prompt	Response	Description
REQ	NEW CHG	Add or change customer data
TYPE	CDB CDR	Customer data block CDR data (Release 21 gate opener)
CUST	0-99	Customer number
CDR	YES	Change CDR options The CDR prompt appears if CDB was entered in response to the TYPE prompt - it will not appear if CDR was entered.
PORT	0-15	CDR port number
...		

Use LD16 to allow CDR records in the Trunk Route Data Block.

Prompt	Response	Description
REQ	NEW CHG	Add new data, or change existing data
TYPE	RDB	Route Data Block
CUST	0-99	Customer number
ROUT	0-511	Route number
...		
CDR	YES	Generate CDR records
- INC	YES	CDR records generated on incoming calls
...		
- OAL	YES	CDR records generated on outgoing calls
...		

Enhanced Malicious Call Trace

A caller using a set with Malicious Call Trace (MCT) allowed can, during an established call, request that the call trace record be printed. The user has the option of sending an alarm to the central office. The feature is available for all attendants and all sets other than ISDN BRI.

Beginning with X11 release 20, enhancements to this feature include:

- a special signal (hook flash and optional digit string) that can be sent to the central office
- flexible alarm duration (0 to 15 minutes)
- optional voice recording of malicious calls. A printed record shows the recorder trunk, recorder route, and member number.
- the ability to send a print record on any SDI port that has MCT identified as a user
- a format change to provide information about the type of call (external or internal)

For information on implementing this feature, see *X11 features and services* (553-3001-305).

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 406, 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 407.

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 407.

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

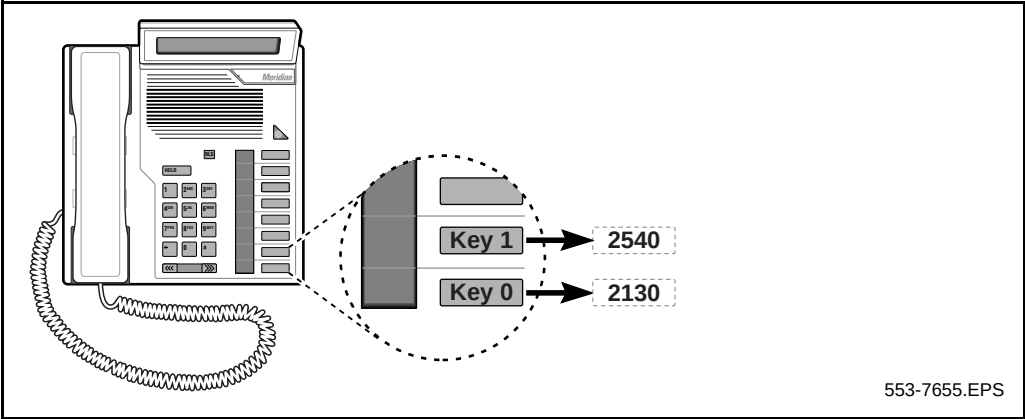
Please note that for calls made using the International Numbering Plan, the CLID for a Public Number is a National Number. For the examples of using the International Numbering Plan, the construction of a Public Local Number is for reference purposes only.

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 40
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



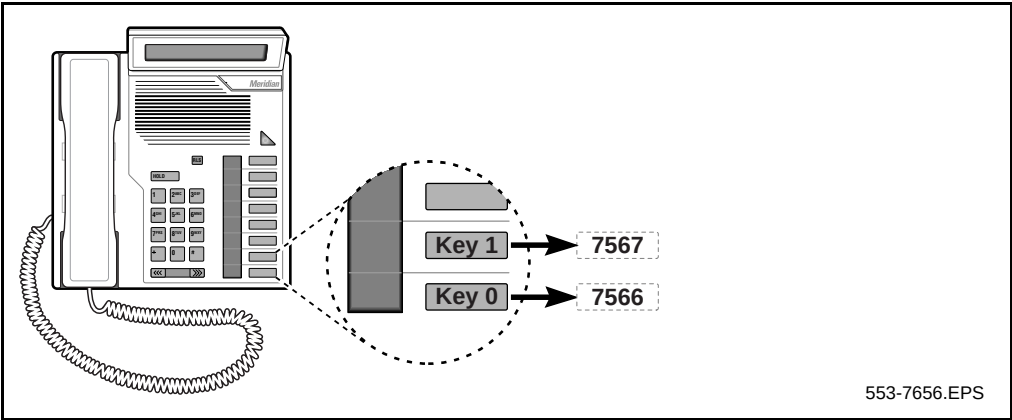
- 1** For a private ESN UDP call made from Key 0 (DN 2130) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 0 (646) plus the DN of the active key (2130).
 - That is, the CLID that is sent would be 646 2130.
- 2** For a private ESN CDP call made from Key 0 (DN 2130) on the set, 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 41
 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

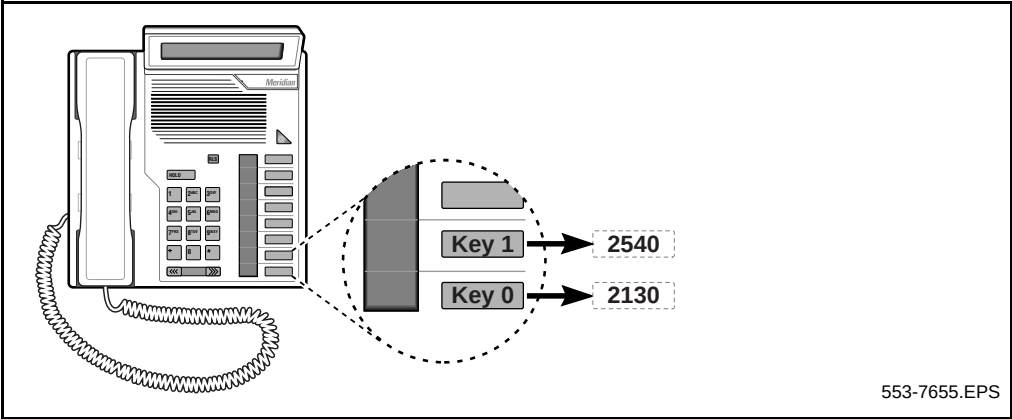
- 1** For a private ESN UDP call made from Key 0 (DN 7566) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 0 (578) plus the DN of the active key (7566).
 - That is, the CLID that is sent would be 578 7566.
- 2** For a private ESN CDP call made from Key 0 (DN 7566) on the set, 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 42
 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



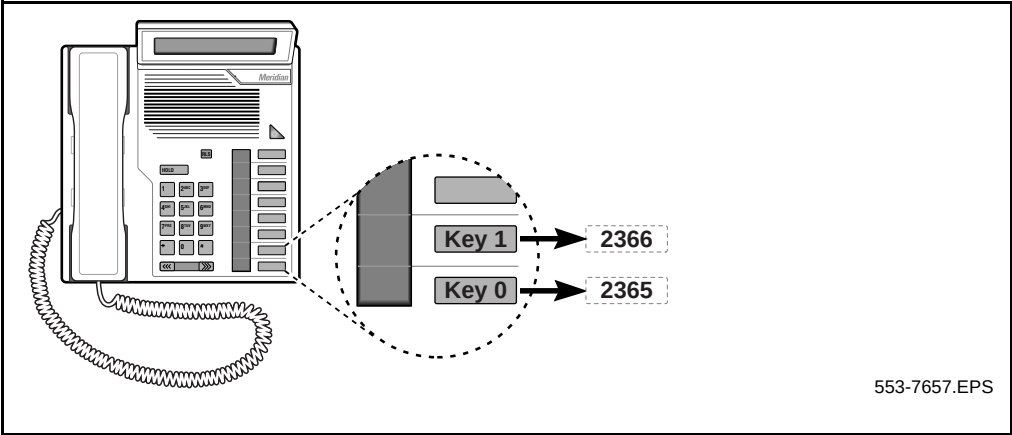
- 1** For a private ESN UDP call made from Key 1 (DN 2540) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 1 (646) plus the DN of the active key (2540).
 - That is, the CLID that is sent would be 646 2540.
- 2** For a private ESN CDP call made from Key 1 (DN 2540) on the set, 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 43
 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



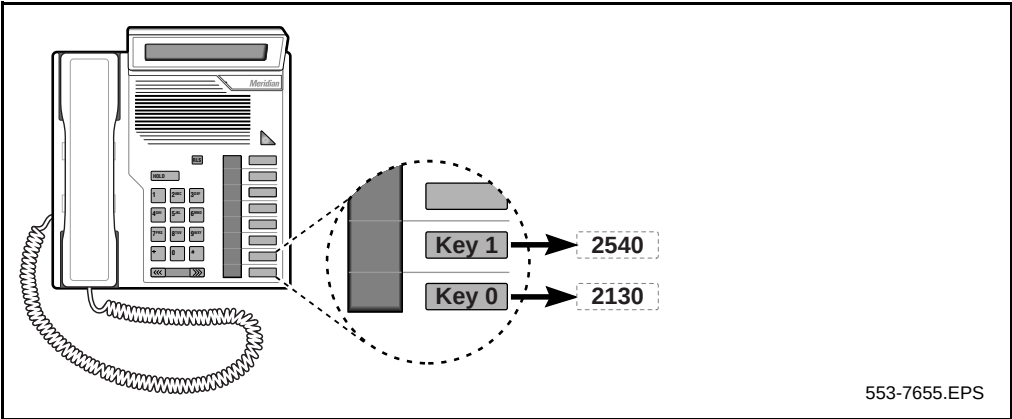
- 1** For a private ESN UDP call made from Key 1 (DN 2366) on the set, the CLID would be built as follows:
 - HLOC from CLID entry 1 (581) plus the DN of the active key (2366).
 - That is, the CLID that is sent would be 581 2366.
- 2** For a private ESN CDP call made from Key 1 (DN 2366) on the set, 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 0.

Table 44
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



- 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.

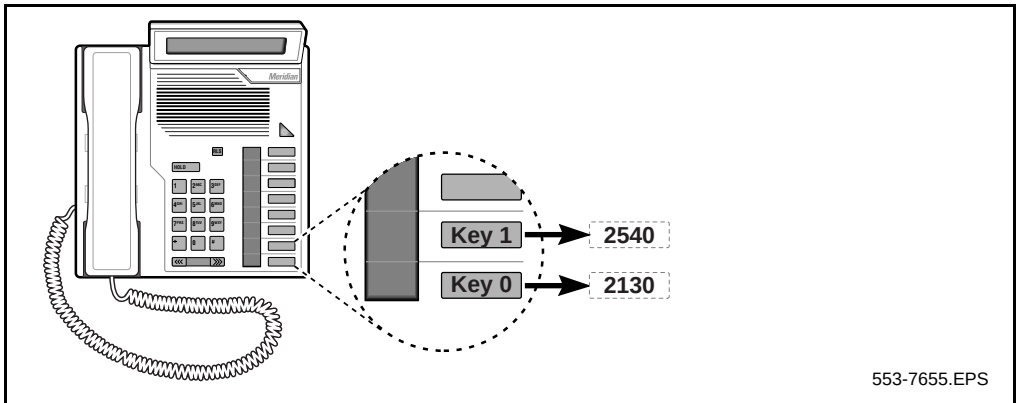
Example 6 -Set does not have DID number on DN key 1, SRCH option is used but does not find a DID

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 45**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



- 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.

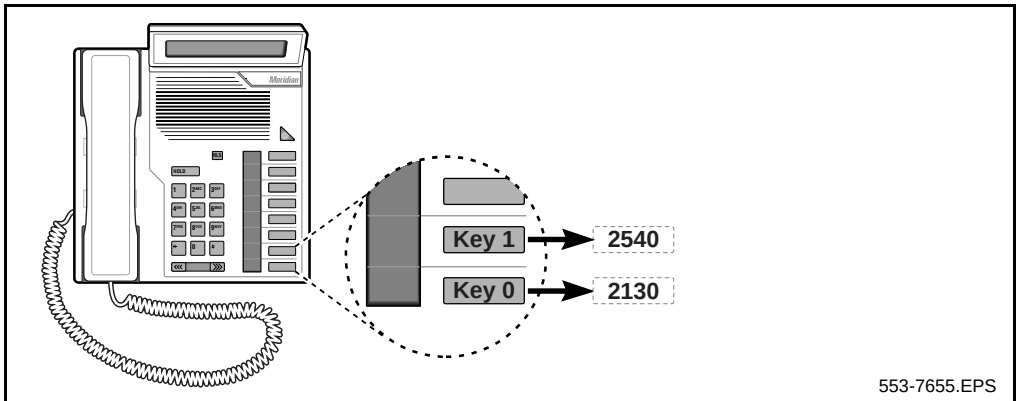
Example 7 - Set with DN KEY prompt of “D” on key 1

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 46
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



- 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.

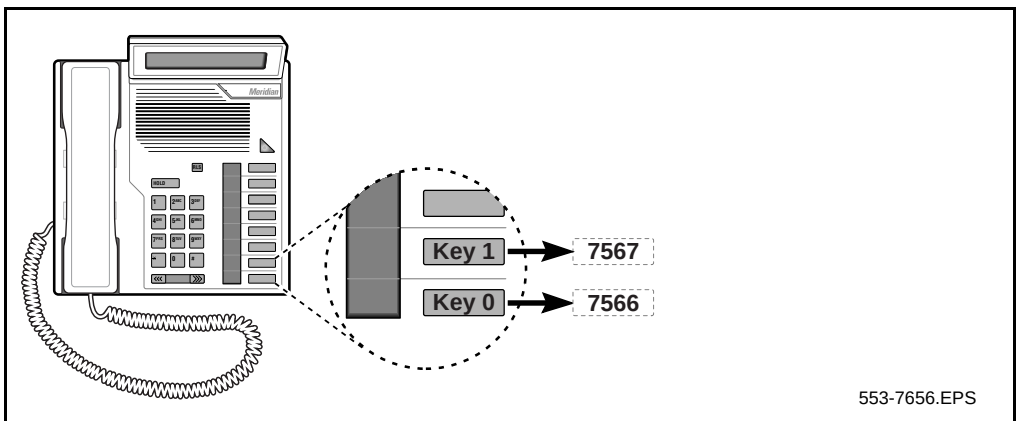
Example 8 - Set with DN KEY prompt of “D” on key 1, International Numbering Plan

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 47
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



- 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.

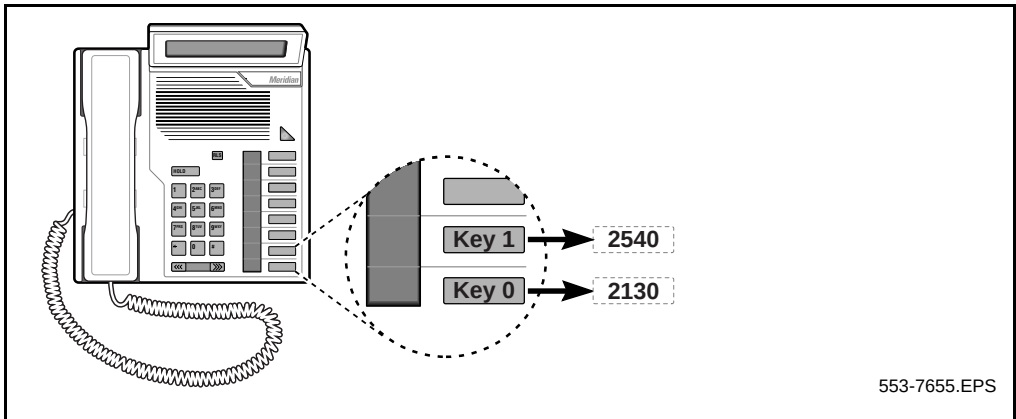
Example 9 - Set with DN KEY prompt of “D” on key 0

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 48
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:
 - HLLOC 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.

EuroISDN Continuation for UK/Spain/Belgium/SN3

The EuroISDN Continuation feature allows Home National Numbers and Home Local Numbers to be configured on a route. When an ISDN call is made from a set to a EuroISDN interface, the CLID constructed by EuroISDN, based on the outgoing route, takes precedence over the CLID constructed for the calling station set.

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 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	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
...		
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	0-9999999 X	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	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
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	l s c u c u	Loop, shelf, card and unit for Options 51C, 61C, 81, 81C. Terminal Number address card and unit for Option 11C.
...		
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	l s c u c u	Loop, shelf, card and unit for Options 51C, 61C, 81, 81C. Card and unit for Option 11C.
...		
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 435, 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).
...		

Feature Operation

No specific operating procedures are required to use this feature.

Integrated Services Access

Integrated Services Access (ISA) is an ISDN PRI feature offered by Meridian 1 for connecting to switches such as DMS-100 and DMS-250.

ISA allows multiple service routes to share the same common pool of B-channels. 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, and they can carry calls of different types. These call types can change on a per call basis. In addition to taking on different trunk types, the service routes can also be uniquely configured for other features, such as Dialed Number Identification Services (DNIS), Incoming Digit Conversion (IDC), or Auto-Terminate.

AT&T's Call-by-Call nodal service offering is similar to Northern Telecom's DMS-250 ISA. Instead of multiple call/trunk types over a single ISDN PRI channel, AT&T offers services from the 4ESS Inter Exchange Carrier (IEC) such as MEGACOM, SDN, and ACCUNET.

Establishing ISA routes

Basic PRI configuration must be performed before Integrated Services Access (ISA) is defined (see "ISDN product overview"). ISA routes and trunks must be defined to access Northern Telecom's ISA functionality or AT&T's Call-by-Call Service.

You cannot configure trunks for the service route that also accesses the ISA master route. With a single PRI (23B + D) configuration, all 23 B-channels can be configured for the ISA master route.

ISA routes cannot be accessed directly, so they must be blocked in the following programs, if applicable:

LD 19	Code Restriction
LD 27	Alternate Route Selection (ARS)
LD 86	Network Alternate Route Selection (NARS) and Basic Alternate Route Selection (BARS)
LD 93	Tenant Services

Accessing the ISA master route

The caller dials the access code of a service route to access an ISA master route. This access can also be achieved through digit manipulation by BARS or NARS or by means of direct trunk access (TARG) values in LD 10, LD 11, and LD 16. A route is configured as an ISA type through service change in LD 16. The ISA master route contains a list of B-channels over PRI that can be shared.

Different service route types such as TIE or WATS are created and associated with an ISA master route type. Service routes are not permitted to have Private trunks or B-channel members. To access call-by-call capability, the caller uses NARS/BARS or CDP. Automatic stepping from a service route to an ISA master route is performed and the ISA master route searches for an idle ISA channel. The caller is prevented from dialing the access code of an ISA master route directly.

These ISA configuration prompts are described in the following sections.

- the Network Service Facility (NSF) option
- the Min/Max function
- the Service Identifier (SID)

Network Services Facility option

This option is configured on the Meridian 1 to indicate whether it expects the Network Services Facility (NSF) Identification Element (IE) from the DMS. The NSF information dictates which service route the Meridian 1 will use to terminate an incoming call.

Northern Telecom connectivity to DMS provides Public, Private, INWATS, OUTWATS, TIE, and FX call types. When specifying COT or DID, the default is the Public call type. The call types determine the NSF values. (NSF = NO yields the Public call type.)

The values for the COT/DID service route (COTR), the WATS service route (WATR), and the TIE service route (TIER) are for incoming call termination only. Predefined NARS, BARS, or CDP allows multiple outgoing routes. The COTR can be a route number for a central office DID/DOD route. It is used for public calls. For incoming public calls, if COTR is a central office route, it is routed to the attendant. If it is a DID/DOD route, it translates the last “n” digits (as predefined in LD 15). For Private and TIE calls, the called number can be translated as defined for the service route.

With NSF = NO:

- COTR = all incoming DID/COT calls
- TIER = all incoming TIE calls

Only Public and TIE calls can be terminated. Because there is no Min/Max throttling, one service route may use all the trunks in the pool. If the NSF is sent from the central office, a master route can still be configured with NSF = NO and the NSF is ignored.

With NSF = YES:

- COTR = all incoming DID/COT calls
- WATR = all incoming WATS calls (prior to X11 release 17)
OR = incoming WATS calls without SID (X11 release 17)

Different TIE and FX calls can be terminated to multiple service routes. With X11 release 17, there can be multiple INWATS routes. These routes are distinguished by the unique SID defined in the service route. This number must be coordinated with the DMS for correct call termination.

Minimum and maximum counter function

The minimum and maximum counter (Min/Max) function allows customers more control and the ability to manage call patterns: you can define a minimum number of B-channels for a service route and you can define a maximum number of calls allowed per service route.

The sum of all the Min values must be less than or equal to the number of B-channels in the master route. The Max values for each service route must be equal to or less than the number of B-channels in the pool less all Min values from other service routes.

The sum of all Min values for the service route cannot exceed the number of B-channels defined for the ISA master route.

When the NSF prompt is YES and the Max value is reached in a service route, the All Trunks Busy (ATB) 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 is pegged against individual service routes when the maximum number of B-channels reserved for that call type has been reached. The ATB counter of an ISA master route is also incremented when the last B-channel of the ISA master route is busied. This occurs whether the NSF prompt is YES or NO.

Service Identifier

In addition to the call type (route type), each call is identified by a service Identifier (SID), which is used by the Meridian 1 and the central office for routing. The SID prompt is available when the NSF prompt is set to YES. These service identifiers must be set up in coordination with the central office for call type delivery and routing purposes.

The Service Identifier allows a call type with multiple SIDs such as INWATS to go to prespecified Directory Numbers.

Before X11 release 17, the SID defaults to the route number, and the value range is 0–127. With X11 release 17, the SID no longer has a default value. Also, the value range of SIDs is expanded to support 0–511.

ISA capability

Note: Support of ISA for DMS switches and Call-by-Call Service Selection for AT&T switches has been withdrawn for X11 software releases prior to X11 release 16. Therefore, X11 release 16 is the minimum release to support ISA capability.

X11 release 16

Basic ISA functionality includes the following:

- Incoming Digit Conversion (IDC) is supported for DID call type only.
- All INWATS calls terminate to the attendant console.
- ISA supports two-way DID trunk types (as do all PRI connections to a central office).
- A total of 127 SID routes is allowed for all trunk types per customer.
- Multiple routes can be defined.
- Calls are routed based on Service Identifier (SID) value.

Meridian 1 to DMS-100

WATS:

- Only one INWATS route can be defined.
- All INWATS calls terminate to the attendant console.
- OUTWATS services are not limited to a single outgoing route.

COT or DID:

- Only one incoming route can be defined: either COT or DID, but not both.
- DID trunk type supports two-way traffic (inbound and outbound).
- More than one outgoing route can be defined.
- DID operates like a two-way COT.

TIE:

- Multiple routes can be defined.
- They are routed according to the Service Identifier (SID) value.

Note: In LD 16, if NSF = NO, then only one TIE route can be defined.

FX:

- Multiple routes can be defined.
- They are routed according to the Service Identifier (SID) value.

Meridian 1 to DMS-250

This includes basic ISA functionality as well as the following:

- Private call type is supported for DMS-250 interfaces to the Meridian 1 and is defined as TIE.

WATS:

- Only one INWATS route can be defined.
- All INWATS calls terminate to the attendant console.
- OUTWATS services are not limited to a single outgoing route.

TIE:

- Multiple routes can be defined.
- They are routed according to the Service Identifier (SID) value.

Note: In LD 16, if NSF = NO, then only one TIE route can be defined.

FX:

- Multiple routes can be defined.
- They are routed according to the Service Identifier (SID) value.

COT or DID:

- Only one incoming route can be defined either COT or DID, but not both.
- DID trunk type supports two-way traffic (inbound and outbound).
- More than one outgoing route can be defined.
- DID operates like a two-way COT.

Meridian 1 to 4ESS

Meridian 1 supports the following AT&T 4ESS nodal service types:

- ACCUNET, a T1 access service for both voice or data
- SDN, Software Defined Network, an AT&T virtual networking package
- MEGACOM 800, inbound domestic bundling
- MEGACOM, outbound domestic bundling
- WATB, banded WATS (the user can specify a band, such as Band 3).
- WATM (the user can specify wide area service exclusive to Band 1 through 9; for example, Band 5 means 0 to 5).
- LDS, Long Distance Service, including “World Connect” (outbound international)
- IWAT, regular 800 service
- I800, International 800, anything outside the U.S.

X11 release 17

In X11 release 17, 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 LD 16.)

- 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.

Operating parameters

ISA supports ST, STE, NT, RT, XT, 21, 21E, 51, 61, 71, and 81 system types.

SL-100 and DMS products require BCS 30 or later for ISA connectivity to the Meridian 1.

The X11 release 17 ISA enhancements are based on the following features:

- Dialed Number Identification Services (DNIS) offered on X11 release 10 or above.
- Incoming Digit Conversion (IDC) for Direct Inward Dialing (DID) offered on X11 release 12 or above.

Characteristics of the X11 release 17 ISA enhancements are as follows:

- 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 LD 16. 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 LD 16. 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 LD 16. 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 LD 16 for all the bands of the WATB service.
- For AT&T interfaces, only nine possible services can be used per ISA master route. With Northern Telecom DMS products, there are 512 possibilities, one for each SID value.

Tables 49 and 50 illustrate the Min/Max function, assuming 23 ISA B-channels.

Table 49
Example of Min/Max function for Meridian 1 to DMS

Call Type	Meridian 1 to DMS interface (WATR = 30, COTR = 10, NSF = YES)	MIN	MAX
Public	(rout 10, tkty DID, icog IAO)	10	13
Private	(rout 20, tkty TIE, sid 22, facy PRV, icog IAO)	1	3
INWATS	(rout 30, tkty WAT, icog ICT)	1	3
INWATS	(rout 35, tkty WAT, sid 30, icog ICT)	1	1
OUTWATS	(rout 40, tkty WAT, sid 9, icog OGT)	1	2
OUTWATS	(rout 45, tkty WAT, sid 13, icog IAO)	1	1
FX	(rout 60, tktp TIE, sid 60, facy TIE, icog IAO)	1	4
TIE	(rout 60, tkty TIE, sid 60, facy TIE, icog IAO)	2	3
TIE	(rout 65, tkty TIE, sid 65, facy TIE, icog IAO)	2	3
	Total	20	
Note 1: See the Min/Max rules contained in this module.			
Note 2: Service types are dominant over call types with AT&T interfaces.			

Table 50
Example of Min/Max function for Meridian 1 to ESS

Service	Meridian 1 to ESS interface	MIN	MAX
ACCunet	(rout 10, tkty DID, icog IAO)	10	15
SDN	(rout 20, tkty TIE, icog IAO)	1	3
IWAT	(rout 30, tkty WAT, icog ICT)	1	3
WATB	(rout 40, tkty WAT, sprm 9, icog OGT)	1	2
WATM	(rout 45, tkty WAT, icog OGT)	1	2
LDS	(rout 70, tkty TIE, icog IAO)	2	3
I800	(rout 80, tkty TIE, icog IAO)	2	3
	Total	18	
Note: See the Min/Max rules contained in this module.			

Feature interactions

- Enbloc dialing
 Enbloc dialing in ISDN PRI performs dialed digit analysis to determine the end of dialing before constructing the outgoing SETUP message. The Trunk Access Code applies to the service route, not to the ISA master route.
- nB+D Primary Rate Interface
 nB + D is an ISDN feature developed for Meridian 1 in X11 release 12. Meridian 1 allows 16 DS1 loops controlled by one primary D-channel (on channel 24 of the first DS1 loop) and one backup D-channel (on channel 24 of the second DS1 loop). ISA can use the 382 B-channels as the ISA pool of trunks.
- AT&T 4ESS SDN Access
 Software Defined Network (SDN) is a service offered by AT&T 4ESS for the virtual private network. SDN can be offered on dedicated channels or ISA channels.

- Incoming Digit Conversion (IDC)
Part or all of the digits received in the DID route are converted and terminated at the existing internal DN in the Meridian 1. With this enhancement, IDC applies to the incoming WATS route over the ISDN interface.
- Dialed Number Identification Services (DNIS)
DNIS provides the last three or four digits of the dialed DN from DID or TIE trunk to be displayed in the Meridian 1 set digit display when the DNIS call terminates on an ACD DN. DNIS length flexibility, introduced with X11 Release 20, allows 1–7 digits. DNIS is supported on a per route basis when using the ISA feature. DNIS also applies to the INWATS service route over the ISDN interface.

Feature packaging

Table 51 shows the packages required for ISA. See *X11 features and services* (553-3001-305) for X11 release software packages and their dependencies.

Table 51
Package requirements for ISA enhancements

Package	Name of package	Mnemonic
117	Call-by-Call Service Selection <i>Dependencies:</i> 145, 146,149	CBC
145	ISDN Signaling	ISDN
146	ISDN Primary Rate Interface <i>Dependencies:</i> 75, 145, 19 (CLID)	PRI
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” on page 451), 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” on page 451), then package 98, DNIS, is required.		

Feature implementation

Configuring ISA routes

Basic PRI configuration must be performed before Integrated Services Access (ISA) is defined. ISA routes and trunks must be defined to access Northern Telecom's ISA functionality or AT&T's Call-by-Call Service.

To configure ISA, take the following steps:

- 1 LD 16 Route Data Block (Procedure 17)
Define the ISA master route, before other route types.
- 2 LD 14 Trunk Data Block (Procedure 18)
Define the associated list of ISA trunks.
- 3 LD 16 Route Data Block (Procedure 19)
Define all service routes.

Procedure 17

Use LD 16 to create an ISA master route (Part 1 of 2)

Prompt	Response	Description
REQ	NEW, CHG, OUT	
TYPE	RDB	Route Data Block
CUST	0–99	Customer number
ROUT	0–511	Route number
TKTP	ISA	Create an ISA trunk route
		Note: Package 117, Call-By-Call Service, is required to define an ISA master route.
DTRK	YES	Digital trunk route
DGTP	PRI	Digital trunk type
ISDN	YES	ISDN option
MODE	PRA	D-channel mode controlling the route (ISA master route)
PNI	1–32700	Customer's Private ID
IFC	aaaa	Interface type: (D100), ESS4, ESS5, SL1, S100, D250

Procedure 17**Use LD 16 to create an ISA master route (Part 2 of 2)**

Prompt	Response	Description
		Note: The IFC of an ISA master route and its associated service route must match.
NSF	(NO),YES	Network Service Facility (for TKTP = ISA and non-AT&T IFC; AT&T always has NSF)
COTR	0-511	DID/central office route number Prompted if IFC = D100, SL1, S100, or D250. Enter CO or DID route.
TIER	0-511	TIE route number Prompted if IFC = D100, SL1, S100, or D250 and NSF = NO
WATR	0-511	WATS route number Prompted if IFC = D100, SL1, S100, or D250 and NSF = YES
ICOG	IAO, ICT, OGT	Incoming and outgoing trunk, incoming trunk, outgoing trunk
SRCH	RRB	Round robin hunting for outgoing trunks
ACOD	xxxx	Trunk route access code

Procedure 18
Use LD 14 to configure ISA trunks

Prompt	Response	Description
REQ	NEW, CHG, MOV, OUT	
TYPE	ISA	ISA trunk type
TN	loop ch	Terminal number address—use loop number created in LD 17
	0–159	PRI loop number
	1–24	PRI channel
CUST	0–99	Customer number
RTMB	0–511, 1–254	Route and Member number for SL-1 NT, RT, XT, and options 51, 61, 71, and 81.
	0–127, 1–254	For all other machine types.
B-CHANNEL SIGNALING		
TGAR	(0)–31	Trunk Group Access Restriction
CLS	aaa	Class of service options

Procedure 19
Use LD 16 to configure ISA service routes (Part 1 of 2)

Prompt	Response	Description
REQ	NEW	Add an ISA service route
TYPE	RDB	Route data block
CUST	0–99	Customer number
ROUT	0–511	Route number
TKTP	aaaa	Types of service route allowed with ISDN
DTRK	YES	Digital trunk route
DGTP	PRI	Digital trunk type
ISDN	YES	ISDN option

Procedure 19
Use LD 16 to configure ISA service routes (Part 2 of 2)

Prompt	Response	Description
_MODE	PRA	PRA master route for ISA
IFC	aaaa	Interface type: (D100), ESS4, ESS5, SL1, S100, D250 Note: The IFC of an ISA master route and its associated service route must match.
SRVC	(ACC)	Service for AT&T ESS connections: NNSF, ACC, I800, LDS, M800, MEG, SDN, IWAT, WATM, WATB Prompted if IFC = ESS4 or ESS5 Note: NSF refers to the services provided on a Call-by-Call basis.
_SRPM	0–(9)	WATS band. Prompted only if SRVC = WATB.
ISAR	Yes, (No)	ISA service route
_RTN	0–511	Select route number of any configured ISA master route Prompted only when ISAR = YES.
_FACY	Yes, (No)	Facility for the call type (only applies if the far-end will be sending an NSF information element, NSF = YES) Prompted when TKTP = TIE, ISAR = YES, and IFC = D100/D250/S100 TIE connection in the NSF IE Private connection in the NSF IE
_SID	0–511	Service Route Identifier number. Prompted if NSF = YES and TKTP = TIE/WAT/FX.
_MIN	xx	Minimum number of channels reserved on the ISA master route
_MAX	xx	Maximum number of channels reserved on the ISA master route
_PRIM	Yes, (No)	ISA route class of service (not prompted after X11 R15
ICOG	IAO, ICT, OGT	Incoming and outgoing trunk, incoming trunk, outgoing trunk
ACOD	xxxx	Trunk route access code

Note: The Listed Directory Number (LDN0) value must be set in LD 15, Customer data block, in order to terminate ISDN/DID incoming calls such as ISA.

Feature testing

Test each PRI trunk to ensure that the Meridian 1 completes an ISA call. Run the following test for each of the available call types: TIE, FX, COT, INWATS, OUTWATS, and DID.

Note: COT and DID are recognized as Public call types and they must be on the same route. They can be used for incoming or outgoing routes.

To test ISA, 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 Min/Max values in all service routes to 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 ISA 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).
- 8 Disconnect both calls.

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:

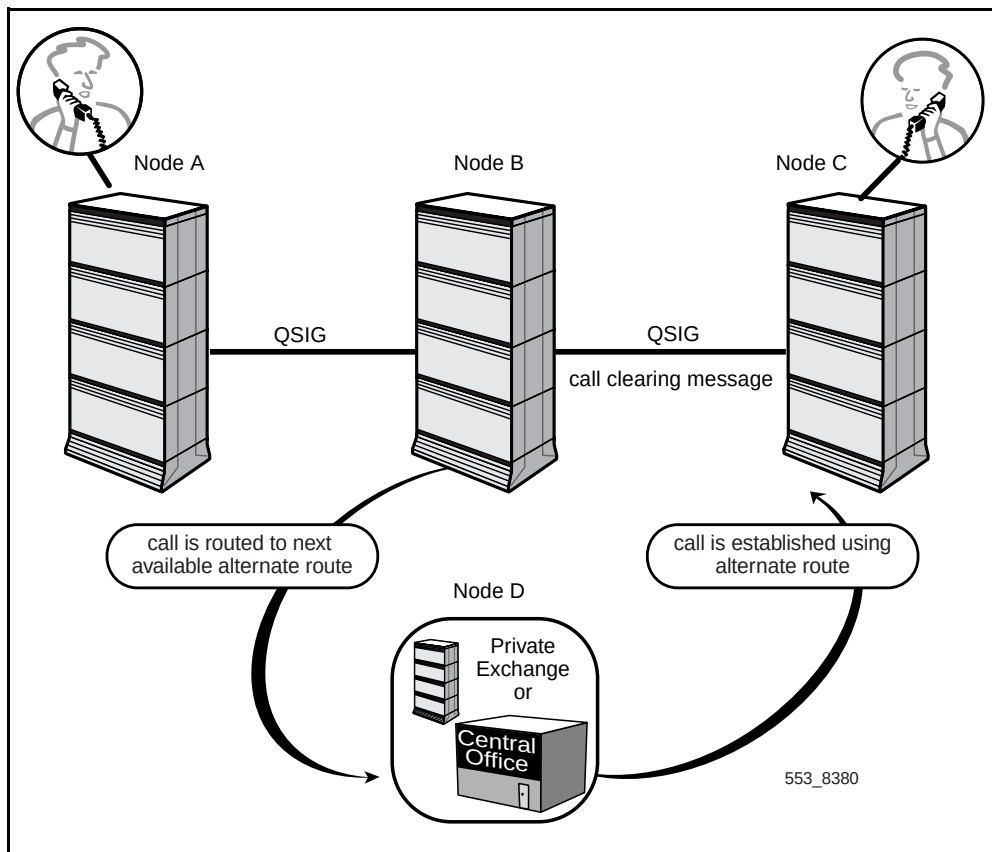
- NRR (no alternate routing is performed. The call receives congestion treatment).
- RRO (reroute if a call encounters congestion at the originating node. If congestion is encountered at a transit node, the call drops back to the originating node, so that the originating node decides if re-routing is 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 (see page 467).

Transit node operation

Consider the following calling scenario for a transit node operation (refer to Figure 25). 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 25
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 an 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 (refer to the ROUT prompt on page 466), 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.

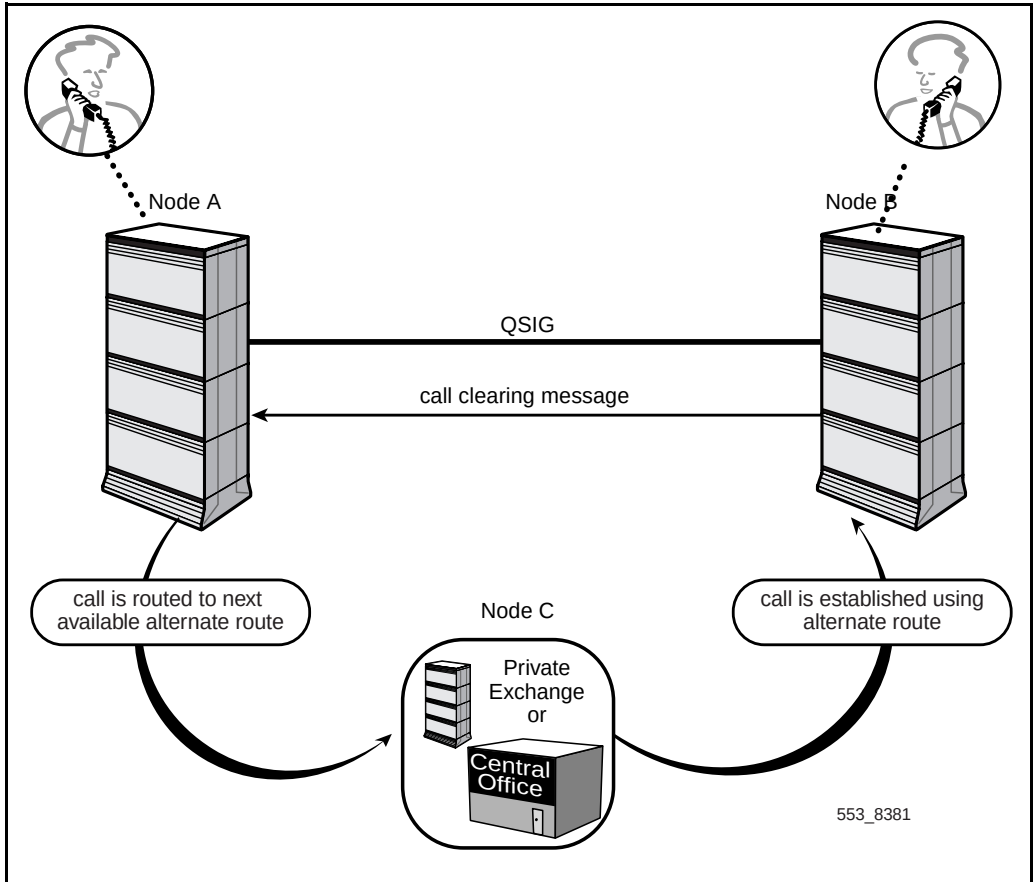
If SBOC = RRO, the congestion information is passed back from transit node B to the originating node A. At node A, QSIG Alternate Routing is activated in an attempt to find an alternate route to set up the call from node A, to node B, to node D, to node C.

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 26). 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 26
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 (refer to the ROUT prompt on page 466), 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 administration

LD 86 – Configure the 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. 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"
	(1)	
	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		ISDN Drop Back Busy options.
	(DBD)	Deny Drop Back Busy.
	DBA	Allow Drop Back Busy on, if all route sets are busy.
	DBI	Allow Drop Back Busy, if all Initial route sets are busy.
...		

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 Call 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 has been 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 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 Presentation/Restriction (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.

Feature interactions

Backup D-Channel

Backup D-channel is not supported on the QSIG interface.

ISDN Signaling Link

ISDN Signaling Link (ISL) on QSIG operation is not supported on Option 11C.

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 implementation

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	PRI	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).

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.

Since the Ring Again feature is configured on set level basis, either by Class of Service or Ring Again key, a set cannot be programmed with CCBS on Meridian Customer Defined Network (MCDN) Network Ring Again allowed. Ring Again is allowed or denied locally or network wide in the same manner.

This feature uses QSIG Generic Transport (GF) platforms. With the development of the QSIG Generic Transport feature, the Call Completion on No Response (CCNR) and Call Completion to Busy Subscriber service on QSIG cannot be involved in any gateway.

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 network does not provide a calling number for the service. 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.

Existing limitations, applicable to standalone or network wide Ring Again operation, apply to CCNR and CCBS on QSIG.

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 implementation

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	l s c u c u	Terminal Number. For Option 11C.
...		
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	l s c u c u	Terminal Number. For Option 11C.
...		
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.

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 QSIGroute 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.

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 Buy 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 486, 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 (OVL P) 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 implementation

This section contains the procedures required 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.
- RGAV	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.
...		

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:

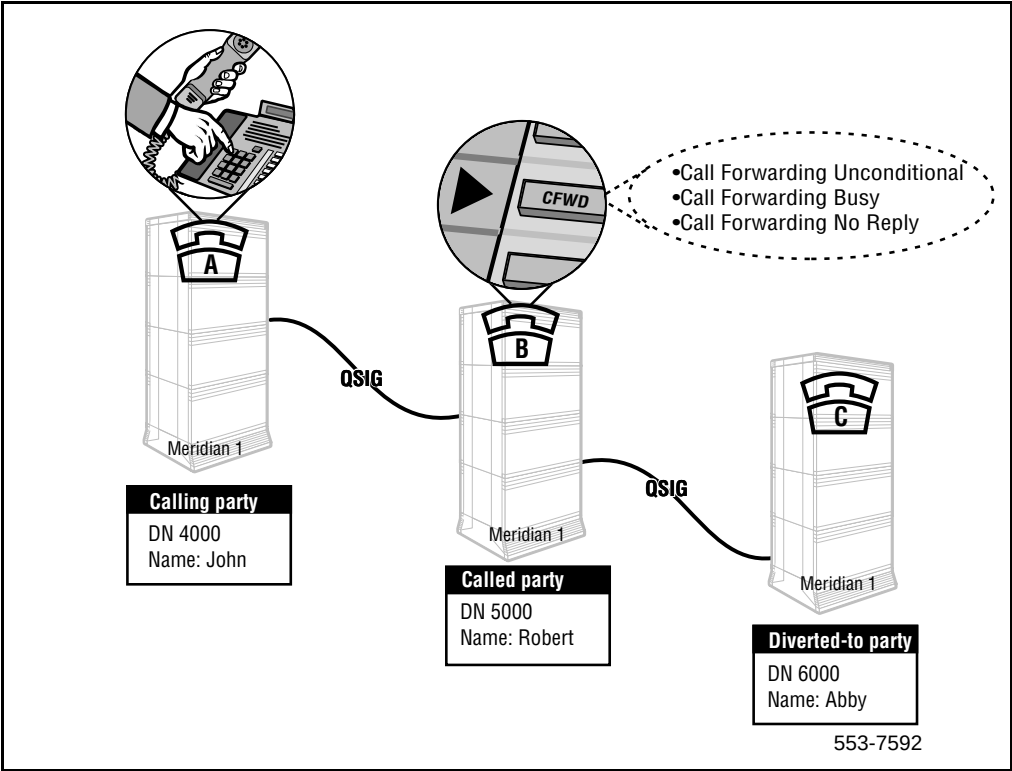
- Call Forwarding Busy (CFB) - the called set is in use
- Call Forwarding No Reply (CFNR) - the called set does not answer after a given number of rings
- Call Forwarding Unconditional (CFU) - the called set is forwarded as soon as the set is reached

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 27 shows an example of a Call Diversion environment.

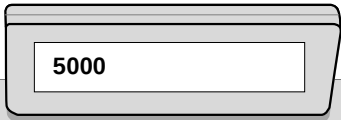
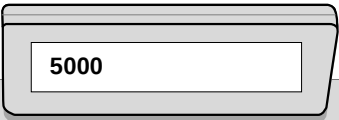
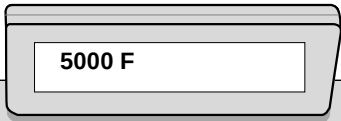
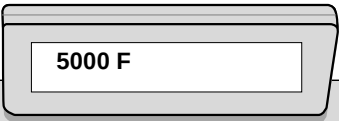
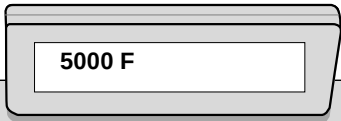
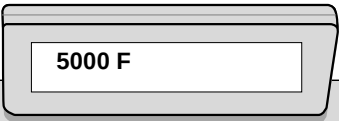
Figure 27
 Call Diversion Environment



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 52, the called party configures one of the three possible Classes of Service.

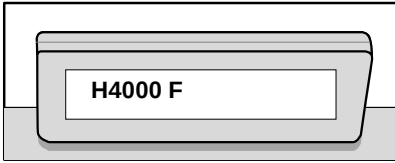
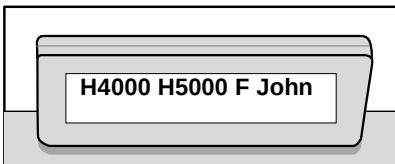
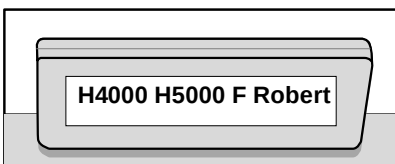
Table 52
Calling Party's Notification

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 53, the called party configures one of the two possible Classes of Service.

Table 53
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 implementation

The 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 54 indicates the remote capabilities meanings for D-channel routes. When using Table 54 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 54
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	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 - 511 0-127	Route Number. For Option 11C.
...		
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.
		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.

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	l s c u c u	Terminal Number. For Option 11C.
...		
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	I s c u c u	Terminal Number. For Option 11C.
...		
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	l s c u c u	Terminal Number. For Option 11C.
...		
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.

Feature operation

No specific operating procedures are required to use this feature.

QSIG Call Diversion Notification Enhancement

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 55 on page 521).

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 55 on page 521).

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 55 on page 521).

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 55 sums up originating user's Notification according rules, according to the served user's Subscription options.

Table 55
originating user's notification versus served user's Subscription option.

Served user's Subscription option: "Calling user receives notification that the call has been diverted"	Originating user's display	
	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 56 on page 523). 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 users' 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 56 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 56
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	OR H4000 H---- F Abby H4000 F Abby	OR H4000 H---- F 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 519). 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 520).

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 522).

Table 57 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 57

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.

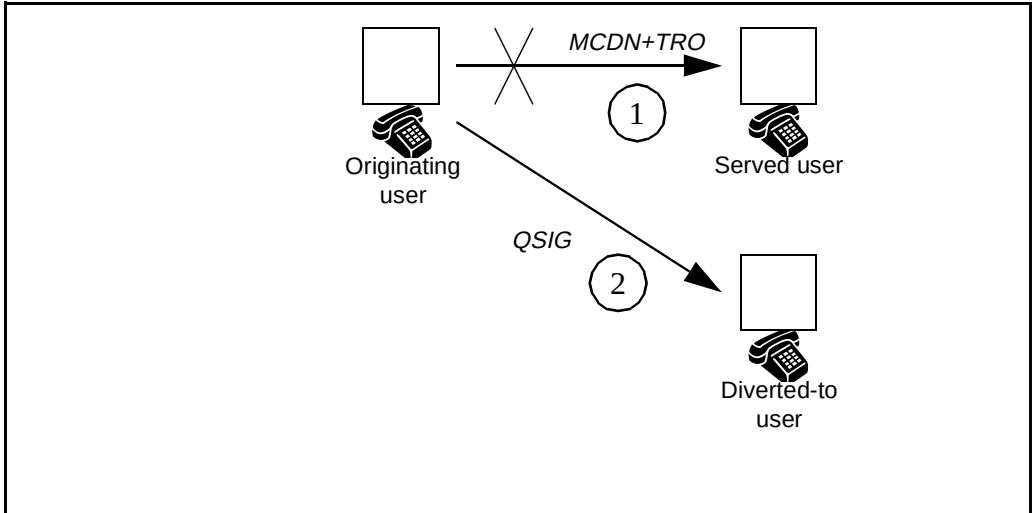
MCDN Trunk Route Optimization

Consider the case presented in Figure 28 on page 533.

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 28
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 implementation

Remote Capability Meanings, for PRI D-Channels

Table 58 indicates the remote capabilities meanings for PRI D-Channels. When using Table 58 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 58
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>
DV10	<u>Sent</u> coded as Object Identifier	<u>Sent</u>	Not processed when <u>received</u>
DV11	<u>Sent</u> coded as Integer Value		
DV20	<u>Sent</u> coded as Object Identifier	Not <u>Sent</u>	Processed when <u>received</u>
DV21	<u>Sent</u> coded as Integer Value		
DV30	<u>Sent</u> coded as Object Identifier	<u>Sent</u>	Processed when <u>received</u>
DV31	<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.

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 QSIG 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).

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.

Feature operation

No specific operating procedures are required to use this feature.

QSIG Call Transfer Notification

The 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 59 summarizes the display options pertaining to the originating set and transferred-to set.

Note: The underlined Class of Service values are in effect.

Table 59
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 implementation

This section contains the procedures required to configure the QSIG Supplementary Services - Name Display Enhancement 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.

ISDN PRI implementation

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 defined 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 yy	Directory Number and CLID entry (range for yy 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.
...		

Feature operation

No specific operating procedures are required to use this feature.

ISDN QSIG Channel ID Coding

PBXs use different kinds of timeslot mapping in ISDN QSIG networks using PRI2 links. When the Meridian 1 interworks with these switches, the QSIG Channel ID Coding feature allows one of two mapping options to be configured.

The QSIG Channel ID Coding feature provides an option for two different mapping schemes for timeslots 17-31 on a PRI2 loop. The mapping scheme for timeslots 1-15 is not affected.

The mapping scheme is applicable for both encoding and decoding of the Channel ID IE.

Prior to the introduction of QSIG Channel ID Coding, the channel number in the Channel ID Information Element (IE) on a Meridian 1 PRI2 QSIG link matched the timeslot number. A summary of the previous mapping is shown in Table 60.

Table 60
Previous implementation of Channel IE and timeslot number

Timeslot number	Channel number for Meridian 1 software	Channel number in Channel ID IE.
1-15	1-15	1-15
17-31	16-30	17-31
16 (signaling)	31 (D-channel)	not applicable

CHID IE mapping options

With the QSIG Channel ID Coding feature, the D-channel can be configured with one of two CHID IE mapping options.

Timeslot number coded in CHID IE

With this option, the channel number of the CHID IE matches the timeslot number. Timeslots 17-31 are assigned channel numbers 17-31. This is the same as the method used prior to the introduction of the QSIG Channel ID Coding feature. A summary of the mapping performed is shown in Table 61.

Table 61
Timeslot number is coded in CHID IE

Timeslot number	Channel number for Meridian 1 software	Channel number in Channel ID IE.
1-15	1-15	1-15
17-31	16-30	17-31
16 (signaling)	31 (D-channel)	not applicable

Channel number coded in CHID IE

With this option, the channel number of the CHID IE matches the Meridian 1 software channel number. Timeslots 17-31 are assigned channel numbers 16-30. A summary of the mapping performed is shown in Table 62.

Table 62
Channel number in Meridian 1 software is coded in CHID IE

Timeslot number	Channel number in Meridian 1 software	Channel number in Channel ID IE.
1-15	1-15	1-15
17-31	16-30	16-30
16 (signaling)	31 (D-channel)	not applicable

The option for the QSIG Channel ID Coding feature is configured in Overlay 17. The two choices are:

- QCHID = NO – Timeslot values 17-31 of the PRI2 loop are associated with channel number 16-30 of the Channel ID IE.
- QCHID = YES – Timeslot values 17-31 of the PRI2 loop are associated with channel number 17-31 of the Channel ID IE (same as previous operation).

Operating parameters

QSIG Channel ID Coding is only supported on QSIG interfaces equipped with the GF capability (introduced in X11 Release 22).

There are two choices of hardware for Option 51C, Option 61C, Option 81, and Option 81C systems:

- PRI2 card (NT8D72) and MSDL card (NT6D80)
- Dual port DTI/PRI2 card (NTCK43) and either the Downloadable D-channel Daughterboard card (NTBK51) or the MSDL card (NT6D80)

These systems require the QPC775 (Release E) or the QPC471 Clock Controller card.

The hardware required for the Option 11C is:

- PRI2 card (NTBK50)
- Downloadable D-channel Daughterboard card (NTBK51)
- Clock Controller (NTAK20)

When a Meridian 1 connects to another Meridian 1 system, the proper setting for QCHID (NO or YES) depends on the software equipped at both switches. If both switches are equipped with X11 Release 24.2x (or later) software, QCHID can be YES or NO, provided it has the same value on both switches. If one switch is equipped with pre-Release 24.2x software, the Release 24.2x switch must be configured with QCHID = YES.

Feature interactions

There are no feature interactions specified for this feature.

Feature packaging

The following packages are required for the QSIG Channel ID Coding feature:

- ISDN Signaling (ISDN) package 145
- 2 Mbps PRI (PRI2) package 154
- International PRA (IPRA) package 202
- Multi-Purpose Serial Data Link (MSDL) package 222
- QSIG Interface (QSIG) package 263
- QSIG GF Transport (QSIGGF) package 305

Feature implementation

LD 17 – Configure the QCHID parameter for the QSIG PRI2 interface.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ADAN	Action Device and Number.
- ADAN	CHG DCH 0-63	Change D-channel.
...	...	
- IFC		Interface type for D-channel.
	ESGF	ETSI QSIG interface with GF capability.
	ISGF	ISO QSIG interface with GF capability.
	EGF4	ETSI QSIG version 4 with GF capability (only available with RIs 24. 2x or later).
...	...	
- DCHL	xxx	PRI2 loop number for D-channel.
...	...	
- RLS	xx	Release ID of the switch at the far end of the D-channel.

- QCHID	NO	Timeslot values 17-31 of the PRI2 loop are associated with channel number 16-30 of the Channel ID IE.
	(YES)	Timeslot values 17-31 of the PRI2 loop are associated with channel number 17-31 of the Channel ID IE (same as previous operation).
...	...	This prompt does not appear for PRI (1.5 Mbps) links.

Feature operation

There are no operating procedures specified for 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).

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 implementation

LD 16 – Configure Automatic Trunk Maintenance in Route Data Block.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	RBD	Route Data Block.
...		
DGTP	PRI	Digital Route type.
IFC	ISGF	ISGF = ISO QSIG interface with GF platform. The ISIG prompt can be entered if both QSIG and QSIGGF packages are included.

LD 17 – Configuration Record.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ADAN	Action Device and Number.
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.

Feature operation

No specific 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 implementation

LD 95 – Modify the Call Party Name Display (CPND) data block.

Note: Call Party Name Display is also defined at the set level in either LD 10 or LD 11 depending on type of set.

Prompt	Response	Description
REQ	NEW	Create Call Party Name Display data block.
TYPE	CPND	Call Party Name Display data block.
CUST	xx	Customer number.
....		
REQ	NEW	Create new name strings.
TYPE	NAME	Name Strings.
CUST	xx	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	xx	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	xx	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	l s c u c u	Terminal Number. For Option 11C.
...		
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	xx	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.

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.

QSIG Supplementary Services - 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.

CNOP 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 OVLR prompt is set to YES in LD 17).

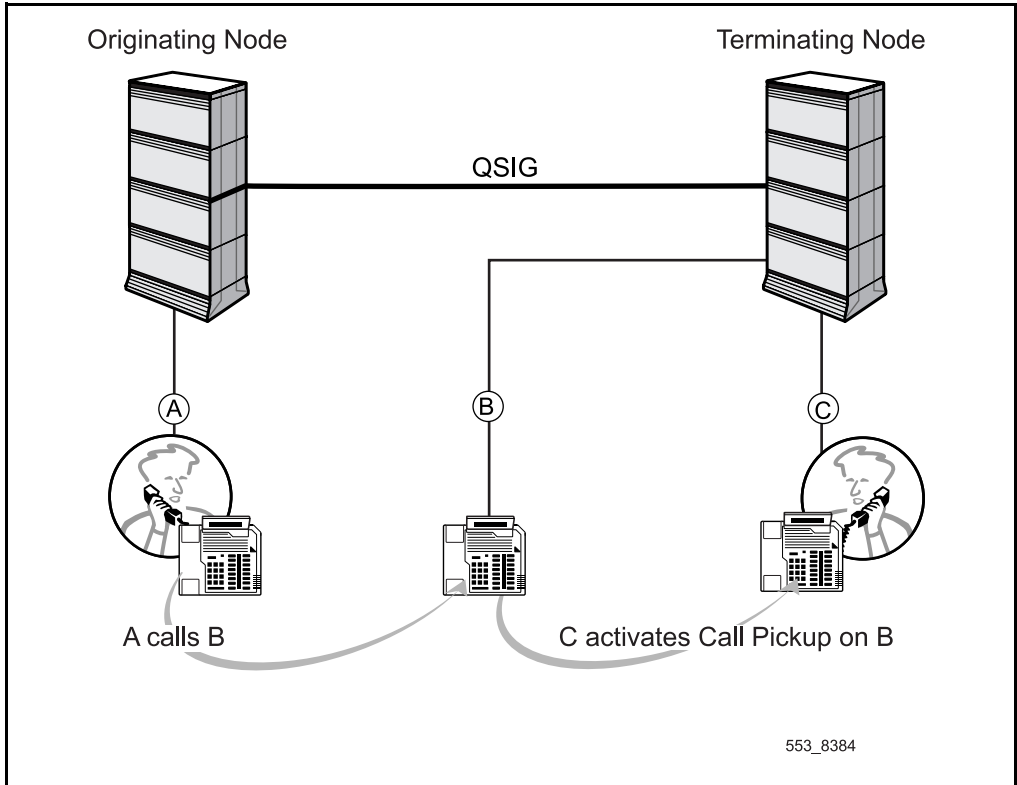
Feature interactions

Call Pickup (over a QSIG link)

Referring to Figure 29, 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 29
Call Pickup over a QSIG link



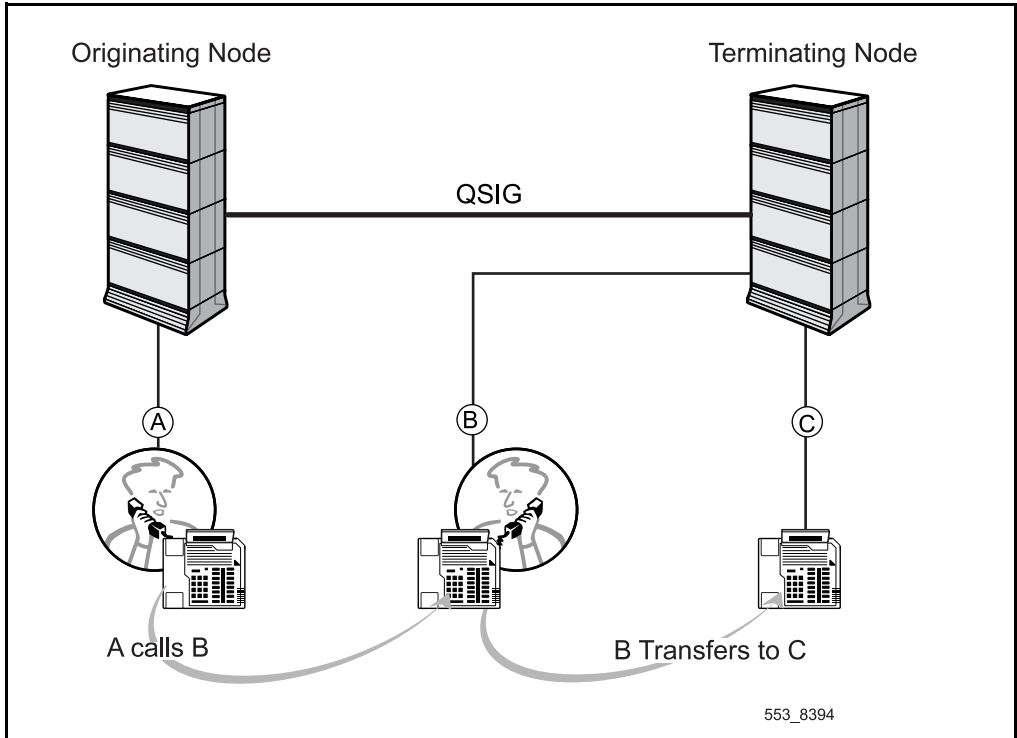
Call Transfer (over a QSIG link)

Referring to Figure 30, 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 30
Call Transfer over a QSIG link



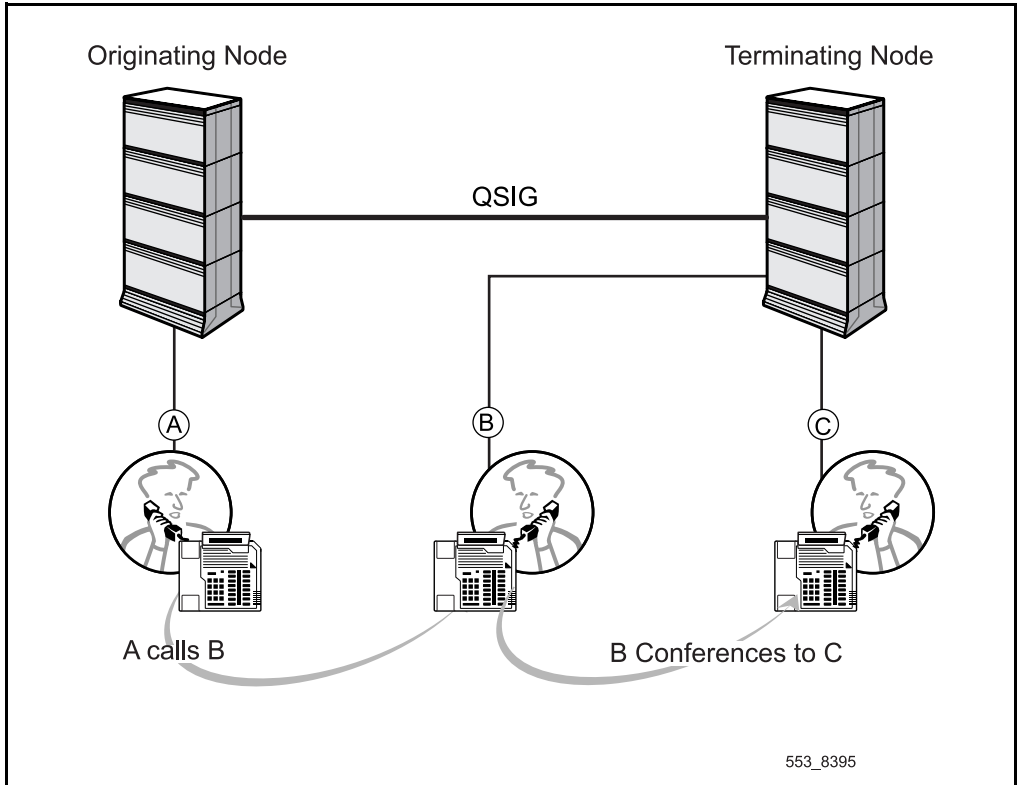
Conference (over a QSIG link)

Referring to Figure 31, 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 31
Conference over a QSIG link



Call Forward all types (over a QSIG link)

Call Forward all types comprises the following call modifications:

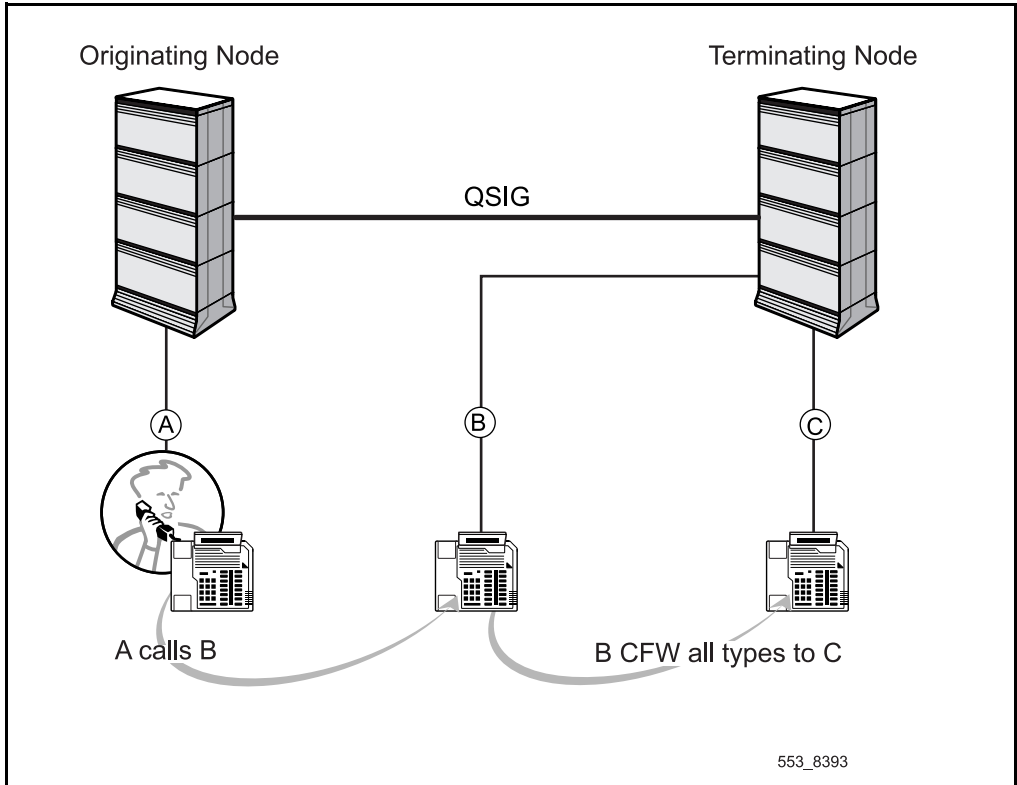
- Call Forward All Calls (CFW)
- Call Forward Busy (CFB)
- Call Forward by Call Type (CFT)
- Call Forward External Deny (CFX)
- Call Forward, Internal Calls
- Call Forward No Answer/Flexible Call Forward No Answer (CFNA)
- Call Forward No Answer, Second Level

Referring to Figure 32, 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 32
Call Forward All Types over a QSIG link



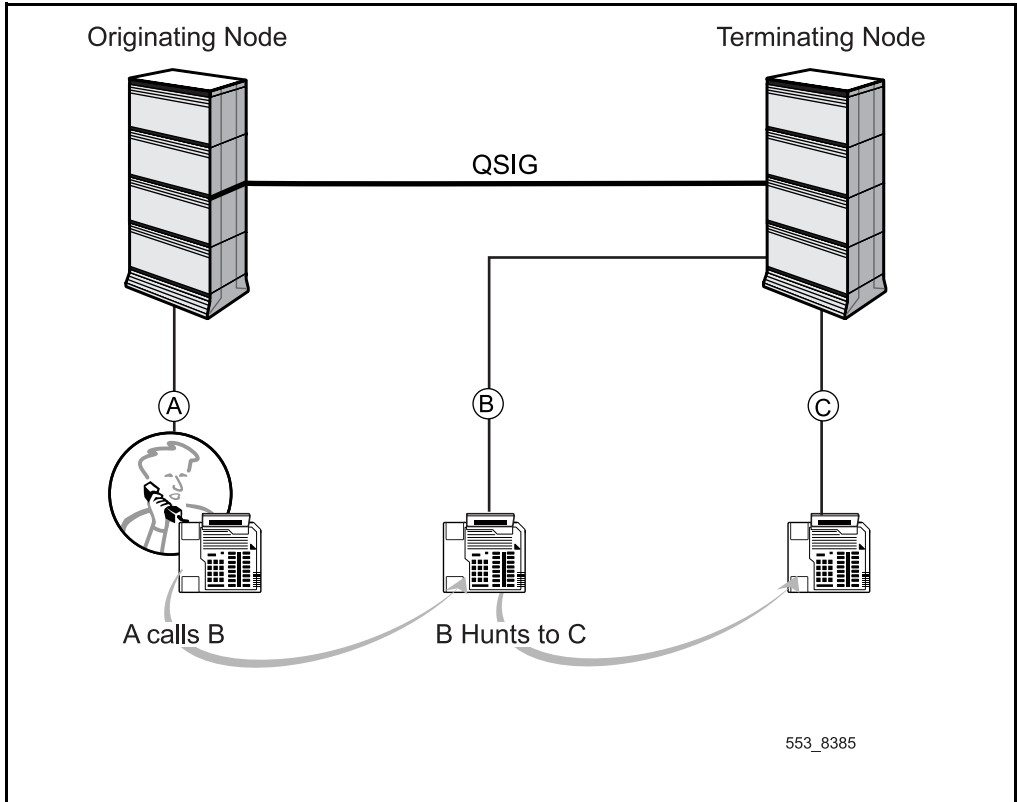
Hunt (over a QSIG link)

Referring to Figure 33, 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 33
Hunt over a QSIG link

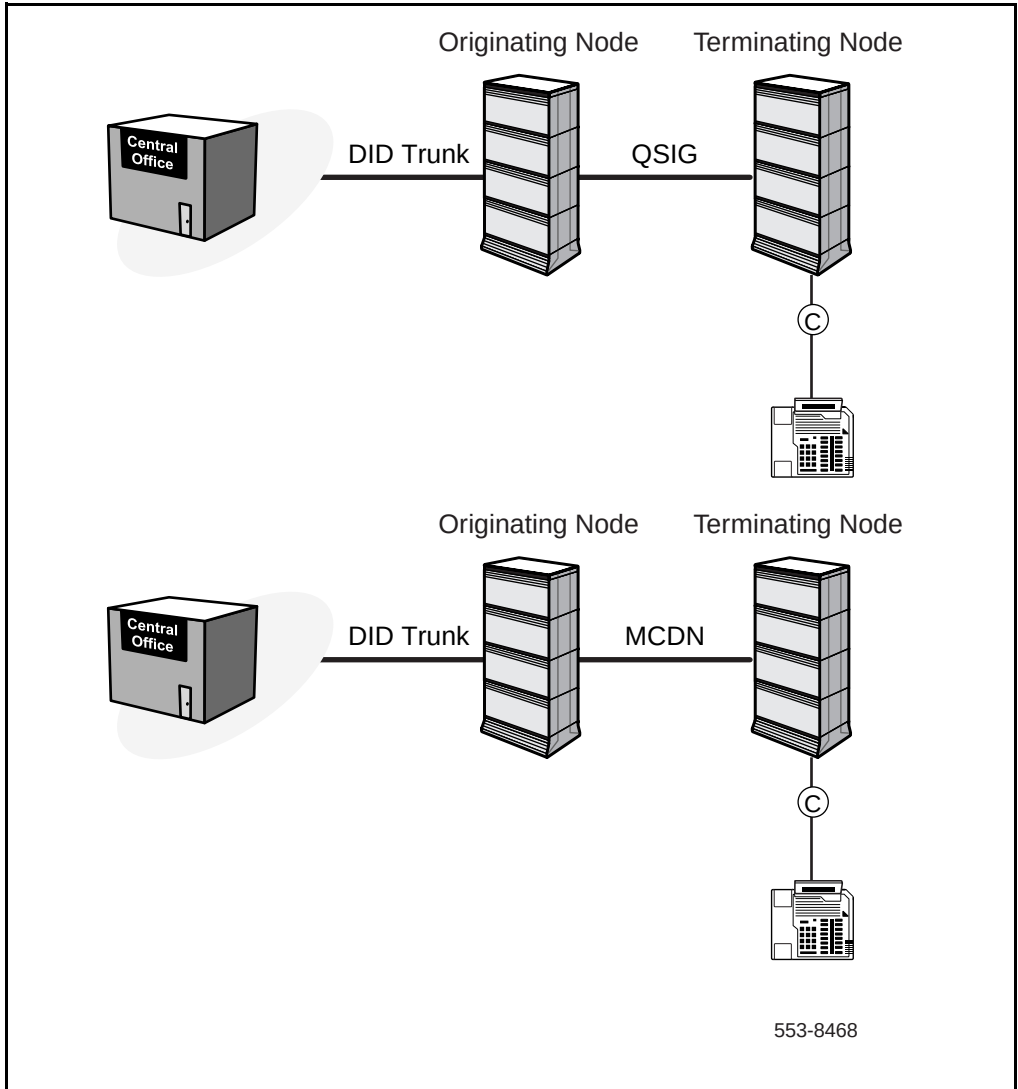


Incoming Digit Conversion (over a QSIG link)

Referring to Figure 34, 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 34
Incoming Digit Conversion over a QSIG link



Call Forward All Types (QSIG/MCDN link)

Call Forward all types comprises the following call modifications:

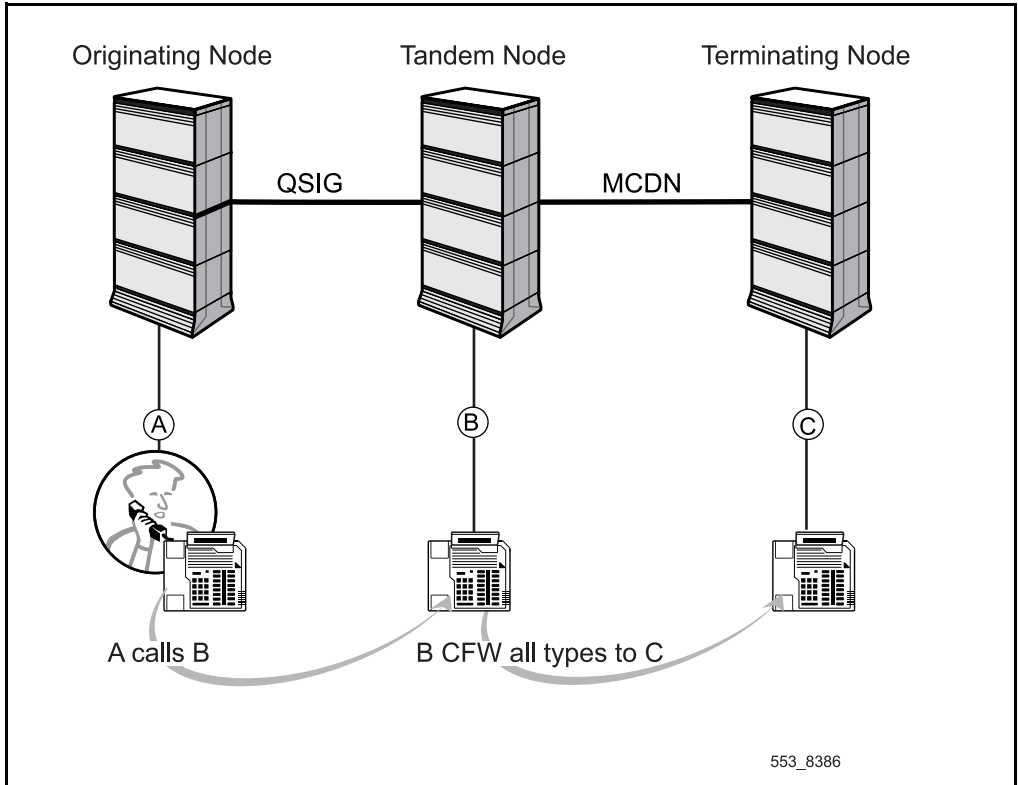
- Call Forward All Calls (CFW)
- Call Forward Busy (CFB)
- Call Forward by Call Type (CFT)
- Call Forward External Deny (CFX)
- Call Forward, Internal Calls
- Call Forward No Answer/Flexible Call Forward No Answer (CFNA)
- Call Forward No Answer, Second Level

Referring to Figure 35, 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 35
Call Forward All Calls over a QSIG/MCDN link



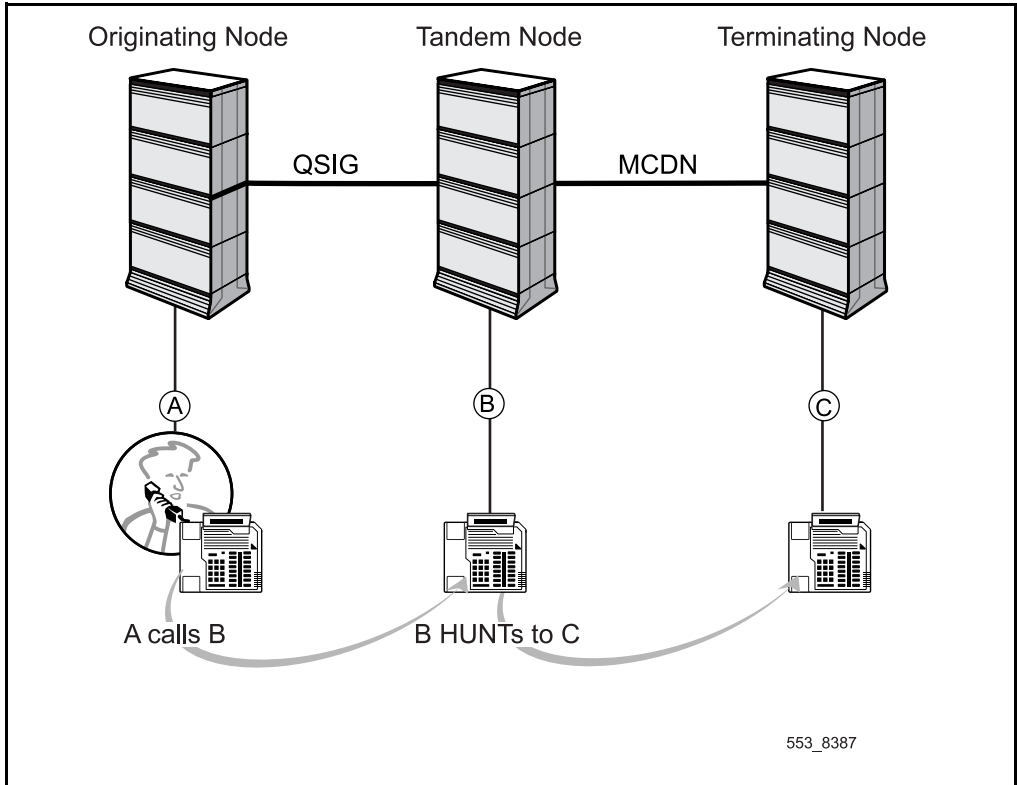
Hunt (QSIG/MCDN link)

Referring to Figure 36, 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 36
Hunt over a QSIG/MCDN link

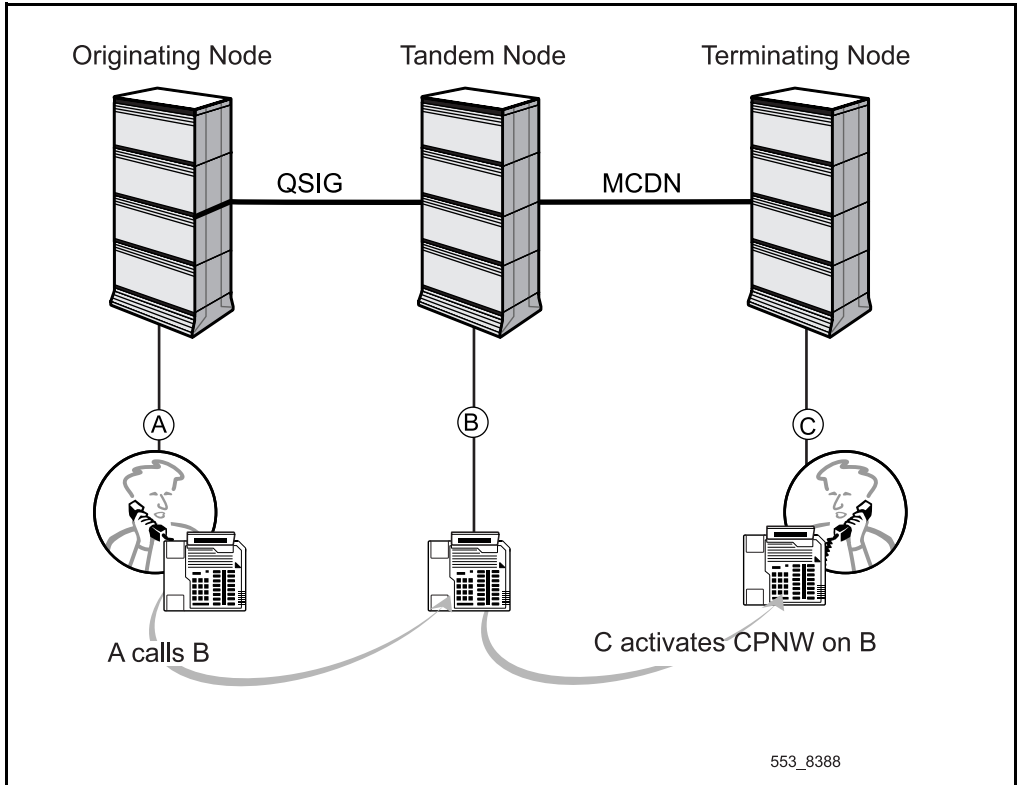


Call Pickup Network Wide (QSIG/MCDN link)

Referring to Figure 37, 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 37
Call Pickup Network Wide over a QSIG/MCDN link



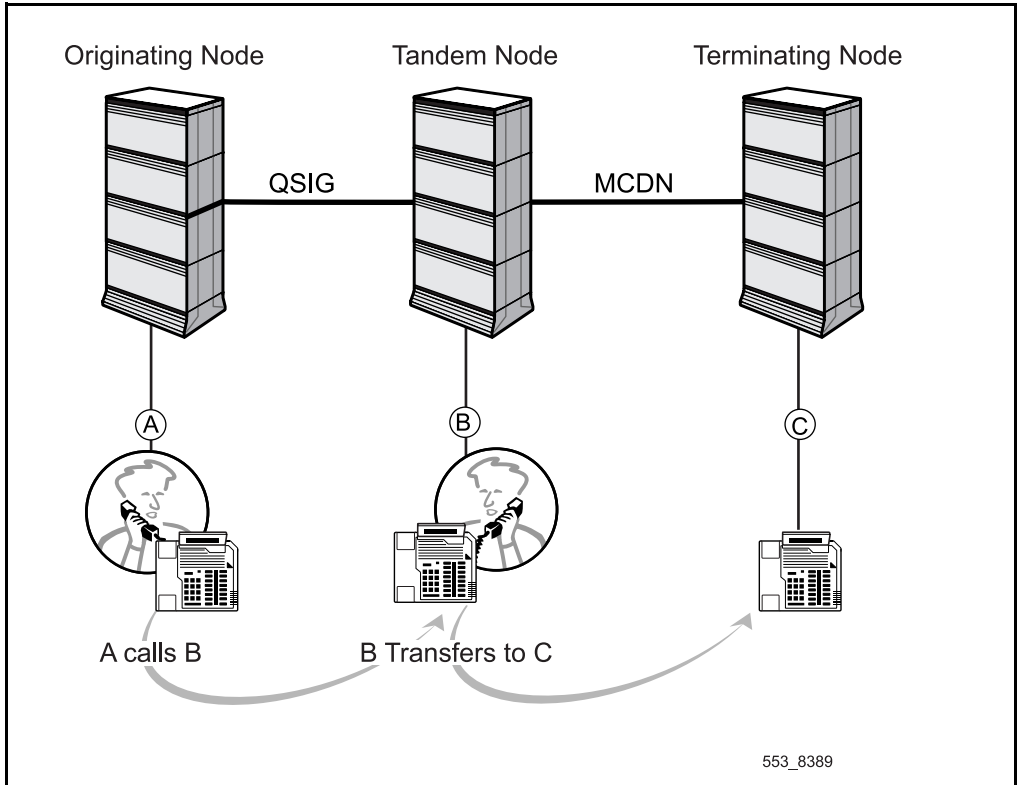
Call Transfer (QSIG/MCDN link)

Referring to Figure 38, 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 38
Call Transfer over a QSIG/MCDN link



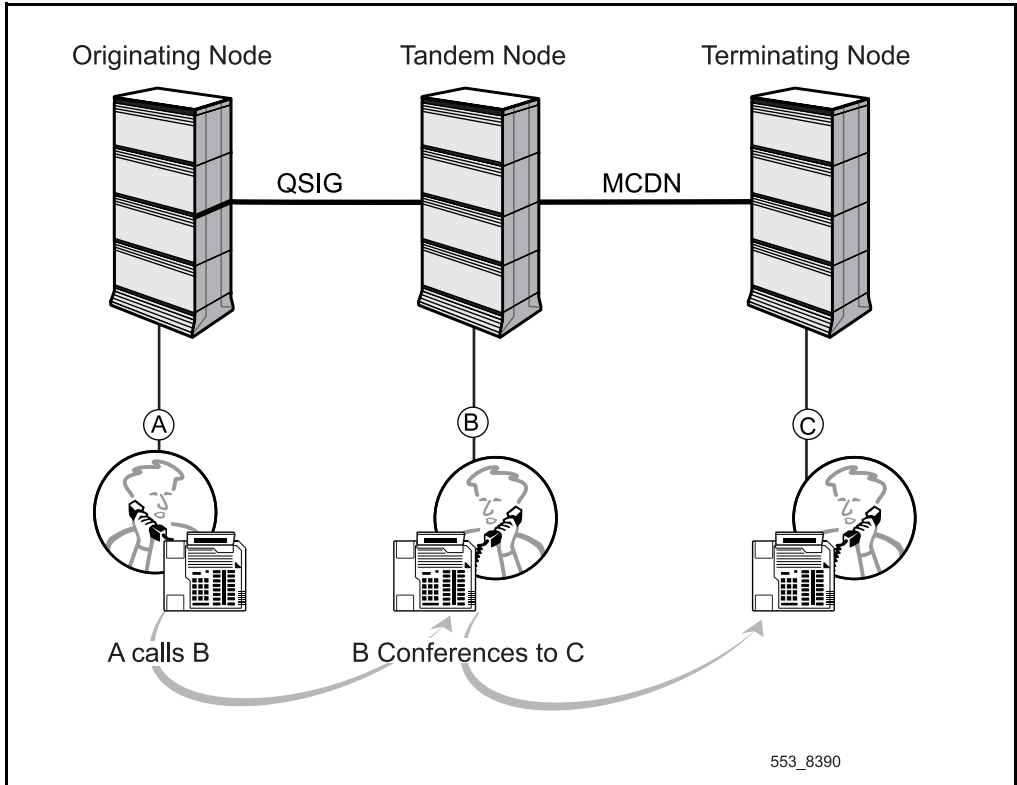
Conference (QSIG/MCDN link)

Referring to Figure 39, 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 39
Conference over a QSIG/MCDN link

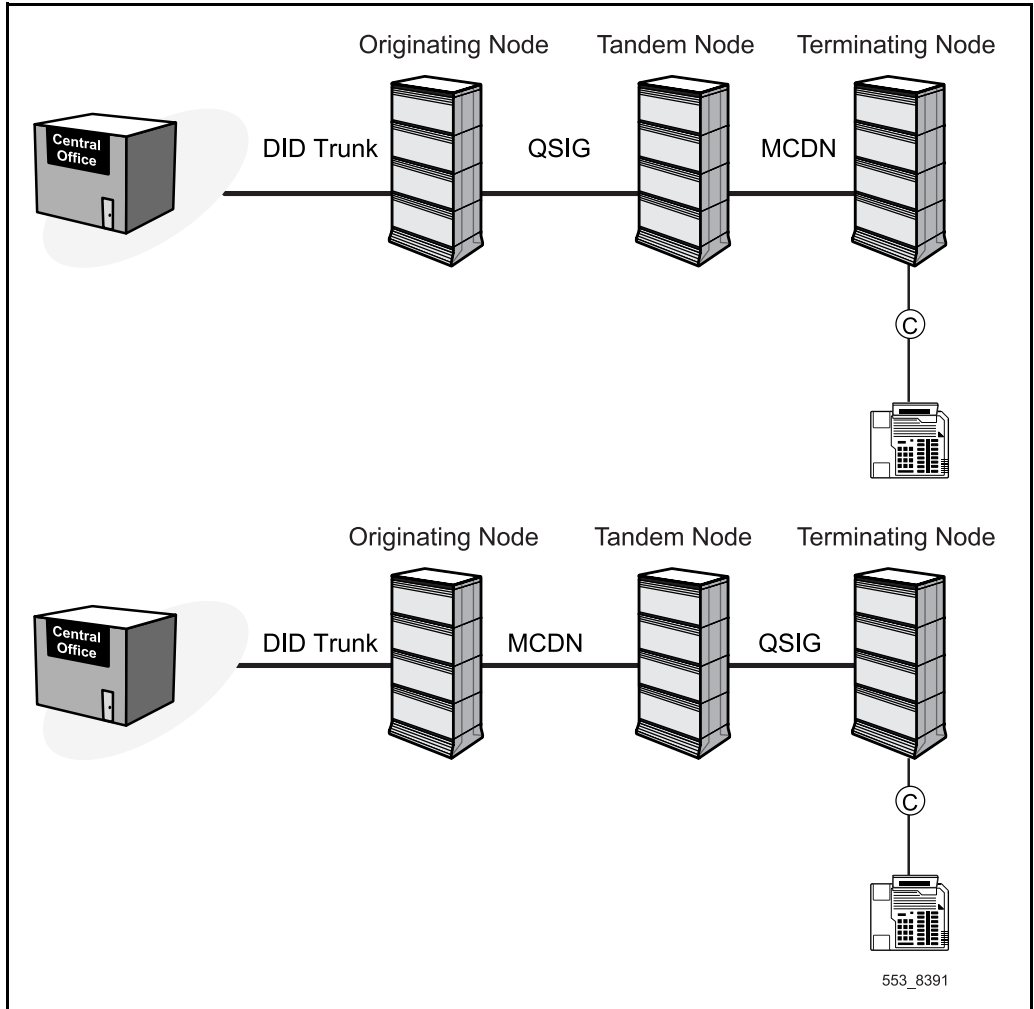


Incoming Digit Conversion (QSIG/MCDN or MCDN/QSIG link)

Referring to Figure 40, 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 40
Incoming DID Digit Conversion over a QSIG/MCDN, or MCDN/QSIG link

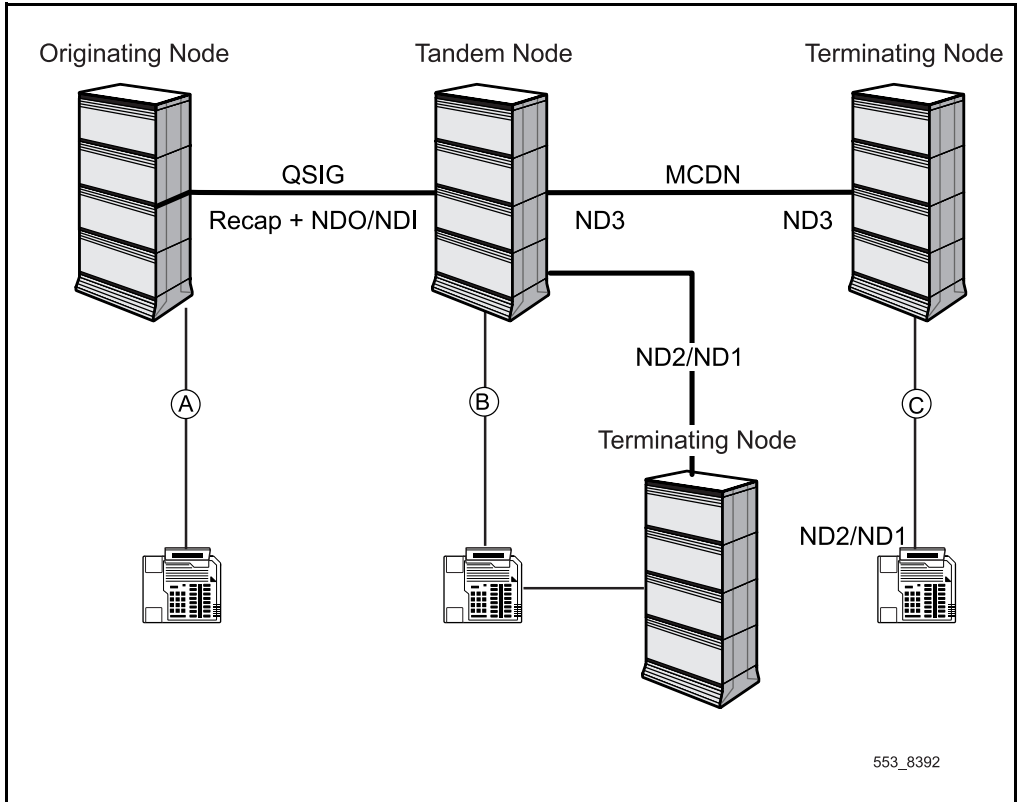


MCDN Name Display features (QSIG/MCDN link)

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 41.

Figure 41
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 implementation

- This section contains the procedures required 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		Calling Party Name Display
	NEW CHG OUT	Add data block. Change existing data block. Remove existing data block.
- NAME		Calling Party Name Display name.
	aaaa yyyy	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.
...		

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 page 623.

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.

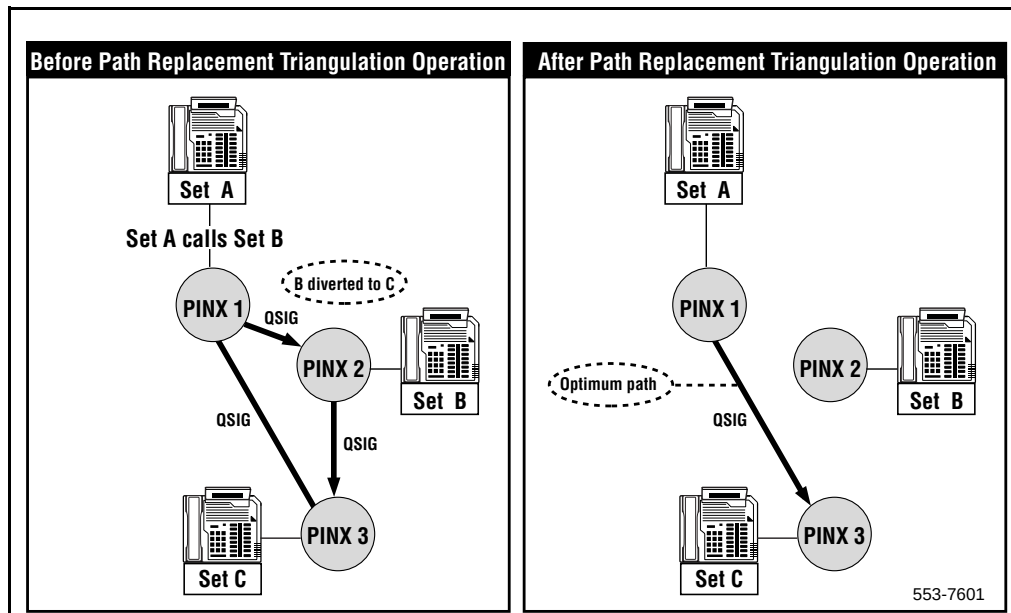
Triangulation Path Replacement

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 42, 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 42
Triangulation Path Replacement

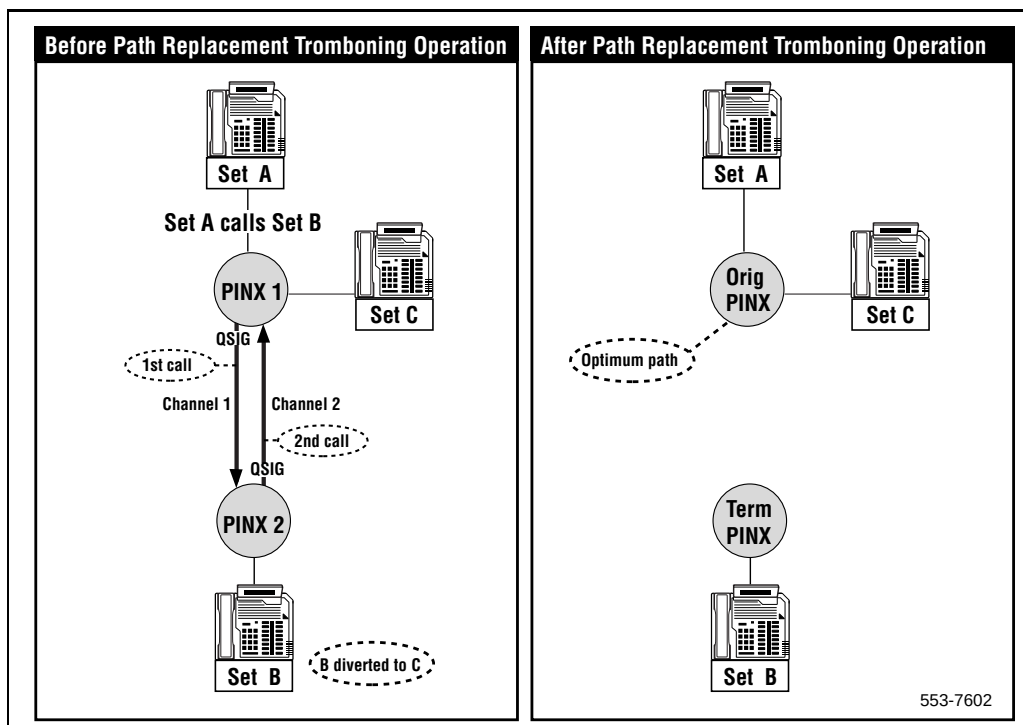


Anti -Tromboning Path Replacement

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 43, 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.

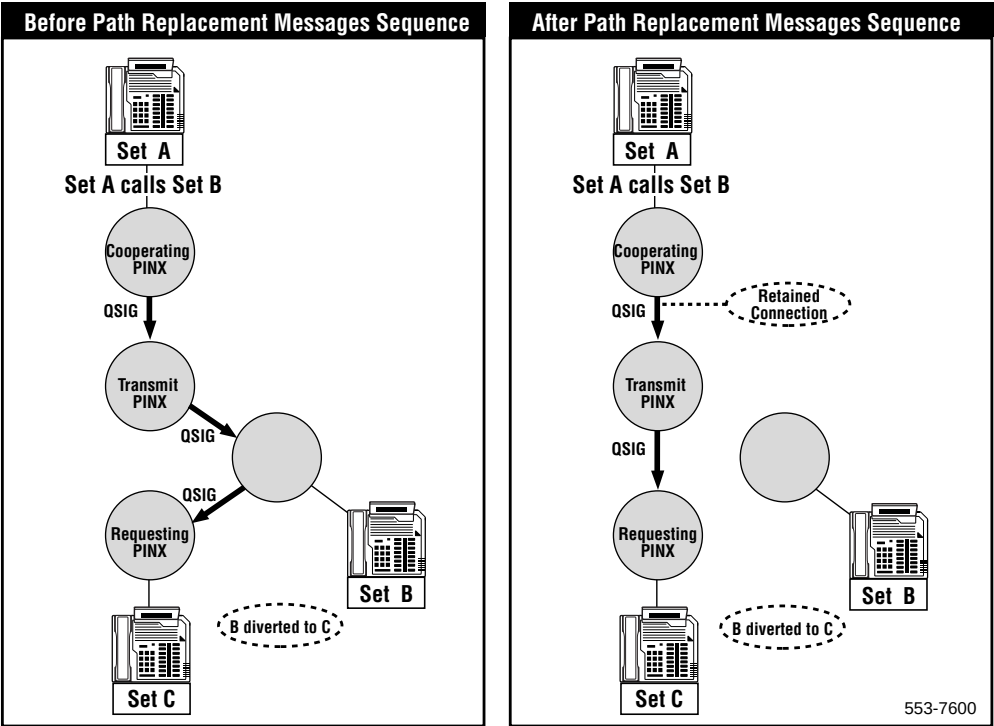
Figure 43
Tromboning Path Replacement



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 44, the connection between the cooperating and transit PINX is retained after path replacement has occurred.

Figure 44
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.

New traffic reports are generated for QSIG Path Replacement. TSF009 reports traffic activity for D-channels and TFS011 reports traffic activity for Multi-purpose ISDN Signalling Processor (MISP) for QSIG Path Replacement service. This pertains to ISDN BRI trunk applications.

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 implementation

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 - 511 0-127	Route Number. For Option 11C.
...		
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.

Feature operation

No specific operating procedures are required to use this feature.

ISDN QSIG-BC and QSIG-GF Compliance Update

With X11 Release 24.2x, two European QSIG interfaces are available. One version (called the ISDN QSIG-BC and QSIG-GF Compliance Update) is compliant with latest editions of the standards. The other version is compliant with older (X11 Release 22) versions of the standards.

The latest European standards documents for QSIG are:

- ETS 300-172, fourth edition (1997)
- ETS 300-239, second edition.

In X11 Release 20, support for the ISDN QSIG interface and the basic call capability was introduced. This version of the interface was based on the ETS 300-172, first edition (1990) document.

In X11 Release 22, the QSIG-GF Transport interface was introduced, in accordance with the ETS 300-239 (1993) standard document. The basic call functionality was upgraded to be compliant with the second edition of the ETS 300-172 document.

QSIG Basic Call Compliance Update

Comprehension required IEs

When an incoming Information Element (IE) coded “comprehension required” is not recognized, the system treats the message the same way it treats messages with a mandatory information element missing. A message is sent back with cause 96 “mandatory information element missing.” The messages returned are shown in Table 63.

Table 63
Unrecognized “comprehension required IE” treatment

Incoming message	Message returned
SETUP	RELEASE COMPLETE with cause 96
DISCONNECT	RELEASE with cause 96
RELEASE	RELEASE COMPLETE with cause 96
RELEASE COMPLETE	No message is returned (see note 1)
Other	STATUS with cause 96
Note 1: The message is treated as if it is received with cause 31 “Normal, unspecified.”	

Transit counter

The transit counter IE is defined as a codeset 4 IE instead of codeset 5. The transit counter functionality is considered to be a supplementary service.

Restart procedure

When a RESTART message with a restart IE coded “Channel indicated” is received with no Channel ID IE, the message is treated as if a mandatory IE is missing. A STATUS message is returned with cause 96, (mandatory IE missing).

Progress indicator

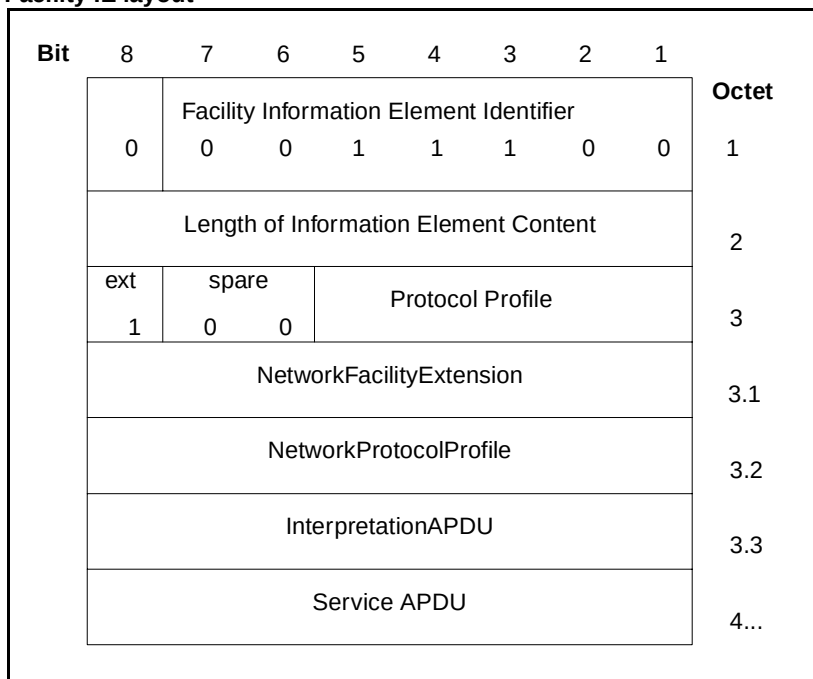
Progress indicators 15, 16, 17 and 18, defined in the European Computer Manufacturer’s Association (ECMA) coding are not defined for this interface.

QSIG GF Compliance Update

Facility IE coding

Figure 45 illustrates the layout of the Facility IE.

Figure 45
Facility IE layout



Protocol profile coding

Figure 46 illustrates three different examples of coding in the Protocol Profile.

Figure 46
Protocol Profile Coding

Bits					
	5	4	3	2	1
	1	0	0	0	1
	1	0	0	1	1
	1	1	1	1	1
All other values are reserved.					

On transmission, the Meridian 1 codes the Protocol Profile as “Networking Extension.”

On reception, the Meridian 1 supports Protocol Profile coded as “ROSE” or “Networking Extension.”

Network Protocol Profile coding

The Network Protocol Profile is used to specify the Service APDU coding type. Since the Meridian 1 only supports ROSE (the default coding type), the Network Protocol Profile is always omitted.

NFE and interpretation coding

No change is introduced by this update in the coding of the NFE and of the interpretation APDU.

Service APDU coding

The Service APDU coding is service dependent. It is not affected by this update.

Operating parameters

The X11 Release 22 version of QSIG is still available, to be used in networks where supplementary services are involved.

The following systems are supported:

- Option 11C
- Option 51C
- Option 61C
- Option 81
- Option 81C

The ISDN QSIG-BC and QSIG-GF Compliance Update feature is not available on PRI 1.5 Mbps links. These links are usually configured with ISO QSIG GF.

The following optional parts of the protocol are not supported by the ISDN QSIG-BC and QSIG-GF Compliance Update feature:

- Message segmentation
- Multi-rate
- Indication of the channel with a map in the Channel ID IE

There are two choices of PRI2 hardware for Option 51C, Option 61C, Option 81, and Option 81C systems:

- PRI2 card (NT8D72) and MSDL card (NT6D80)
- Dual port DTI/PRI2 card (NTCK43) and either the Downloadable D-channel Daughterboard card (NTBK51) or the MSDL card (NT6D80)

These systems require the QPC775 (Release E) or the QPC471 Clock Controller card.

The hardware required for the Option 11C is:

- PRI2 card (NTBK50)
- Downloadable D-channel Daughterboard card (NTBK51)
- Clock Controller (NTAK20)

The hardware required for ISDN BRI is as follows:

- SILC card (NT6D70)

- MISP card (NT6D73) for Option 51C, Option 61C, Option 81, and Option 81C systems
- MISP card (NTBK22) for the Option 11C system

Feature interactions

There are no feature interactions specified for this feature.

Feature packaging

The following software packages are required for ISDN PRI2 QSIG:

- ISDN Signaling (ISDN) package 145
- 2 Mbps PRI (PRI2) package 154
- International PRA (IPRA) package 202
- Multi-Purpose Serial Data Link (MSDL) package 222
- QSIG Interface (QSIG) package 263
- QSIG GF Transport (QSIGGF) package 305

The following software packages are required for ISL QSIG:

- ISDN Signaling (ISDN) package 145
- ISDN Signaling Link (ISL) package 147
- 2 Mbps PRI (PRI2) package 154
- Multi-Purpose Serial Data Link (MSDL) package 222
- QSIG Interface (QSIG) package 263
- QSIG GF Transport (QSIGGF) package 305

The following software packages are required for ISDN BRIT QSIG:

- ISDN Signaling (ISDN) package 145
- ISDN Basic Rate Access (BRI) package 216
- Multi-Purpose Serial Data Link (MSDL) package 222
- ISDN BRI Trunk Access (BRIT) package 233

- QSIG Interface (QSIG) package 263
- QSIG GF Transport (QSIGGF) package 305

Feature implementation

To configure the updated QSIG interface on a PRI2 link:

- 1** Configure the updated interface type for the D-channel in LD 17.
- 2** Configure the updated interface type on the route in LD 16.

To configure the updated QSIG interface on a BRI trunk route:

- 1** Configure the updated interface type on the route in LD 16.

LD 17 – Configure the updated interface type for the D-channel.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ADAN	Action Device and Number.
- ADAN	NEW DCH 0-63	New D-channel number.
...	...	
- IFC		Interface type for D-channel.
	EGF4	ETSI QSIG version 4 with GF capability (only available with RIs 24.2x or later). Only available for PRI2 loops.
...	...	
- DCHL	xxx	PRI2 loop number for D-channel.
...	...	

LD 16 – Configure the updated interface type for the trunk route.

Prompt	Response	Description
REQ	NEW/CHG	Add or Change.
TYPE	RDB	Route Data Block.
...	...	
- IFC		Interface type for D-channel.
	EGF4	ETSI QSIG version 4 with GF capability (only available with RIs 24.2x or later).
...	...	

Feature operation

There are no operating procedures specified for this feature.

ISDN Signaling Link

ISDN Signaling Link (ISL) provides the capability to replace both digital and analog conventional trunk signaling with out-of-band ISDN D-channel signaling. The following applications are supported by ISL:

- Calling Line Identification (CLID)
- CLID in Call Detail Recording (CDR)
- Electronic Switched Network (ESN) interworking
- Network Call Redirection (NCRD)
- Network Ring Again (NRAG)
- Network Message Services (NMS)
- Network Call Party Name Display (NCPND)
- Network ACD (NACD)

When the D-channel is inactive, ISL trunk calls can automatically revert to conventional trunk signaling. This applies to both primary and backup D-channels.

ISL supports TIE and ISA trunk types with Meridian 1 to Meridian 1 connectivity.

The TIE lines and trunk used for the D-channel can be leased from the central office (CO). With leased lines, the function of the CO is simply to provide the trunk wire facilities between Meridian 1 systems for circuit switched connections.

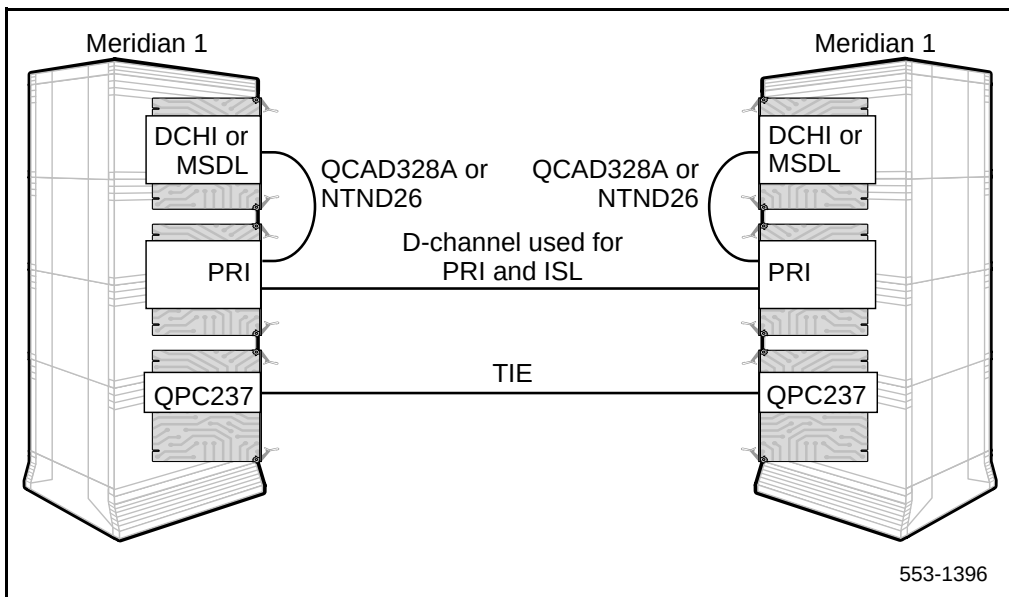
The ISDN Signaling Link supports a uniform trunk hardware configuration. This configuration uses the QPC237 4-wire E&M TIE trunk card in place of other analog trunk cards (such as the QPC71 TIE trunk card or the QPC72 DID/DOD trunk card).

Note: If the QPC237 TIE trunk card is not used, backup D-channel is not available.

There are two modes of ISL operation:

- Shared mode: The 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. See Figure 47.
- Dedicated mode: The DCHI does not support ISDN PRI signaling. The DCHI is reserved for ISL use. The D-channel can communicate with the far end by means of a dedicated leased line, dial-up modem, or DTI/PRI trunk. See Figure 48.

Figure 47
ISDN Signaling Link: shared mode



For ISL to use an ISA route, the ISA route must be identified as ISL in LD 16. This is done by assigning the MODE prompt to ISLD.

When an ISL call utilizes a Call-by-Call Service, the D-channel associated with the ISA route for the Call-by-Call Service is used for signaling.

Note: In X11 release 15, the High Speed Data Module (HSDM) is used in place of both the Asynchronous/Synchronous Interface Module (ASIM) and the Add-On Data Module (ADM).

Figure 48
ISDN Signaling Link: dedicated mode configurations

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Reverting to conventional trunk signaling This feature handles ISL trunk calls by reverting to conventional trunk signaling when the D-channel is inoperative. This applies to the primary and backup D-channels as well as ISA.

When a primary or backup D-channel goes down:

- Established ISL calls remain established, regardless of the signaling method used.
- Transient ISL calls that are set up using conventional trunk signaling are not disturbed.
- Transient ISL calls that are set up by means of D-channel signaling are dropped. The user must reinitiate the call. Then conventional trunk signaling is used if the D-channel remains inactive.
- ISL channels are not marked maintenance busy.

There are two scenarios that can occur when a D-channel is reestablished, one with backup D-channel and one without. When a backup D-channel reestablishes:

- There is no impact. The other D-channel simply recovers. ISL calls still using D-channel signaling (in existing software) can bypass the restart procedure.

When a D-channel that does not have a backup reestablishes:

- Transient and established ISL calls that are set up using conventional trunk signaling are not disturbed.
- Established ISL calls that are set up using D-channels are disconnected.
- To disconnect an established ISL call, the system uses the same signaling method that the call was set up with.

When the ISL D-channel goes down, the following scenario occurs. Since ISL trunks can convert to conventional trunk signaling, the ISL route (which is associated with a D-channel) is bypassed using conventional trunk signaling.

Feature implementation

There are two modes of ISDN Signaling Link (ISL) operation:

- Shared mode
The 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.
- Dedicated mode
The DCHI does not support ISDN PRI signaling. The DCHI is reserved for ISL use. The D-channel communicates with the far end by means of a dedicated leased line, dial-up modem, or DTI/PRI trunk.

ISDN Signaling Link (ISL) supports Calling Line Identification (CLID) and CLID in Call Detail Recording (CDR), Electronic Switched Network (ESN) interworking, and Network Ring Again (NRAG) applications. The ISL service is supported in the uniform trunk hardware configuration. For Call-By-Call Service, an ISA route must be established and identified with the ISL interface.

Configuring ISL

Note: Before making a change to an ISL trunk, disable the D-channel. The Meridian 1 may initialize if you do not follow this procedure.

To configure ISL, perform the following steps:

- 1** LD 17 Configuration Record (see Procedure 20)
Configure the D-channel for ISL use.
X11 release 17 and earlier
- OR*
- 2** LD 17 Configuration Record (see Procedure 21)
Configure the D-channel for ISL use.
X11 release 18 and later
- 3** LD 15 Customer Data Block (see Procedure 22)
Define a PRI customer.

- 4 LD 16 Route Data Block (see Procedure 23)
Enable the ISL option on a per route basis, assign a D-channel for each route, and enable the ISL Call-By-Call Service.
- 5 LD 14 Trunk Data Block (see Procedure 24)
Assign a channel identification to each trunk with the ISL option.

Procedure 20

Configure the D-channel for ISL in LD 17 (X11 release 17 and earlier) (Part 1 of 2)

Prompt	Response	Description
REQ	CHG	Change data.
TYPE	CFN	Configuration record
...		
PARM	YES	Change parameters.
ISDN	YES	ISDN.
DCHI	1–15	DCHI port number (remove with Xnn)—only odd numbers allowed
BCHI	1–15	Back-up DCHI port number
USR		Change DCHI parameters
	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
		Note 1: One of the above responses is mandatory and there is no default.
		Note 2: Package 147, ISDN Signaling Link, is required.
DCHL	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	0–159	PRI loop number for BCHI

Procedure 20**Configure the D-channel for ISL in LD 17 (X11 release 17 and earlier) (Part 2 of 2)**

Prompt	Response	Description
OTBF	1–(16)–127	Number of output request buffers—use default (16)
DRAT		D-channel transmission rate
	56K	56 kbps, default when LCMT (LD 17) is AMI
	64KC	64 kbps clear, default when LCMT (LD 17) 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	loop ID	Not prompted if the D-channel is in dedicated mode (the D-channel does not require a channel on the PRI card)
ISLM	1–382	Number of ISL trunks controlled by the D-channel (no default value)
CLOCK	(EXT), INT	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 loopback testing, where one side is set to INT, the other side is set to EXT.

Procedure 21**Configure the D-channel for ISL in LD 17 (X11 release 18 and later) (Part 1 of 2)**

Prompt	Response	Description
REQ	CHG	Change
TYPE	CFN	Configuration Record
ADAN	NEW DCH 0–63	Add a primary D-channel (can also be CHG and OUT DCH)
CTYP	DCHI, MSDL	Card type
DNUM	0–15	Device number: physical port (odd) for D-channel on DCH, physical card address for MSDL
_PORT	0–3	Port number on MSDL card
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

Procedure 21**Configure the D-channel for ISL in LD 17 (X11 release 18 and later) (Part 2 of 2)**

Prompt	Response	Description
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	DCHI, MSDL	Card type
DNUM	0–15	Physical port (odd) for D-channel, card number for MSDL
_PORT	0–3	Port number on MSDL card
BCHL	0, 2, 4, ... 159	PRI loop number for backup D-channel
RCVP	Yes, (No)	Auto-recovery to primary D-channel option
ADAN	<cr>,****	Go on to next prompt or exit overlay

Procedure 22**Use LD 15 to define a PRI customer (Part 1 of 2)**

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	0-99	Customer number
LDN0	xxxx . . x	Listed Directory Number 0 length This value must be set to terminate all incoming ISDN/DID calls. Determines the number of digits to translate.
ANAT	xxxx . . x	Attendant billing number ANAT and ANLD combined must be 7 digits.
ANLD	xxxx . . x	ANI listed DN ANLD and ANAT combined must be 7 digits.
AC2		Access code 2. Enter call types (type of number) that use access code 2. This relates to ESN dialing plans. If you do not have a dialing plan, <cr> past this prompt. Multiple responses are permitted. If a call type is not entered here, it automatically defaults to access code 1.
	NPA	E.164 National
	NXX	E.164 Subscriber
	INTL	International
	SPN	Special number
	LOC	Location code (prompted only for NARS)
ISDN	YES	Change ISDN options
_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)
_HNPA	100-999	Home Number Plan Area code (for CLID)

Procedure 22**Use LD 15 to define a PRI customer (Part 2 of 2)**

Prompt	Response	Description
_HNXX	100–999	Prefix for central office (for CLID)
_HLOC	100–9999	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 internode hops in a network redirection call

Procedure 23**Use LD 16 to enable the ISL option on a per route basis (Part 1 of 3)**

Prompt	Response	Description
REQ	NEW	Add a PRI trunk route
TYPE	RDB	Type of data
CUST	0–99	Customer number
ROUT	0–511	Route number
TKTP	TIE	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
_DCH	1–15	DCH port number or MSDL logical 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), No	Network call name allowed

Procedure 23**Use LD 16 to enable the ISL option on a per route basis (Part 2 of 3)**

Prompt	Response	Description
_NCRD	(No), Yes	Network Call Redirection
_TRO	Yes, (No)	Trunk optimization allowed (denied) on the route
_NSF	Yes, (No)	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 Class Of Service
_CLS	aaa	Class of service restriction for tie route
_TGAR	0–31	Trunk group access restrictions
_IEC	000–999	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

Procedure 23**Use LD 16 to enable the ISL option on a per route basis (Part 3 of 3)**

Prompt	Response	Description
_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

Procedure 24**Respond to the following prompts in LD 14**

Prompt	Response	Description
REQ	NEW, CHG, MOV, OUT, END	
TYPE	TIE	Trunk type allowed
TN	loop ch	Use loop number created in LD 17
RTMB	0–511 1–254	The route defined as an ISA route in LD 16
CHID	1–382	Channel identifier for ISL channels (remove with Xnn)—must be coordinated with far end (no default value)

Feature testing

To verify the ISL, do the following:

- 1 Coordinate with far end personnel. Place a call over a Meridian 1 switch.
- 2 As you are dialing, the dialed DN appears on your telephone.
- 3 When the far end telephone is ringing, the CLID of your telephone is displayed on the far end telephone.
- 4 Both telephones continue to display the CLID when the far end goes off hook.

Integrated Trunk Access

Integrated Trunk Access (ITA) allows common digital transmission facilities (such as a T1 link) to be shared by:

- B-channel trunks (ISL/PRI)
- traditional A&B bit signaling trunks

This feature removes some trunks from PRI exclusive use, to share between PRI and traditional A&B signaling. ITA supports the following configurations:

- Meridian 1 to Meridian 1
- Meridian 1 to SL-100
- Meridian 1 to DMS-100
- Meridian 1 to DMS-250

Note 1: Channels must match for both signaling and routing.

Note 2: A separate Route Data Block (LD 16) must be configured for A/B channels. While PRI is operational, create an RDB for the A/B channels. Then remove the PRI trunks in LD 14. Create new trunks with the same TNs for the new route.

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 662, “Transit node operation” on page 664, and “MCDN Alternate Routing examples” on page 666 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 49, 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 50, 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.

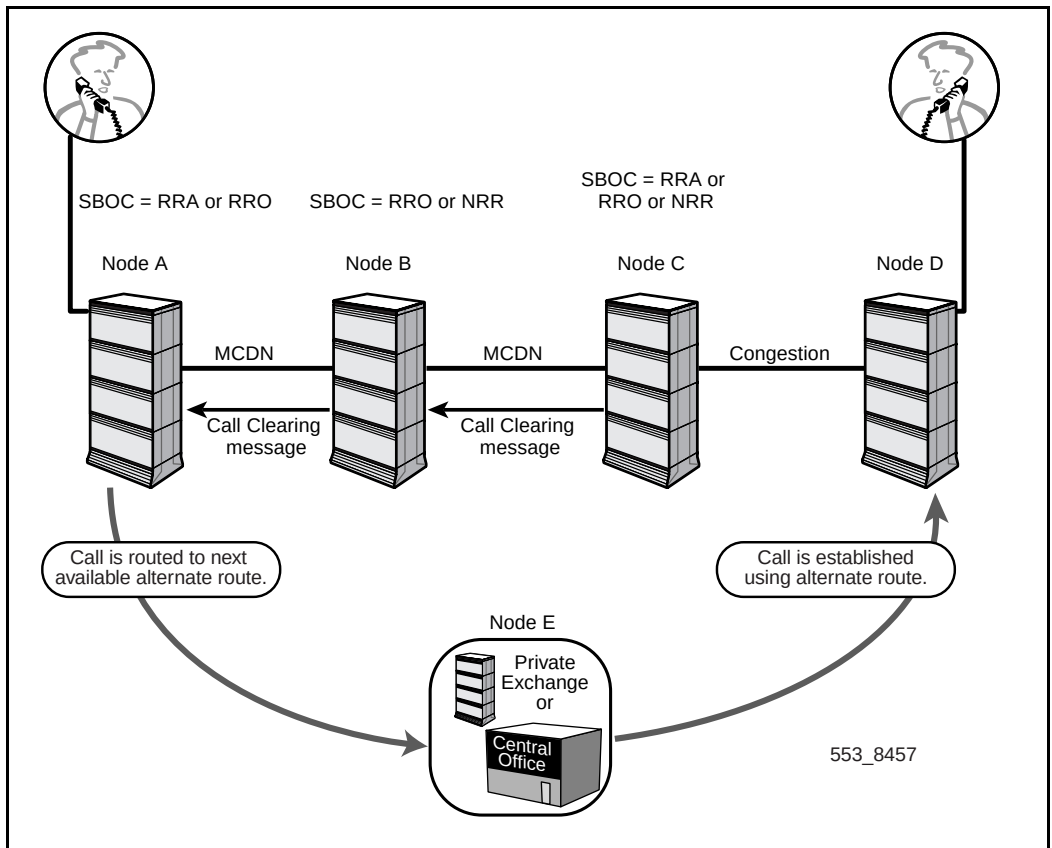
At node B, the SBOC option is checked to determine the routing treatment:

- 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 49 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.

Figure 49
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.

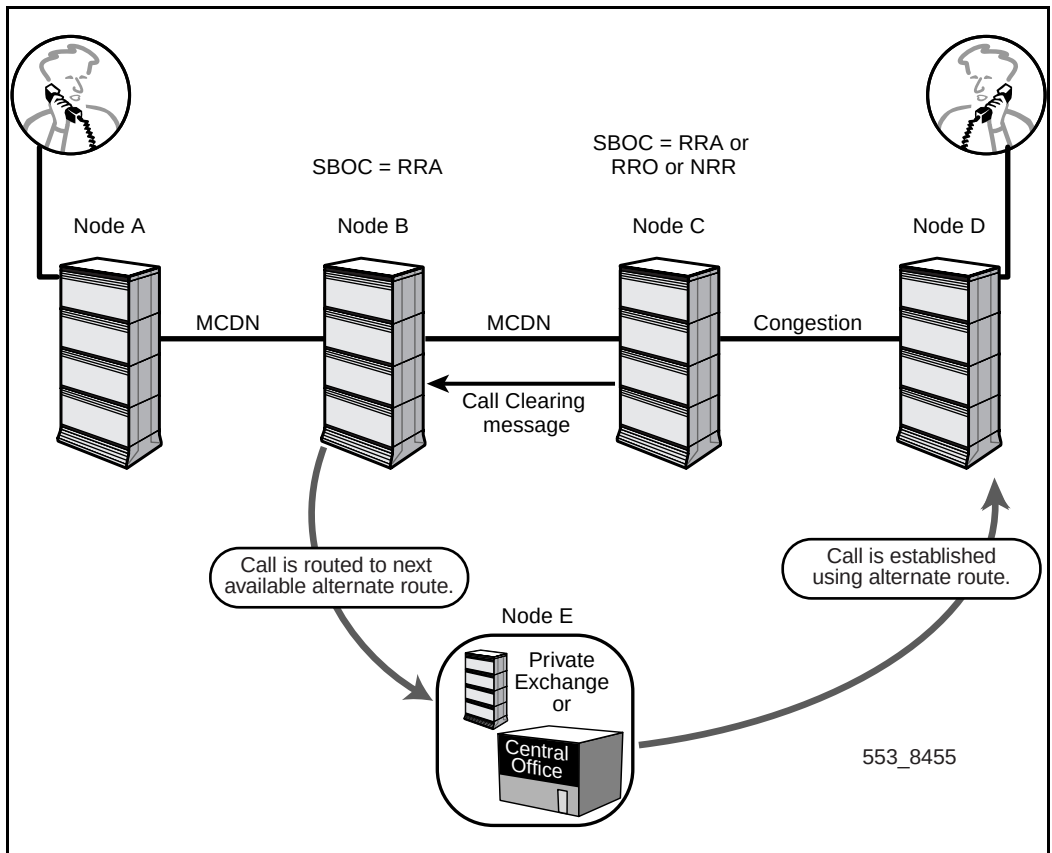
Whether node C is defined as SBOC = RRA or RRO or NRR, the congestion message, along with a MCDN Alternate Routing feature cause value, is always sent back to node B.

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 50 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 50
Transit node RRA operation

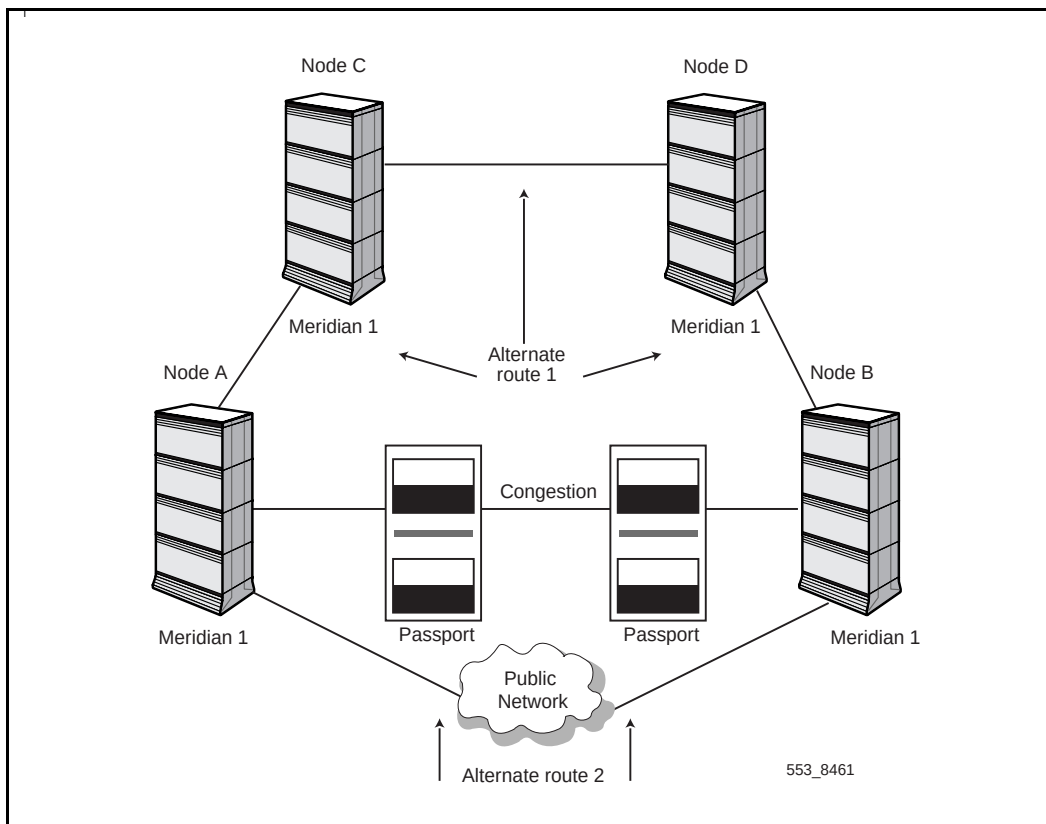


MCDN Alternate Routing examples

Example 1: Meridian 1 networked with Passport

In this scenario (refer to Figure 51), 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 51
Example of Meridian 1 with Passport network

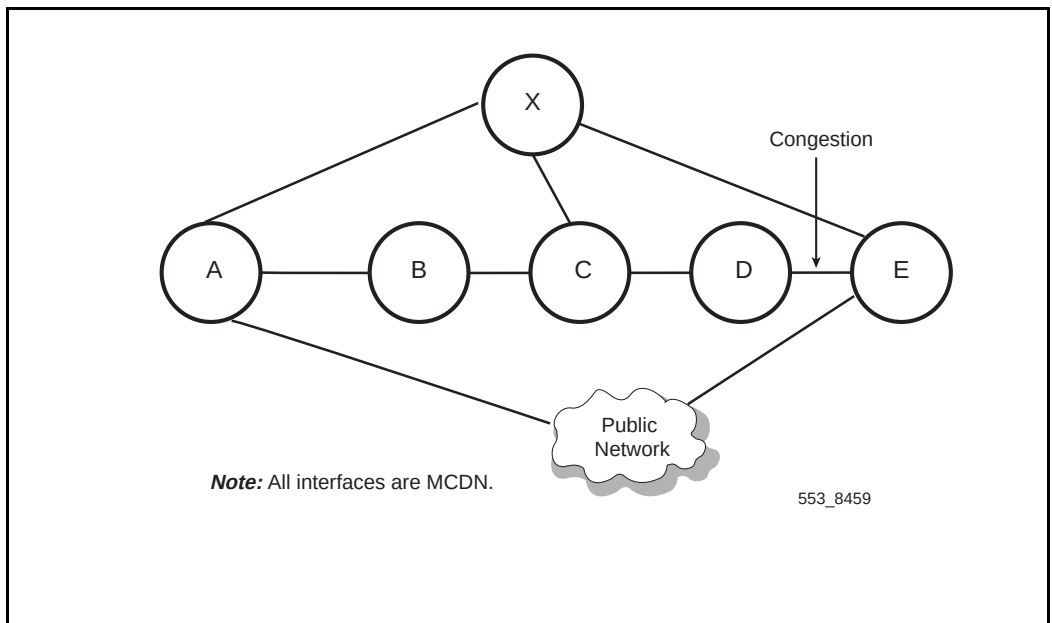


Example 2: Multi node network

Consider a scenario (refer to Figure 52) 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 52
Example of multi node network

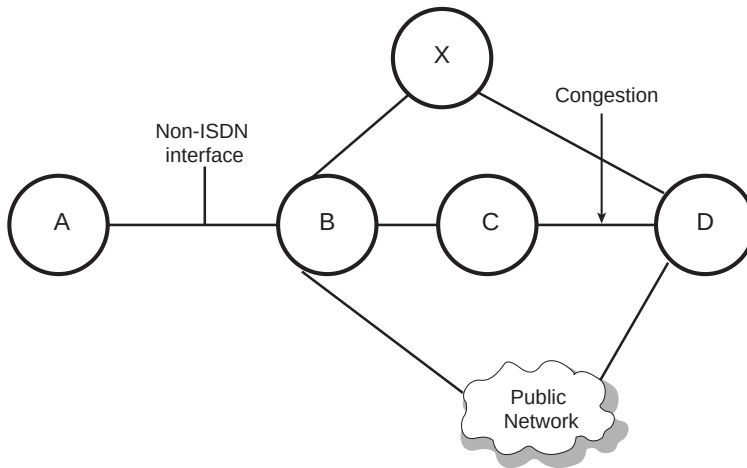


Example 3: Tandem call with non-ISDN originating node

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 53**Example of a tandem call with non-ISDN originating node**

Note: All unmarked connections are MCDN interfaces.

553_8460

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 implementation

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.

Feature operation

There are no operating procedures required to use this feature.

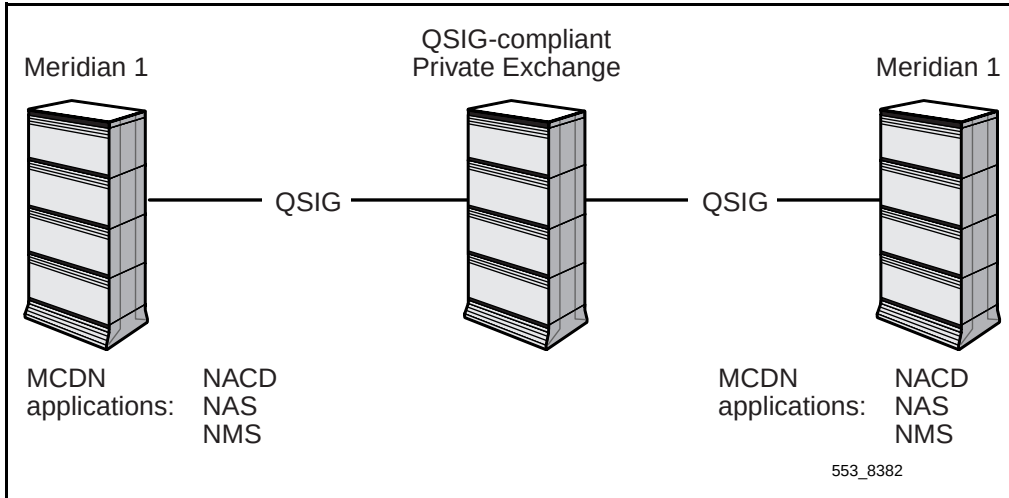
MCDN End to End Transparency

Meridian Customer Defined Network (MCDN) services are based on propriety specific Integrated Services Digital Network (ISDN) signaling. The MCDN End to End Transparency (MEET) 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). MEET 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 54 illustrates the MEET feature.

Figure 54
MCDN End to End Transparency



NAS using the QSIG transport

The MEET 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 MEET 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 MEET 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 MEET feature, NACD continues to work fully with Symposium in an MCDN network. The MEET 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

MEET 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 implementation

To implement MEET, follow these steps:

- In LD 17, configure a D-Channel for a PRI interface using the QSIG transport and select the NAS, NACD and/or NMS MCDN features.

After selecting NAS in LD 17 or LD 16, to configure NAS for a QSIG link, follow these steps:

- In LD 12, configure attendant consoles with NAS key (optional).
- In LD 15, enable or disable network attendant control, NAS control and define trunk ICI keys and NAS routing thresholds in LD 15.
- In LD 86, define the NAS routing table.

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.
- In LD 15, configure a CLID table.
- In LD 23, configure the ACD DN queue at source and target nodes.
- In LD 23, configure the NACD routing table in LD 23.
- In LD 11, define a Meridian 1 proprietary ACD set at source and/or target node.

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.
- In LD 15, allow Message Waiting Center access.
- In LD 11, 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.

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. Precede MQC feature type with X to remove.
	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 or 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 telephone 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	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	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 or 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 ACD agent 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	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	(MWD) MWA	Class of Service options. MWD = Message Waiting Denied MWA = Message Waiting Allowed.
...		
KEY	xx MIK	MIK = Message Indication Key. xx = key number.
	xx MCK	MCK = Message Cancellation Key. xx = key number.

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 or 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	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	VMA	Allow voice messaging.
...		
KEY	xx ACD yyyy 0-N/D zzzz	xx = key number 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). xx MSB xx NRD xx TRN xx A03 xx A06 xx RLS	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. Make Set Busy key. Not Ready key. Call Transfer key. A03 = Three-Party Conference key. A06 = Six-Party Conference key. 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.

Feature operation

Feature operation for direct Message Center calls and Indirect Message Center calls are presented in the following sections.

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).

Direct Message Center call

- 1 User A dials their MC DN or presses their MWK key.
- 2 The MC rings. For ACD sets, the MCK lamp state shows the MC user's message indication state: lit if there is no message; slow flash if a message is waiting; fast flash if there is bad data; dark if message waiting indication class of service is denied.
- 3 The MC operator answers the call. For DN sets, the MCK lamp state reflects MC user's message indication state.
- 4 User B is connected to MC and is given their message by the MC operator.
- 5 The MC operator presses MCK key (if MCK lamp is flashing) to turn off message waiting indication at station B. The MCK lamp changes to dark.
- 6 User A disconnects from the MC.

Indirect Message Center call

- 1** User A calls User B.
- 2** User B has calls redirected to the MC (Call Forward all Calls or No Answer).
- 3** Call is presented to the MC; MC rings; MC operator answers the call.
- 4** If QSIG Diversion is configured, the MIK lamp has the lamp state that reflects the MC user's message indication state: lit if there is no message; flash if a message is waiting; fast flash if there is bad data; dark if message waiting indication class of service is denied. User A is connected to MC and leaves a message.
- 5** If QSIG diversion is not configured, the MC operator activates the Message Waiting indication in the following sequence:
 - MC operator puts the call On Hold, presses the MIK key and MIK lamp lights.
 - MC operator dials User B's DN. The MIK lamp changes to the lamp state that reflects the MC user's message indication state.
 - If the MIK lamp is lit, the MC operator presses the MIK key to turn on the message waiting indication at station B, The MIK lamp changes to dark.
 - The MC operator returns to the Held call.
- 6** User A disconnects from the call.

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.

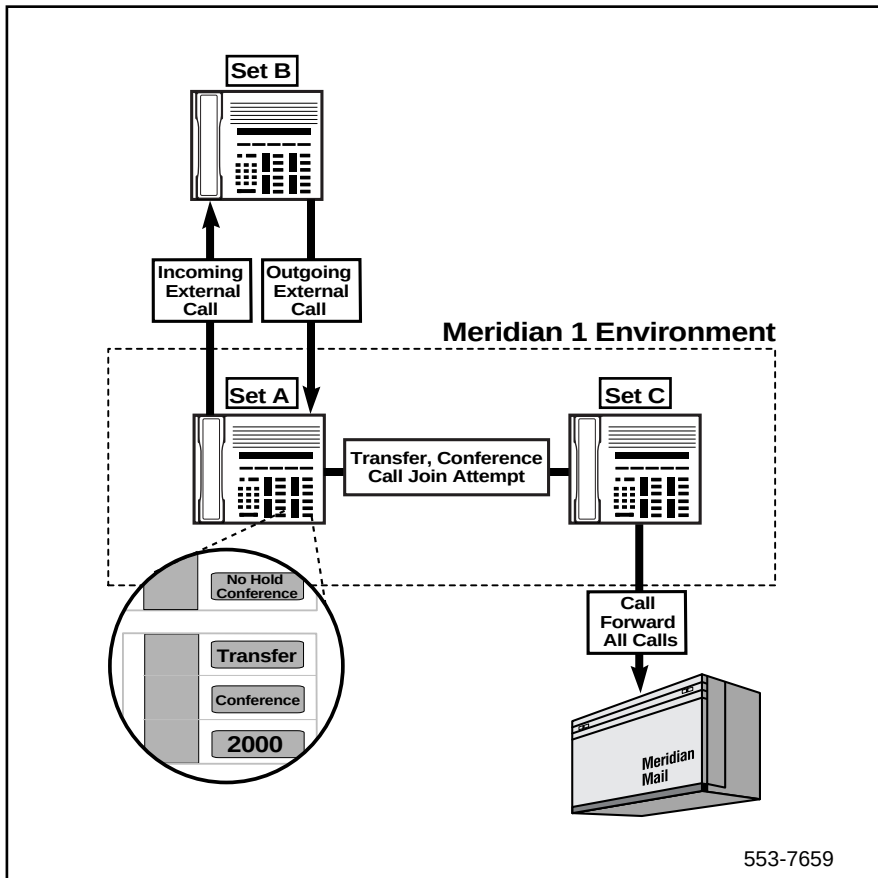
Meridian Mail Trunk Access Restriction averts potential Meridian Mail system abuse by distinguishing between internal and external calls that are directed to Meridian Mail. When activated, Meridian Mail Trunk Access Restriction impacts the operation of the following features:

- 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 55, 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 55
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 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	xx	Customer number.
- OPT	MCI	Message Centre Included.
...		
- MTAR	YES	Meridian Mail Trunk Access restricted. NO = Meridian Mail Trunk Access allowed.

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 64 summarizes how different external calls are handled when Meridian Mail Trunk Access Restriction is enabled.

Table 64
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

Meridian Network Services Drop Back Busy/Off-Hook Queuing

Introduction

This document describes the Meridian Network Services (MNS) Drop Back Busy and Off-Hook queuing features which are available across an ISDN network.

The MNS DBB feature provides Drop Back capability at a tandem node as a call is being set up. All network calls which are blocked at a tandem node are dropped back to the originating node where the next alternative is used.

The MNS OHQ feature provides the originator of a network call control over whether Off-Hook Queuing is to be provided at a tandem node or not. The Off-Hook Queuing mechanism itself is unchanged from the original OHQ feature provided for non ISDN (ESN) networks. Therefore, all existing eligibility criteria must be met to allow this feature to function.

This feature effectively provides the originating node control over network calls using MNS.

Definition of terms

- DBB Drop Back Busy
- ESNElectronic Switched Network
- ISDNIntegrated Services Digital Network
- MNSMeridian Network Services
- NARSNetwork Alternate Route Selection
- NASISDN Network Attendant Service

- NASANetwork Attendant Service Active
- OHQOff-Hook Queuing
- PRAPrimary Rate Access
- RLBRoute List Block

General description

This feature provides network cells Drop Back Busy (DBB) capability across an ISDN network. All MNS calls which are blocked at a tandem node are dropped back to the originating node, where the next alternative is used.

MNS calls are also provided with an Off-Hook Queuing (OHQ) option. This provides the originator of an MNS call control over whether queuing is to be provided at any tandem node of an ISDN network. The queuing feature is set up in the same manner as ESN OHQ. The existing ESN Off-Hook Queuing criteria must be met in order for a call to be queued at a tandem node. That is, if the originating node has the IOHQ option set, and all routes in the initial route list at a tandem node are busy, then the following ESN OHQ criteria must be met:

- At least one of the trunk routes in the initial set of routes in a route list is defined as being eligible for OHQ.
- The network class of service (NCOS) assigned to the calling party is defined to permit OHQ.
- The probability that the call will timeout in the OHQ before a trunk becomes available is below a specified threshold.
- The OHQ feature is enabled for the customer.

Depending upon the IDBB and IOHQ options selected at the originating node, a call at a tandem location will have the following alternatives:

- Drop Back to the originator if all routes in the initial set are busy, and use the next alternative at the originating node.
- Off-Hook Queue if all routes in the initial set are busy, then Drop back to the originating node upon OHQ timeout.

- Off-Hook Queue if all routes in the initial set are busy. Upon OHQ timeout, attempt routing via the extended set. If all routes in the extended set are busy, then Drop Back to the originating node.
- Drop Back to the originator if all routes in the initial set and extended set are busy (DEFAULT).

These options are applicable to any MNS call over an ISDN network.

Assumptions and limitations

Feature limitations

The MNS DBB and OHQ features are supported only for network calls over an ISDN network. Non-ISDN calls are not given DBB or OHQ treatment as specified in this document.

The ESN OHQ must be set up in order for the MNS OHQ feature to operate.

Packaging

This feature is packaged under the Originator Routing Control package. It is assumed that the NASA prompt in overlay 17 has been set to YES to allow use of ISDN Supplementary Services.

To support the DBB feature, the NARS, NCOS, FCBQ, and BRTE packages must be equipped. Any packages required to support ISDN/PRA must be equipped.

Real-time impacts

The MNS DBB and OHQ features use existing call mechanisms, thus no significant real time impact is expected.

Memory impacts

Data store

This feature uses 3 bits of data store memory in each ESN Route List Entry Block.

Program store

This feature adds less than 100 words.

Hardware environment

The DBB feature requires ISDN capabilities.

Feature operation

Each ESN route list entry block has an MNS DBB and an OHQ field associated with it. These fields define the IDBB and IOHQ option to be used at a tandem node.

The IDBB and IOHQ options are never reset at a tandem node—even if the feature is not supported at that node. That is, DBB or OHQ treatment at any tandem node is based upon the IDBB or IOEQ option set at the originating node.

When a call is initiated, the IDEB and IOHQ options are sent with the call setup information. The remote node will act according to the IDBB and IOHQ options received in the call setup message. The options available at a remote node are:

- Drop Back to the originator if all routes in the initial set are busy.
- Off-Hook Queue if all routes in the initial set are busy, then Drop Back to the originating node upon OHQ timeout.
- Off-Hook Queue if all routes in the initial set are busy. Upon OHQ timeout, attempt routing via the extended set. If all routes in the extended set are busy, Drop Back to the originating node.
- Drop Back to the originator if all routes in the initial set and extended set are busy. This is the default option.

A blocked network call will drop back to the originator regardless of the cause. That is, drop back will take place if trunks are busy, disabled, in maintenance, or due to call connection limitations.

With the Message Intercept feature equipped, the user could receive the message intercept voice response instead of the Off-Hook Queuing tone.

OHQ eligibility at a tandem node is determined by the current ESN OHQ eligibility criteria.

Example

Figure 56 illustrates a simple example of MNS DBB and OHQ operation.

Figure 56**Example of MNS DBB and OHQ operation**

Node A:

First alternative = B

Second alternative = D

(extended set probably via public exchange)

Options:

Drop Back Busy (IDBB):

DBA—Drop Back if all routes in the initial and extended sets are busy

DBI—Drop Back if all routes in the initial set are busy

Off-Hook Queuing Options (IOHQ):

NO—No off-hook queuing

YES—OHQ if possible at tandem node (if OHQ enabled for the node)

The possible scenarios for the case in which Set A dials the DN of Set D, are as follows:

- 1** IDBB = DBI and IOHQ = NO: If all routes in the initial set between Node B and Node C are busy, the call drops back to Node A and the next alternative is used, if available.
- 2** IDBB = DBI and IOHQ = YES: If all routes in the initial set between Node B and Node C are busy, then OHQ is provided. Upon OHQ timeout, the call drops back to Node A and the next alternative is used, if available.
- 3** IDBB = DBA and IOHQ = YES: If all routes in the initial set between Node B and Node C are busy, then OHQ is provided. Upon OHQ timeout, routing via the extended set is attempted. If all routes in the extended set are busy, the call Drops Back to Node A and the next alternative is used, if available.
- 4** IDBB = DBA and IOHQ = NO (Default options): If all routes in the initial and extended set between Node B and Node C are busy, the call drops back to Node A and the next alternative is used, if available.

Feature administration

Overlay 86

The MNS DBB and OHQ options are administered via overlay 86 through addition of the IDBB and IOHQ prompts, respectively. The IDBB and IOHQ prompts only appear when administration is performed on an entry in a Route List block (RLB), and the following conditions are met;

- 1
- The ISDN and Originator Routing Control packages are equipped.
- 2
- The user has entered YES in response to the ISDN prompt in the customer data block.

If the above conditions are met, the IDBB and IOHQ prompts appear following the FSNI prompt as follows in Table 65:

Table 65
IDBB and IOHQ prompts

Prompt	Response	Comments
feat	rlb	route list block
rli		route list index
entr		route list entry number
fsni		free special number screening index
IDBB		ISDN Drop Back Busy option
	(DBA)	Drop Back if All routes busy
	DBI	Drop Back if Initial set busy
IOHQ		ISDN Off-Hook Queuing option
	(NO)	No Off-Hook Queuing (DEFAULT)
	YES	Off-Hook Queue

The MNS OHQ option gives the originating node control over the ESN OHQ feature at a tandem node. Therefore, ESN Off-hook Queuing must be configured at a tandem node for this option to take effect. Furthermore, the existing ESN OHQ eligibility criteria must be met.

System utilities

Sysload

No conversion is required.

Feature interactions

- 1** Electronic Switched Network (ESN)
DBB relies on the ESN dialing plan and routing mechanisms. ESN must be packaged with DBB.
- 2** ESN Off-Hook Queuing (ESN OHQ)
ISDN OHQ provides the originating node control over the ESN OHQ queuing feature at a tandem node. Therefore, ESN OEQ must be set up for ISDN OHQ to operate.
- 3** ISDN Network Attendant Service (NAS)
NAS routing will take precedence over ISDN DBB.
- 4** Message Intercept
With the Message Intercept feature equipped, the user could receive the message intercept voice response instead of the Off-Hook Queuing tone.

MSDL Idle Code Selection

When a T1 carrier is disabled at the remote end, the remote T1 or ISDN PRI hardware raises a “Red Alarm” status and sends a “Yellow Alarm,” to the local (near end) Meridian 1, which takes all trunks and channels out of service, and responds to the remote end by sending an “Unassigned PCM” (FF) code. However, some switches do not recognize the “Unassigned PCM” code, and instead expect an “Idle PCM” (7F) code.

The Idle Code Selection feature allows a Meridian 1, upon receiving a “Yellow Alarm” condition from the remote end with a disabled T1 carrier, to be configured to respond by sending an “Idle PCM” code instead of an “Unassigned PCM” code. Therefore, a remote switch, such as a Lucent 5ESS, which expects to receive an “Idle PCM” code can be cleared of a Red Alarm, the Meridian 1 can be cleared of a Yellow Alarm, and trunks and channels can be brought back into service.

The craftsperson should confirm that the remote end supports the “Idle PCM” code, before configuring this feature on a loop.

The Idle Code Selection is an enhancement to the existing DTI (package 75) and PRA (package 146) packages.

Figure 57 shows the existing operation, where the Meridian 1 responds to the remote end only with an “Unassigned PCM” code. Figure 58 shows the enhancement made by the Idle Code Selection feature, where the Meridian 1 responds with either the “Unassigned PCM” code or the “Idle PCM” code, depending on how the loop has been configured, as described in “Feature implementation” on page 727.

Figure 57
Meridian 1 response to Yellow Alarm condition prior to Idle Code Selection feature

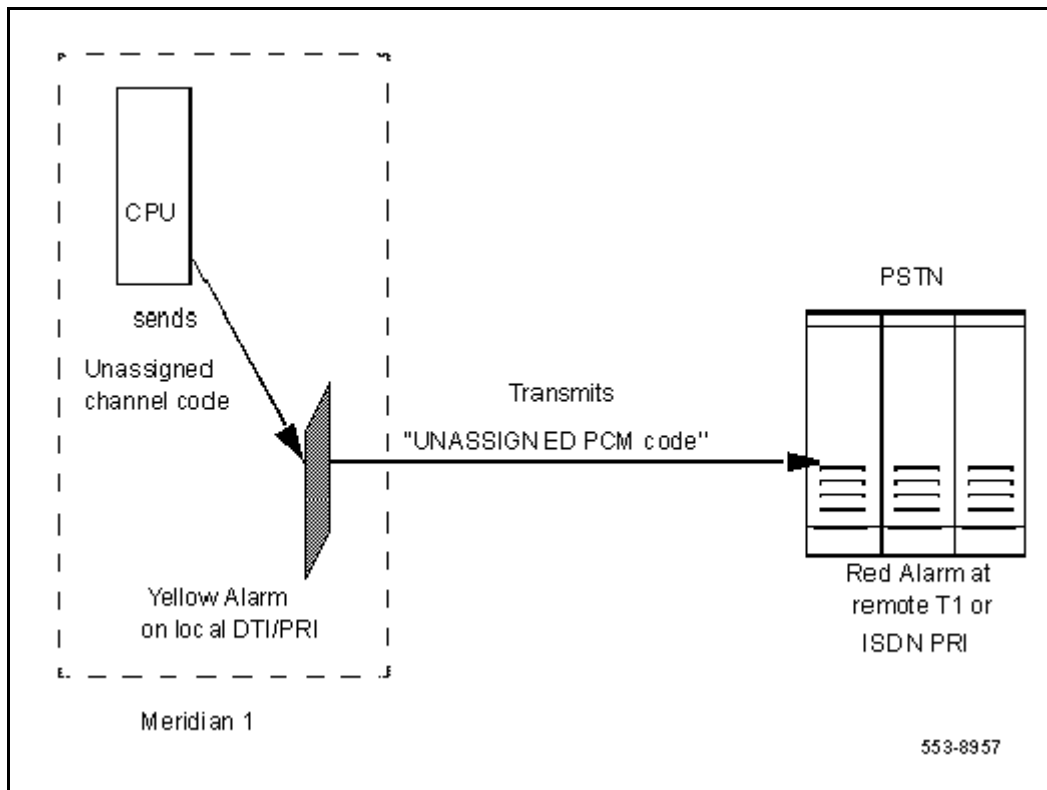
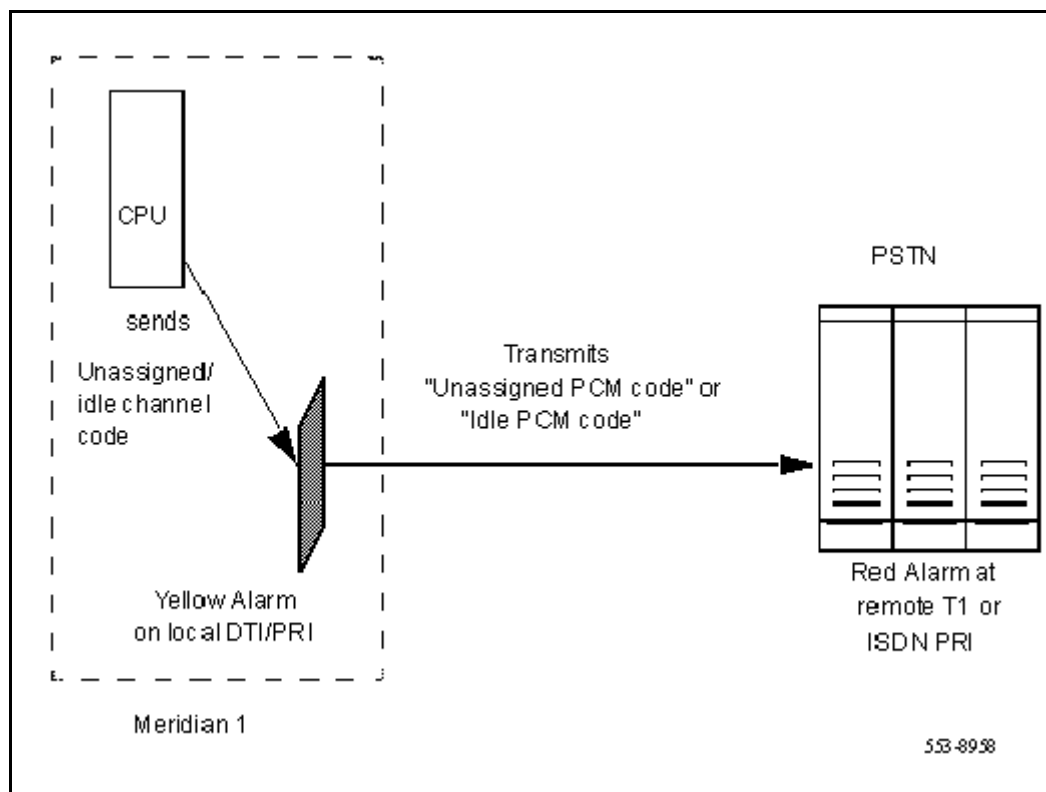


Figure 58
Meridian 1 with Idle Code Selection feature responding to Yellow Alarm condition



Operating parameters

Idle Code Selection applies to option 11C, 51C, 61C, 81, and 81C systems running X11 release 24 or later software. This feature applies to DTI and PRI (1.5 Mbps) only and not to DTI2 nor PRI2.

Feature interactions

Idle Code Selection, as an addition to the existing DTI (package 75) or PRA (package 146) packages, does not add any additional feature interactions.

In the following cases, when modifying or deleting loops, a new SCH warning message will be output, indicating that “ICS data associated with the loop is removed.”

- when changing the IFC type of a PRI loop that has ICS data associated with it and,
- when removing a DTI/PRI loop that has ICS data associated with it.

Feature packaging

Idle Code Selection is not a separate package, but is an enhancement to the existing DTI (package 75) and PRA (package 146) packages. Idle Code Selection requires either the DTI or PRA package. ISDN package 145 is required for ISDN.

Feature implementation

LD 73 – Activate (or deactivate) a loop to send “Idle PCM” code.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	DDB	Digital Data Block
...	...	
SRMM	1-(2)-127	Slip Rate Maintenance Maximum.
ICS	xxx	Idle Code Selection loop number. xxx = 0-159 for options 51C, 61C, 81, and 81C. xxx = 0-63 for option 11C.
	(Xnnn)	To deactivate the feature on loop xxx.
...	...	

Feature operation

No specific operating procedures are required to use this feature.

MSDL Status Enquiry Message Throttle

When a D-channel recovers from data link failure, in a Meridian 1 to Meridian 1 network interface, the “network” (master) side of the “network” side to “user” (slave) side interface sends a Status Enquiry message to the “user” side, for every established B-channel, to request the call state.

The Status Enquiry Message Throttle feature regulates the sending of Status Enquiry messages, by limiting the Status Enquiry messages sent within a 128 millisecond time period. The Network side of the interface uses a fixed number of Status Enquiry messages that is configurable per D-channel through a Status Enquiry Message Throttle (SEMT) parameter in LD 17. By reducing the number of Status Enquiry messages sent in a given 128 msec time period, this feature improves the amount of network congestion experienced after a D-channel recovers from data link failure. This also frees up some timeslots for call processing.

By default the SEMT parameter is 1. The valid input range is 1 to 5.

Operating parameters

The Status Enquiry Message Throttle feature applies to options 11C, 51C, 61C, 81, and 81C running X11 release 24 or later software.

This feature supports both the NT6D80 Multi-Purpose Serial Data Link (MSDL) card and the NT5D12 Dual Port DTI/PRI card with the Downloadable D-channel daughterboard for DDP (NTBK51AA). ISDN PRI and ISL interfaces are supported.

This feature applies only to Meridian 1 to Meridian 1 interfaces (MCDN inter-networking).

The new prompt, SEMT, only applies to the “network” side interface of the Meridian 1 to Meridian 1 network.

Feature interactions

There are no feature interactions for this feature.

Feature packaging

There are no new packages introduced by this feature.

The following packages are required:

- Multi-Purpose Serial Data Link (MSDL), package 222.
- ISDN Signaling (ISDN), package 145.
- ISDN Primary Rate Access (PRA), package 146 or ISDN Signaling Link (ISL), package 147.

Feature implementation

LD 17 – Configure the Status Enquiry Message Throttle (SEMT) parameter.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	CEQU	All input/output devices.
ADAN	aaa DCH xx	Primary D-channel number. Where: aaa = NEW or CHG. xx = 0-63 for options 51C, 61C, 81, and 81C. xx = 1-9 for option 11C.
CTYP	MSDL	Multi-purpose Serial Data Link card.
GRP	0-4	Network Group number for options 81 and 81C.
DNUM	0-15	Device number for I/O ports. All ports on the MSDL card share the same DNUM. The MSDL card address settings must match the DNUM value.
CDNO	1-9	For option 11C: card slot number where NTB51AA Downloadable DCH daughterboard is configured.
PORT	0-3 1	Port number for the MSDL card. For option 11C: default port 1 is printed for the NTB41AA Downloadable DCH Daughterboard.
USR	PRI	Primary Rate Interface. D-channel for ISDN PRA only.
IFC	SL1	Meridian SL-1 interface.
DCHL	xxx	D-channel PRI loop number. Where: xxx = 0-159 for options 51C, 61C, 81, and 81C. xxx = 1-9 for option 11C.
...	...	
OTBF	1-(32)-127	Output Request Buffer
DRAT		D-channel Transmission Rate
SIDE	NET	Network, the controlling switch.

SEMT	(1)-5	Number of Status Enquiry messages sent within 128 msec from the Network side.
RLS	xx	Release ID of the switch at the remote (far) end of the D-channel.
...	...	

Feature operation

No specific operating procedures are required to use this feature. Table 66 lists commands for getting the status, enabling, and disabling the MSDL card or Downloadable D-channel Daughterboard card.

Table 66
MSDL/Daughterboard card system commands

Command	Response
STAT MSDL xx	Get status of the newly configured MSDL card. Where: • xx = device number (DNUM) entry for newly configured MSDL card. • <u>xx = Card slot number (CDNO) for the NTBK51AA Downloadable DCH Daughterboard.</u> <i>The card status is output and can be any one of the following:</i> MSDL xx: ENBL MSDL xx: MAN DSBL MSDL xx: SYS DSBL reason Note: The "MSDL xx: SYS DSBL reason" message indicates that maintenance is required by the craftsman and installation can only continue when reason is corrected. Refer to <i>LD 48 Alphabetical list of commands</i> "STAT MSDL (x(FULL))" command for a complete list of reasons.
DIS MSDL xx	Disable the MSDL device if Stat command indicates MSDL is in enabled state.

Table 66
MSDL/Daughterboard card system commands

ENL MSDL xx FDL	Enable the MSDL card. Where: • xx = D-channel number configured in LD 17. Enabling the MSDL card with this command is only permitted if the card is currently in the Manually Disabled state. Note: A series of dots (“.”) are output which indicate that software download is in progress. Following the download the card will be enabled.

MSDL Port Overload Counter

The MSDL Port Overload Counter feature provides the capability of locking out individual MSDL ports when incoming messages through a port exceed or equal the port overload threshold of 200 messages in a two second time period.

When any of the four ports on the MSDL card reaches the port overload threshold it is locked-out, but the operation of other ports on the MSDL card will not be affected.

The MSDL card is still subject to a card overload threshold, which will cause a lock-out if it receives 300 or more messages per two seconds. However, when an individual MSDL port becomes overloaded, the messages to that port are subtracted from the total card messages used in performing the card overload check. Furthermore, port overload checks have priority over card overload checks.

The overloaded port on the MSDL card is locked-out so that the card stops responding to the incoming messages from the overloaded port. This prevents the Meridian 1 CPU from servicing a very high incoming message rate from the port, which could cause system degradation.

Figure 59 shows the existing MSDL card lock-out, while Figure 60 shows the port lock-out functionality introduced by the Port Overload Counter feature. Figure 61 demonstrates a port overload check being performed before a card overload check.

Figure 59
MSDL card lock-out

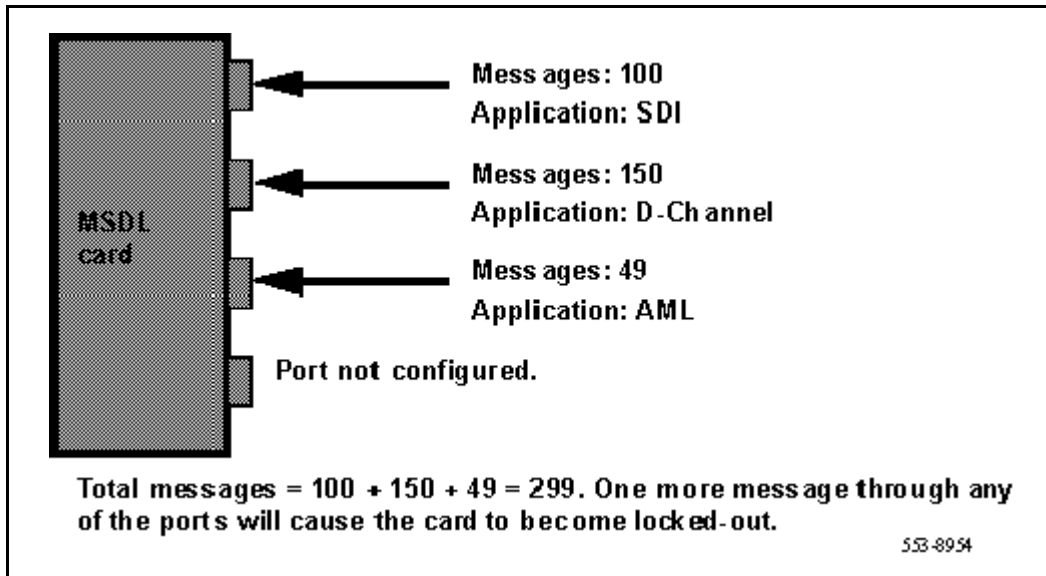


Figure 60
MSDL port lock-out

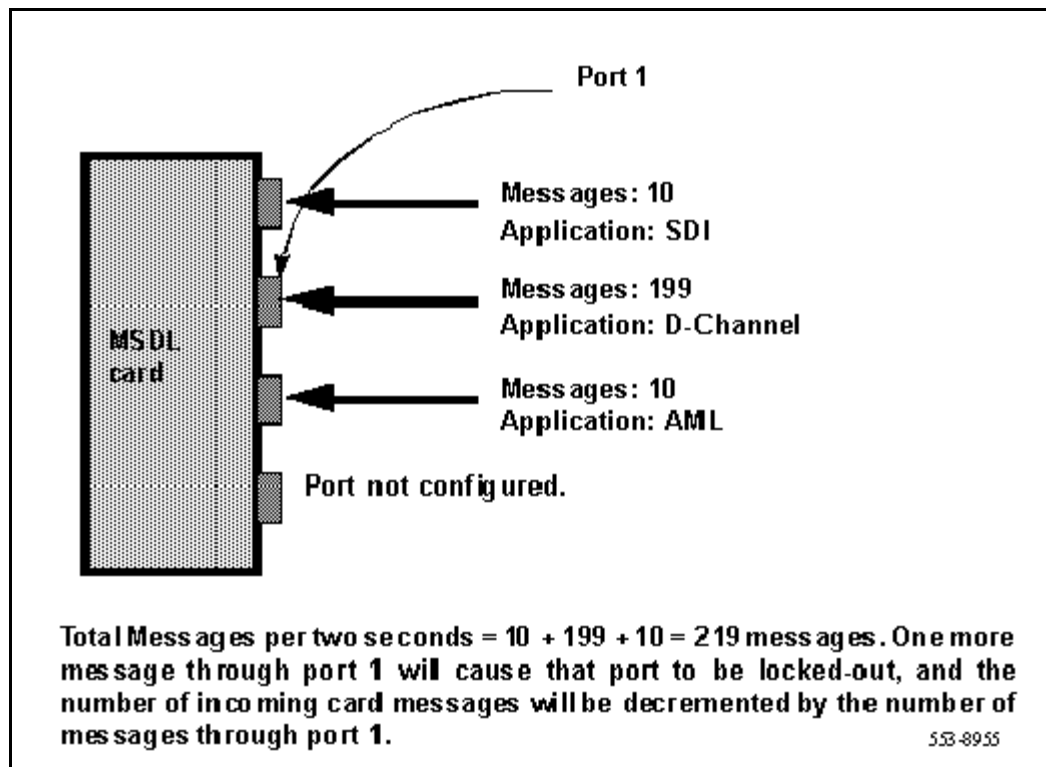
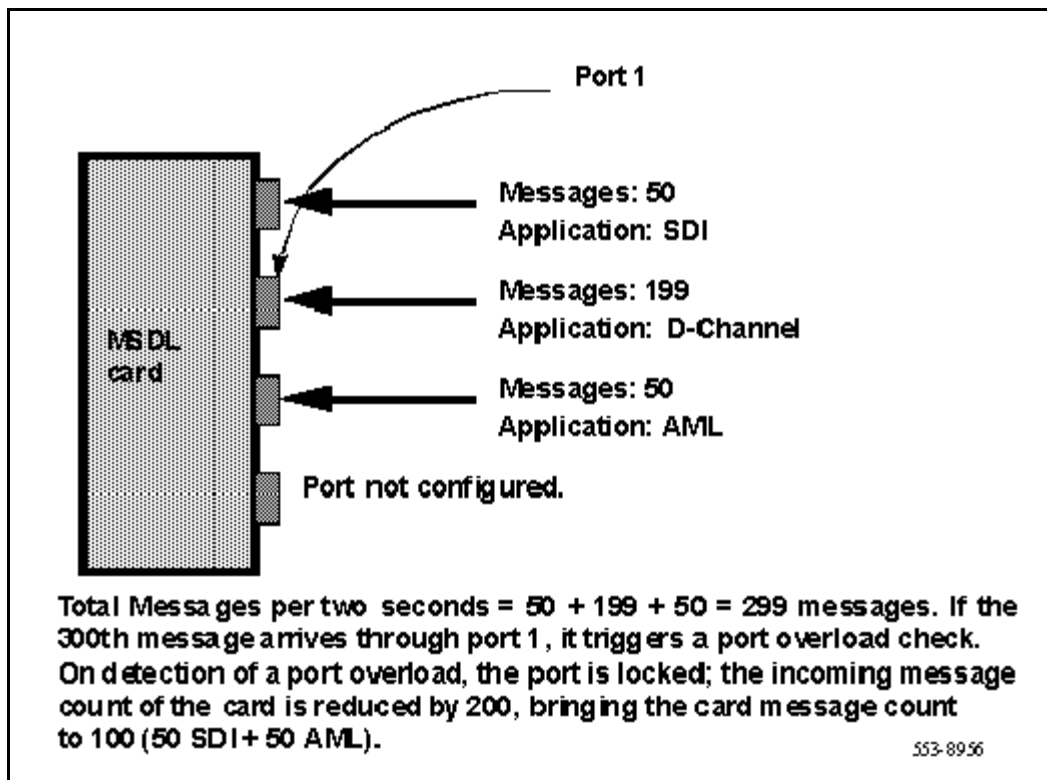


Figure 61
MSDL port overload check preceding card overload check



Operating parameters

This feature applies to Meridian 1 options 51C, 61C, 81, and 81C systems running X11 release 24 or later software.

Feature interactions

MSDL/MISP Interface Handler (MMIH)

The MMIH provides a software interface between the MSDL/MISP card and the Meridian 1 software, and allows applications on the MSDL/MISP card to access each other through the interface.

Previously, the interface software maintained a counter of incoming messages on an MSDL application basis. When the sum of all messages received indicated an excessive incoming message rate, the MSDL card was locked-out.

The Port Overload Counter feature modifies the MMIH so that incoming message counters are maintained for individual MSDL ports

This feature changes the functionality of the MMIH for an MSDL card, but the MISP remains unchanged.

DCH/SDI/AML Application

The Port Overload Counter feature changes the DCH/SDI/AML Application to cause the MSDL port to lockout when the incoming messages exceed the Port Overload threshold value.

B-Channel Overload Control (BCOC)

This feature has no interaction with the B-Channel Overload Control Feature.

MISP

This feature does not change the functionality of the MISP card interface.

Feature packaging

The Port Overload Counter feature requires the following package:

- MSDL Card Package, package number 222.

Feature implementation

No change to the existing configuration is required to enable this feature. However, as described in “Maintenance and Diagnostics” on page 741, modifications have been made to overlay maintenance and diagnostic commands.

Feature operation

No specific operating procedures are required to use this feature. The feature is activated whenever a configured application on an MSDL card is active and is receiving messages through the active port.

Maintenance and Diagnostics

The Port Overload Counter feature has made the following modifications to overlay maintenance and diagnostic commands:

Overlay 37 - I/O Diagnostic

Commands	System Responses	Description
STAT MSDL xx (Where xx = physical MSDL number)	MSDL xx: ENBL SDI 7 OVLD PORT 0 DCH 11 OVLD PORT 1 AML 12 OVLD PORT 2	Display the status of ports on a card. The status includes overloaded ports.
STAT TTY xx (Where xx = logical SDI number)	TTY xx: OVLD	Display the status of an overloaded MSDL port running an SDI application.
ENL TTY xx Where xx = logical SDI number)	IOD_xxx	Failed to enable the SDI on MSDL port xx. Refer to "Overloaded MSDL port running an SDI Application" on page 743.

Overlay 48 - Link Diagnostic

Commands	System Responses	Description
STAT MSDL xx (Where xx = physical MSDL number)	MSDL xx: ENBL SDI 7 OVLD PORT 0 DCH 11 OVLD PORT 1 AML 12 OVLD PORT 2 (Where xx = physical MSDL number)	Display the status of ports on a card. The status includes overloaded ports.
STAT AML aa (Where xx = logical AML number)	AML: xx MSDL: yy PORT: zz DES: LYR2: OVLD (Where xx = logical AML number, yy = physical MSDL number, and zz = MSDL port)	Display the status of an overloaded MSDL port.
ENL AML xx (Where xx = logical AML number)	CSA_XXX	Failed to enable AML link. Refer to "Overloaded MSDL port running an AML Application" on page 743.

Overlay 96 - PRI D Channel Diagnostic

Commands	System Responses	Description
STAT MSDL xx (Where xx = physical MSDL number)	SDI 7 OVLD PORT 0 DCH 11 OVLD PORT 1 AML 12 OVLD PORT 2	Display the status of ports on a card. The status includes overloaded ports.
STAT DCH xx (Where xx = logical D Channel number)	DCH xx : OVLD DES:	Display the status of an overloaded MSDL port running a D Channel Application.
ENL DCH xx (Where xx = logical D Channel number)	DCH_XXX	Failed to enable the D Channel. Refer to "Overloaded MSDL port running a DCH Application" on page 743.

Fault Clearance Procedures

Overloaded MSDL port running a DCH Application

Cause: The Meridian 1 received an excessive number of messages (equal to or greater than 200 messages in a two second time period) from the MSDL port.

To clear the fault: Manually disable the D-Channel in Overlay 96 using the command DIS DCH xx, where xx is the D-Channel number. Enable the D-Channel using Overlay 96 using the command ENL DCH xx.

Overloaded MSDL port running an AML Application

Cause: The Meridian 1 received an excessive number of messages (equal to or greater than 200 messages in a two second time period) from the MSDL port.

To clear the fault: Manually disable the AML Link in Overlay 48 using the command DIS AML xx, where xx is the AML Link number. Enable the AML Link using Overlay 48 using the command ENL AML xx.

Overloaded MSDL port running an SDI Application

Cause: The Meridian 1 received an excessive number of messages (equal to or greater than 200 messages in a two second time period) from the MSDL port. One scenario of the overloaded SDI port is the case of a smart-modem setup for “smart” vs. “dumb” mode. The Meridian 1 and the modem may be bouncing the same messages back and forth until the 200 port message threshold is reached.

To clear the fault: Manually disable the link in Overlay 37 using the command DIS TTY xx, where xx is the SDI number. Enable the AML Link using Overlay 37 using the command ENL TTY xx.

MWI Interworking with DMS

The Message Waiting Indication (MWI) feature allows a Message Center on either Meridian 1 or DMS-100 (Centrex) to exchange Message Waiting Indicator information with phones serviced by either type of system on the network. Calls redirected to the Message Center can be from private or public network callers on either system. A caller served by Meridian 1 can use the Message Center on DMS. A caller served by DMS can use the Message Center (Meridian Mail) on Meridian 1. The Meridian 1 must use a Meridian Mail as its Message Center.

MWI uses the non-call associated Facility messages on ISDN PRI for transporting the TCAP information.

The Meridian 1 and DMS systems can be connected directly or in tandem to whichever system hosts the Message Center. When a caller from either system leaves a message on either system, the Message Waiting Indicator is activated. When the receiver retrieves the message, the Message Waiting Indicator is deactivated. The indicator is either a visual LED (light emitting diode), an icon, or an audible tone in the telephone handset.

Figure 62 shows a network in which Meridian 1 hosts the Message Center that serves both Meridian 1 users and users of a DMS-100 in the same customer group.

Note: CCS#7 is not supported by the Meridian 1; CCS#7 must be a DMS-to-DMS configuration.

Figure 62
Private corporate network with Meridian 1 hosting the Message Center

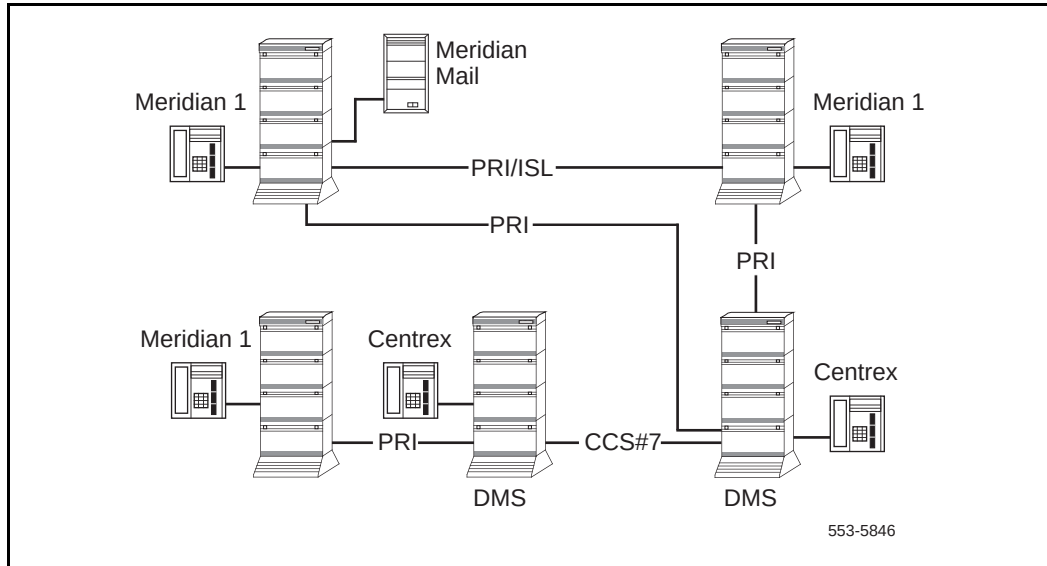
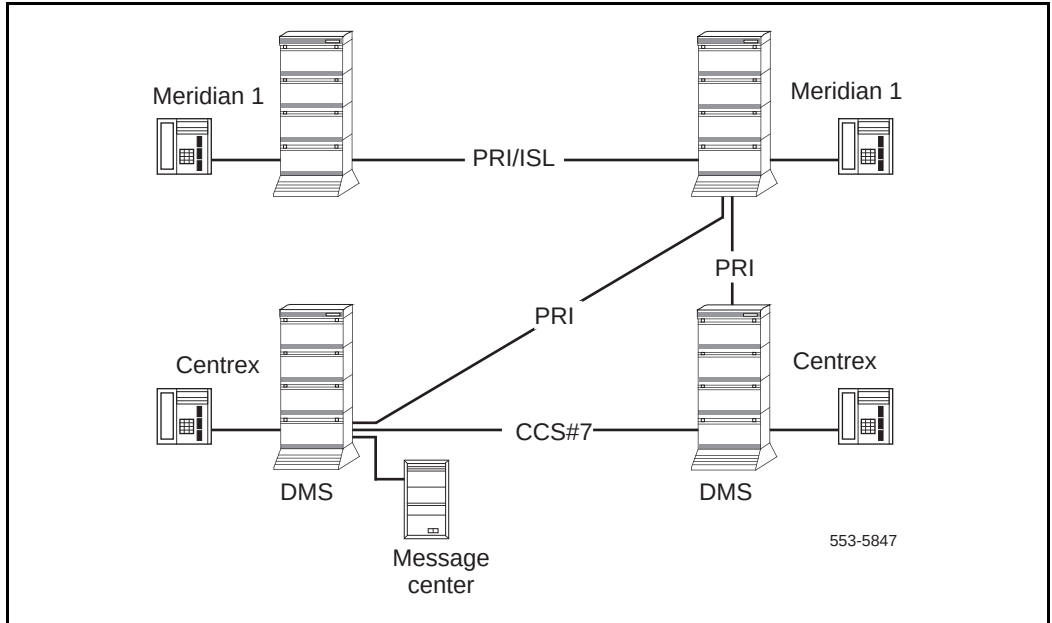


Figure 63 shows a network in which DMS hosts the Message Center that serves both Meridian 1 users and DMS users in the same or different enterprise groups.

Figure 63
Private corporate network with DMS hosting the Message Center



Note: CCS#7 is not supported by the Meridian 1; CCS#7 must be a DMS-to-DMS configuration.

Operating parameters

MWI supports DMS-100 and SL-100 as tandem switches, but no non-Northern Telecom switches as tandems.

Call redirection to Meridian Mail is based on the Network Call Redirection (NCRD) feature in X11 release 16. It is subject to the operating parameters of the NCRD feature.

MWI is based on the X11 release 16 Network Message Services-Meridian Mail (NMS-MM).

Only Meridian Mail is supported as the Message Center on Meridian 1.

Both DMS-100 (using BCS 36) and Meridian 1 can transport Facility messages for MWI and can be tandem switches. DMS-100 can tandem Facility messages from Meridian 1 to Meridian 1 for features such as Call Sender activated by Meridian 1 users of Meridian Mail. Other Facility messages that DMS-100 can tandem are for updating the voice mail softkeys of an M2317 or M3000 set.

MWI allows public and private numbers for the Original Called Number (OCN) in the Setup message during call forwarding, and for the Directory Numbers (DN) in the ORIG and DEST Information Elements (IE) of the Facility message to toggle the MWI indicator. The OCN refers to the user's mailbox DN. The OCN must be unique in the Meridian Mail database. If the call forwarding DN to the Message Center is a private number, then the OCN constructed in the setup message will contain a private number. If the call forwarding DN to the Message Center is a public number, then the OCN constructed in the setup message will contain a public number.

If Meridian Mail is on Meridian 1:

- For Meridian 1 users, Meridian Mail provides the same functions as for the X11 release 16 NMS-MM users, if a private number is used.
- For DMS users, some Meridian Mail features may not be available. Contact your local DMS administrator for available Meridian Mail features.

If the Message Center is on DMS:

- If a set on Meridian 1 does not have a DID number, the call forwarding DN to the Message Center should be private. Thus, a set that cannot receive DID calls will still be able to use the Message Center services provided that the DMS Message Center supports private numbers for the mailbox DNs.

End-to-End in-band signaling is required for accessing Message Center features for a local or remote switch.

The call forwarding connection from the caller to the Message Center on another switch must be with ISDN conductivity between Meridian 1 and DMS. This is for passing the OCN from the caller's switch to the switch that hosts the Message Center for leaving voice messages and for transporting TCAP messages to toggle the MWI indicator.

Feature interactions

- Multiple Customer
Serving multiple customers requires multiple Meridian Mail servers. MWI itself does not support multiple customers.
- Multi-Tenant Service
Meridian Mail Phase 8 supports Multi-Tenant Service. Tenants from the same customer can use one or more Message Center servers. Tenants from different customers cannot use the same Meridian Mail. The customer controls tenant access to MWI using the sets that belong to the tenant.
- Network Message Services, Meridian Mail
Although the Facility message for MWI uses a different TCAP format from that used for NMS, the X11 release 16 functions continue to operate. X11 release 19 Meridian 1 converts the message format when exchanging MWI Facility messages with earlier releases.
- DCH Error Monitoring
The X11 release 19 DCH Error Monitoring monitors ISDN messages on a per feature basis. If the MWI RCAP for the D-channel is added or deleted in LD 17, DCH Error Monitoring will work properly for the NMS feature when the D-channel message monitoring is disabled and then enabled.

- 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.
- AML Link Recovery
AML Link Recovery redirects the calls to the ACD queue of the ACD Night Forward DN when the AML link goes down. This recovery is also available for calls in the Meridian Mail ACD queue on Meridian 1 when the AML link goes down.

Feature packaging

MWI Interworking depends on X11 release 19. See *X11 features and services* (553-3001-305) for X11 release software packages and their dependencies.

The package requirements for MWI are different for each node, as described in the following tables.

The originating node has Message Center users. Table 67 shows the originating node package requirements.

Table 67
Package requirements for an MWI originating node

Package	Name of package	Mnemonic
219	Message Waiting Indication (if connected to DMS/BCS36 for interworking)	MWI
10	End-to-End Signaling	EES
40*	Basic ACD	BACD
45*	ACD package A	ACDA
46	Message Center	MWC
145	ISDN Signaling	ISDN
146	ISDN Primary Rate Access	PRI
or 147	ISDN Signaling Link (for Meridian 1 to Meridian 1)	ISL
148	ISDN Network Service	NTWK
175	Network Message Service	NMS
* This package is required only if ACD DN is used as the Message Center DN.		

The host node holds the Message Center. Table 68 shows the host node package requirements.

Table 68
Package requirements for an MWI host node

Package	Name of package	Mnemonic
	X11 release 19 or above	
219	Message Waiting Indication (if connected to DMS/BCS36 for interworking)	MWI
10	End-to-End Signaling	EES
35	Integrated Message Service	IMS
40	Basic ACD	BACD
45	ACD package A	ACDA
46	Message Center	MWC
77	Command Status Link	CSL
145	ISDN Signaling	ISDN
146 or 147	ISDN Primary Rate Access	PRI
	ISDN Signaling Link (for Meridian 1 to Meridian 1)	ISL
148	ISDN Network Service	NTWK
175	Network Message Service	NMS

The tandem node does not have Message Center users. Table 69 shows the tandem node package requirements

Table 69
Package requirements for an MWI tandem node

Package	Name of Package	Mnemonic
219	Message Waiting Indication (if connected to DMS/BCS36 for interworking)	MWI
145	ISDN Signaling	ISDN
146 or 147	ISDN Primary Rate Access ISDN Signaling Link (for Meridian 1 to Meridian 1)	PRI
148	ISDN Network Service	

Feature implementation

Use the following steps to configure MWI.

Figures 64 and 64 show the configuration requirements for MWI Interworking.

Procedure 25

Use LD 17 to configure 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

If the Message Center is on a Meridian 1, it must be a Meridian Mail. No other messaging devices are supported for the Meridian 1. The DMS may use Meridian Mail or other messaging devices (Octel) for its Message Center.

If the Message Center is on DMS for MWI Interworking, a Meridian 1 that is connected to DMS must be on Release 19; other Meridian 1 switches that are connected to the Release 19 switch can be Release 16, 17, or 18.

Figure 64
Configuration requirements for MWI interworking with Meridian Mail on the Meridian 1

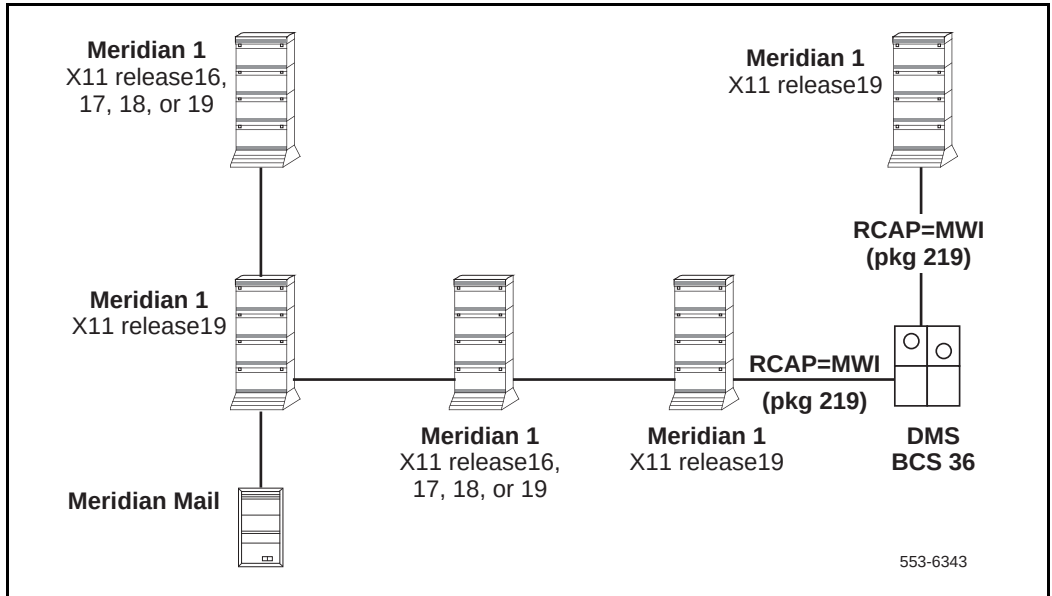
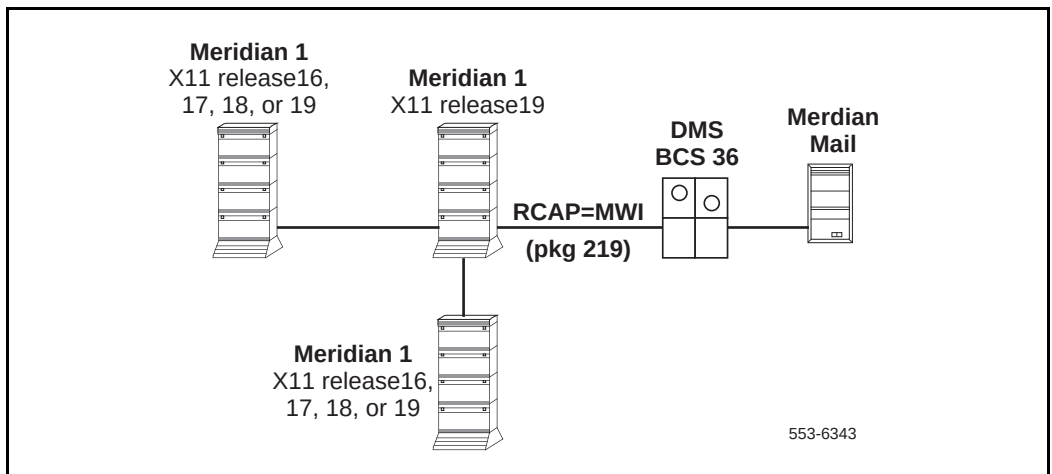


Figure 65
Configuration requirements for MWI interworking with the Message Center on the DMS



Procedure 26

Use LD15 to enable Message Service

Prompt	Response	Description
REQ	CHG	Change.
TYPE	CDB IMS_DATA	Customer Data Block Release 21 gate opener.
CUST	0-99	Customer number
- IMS	YES	Change Integrated Message System
- IMA	YES	Enable Integrated Message System

Procedure 27

Use LD 23 to configure an ACD Group for the Message Center users in the remote switch

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.

Procedure 28**Use LD 11 to define the ACD Group as the Message Center DN for each telephone**

Prompt	Response	Description
REQ	CHG	
FDN	x..x	Flexible call forward No Answer to Message Center DN
EFD	x..x	Call Forward by Call Type—External No Answer to Message Center DN
EHT	x..x	Call Forward by Call Type—External Hunt to Message Center DN
HUNT	x	Hunt to Message Center DN
KEY	xx MWK x..x	Message Waiting Key, where x..x is the Message Center DN.

Procedure 29**Use LD 15 to configure AC2 to insert ESN access code and PNI**

Prompt	Response	Description
REQ	NEW, CHG, END	
TYPE	CDB NET_DATA	Customer Data Block 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
	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.

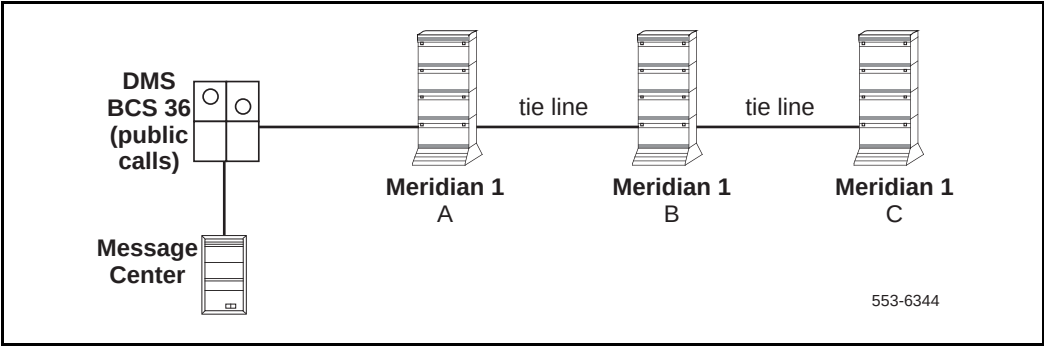
For ISDN Networking Features such as NRAG, NMS and MWI, the originating switch must not use the digit manipulation (DMI) to insert the ESN access code. The ESN access code must be inserted at the terminating/tandem node via the INST prompt if it connects to the DMS in the Public Network.

Procedure 30**Use LD 16 to 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.

Use “INST” in LD 16 at Meridian 1 location A for incoming tandem/terminating calls. Use “INAC” at Meridian 1 locations B and C.

Figure 66
When to use INAC or INST in LD 16



For the message center users on M-1, configure Home Location Code and Home NPA to terminate a Facility message from the message center either on M-1 or on DMS to the message center user’s switch. The Facility message is for turning on/off the message waiting indicator for the user.

For the private ESN Uniform Dialing Plan, use LD 90 to configure Home Location Code (HLOC)

Procedure 31
Use LD 90 to 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)

For the public numbering plan, a 10 digit number (NPA+NXX+XXXX) is used in the ORIG and DEST IE of the Facility message. Use LD 90 to configure Home NPA and Central Office Translation (NXX) to terminate the Facility message onto the message center user's DN.

Procedure 32**Use LD 90 to 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

Procedure 33**Use LD 90 to 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.

Procedure 34

Use LD 22 to print the configuration record

Prompt	Response	Description
REQ	PRT	Print system data
TYPE	CFN	Configuration record
RLS	xx	Release ID of the switch at the far end of the D-channel
RCAP	MWI	Remote D-channel capabilities

Note: The mnemonic "MWI" is printed for overlay 22.

Feature operation

MWI performs two basic operations: 1) activate the MWI at the caller's set; 2) deactivate the MWI at the subscriber's telephone. Table 70 shows the sequence that activates the MWI. Table 71 shows the sequence that deactivates the MWI.

Table 70
When MWI is activated

Sequence	Caller	Receiver	Message Center
1	Calls receiver	Receiver not available	
2	Leaves a message		Records caller's message
3	Hangs up		Activates MWI on receiver's set

Table 71
When MWI is deactivated

Sequence	Receiver	Message Center
1	Notifies MWI	
2	Calls the Message Center	Plays messages
3	Clears the mailbox	
4	Hangs up	Deactivates MWI on receiver's set

Some of the failures that can occur and how MWI handles them are:

- AML/CSL link failure
If the AML/CSL link fails between Meridian Mail and its host Meridian 1, calls are redirected to the ACD Night Call Forward DN for the ACD queue involved.
- D-channel failure
If the D-channel is out of service, the Facility message is lost. For Meridian Mail, an MWI CSL message is sent to the Meridian Mail server.
- Inconsistent data base
If the Facility message that toggles MWI cannot be delivered to the caller's set because the DN is invalid or MWI is not supported in the remote switch, an MWI CSL message is sent to Meridian Mail.

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 72 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 72
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 73.

Table 73
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.

Note: NAS and CAS cannot be configured on the same Meridian 1.

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.

DPNSS1 Route Optimisation/MCDN Trunk Anti-Tromboning Interworking

If tromboning trunks are removed on the MCDN side of a RO/TAT Interworking gateway scenario by the Network Attendant Service feature (since NAS has presence over TAT), the RO/TAT Interworking functionality is not invoked. The result is that, if NAS is equipped, attendant-extended calls that are in a tromboning state are optimised on the MCDN side, but DPNSS1 trunks are not optimised on the DPNSS1 side of the RO/TAT Interworking gateway scenario.

EuroISDN Master Mode

NAS signaling is not supported on a EuroISDN Master Mode connectivity. However, NAS will interwork with an incoming call from the EuroISDN Master Mode (routing and call handling).

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.

Virtual Network Services

As stated earlier, NAS and CAS cannot be configured together on the same Meridian 1. Since VNS requires NAS, this means that VNS and CAS cannot be configured together on the same Meridian 1, either.

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 administration

Configure NAS operation by making changes in LD 12, LD 15, LD 17, and LD 86. Optional functionalities are provided by making changes in LD 93, and LD 16.

LD 12 – Configure Attendant Consoles with NAS keys.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	ATT 1250 2250	Type of console
TN	l s c u c u	Terminal Number. For Option 11.
KEY	xx NAS	xx is 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, Recall to Same Attendant, NAS routing, and define a TRK ICI key.

Prompt	Response	Description
REQ	CHG	Change existing data block.
TYPE	CDB NET	Customer Data Block. Networking Data. Release 21 gate opener.
CUST	xx	Customer number.
- OPT	aaa	Options.
- AC2	aaa	Access Code 2 as defined in LD 86.
- ISDN	YES	Integrated Services Digital Network
...		
- NAS	(YES) NO	Specifies whether to (allow) or deny attendant control for call extension.
- NAS_ ACTV	(NO) YES	Specifies whether to allow or (deny) NAS routing.

- NAS_ ATCL	(YES) NO	Specifies whether to allow (YES) or deny attendant control for call extension.
- NAS_ ACTV	(NO) YES	Specifies whether to allow or (deny) NAS routing.
...		
- ICI	xx NCO NDID NTIE NFEX NWAT	Respond with the key number, from 0 to 19, followed by a space, followed by the trunk type. Network CO trunk Network DID trunk Network TIE trunk Network FEX trunk Network WAT trunk
- RTSA	(RSAD) RSAA RSAX	Recall to Same Attendant Denied Recall to Same Attendant Allowed Recall to Same Attendant allowed, with queuing on busy attendant.

LD 17 – Configure the D-channel interface (DCHI) for NAS.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	ADAN	Action Device and Number.
DCHI	xxx	Respond with DCHI number for which NAS signaling is to be allowed or restricted.
NASA	YES (NO)	Specifies whether DCHI is to be allowed or (denied) NAS signaling.

LD 86 – Configure NAS routing.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
CUST	xx	Customer number.
...		
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	1–7	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	xxxxxxxxxxxxxxxx	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	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 24-hour 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.)
DBK	Z Z Z Z	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	Z Z Z Z	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.

LD 93 – Assign a NAS routing table to Console Presentation Groups.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	CPG	Console Presentation Group.
CUST	xx	Customer number.
CPG	1-63	Console Presentation Group number.
CPGS	(NO) YES	Customer Presentation Group Services.
ROUT	0-511	Route number.
TEN	1-511	Tenant number.
NTBL	(0) - 63	NAS routing table to be used for calls directed to this Attendant Console Group(ACG)/ Console Presentation Group (CPG).

LD 16 – Allow or deny pre-answer tromboning (allow or deny an incoming call to be directly routed back on the same route).

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number.
ROUT	0-511	Route Number.
TKTP	aaa	Trunk Type requires response when REQ=NEW.
TRMB	(YES) NO	Tromboning. NO = Tromboning denied. Incoming trunk call on route may not be routed back on same route. YES = Tromboning allowed. Incoming trunk call on route may be routed back on the same route. 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.

Note: The anti-tromboning capabilities programmed in LD 16 only apply to attendant extended 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.

Example of NAS implementation

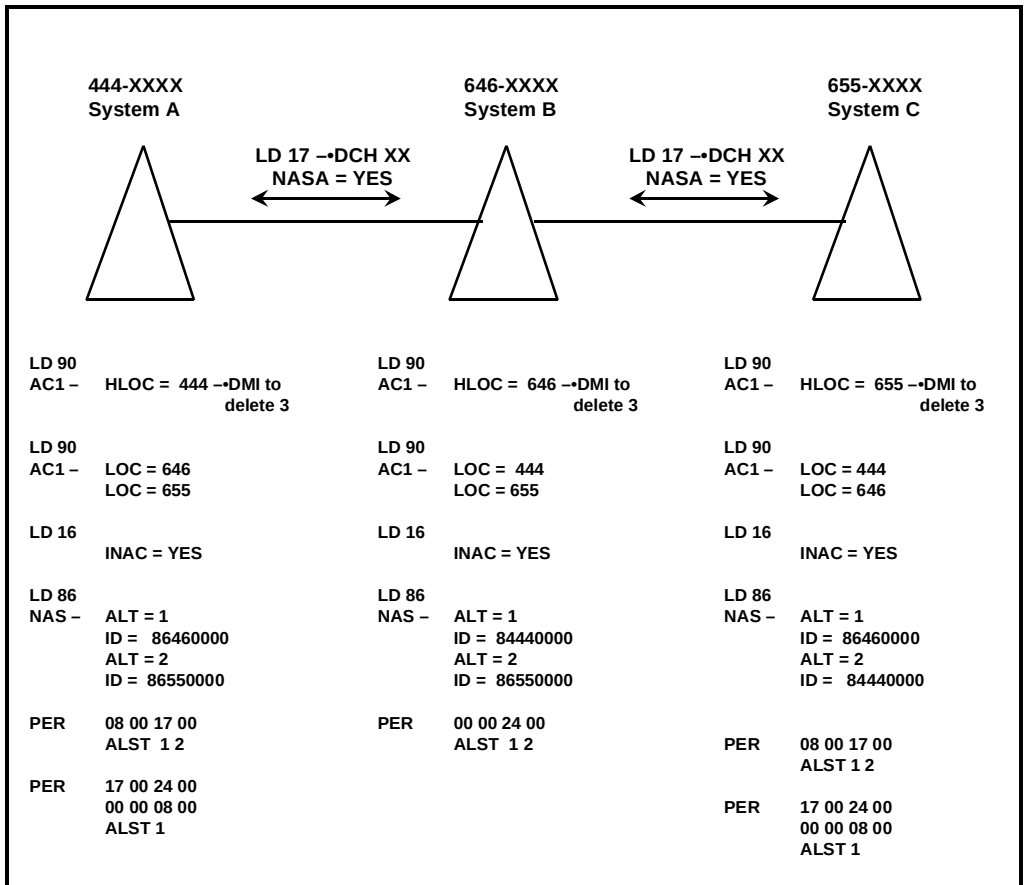
Figure 67 illustrates a simple application of the NAS functionality in a private ISDN PRI network connecting three Meridian 1 systems. Although this example uses NARS, the same functionality can be accomplished using CDP.

Each system has the translations in place for a HLOC and the two LOC codes for the other two Meridian 1 locations. This programming was done in the NARS database. The route lists required in order to process these types of calls have been programmed also.

The INAC implementation was part of the basic ISDN/Networking programming.

The NAS programming involves the configuration of the D-channel for NAS functionality, the ID of the other attendants to be used, a list of the sequence in which these attendants are to be scanned for availability and the time periods for each list.

System B, in this example, is the location where attendants should be available 24 hours a day. During the day, the other two locations are programmed to use System B as their first choice backup and then as a second choice System A uses System C and System C uses System A. At night, Systems A and C use System B as the only backup. If it is unavailable, calls will be given Night Service.

Figure 67**A simple application of NAS functionality in a private ISDN PRI network**

Feature operation

There are no operating procedures specified for this feature.

Network Call Redirection

Network Call Redirection (NCRD) provides Network Call Forward No Answer (NCFNA) and Network Call Forward All Calls (NCFAC) over an ISDN PRI or ISL network. Calls can be transferred over the network, but the Calling Line Identification (CLID) display does not reflect the reason for the transfer.

With X11 release 16 and later software, Network Call Redirection (NCRD) incorporates these features:

- Network Call Forward Busy NCFB
- Network Hunt NHUNT
- Network Transfer NXFER
- Call Pickup PKUP
- Call Forward by Call Type CFCT

Network Call Redirection (NCRD) is based on standard Call Redirection, which permits call redirection within a Meridian 1. NCRD redirects calls through more than one PBX over ISDN. The Calling Line ID (CLID) shows a name and network DN in place of the local DN.

On a system level, NCRD supports Meridian 1 to Meridian 1, SL-100, and DMS-100 connections. Private numbering plans, Uniform Dialing Plans (UDPs) in ESN, and the Coordinated Dialing Plan (CDP) are supported by both network configurations.

If the calling party's numbering plan is any other type, then Call Forward by Call Type (CFCT) calls use Route Class Marks (RCLS) to determine call type—internal or external. The features interfacing with network services also support expanded DNs.

Some redirected calls can pass through or tandem one switch. If a call is redirected several times, only one CFNA (or NCFNA) is allowed, unless the forwarding telephone has Second Level CFNA defined.

The following telephone types are supported by this feature:

- Meridian 1 Digit Display telephones
- 500/2500 telephones (for redirection only without display)
- Attendant telephones
- M2000 and M3000 digital telephones
- M2317 digital telephones
- M2008, M2016S, M2216ACD, and M2616 when equipped with displays

Note: A redirected call over PRI that ends on a busy telephone cannot activate the Network Ring Again (NRAG) feature.

NCRD terminology

There are four types of parties in a call redirection scenario:

- the originating party
- the originally dialed DN
- the redirecting party
- the terminating party

In a simple call redirection, a call is redirected once. When A calls B, and B redirects the call to C, the following parties are identified:

A is the originating party
B is the originally called party and the redirecting party
C is the terminating party

With further call redirection, the party's terminology changes:

A calls B	A is the originating party
	B is the originally dialed DN
B redirects the call to C	C is the redirecting party
C redirects the call to D	D is the terminating party

Originating party notification

An originating party with CLID services can display a reason for the call redirection. Figure 68 shows the format on a Digit Display for the originating party on an internal redirection.

Figure 68

Display format for NCRD: Originating party with CLID

Originally called party DN	Terminating party DN	Reason for redirection	Terminating party name

The “Reason for redirection” field shows why the call is redirected. The mnemonic displayed is assigned by the customer in LD 95. See the chapter on configuring PRI for the procedure to program Network Call Redirection (NCRD). For a complete description of the prompts and responses available, see the *X11 input/output guide* (553-3001-400).

In addition, NCRD uses Q.931 notification messages to indicate that a transfer has occurred. An extra message helps update telephones and telephone displays to show the reason for call redirection. Also, the displays for attendant extended calls are complete to all call parties.

Terminating party notification

The Digit Display for a terminating party with CLID allowed shows the reason for call redirection. Figure 69 is an example of the format for a terminating party on an internal call redirection.

Figure 69

Display format for NCRD: Terminating party with CLID

Calling Line ID	Originally called number	Reason for redirection	Calling party name

If the originating party information is not available, the redirecting party DN is displayed instead.

Tones on redirection

Tones returned to the originating party are determined by the reason for call redirection. Table 74 lists which call redirections return a tone and which tone they return.

All the items in this table relate to network services only. Most of these features have similar or exact applications in the regular PBX network, without ISDN functionality.

A redirection counter is transmitted with the call forwarding information. When the count meets the redirection counter maximum, there are two possible scenarios:

- Network Call Forward All Calls (NCFAC)
If all call redirections are due to NCFAC, then the calling party receives overflow tone.
- Network Call Forward No Answer (NCFNA)
If one of the redirections is due to NCFNA, then an attempt is made to re-ring the telephone that initiated the NCFNA.

Table 74
Tones returned on call redirection

Reason for redirection	Tone returned	Conditions
Attendant extended calls	Overflow (Fast Busy)	Invalid call attempt
Busy (CFB)	Busy	Far end has an active call in progress See note.
Call Forward No Answer (CFNA)	Ringing	Network CFNA tries again to ring the dialed DN
Call Pick up	1 Overflow	1 Invalid access code, or invalid Pickup DN
	2 Busy	2 Call already answered by another Pickup Group member
Call Transfer (XFER)	Overflow	1 Invalid call attempt
		2 Transferring party without XFER allowed
Hunt	Busy	No answer to any Hunt DN and no attendant is available
Overflow	Overflow (Fast Busy)	
Note: Hunt overrides CFB. When busy, telephones with both features have calls forwarded to the Hunt DN. The originator receives overflow tone when the call is unable to terminate. The exception is when the "forward to" DN is busy and no redirections are allowed due to NCFNA.		

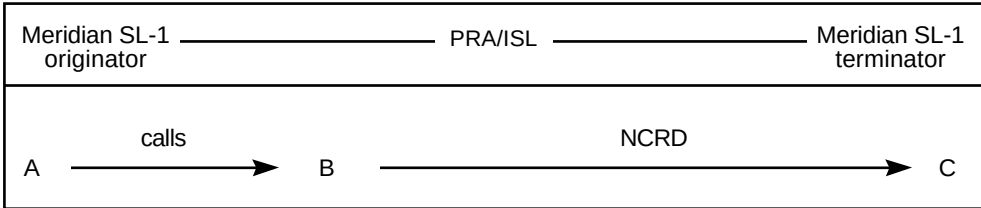
NCRD configurations

The following figures are examples of typical call redirection configurations. The text associated with each figure explains the scenarios. These scenarios are shown in Figure 70:

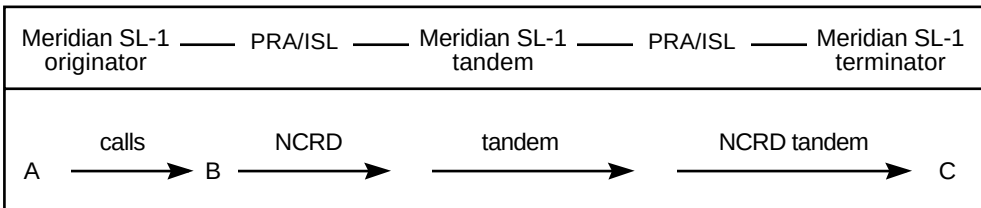
- Intranode NCFAC
- Internode tandem NCFAC
- Tandem NCFAC
- Tandem NCFAC and intranode redirection
- NCFNA
- Tandem NCFNA

Figure 70
Network configurations for NCFAC and NCFNA

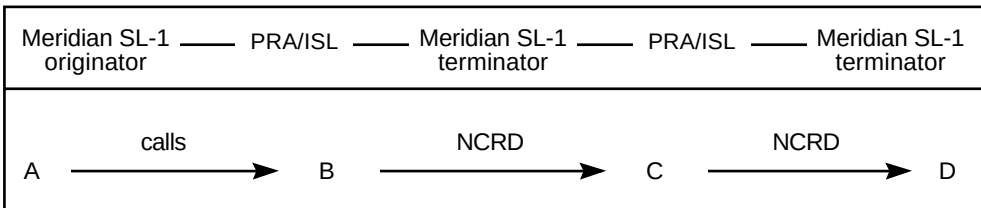
Meridian SL-1 to Meridian SL-1 configuration for NCFAC and NCFNA



Tandem Meridian SL-1 configuration for NCFAC and NCFNA



Multiple hops configuration for NCFAC only



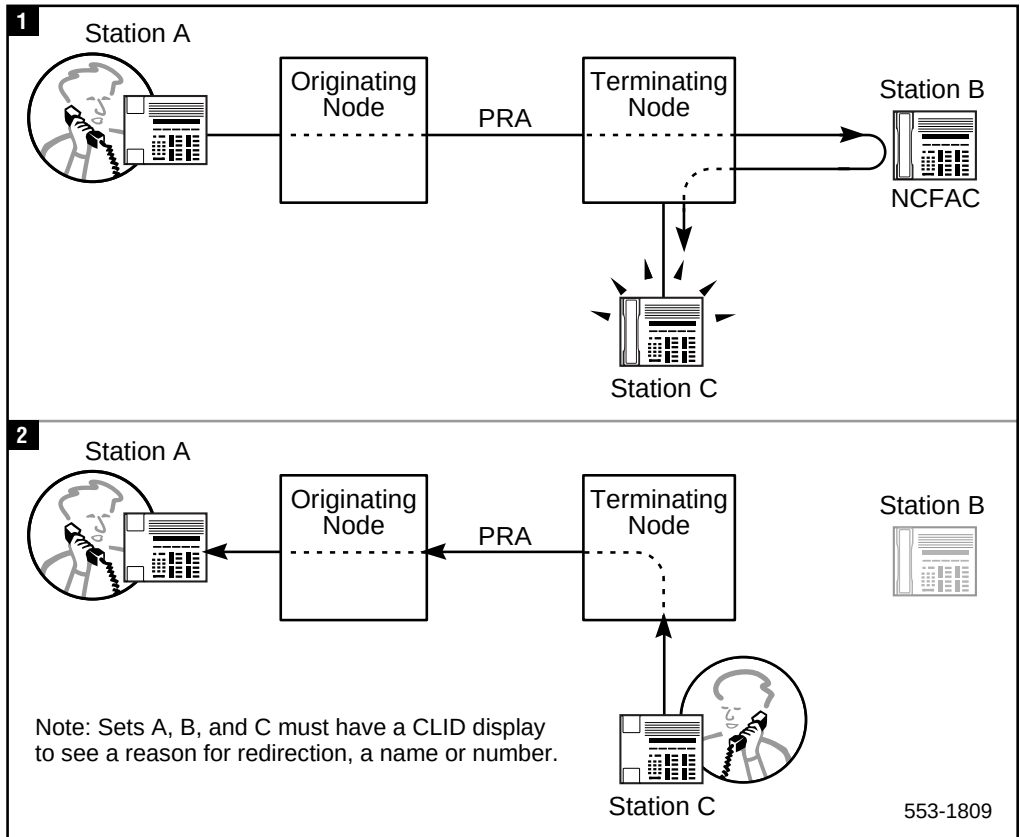
553-1815

Intranode NCFAC redirection

The following sequence occurs in an NCFAC scenario. See Figure 71.

- 1** Station A calls Station B on another node. Station B has Call Forward All Calls and forwards to Station C.
- 2** The call is then forwarded to Station C. Station C resides in the same terminating node as Station B.
- 3** The terminating node, Station C, sends the CLID display information to Station A. When Station C answers the call, a message is sent to the originating node, Station A.

Figure 71
Intranode NCFAC redirection

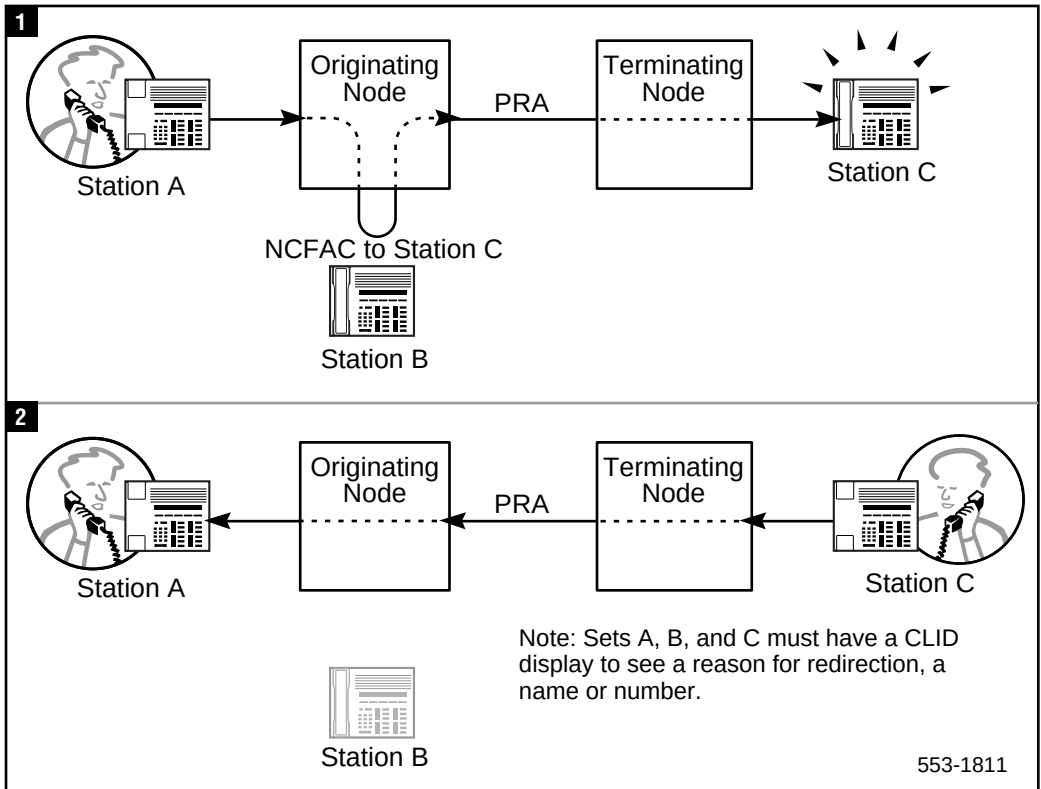


Internode NCFAC redirection

The following occurs in an internode NCFAC redirection scenario. See Figure 72.

- 1** Station A generates a call to Station B. Station B has Call Forward All Calls and forwards to Station C. Station C is located on another switch, making this an internode call.
- 2** A message that contains the called number, calling number, original called number, original redirection reason, and the redirection counter is sent with the call.
- 3** When Station C answers the call, a message is sent to the originating node indicating this response.

Figure 72
Internode NCFAC

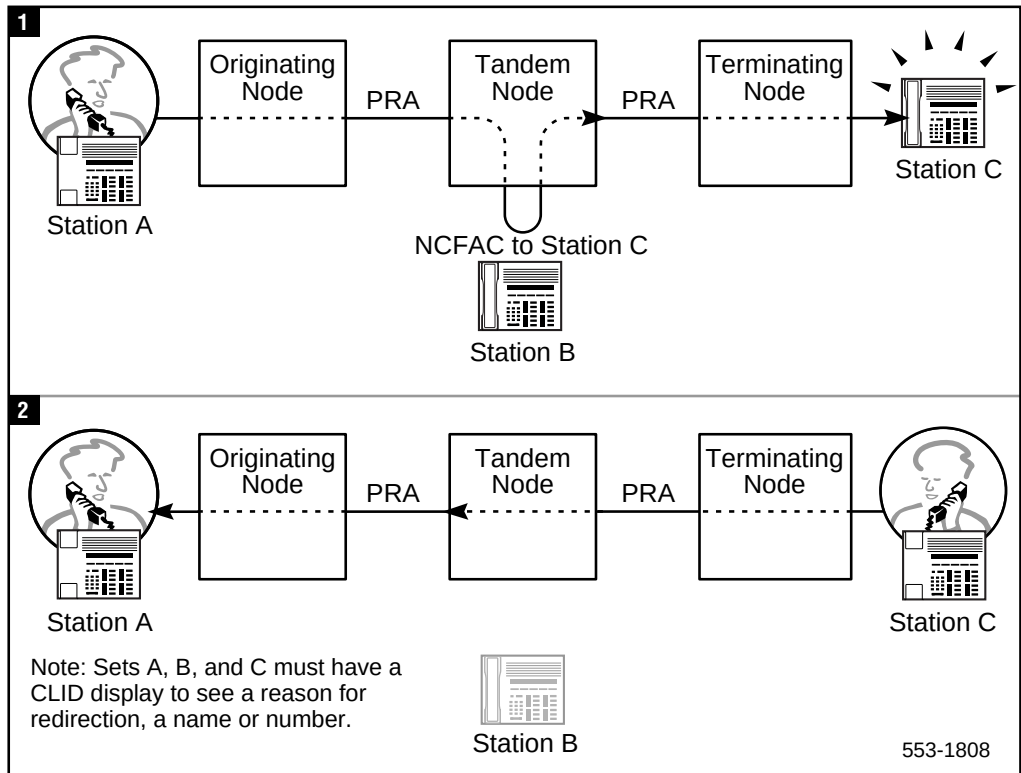


Tandem NCFAC redirection

The following scenario occurs in tandem NCFAC redirection. See Figure 73.

- 1** Station A generates an internode call to Station B. Station B has Call Forward All Calls and forwards to Station C on another switch.
- 2** The call is translated at the tandem node and then forwarded to Station C at the terminating node.
- 3** The message that accompanies the call from the tandem to the terminating node contains the called number (Station C), the calling number (Station A), the original called number (Station B), the original reason for redirection (NCFAC), and the redirection counter that has a value of 1.
- 4** The terminating node sends a message to the originating node that contains the call forwarding information along with an indication of ringing Station C.
- 5** When Station C answers the call, a message indicating this response is sent first to the tandem node and then relayed to the originating node.

Figure 73
Tandem NCFAC

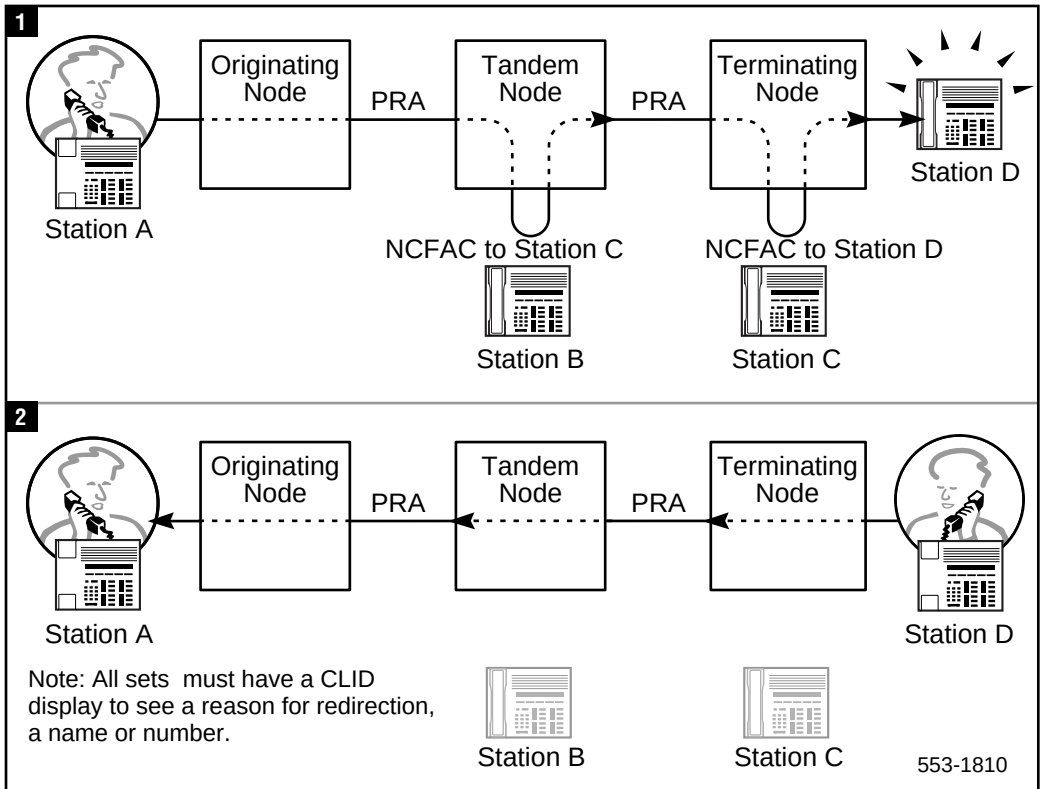


Tandem NCFAC and intranode redirection

The following occurs in a tandem NCFAC. This is followed by an intranode redirection scenario. See Figure 74.

- 1** Station A generates an internode call to Station B. This Station B has Call Forward All Calls and forwards to Station C on another node. In this scenario, Station C has Call Forward All Calls and forwards the call to telephone D on the same node.
- 2** The call is forwarded from the tandem node to the terminating node for Station C. The CLID information is sent as a message along with the call. This information includes:
 - redirected party number (Station C)
 - calling number (Station A)
 - original called number (Station B)
 - original redirection reason (CFAC or NCFAC)
 - the redirection counter (1)
- 3** The call is then forwarded to telephone D within the terminating node. The terminating node sends the call forwarding information to the originating node (Station A).
- 4** The redirection counter is still 1 since there was a single network redirection.
- 5** Station D answers and a message is sent notifying the originating node of this response.

Figure 74
Tandem NCFAC intranode

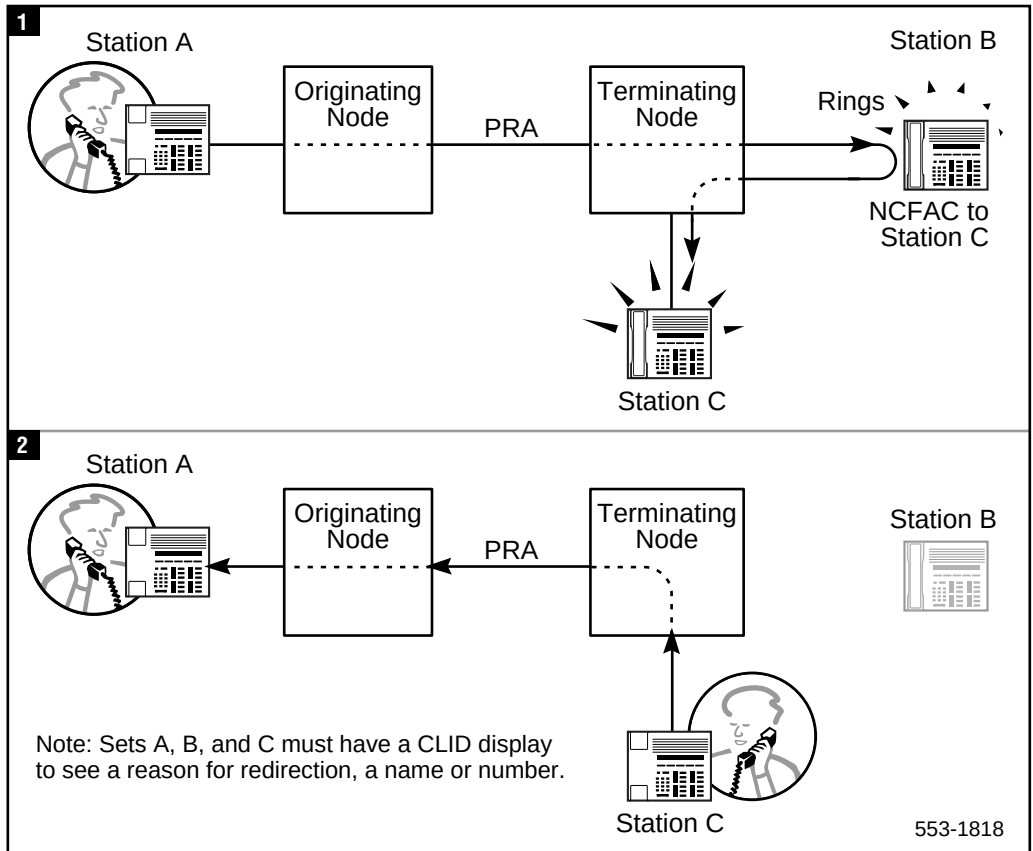


NCFNA redirection

The following occurs in an NCFNA redirection scenario. See Figure 75.

- 1** Station A generates an internode call to Station B, which has Call Forward No Answer and forwards to Station C.
- 2** The call is forwarded to Station C when the ringing (or alerting) phase times out.
- 3** The terminating node sends a message to the originating node that contains the redirection number (Station C) and the redirection reason (NCFNA).
- 4** When Station C answers the call, the terminating node generates a message to the originating node indicating this response.

Figure 75
NCFNA

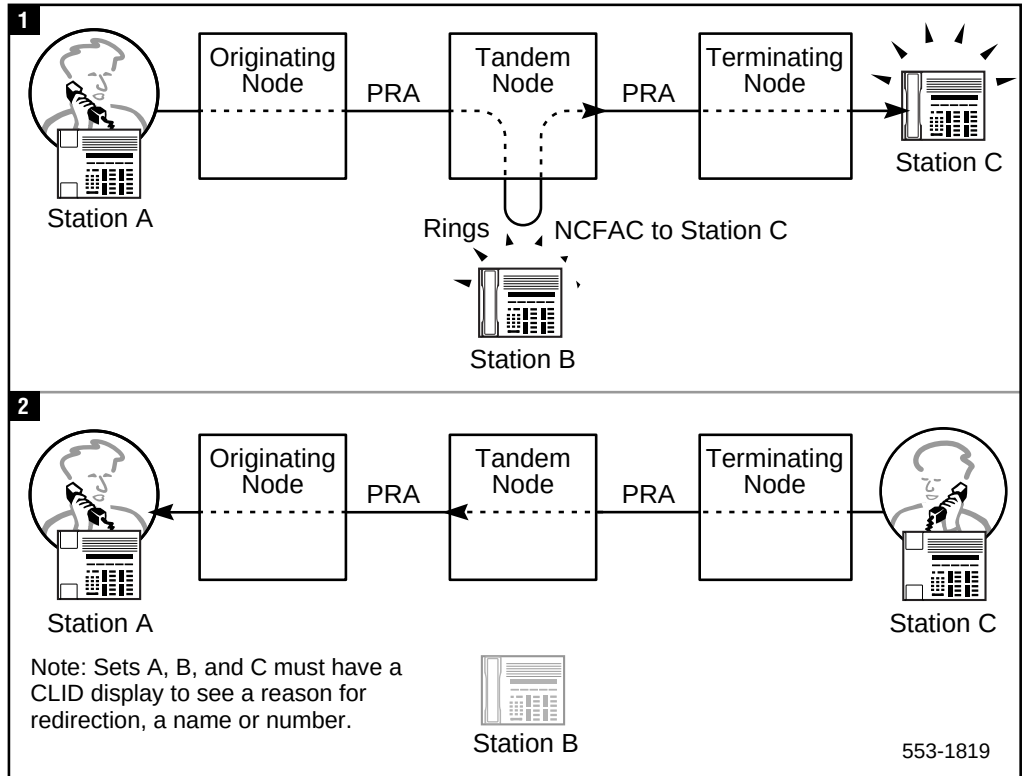


Tandem NCFNA redirection

The following occurs in tandem NCFNA redirection. See Figure 76.

- 1** Station A generates an internode call to Station B, which has Call Forward No Answer and forwards to Station C.
- 2** The call is transferred to Station C when the ringing (alerting) phase times out.
- 3** The message sent to the terminating node contains the terminating party number (Station C), calling number (Station A), original called number (Station B), original reason for redirection (NCFNA), and the redirection counter with a value of 1.
- 4** The terminating node sends a message to the tandem node, which relays the message to the originating node with the redirection number (Station C) and the reason for redirection.

Figure 76
Tandem NCFNA



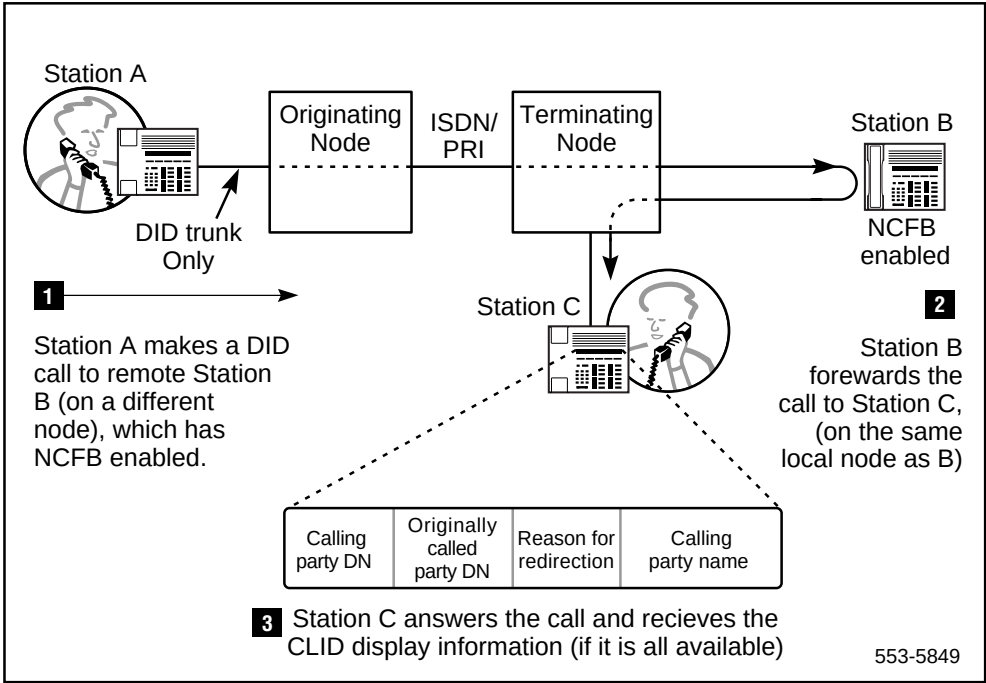
Network Call Forward Busy

Remote Network Call Forward Busy

The folowing occurs in a Remote Network Call Forward Busy scenario. Refer to Figure 77.

- 1 DID trunk A initiates a call to remote Station B (on a different node), which has NCFB enabled.
- 2 NCFB forwards the call to Station C, on a node local to the originally dialed Station B.
- 3 Station C answers the call.
- 4 The terminating telephone receives the call information to display the reason for redirection and, if available, the originating number and name.

Figure 77
Remote Network Call Forward Busy scenario

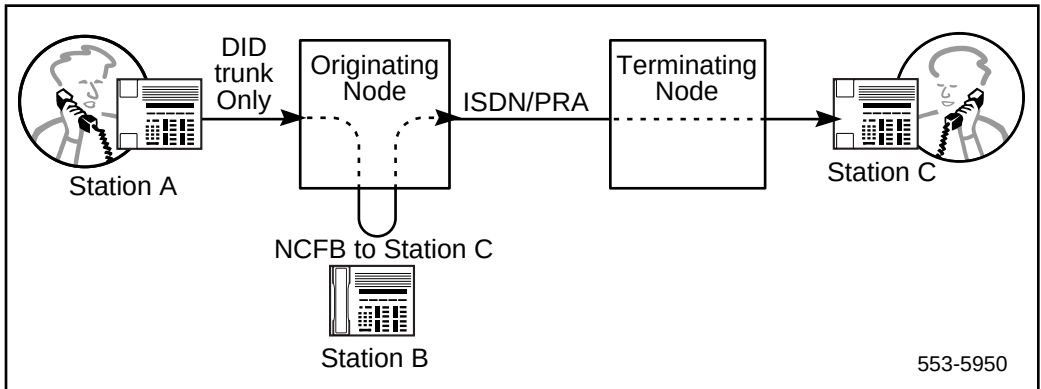


Internode Network Call Forward Busy

The following occurs in an Internode Network Call Forward Busy scenario. Refer to Figure 78.

- 1 DID trunk A dials a local call to Station B with NCFB enabled.
- 2 The originally dialed telephone forwards the call to Station C, on a remote node.
- 3 Station C answers the call.
- 4 The terminating telephone receives the call information to display the reason for redirection and, if available, the originating number and name.

Figure 78
Internode Network Call Forward Busy scenario

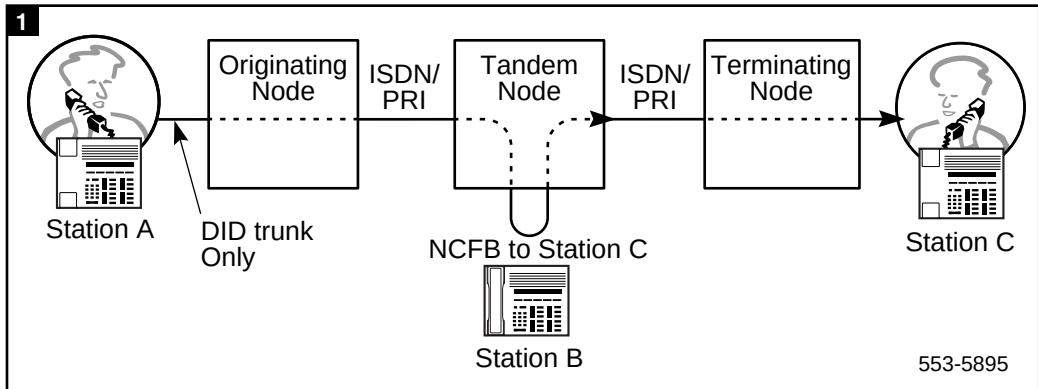


NCFB through a tandem node, example 1

The following example provides a scenario of Network Call Forward Busy through a tandem node. Refer to Figure 79.

- 1 DID trunk A initiates a call to Station B with NCFB, on a remote node.
- 2 The call is forwarded from one remote node (a tandem node) to the terminating telephone at a third location.
- 3 Station C answers the call.
- 4 The terminating telephone receives the call information to display the reason for redirection and, if available, the originating number and name.

Figure 79
NCFB through a tandem node, example 1

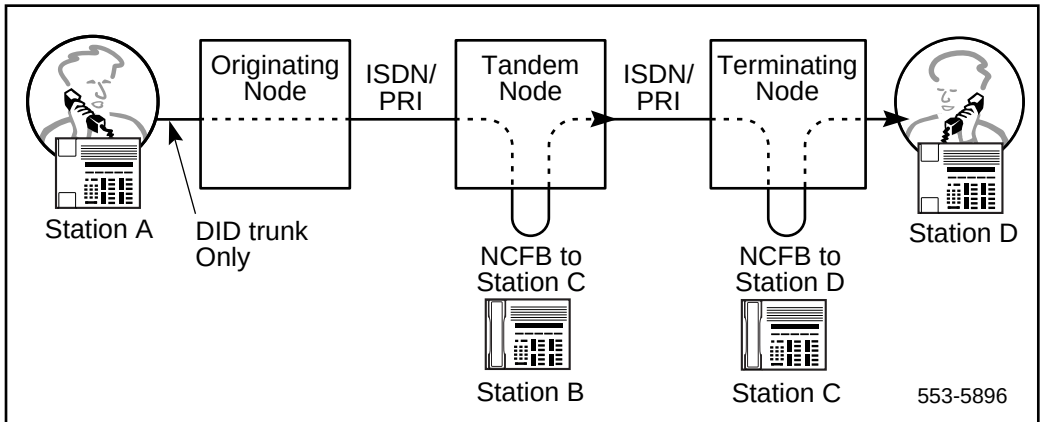


NCFB through a tandem node, example 2

The following example provides another scenario of Network Call Forward Busy through a tandem node. Refer to Figure 80.

- 1 DID trunk A initiates an internode call to Station B with NCFB.
- 2 The call is forwarded through the tandem node to Station C on another remote node. Station C also has the NCFB feature enabled.
- 3 The call is forwarded to the terminating telephone and answered.
- 4 The terminating telephone receives the call information to display the reason for redirection and, if available, the originating number and name.

Figure 80
NCFB through a tandem node, example 2



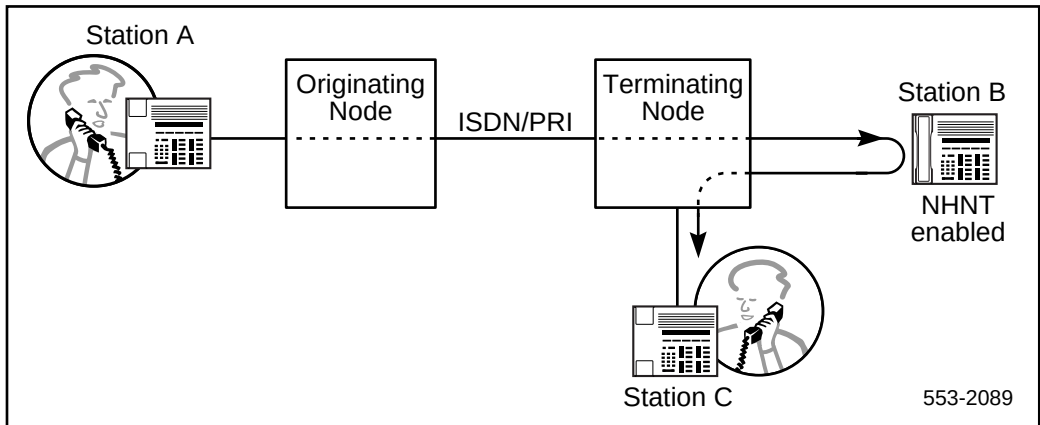
Network Hunt

Remote Network Hunt

The following occurs in a Remote Network Hunt scenario. Refer to Figure 81.

- 1 Station A initiates a call to remote Station B (on a different node), which has NHNT enabled.
- 2 NHNT forwards the call to Station C, on a node local to the originally dialed Station B.
- 3 Station C answers the call.
- 4 The terminating telephone receives the call information to display the originating number, name, and reason for redirection.

Figure 81
Remote Network Hunt scenario

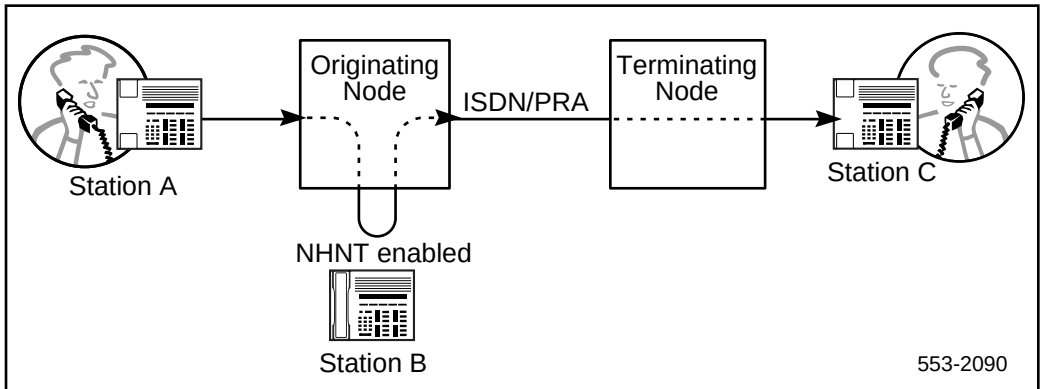


Internode Network Hunt

The following occurs in an Internode Network Hunt scenario. Refer to Figure 82.

- 1 Station A dials a local call to Station B with NHNT enabled.
- 2 The originally dialed telephone forwards the call to Station C, on a remote node.
- 3 Station C answers the call.
- 4 The terminating telephone receives the call information to display the originating number, name, and reason for redirection.

Figure 82
Internode Network Hunt scenario

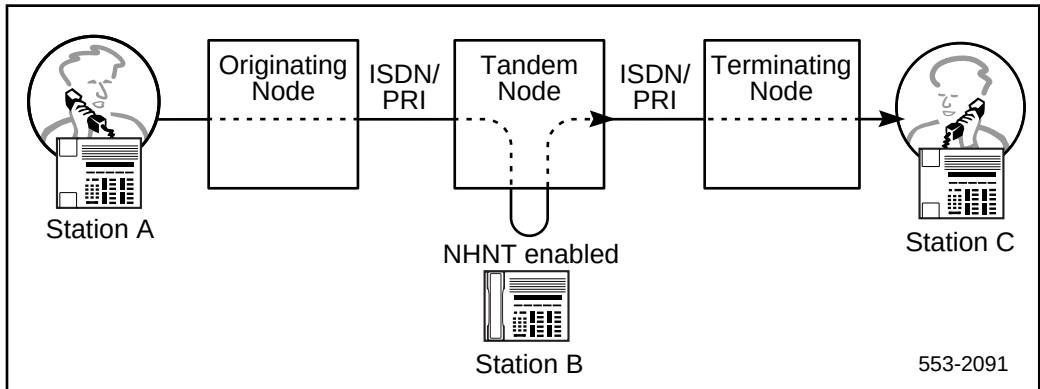


Network Hunt through a tandem node, example 1

The following example provides a scenario of Network Hunt through a tandem node. Refer to Figure 83.

- 1 Station A initiates a call to Station B on a remote node with NHNT.
- 2 The call is forwarded from one remote node (a tandem node) to the terminating telephone at a third location.
- 3 Station C answers the call.
- 4 The terminating telephone receives the call information to display the originating number, name, and reason for redirection.

Figure 83
Network Hunt through a tandem node, example 1

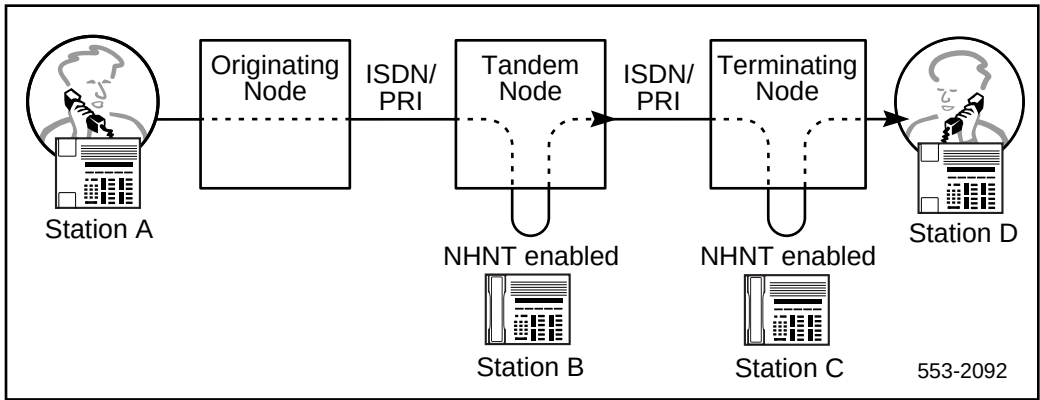


Network Hunt through a tandem node, example 2

The following example provides another scenario of Network Hunt through a tandem node. Refer to Figure 84.

- 1 Station A initiates an internode call to Station B with NHNT.
- 2 The call is forwarded through the tandem node to Station C on another remote node. Station C also has the NHNT feature enabled.
- 3 The call is forwarded to the terminating telephone and answered.
- 4 The terminating telephone receives the call information to display the originating number, name, and reason for redirection.

Figure 84
Network Hunt through a tandem node, example 2



Network Transfer

The originally dialed party can transfer a call over ISDN using Network Transfer (NXFER). As with regular call transfers, the incoming call is automatically placed on Hold while the transfer is being set up. When the redirection is complete, the originally dialed telephone is automatically released. Refer to the figures in this section for examples of different Network Transfer (NXFER) scenarios.

Internal call redirections, where all parties are local on the same switch, do not show a reason for redirection on the Digit Display.

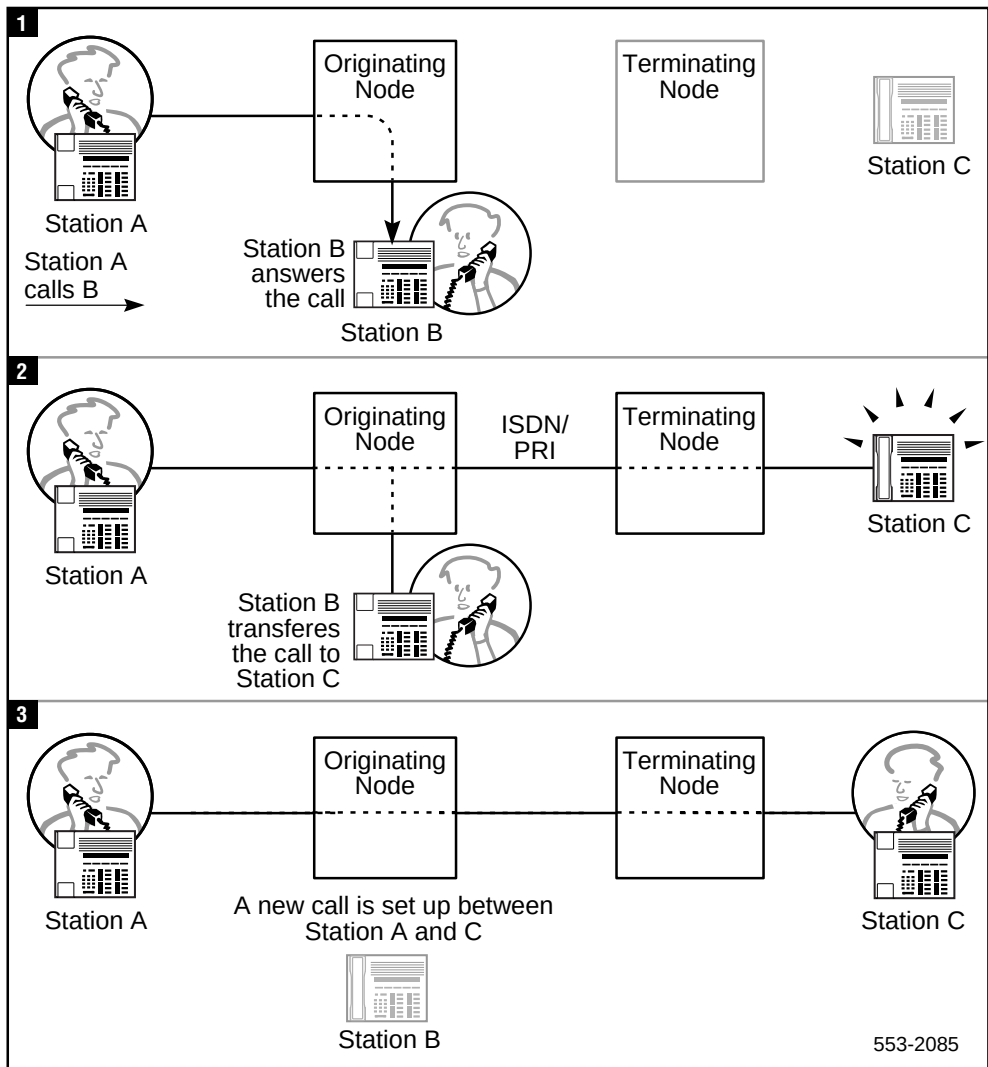
This function is not associated with Network Call Transfer, an ESN feature that operates only on analog or digital trunks.

Internode Network Transfer

The following occurs in an internode Network Transfer scenario. Refer to Figure 85.

- 1 Station A initiates a local call to Station B.
- 2 Station B uses Call Transfer to redirect the call to Station C, which is on a remote node.
- 3 The originally dialed call is released from the originally dialed DN, and a “new” call is set up between the originating node and the terminating telephone (Station C).

Figure 85
Internode Network Transfer scenario

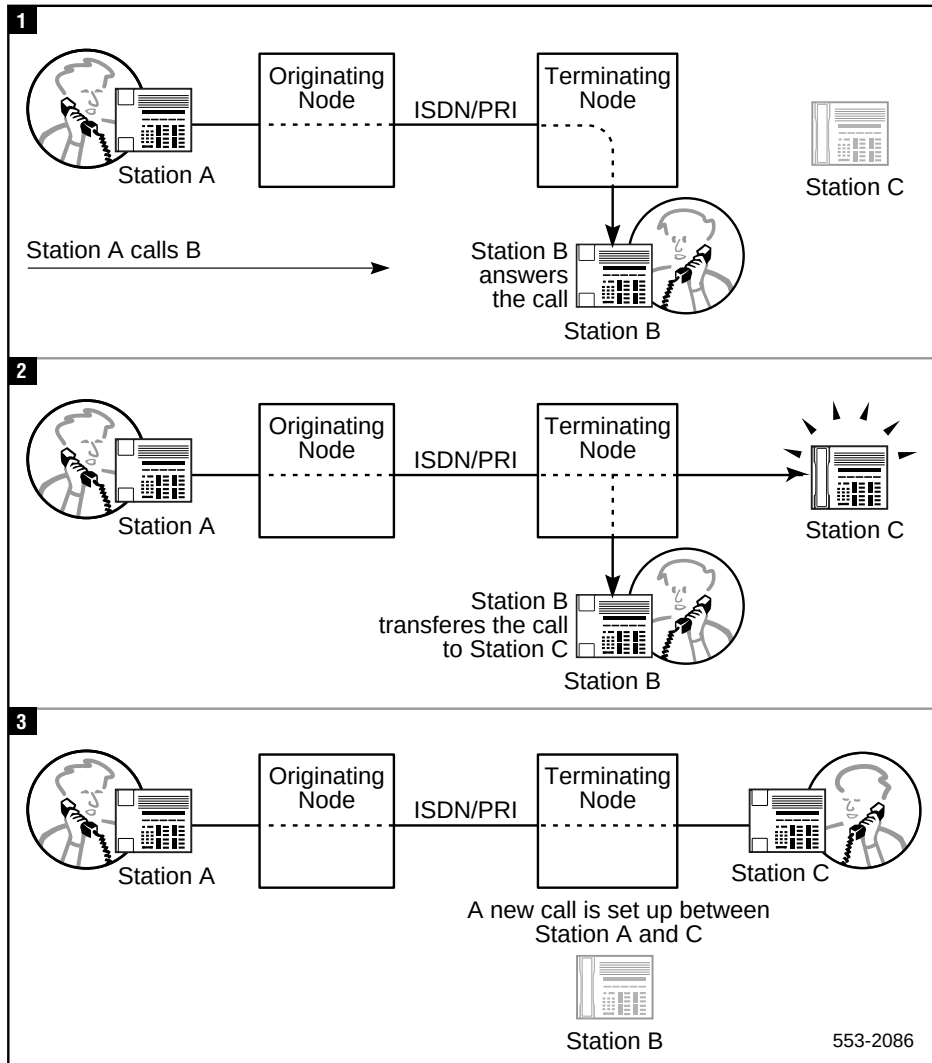


Remote Network Transfer

The following occurs in a Remote Network Transfer scenario. Refer to Figure 86.

- 1** Station A initiates a remote internode call to Station B.
- 2** Station B answers the call and generates a local Call Transfer to Station C.
- 3** Station B completes the transfer, leaving A connected to C.
- 4** When the originally dialed telephone is released from the transfer, the terminating telephone receives the call information to display the originating number, name, and reason for redirection.

Figure 86
Internode Network Transfer scenario

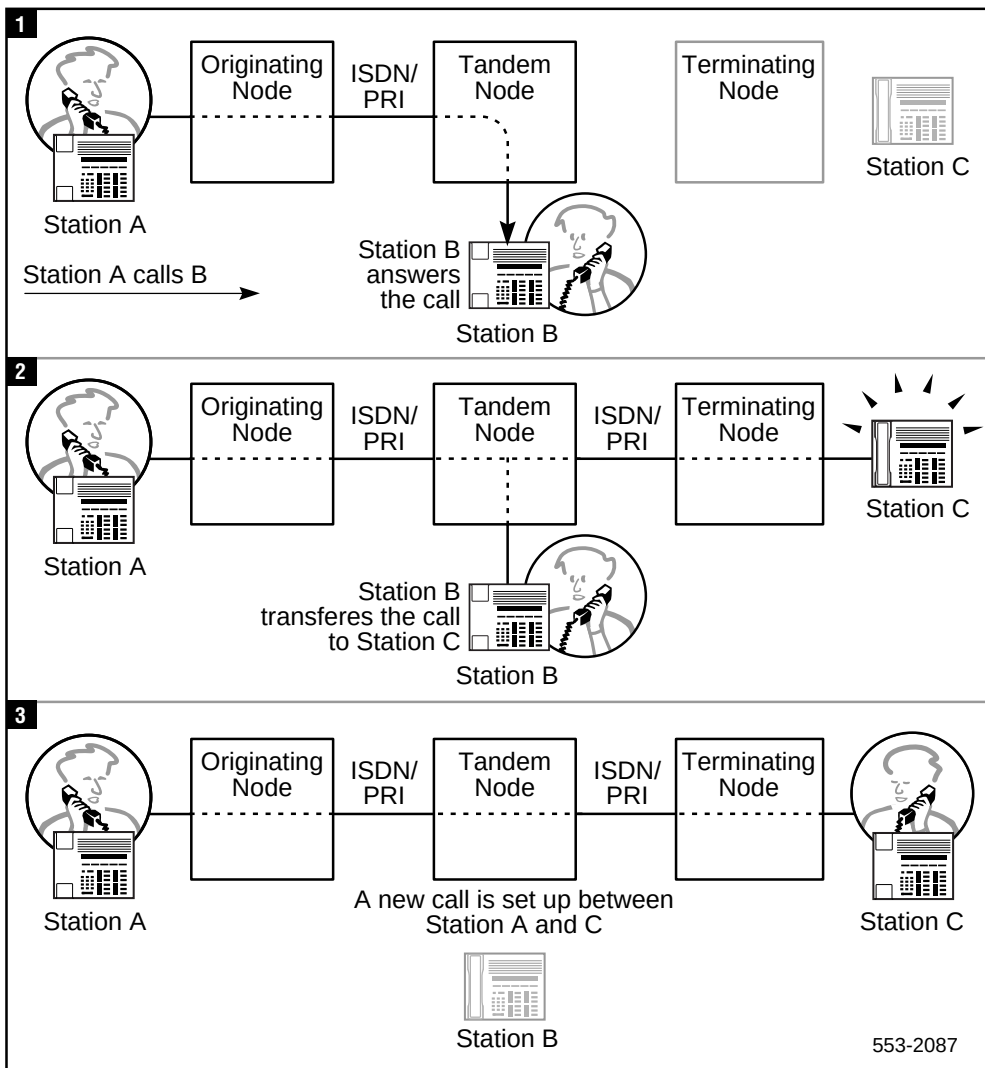


Tandem Network Transfer

The following occurs in a Tandem Network Transfer scenario. Refer to Figure 87.

- 1** Station A initiates a remote internode call to Station B.
- 2** Station B, on a tandem node, transfers the call to Station C on another remote node.
- 3** The call transfer is completed to the terminating telephone, Station C.
- 4** When the originally dialed telephone is released from the transfer, the terminating telephone receives the call information to display the originating number, name, and reason for redirection.

Figure 87
Tandem Network Transfer scenario

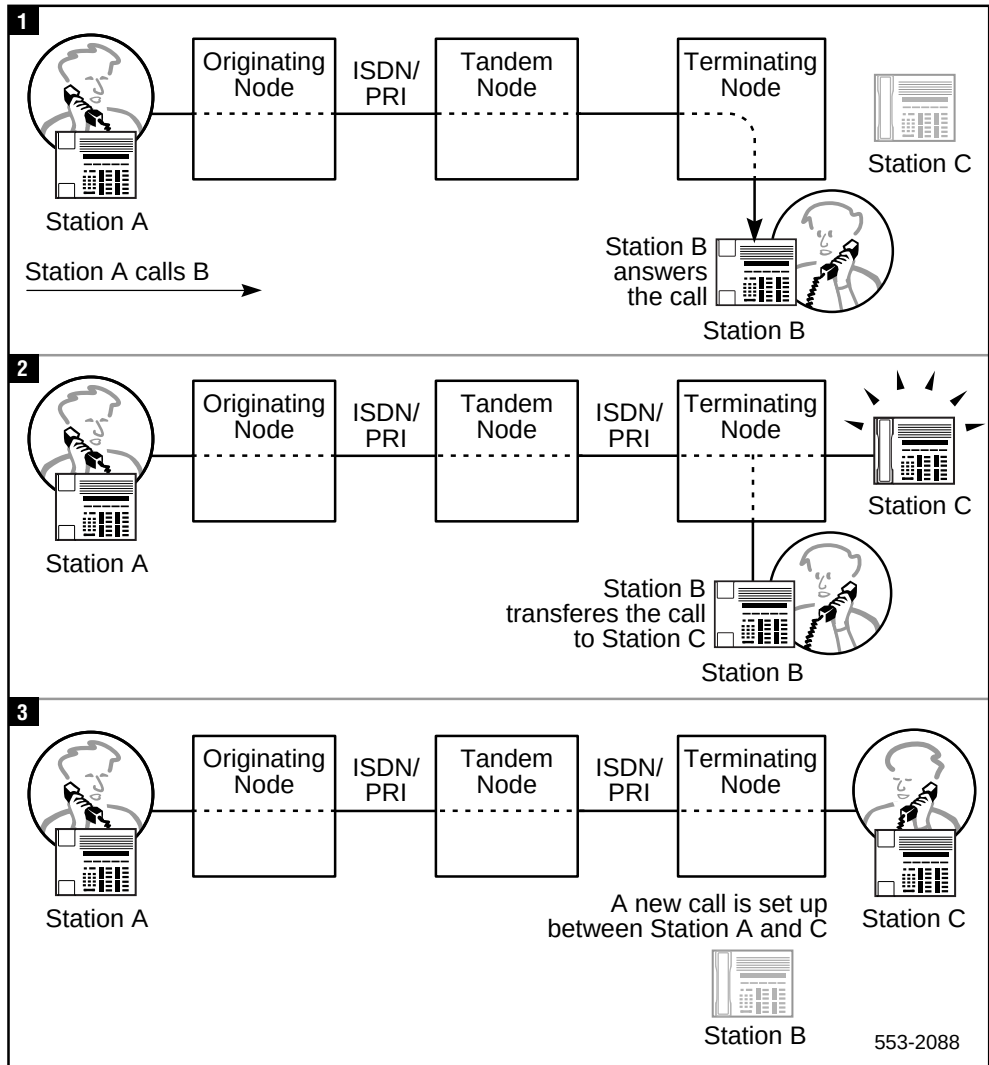


Remote Tandem Network Transfer

The following occurs in a Remote Tandem Network Transfer scenario. Refer to Figure 88.

- 1** Station A initiates a tandem internode call to Station B.
- 2** Station B answers and transfers the call to a local Station C.
- 3** Station C is connected with the redirected call from Station A.
- 4** When the originally dialed telephone is released from the transfer, the terminating telephone receives the call information to display the originating number, name, and reason for redirection.

Figure 88
Remote Tandem Network Transfer scenario

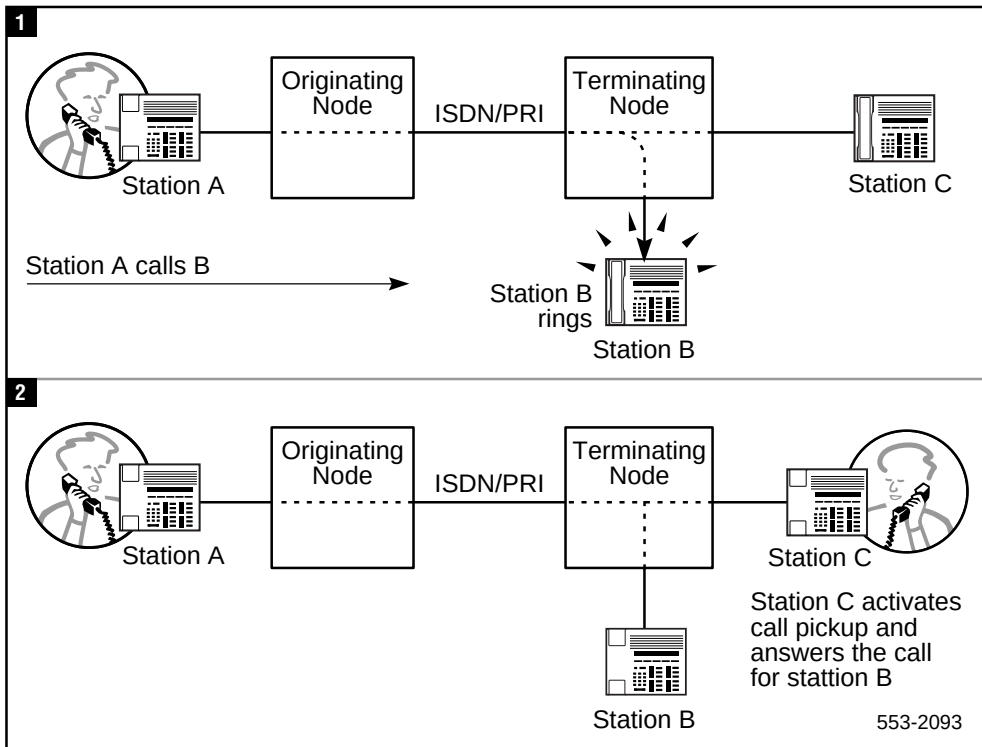


Network Call Pickup

The following occurs in a Network Call Pickup scenario. Refer to Figure 89.

- 1 Station A initiates a call to Station B, part of a remote Network Call Pickup group.
- 2 Station B, the originally dialed telephone, rings.
- 3 Station C activates Call Pickup and answers the call originally directed to Station B.

Figure 89
Network Call Pickup scenario



Feature implementation

The following procedures define the administration of the Network Call Redirection features within an ISDN environment.

Incoming calls can be redirected only if the trunk-to-trunk connection is already allowed. Refer to the *X11 input/output guide* (553-3001-400). These networking features are based on the regular features they are named after. For example NCFB is based on Call Forward Busy, and NCFNA is based on Call Forward No Answer. All the same operating parameters apply; refer to the *X11 features and services* (553-3001-305).

Follow the steps described here to implement features for Network Call Redirection:

- Network Call Forward Busy (NCFB)
- Network Hunting (NHNT)
- Network Transfer (NXFER)

To configure NCFNA, NHNT, NCFB, and NXFER, use the following steps:

- 1** LD 15 Configuration Record (Procedure 35)
Forward calls to a forwarding DN.
- 2** LD 16 Route Data Block (Procedure 36)
Allow Network Call Redirection.
- 3** LD 95 Call Party Name Display (Procedure 37)
Display the reason calls are redirected.
- 4** LD 95 Call Party Name Display (Procedure 38)
Give each DN a name.
- 5** LD 10 Single-line telephone sets (Procedure 39)
Enable the appropriate feature in the data block.
- 6** LD 11 Multi-line telephone sets (Procedure 40)
Enable the appropriate feature in the data block.

Note: Responses in parentheses are default values throughout the procedures.

Procedure 35**Respond to the following prompts in LD 15**

Prompt	Response	Description
REQ	CHG	Change data.
TYPE	CDB RDR_DATA	Customer data block Call Redirection data (Release 21 gate opener)
CUST	0–99	Customer number
- OPT	aaa	Options
- FNAD	FDN	Call Forward No Answer DID calls—Flexible CFNA DN
- FNAT	FDN	Treatment for external CFNA calls (non-DID)—when FDN is selected, CFCT handles the call
- FNAL	FDN	Requests treatment for CFNA—when FDN is selected, DID calls are forwarded
- RCNT	0–(5)	Maximum number of internode hops allowed in a network redirection call. This field must be set to greater than 0 for a network redirection to take place. Note: The RCNT prompt is only checked for redirected calls when the ISDN prompt is yes in LD 15.

Procedure 36**Respond to the following prompts in LD 16**

Prompt	Response	Description
REQ	CHG	
TYPE	RDB	Route data block
CUST	0–99	Customer number
ROUT	0–511	Route number
.		
.		
.		
SRVC		
NCNA	YES, (NO)	Network Call Name is (is not) allowed
NCRD	YES, (NO)	Allows Network Call Redirection messages 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 messages, 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. It is appropriate to set NCRD = NO when your network interfaces with a network that is equipped with a version of ISDN earlier than X11 release 14.
TRO	YES, (NO)	Trunk Optimization
		TRO economizes trunk use throughout the network as part of the NCRD feature.

Procedure 37
Respond to the following prompts in LD 95

Prompt	Response	Description
REQ	CHG	Change existing data
TYPE	CPND	Call Party Name Display data block
CUST	0–99	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." Enter the mnemonic that represents NCFAC on a set's CLID display.
CFNA	xxxx, (N)	Mnemonic for (Network) Call Forward No Answer display. Enter the mnemonic that represents NCFNA on a set's CLID display. Default is "N."
HUNT	xxxx, (B)	Mnemonic for Network Hunting display
PKUP	xxxx, (P)	Mnemonic to allow Call Pickup display
XFER	xxxx, (T)	Mnemonic for Call Transfer display

Procedure 38**Respond to the following prompts in LD 95**

Prompt	Response	Description
REQ	CHG	
TYPE	NAME	Call Party Name Display name entry
CUST	0–99	Customer number
DIG	xxx xx	An existing Dial Intercom Group number (0–253) and member number (0–99)
NAME	aaa...a	CPND name using ASCII characters. The DIG prompt is reprompted. Enter <CR> to get the DN prompt.
DN	xxxx	DN of eligible type.

Procedure 39
Respond to the following prompts in LD 10

Prompt	Response	Description
REQ	CHG	
TYPE	500	Enter set type
HUNT	xxxx	Hunt DN for internal calls
FTR	EFD xxx	External Flexible Call Forward DN Only allowed if LD 15 is properly configured: FNAD = FDN FNAL = FDN FNAT = FDN If the DNXP package is equipped, up to 7 digits are allowed; otherwise, only 4 digits can be entered. Accepted only if CLS is MWA or FNA.
	EHT xxxx	External Hunt DN Only allowed if CLS = CFTA Same digits as defined above
	FDN xxxxxxxx	Flexible Call Forward No Answer DN (cannot be an LDN) Same digits as defined above

Procedure 40**Respond to the following prompts in LD 11**

Prompt	Response	Description
REQ	CHG	
TYPE	xxxx	Enter set type as appropriate
FDN	x..x	Flexible CFNA DN where xx is the MCDN. The FDN value should include AC1/AC2 when applicable (up to 13 digits).
EFD	xxxx	Network CFNA DN for external calls
HUNT	xxxx	Network Hunt DN for calls with CLS = CFTD
EHT	xxxx	Network Hunt DN for external calls

Feature testing

To verify Network Call Redirection (NCRD), do the following:

- 1 Place a call from the Meridian 1 system over a PRI trunk to a Digit Display telephone at a far end facility. This far end facility must be on a different node.
- 2 To make sure that network redirection takes place, the originally dialed number must be in an NCFNA or NCFAC condition.
- 3 Verify that the call is terminated correctly.

Note: In order to do steps 4 and 5, both ends must be equipped with X11 release 15 or later ISDN software.

- 4 Verify that the display of the originating party contains the following:
 - Originally called party DN (or redirecting DN)
 - Connected party DN
 - Reason for redirection
 - Connected party name
- 5 Verify that the display of the terminating party contains the following information:
 - Calling party DN
 - Originally called party DN (or redirecting DN)
 - Reason for redirection
 - Calling party name
- 6 Verify that the call can be released properly from either end.
- 7 Have the far end place a call that is redirected. Then repeat steps 4 through 6.

Network Call Party Name Display/Network Name Delivery

Network Call Party Name Display (NCPND) provides a network-wide visual display of names and telephone numbers to both parties of a call. For telephones equipped with an alphanumeric display, NCPND provides the display of the calling party's name on the terminating telephone and the called party's name on the calling telephone. The name and number display lasts for the duration of the call.

The sending of names over the private network is an option set up on a per route basis. The name is provided by Call Party Name Display (CPND) configured in each switch. For call redirections, a set option provides a display of the redirecting name instead of the calling name.

The following telephones and attendant consoles are supported:

- M2317 digital telephones
- M3000 Touchphone
- all Meridian Modular Telephones with digit display
- M1250 and M2250 attendant consoles

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

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.
- 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.
- 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

Network Name Delivery method 2 (ND2) is available in X11 release 17 and later. ND2 provides network-wide name display in compliance with the Meridian Customer Defined Networking (MCDN) protocol. It allows interworking among Meridian 1s and a DMS-100/250 central office.

The following list describes the ND2 operating parameters:

- All DMS-100s must be equipped with BCS32 or later software and all Meridian 1s with a direct connection to the DMS-100 must be equipped with X11 release 17 or later.
- 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 release 14 through 16. ND2 is recommended for X11 release 17 and up. The far ends must match.

Feature interactions

Refer to Call Party Name Display in *X11 features and services* (553-3001-305) for CPND feature interactions.

Feature packaging

NCPND requires these packages.

95	Call Party Name Display	CPND
145	ISDN Signaling	ISDN
146	ISDN Primary Rate Interface Dependencies: 75, 145, 19 [CLID]	PRI

Feature implementation

LD 95—Configure the Call Party Name Display feature

Refer to “Call Party Name Display” in *X11 features and services* (553-3001-305) to implement CPND.

LD 16—Enable NCPND for each required trunk route

NCNA	Yes, (No)	Allow or deny Network Call Party Name Display. To prevent hit-and-miss name display or the dropping of calls in networks whose nodes have BCSS31 or earlier or X11 release 16 or earlier, enter No. For example, where an X11 release 17 Meridian 1 node has an adjacent DMS node with BCS31 or earlier, enter No.

LD 17—Indicate the remote capability (which Network Name Delivery protocol is supported by the remote node/switch on this DCH interface)

RCAP	ND1/ND2	Network Name Delivery method 1 (ND1) Network Name Delivery method 2 (ND2) (X11 release 17 and later with BCS 32 and later)

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 automatically dials 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 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 a 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 provides the ability for Meridian digital sets to have two-way intercom calls on specially designated keys (not on the DN keys) with other Meridian digital 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 (prior to Release 21, only ringing mode was available). 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 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.

Note: When configuring two-way Hot Type D keys in voice mode, it must be taken into account the fact that the CLID does not transmit the originator's Hot Type D DN between ISDN locations; it contains the prime DN of the originating set, and not the originator's Hot Type D DN. Therefore, ringing may occur on the Hot Type D key rather than immediate answer, since a match could not be found for the originator's Hot Type D DN. For this reason also, when the configured mode is either voice, ringing, or non-ringing, a "No Answer Indication" is not left on the set called set of a two-way Hotline. It is therefore recommended that the Hot Type I be used for a two-way Hotline, since it relies only on the prime DN.

Operating parameters

Hot Type I calls are not allowed on analog (500/2500 type) sets.

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 Hot Type D (when the No Answer Indication applies) must be either a Coordinated Dialing Plan or a Universal Dialing Plan number that must terminate on a Prime DN of a Meridian digital 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.

If the termination mode is voice and the called party is idle and the handsfree voice call (HVA in LD 15) is active, there is no indication to the software that the called party really answered the call. If any other key is pressed, the No Answer Indication is not left.

Hot Line keys must be defined with the same dialing plan.

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.

Auto Hold

If a user who originated a Hot Type I call receives or makes another call on another DN, pressing that DN puts the established call on hold. If a user presses the Hot Type I key while a call is established on it, the call is placed on hold. If the Hot Type I key is pressed while a call is established on another DN, the established call is put on hold. If a station with automatic hold allowed Class of Service receives an Hot Line call, the user of that station can put the active call on hold by pressing the Hot Type I key or by making or answering another call on another key.

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.

Conference

A Conference call may involve a mixture of intercom and regular DN keys.

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.

Flexible Feature Code (FFC) Boss Secretarial Filtering

Hot Type I calls overrides this feature (i.e., Hot Type I calls are not filtered by FFC Boss Secretarial filtering). The call terminates on the Boss' set and is not forwarded to the secretary.

FFC Boss Secretarial Filtering takes precedence over enhanced Hot Type D calls. In this case, if FFC Boss Secretarial Filtering is active, calls terminate on the secretary's set.

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 set, the first Meridian digital 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.

Ringing Change Key

The ringing/non-ringing mode of an enhanced Hot Type D or of a Hot Type I key is not changeable by using the Ringing Change Key feature.

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 1.5 Mbps Primary Rate Interface (PRI2) package 146

Feature implementation

Note: When configuring two-way Hot Type D keys in voice mode, it must be taken into account the fact that the CLID does not transmit the originator's Hot Type D DN between ISDN locations; it contains the prime DN of the originating set, and not the originator's Hot Type D DN. Therefore, ringing may occur on the Hot Type D key rather than immediate answer, since a match could not be found for the originator's Hot Type D DN. For this reason also, when the configured mode is either voice, ringing, or non-ringing, a "No Answer Indication" is not left on the set called set of a two-way Hotline. It is therefore recommended that the Hot Type I be used for a two-way Hotline, since it relies only on the prime DN.

LD 11 – Define Hot Type D and I keys and Classes of Service as follows:

Prompt	Response	Description
REQ	NEW, CHG, OUT	Configure, change or remove.
TYPE	aaaa	Telephone type where aaaa cannot = M3000.
TN	I s c u c u	Terminal Number. Terminal Number for the Option 11.
...		
CLS	FICA (FICD) NAIA (NAID)	Forward Hot Type I allowed. Forward Hot Type I denied (default). No Answer indication allowed. No Answer indication denied (default).
...		
KEY	nn HOT D dd target_num hot_dn R/V/N/(H)	Two-way Hot Line type D Key. nn = key number. 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 type I key. nn = key number. dd = number of digits dialed. target_number = terminating DN (31 digits maximum). Termination mode: V = Voice (the default) N = Non-ringing, and R = Ringing.

LD 95 – Configure the Calling Party Name Display:

Prompt	Response	Description
REQ	NEW, CHG	Configure or change.
TYPE	CPND	Calling Party Name Display.
CUST	0-99	Customer Number.
...		
NITC	aaaa (NI)	Non-Hot Line call. Indicates that the Hot Line call terminated as a normal call.

Feature operation

Press the Hot Type I or D key to initiate a 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.

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
- Calling Party Number Privacy, using the Calling Party Name feature (*67)
- 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 a 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 implementation

The following two service changes are required for this feature: define a new interface type for a given D-channel; and define the download.

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	MSDL	Supported only on Multi-purpose Serial Data Link (MSDL) or Downloadable D-channel cards.
...		
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 = AT&T 5ESS.
PRI	lll nn	lll = 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	MSDL	Card type.
...		

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.
...		

Feature operation

No specific operating instructions are required to use this feature.

Network Message Services

Network Message Services (NMS) uses ISDN signaling capabilities to provide messaging services across an ISDN network. Meridian 1 systems interconnected with PRI or ISL can extend supported message services to all users within that network on a customer basis from a single, central location. Access to NMS and feature activation from the messaging system is transparent to the end user.

X11 release 15

For X11 release 15 and later, Network Message Services supports the Message Center (MC) feature. NMS-MC supports centralized manual message centers that use attendant consoles, Meridian 1 telephones, or ACD telephones as answering positions.

X11 release 16

A second distinct application, NMS-Meridian Mail (NMS-MM), is introduced to provide end-user and calling party access to centralized Meridian Mail services across the network.

NMS functions common to both applications are described here and details specific to each are described later in this module. Differences between Message Center and Meridian Mail functions are described under their respective headings.

Within NMS operations, there are direct message calls and indirect message calls:

- Direct calls are initiated by the user accessing the Message Center to receive messages. Access is allowed by dialing the message facility directly or using the Message Waiting Key (MWK).
- Indirect calls occur when a redirection feature directs the call to a Message Center so the caller can leave a message.

An NMS call has two components: basic PRI call signaling and transaction signaling. The PRI portion of the call is supported by ISDN PRI or ISL and Network Call Redirection (NCRD)—subject to the requirements for PRI calls and the NCRD feature. NMS always uses non-call-associated, connectionless Transaction Signaling messages to turn on/off the user set Message Waiting Indication (MWI) and to transport call information for certain Meridian Mail features, including Call Sender (that is, the transport of connectionless signaling information across the ISDN network).

There are three types of network nodes supporting NMS:

- Originating node. For direct calls, the originating node is the PBX where the calling party resides. For indirect calls, the originating node is the node where the originally dialed party resides.
- Tandem node. This switch can pass transaction signaling messages on to the next PBX. Stations on a tandem node do not have access to Network Message Services functionality.
- Terminating node. This is the PBX where the Message Center or Meridian Mail server resides, and where the call terminates.

NMS supports Coordinated Dialing Plans (CDPs) and Uniform Dialing Plans (UDPs). All nodes must conform uniformly to the adopted dialing plan. NMS does not support mixed CDP/UDP across a network and limits CDP support to Distant Steering Codes.

Table 75 summarizes the packaging requirements for NMS.

Additional documentation

For network applications, you should have the Northern Telecom Publications (NTPs) supporting ISDN listed in the front of this document. There are additional sets of NTPs supporting the ACD D package and ACD-MAX applications. Consult with your Northern Telecom representative for a complete list of supporting NTPs.

For NMS applications that use ACD, refer to these NTPs:

Automatic Call Distribution feature description (553-2671-110)

Automatic Call Distribution ACD management commands and reports (553-2671-112)

Network ACD description and operation (553-3671-120)

Network Message Services—Message Center

Network Message Services-Message Center (NMS-MC) allows a caller transparent access to a centralized message center over an ISDN PRI/ISL network.

These Message Center configurations are supported:

- ACD Message Center
- DN Message Center
- Attendant Message Center

For these types of Message Centers, the Message Indication Key (MIK) on a message taker's set is used to turn on Message Waiting Indication at a user telephone. The Message Cancellation Key (MCK) is used to turn off Message Waiting Indication.

The NMS-MC supports direct and indirect NMS-MC access across ISDN. Direct access is initiated by dialing the Message Center DN or pressing the Message Waiting Key (MWK). Indirect access occurs when a call is presented to the NMS-MC by any of the call redirection features supported by Network Call Redirection (NCRD) including

- Network Call Forward All Calls
- Network Call Forward No Answer
- Network Call Forward Busy
- Network Hunting

See the NCRD module in this document for further details.

Network Message Services—Meridian Mail

NMS-MM provides transparent access to the Meridian Mail system across the network. NMS-MM operates only between system machines supported by a single Meridian Mail server facility. Users on remote nodes configured as part of the NMS-MM server base have access to all the Meridian Mail features available on the local switch.

See the NCRD module when you consider the redirections that apply to your particular environment. Since Message Center support is on a customer-by-customer basis, configure your network accordingly. See *Message Center description and operation* (553-2691-100). In Meridian Mail applications, different network PBXs (nodes) must be configured with the same Meridian Mail server for proper messaging support. See the Meridian Mail suite of NTPs.

Direct calls for NMS-MM are initiated by dialing the message facility directly or pressing MWK on a properly programmed telephone. Functionality mimics current operations, including Auto-login with a user's password. See the appropriate NTP for a description of call functions.

Indirect calls are presented to the Meridian Mail server from call redirection services. NMS-MM relies on Network Call Redirection (NCRD) to provide the originally dialed and calling party numbers to the Meridian Mail server for message processing. NMS-MM supports Off-net Access through direct dialing.

Operating parameters

The following list describes the NMS operating parameters:

- PRI or ISL is needed for both direct and indirect Message Center calls.
- The NMS DN must be unique and still be able to be reached by means of PRI or ISL from all NMS users in the network, and vice versa.
- NMS supports Meridian 1 to Meridian 1 connections only.
- The local NMS-MM DN defined in each node must also be configured in the Meridian Mail server database, in the VSDN table.
- In-band End-to-End Signaling (EES) is required for NMS-MM at terminating and originating nodes.
- NMS-MM requires X11 release 16 NCRD interworking to provide full service.
- NMS-MM requires the Meridian Hospitality Voice Services package to provide link recovery enhancements for Meridian Link ISDN/AP.
- NMS-MM does not support international dialing.
- Only one Message Center DN can be defined for a telephone. Multiple Message Center types are not supported.
- The NMS does not support Trunk Steering Codes (TSCs).
- For complete functionality each node requires X11 release 16 or later software.

Feature interactions

Listed here are differences in networking applications which may impact Network Message Services operations.

- Password Suppression
 - Password Suppression is not supported accross a Meridian 1 network.

- Network Call Redirection (NCRD)
Indirect access to the NMS-Meridian Mail (NMS-MM) application is based on the NCRD package, which is broken down into the following areas:
 - Call Forward All Calls and Call Forward No Answer (X11 release 14) and Call Forward Busy, Network Call Transfer, and Network Hunting (X11 release 16) provide the base for NMS indirect access.
 - Attendant Extended Call presents the same information to Meridian Mail as Network Call Transfer except that the DN Update message is sent to the NMS-MM when the attendant releases the call. The connected party number is updated only when the attendant is released.
 - NMS does not support incoming calls from CO Loop Start trunks because X11 release 14 NCRD does not redirect these calls. Calls that come into the switch from a CO Loop Start trunk cannot be redirected to another trunk by means of attendant extension or call redirection; these calls are blocked when redirection is activated.
- Barge-in Attendant
The attendant can barge-into an NMS-MM call at the terminating PBX. During barge-in, the user cannot use features that require switch effort, such as the Call Sender feature.
- Trunks
When a call is presented to the NMS-MM by means of a non-PRI or ISL trunk, the call is treated as an external call even if it is an on-network call. The external greeting is applied and the message is announced as from an external number.

- Meridian Hospitality Voice Services

NMS-MM requires the Meridian Hospitality Voice Services (MHVS) package in X11 release 16 to provide Meridian Link ISDN/AP protocol recovery treatment for link applications. All calls to the ACD Night Call Forward (NCFW) DN are redirected to the Meridian Mail server when the ISDN/AP link fails. Call treatment in NMS-MM is identical to the NCFW treatment. See the appropriate ACD NTP listed in “Additional documentation” on page 853.

ISDN requires that the network be equipped with either Coordinated Dialing Plan (CDP) or a Uniform Dialing Plan (UDP) throughout, but it does not support a mixture of both.

NMS does not support the following packages and options:

- Packet Transport Equipment Meridian Mail (MP)
- Multiple Message Center interworking

Feature packaging

Table 75 shows the packages NMS-Message Center requires per node.
 Table 76 shows the package requirements per node for NMS-Meridian Mail.
 See *X11 features and services* (553-3001-305) for X11 release software packages and their dependencies.

Table 75
Required feature packages for each NMS-Message Center node

Name	Mnem.	No.	Orig.	Tandem	Term.
End-to-End Signaling	EES	10	X		X
Basic Automatic Call Distribution *	BACD	40	X		X
Automatic Call Distribution Package A *	ACDA	45	X		X
Message Center	MWC	46	X		X
ISDN Signaling	ISDN	145	X	X	X
ISDN Primary Rate Access	PRA	146	X	X	X
OR					
ISDN Signaling Link	ISL	147	X	X	X
Advanced Network Services	NTWK	148	X	X	X
Network Message Services	NMS	175	X		X
* These packages may not be required for your particular Message Center application.					

Table 76
Required feature packages for each NMS-Meridian Mail node

Name	Mnem.	No.	Orig.	Tandem	Term.
End-to-End Signaling	EES	10	X		X
Integrated Message Service	IMS	35			X
Basic Automatic Call Distribution *	BACD	40	X		X
Automatic Call Distribution Package A *	ACDA	45	X		X
Message Center	MWC	46	X		X
Meridian Link ISDN/AP	IAP3P	77			X
ISDN Signaling	ISDN	145	X	X	X
ISDN Primary Rate Access	PRA	146	X	X	X
OR					
ISDN Signaling Link	ISL	147	X	X	X
Advanced Network Services	NTWK	148	X	X	X
Network Message Services	NMS	175	X		X
* These packages may not be required for your particular Message Center application.					

Feature implementation

For a description of all the prompts and responses for system software, see *X11 input/output guide* (553-3001-400).

Package 175, NMC, introduced in X11 release 15, was renamed NMS in X11 release 16 to cover both Meridian Mail and Message Center.

NMS operates only between Meridian 1 systems. NMS-MCs are configured on a customer-by-customer basis. NMS-MM operates only between machines supported by the same Meridian Mail server facility.

Note: In X11 release 15 and later, Network Message Services require ESN access code insertion. The configuration of ESN access code insertion is shown in Procedure 43 in this chapter.

To configure NMS, use Procedures 41 through 47. Refer also to Table 77 for NMS DN information.

Note: All these procedures apply to both NMS-MM and NMS-MC except for Procedure 45, which is Meridian Mail only.

Procedure 41
Use LD 17 to define the software release of each switch at the far end of each D-channel in the NMS network (X11 release 17 and earlier)

Prompt	Response	Description
REQ	NEW, CHG	
TYPE	CFN	Configuration database
ISDN	YES	
DCHI	1–15	D-channel to the far end
RLS	xx	Enter the X11 release of the far end. The minimum release for NMS-MC is 15 and for NMS-MM is 16.

Procedure 42

Use LD 17 to define the software release of each switch at the far end of each D-channel in the NMS network (X11 release 18 and later)

Prompt	Response	Description
REQ	CHG	Change
TYPE	CFN	Configuration record
ADAN	CHG DCH 0–63	Change D-channel information
RLS	xx	Enter the X11 release of the far end. The minimum release for NMS-MC is 15 and for NMS-MM is 16.

Procedure 43

Use LD 15 to enable Message Services

Prompt	Response	Description
REQ	CHG	Change data
TYPE	CDB IMS_DATA	Customer Data Block Integrated Message Services data (Release 21 gate opener)
- IMA	YES	Enable Integrated Message Services

Procedure 44**Create an ISDN transport signaling database in LD 16**

Prompt	Response	Description
REQ	NEW, CHG	
TYPE	RDB	Route Data Block
CUST	xx	Customer number or range of customer numbers
ROUT		Route number
ISDN	YES	ISDN option
INAC	(NO),YES	Insert Access Code. INAC = YES is required for ISDN network features. This prompt only appears if the route type is a tie trunk.
PNI	1–32700	Customer private identifier—unique to a customer. This is the private identifier of the target switch and must be the same number used for PNI in LD 15 for remote customer. Matches PNI in LD 16 at remote to PNI in LD 15 at local site.
NCRD	YES	Network Call Redirection
TRO	YES	Trunk Route Optimization allowed (denied) on the route

Procedure 45**Use LD 23 to define the Meridian Mail ACD group in the remote switch (NMS-MM only)**

Prompt	Response	Description
REQ	CHG	Change existing data
TYPE	ACD	Automatic Call Distribution data block
CUST	0–99	Customer number
ACDN	xxxxxxx	The Meridian Mail DN
MWC	YES	Message Center services

Note: Do not define any ACD agents for this ACD group to allow automatic redirection to the ACD Night Call Forward DN (NFCW).

Procedure 45**Use LD 23 to define the Meridian Mail ACD group in the remote switch (NMS-MM only)**

Prompt	Response	Description
MAXP	xxxx	Maximum number of agent positions
NCFW	x..x	Night Call Forward DN, where x...x is the NMS-DN. If network DN, include AC1/AC2.

Note: Do not define any ACD agents for this ACD group to allow automatic redirection to the ACD Night Call Forward DN (NFCW).

Procedure 46**Use LD 11 to define the Network Message Services DN for each telephone**

Prompt	Response	Description
REQ	CHG	Change existing data
TYPE	aaa	Telephone type
...		
FDN	x..x	Flexible Call Forward No Answer NMS-DN. See Note.
...		
CLS	MWA	Message Waiting Allowed Class of Service
...		
EFD	x..x	Call Forward by Call Type—External No Answer to NMS-DN.
EHT	x x	Call Forward by Call Type—External Hunt to NMS-DN
HUNT	x	Hunt to NMS-DN
KEY	xx MWK x...x	Message Waiting Key, where x..x is the NMS-DN. See Note.

Note: The NMS-DN can be the local or the network ACD DN.

Procedure 47
Use LD 10 to define the Network Message Services DN for each telephone

Prompt	Response	Description
REQ	CHG	
FTR	FDN x..x	Flexible Call Forward No Answer NMS-DN, x..x is the NMS-DN. The NMS-DN can be the local or the network DN. If network DN, include AC1/AC2.

Table 77
Network Message Services DN (applies to both NMS-MC and NMS-MM)

Call type	Network Message Services DN (NMS-DN)	Number of digits
Private call using Uniform Dialing Plan (UDP)	ACC + LOC + XXXX	8 to 9
Private call using Coordinated Dialing Plan (CDP)	DSC + X..X	10 maximum
Public numbering plan	ACC + (1) + NPA + NXX + XXXX ACC + (1) + NXX + XXXX	14 maximum

Feature testing

To verify NMS-MM, perform the following steps:

- 1** Coordinate with far end personnel. Place a call to a busy station at the far end over a PRI trunk.
- 2** Let the call forward to the Network Message Services and leave a message.
- 3** Verify that the message waiting lamp is lit on the called station.
- 4** Log into Meridian Mail and listen to the message.
- 5** Use the Call Sender command to call the person who left the message.
- 6** Verify all Meridian Mail features are available by the far end user.

Network Ring Again

Network Ring Again (NRAG) provides Ring Again capability within the PRI/ISL network. NRAG allows a caller at location A, encountering a busy destination at location B anywhere in the ISDN PRI network, to press the Ring Again key and be notified when the busy station becomes idle.

NRAG operates in “free notification” mode. This means the terminating switch determines when the called party becomes idle and notifies the originating switch.

For Meridian digital sets, the caller’s phone emits a buzz from the speaker and the Ring Again lamp flashes. To call the station, the caller presses a DN key and then the Ring Again key on the phone—the call is made automatically.

For analog (500/2500 type) sets, the caller’s phone provides short bursts of ringing as a station-idle notification. To call the station, the caller lifts the phone’s receiver during the ringing period—the call is made automatically.

When more than one caller activates NRAG on a terminating station, the calls are queued on a first-come, first-served basis. When the called station becomes idle, only the first caller in the queue is signaled. The second caller in the queue is signaled only after the Queue Advance Timer (4 seconds) expires.

Once NRAG has been activated, the Called Party status is monitored until one of the following events occurs:

- The line is idle and a new call setup can be tried.
- The call is deactivated when a customer-defined timer expires.
- The call is manually deactivated by the caller.

NRAG requires a number of timers to control the feature functions on both the originating and terminating switches. Tables 78 and 79 show the values defined and which timers are used by the Meridian 1.

Table 78
Originating Switch Timers

Timer code	Description	Duration
T2	Period for unanswered recall notify	30 seconds
T5	Message Response Timer	4 seconds
T6	Duration Timer	30 minutes
TR2	Recall Suspend Option Timer	9 minutes
Note: TR2 not applicable to Meridian 1.		

Table 79
Terminating Switch Timers

Timer code	Description	Duration
T7	Duration Timer	30 minutes
GT	Guard Timer	6 seconds
QAT	Queue Advance Timer	4 seconds
Note: GT is not applicable to Meridian 1.		

X11 release 14

With X11 release 14, NRAG capability is extended to 500/2500 telephone types. (With X11 release 13, NRAG functions for Meridian 1 electronic and digital telephones only.)

X11 release 15 and later

NRAG is compatible with the following systems:

- Meridian 1
- SL-100

- DMS-100
- DMS-250 supported as a tandem switch only

Note: SL-100, DMS-100, and DMS-250 support private numbering plans only.

Operating parameters

The following list describes the NRAG operating parameters:

- The interfaces must be Meridian 1 or DMS. NRAG is not supported for AT&T connections.
- The call must be PRI end to end.
- The calling and called party number provided for the PRI call must be within the same dialing plan.
- NRAG is supported with the Uniform Dialing Plan (UDP), typically with 3-digit location codes and 4-digit Directory Numbers.
- NRAG is supported in Coordinated Dialing Plan (CDP) networks with up to 4-digit directory numbers if the Distant Steering Codes do not exceed 2 digits. X11 release 14 and earlier support only up to 6-digit CDP. X11 release 15 and later support up to 10-digit CDP.
- The appropriate package, such as NARS, BARS CDP, or ISDN, must be equipped.
- NRAG supports Private/TIE trunks but not Public call types.
- The Calling Line Identification (CLID) for ACD sets is the ACD DN instead of the ACD POS ID.
- NRAG is not compatible with an Add-On Data Module (ADM) trunk route.
- NRAG does not support tandem TIE trunk networks using Direct Trunk Access Codes or Trunk Steering Codes.
- NRAG is not supported for calls using a Trunk Access Code.
- NRAG, like Ring Again, is not supported on modem routes.
- NRAG cannot be invoked for a redirected call, a blocked call, or a modified call (for example, conference, transfer, or attendant calls).

The following features are not supported by NRAG:

- Call Redirection
- Trunk Group Busy Indication
- Flexible and Coordinated Call Back Queuing
- Network Facilities Blockage (Main CBQ)
- ACD Queue calls
- Attendant Console calls
- Maintenance Busy Mode
- Direct Inward System Access
- Directed Call Pickup

Feature interactions

- Make Set Busy
NRAG can be originated by a station in the Make Set Busy (MSB) mode. It can also be activated against a station in the MSB mode, assuming no Call Forward All Calls DN.
- Do Not Disturb
Ring Again originating from a station with Do Not Disturb (DND) active is supported; however, NRAG cannot be activated against a terminating station that has DND activated.
- Call Waiting/Camp-On
If Call Waiting or Camp-On is active on the terminating station, no notification will be sent to the originating party until the terminating station becomes idle.
- Call Forward All Calls
If the originating station activates Call Forward All Calls (CFAC) after activating NRAG, NRAG can still be received.
- Data calls
NRAG is supported for data calls.
- Calling Line Identification
NRAG is supported only if the Calling Line Identification (CLID) uses the prime DN.

- Incoming Digit Conversion
If there is any conversion done to the called DN, NRAG is not supported.
- CDP and NARS
For networks with CDP and NARS using the same route, turn off INAC and insert a DMI when needed.

Feature packaging

The option number for NRAG is 148 (NTWK). Table 80 shows the packages required for this feature. See *X11 features and services* (553-3001-305) for X11 release software packages and their dependencies.

Table 80
Package requirements for Network Ring Again

Package	Name of package	Mnemonic
75	PBX Interface for DTI/CPI	PBXI
145	ISDN Signaling	ISDN
146	ISDN Primary Rate Interface	PRI
OR	<i>Dependencies:</i> 75, 145, 19 [CLID]	
147	ISDN Signaling Link <i>Dependencies:</i> 145	ISL
Note 1: Package 75 is not required for ISL (package 147), unless ISL is over DTI.		
Note 2: NRAG requires ISDN option package 145 with 146 or 147.		

Feature implementation

X11 release 14 added a new prompt, PNI, to LD 15 to enter the Private Network Identifier value per customer. X11 release 14 also added the PNI prompt to LD 16 along with a second new prompt to enter the NRAG service timer per route. For a description of the prompts and responses for Meridian 1 software, see the *X11 input/output guide* (553-3001-400).

The duration timer for Network Ring Again (NRAG) controls the amount of time between placing the call on Ring Again and timeout.

Note: In X11 release 15 and later, Network Ring Again (NRAG) requires ESN access code insertion. The configuration of ESN access code insertion is provided in “Check Numbering Plan enhancement interaction” on page 873.

Configuration

All NRAG database configuration must be checked point to point, regardless of whether NRAG is activated point to point or it tandems through an intermediate node. Within one network, use the same value for customer private identifier (PNI) in both the Customer Data Block (LD 15) and the Route Data Block (LD 16) in all systems.

Note: PNI must be greater than zero for NRAG to be functional.

Check Numbering Plan enhancement interaction

If a Meridian 1 switch is running X11 release 15 or later and is interfacing with an X11 release 15 or later, then the originating switch must not use the digit manipulation (DMI) to insert the ESN access code. The ESN access code must be inserted at the terminating node. See the example in Table 81.

Table 81
Inserting the ESN access code

Originating Switch	Terminating Switch
X11 release 15 and later	X11 release 15 and later
LD 86: DMI = 0	LD 16: INAC = YES

By default, making INAC = YES always inserts AC1. However, if your switch is receiving Public call types such as NXX or NPA over the same PRI route as the terminating switch, and you need to insert AC2, you must specify these call types under the AC2 prompt in the Customer Data Block. For example, LD 15: AC2 = NXX NPA.

Note 1: For X11 release 14 and earlier, use INST in LD 16. For X11 release 15 and later, use INAC.

Note 2: The terminating PBX must Insert Net Access Code (INAC).

Release identification

For Meridian 1 software from X11 release 15 and later, the configuration record in LD 17 must contain the Release ID of the corresponding switch. For DMS interfaces, it must contain the correct BCS load. For example, in LD 17:

RLS_ID = 15 (Meridian 1 interface)

RLS_ID = 28 (DMS interface)

Refer to *X11 input/output guide* (553-3001-400) for minimum compatible releases.

NARS calls

If NRAG is to be activated on a NARS call, verify that the Home Location Code is defined in the Customer Data Block in LD 15. For example, in LD 15:

HLOC = 646

Coordinated Dialing Plan call

Follow these steps for a Coordinated Dialing Plan (CDP) call:

- 1 Check LD 87 for all local steering codes and distant steering codes.
- 2 Check the ESN Data Block for the following prompts:

LD 86: CDP = YES/NO

MXSC = Maximum number of Steering Codes

NCDP = Number of digits in CDP DN

Implementation procedures

Follow these steps to configure Network Ring Again:

1 LD 17 Configuration Record (Procedure 48)

Set the software release ID of the far end.

X11 release 17 and earlier

OR

1 LD 17 Configuration Record (Procedure 49)

Set the software release ID of the far end.

X11 release 18 and later

2 LD 15 Customer Data Block (Procedure 50)

Set up Private Network Identifier (PNI) mapping between call type translator HLOC, LSC, HNPA, or HNXX for proper CLID construction.

3 LD 16 Route Data Block (Procedure 51)

Set up duration timer (NRAG), Private Network Identifier (PNI), insertion of ESN access codes (INAC).

Procedure 48

Use LD 17 to define the software release ID (X11 release 17 and earlier)

Prompt	Response	Description
REQ	CHG	
TYPE	CFN	Configuration Data Block
ISDN	YES	
DCHI	1-15	D-channel number
.		
.		
RLS	xx	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. The minimum X11 release is 14; the minimum BCS release is 28.

Procedure 49
Use LD 17 to define the software release ID (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	DCHI, MSDL	Card type
DNUM	0–15	Device number: physical port (odd) for D-channel on DCH, physical card address for MSDL
_PORT	0–3	Port number on MSDL card
RLS	xx	Release ID of the switch at the far end of the D-channel

Procedure 50**Respond to the following prompts in LD 15**

Prompt	Response	Description
REQ	NEW CHG	Add or change data
TYPE	CDB NET_DATA	Customer Data Block Networking Data (Release 21 gate opener)
CUST	0-99	Customer Number
- OPT	RNA	Allow Ring Again on No Answer
- AC2	aaa	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.
- 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	100-999	Area code for the Meridian 1 system
- HNXX	100-999	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.

Procedure 51**Respond to the following prompts in LD 16**

Prompt	Response	Description
REQ	NEW,CHG,OUT	
TYPE	RDB	Route Data Block
CNTL	(NO),YES	Changes to controls or timers
TIMR	NRAG (30)–240	Network Ring Again duration timer (T6 and T7 timers)—time is in minutes. Currently, only a value of 30 minutes is supported. Note: Package 148, Advanced ISDN Features, is required.
...		
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.
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.

Feature testing

To verify NRAG, perform the following steps:

- 1** Coordinate with far end personnel. Place a call to a busy station at the far end over a PRI trunk.
- 2** Verify that the calling terminal can activate NRAG and that any Ring Again indicator lamps are lit.
- 3** When the far end call disconnects, verify that the calling terminal is notified.
- 4** Verify indication that the far end has disconnected.
- 5** Initiate NRAG capabilities.
- 6** Calling party answers.
- 7** Disconnect.

Note: Verify this procedure against different terminal types.

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 83, "Differences between Nortel's ISA, Lucent's CBC, and NI-2 CBC," on page 889 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 90 depicts a configuration using dedicated facilities, while Figure 91 shows an NI-2 Call By Call Service Selection configuration. Figure 92 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 for a description of the services that are offered.

Figure 90
Dedicated facilities configuration

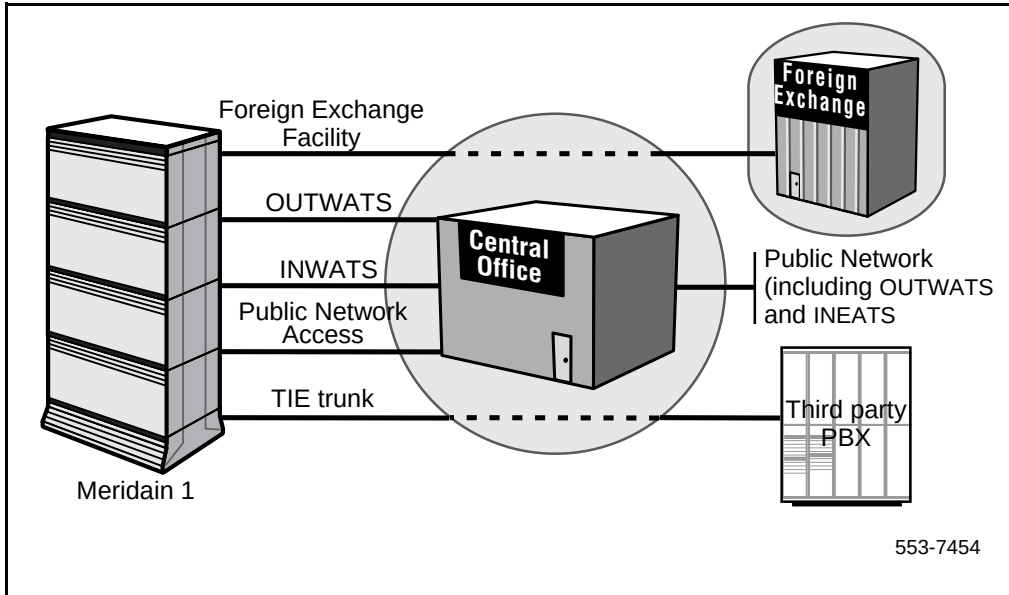


Figure 91
NI-2 Call By Call Service Selection configuration

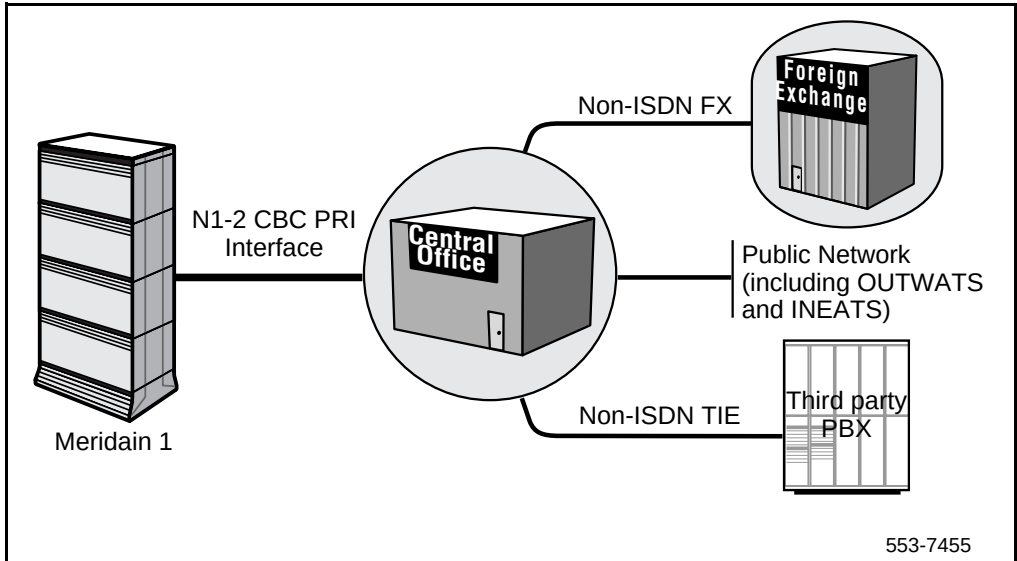
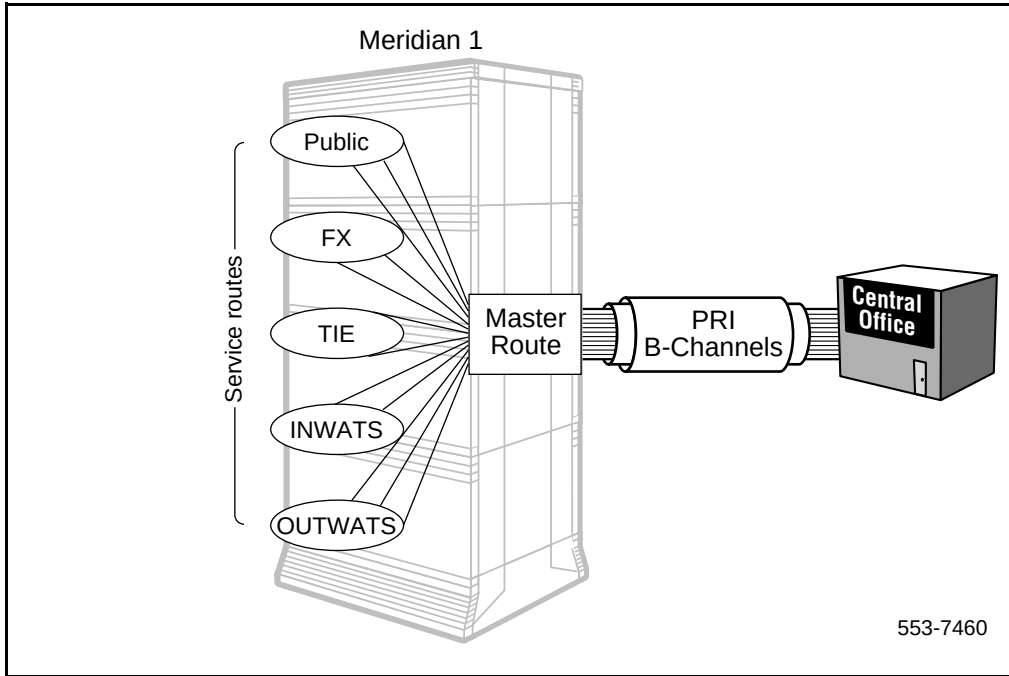


Figure 92
NI-2 CBC master route and service routes on the Meridian 1



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 82.

Table 82
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 83 summarizes the differences between Nortel's ISA, Lucent's Call By Call Service Selection, and NI-2 Call By Call Service Selection.

Table 83
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 — I800	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 84:

Table 84
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 implementation

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	Supported only on Multi-purpose Serial Data Link (MSDL) or Downloadable D-channel cards.
...		
USR	PRI	D-channel mode.
IFC	NI2	NI-2 TR-1268 interface type.
CO_TYPE		Central Office switch type (prompted only if IFC = NI2).
	(STD)	STD = Totally compatible with Bellcore standard.
	ATT	ATT = Lucent 5ESS.
PRI	Ill nn	Ill = PRI loop using the same D-channel (0,1,...159) nn = Interface identifier (2-15)
...		

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	0-511 0-127	Route number. For Option 11C.
TKTP	CBCT	The trunk type is a Call By Call master route.
...		
ISDN	YES	ISDN route.
- IFC	NI2	Interface type is NI-2.
- IPUB	0-511 0-127	Service route to be used for incoming network calls. For Option 11C.
...		
- - 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, where: l = Previously defined loop number (0-159). ch = channel (1-24).
CUST	xx	Customer number.
RTMB	0-511,1-254	CBC master route and member number.
...		

LD 16 – Configure the NI-2 CBC service routes.

Note: Up to 512 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.
...		
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	0-511 0-127	Master route number, as previously defined in LD 16, with which the service routes are associated. For Option 11 C.
- - 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. Refer to page 886 for a list of these values.

- - 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.
...		

Sample configuration

The following provides a sample configuration of the NI-2 CBC feature.

Load Overlay 17 and configure a primary D-channel for the NI-2 Basic Call Service.

Prompt	Response	Description
REQ	NEW	Add configuration information.
TYPE	CFN	Configuration Record.
ADAN	NEW DCH 1	Add a primary D-channel for NI-2, where 1 is the primary D-channel number.
CTYP	MSDL	Supported only on Multi-purpose Serial Data Link (MSDL) or Downloadable D-channel cards.
...		
USR	PRI	D-channel mode.
IFC	NI2	NI-2 TR-1268 interface type.
CO_TYPE	STD	Central Office switch type for the NI-2 interface. STD = Totally compatible with Bellcore standard.
PRI	1 2	1 = PRI loop using the same D-channel (0,1,...159) 2 = Interface identifier (2,3,...15)
...		

Load Overlay 16 and configure a trunk route as an NI-2 Call By Call Service Selection master route.

Prompt	Response	Description
REQ	CHG	Change data.
TYPE	RDB	Route Data Block.
DMOD	1-127	Default Model number for this route (Option 11)
CUST	0	Customer number.
ROUT	0	Master route number.
TKTP	CBCT	The trunk type is a Call By Call master route.
DTRK	YES	Trunk route is digital.
DGTP	PRI	Trunk type is digital.
ISDN	YES	ISDN is used.
...		
- IFC	NI2	Interface type is NI-2.
- IPUB	1	Service route for incoming public network calls.
...		
- - PNI	1	Customer's Private Network Identifier.
...		
ICOG	IAO	The trunk is incoming and outgoing.
...		

Load Overlay 14 and define the associated list of trunks (B-channels) that are to be shared by the NI-2 CBC service routes.

Prompt	Response	Description
REQ	CHG	Change data
TYPE	CBCT	Call By Call trunk.
TN	0 1	Loop and channel for digital trunks, where: 0 = Previously defined loop number (0-159). 1 = channel (1-24).
CUST	0	Customer Number.
RTMB	0 1	CBC master route and member number.
...		

Load Overlay 16 and define the NI-2 CBC service routes. Up to 512 service routes can be configured using this procedure.

Prompt	Response	Description
REQ	NEW,CHG	Add or change data.
TYPE	RDB	Route Data Block.
CUST	0	Customer number.
ROUT	1	Service route number.
...		
TKTP	TIE	Service trunk type.
...		
ISDN	YES	ISDN route.
- IFC	NI2	Interface type is NI-2.
- CBCR	YES	Service route indicator.
- - RTN	0	Master route number, as previously defined in LD 16, with which the service routes are associated.

-- SRVC	20	Decimal value of for TIE service.
-- FACN	20	TIE Facility Number.
-- MAX	1	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.
...		

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.

The following systems are supported:

- Option 11C
- Option 51C
- Option 61C
- Option 81
- Option 81C

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.

This feature applies to both Basic Rate Interface and Primary Rate Interface connections.

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
- 2 Mbps PRI (PRI2) package 154
- International PRA (IPRA) package 202
- 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
- 2 Mbps PRI (PRI2) package 154
- 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 ISDN BRIT QSIG interface:

- ISDN Signaling (ISDN) package 145
- ISDN Basic Rate Interface (BRI) package 216
- Multi-Purpose Serial Data Link (MSDL) package 222
- ISDN BRI Trunk Access (BRIT) package 233
- 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 implementation

This feature does not require any special configuration. It is applicable to existing ETSI QSIG, ISO QSIG, and NI-2 interfaces.

Feature operation

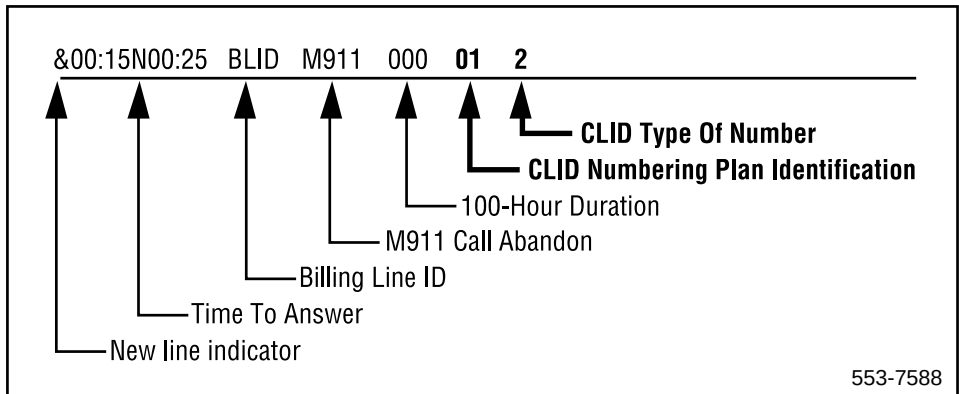
There are no operating procedures specified for this feature.

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 93 illustrates the format of the third line of a CDR ticket.

Figure 93
Third line format for CDR ticket



1. "Ticket" is the international term for record.

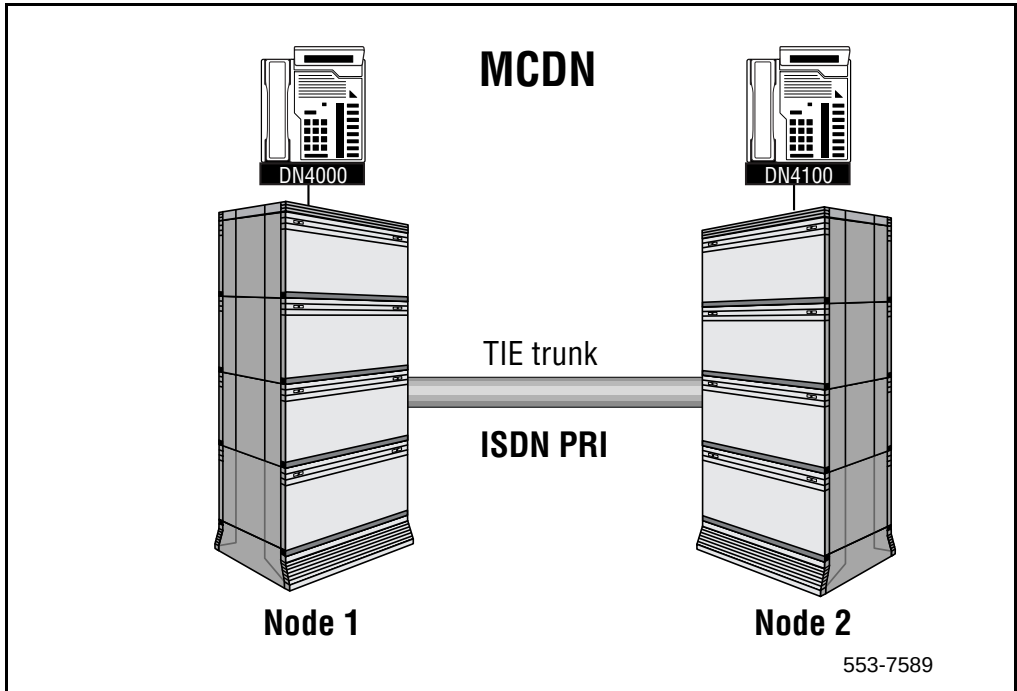
Table 85 describes the contents of the third line of CDR tickets.

Table 85
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 94 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 94
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 86 and 87 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 86 to 95.

Tables 86 to 95 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 94, Tables 86 and 87 show the NPI and TON information for an MCDN incoming trunk.

Table 86
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 87
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 88 and 89 show the NPI and TON information for a EuroISDN incoming trunk.

Table 88

NPI information printed in the CDR ticket for a EuroISDN 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

Table 89

TON information printed in the CDR ticket for a EuroISDN 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
1	001 - international number	cannot be mapped
2	010 - national number	010 - level 1 regional number
3	011 - network specific number	011 - network specific number
4	100 - subscriber number	100 - subscriber number
5	not used	not used
6	cannot be mapped	cannot be mapped

Tables 90 and 91 show the NPI and TON information for a QSIG incoming trunk.

Table 90
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 91**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 92 and 93 show the NPI and TON information for a non-UIPE and non-MCDN incoming trunk.

Table 92
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.

Table 93**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.

2. For all interfaces not mentioned in 1.

Tables 94 and 95 show the NPI and TON information for an NI-2 incoming trunk.

Table 94
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 95
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: EuroISDN, QSIG (ISO and ETSI), 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 implementation

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.

Feature operation

No specific operating procedures are required to use this feature.

Remote Virtual Queuing/Originator Routing Control

Remote Virtual Queuing

Remote Virtual Queuing (RVQ) allows you to perform queuing-type functions on a busy trunk route (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.

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 repeatedly 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 functions 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.
- Data terminals are supported.
- Attendants cannot activate RVQ.
- RVQ is activated only by telephones with Ring Again allowed.
- AUTHCODE is supported on the first tandem node only.

- Trunk Access codes are not supported.
- ACD DN's are supported as a terminating DN.
- Attendants are supported as terminating stations.

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-X11 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” on page 936 in this module).

Meridian Modular, 500/2500, SL-1, and Meridian digital telephones can activate and receive RVQ calls.

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. Give consideration to the number of stations given an NCOS that have low RVQ retry timers. The lower the timer, the higher the number of call attempts on the network traffic.

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 per set 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 can 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-network trunk paths cannot be checked beyond the first NRC 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.

RVQ supports only Meridian 1 machines in a private ISDN PRI/ISL network. A non-Meridian 1 machine functioning in tandem with a Meridian 1 machine is treated as a non-RVQ compatible (NRC) trunk.

RVQ supports the following trunk types:

— 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 is cancelled if the originating node system initializes.

If the originating node performs a cold start, RVQ is cancelled.

RVQ from a Conventional Main (RVQCM) requires a special configuration. See the “Feature implementation” on page 937.

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 call back. 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 call back queues are allowed per trunk group for the Conventional Main by dialing any digits (up to seven) based on the availability of Meridian 1 call registers.

When utilizing RVQCM, do not Call Forward the calling telephone when awaiting call back. If the telephone is forwarded, it is possible that the tie trunk will not be released at the end of the call.

Feature interactions

- Coordinated Call-Back Queuing
CCBQ and RVQ can both be enabled on a single machine.
- Call Back Queuing to a Conventional Main
CBQCM and RVQ can both be enabled on a single machine.
- Direct Inward System Access
DISA DN's 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 a 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 Queuing
RVQ and Off Hook Queuing (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 supports Meridian 1 machines only. A non-Meridian 1 machine working in tandem with a Meridian 1 is treated as a non-RVQ compatible (NRC) trunk.

RVQ on a private network

RVQ is supported for Meridian 1 machines, running X11 release 18 on an ISDN PRI/ISL network only. RVQ follows this checklist before starting:

- The first tandem node must be a Meridian 1 node, running X11 release 18 or later software.
- The Network Class of Service (NCOS) of the originating node 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 (NCTL).

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. When a blocked path occurs, RVQ searches the network to ensure that the entire path will be clear once the blockage disappears. 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:

- The first tandem node must be a Meridian 1 node, with X11 release 18 or later.
- The Network Class of Service (NCOS) of the originating node 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 (NCTL).

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 is any switch that directly connects through tie trunks to an ESN node and is not equipped with ESN network signalling features. When the Conventional Main call enters the ESN node, the NCOS assigned to the incoming tie trunk determines RVQCM eligibility. Use Authcode Conditionally Last to upgrade the NCOS if necessary.

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 Network Class of Service (NCOS) of the incoming tie trunk 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 (NCTL).
- The incoming tie trunk Route Data Block allows CBQ.
- The incoming tie trunk is analog or DTI, but not ISDN PRI.

RVQCM is offered to the Conventional Main caller with a special offer tone (three beeps). To accept RVQ, enter the calling number. After the same special confirmation tone (three 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 call back tone (three 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 call back, the RVQ call back is placed in a 5 minute suspense state. After 5 minutes have passed, RVQ attempts the call back 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 Conventional Main. Operating parameters relating to Call Back Queuing for Conventional Mains (CBQCM) also apply to RVQCM as follows. Refer to the *Electronic Switched Network 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 call back. 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 call back queues are allowed per trunk group for the Conventional Main by dialing up to seven digits (any digits are allowed) based on the availability of Meridian 1 call registers.

CAUTION

Conventional Mains must not allow RVQCM call back 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 Meridian digital telephone

The following lists the steps required to activate RVQ from any Meridian digital telephone.

- 1** Place a call to a DN on another node.
- 2** Hear overflow tone (fast busy) 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.

If the terminating telephone is busy, you hear regular busy tone. You can 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 an analog (500/2500 type) telephone

The following lists the steps required to activate RVQ from any analog (500/2500 type) telephone.

- 1** Place a call to a DN on another node.
- 2** Hear overflow tone (fast busy) indicating a busy trunk route along the call path.
- 3** Switchhook flash, and hear special tone (three 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 on hook. However, the timer runs while you are on hook, or off hook for a maximum of 30 minutes.
- 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 a 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 (three beeps), or RAN if configured, indicating a busy trunk along the call path.
- 3** Dial the calling DN, and hear the same special tone (three beeps).
- 4** Go on hook.
- 5** The phone rings when the originating node calls back.
- 6** Go off hook, and hear the same special tone (three beeps). Stay off hook, and the call is connected. If the RVQ notice is not answered within the time set in LD87 (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 call back, the RVQ call back is placed in a 5 minute suspense state. After 5 minutes have passed, RVQ attempts the call back again. If the calling telephone is still busy, or does not answer, RVQ is canceled.

Feature packaging

Originator Routing Control/Remote Virtual Queuing (ORG-RVQ) is package 192. It requires the following packages as well. Refer to *X11 features and services* (553-3001-305) for a complete list of package dependencies.

- 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)

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.

Procedure 52

Use LD 86 to configure 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.
...		

Procedure 53

Use LD 87 to configure originating node for CBQ

Prompt	Response	Description
REQ	CHG	Change
CUST	nn	Customer number
FEAT	NCTL	Network Control
...		
SCBQ	YES	Allow systemCall 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).

In LD 86 (Route List Data Block), 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).

Procedure 54**Use LD 86 to configure outgoing routes of 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

In LD 16 (Route Data Block), allow CBQ for the incoming non-ISDN routes on the originating nodes (for RVQ at a Conventional Main operation).

Procedure 55

Use LD 16 to allow CBQ for the incoming non-ISDN routes

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.
...		

In LD 17 (Configuration Record), configure RVQ on the D-channel.

Procedure 56

Use LD 17 to configure RVQ on the D-channel

Prompt	Response	Description
REQ	CHG	Change
TYPE	ADAN	Action Device and Number
- ADAN	CHG DCH x	Change D-channel x
...		
- RCAP	RVQ	Remote Capabilities (RVQ is entered for Remote Virtual Queuing.
...		

Originator Routing Control

Originator Routing Control (ORC) has two components: Network Drop Back Busy (DBB) and Network Off Hook Queuing (OHQ). DBB allows network calls that are blocked at a tandem node to be rerouted (dropped back) to the originating node. The calls are then directed over an alternate route. OHQ feature allows off hook queuing to be configured at a tandem node, thereby allowing off hook queuing at that node.

Both DBB and OHQ give the originating node control over the routing of all outgoing network calls.

The DBB and OHQ capabilities are only supported over an ISDN network. With DBB and/or OHQ configured, an ISDN call to a tandem node may encounter the conditions shown in Table 96.

Table 96
DBB/OHQ configurations

Configuration	Condition	Treatment
IDBB = DBI	All routes in initial (I) set busy	Drop back to originating node.
IDBB = DBA	All routes in "I" set and extended (E) set busy	If all routes in "I" set busy, attempt routing over "E" set. If all routes in "E" set are busy, drop back to originating node. This is the default configuration.
IOHQ = YES IDBB = DBI	All routes in "I" set busy	Off-hook queue. If OHQ timer times out, drop back to originating nod.
IOHQ = YES IDBB = DBA	All routes in "I" set and "E" set busy	Off-hook queue to "I" set. When OHQ timer times out, attempt routing over "E" set. If all routes in "E" set are busy, drop back to originating node.

An initial set of routes (I set) are those routes in a route list which have been customer-defined for a node as being inexpensive. The system attempts to complete a call over these routes before testing for queue eligibility. An extended set of routes (E set) are those routes in a route list that are not part of the initial set. These routes are usually designated as expensive. The system attempts to complete a call over these routes only when the initial set queuing times out.

Operating parameters

None.

Feature interactions

Off-hook queuing

Message Intercept

If the Message Intercept feature is equipped, a caller in an off hook queue may receive the message intercept voice response rather than the off hook queuing tone.

Drop Back Busy

Remote Virtual Queuing

Drop Back Busy (DBB) and Remote Virtual Queuing (RVQ) are both packaged under package 192 (ORC/RVQ). If 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 “Feature implementation” on page 943 for more information.

Network Attendant Service

Network Attendant Service (NAS) routing takes precedence over DBB.

Feature packaging

Originating Routing Control/Remote Virtual Queuing(ORC-RVQ) package 192 for Drop Back Busy; Off-hook Queuing (OHQ) package 62 for Off-hook Queuing; ISDN Supplementary (ISDNS) package 161; Network Alternate Route Selection (NARS) package 58; Network Attendant Service (NAS) package 159; Network Class of Service (NCOS) package 32; Flexible Call Back Queuing (FCBQ) package 61; Basic Routing (BRTE) package 14; Integrated Services Digital Network (ISDN) package 145; 2.0 Mbit Primary Rate Access (PRI2) package 154 for E-1 applications; and 1.5 Mbit Primary Rate Access (PRA) package 146 for T-1 applications.

Feature implementation

In LD 86 (Route List Data Block), configure the originating nodes for Network Drop Back Busy.

Procedure 57

Use LD 86 for Network Drop Back Busy

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		Enter DBI or DBA. Enter DBD to enable Remote Virtual Queuing..
	DBI	DBI = Drop Back if Initial set is busy.
	DBA	DBA = Drop Back if all routes are busy.
	(DBD)	DBD = Drop Back Busy disabled.
IOHQ	YES, NO	YES = allow Network Off-hook queuing NO = disable Network Off-hook queuing

In LD 87 (Network Control Block), configure the nodes for OHQ (if required).

Procedure 58
Use LD 87 to configure OHQ nodes

Prompt	Response	Description
REQ	CHG	Change
CUST	nn	Customer number
FEAT	NCTL	NetworkControl Block
SOHQ	YES	Allow system (customer) Off-hook queuing.
OHTL	nn	Off-hook queue time limit.
...		
NCOS	nn	Network Class of Service number. The originating telephone must have the same value.
...		
OHQ	YES	Allow Off Hook Queueing allowed for this NCOS
...		

In LD 16 (Route Data Block), configure the network routes NCOS (if OHQ required).

Procedure 59
Use LD 16 to configure NCOS routes

Prompt	Response	Description
REQ	CHG	Change
TYPE	RDB	Route datablock
CUST	nn	Customer number
ROUT	nnn	Route number
...		
SIGO	ESN2 ESN3 ESN5	NCOS type support
...		

In LD 86 (Route List Data Block), configure the tandem nodes for OHQ (if required).

Procedure 60

Use LD 86 to configure OHQ tandem nodes

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
...	...	...
OHQ	YES	Allow OHQ
...		
ENTRY	<cr>	
ISET	nn	Size of Initial set

In LD 16 (Route Data Block), configure the tandem nodes for OHQ (if required).

Procedure 61
Use LD 16 to configure OHQ tandem nodes

Prompt	Response	Description
REQ	CHG	Change
TYPE	RDB	Route datablock
CUST	nn	Customer number
ROUT	nnn	Route number
...		
OHQ	YES	Allow OHQ.
...		

Software Defined Network Access

AT&T's Software Defined Network (SDN) provides the equivalent of a private network. The network is controlled by customized call-processing specifications stored in the AT&T network, rather than at customer sites. To access SDN, the customer uses access lines from their location to the AT&T network.

SDN can transmit voice, data, or graphics. Analog transmission to 9600 bps and 56 kbps or 64 kbps clear end-to-end digital data transmission are supported.

Feature implementation

Routes defined for access to AT&T services, such as SDN, must be TIE trunk routes. Use Procedures 62 and 63 to configure access to SDN service.

Note: The tariff is currently approved for ISDN as of 1992.

Procedure 62

Use LD 17 to define the AT&T interface (X11 release 17 and earlier)

Prompt	Response	Description
REQ	CHG	
TYPE	CFN	Configuration data block
ISDN	YES	
_IFC	ESS4, ESS5	AT&T 4ESS or 5ESS
Note: Package 149, Inter-exchange Carrier (IEC), is required to select the interface to AT&T 4ESS.		

Procedure 63**Use LD 17 to define the AT&T interface (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	DCHI, MSDL	Card type
DNUM	0–15	Device number: physical port (odd) for D-channel on DCH, physical card address for MSDL
_PORT	0–3	Port number on MSDL card
USR	PRI, ISLD, SHA	D-channel mode
PRI	0–159 2–15	Additional PRI loops using the same D-channel, and interface ID
IFC	aaaa	Interface type: (D100), D250, ESS4, ESS5, SL1, S100

Procedure 64**Use LD 16 to configure a TIE route for SDN access**

Prompt	Response	Description
REQ	NEW,CHG,OUT	
TYPE	RDB	Route data block
CUST	0–99	Customer number
ROUT	0–511	Route number
TKTP	TIE	TIE trunk route
ISDN	YES	
_IFC	ESS4, ESS5	AT&T 4ESS or 5ESS
_SRVC	SDN	Software Defined Network

Software Release ID

Software Release ID uses the D-channel connection of your switch to identify the software release of an adjoining switch. This feature identifies the software release of the NRAG, NACD, NMS, and NCRD features. The software release ID can be requested for all direct connections to the Meridian 1. However, the Software Release ID cannot be obtained for switches in a tandem configuration. The information provided by the Software Release ID depends on the interfacing switches. That is, a Meridian 1 switch provides an X11 release number and a DMS-100 switch provides a BCS number. See Table 97.

Table 97
Software Release ID information

ISDN feature	DCH interface type	Supported release
NRAG	Meridian 1, SL-100 DMS-100, DMS-250	Release 12 & above BCS 26 & above
NACD	Meridian 1 DMS-100, DMS-250	Release 15 & above BCS 29 & above
NMS-MC	Meridian 1	Release 15 & above
NMS-MM	Meridian 1	Release 16 & above
NCRD	Meridian 1, SL-100 DMS-100	Release 16 & above BCS 28 & above

Note: If the interface is changed, the release ID is also changed. The release ID must then be reconfigured.

This feature prevents software incompatibility between two switches. Different applications are supported by different releases, and for most of the ISDN applications, operations are invoked by sending messages back and forth. To prevent software incompatibility, the following occurs. The release ID of the connecting D-channel is checked before data is sent through the ISDN interface. If the connecting switch does not have the software to handle the feature requested, an application message is not sent. Instead, an error message is printed.

Table 97 shows the relationship between the ISDN application, the equipment, and the release ID (X11 or BCS) at the far end.

Note: The release ID information is required and supported for connection to Northern Telecom equipment only. For connections to AT&T ESS4/5, set RLS = 1.

Feature implementation

The Software Release ID feature is configured in LD 17.

Procedure 65
Respond to the following prompts in LD 17 (X11 release 17 and earlier)

Prompt	Response	Description
REQ	NEW,CHG	
TYPE	CFN	Configuration Data Block
ISDN	YES	
DCHI	1–15	D-channel number
RLS	xx	This is the current software release of the far end. If the software is incompatible, it prevents the sending of application messages. Refer to <i>X11 input/output guide</i> (553-3001-400) for details concerning required releases.

Procedure 66**Respond to the following prompts in LD 17 (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	DCHI, MSDL	Card type
DNUM	0–15	Device number: physical port (odd) for D-channel on DCH, physical card address for MSDL
_PORT	0–3	Port number on MSDL card
RLS	xx	Release ID of the switch at the far end of the D-channel. Refer to <i>X11 input/output guide</i> (553-3001-400) for details concerning required releases.

Issued:	92 12 31
Status:	Standard
X11 Release:	17

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 reestablished before T309 expires, a status inquiry 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 T309 timer expires, the call is cleared.

If T309 expires before the D-channel is reestablished, 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 reestablished.

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 the network side sends the status inquiry message on all active calls when the D-channel is reestablished.

Operating parameters

Prior to X11 release 17, the Meridian 1 does not support the T309 and sending the status inquiry message for North American interfaces. All active calls are cleared with a global restart whenever a D-channel is reestablished.

The compatibility checking by means of the status inquiry 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 T309 timer, it sends a global restart when the D-channel is reestablished.

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 reestablished or the call is cleared by the far end.

Feature interactions

- Integrated Services Access

Integrated Services Access (ISA) tracks the number of active calls. Prior to X11 release 17, the counter for active calls is reset when the D-channel comes back. With the implementation of T309, active calls are preserved if the 90 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 inquiry message are included in basic ISDN PRI/ISL functionality. No additional packages are required.

Feature implementation

The T309 timer is preset at 90 seconds and cannot be service changed.

Trunk Optimization before answer

Trunk Optimization before answer (TRO) enhances routing on PRI and ISL routes for redirected calls. Trunk Optimization before answer (TRO) occurs when a direct call is made from the originating to the redirection telephone, from Meridian 1 to Meridian 1 machines.

Trunk Optimization before answer (TRO) only operates when Network Call Redirection is also enabled in your system.

TRO applies to the following call redirections:

- Network Call Forward All Calls (NCFAC)
- Network Call Forward No Answer (NCFNA)
- Network Hunting (NHNT)

With supporting network call redirection features enabled on each node, TRO can work as shown in Figure 95.

Case 1

The originating telephone A calls a remote telephone B over a PRI/ISL route (1), and due to Network Call Forward All Calls (NCFAC), Network Call Forward No Answer (NCFNA), or Network Hunting (NHNT), the call is forwarded to telephone C over route 2.

When TRO is enabled at switch B, messages are sent from the redirecting node (B) to the originating node (A) with the following information:

- redirection number
- redirection reason
- redirection counter

If the originating node does not support Trunk Optimization, the node sends a message rejecting TRO, and the call proceeds on the current route. The redirecting node then cancels TRO routing.

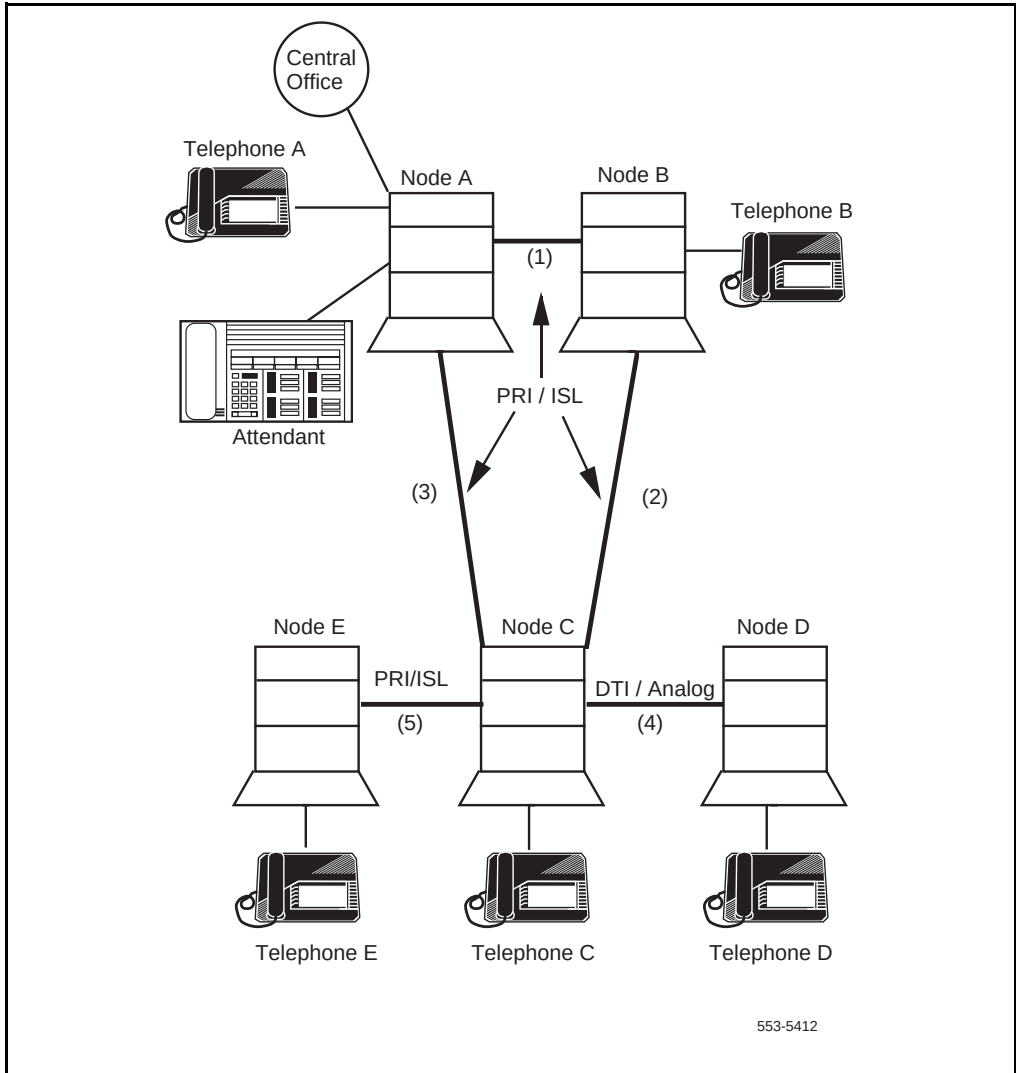
If node A has TRO enabled, and has a first choice route member available, and the redirection counter does not exceed the limit, the system sends back a message accepting TRO. The redirecting node sends a message to release the connection, the originating node sends a message confirming that the original connection (1) is dropped. The originating node also establishes a direct connection to telephone C over route 3.

In this case, the switch routes 1 and 2 are available for additional calls.

Case 2

The originating telephone A calls remote telephone E over PRI/ISL routes (3 and 5), and due to Network Call Forward All Calls (NCFAC), Network Call Forward No Answer (NCFNA), or Network Hunting (NHNT), the call forwards to telephone C over a PRI/ISL route (5). When node A accepts the TRO request, node A establishes a direct connection to node C over route 3. In this case, both connections over route 5 are dropped, and the route is available for other calls.

Figure 95
Trunk Optimization examples



Operating parameters

TRO is only supported before the call is answered.

TRO must be supported on all the nodes involved, by responding YES to the TRO prompt in the Route Data Block (RDB), LD 16. Also, each telephone redirecting the call must have a Call Forward/Hunt feature allowed. The TRO operation is not supported if the originating telephone and the redirection telephone reside on the same node.

Trunk routes targeted for optimization must be listed in the Route List Index (RLI entry 0).

Only ISDN PRI/ISL trunks are supported. If an analog or digital trunk (not controlled by a D-channel) is used between the originating and redirecting node, TRO does not operate. The call continues on the original path.

Trunk Optimization operates independently of the telephone type used for a call. TRO works for both voice and data calls between Meridian 1 machines.

Only Meridian 1 to Meridian 1 connections are supported. Non-Meridian 1 switches can operate as tandem switches if they can send along the TRO messages.

When the call is redirected, a 2-second timer begins within the redirecting system, waiting for a responding message from the originating node. If the timer expires, the call continues along the original path, and TRO does not operate.

Carefully analyze traffic estimates for all routes targeted for TRO to ensure that enough trunks and routes are available for all routing possibilities.

TRO is not supported with mixed dialing plans. Use caution when implementing TRO on a network using UDP and CDP at the same time. Because location codes are not used between CDP locations, TRO may direct calls to the wrong location. Duplicate CDP DNs at other TRO locations may cause TRO to redirect the call to the wrong DN.

In Figure 95, assume nodes A and B share a CDP numbering plan, and nodes C, D, and E share a second CPD numbering plan. If TRO is desired between the two CDP groups, then *no* DN from *either* CDP network can be duplicated in the other CDP network.

Trunk Optimization *is not supported* for the following call types:

- DID trunk call at node A goes to telephone B on node B, that has NCFAC, NCFNA, NHNT to telephone C.
- DID trunk call from node A to telephone A, that has NCFAC, NCFNA, NHNT to telephone B, having NFAC, NCFNA, NHNT to telephone C.
- Telephone D calls telephone B, which is NCFAC, NCFNA, NHNT to telephone C when node D is connected by a non-ISDN link to node C.
- When the attendant extends a DID or incoming trunk call to telephone B and releases, and telephone B is CFNA to telephone C. After three rings, the call is forwarded, but not optimized, to telephone C.

If the attendant remains with the call, TRO functions.

- Telephone A uses Transfer or Conference to telephone B when telephone B has NCFAC, NHNT, NCFNA to telephone C.
- Calls to Meridian Mail autoattendant functions are not optimized because the call is viewed as answered.
- If redirecting the call increments the network redirection counter beyond the limits.
- AUTOVON calls.
- ACD Night Call Forward calls.
- ACD Interflow calls.

Feature interactions

With the exception of those discussed here, call redirection features are not affected or supported.

— Attendant calls

Attendant extended calls can allow or restrict TRO as shown in the following:

- Telephone A, a DID trunk, or an incoming trunk calls the attendant, and the attendant extends the call to telephone B, which has NCFAC, NHNT to telephone C. The call is optimized to telephone C.
- A DID trunk or an incoming trunk call to the attendant is extended to telephone B, and the attendant does not release the call. Telephone B has NCFNA to telephone C. After three rings, the call forwards to telephone C, and the attendant releases the call. The call is optimized to telephone C.

— BARS/NARS

BARS/NARS operation is not changed. BARS/NARS is used to determine route availability to terminate the optimized call. Only Uniform Dialing Plan (UDP) and Coordinated Dialing Plan (CDP) are supported by TRO. Direct Trunk Access Codes are not supported.

— Call Party Name Display

When a call is optimized, the name or number may not appear on the receiving party's display.

— Class of Service

It is important to program redirecting telephones with Class of Service (CLS) to allow call redirection.

— Dialed number display

Calls modified by Network Call Redirection and TRO may affect the display results on the answering telephone. The dialed number/name will not appear on the called telephone's display, despite having it allowed.

- Network Call Forward by Call Type (NCFCT)
Prior to X11 release 16, call type treatment (internal or external) is determined by the Route Class of Service (RCLS) prompt in LD 16, associated with the incoming trunk route. With X11 release 16 and later, for calls containing CLID in the setup message, the RCLS prompt is superseded by the numbering plan type identified within the setup message. Incoming trunk calls answered at node A prior to entering the tie trunk link using call modification contain a CLID as a result of the call modification, and may result in internal call treatment at the terminating node.

Be sure to consider this feature when configuring your network.

- Network Call Redirection (NCFAC, NCFNA, NHNT)
TRO depends on Network Call Redirection (NCRD) messages over the D-channel. Be sure to allow NCRD for all routes targeted for TRO calls. When a call is redirected using TRO, the redirection information is passed to the originating node. The redirection is suspended, and a direct connection is established. If a route is not available when the call is placed, the call may be blocked.
- Network Call Transfer
Trunk Optimization does not operate for Network Call Transferred calls. Station and attendant extended calls do not utilize TRO.
- Network Message Service
TRO occurs when Meridian Mail Call Sender is activated. No optimization takes place when through dialing or operator revert features are used because the calling DN is not provided to Meridian Mail with these features. When a call is optimized, the original called party information is included in the setup message of the call. This is the way Meridian Mail determines the intended receiver.

Feature packaging

TRO is packaged as an ISDN feature in Advanced Network Services (NTWK), package 148.

Feature implementation

Trunk Optimization is configured in LD 16.

Procedure 67

Respond to the following prompts in LD 16

Prompt	Response	Description
REQ	CHG	
TYPE	RDB	Route data block
CUST	0–99	Customer number
ROUT	nnn	Route number 0–511 for NT, XT, 61, 71, and 81 0–127 for ST, 21, STE, 21E
DTRK	YES, (NO)	Digital Trunk Route Must be YES to prompt ISDN
ISDN	YES, (NO)	ISDN option
NCRD	YES, (NO)	Network Call Redirection. Allows network call redirection messages to be sent (or blocks messages if NCRD = NO). Must be YES to prompt TRO.
TRO	YES, (NO)	Trunk Optimization

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 or analog trunk (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 967 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 DMS-250. In the first case, each Meridian 1 must be equipped with TAT. In the latter case, the DMS-250 must be a Sprint load equipped with the MCDN Release Link Trunk (RLT) feature. In the case of a Meridian 1 to DMS interworking, 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 978 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 969).

In Figure 96, 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.

Figure 96
Before Trunk Anti-Tromboning operation

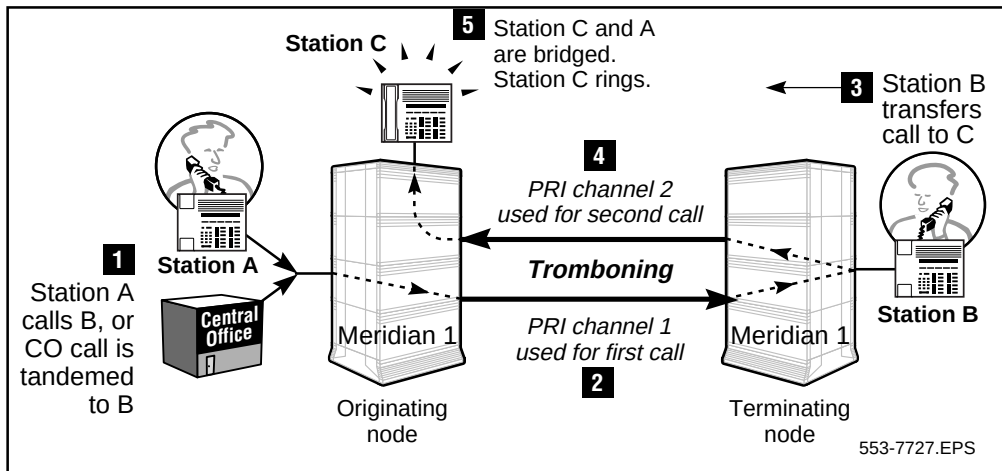
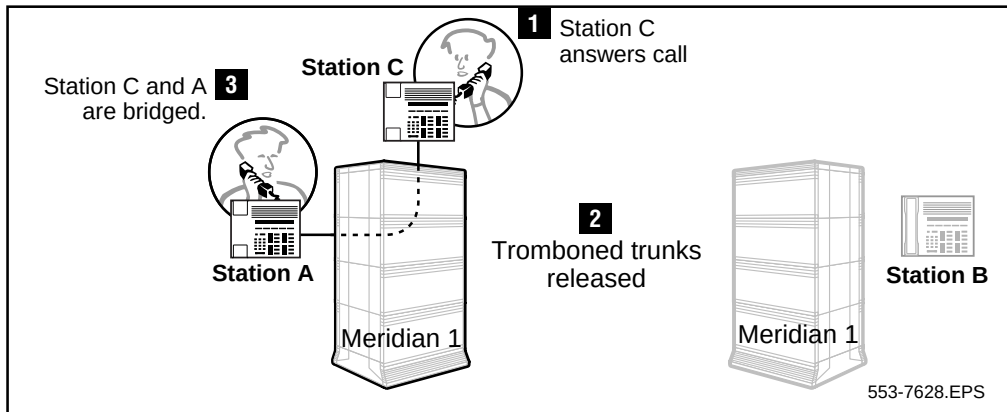


Figure 97 illustrates how the application of TAT eliminates the redundant ISDN PRI B-channels forming the loop-back. After Station C answers the call, Station A and Station C are bridged at the originating node and the redundant trunks are released, provided the trunks involved are associated with the 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 97
After Trunk Anti-Tromboning operation m



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-250 Sprint load 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 = DMS-250 Sprint load 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 98, 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-250.

- Station A located at an originating switch (Public Central Office or PBX) DMS node, makes an internodal call through a DMS-250 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-250, to Station C located at the originating switch (redirected call);
- Station C answers;
- Station A connects to Station C.

Figure 98
Anti-tromboning for Network Call Redirection (case 1), M1/DMS

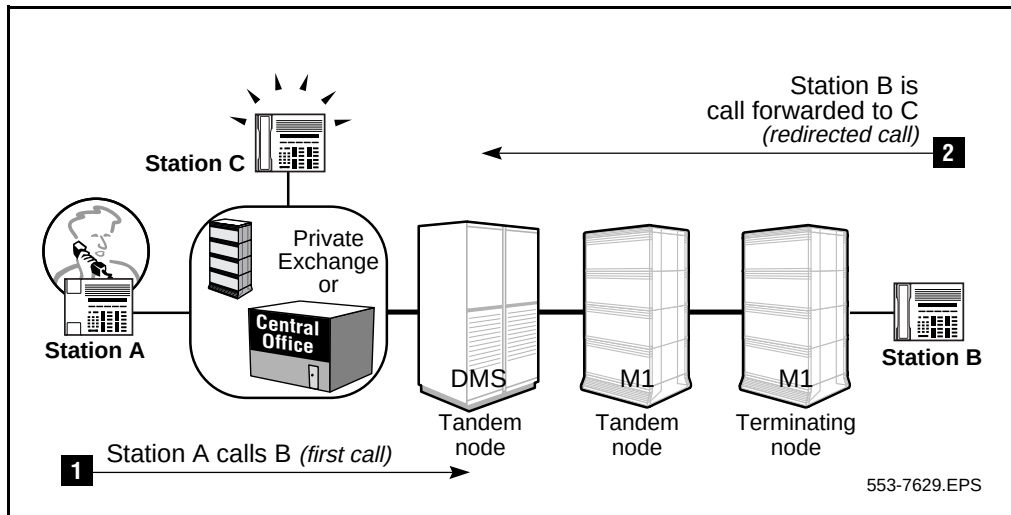
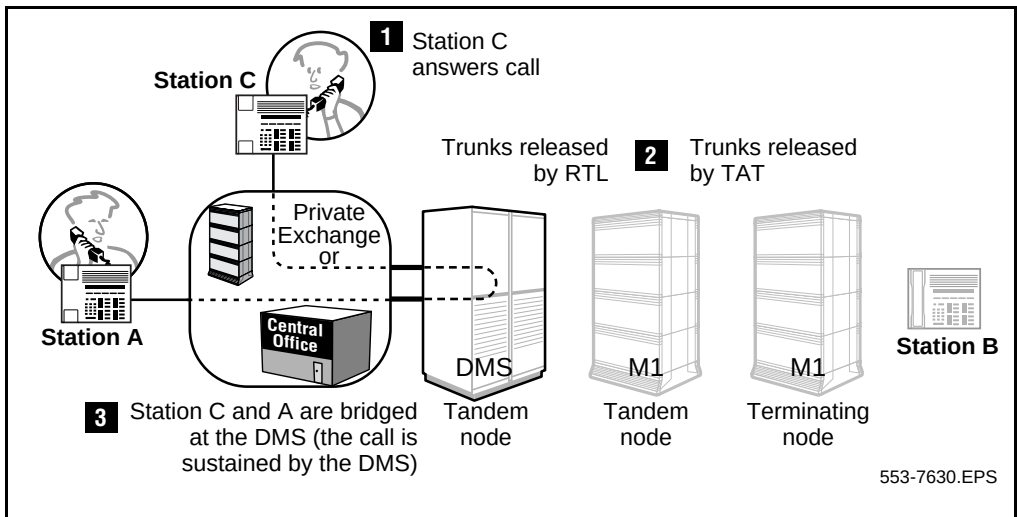


Figure 99 shows the results of anti-tromboning, after Station C answers the call.

- 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 99
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 100, 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-250. 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-250 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 100
Anti-tromboning for Network Call Redirection (case 2), M1/DMS

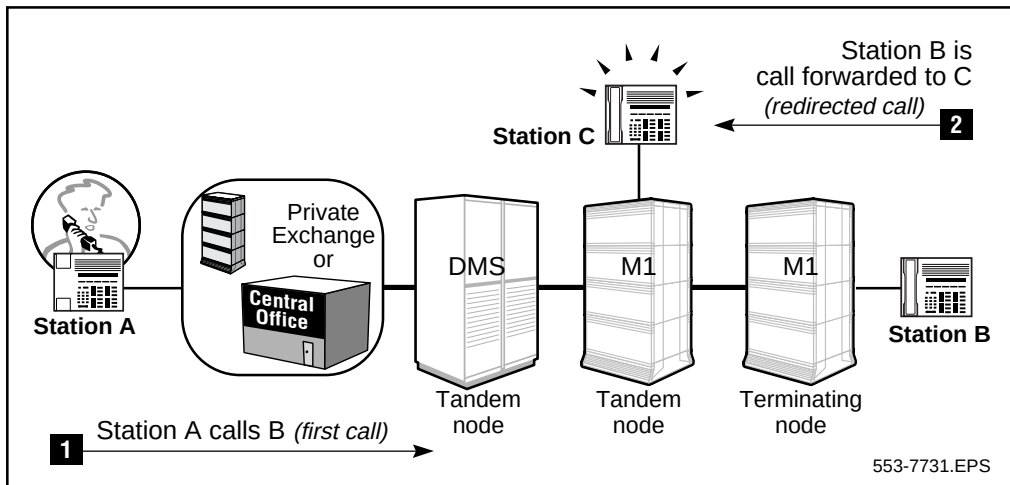
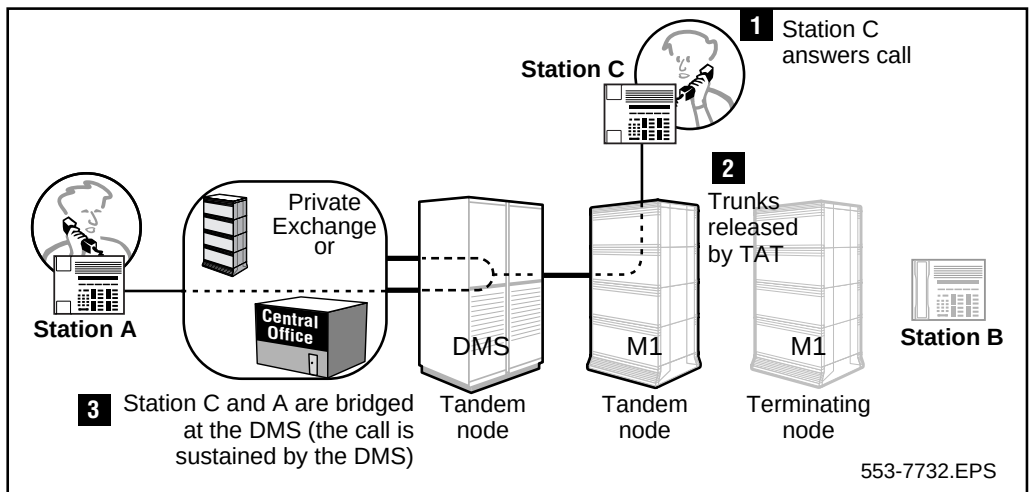


Figure 101 shows the results of anti-tromboning, after Station C answers the call.

- The trunks between the terminating Meridian 1 and the tandem Meridian 1 are released by TAT;
- Station C and Station A are connected.

Figure 101

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 102, 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 102
Anti-tromboning for Call Modification, DMS/M1

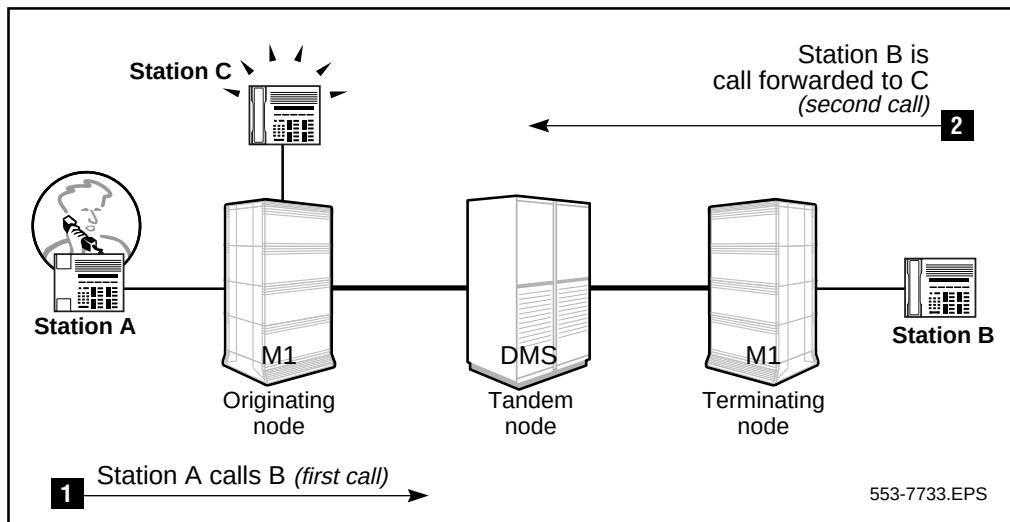
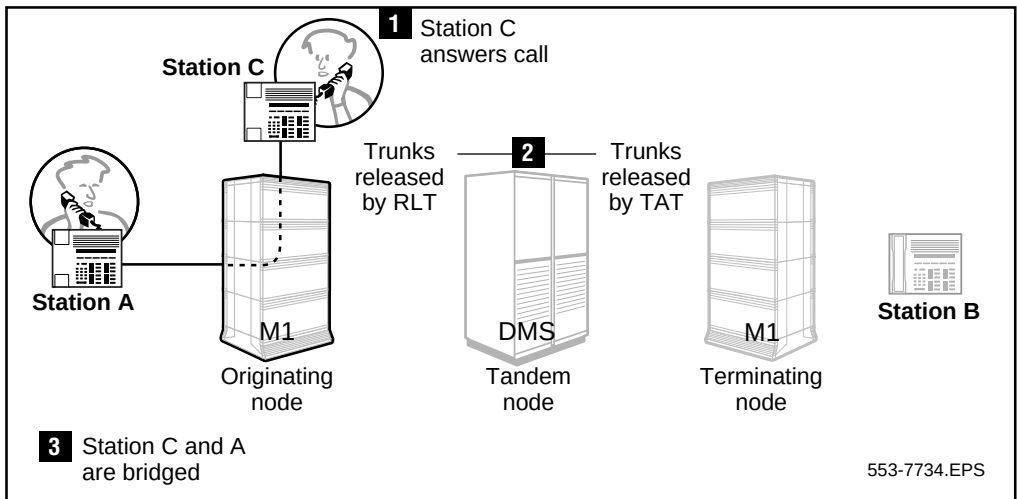


Figure 103 shows the results of anti-tromboning, after Station C answers the call.

- 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 103
Results of anti-tromboning for network call transfer, DMS/M1



Anti-tromboning operation for Call Modification, Meridian 1 interworking with Meridian 1

In Figure 104, 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 104
Anti-tromboning for network call transfer, M1/M1

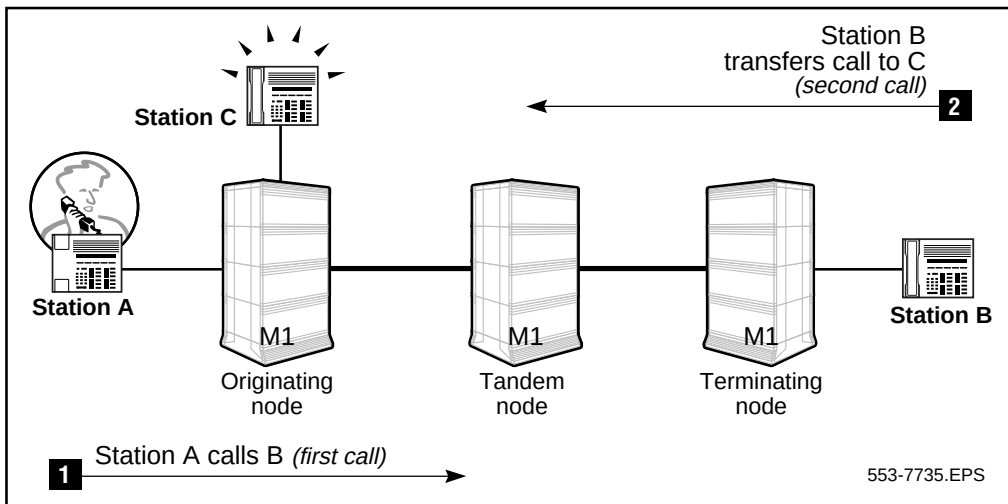
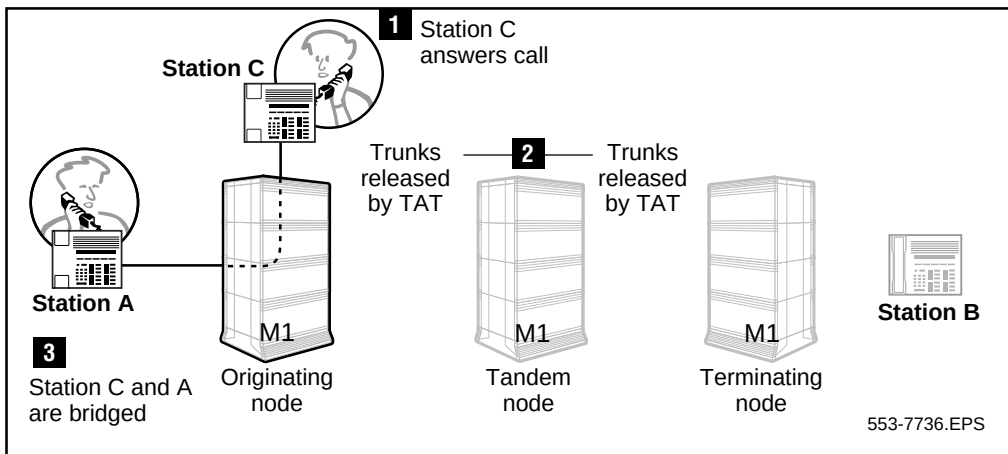


Figure 105 shows the results of anti-tromboning, after Station C answers the call.

- 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 105

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 979.) 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-250 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 986.

Note: For more detailed information on the TRO-BA feature, refer to the ‘Trunk Optimization-Before Answer’ feature description module in this document.

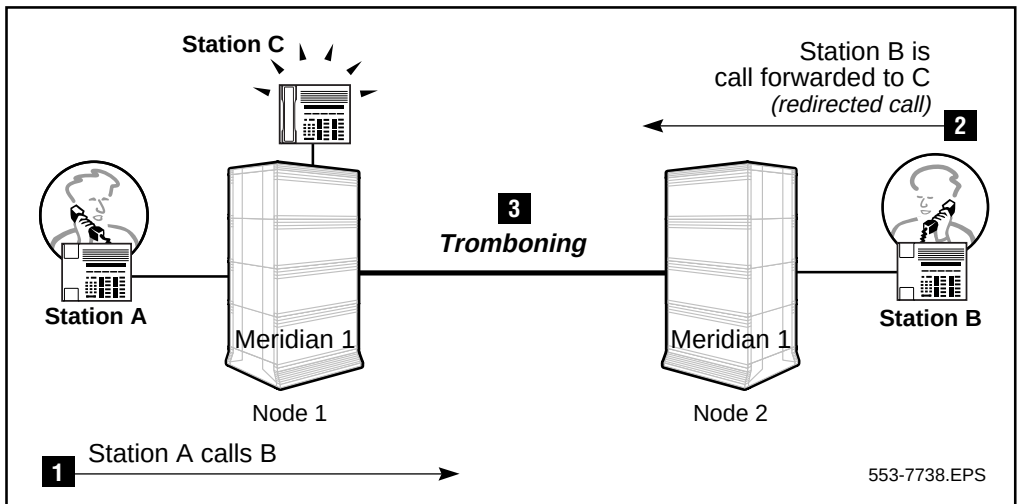
TRO-BA takes precedence over TAT

The following provides a basic example of how TRO-BA takes precedence over TAT in a call forward scenario.

Referring to Figure 106:

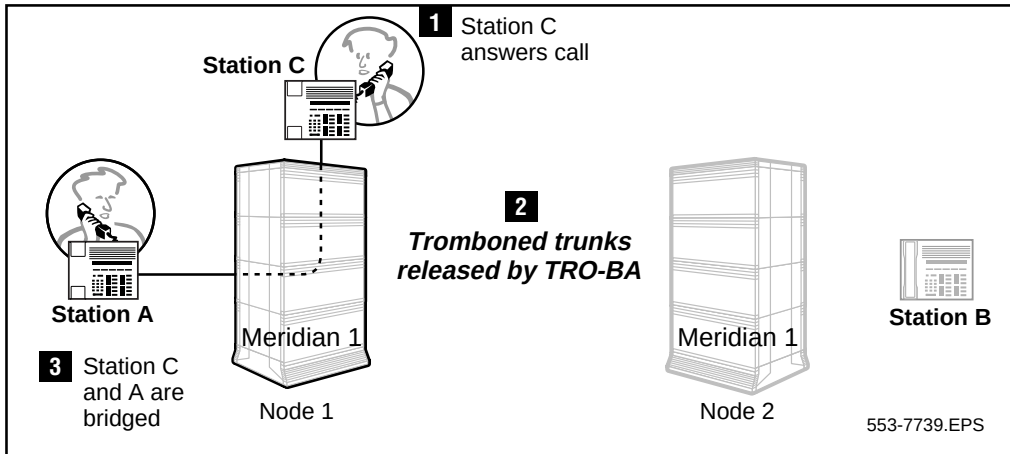
- Station A on Node 1 calls Station B on Node 2, over an ISDN PRI/ISL/VNS trunk;
- Station B on Node 2 is call forwarded all calls to Station C on Node 1, over another PRI/ISL/VNS trunk (redirected call.) This means that tromboning exists between Node 1 and Node 2;

Figure 106
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 107. Since there no longer exist any tromboned trunks, TAT is not invoked.

Figure 107
After optimization has been applied by TRO-BA



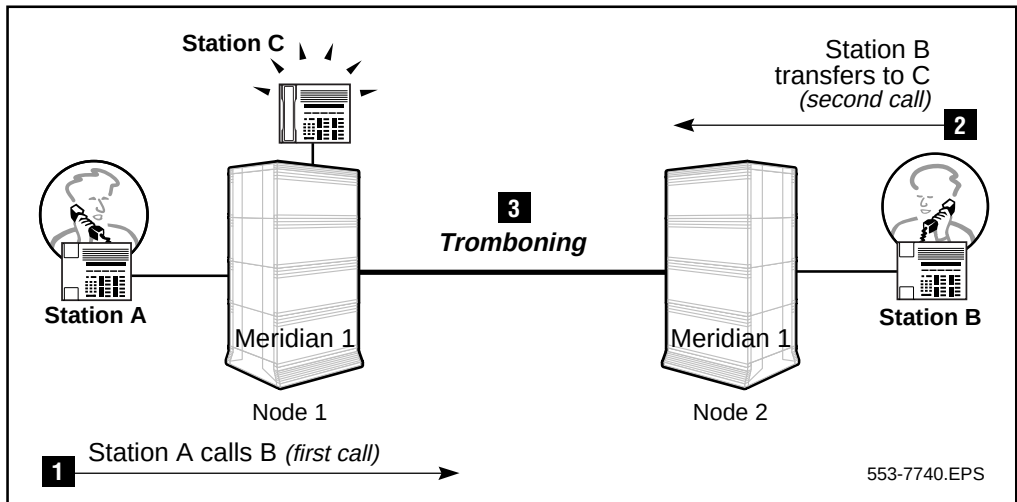
TRO-BA does not optimize trunks due to a call transfer - anti-tromboning is completed after the call is connected

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 108:

- 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 108

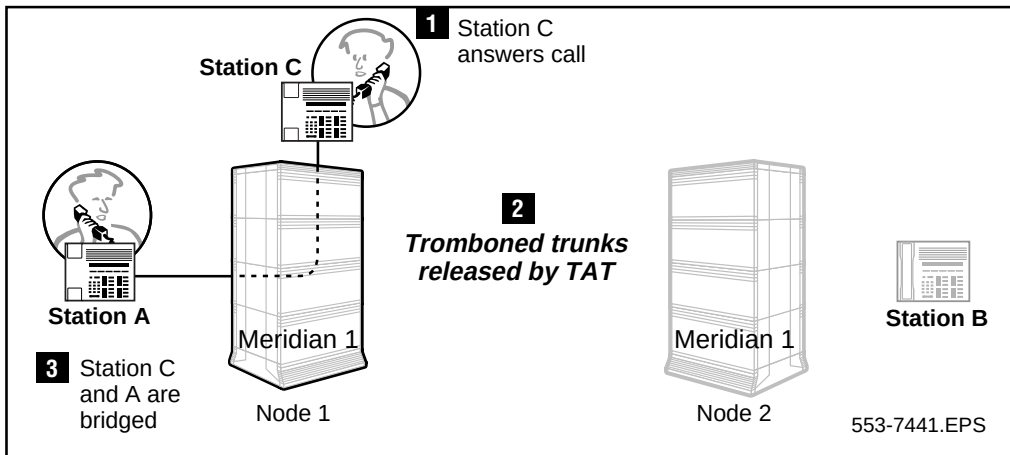
TRO-BA/TAT operating together, before optimization in a call transfer scenario



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 109.

Figure 109
After TAT applied to tromboned trunks due to a call transfer



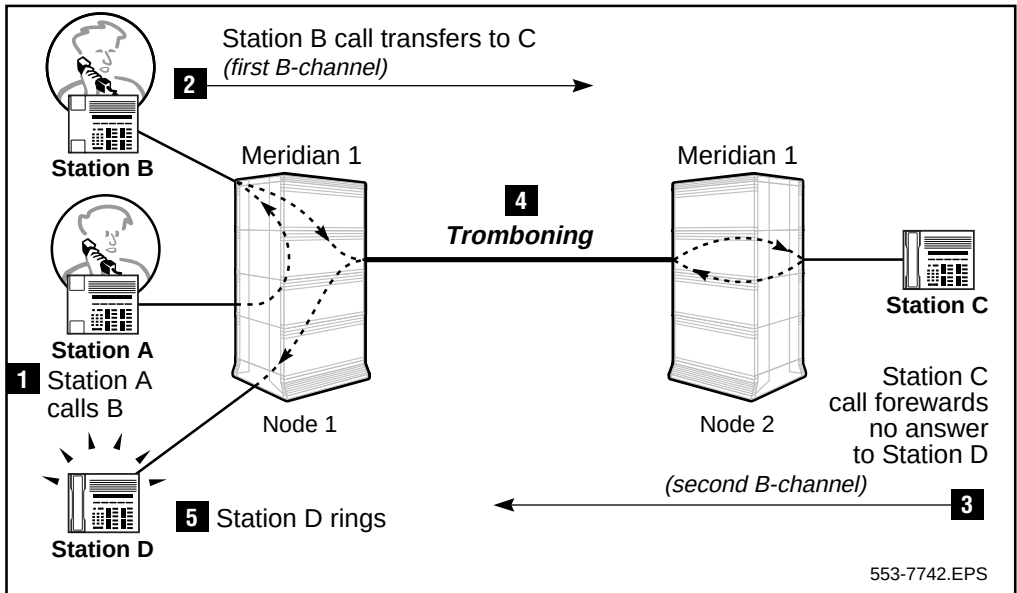
Trunk optimization with call redirection due to call transfer

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 110:

- 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;

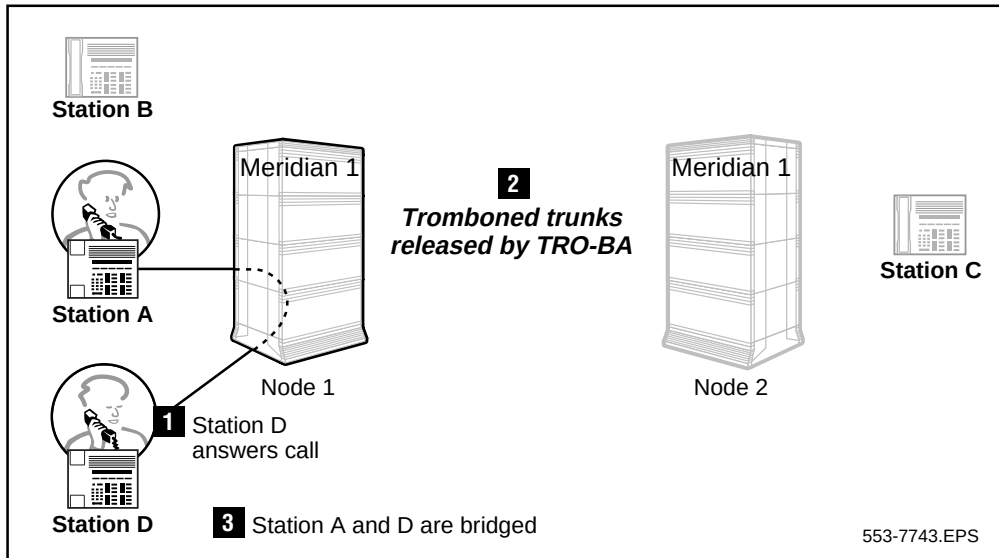
Figure 110

TRO-BA/TAT operating together, before optimization in a call transfer scenario



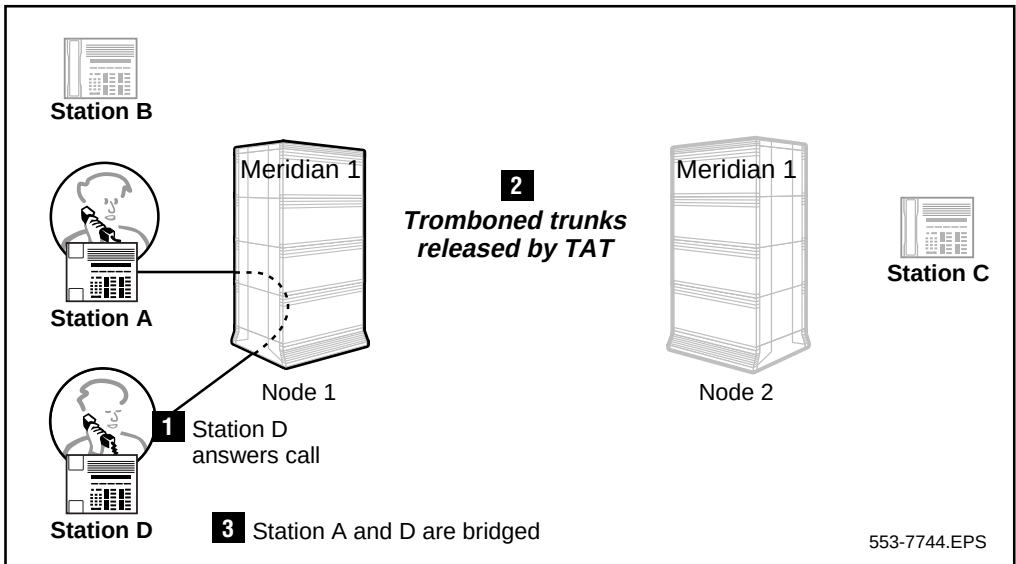
- Station B completes the call transfer while Station C is ringing. After the call is presented to Station D, TRO-BA optimizes the trunks, and bridges Station A and Station D locally. Refer to Figure 111.

Figure 111
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 112.

Figure 112
Tromboned trunks released by TAT



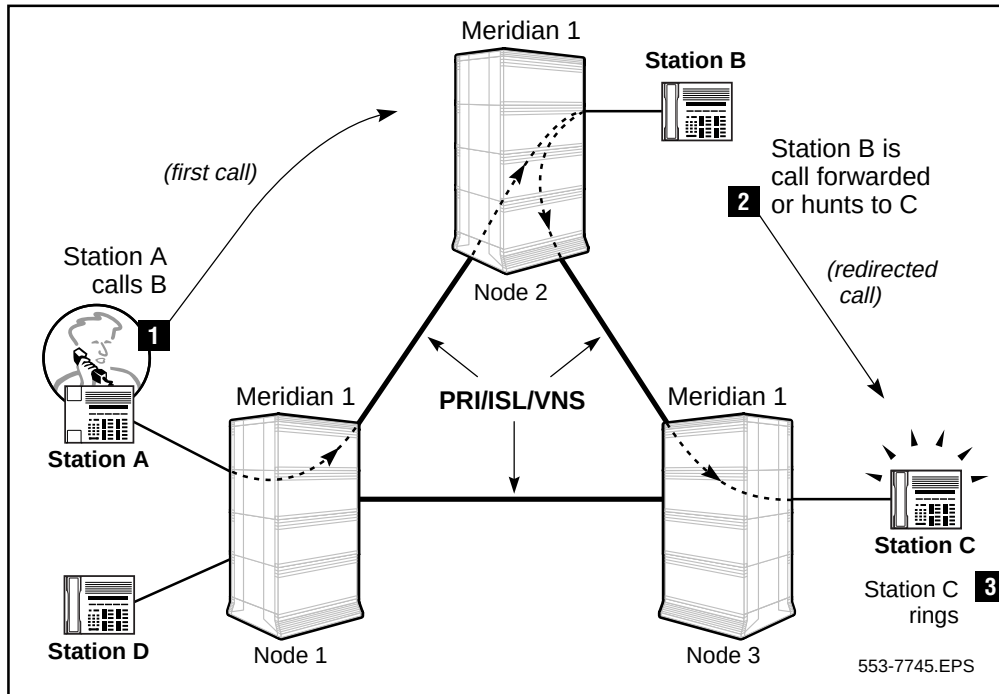
TRO-BA and TAT functionality in a call triangulation scenario

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 113:

- 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;

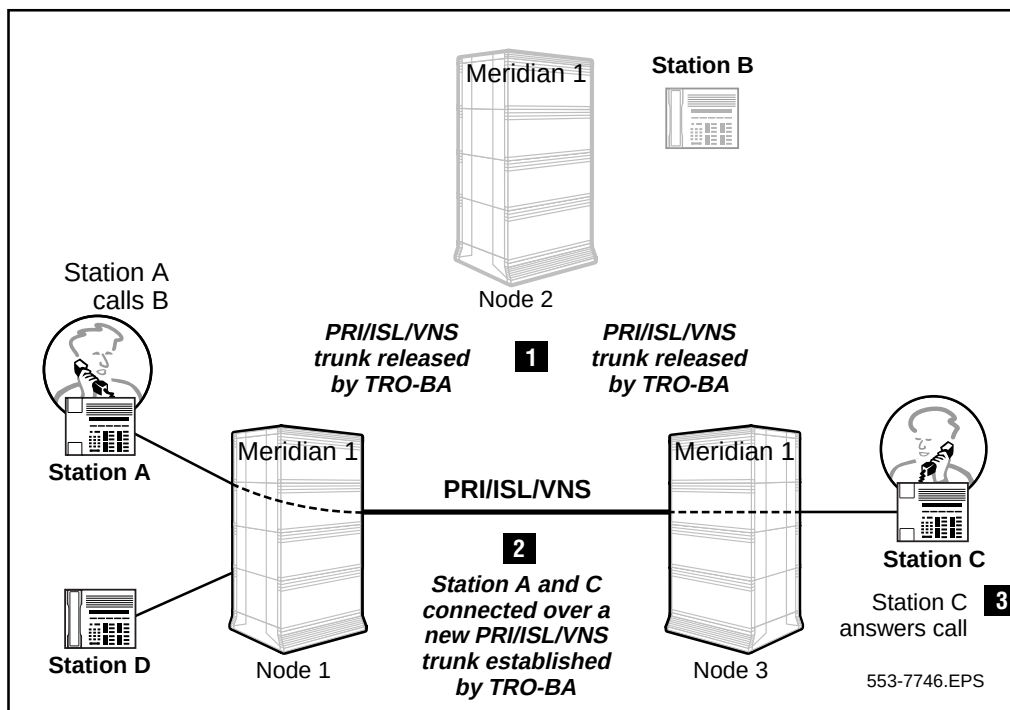
Figure 113
Call path before TRO-BA has been applied



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 114.

Note: The TAT feature cannot provide this functionality, because multiple D-channels are used.

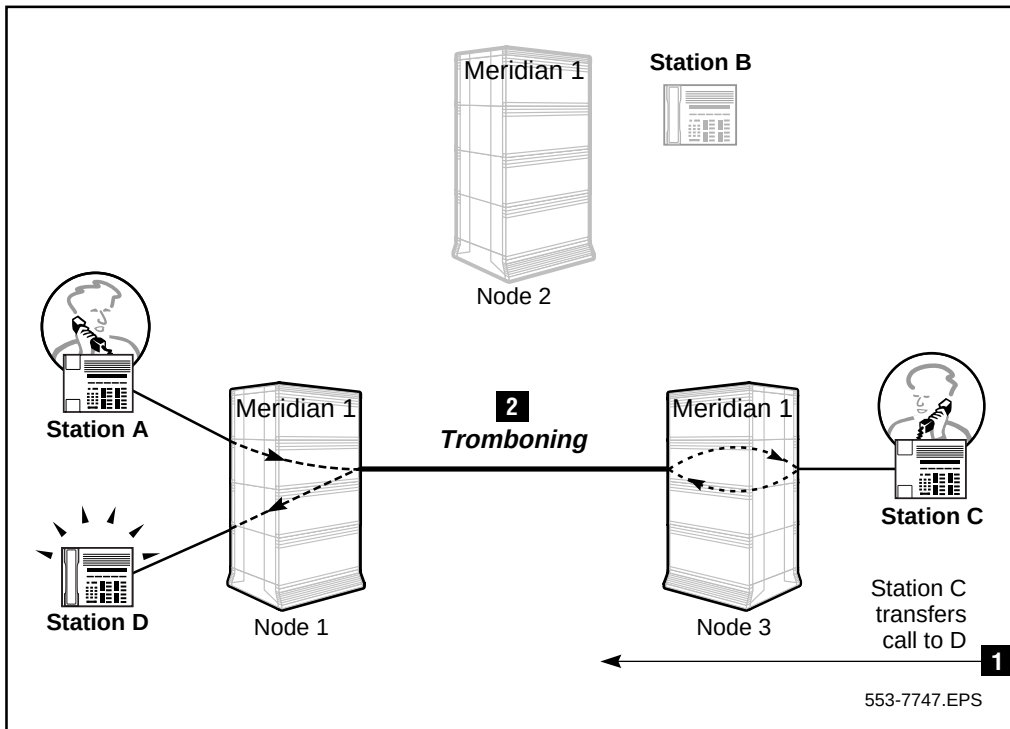
Figure 114
Call path after TRO-BA has been applied



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.

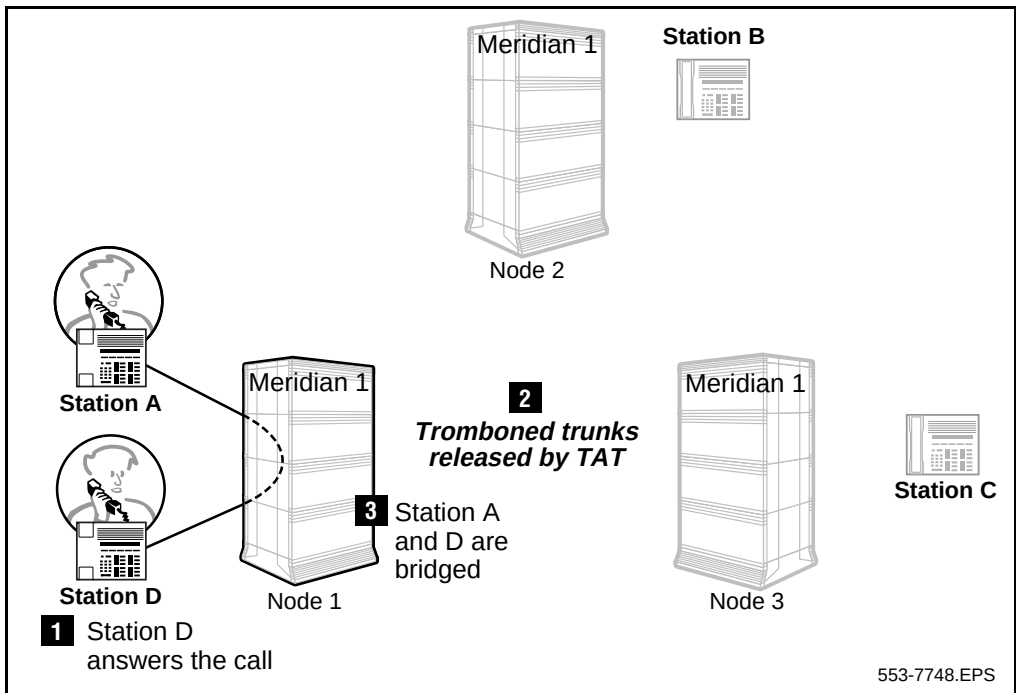
- Station C answers the call, and initiates a call transfer to Station D on Node 1, over a separate PRI/ISL/VNS trunk. This results in tromboning between Node 1 and Node 3. Refer to Figure 115.

Figure 115
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 116.

Figure 116
Tromboned trunks released by TAT



Operating parameters

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 the DMS-250 Sprint load 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.

The Trunk Anti-Tromboning feature will only be supported on the Multi-purpose Serial Data Link (MSDL) card, for D-channel handling.

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.

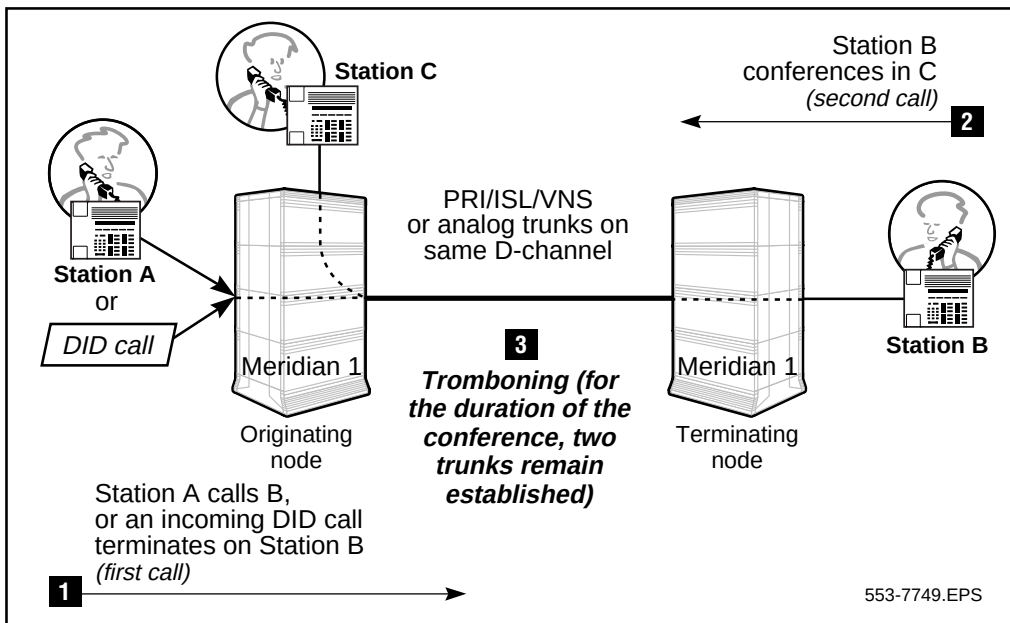
Conference

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 117:

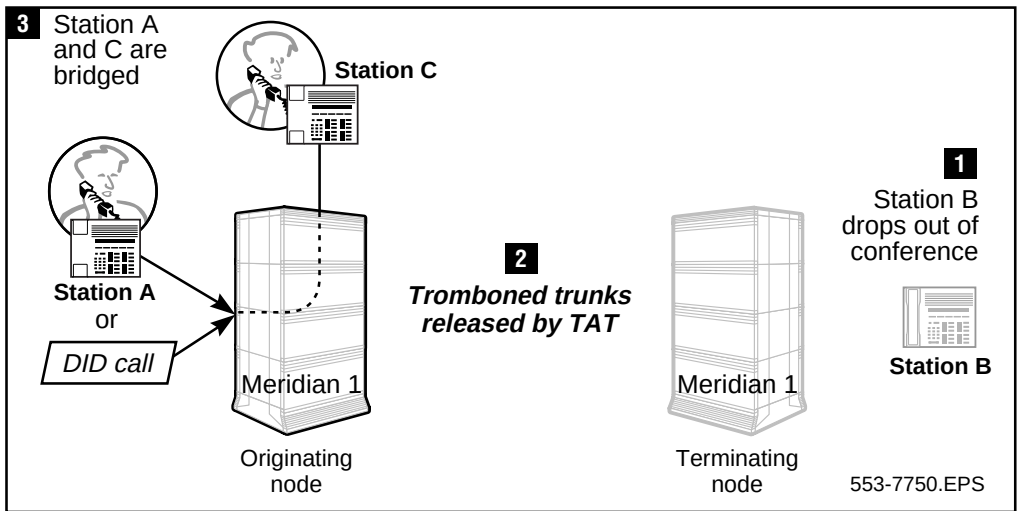
- Station A, or an incoming DID trunk call, at the originating node, is connected to Station B at the terminating node over a PRI/ISL/VNS or analog trunk (first call);
- Station B conferences in Station C, also located at the originating node, over a second PRI/ISL/VNS or analog trunk that is associated with the same D-channel as the first (second call);
- During the extent of the three-party conference, the two trunks are tromboned.

Figure 117
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 118.

Figure 118
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

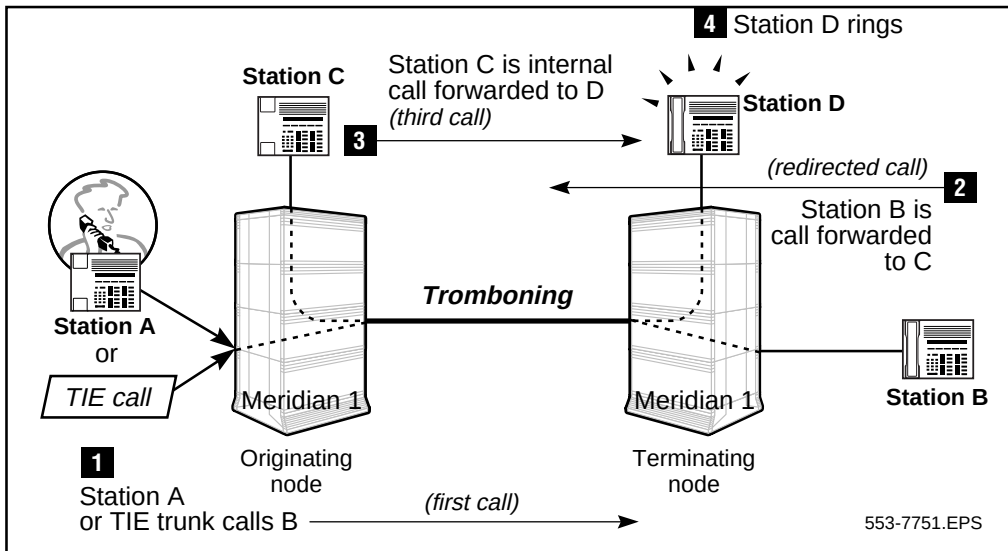
Trunk Anti-Tromboning is not supported on a call restored by INIT ACD Queue Call Restore.

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 119:

- 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.

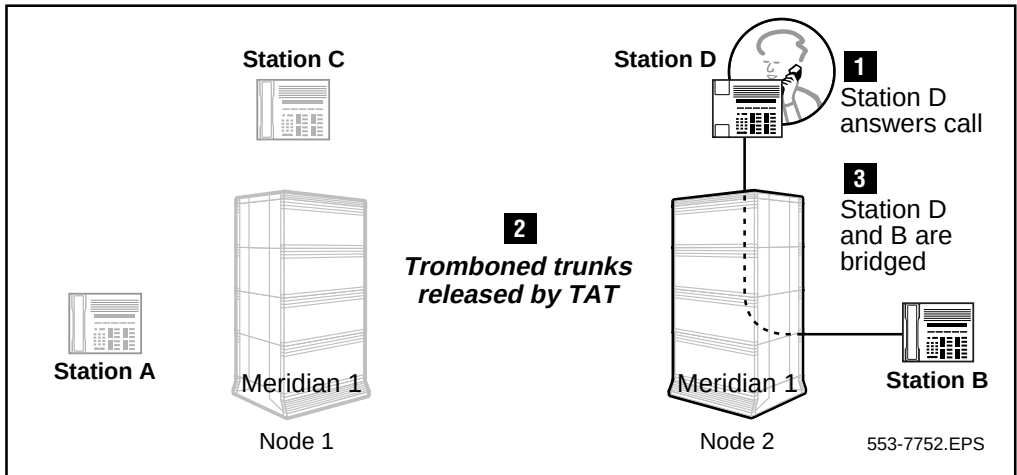
Figure 119
Internal Call Forward before TAT, Node 2 is a Meridian 1



After Station D answers the call, TAT releases the tromboned trunks between Node 1 and Node 2. Refer to Figure 120.

Figure 120

Internal Call Forward after TAT, Node 2 is a Meridian 1

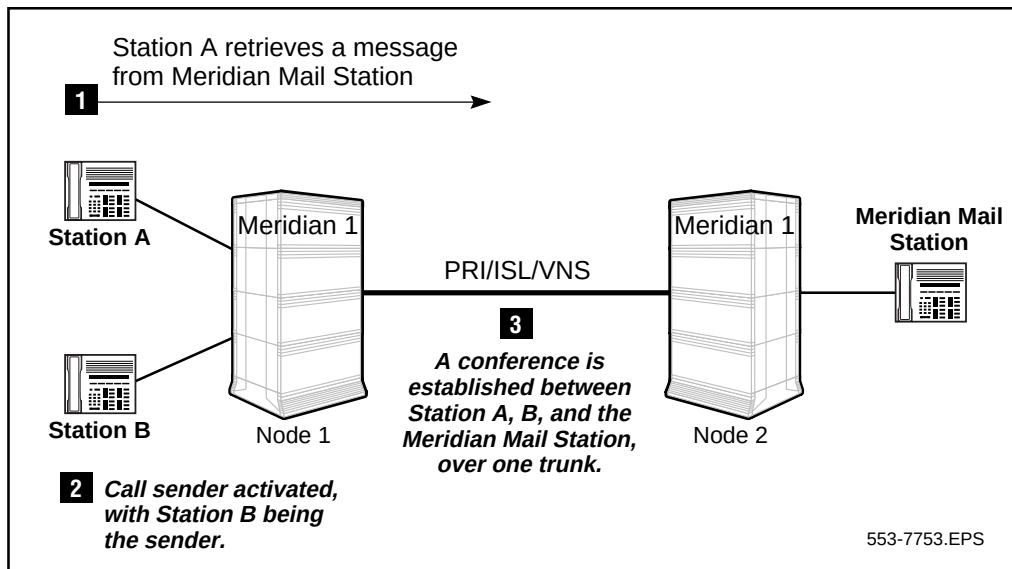


Meridian Mail

The TAT feature will release tromboned PRI/ISL/VNS trunks arising from the application of the Auto Attendant, Thru-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 121:

- 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 121
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 122 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.

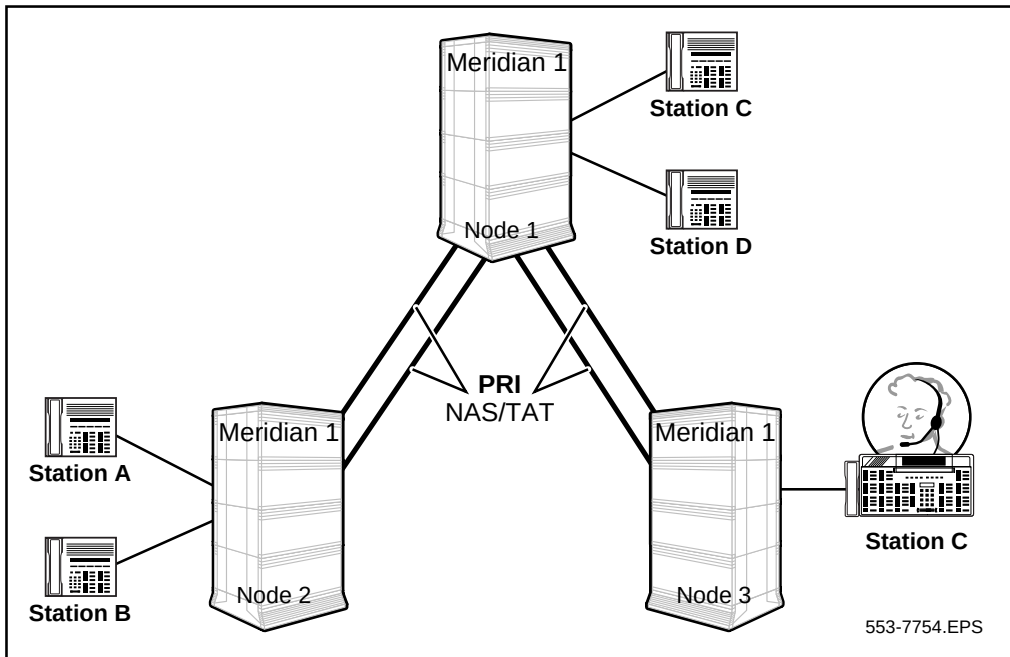
Case 3 - NAS is equipped between Node 1 and Node 2, and TAT is equipped between Node 2 and Node 3

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 122
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 123, 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 124.

Figure 123
Network Call Pickup before TAT

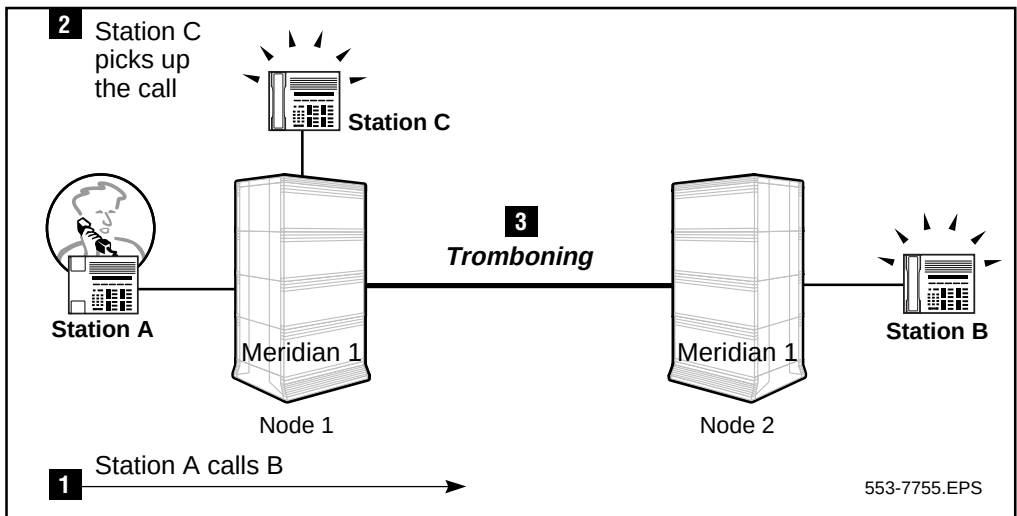
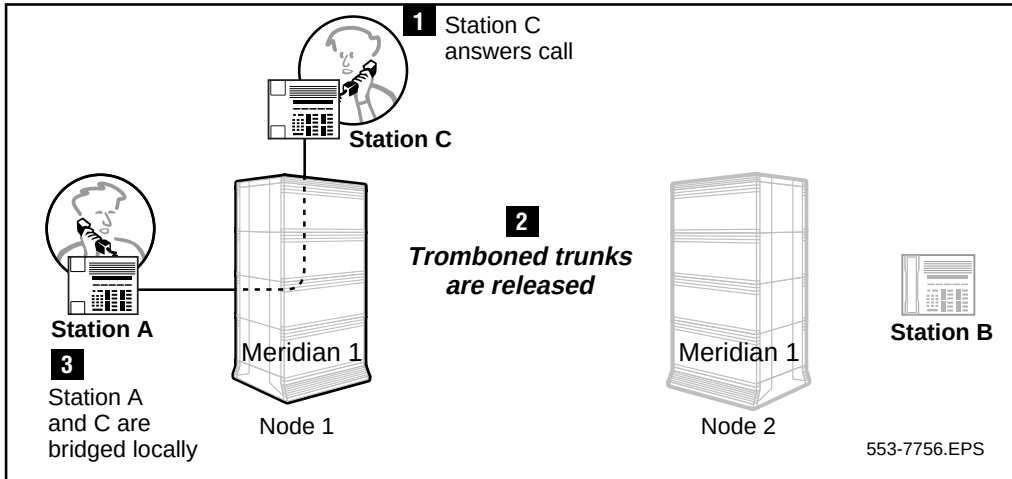


Figure 124
Network Call Pickup after TAT



Network Call Redirection

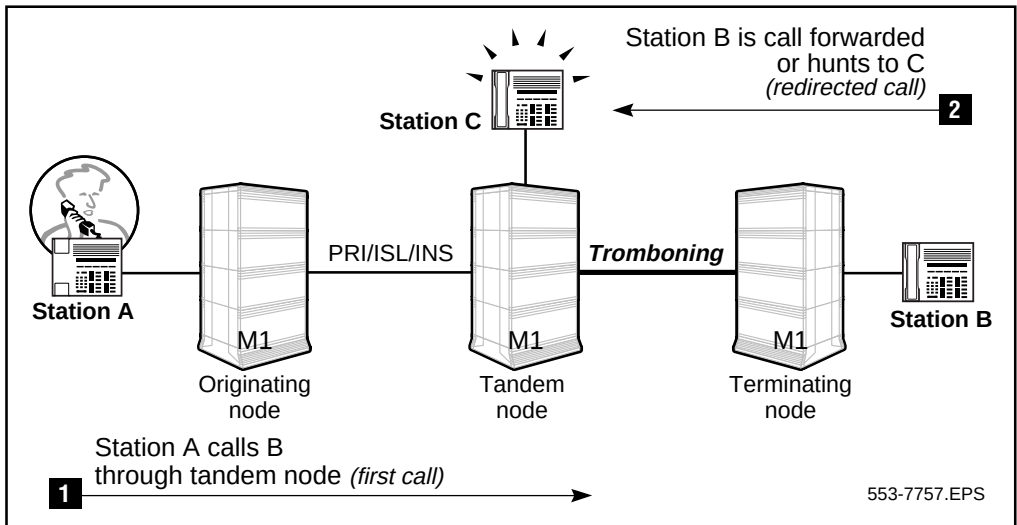
The Trunk Anti-Tromboning feature eliminates the tromboning of PRI/ISL/VNS or analog trunks resulting from the operation of any of the following Network Call Redirection features:

- 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 125 illustrates the following scenario:

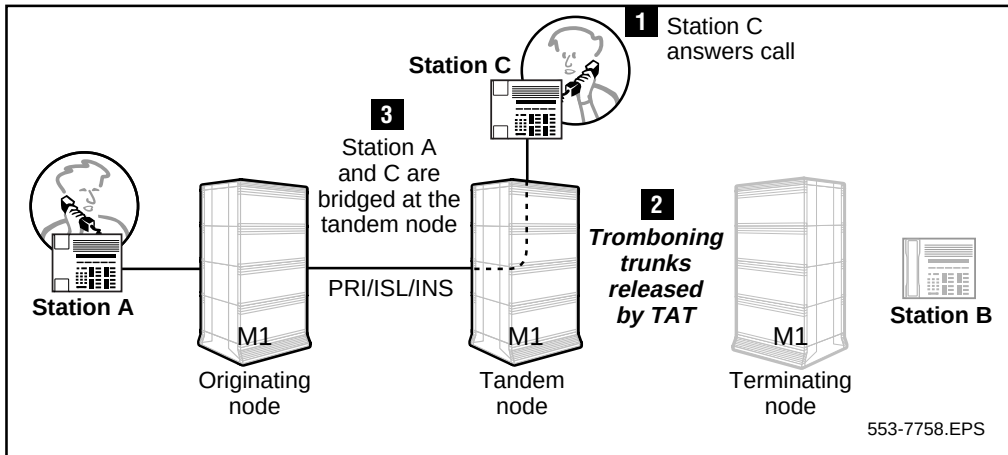
- Station A, on the originating node, calls Station B, on the terminating node, across a tandem node over a PRI/ISL/VNS trunk (first call);
- Station B is call forwarded or hunts over another PRI/ISL/VNS trunk, to Station C located on a tandem node (redirected call.) This causes tromboning between the terminating and the tandem nodes.

Figure 125
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 126.

Figure 126
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.

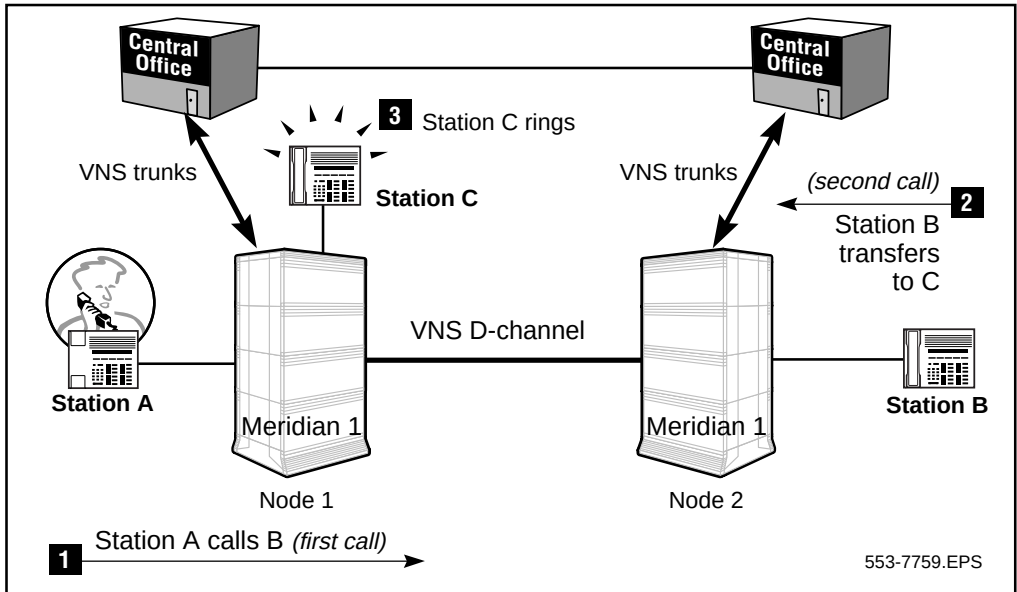
Trunk Route Optimization - Before Answer

See “Trunk Anti-Tromboning and Trunk Optimization - Before Answer both equipped on the same Meridian 1” on page 978.

Virtual Network Services (VNS)

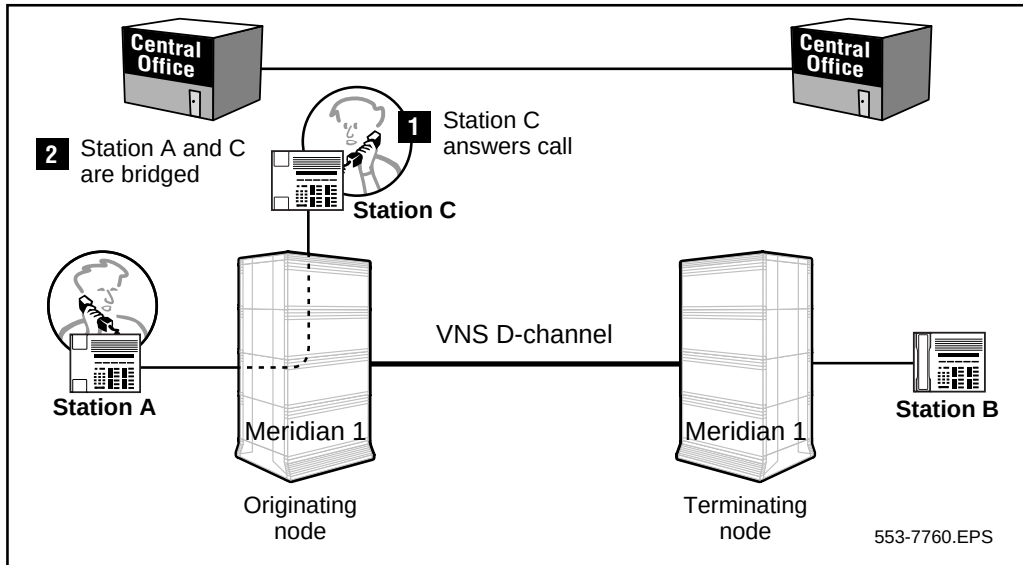
The Trunk Anti-Tromboning feature will perform anti-tromboning operations to eliminate tromboned trunks (physical B-channels) associated with the same VNS D-channel. For example, in Figure 127, Station A at the originating node calls Station B at the terminating node, over a VNS D-channel trunk. Station 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 127
VNS before TA



After Station C answers, the tromboned trunks are released, and Station A and Station C are bridged. Refer to Figure 128.

Figure 128
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 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		Card type.
	MSDL	MSDL = Multi-purpose Serial Data Link (for Options 51C, 61C, 81, 81C.) MSDL = Downloadable D-channel for Option 11.
- CDNO	1-10	For Option 11 only. The card number for the Downloadable D-channel.
- PORT	0-3 1	Port number on MSDL cards. Only port 1 is valid for the Option 11.
...		
- IFC	SL1 S100 D100 D250	Interface type for D-channel. Either SL1, S100, D100, or D250 may be entered. Currently, SL1 and D250 are the only interfaces supported by TAT.
...		
- 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.

Feature operation

The Trunk Anti-Tromboning feature is transparent to the user, provided all datafills and hardware are assigned and equipped properly.

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 2 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.

No change is made to existing VNS operation.

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.

Multi-Party Operations - Ringing No Answer

In a standalone environment, the RGNA prompt in the Customer Data Block will be used when an external trunk is transferred on ringing and the called party does not answer. In a network environment, the RTIM timer value in the Customer Data Block will be used for slow answer recall.

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.

Night Service Enhancement

Recalls made while the attendant is in Night Service are routed to the Night DN, if the original call is an external call. In such a case, the destination party is disconnected, the internal network trunk is released and the original extended call is presented to the Night DN. If the original call is internal, 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 implementation

LD 15 – Modifications to Customer Data Block.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	ATT	Attendant console prompts.
CUST	0-99	Customer number.
- RTIM	xxx yyy zzz	Enter defined value for the Slow Answer Recall timer where: xxx = 0-(30)-378 Slow Answer Recall yy y= 0-(30)-510 Camp On Recall zzz = 0-(30)-510 Call Waiting Recall
<CR>		
TYPE	NET	Trunk and network options.
CUST	0-99	Customer number.
...		
- ISDN	YES	Change the Integrated Services Digital Network options.
...		
- PSTN	NO	Enter "NO" to allow no limit on the number of Public Switched Telephone Network trunks in any one network connection.
...		
- DITI	YES	Allow Direct Inward Dialing to TIE connections for customer.

- TRNX	YES	Allows transfer on ringing of supervised external trunks across the network. If "NO" is entered, transfer on ringing of supervised external trunks across the network are prevented.
- EXTT	YES	Allows connection of supervised external trunks. If "NO" is entered, connection of supervised external trunks is prevented.

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).

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.

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;
- Analog Private Networking Signalling System (APNSS); and
- Basic Rate Interface trunks (used for NUMERIS, 1TR6 or MCDN).

The following signaling systems are not supported for VNS:

- Japan D70; and
- Multifrequency Extended Signaling for Socotel (MFE).

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.

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.

Analog Private Networking Signalling System (APNSS)

APNSS trunks cannot function as VNS Bearer trunks.

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 administration

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	xx	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	xx	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	xx	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	xx	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	xx	Customer number. At least one D-Channel must be configured with USR = VNS or USR = SHA V 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	0-63	The D-channel used for these VNS calls (must be configured in LD 17).
	0-15	For Option 11.
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	xx	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.

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 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	0-99 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 <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	0-99 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. 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	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
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.

Feature Operation

No specific operating procedures are required to use this feature.

Engineering guidelines

This module contains guidelines for ISDN-compatible software and hardware. This information includes the following:

- system compatibility
- configuration parameters
- data characteristics
- transmission characteristics
- loss and level plan
- call connection limitations
- software packages
- software/hardware compatibility
- hardware requirements
- ROM requirements
- cable information

System compatibility

The X11 Release 17 ISDN software supports the following system types:

- ST, NT, RT, and XT
- 21, 51, 61, and 71

The X11 Release 18 ISDN software supports the following system types:

- STE, NT, RT, and XT
- 21E, 51, 61, 71, and 81

The X11 Release 19 ISDN software supports the following system types:

- STE, NT, RT, and XT
- 21E, 51, 61, 61C, 71, and 81

The X11 Release 20 ISDN software supports the following system types:

- STE, NT, RT, and XT
- 21E, 51, 51C, 61, 61C, 71, and 81

The X11 Release 21 ISDN software supports the following system types:

- STE, NT, RT, and XT
- 21E, 51, 51C, 61, 61C, 71, 81 and 81C

The X11 Release 22 ISDN software supports the following system types:

- 51C, 61C, 81 and 81C

Configuration parameters

There are two types of configuration parameters:

- line rate
- T1 compatibility

The line rate is 1.544 Mbps.

The integrated voice and data can use a single medium to transmit speech and data between locations.

There are three advantages to T1 compatibility:

- T-link version 2 supports Meridian 1 to Meridian 1, Meridian 1 to SL-100, and Meridian 1 to Custom DMS-100 for 56 or 64 kbps data
- includes capability to be configured as a standard T1 DS-1 link
- eliminates need for channel bank equipment when using digital network facilities

Data characteristics

PRI utilizes Northern Telecom's T-link Data Rate Adaptation protocol. There are three transmission modes:

- asynchronous 50 bps to 19.2 kbps
- synchronous 1200 bps to 64 kbps
- half or full duplex

Transmission characteristics

There are five types of transmission necessary for ISDN compatibility:

- carrier system compatibility
- synchronization
- signaling
- trunk types supported
- voice transmission

These transmission types are described in the lists that follow.

Carrier system compatibility:

- compatible with D2, D3, D4, B8ZS, and Extended superframe format (ESF) framing on T1 repeater cables
- compatible with systems that use a DS-1 interface, such as fiber optics, microwave, copper, satellite, and infrared
- meets CCITT Q.921 and Q.931 recommendations
- complies with T1D1 minimal subset

Synchronization: stratum 3 compatible (accuracy, jitter, pull-in range)

Signaling:

- in PRI mode: ISDN D-channel signaling
- in DTI mode: loop start, ground start, E&M, DTMF, and dial pulse
- in ITA mode: PRI trunks use PRI mode and DTI trunks use DTI mode

Trunk types supported:

- CO, FX, WATS, DID, TIE (2-wire E&M, 4-wire E&M)

Voice transmission:

- meets EIA Digital PBX Draft Standard PN-1429 requirements such as loss and level, distortion, and delay

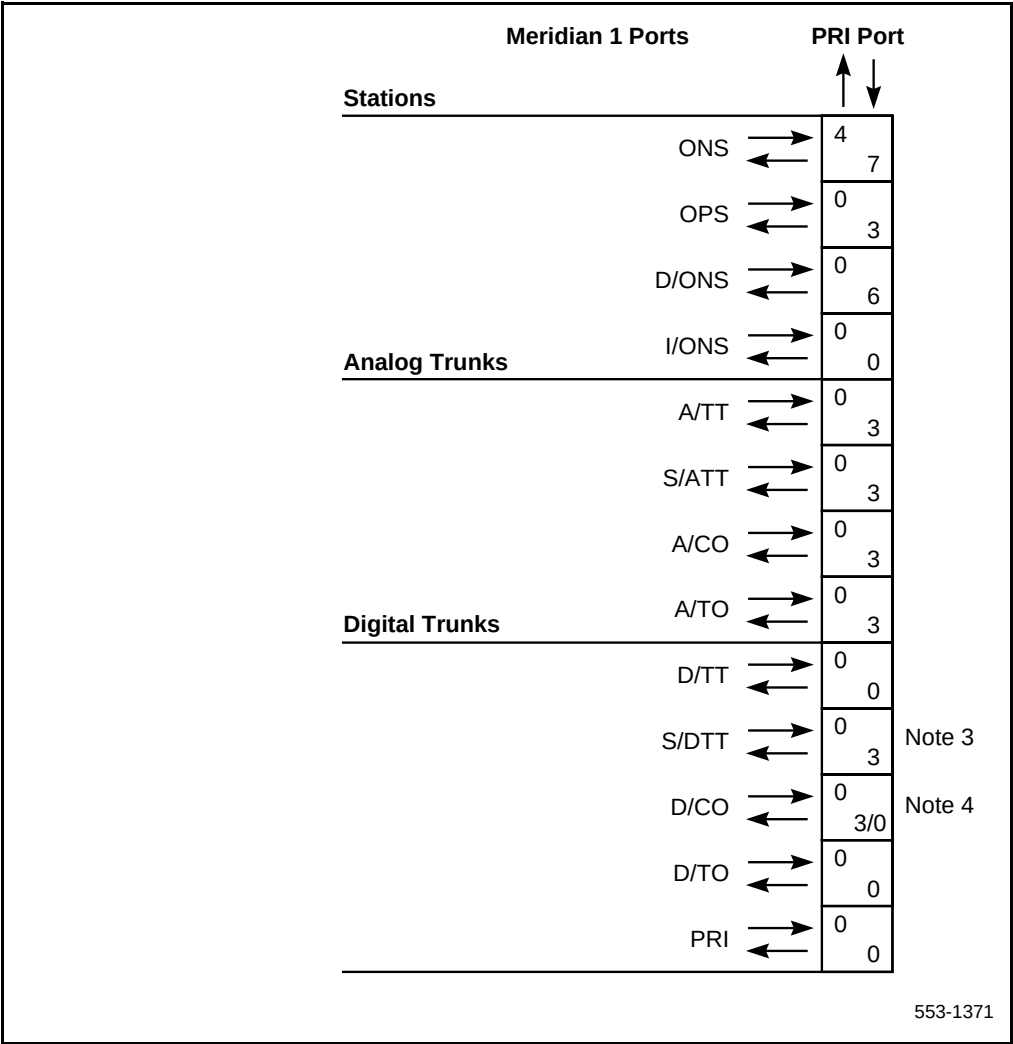
Note: ISDN meets the Radio Frequency Interference (RFI) requirements.

Loss and level plan

The loss plan for PRI has been added to the existing Meridian 1 loss matrix (the EIA loss plan).

Figure 129 shows the connections on a port-to-port basis and the corresponding loss values (in dB) for both directions of transmission.

Figure 129
PRI loss and level plan



Note 1: The loss is bidirectional. For example, the A/TT coordinate indicates a nominal port-to-port loss of:
0 dB from the A/TT interface to the Primary Rate Interface (PRI)
3 dB loss from the Primary Rate Interface (PRI) to the A/TT interface

Note 2: The table column is shown; the loss table has a corresponding row.

Note 3: For echo control reasons, this connection cannot be loss-less.

Note 4: The value of 0 dB in the PRI-D/CO direction is the long-term objective. The value of 3 dB is to be used for connections to D/COs that have not been programmed for inserting receive-side loss on PRI to local loop connections.

Legend:

ONS	Line interface/on premise line
OPS	Line interface/off premise line
D/ONS	Digital line interface/on premise line
I/ONS	ISDN terminal (on premise)
A/TT	Analog trunk interface/analog TIE trunk
S/ATT	Analog trunk interface/analog satellite PBX TIE trunk
A/CO	Analog trunk interface/analog CO trunk
A/TO	Analog trunk interface/analog toll office trunk
D/TT	Digital trunk interface/digital or combination TIE trunk
S/DTT	Digital trunk interface/digital satellite PBX TIE trunk
D/CO	Digital trunk interface/digital or combination CO trunk
D/TO	Digital trunk interface/digital or combination toll office trunk
PRI	Primary Rate Interface

Call connection limitations

Call connection restrictions limit user access to networks and features by allowing users to set the following limits:

- number of tandem connections
- number of call redirections
- number of PSTNs; can be one or unlimited
- number of μ /A-law conversions
- number of satellite delays

These restrictions apply only within an ISDN environment. Limitations also prevent trunk lockup by allowing only one trunk without disconnect supervision to participate in a call connection. (Trunks providing disconnect supervision include CO/FX/WATS, CO, DID, TIE, CCSA, 2MB DTI trunks, and ISDN.) If multiple call transfers, conferences, or other situations cause two or more unsupervised trunks to be connected, call connection restrictions may not be effective.

Call connection restrictions override the Satellite Link Control feature. If the two features conflict (for example, Satellite Link Control limits satellite hops to one and call connection restrictions permit five hops), call connection restrictions prevail.

Prompts in LD 15 permit configuration of Call Connection Restrictions.

LD15—Call Connection Restriction Implementation

REQ	CHG	Change data.
TYPE	CDB NET_DATA	Customer Data Bloc. Networking Data (Release 21 gate opener).
CUST	0-99	Customer number.
ISDN	YES	ISDN option; must be set to YES to see following call connection restriction prompts.
...		
- RCNT	0-(1)-5	Number of call redirections allowed in a call connection.
- PSTN	YES/(NO)	YES limits the number of PSTNs allowed in a call connection to 1. NO permits unlimited PSTNs.
- - TNDM	0-(15)-31	Number of tandem connections allowed in a call connection.
- - PCMC	0-(15)-31	Number of PCM (μ /A-law) conversions permitted in a network connection.
- - SATD	0-(1)-5	Number of satellite delays allowed in a network connection.

Software packages

The following tables list the software features and their corresponding packages.

Note 1: To upgrade current ISDN software, see *Software conversion procedures* (553-2001-320).

Note 2: Package 19 is required for receiving CLID or NCPND.

Note 3: Package 75, PBX interface, is not required for ISL (package 147), unless ISL is over DTI. For ISL over analog trunks, ESN # 2 or 3 signaling is required. ESN # 5 signaling can be used if package 75 is installed.

Note 4: The QPC720C PRI card is required for DTI, with X11 Release 17 and later.

Note 5: CDP (package 59) requires packages 28 and 61. Packages 28 and 61 are not required for NARS (package 58).

Note 6: If the user dials a Location code, package 58 must be equipped at the originating and the receiving Meridian 1. If CDP is used, package 59 needs to be equipped at both sites.

Note 7: Package 117 is also required in ISA configurations.

Note 8: Multi-purpose Serial Data Link (MSDL) cards (NT6D80) require package 222 for D-channel (and Application Module Link) operations.

Table 98
Software packages (Part 1 of 3)

Features	Package dependencies
64 Kbps Clear Data Transport	75, 145, 146
Attendant Blocking of Directory Number (ABDN)	14, 28, 32, 58, 75, 127, 145, 146 or 147, 159
Attendant and Network Wide Remote Call Forward	1, 18, 58, 59, 73, 139, 145
Backup D-channel	75, 145, 146 or 147
Basic Call Service	75, 145, 146 or 147
Call Forward, Break-In, Hunt Internal or External Network Wide	159, 263
Call Page Network Wide	307
Call Park Network Wide	306, 159, 33
Calling Line Identification (CLID)	19, 75, 145, 146 or 147
CLID in CDR record	4, 5, or 6, 118, 75, 145, 146 or 147
AT&T 4ESS	75, 145, 146
Custom AT&T 5ESS	75, 145, 146, 149
Custom DMS100	75, 145, 146
Data Packet Network (DPN) access	75, 145, 146
Display of Calling Party Denied	95, 145, 159
DTI Backwards Compatibility	75
DTI with Extended Superframe (ESF)	75, 145, 146
E.164/ESN Numbering Plan Expansion	19, 57, 58, 145, 146, 147, 160, 203, 216, 222, 235, 263
ESN over ISL or Primary Rate Interface	14, 32, 37, 39, 58 or 59, 75, 145, 146
Integrated Services Access (ISA)	75, 117, 145, 146

Table 98
Software packages (Part 2 of 3)

Features	Package dependencies
Integrated Trunk Access (ITA)	75, 145, 146
ISDN CLID Enhancements	145
ISDN Signaling Link (ISL)	75, 145, 147
Local trunk queuing over PRI/ISL (offhook or call back queuing)	14, 28, 32, 37, 58 or 59, 62, 75, 145, 146 or 147
Meridian Mail Trunk Restriction	46
Multi-purpose Serial Data Link (MSDL)	222
NCOS over ISDN Signaling Link (ISL)	14, 32, 37, 39, 58 or 59, 75, 145, 147
NCOS over Primary Rate Interface to Custom DMS-100	14, 32, 37, 39, 58 or 59, 75, 145, 146
National ISDN-2 (NI-2)	145, 146, 222, 291
Network Attendant Service (NAS)	14, 28, 32, 58, 59, 61, 75, 127, 145, 146 or 147, 148, 159, 161, 192
Network Call Forwarding	14, 32, 58 or 59, 75, 145, 146 or 147
Network Call Party Name Display (NCPND)	19, 75, 95, 145, 146 or 147
Network Call Redirection (NCRD)	145, 146 or 147
Network Message Services (NMS)	14, 32, 58 or 59, 75, 77, 145, 146 or 147, 148, 175
Network Ring Again (NRAG)	14, 32, 58 or 59, 75, 145, 146 or 147, 148
Network Wide Listed Directory Numbers	14, 32, 58, 75, 76, 145, 146 or 147, 159
Non-Associated Signaling (nB +D)	75, 145, 146 or 147
PRI to DMS-250 or AT&T 4ESS	75, 145, 146, 149
Private Network Hopoff and Overflow	14, 28, 32, 58 or 59, 61, 75, 145, 146 or 147
QSIG Basic Call	263, 19, 145, 146, 222

Table 98
Software packages (Part 3 of 3)

Features	Package dependencies
QSIG Call Completion	263, 305, 316
QSIG GF Transport	263, 305
QSIG Name Display	19, 95, 139, 263, 305
Remote Virtual Queuing	192
T-1 Frame Slippage Auto-recovery	75, 145, 146
Trunk Anti-Tromboning	312, 145, 146 or 147, 148, 222
Trunk Optimization (TRO)	145, 146 or 147, 148
VNS VDN Expansion	14, 32, 58, 145, 146, 147, 148, 161, 183

Software and hardware compatibility

The different configurations within an ISDN environment are supported by different sets of features and services. As ISDN evolves, more and varied configurations are supported. These different configurations have their own software and hardware dependencies, as listed in the following tables.

The tables in this section describe the following configurations:

- Meridian 1 software and hardware compatibility
- Meridian 1 connectivity to SL-100, Custom DMS-100, and DMS-250, with software and hardware compatibility
- Meridian 1 connectivity to AT&T 4ESS and Custom AT&T 5ESS software and hardware compatibility
- Meridian 1 connectivity to National ISDN-2 (NI-2) software and hardware compatibility

Features in progressive Releases of X11 software are compared with the hardware introduced per Release—different versions of the QPC720 and the QPC757 cards. Remember that features are limited to the lowest software Release supporting a particular feature.

For example, a Meridian 1 with QPC757A supports software up to X11 Release 13 only. A node with QPC757C can support software up to X11 Release 15 — and calls between these two nodes are only supported by the lowest software version, X11 Release 13. Therefore, all nodes in the same network should support the same hardware and software.

Note: QPC720C is introduced in X11 Release 17. It is required for high-speed data calls (56K) between a Meridian 1 with a QPC472 using DTI to a Custom DMS-100 using PRI to a Meridian 1 with a QPC720.

Also, MSDL NT6D80 vintage AA supports Releases 18 - 20, inclusive. NT6D80 vintage AB supports Releases 21 and higher.

Conventions within the following tables are:

- LF = limited functionality (the two items do interact, but call functions are somewhat limited compared to a different configuration)
- N = no, or “not supported”
- - = not applicable, or it does not apply to this configuration
- NR = not recommended for this configuration
- R = X11 Release number
- Y = yes, it is supported

Table 99
Meridian 1 software and hardware compatibility (Part 1 of 4)

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
* The QPC720D was not introduced in North America (it is only used in Hong Kong.) ** The QPC720F has been introduced to handle NI-2, and R22 and higher software features. *** The NT6D80AA MSDL supports R18 - R20 inclusive. The NT6D80AB supports R21 and higher. **** Includes the NTBK51AA Downloadable D-Channel Daughterboard.																					
Attendant Blocking of DN	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
Attendant Netwide RCFW	N	N	N	N	N	N	Y	Y	Y	N	N	Y	Y	N	N	N	N	N	Y	Y	Y
Att/Net RCFW	N	N	N	N	N	N	Y	Y	Y	N	N	Y	Y	N	N	N	N	N	Y	Y	Y
Backup D-channel	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
Basic Call Service	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CFW, Break-In, Hunt Internal, External Netwide	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
CFW/Hunt Override FFC	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	Y	Y	Y	N	Y	Y
Call Page Netwide	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	Y	Y	N	Y	Y
Call Park Netwide	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
Call Pickup Network Wide	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
Calling Line ID	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Calling Party Privacy	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	Y	N	N	N	Y	Y
CLID in CDR	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
DCH Error Report and Monitoring	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y

Table 99**Meridian 1 software and hardware compatibility (Part 2 of 4)**

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
DTI, ESF, CRC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-
Display of Calling Party Denied	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y
DTI Compatibility	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	Y
Electronic Lock Net/Private Line	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y
E.164/ESN Numb Plan Expansion	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y
ESN over PRI	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Incoming Trunk Program. CLID	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
ISDN CLID Enhancements	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y
ISL*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
ISL (Conventional)*	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
ITA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Meridian Mail Trunk Restriction	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
NACD	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
NAS	N	N	N	N	N	N	Y	Y	Y	N	N	Y	Y	N	N	N	N	Y	Y	Y	Y
National ISDN 2 TR-1268 PRI	N	N	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
* Features must be compatible with the transport.																					

Table 99
Meridian 1 software and hardware compatibility (Part 3 of 4)

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
nB + D	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NCPND	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NND	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y
NCRD																					Y
— NCFAC	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
— NCFB	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
— NCFNA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
— NHNT	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
NWLDN	N	N	N	N	N	N	Y	Y	Y	N	N	Y	Y	N	N	Y	Y	Y	Y	Y	Y
— NXFER	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
Network Call Trace	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	N	Y	Y	Y	Y
Network Intercom	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
B8ZS	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NMS-MC	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
NMS-MM	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
NRAG	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
QSIG Basic Call	N	N	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
QSIG Call Completion	N	N	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
QSIG GF Transport	N	N	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
QSIG Name Display	N	N	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y

Table 99
Meridian 1 software and hardware compatibility (Part 4 of 4)

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
64 K Clear Data	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Remote Virtual Queuing	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	N	N	Y	Y	Y	Y
Trunk Anti-Tromboning	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
TRO	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
T1 Frame Slip Auto-recovery*	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	-	-	N	N	-	-	-	Y*
T309 Timer	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Virtual Network Services	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y
VNS VDN Expansion	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y
* Without the NTBK51AA.																					

Table 100**Meridian 1 compatibility with connectivity to SL-100, Custom DMS-100, DMS-250**

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720CIE*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
	* The QPC720D was not introduced in North America (it is only used in Hong Kong.)																				
	** The QPC720F has been introduced to handle NI-2, and R22 and higher software features.																				
	*** The NT6D80AA MSDL supports R18 - R20 inclusive. The NT6D80AB supports R21 and higher.																				
	**** Includes the NTBK51AA Downloadable D-Channel Daughterboard.																				
Backup D-channel	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
nB+D	N	N	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	N	N	Y	Y	Y	Y
Basic Call Service	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Calling Line ID	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CLID in CDR	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
DPN access	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
DTI, ESF, CRC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-
DTI Compatibility	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	Y
ESN over PRI	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ISA	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NND	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y
NCRD																					Y
— NCFAC	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
— NCFB	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
— NCFNA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
— NHNT	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
NRAG (TIE)	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
B8ZS	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
NRAG	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
64 K Clear Data	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Private Network Hopoff	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
T1 Frame Slip Auto-recovery*	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	-	-	-	-	-	-	-	Y*
* Without the NTBK51AA.																					

Table 101
Meridian 1 software and hardware compatibility with connectivity to AT&T 4ESS

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
* The QPC720D was not introduced in North America (it is only used in Hong Kong.) ** The QPC720F has been introduced to handle NI-2, and R22 and higher software features. *** The NT6D80AA MSDL supports R18 - R20 inclusive. The NT6D80AB supports R21 and higher. **** Includes the NTBK51AA Downloadable D-Channel Daughterboard.																					
ANI in CDR	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ANI Station ID	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Backup D-channel	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
Basic Call Service	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ISA/CBC	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
DTI, ESF, CRC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-
nB+D	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y

Table 102**Meridian 1 software and hardware compatibility with connectivity to Custom AT&T 5ESS**

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
* The QPC720D was not introduced in North America (it is only used in Hong Kong.) ** The QPC720F has been introduced to handle NI-2, and R22 and higher software features. *** The NT6D80AA MSDL supports R18 - R20 inclusive. The NT6D80AB supports R21 and higher. **** Includes the NTBK51AA Downloadable D-Channel Daughterboard.																					
ANI Station ID	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
Basic Call Service	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ISA/CBC	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	N	Y	Y	Y	Y

Table 103**Meridian 1 software and hardware compatibility with NI-2**

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
* The QPC720D was not introduced in North America (it is only used in Hong Kong.) ** The QPC720F has been introduced to handle NI-2, and R22 and higher software features. *** The NT6D80AA MSDL supports R18 - R20 inclusive. The NT6D80AB supports R21 and higher. **** Includes the NTBK51AA Downloadable D-Channel Daughterboard.																					
Bearer capability	N	N	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
Basic Call Service	N	N	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
Calling Party Number	N	N	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
nB+D	N	N	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
Backup D-channel	N	N	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y

Table 104
Meridian 1 software and hardware compatibility

Services	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C	757A	757B	757C	757D	757E	MSDL
Release 13	Y	LF	LF	LF	LF	LF	LF	LF	LF	LF	Y	Y	Y	Y	LF	LF	LF	LF	N
Release 14	LF	Y	LF	LF	LF	LF	LF	LF	LF	LF	NR	Y	Y	N	LF	Y	Y	Y	N
Release 15	LF	LF	Y	LF	LF	LF	LF	LF	LF	LF	N	Y	Y	N	N	Y	Y	Y	N
Release 16	LF	LF	LF	Y	LF	LF	LF	LF	LF	LF	N	Y	Y	N	N	LF	Y	Y	N
Release 17	LF	LF	LF	LF	Y	LF	LF	LF	LF	LF	N	Y	Y	N	N	N	LF	Y	N
Release 18	LF	LF	LF	LF	LF	Y	LF	LF	LF	LF	N	N	Y	N	N	N	N	Y	Y
Release 19	LF	LF	LF	LF	LF	LF	Y	Y	Y	Y	N	N	Y	N	N	N	N	Y	Y
Release 20	LF	LF	LF	LF	LF	LF	Y	Y	Y	Y	N	N	Y	N	N	N	N	Y	Y
Release 21	LF	LF	LF	LF	LF	LF	Y	Y	Y	Y	N	N	Y	N	N	N	N	Y	Y
Release 22	LF	LF	LF	LF	LF	LF	Y	Y	Y	Y	N	N	Y	N	N	N	N	Y	Y
QPC720A	Y	NR	N	N	N	N	N	N	N	N	Y	LF	LF	Y	Y	LF	LF	LF	N
QPC720B	Y	Y	Y	Y	Y	N	N	N	N	N	LF	Y	LF	N	LF	Y	Y	Y	N
QPC720C/E	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	LF	LF	Y	N	LF	Y	Y	Y	Y
QPC720F	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	LF	LF	Y	N	LF	Y	Y	Y	Y
QPC757A	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Y	LF	LF	LF	LF	LF
QPC757B	LF	LF	N	N	N	N	N	N	N	N	Y	LF	LF	LF	Y	LF	LF	LF	LF
QPC757C	LF	Y	Y	LF	N	N	N	N	N	N	LF	Y	Y	LF	LF	Y	LF	LF	LF
QPC757D	LF	Y	Y	Y	LF	N	N	N	N	N	LF	Y	Y	LF	LF	LF	Y	LF	LF
QPC757E	LF	Y	Y	Y	Y	Y	Y	Y	Y	Y	LF	Y	Y	LF	LF	LF	LF	Y	LF
NT6D80 (MSDL)	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	N	N	N	Y	Y	Y
NT5D12/w NTBK51AA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	LF	LF	Y	N	LF	Y	Y	Y	Y
Y = (supported); N=not supported; NR=not recommended; LF=limited functionality (items interact, but call functions could be limited)																			

Meridian 1 connectivity

X11 Release 17 and later software supports ISDN signaling between Meridian 1 and the following products:

- Meridian 1
- SL-100
- Custom DMS-100 and DMS-250
- AT&T 4ESS
- Custom AT&T 5ESS

General networking capabilities available with X11 Release 17

- Basic Call Service
- Calling Line Identification
- Calling Line Identification in Call Detail Recording (CDR) Record
- DTI Backwards Compatibility
- Trunk Route Optimization (before answer)

General networking capabilities available with X11 Release 18

- Remote Virtual Queuing

General networking capabilities available with X11 Release 20

- Network Attendant Services
- Attendant Network Remote Call Forward
- Network Listed Directory Number

General networking capabilities available with X11 Release 21

- Attendant Blocking of DN
- Calling Party Privacy
- Call Forward/Hunt Override via FFC
- Call Pickup Network Wide
- Electronic Lock Network Wide/Private Lines
- Incoming Trunk Programmable CLID

- National ISDN-2 (NI-2) TR-1268 PRI
- Network Intercom
- Display of Calling Party Denied
- Trunk Anti-Tromboning
- Virtual Network Services

General networking capabilities available with X11 Release 22

- Automatic Redial
- Call Forward, Break-In and Hunt Internal or External Network Wide
- Call Page Network Wide
- Call Park Network Wide
- E.164/ESN Numbering Plan Expansion
- ISDN CLID Enhancements
- QSIG Basic Call
- QSIG Call Completion
- QSIG General Function Transport
- QSIG Name Display
- Meridian Mail Trunk Access Restriction
- Trunk to Trunk Connection
- Virtual Network Services Directory Number Expansion

Hardware requirements

The following hardware is required for ISDN:

— QPC720C Primary Rate Interface card (up to and including Release 20)

OR

— QPC720C Primary Rate Interface card for 64 (for NI-2 and from Release 21 and higher)

OR

— NT5D12 DDP, that requires the following:

- one NT6D80 MSDL

or optionally, as a plug-on

- one NTBK51AA Downloadable D-Channel daughterboard

or optionally, an external DCHI card

- one QPC757 DCHI

— QPC757xx, or NT6D11xx D-channel Interface (one per 16 PRIs)

OR

— Multi-purpose Serial Data Link (MSDL) - NT6D80AA (Release 18 - 20 inclusive), NT6D80AB supported on X11 Release 21 and higher)

— QPC471 (vintage B or higher is recommended) or QPC775 Clock Controller (one per CPU)

— QPC471 vintage H or later is required for option 81 systems

— QPC414B Network Card (one loop per PRI)

Note 1: For PRI, the QPC720x, QPC757x (or NT6D80xx), and QPC471 (or QPC775) cards are all required. For every destination, an independent D-channel is also needed, one for every 16 PRIs to the same destination.

Note 2: The QPC471 and QPC775 Clock Controller cards cannot be intermixed in one system.

Note 3: For every destination, an individual D-channel is required.

- Channel Service Unit (CSU): U.S.A. regulations (FCC Part 68) require Network Channel Terminating Equipment (NCTE) at the demarcation point to registered common carrier trunks. Use Digilink, Verilink, or similar CSUs (one per PRI).
- For data calls using satellite transmission, the MCA, MCU, and HSDM provide echo cancellation capabilities.
- Packet Assembler/Disassembler (PAD): for DPN capability, an X.25 Meridian 1 compatible PAD is required.
- Test equipment: use a Thor Error Counter, or the equivalent, to test bipolar violations on PRI circuits.
- 2400-baud modem with auto dial capability: can be used for ISL in dedicated mode. The recommended modem is the Hayes Smartmodem 2400. See *ISDN Primary Rate Interface installation* (553-2901-200) for information about how to configure the Hayes Smartmodem 2400.
- QMT11 Asynchronous/Synchronous Interface Module (ASIM) can be used for ISL in dedicated mode. This module has leased line capability.
- QMT21 High Speed Data Module (HSDM), Meridian Communications Adapter (MCA), or Meridian Communications Unit (MCU) must be used for 64K clear transmission (available between Meridian 1 systems). This also applies to the DMS-250 and the SL-100 using their data units.
- QPC237 4W TIE E&M Trunk can be used to support ISL uniform trunk hardware configuration.

Tables 105 and 106 show current system hardware requirements.

Table 105

System D-channel hardware requirements with a single D-channel

System parameters	QPC757	NT6D11xx	
		Single port	Dual port
Maximum cards per system	8	15	8
Maximum D-channels per system	8	15	8
Maximum asynch ports	8	15	8
Maximum PRI channels to each destination, by each D-channel port	23 with 1 PRI 47 with 2 PRI . . . 359 with 15 PRI	23 with 1 PRI 47 with 2 PRI . . . 359 with 15 PRI	23 with 1 PRI 47 with 2 PRI . . . 359 with 15 PRI
Maximum B-channels per system	2872	5385	2872

Table 106

System hardware requirements with a backup D-channel

System parameters	QPC757	NT6D11xx	
		Single port	Dual port
Maximum cards per system	8	16	8
Maximum DCHI	8	14	8
Maximum asynch ports	8	14	8
Maximum PRI channels to each destination, by each D-channel port	23 with 1 PRI 46 with 2 PRI . . . 382 with 16 PRI	23 with 1 PRI 46 with 2 PRI . . . 382 with 16 PRI	23 with 1 PRI 46 with 2 PRI . . . 382 with 16 PRI
Maximum B-channels	1528	2674	1528

ROM requirements

Table 107 shows current ROM and memory card requirements.

Table 107
ROM and memory card requirements

X11 Release	Card type	ST, 21	STE and 21E	RT	NT, 51, 61	XT, 71	51C, 61C, 81C
14	Memory	QPC673 or QPC814	N/A	QPC583	QPC583	QPC583	N/A
	ROM	QPC717D or QPC937	N/A	QPC602	QPC602	QPC602	N/A
15,16,17	Memory	QPC814	N/A	QPC583A	QPC583	QPC583	N/A
	ROM	QPC940	N/A	QPC939A	QPC939	QPC939	N/A
18,19,20, 21	Memory	N/A	NTND01	NTND09	NTND09	NTND09	Note
	ROM	N/A	NTND31	NTND08	NTND08	NTND08	Note
Note 1: ROM and memory requirements for the option 81, X11 Release 18 and later, option 61C, X11 Release 19 and later, and option 51C, X11 Release 20 and later, are fulfilled with the NT6D66 Call Processor (CP) card. Note 2: Release 20 requires increased memory for some systems. All option 51C, 61C, and 81 required a 48MB CP card. Refer to <i>Software conversion procedures</i> (553-2001-320) for details.							

Cable information

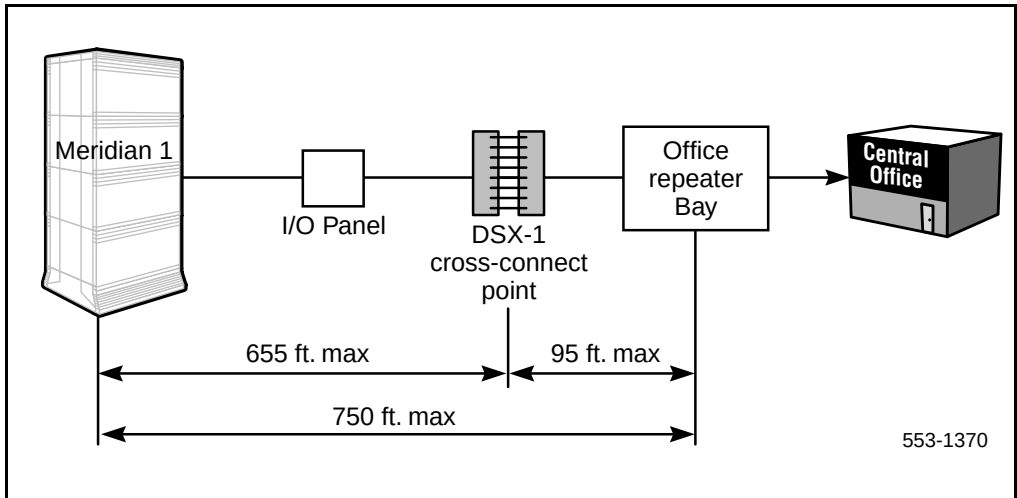
The following lists contain cable and channel information. The cable type used is a 2-pair twisted wire.

Cable distance (see Figure 130):

- 655 ft (200 m) Meridian 1 to DSX-1 cross-connect point (using ARAM or ABAM equivalent shielded cable)
- 750 ft (229 m) from Meridian 1 to Office Repeater Bay

Specific cables are detailed in *ISDN Primary Rate Interface installation* (553-2901-200).

Figure 130
Cable distance to DSX-1 and office repeater bay



Glossary

This module lists, in alphanumeric order, the acronyms, abbreviations, and initializations used in this document.

A/B

A and B bit signaling

ABDN

Attendant Blocking of Directory Number

AC

Access Code

ACB

Automatic Call Back

ADM

Add-On Data Module

AIM

Asynchronous Interface Module

AMI

Alternate Mark Inversion

ANI

Automatic Number Identification

AR

Automatic Recall

ASE

Application Service Element

B8ZS

Bipolar 8 Zero Substitution (provides 64 kbps clear channel capability)

BARS

Basic Alternate Route Selection

BC

Bearer Capability

BCH

B-channel

BISI

Busy Idle Status Indication

BRA

Basic Rate Access

BRI

Basic Rate Interface

CALLATTR

Call Attribute table or index

CARRMTC

Carrier Maintenance

CBC

Call-by-Call Service

CBQ

Call Back Queuing

CC

Central Controller

CCBQ	Coordinated Call Back Queuing
CCITT	International Telegraph and Telephone Consultative Committee
CDN	Called Party Number
CDP	Coordinated Dialing Plan
CDPA	Called Party Address
CDR	Coordinated Detail Recording
CFB	Call Forward Busy
CFI	Call Forward Intragroup
CFU	Call Forward Universal
CGN	Calling Number
CGPA	Calling Number Address
CHID	Channel Identifier
CLID	Calling Line Identification

CLLI	Common Language Location Identifier
CO	Central Office
COS	Class of Service
COT	Central Office Trunk (Meridian 1 only)
CPB	Call Processing Busy
CPF	Called Party Free
CPU	Central Processing Unit
CPV	Command Protocol Violation
CR	Call Reference
CRC	Cyclic Redundancy Check
CUSTNTWK	Customer Networking
D2/D3/D4	Channel banks which handle A0 bit signaling
DCH	D-channel Handler, D-channel interface on the MSDL card

DCHI	D-channel Interface on the QPC757 DCHI card
DDD	Direct Distance Dialing
DID	Direct Inward Dialing
DISA	Direct Inward System Access
DMI	Digit Manipulation Index
DMS	Digit Manipulation System
DNATTR	Directory Number Attributes
DND	Do Not Disturb
DNGRP	Directory Number Groups
DOD	Direct Outward Dialing
DPC	Destination Point Code
DPN	Digital Packet Network
DRAM	Digitally Recorded Announcement

DSL

Digital Subscriber Loop

DTCI

ISDN Digital Trunk Controller

DTI

Digital Trunk Interface

DTRID

Terminating Transaction Identifier

DU

Data Unit

E.163

Telephony Numbering Plan

E.164

North American public dialing plan

ERWT

Expensive Route Warning Tone

ESF

Extended superframe format

ESN

Electronic Switching Network

ETN

Electronic Tandem Network

FDL

Facility Data Link

FNPACONT

Foreign Numbering Plan Area Control table

FPS

Frame Pattern Sequence

FX

Foreign Exchange trunk

GNCT

Generalized No Circuit Treatment

GT

Guard Timer

GTT

Global Title Translations

GTTO

Guard Timer Time Out

HNPACONT

Home Numbering Plan Area Control table

IAC

ISDN Access Controller

IAM

Initial Address Message

IBN

Integrated Business Network

IBNRTE

IBN Routing Table

IBNT2

IBN Trunk 2-way

IBNTI

IBN Trunk Incoming

IBNTO

IBN Trunk Outgoing

IBNXLA

IBN Translation Table

IE

Information Element

IEC

Inter-Exchange Carrier

IFC

Interface Type

IID

Interface Identifier

INWATS

Inward Wide Area Telephone Service

ISA

Integrated Services Access

ISDN

Integrated Services Digital Network

ISL

ISDN Signaling Link

ISO

International Standards Organization

ISUP

ISDN User Part

ITA

Integrated Trunk Access

KSETLINE

Keyset Line table

LAPD

Link Access Procedure on the D-channel

LATA

Local Access and Transport Area

LDN

Listed Directory Number

LEC

Local Exchange Carrier

LEN

Line Equipment Number

LINEATTR

Line Attributes table

LOC

Location Code

LTAP

Logical Terminal Access Privilege

LTCALLS

Logical Terminal Calls table

LTCLASS

Logical Terminal Class table

LTDATA

Logical Terminal Data table

LTDEF

Logical Terminal Definition table

LTGRP

Logical Terminal Group table

LTID

Logical Terminal Identifier

LTKEY

Logical Terminal Key

LTMAP

Logical Terminal Map table

LTNUM

Logical Terminal Number

MADN

Multiple Appearance Directory Number

MAP

Maintenance and Administration Position

MBG

Multiple Business Group

MCDN

Meridian Customer Defined Networking

MDC

Meridian Digital Centrex

MSB

Make Set Busy

MSDL

Multi-purpose Serial Data Link card (NT6D80)

MSGRTE

Message Route

NACD

Network ACD

NARS

Network Alternate Route Selection

NAS

Network Attendant Service

NFWD

Network Call Forward

NCFB

Network Call Forward Busy

NCFNA

Network Call Forward No Answer

NCOS

Network Class of Service

NCPND

Network Call Party Name Display

NCT

Network Call Transfer

NCTE

Network Customer Terminating Equipment

NAUT

Network Authorization Code

NETID

Network Identifier

NETNAME

Network Name

NHNT

Network Hunt

NINTNRAG

Non-interworking Network Ring Again

NMRTNRAG

No Message Route Network Ring Again

NMS

Network Message Services

NN

National Number

NPA

Numbering Plan Area

NPI

Numbering Plan Indicator

NRAG

Network Ring Again

NSC

Network Speed Call

NSF

Network Specific Facility

NSIG

Network Signaling

NXFR

Network Call Transfer

OAM

Operations, Administration, and Maintenance

OFRT	Office Routing table
OHQ	Off Hook Queuing
OPC	Originating Point Code
OSI	Open Systems Interconnection
OTRID	Originating Transaction Identifier
PBX	Private Branch Exchange
PDN	Primary Directory Number
PHI	Packet Handler Interface
PI	Progress Indicator
PIC	Preferred Inter-LATA Carrier
PNI	Private Number Identifier
PRI	Primary Rate Interface
PSTN	Public Switched Telephone Network

PTS

Per Trunk Signaling

PUB

Public (call type)

PVN

Private Virtual Network

PVT

Private (call type)

PX

PBX trunks

Q.921

CCITT recommendation for Layer 2 of ISDN

Q.931

CCITT recommendation for Layer 3 of ISDN (protocol for D-channel messages)

QAT

Queue Advance Timer

RAGT

Reserve Agent Timer

RAN

Recorded Announcement

ROSE

Remote Operations Service Element

RTEID

Route Identification Index

RTEREF

Route Reference table

RTESEL

Route Selector

RVQ

Remote Virtual Queuing

SAPI

Service Access Point Identifier

SCCP

Signaling Connection Control Part

SELSEQ

Selection Sequence

SETUP

Q.931 message type

SID

Service Identifier

SPECCONN

Special Connections (table)

SPN

Special Number

SS7

Signaling System #7

SSN

Subsystem Number

SSP

Service Switching Point

STDPRCT

Standard Pretranslator Control Table

STINV

Signaling Terminal Inventory Table

STP

Signal Transfer Point

SWERR

Software Error

TARG

Trunk Access Restriction Group

TCAP

Transaction Capabilities Application Part

TCOS

Traveling Class of Service

TEI

Terminal Endpoint Identifier;
Terminal Equipment Interface

TFMI

Traffic Mix Information

THOUGRP

Thousands Group table

TIE

Terminal Inter-Exchange line or trunk

TN

Transit Number

TNCOS

Terminal Number Class of Service

TNS

Transit Network Selector

TO

Time-Out

TON

Type of Number

TRKGRP

Trunk Group table

TRKSGRP

Trunk Subgroup table

TRO

Trunk Route Optimization before answer

UDP

Uniform Dialing Plan

VF

Voice Frequency

VFG

Virtual Facility Group

VIRTGRPS

Virtual Facility Groups Table

WATS

Wide Area Telecommunications Service

XLAIBN

Translate call as private network call

XLAIEC

Inter-Exchange Carrier translation

XLALEC

Local Exchange Carrier translation

XLARTE

Translation Route

Meridian 1

ISDN Primary Rate Interface

Description and administration

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