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Meridian Super Node

Meridian SL-100

M1 Interworking Services Guide

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Meridian Super Node

Meridian SL-100

M1 Interworking Services Guide

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About this document

When to use this document

This document provides information on how the Meridian 1 (M-1) and Meridian SuperNode (MSL-100) PBX switches exist in the same network, the interworking features used across a hybrid network, and known feature compatibilities and incompatibilities. This guide is applicable to sites using Meridian 1 and MSL-100 switches in the same network.

How to check the version and issue of this document

The version and issue of the document are indicated by numbers, for example, 01.01.

The first two digits indicate the version. The version number increases each time the document is updated to support a new software release. For example, the first release of a document is 01.01. In the next software release cycle, the first release of the same document is 02.01.

The second two digits indicate the issue. The issue number increases each time the document is revised but re-released in the same software release cycle. For example, the second release of a document in the same software release cycle is 01.02.

To determine which version of this document applies to the software in your office and how documentation for your product is organized, check the release information in *Master Index of Publications.*

References in this document

Refer to the following documents for more information on the features described in this document:

- *Basic Call Service*
- *MCDN Integrated Services Access*
- *Primary Rate Access (PRA) Maintenance*
- *Optivity Telephony Manager User's Guide*
- *Meridian 1 Meridian Administration Tool User's Guide*

What precautionary messages mean

The types of precautionary messages used in Nortel Networks documents include attention boxes and danger, warning, and caution messages.

An attention box identifies information that is necessary for the proper performance of a procedure or task or the correct interpretation of information or data. Danger, warning, and caution messages indicate possible risks.

Examples of the precautionary messages follow.

ATTENTION - Information needed to perform a task

ATTENTION

If the unused DS-3 ports are not deprovisioned before a DS-1/VT Mapper is installed, the DS-1 traffic will not be carried through the DS-1/VT Mapper, even though the DS-1/VT Mapper is properly provisioned.

DANGER - Possibility of personal injury

DANGER

Risk of electrocution

Do not open the front panel of the inverter unless fuses F1, F2, and F3 have been removed. The inverter contains high-voltage lines. Until the fuses are removed, the high-voltage lines are active, and you risk being electrocuted.

WARNING - Possibility of equipment damage

WARNING

Damage to the backplane connector pins

Align the card before seating it, to avoid bending the backplane connector pins. Use light thumb pressure to align the card with the connectors. Next, use the levers on the card to seat the card into the connectors.

CAUTION - Possibility of service interruption or degradation

CAUTION
Possible loss of service
Before continuing, confirm that you are removing the card from the inactive unit of the peripheral module. Subscriber service will be lost if you remove a card from the active unit.

How commands, parameters, and responses are represented

Commands, parameters, and responses in this document conform to the following conventions.

Input prompt (>)

An input prompt (>) indicates that the information that follows is a command:

```
>BSY
```

Commands and fixed parameters

Commands and fixed parameters that are entered at a MAP terminal are shown in uppercase letters:

```
>BSY CTRL
```

Variables

Variables are shown in lowercase letters:

```
>BSY  CTRL  ctrl_no
```

The letters or numbers that the variable represents must be entered. Each variable is explained in a list that follows the command string.

Responses

Responses correspond to the MAP display and are shown in a different type:

```
FP 3 Busy CTRL 0: Command request has been submitted.

FP 3 Busy CTRL 0: Command passed.
```

1 Basic call services

Meridian 1/Meridian SL-100 interworking

For networks that include both the Meridian 1 (M-1) PBX switch and the Meridian SL-100 (MSL-100) switch, it is important to note the many interworking features as well as any known feature incompatibilities or differences. Though the hardware and software architecture of the Meridian 1 and MSL-100 switches may vary in many ways, the systems are designed to provide compatibility across Nortel Networks platforms, using standard open interfaces wherever possible.

ISDN product overview

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

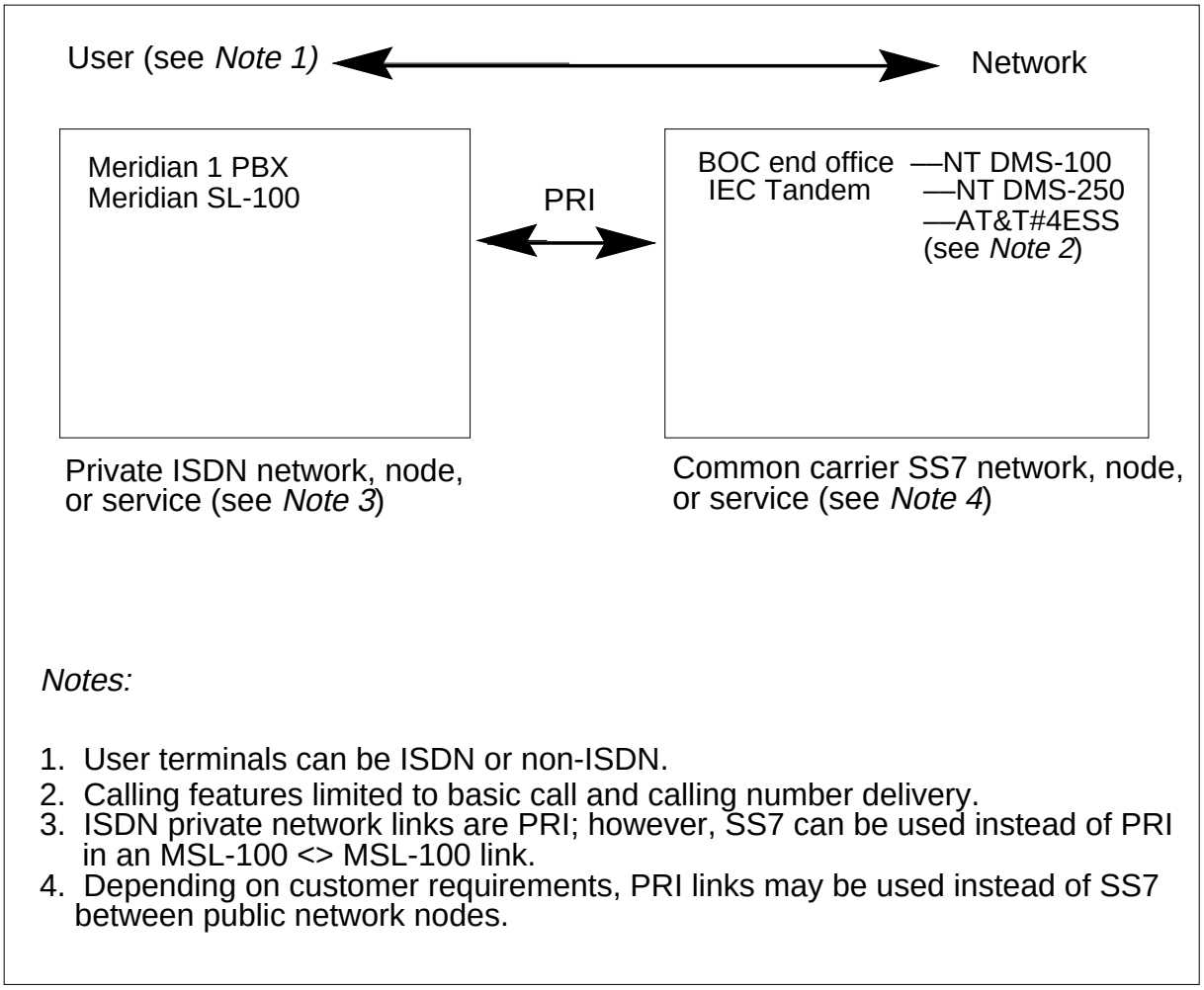
ISDN uses one transport to carry multiple information types. Networks for voice, data, images, or video conferencing are now combined onto one common high-speed transport.

Note: For more detailed basic call service information, refer to 555-8001-101, *Basic Call Service Network Services*.

Network implementation of basic call service

Primary rate interface (PRI) protocol links private network facilities to other private network facilities or public networks. Although public networks generally use SS7 links, they may also use PRI links. See Figure 1-1, "Network elements of basic call service" on page 1-2 for the network elements of basic call service.

Figure 1-1 Network elements of basic call service



Basic call connections

An ISDN node can function as an originating or terminating endpoint, or as a direct access tandem in a private or public network. Table 1-1, "Network

connections supported for Meridian 1 and MSL-100" on page 1-3 shows compatible network connections for Meridian 1 and MSL-100 switch types.

Table 1-1 Network connections supported for Meridian 1 and MSL-100

Meridian 1	PRI	Q.SIG	NI-2	ETSI	ESN	ETN	ISDN AP (Meridian link)	Analog/Digital PTS
MSL-100	PRI	SS7	NI-1	NI-2	ESN	ETN		FGD

Note 1: Connectivity to other vendors equipment and ISDN services increases with each software release.

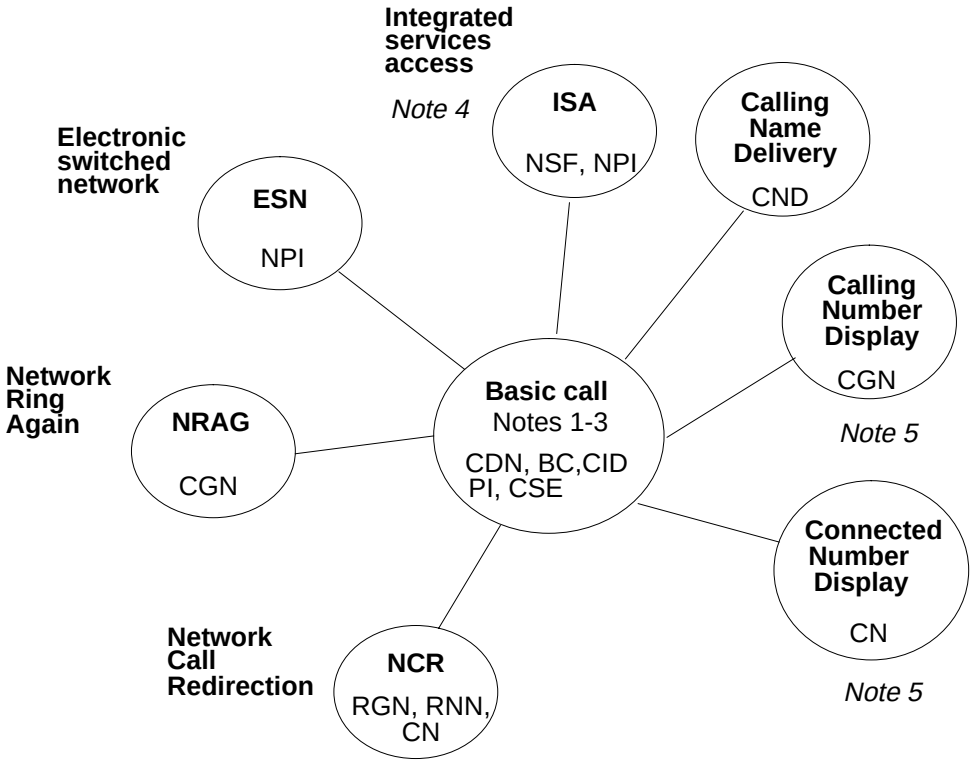
Note 2: A single customer group can have a mix of ISDN/non-ISDN terminals, access, and facilities.

Network calling features

Information elements (IE) within call control messages enable other ISDN services. Figure 1-2, "PRI IEs for network features" on page 1-4 displays IEs for ISDN features currently supported on PRI/SS7 trunk group types. Table 1-2, "PRI message elements" on page 1-5 explains these message elements.

Note: If non-ISDN links are included, basic call provides call control functions only; no feature processing is available.

Figure 1-2 PRI IEs for network features



Notes:

1. PRI IEs used for a basic call are defined in Table 1-2.
2. Message elements are derived from datafill parameters and collected digits (translations).
3. The call reference, protocol discriminator, and message type IEs are mandatory in all messages.
4. Also known as call-by-call service.
5. ISDN terminals or terminals with display are required for some features.

PRI information elements

- Table 1-2, "PRI message elements" on page 1-5 lists the PRI call control message elements. Figure 1-2, "PRI IEs for network features" on page 1-4 shows the IEs associated with different calling features.
- The call reference identifies messages associated with the call request at the local user-network interface.

- The protocol discriminator distinguishes call control messages from other message types, such as maintenance messages.
- Message type identifies the call message, such as setup or disconnect.

Table 1-2 PRI message elements (Sheet 1 of 2)

Element	Definition	Options	Comments
BC	*B*earer *C*apability defines the transmission characteristics associated with a call.	Speech (see Note 1)3.1 KHz64 Kbps clear64 Kbps restricted 56 Kbps	VoiceVoiceband data B8ZS data, 64 KbpsB7 data, 56 Kbps (see Note 2)DS-1 data, 56 Kbps
CDN	*C*alle*D* *N*umber		Used for routing.
TON	Type of Number	International, national, local directory number (DN), unknown	
NPI	Numbering Plan Indicator	Public (E.164) or private (ESN)	
IA5 Digits	Dialed digits	0 through 9, * and #	
CID	*C*hannel *ID*		Identifies the PRI trunk. Must be coordinated with far end.
IID	The interface ID identifies the DS-1 span	2-15 (Meridian 1 only) or 0 to 31	In the Meridian 1, 0 is reserved for the D-channel; 1 is reserved for backup D.
Channel Number	Channel number on that DS-1	1-23 (Meridian 1 only) or 1 to 24	Channel 24 is reserved for the D-channel in Meridian 1. For NI-2, channel 24 is reserved for the D-channel for all CPE.

Note 1: All non-ISDN sets are assumed to have speech BC.

Note 2: Also referred to as AMI, ZCS, and inverted HDLC. With 64K restricted, the encoding scheme produces an effective data rate of 56 Kbps.

Table 1-2 PRI message elements (Sheet 2 of 2)

Element	Definition	Options	Comments
PI	The *P*rogress *I*ndicator describes events that may affect call handling.	Call is not end-to-end ISDN. In-band information now available.	Used when call originates or terminates on non-ISDN trunk. When call terminates to non-ISDN line, audible ringing or tones sent inband to originating PRI.
CSE	*C*au*SE*	See Cause tables in each switch section.	Identifies why a call cannot be completed or that there is an inband treatment, (such as busy).
NSF	*N*etwork *S*pecific *F*acilities (used for ISA routing).	The service selector specifies the type of call service (foreign exchange (FX) and terminal interface equipment (TIE), for example). The service ID selects a specific trunk facility.	The NSF explicitly identifies the network facilities requested for call routing. Applies to incoming and outgoing calls.
RGN	*R*edirectin*G N*umber	Includes TON, NAP, IA5 Digits, and reason for redirection.	Identifies the number invoking call redirection.
RNN	*R*edirectio*N N*umber	Includes TON, NAP, IA5 Digits, and reason for redirection.	Identifies the number to which call redirection is invoked.
TNS	*T*ransit *N*etwork *S*elector	To be supported in a later release.	The TNS requests a transit network, such as an IEC, for call routing.

Note 1: All non-ISDN sets are assumed to have speech BC.

Note 2: Also referred to as AMI, ZCS, and inverted HDLC. With 64K restricted, the encoding scheme produces an effective data rate of 56 Kbps.

PRI interface characteristics

ISDN calls are processed using a sequence of call set up and release messages provided by the PRI interface. The message elements for routing and features

as well as parameters for error control are configured as part of PRI installation.

Note: During PRI installation, several interface and transmission parameters configured in datafill must be coordinated at the near end and far end.

The following sections summarize PRI interface characteristics. Not all of these characteristics apply to all equipment types.

B- and D-channel configuration

The PRI access structure is usually 23B+D, in which 23B, or “bearer" channels are controlled by a D, or signaling, channel. Each channel occupies one timeslot on a DS-1 span (a DS-1 span carries 24 channels). The D-channel carries call control information according to International Telecommunications Union (ITU) recommendation Q.931.

Note: The NI-2 standard requires that the D-channel occupy the 24th channel in the 23B+D structure.

The B-channels, nB+D, are controlled by a D-channel on another DS-1 span in non-associated signaling. For nB+D, the DS-1 span for the B-channels must be appropriately identified across the PRI interface using the channel ID IE.

The B-channels can be used for any user information (voice or data) and are 56 Kbps or 64 Kbps trunks. PRI trunks provide simultaneous, bidirectional digital transmission.

Note: The 56 Kbps option accommodates all equipment types.

A PRI trunk carries voice or data calls. The B-channel trunk group is defined in the software. Each B-channel can be used simultaneously and independently. The D-channel is also 56 Kbps or 64 Kbps.

Backup D-channel

A backup D-channel can be configured for reliability if the primary D-channel fails. The backup D-channel is configured in datafill.

The system automatically switches to the backup D-channel when the D-channel fails, when a backup D-channel is configured. When call control is transferred to the backup D-channel, there can be an interruption in service.

If the primary D-channel recovers, the system can be configured to switch control back to the primary D-channel. This option is configured in the software.

Channel identifier

B-channels are identified using the channel identifier (CID) IE. The CID includes the interface identifier (IID) or DS-1 span, a D-channel number. The trunk group can contain several CIDs.

> ***Note:*** The call cannot be completed unless the CIDs are identical end-to-end.

The receiving node assumes that the channel specified is on the same DS-1 as the associated D-channel if the IID field is omitted.

B-channel allocation

The B-channel (DS-1 timeslot) is always identified by the originator and dedicated to that call for outgoing calls. According to the search method defined in the software, the switch selects the next available, or idle member in the trunk group and reserves it for that call. No B-channel negotiation is supported. The selected B-channel is identified in the call setup message using the CID IE.

> ***Note:*** The channel ordering sequence for channel format D2 is different from that used for formats D3, D4, and extended superframe format (ESF).

A call is routed to the next trunk group in the route list if all B-channels in the PRI are busy. For incoming calls, the network allocates the B-channel in the same manner.

Network vs. user

In a PRI connection, one end functions as the network for the exchange of call control messages. The other end functions as the user. These parameters define the ends of the link for the local connection only. They do not have end-to-end significance. The user or network function is identified in the software for the trunk group.

B-channel glare

When a call termination and origination occur simultaneously on a single trunk member, glare occurs. To minimize glare, opposite ends of a PRI connection should be datafilled. This is accomplished by opposite ends of the interface to allocate B-channels in a different selection sequence. This is configured in the software.

Call treatments

Call treatments are announcements or inband tones (such as subscriber busy) applied during call processing. An attempt is made to map the treatment to a cause (CSE), when a call is routed to treatment, with the following results.

- If the CSE cannot be mapped to a treatment, then a default treatment is supplied inband to the originator.
- If the treatment can be mapped to CSE, then a disconnect message with the CSE element is sent to the PRI interface. The CSE is pegged in the operational measurements (OM).

The source of the treatment is determined as follows:

- According to datafill, the caller is supplied with an inband treatment from the local public network node or at the originating office.
- The treatment is supplied at the node where interworking occurs if the call is not end-to-end ISDN.

DRAMs and RANs

The use of recorded announcements (RAN), (Meridian 1 only), or digital recorded announcement machines (DRAM) to provide announcements to PRI interfaces is fully supported. When specifying a route list or when specifying an announcement to be applied to a treatment, DRAMs may be used.

BC screening

Bearer capability screening is implemented on three levels depending on switch type:

- station-to-station (DN-to-DN
- line-to-trunk
- trunk-to-trunk

When BC screening is implemented between originating and terminating DNs, the terminating switch screens all call requests to ensure the compatibility of the user terminals before the connection is completed. The BC in the setup message from the incoming call is checked against the BC assigned to the terminating DN. If the software shows the terminals to be compatible, then the call is completed. If they are not compatible, the call is not completed and the originator is given call not accepted (CNAC) treatment.

For outgoing calls, the BC information is used to determine if a device with that BC can terminate to that PRI trunk group. If the call BC is compatible, it

is passed to the outgoing call setup message. No BC screening is done for non-PRI trunks.

Note: The Meridian 1 PBX uses trunk BCs only to disallow 64K clear data calls over non-PRI trunks.

For tandem calls, calls originating on trunks configured with a particular BC are allowed to terminate to trunks with a compatible BC when BC screening is implemented.

Note: ISDN terminals do not require this feature since they have the capability to screen incoming calls on the basis of information sent to them by the network.

Routing

There are two types of routing available:

- dedicated trunk routing and integrated services access (ISA)
- call-by-call type service (see 555-8001-102 for MSL-100 and 553-2901-100 for Meridian 1)

Dedicated trunk routing for PRI ESN and plain ordinary telephone service (POTS) calls uses existing translations tables and routing procedures. A call type of public or private is associated with each incoming and outgoing call.

For all incoming and outgoing calls, the call type is obtained from the call setup message and is used to select the appropriate translation and routing tables.

Incoming calls

For incoming calls, the switch looks at the CDN, which includes the type of number (TON), numbering plan indicator (NPI), and called digits.

Note: The network specific facilities information element (NSF IE), if included, applies only to ISA calls.

These elements are then mapped to a call type according to the following rules:

- If the NPI is specified, then the call type=NPI (PUBLIC or PRIVATE).
- If there is no NPI, then the default for the call type is PUBLIC.

Note: If the dialed digits in the CDN include any prefix digits, they are translated to the appropriate NPI. The CDN may also include prefix digits for a preferred interLATA carrier (10xxx) since the transit network selector (TNS) is not supported.

The following call types are supported for incoming PRI calls:

Table 1-3 PRI call types

Meridian 1	MSL-100 or MDC	DMS-100	DMS-250
central office terminal (COT)	public (PUB)	PUB	PUB
direct inward dial (DID)	private (PVT)	not applicable	PVT
TIE	TIE	not applicable	TIE
WAT	WATS	WATS	WATS
foreign exchange (FX)	FX	FX	FX
		not applicable	inward wide area telephone service (INWATS)
PVT from DMS 250			
Note: All call types for incoming calls are supported by all switches.			

For calls incoming to the Meridian 1 system, existing translations and routing apply. TIE calls are treated as private calls; all other call types are treated as public calls.

Table 1-4, "PRI routing for incoming calls (MSL-100, DMS-100, DMS-250 switches)" on page 1-11 displays call processing and routing combinations for the MSL-100, DMS-100, and DMS-250 systems.

Table 1-4 PRI routing for incoming calls (MSL-100, DMS-100, DMS-250 switches) (Sheet 1 of 2)

IE	Call type	Dialing plan	XLARTSEL	Comments
NSF	FX			
	TIE INWATS	The NSF is used for ISA routing. See ISA Network Services Guide (555-8001-102).		
NPI	PRIVATE	ESN or ETN	XLAIBN	PBX or MDC
			RTEREF table name	Direct routing—no translation but may require digit manipulation (for example, WATS or FX application)

Table 1-4 PRI routing for incoming calls (MSL-100, DMS-100, DMS-250 switches) (Sheet 2 of 2)

IE	Call type	Dialing plan	XLARTSEL	Comments
			XLAIEC (DMS-250 only)	References CALLATTR table.
	PUBLIC	standard E.164	XLALEC	POTS translations; references LINEATTR table
			RTEREF table name	Direct routing—no translation but may require digit manipulation (for example, WATS application)
			XLAIEC (DMS-250 only)	References CALLATTR table.

Outgoing calls

Table 1-5, "Outgoing call types" on page 1-12 lists the call types that are supported for outgoing calls.

Table 1-5 Outgoing call types

Meridian 1	MSL-100 or MDC	DMS-100	DMS-250
COT	PUB	PUB	PUB
DID	PVT	not applicable	PVT
TIE	TIE	not applicable	TIE
WAT	WATS	WATS	
FEX	FX	FX	FX
		not applicable	INWATS
PVT (to DMS-250			

Note: All call types foroutgoing calls are supported by all switches.

For outgoing calls, the setup message incorporates the TON, NPI, and call digits in the CDN. The BC is also included.

In the Meridian 1 PBX, the ISDN route and trunk type for the call type are configured in the customer database. Normal translations and routing apply. The facility selected determines the route for the call. TIE calls are treated as private calls. All other call types are treated as public calls.

In the MSL-100, DMS-100, and DMS-250 switches, calls are translated and routed according to standard routing selectors. Dialed digits are collected and translated according to datafill. The translations tables index the appropriate routing table, which reference the trunk group CLLI (or ISA if specified for call-by-call routing). See 555-8001-102. The CLLI table indexes table TRKGRP to obtain the logical trunk identification (LTID), which is then used to access the service tables.

A call type is defined for each route (trunk LTID) in table LTCALLS. The call type maps to the NPI for the setup message for the outgoing call. The translation attributes are obtained from XLARTE in LTCALLS and the translated digits are added to the CDN IE for the outgoing setup message.

Note: All digits must be present before sending the setup message.

Table 1-6, "Valid routing combinations for PRI routing on outgoing calls" on page 1-13 shows valid routing combinations for PRI routing on outgoing calls for the MSL-100, DMS-100, and DMS-250 switches.

Note that the only valid call types for dedicated trunk routing are

- PRIVATE with an NPI of PRIVATE and nil NSF
- PUBLIC with PUBLIC NPI and nil NSF

Table 1-6 Valid routing combinations for PRI routing on outgoing calls (Sheet 1 of 2)

CALLTYPE	NPI	NSF (see Note 1)	XLARTE	Comments
PRIVATE (PBX to PBX)	PRIVATE (PBX to PBX) (see Note 2)	nil	XLAIBN or RTEREF	private dialing plan over a direct PBX-PBX connection
	PRIVATE	PRIVATE (ISA only)	XLAIBN or RTEREF	private dialing over private facilities
	PUBLIC (see Note 4)	PRIVATE (ISA only)	XLAIBN or RTEREF	E.164 dialing over private facilities.

Note 1: The call type maps to an NSF for ISA calls only.

Note 2: When call type = PRIVATE, the dial plan is determined by the translations datafill. Calls can be routed over the private network with overflow to the public network as configured datafill.

Note 3: The NPI is not included in the setup message for PUBLIC calls. If no NPI is specified in an incoming call, the default call type is PUBLIC.

Note 4: When an ISA selector is specified and CALLTYPE = PUBLIC, an NPI field with options PVT or PUB is required.

Table 1-6 Valid routing combinations for PRI routing on outgoing calls (Sheet 2 of 2)

CALLTYPE	NPI	NSF (see Note 1)	XLARTE	Comments
PUBLIC	PUBLIC (see Note 3)	nil	XLAIBN, XLALEC, XLAIEC (DMS-250 only) or RTEREF, such as IBNRTE.	E.164 dialing over public network facilities (PSTN).
TIE	PRIVATE	TIE (ISA only)	XLAIBN or RTEREF	private dialing plan over CO-provided facilities The FACNUM is ignored.
WATS	PUBLIC	WATS (ISA only)	XLAIBN, XLALEC, XLAIEC (DMS-250 only), or RTEREF, such as IBNRTE.	A zone number can be specified or auto zoning can occur.
FX	PUBLIC	FX (ISA only)	XLALEC or RTEREF	The FACNUM is ignored.

Note 1: The call type maps to an NSF for ISA calls only.

Note 2: When call type = PRIVATE, the dial plan is determined by the translations datafill. Calls can be routed over the private network with overflow to the public network as configured datafill.

Note 3: The NPI is not included in the setup message for PUBLIC calls. If no NPI is specified in an incoming call, the default call type is PUBLIC.

Note 4: When an ISA selector is specified and CALLTYPE = PUBLIC, an NPI field with options PVT or PUB is required.

Tandem calls

In a PRI-to-PRI tandem call, the CGN of the originating call is delivered to the outgoing route.

ESN calls

There are many types of dialing plans that are defined for a network. Electronic switching network (ESN) is one type of dialing plan traditionally used for Nortel Networks private networks. PRI supports all PBX/centrex ESN features for ISDN networking or provides identical features in Meridian customer defined network (MCDN) calling services. ESN calling is supported over private or central office (CO)-provided facilities.

Electronic tandem network compatibility

Electronic tandem network compatibility (ETN) is compatible with ESN dialing. ETN is a type of private network dialing plan. ETN calls are processed identically to ESN calls, except that a traveling class of service

(TCOS) is appended to the outgoing CDN and for incoming calls, the PRI changes the TCOS to a network class of service (NCOS).

When NCOS information that includes TCOS information is received, a Nortel Networks switch provides access to ETN. The NCOS and TCOS are used interchangeably as long as the NCOS assignments are uniform throughout the network.

Data calls

Data calls are normal calls over PRI (using standard PRI signaling) with a BC of 56 or 64Kbps. Voiceband data calls (with modems) are assigned a BC of 3.1 KHz.

Note: 64Kbps calls do not terminate to 56Kbps trunks, but 56Kbps calls do terminate to 64Kbps or 56Kbps trunks.

All data calls over a PRI B-channel are transported with bit transparency by removing the packet assembly/disassembly (PAD) associated with the PRI trunk.

Note: 64KC tandem data calls must switch to voice a PAD with 00 value.

The following data devices are supported:

- asynchronous interface module (AIM)
- asynchronous interface line unit (AILU)
- low speed data unit (LSDU)
- high speed data unit (HSDU)

Call authorization

In the MSL-100 switch, each call originating over a PRI has an authcode associated with it.

Call authorization on the MSL-100 switch is performed against four characteristics:

- authcodes
- personal identification number (PIN) digits
- account codes
- calling line ID

In the Meridian 1 PBX, authcodes include network authcodes and basic authcodes.

ESN signaling

ESN signaling is supported for SS7 and PRI links in addition to traditional private links between PBX and Centrex offices.

ESN feature support

The following ESN services are provided over ISDN PRI:

- call back queuing
- coordinated dialing plan
- ESN route selection
- network authorization codes
- network call detail recording (CDR) or station message detail recording (SMDR)
- network control signaling
- network speed call
- network traffic and operational measurements
- off-hook queuing
- priority queuing

The features provided only on the Meridian 1 PBX are as follows:

- Coordinated Call-Back Queuing
- Call-Back Queuing to conventional main
- Network Call Transfer

Requirements

There are specific datafill requirements for ESN signaling for the MSL-100 switch when connected to a Meridian 1 PBX. Tables PACMAN, COSMAP, and COSDATA must be datafilled to accommodate ESN digits incoming from the Meridian 1, and table DIGMAN must be datafilled for calls outgoing to the Meridian 1.

Meridian 1 network options

The Meridian 1 system supports PRI links only for ISDN networks. A link includes the signaling link and associated trunks.

- PRI links use the message-based, Common Channel Signaling Protocol 23B+D. The D-channel provides call control signaling (Q.931); the

B-channels provide voice and data trunks. The PRI interface carries the B- and D-channels on one or more DS-1 spans, also called T1 spans.

- ISA links combine routing parameters from the PRI database with PRI signaling so that multiple call types can be carried by a single trunk. ISA is a routing application on a PRI link.
- Integrated service links (ISL) add an out-of-band D-channel to existing analog or digital trunk facilities for a PRI-like interface. ISLs provide ISDN features and faster connections over non-ISDN trunks. In shared (SHA) mode, the D-channel supports both ISL and PRI trunks. In dedicated (ISLD) mode, the D-channel supports ISL trunks only.

Table 1-7, "Meridian 1 network options for basic call service" on page 1-17 is a summary of the Meridian 1 network options for basic call service.

Table 1-7 Meridian 1 network options for basic call service (Sheet 1 of 2)

Trunk	PRI	ISA	ISL (see notes 1-2)
DCH mode	PRI	PRI	ISLD or SHA
Restrictions	none	Not available on Meridian 1 to Meridian 1 network	TIE trunk (Meridian 1 to Meridian 1 network only)
X11 software	Release 13 min	Release 13 min	Release 13 min

Note 1: ISL supports calling line ID (CLID), CLID in CDR, ESN, Network Ring Again (NRAG), and Network Call Redirection.

Note 2: ISL is not the same as inband ANI (also called digital inband, PTS trunks, or T1 with AB signaling), which is non-D-channel.

Table 1-7 Meridian 1 network options for basic call service (Sheet 2 of 2)

Capacity (varies by system type)	Up to 16 DS-1 spans (1D + 383B) min: 1D + 23Bmax: 1D + 383B (see Note 3) D-channel: 1 min to 8 maxB-channel: 1 min to 383 max		Up to 16 ISL links*SHA mode*min: 1D + 1B + 1 ISLmax: 1D + 383B or ISL*ISLD mode*min: 1D + 1 ISLmax: 1D + 383 ISL (for DTI)max: 1D + nISL (for ATI) (see Note 4)
ESN support	yes	yes	yes

Note 1: ISL supports calling line ID (CLID), CLID in CDR, ESN, Network Ring Again (NRAG), and Network Call Redirection.

Note 2: ISL is not the same as inband ANI (also called digital inband, PTS trunks, or T1 with AB signaling), which is non-D-channel.

PRI interface considerations

Basic call service is configured as part of the PRI or SS7 interface installation. Table 1-8, "Meridian 1 PRI interface considerations" on page 1-18 shows PRI interface requirements and networking considerations for the Meridian 1 system, and provides an overview of database implementation.

Note: Refer to 555-8001-102, *MCDN Integrated Services Access* for the database parameters associated with ISA.

Table 1-8 Meridian 1 PRI interface considerations (Sheet 1 of 3)

Mode	PRI	SHA	ISLD
Feature packages	PRA, ISDN; IEC is required for DMS-250 or ESS#4 connection.	ISDN, ISL, PRA	ISDN, ISL, PRA

Table 1-8 Meridian 1 PRI interface considerations (Sheet 2 of 3)

Implementation	D-channel signaling is provided by the DCHI card. The PRI card provides the DS-1 link, which is synched to an external clock.	Requires a PRI interface with an active D-channel	D-channel signaling is provided by a dedicated connection using a dedicated leased line, dial-up modem, or DTI trunk.
Requirements	For 64 Kbps clear end to end, all repeaters and DS-1 interfaces must be set to B8ZS.	The QPC720 pack is not required to implement ISL. For ISLD operation, external clock (CLOK in LD17) requires a modem or ASIM. The HSDM is required for ISL SHA. Channel IDs must match at the endpoints.	

Table 1-8 Meridian 1 PRI interface considerations (Sheet 3 of 3)

Networking considerations	The D-channel occupies channel 24 on the DS-1 link. A DS-1 span can carry only one D-channel. Backup D-channel is only available for Meridian 1 to Meridian 1 PRI links. Compression is not allowed on D-channels implemented over existing T1 networks (T1 multiplexers).	Does not require a B-channel on the PRI. Must be configured as TIE. This is the only trunk type allowed for a Meridian 1 to Meridian 1 link. With auto recovery, when the D-channel fails, ISL-configured trunks automatically revert to inband trunk signaling (release 14 and later). Backup D-channel is available for ISL links. Compression is not allowed on D-channels implemented over existing T1 networks (T1 multiplexers).
Database configuration	The D-channel mode is identified in LD17, (prompt USR); the D-channel is associated with the trunk group in LD17, prompt PRI.	ISL trunks are enabled on a per trunk group basis. * The D-channel type is identified in LD17, USR. * The ISL trunks are assigned a channel ID (CHID) in LD14 for the trunk group.

Meridian 1 basic call service considerations

Table 1-9, "Meridian 1 basic call service considerations" on page 1-21 lists the basic call service requirements and networking considerations, and provides an overview of datafill for basic call service on the Meridian 1 PBX.

Table 1-9 Meridian 1 basic call service considerations (Sheet 1 of 2)

Link	PRI
Feature packages	Requires ISDN PRI feature packages only
Implementation	Basic call is configured as part of PRI installation.
	Bearer capability screening uses the CLS (VCE or DTA) assigned to the Meridian 1 PBX set in LD11. There is no BC screening for the route or trunk, except that data calls with a BC=64KC are not allowed over non-PRI trunks.
Requirements	Meridian 1 to DMS-100 links require a uniform dialing plan (CDP or NARS) configured on the Meridian 1 PBX.
Networking considerations	It is recommended that route selection be set up to select the PRI trunk first with overflow re-routing to the non-PRI trunks.
	The Meridian 1 PBX supports the following BC for incoming calls: speech, 3.1 KHz, 64KC, 64KR, and 56K. For outgoing calls, the Meridian 1 PBX assigns BCs of speech, 64KC or 56K.
	Outgoing data calls (CLS=DTA) are 56K unless the unit is QMT21 (HSDU) and is set for 64K clear, then BC=64KC.
	All outgoing voice calls are assigned a BC of speech.
	Incoming calls with a BC of speech or 3.1 KHz must terminate to a voice terminal (CLS=VCE).
	Incoming calls with a BC of 64KC, 64KR, and 56K must terminate on a terminal with CLS=DTA.
	Data calls with a BC=64KC are not allowed over non-PRI trunks.

Table 1-9 Meridian 1 basic call service considerations (Sheet 2 of 2)

Database configuration for basic call	Basic call is configured as part of PRI installation. There is no datafill for bearer capability; this is handled transparently by the switch.
Feature interactions	None

Software requirements

Table 1-10, "Meridian 1 basic call and ESN feature packages (release 15 and later)" on page 1-22 shows the software dependencies for basic call services for the Meridian 1 PBX. ESN requires no new options for ISDN networking.

Table 1-10 Meridian 1 basic call and ESN feature packages (release 15 and later) (Sheet 1 of 2)

Basic call		
SW0000A	Base package	* Includes PBX interface (PBXI) for DTI/CPI (Option 75)
SW0300A	Basic ISDN features	* Requires base package
ISDN (Option 145 and 118)		* Includes ISDN signaling, CLID, and CLID in CDR
SW0301A	ISDN primary rate access	* Provides basic call on PRI and ESN signaling on PRI
PRA (Option 146)		* Requires base package and SW0300A
SW0302A	ISDN signaling link	* Requires base package and SW0300A for dedicated mode
ISL (Option 147)		* Also requires SW0301A for shared mode
SW0304A	Inter-exchange carrier	* Requires SW0301A
IEC (Option 149)		* Required with DMS-250 and AT&T #4ESS connection

Table 1-10 Meridian 1 basic call and ESN feature packages (release 15 and later) (Sheet 2 of 2)

Basic call		
SW0305A CBC (Option 117)	Call-by-call service	* Refer to MCDN Integrated Services Access Guide (555-8001-102)

Hardware requirements

Figure 1-3, "Meridian 1 PRI hardware configuration" on page 1-24 shows the basic hardware architecture for PRI links on the Meridian 1 PBX.

Figure 1-3 Meridian 1 PRI hardware configuration

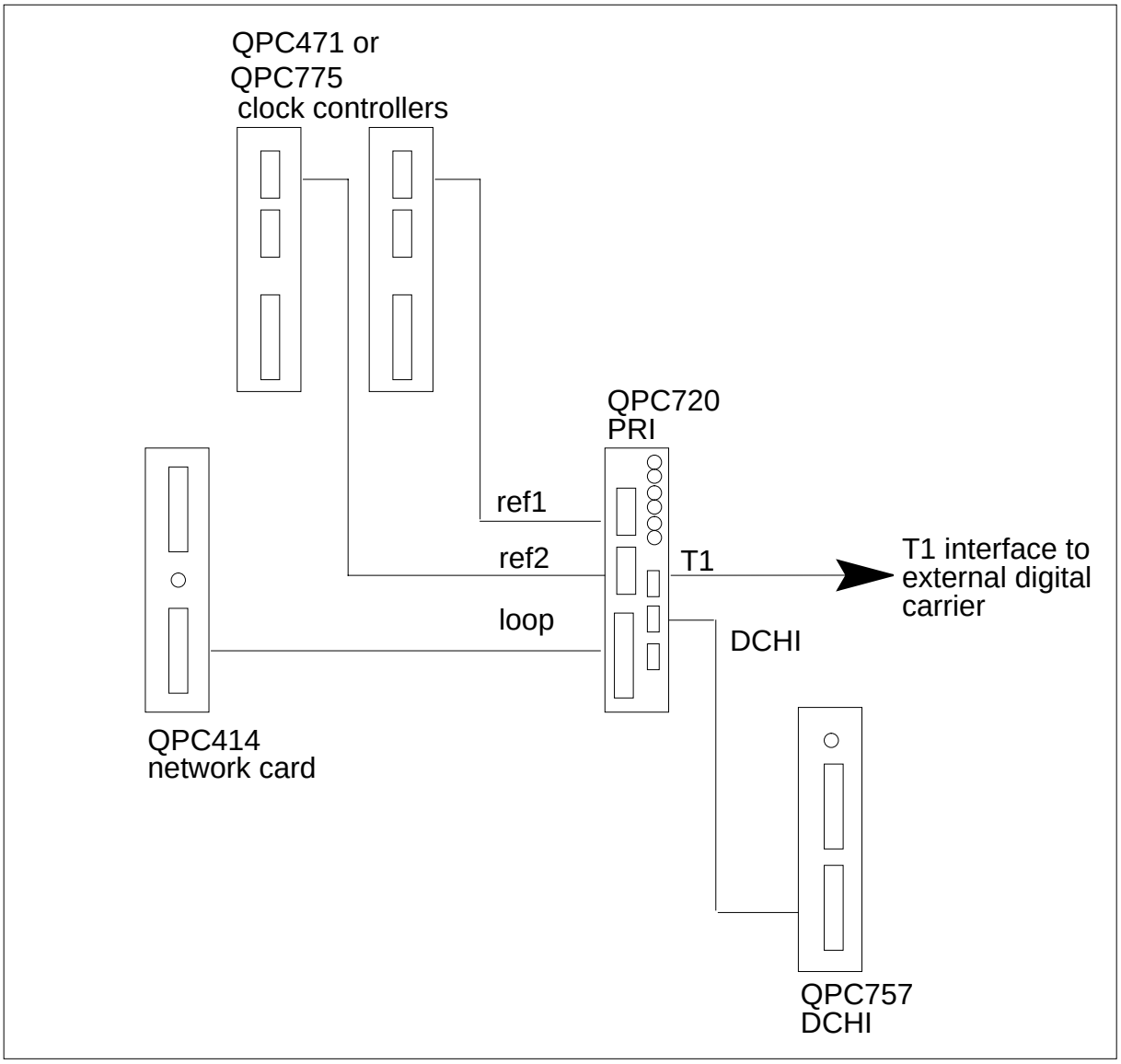


Table 1-11, "Meridian 1 PRI and ISL hardware description" on page 1-25 shows the hardware requirements for PRI links. Additional hardware or ROM may be required depending on system configuration, such as channel service unit (CSU), echo canceller (satellite transmission), X.25 packet

assembler/disassembler (PAD), and QMT21 high-speed data module (HSDM).

Table 1-11 Meridian 1 PRI and ISL hardware description

Card	Abbreviation	PEC	Comments
D-channel interface	DCHI	QPC757D	* Only one DCHI per PRI card * Up to 8 DCHI cards allowed; one D-channel port (J2) per card * Port # switch settings must match DCHI in LD17. * Set jumpers for high or low speed (ISL).
PRI (DS-1 span) (See Note 1.)	PRI	QPC720B	Each PRI provides 24 channels. Up to 16 cards per D-channel (DCHI)
Clock controller (See Note 2.)	CC	QPC471 or QPC775	Release 15 or later requires vintage B. Canada and international only
Network card	n/a	QPC414	One network loop per card
4-wire E&M tie trunk	n/a	QPC237	ISL only
High-speed data module	HSDM	QMT21	ISL only; required for DTI 64K clear data. Requires B8ZS line coding on PRI in LD17; replaces ASIM and ADM in release 15 (see Note 3)

Note 1: Because PRI is T1-compatible, QPC720 is also used for DTI applications (release 5 and up). However, with extended superframe format (ESF) PRI and DTI, minimum of release 13 is required.

Note 2: The QPC471 and QPC775 clock controllers cannot be mixed in one system.

Note 3: The ISLD link requires ASIM or HSDM with DTI.

Meridian 1 database PRI datafill considerations

The following tables show the database parameters associated with configuring PRI, ISL, and ESN capabilities:

- The PRI interface datafill dependencies are listed in Table 1-20, "Meridian 1 PRI datafill dependencies" on page 1-38.
- The correlation tables show the parameters that must be coordinated with the far end for network service.
- These tables describe datafill for dedicated trunking only.

The following tables present defaults in boldface. Not all fields in a table may be shown. Only those fields important to PRI, ISL, basic call service, or ESN signaling are presented. Prompts in lower case mark the end of sections of prompts that are not relevant to these capabilities.

Note: PRI loops must be configured in software before defining D-channel association.

The following table summarizes datafill sequence for installing the PRI interface.

Table 1-12 Meridian 1 PRI datafill sequence

		Initial install
1. LD73 (DDB)	Set error detection thresholds and clock synchronization control.	X
2. LD15 (CDB)	Equip customers with PRI capability.	X
3. LD17 (CFN)	Configure all PRI loops (DS-1 spans) before associating the D-channel link.	X
4. LD17 (CFN)	Add the associated D-channel (DCHI card) and configure the D-channel link.	X
5. LD16 (RDB)	Configure PRI routes.	X
7. LD14	Configure PRI trunks (B-channels).	X
5. LD86 (DGT)	Add ESN dialing capability (if ESN is not required, skip this step).	OPT

LD73

Table 1-13, "LD73" on page 1-27 is an example of step 1 from the previous table.

Step 1: LD73 (DDB)—Set maintenance thresholds and clock control for PRI loop.

Table 1-13 LD73

Prompt	Options	Description	Requirements	Comments
PREF	0-159 or *<cr>*	primary clock or free run		
SREF	0-159 or *<cr>*	secondary clock or free run		appears if PREF=0-159
TRSH	0-15	reference #	Match TRSH in LD17 on DLOP	
RALM	1-*3*-128	yellow alarm 24-hr out-of-service limit	Must be enabled in LD60	Service must be manually restored.
BIPC	0-*2*-128	24-hr limit for times returned to service	Uses BIPV out-of-service limit	0 restores service automatically.
LFAC	0-*3*-128	24-hr limit for times returned to service	Uses LFAL out-of-service limit	0 restores service automatically.
BIPV	1-*3*-4 1-*2*-4	bit error rate maintenance and out-of-service limits (BPV and CRC)	1=>10K in 6.6 sec2=>10K in 66 sec3=>10K in 660 sec4=>10K in 6600 sec	
SRTK	1-*5*-24 1-*30*-360	slip count (tracking) maintenance and out-of-service limits		appears if PREF=0-159; service must be manually restored
SRNT	1-*15*-1024 1-*3*-1024	slip rate (free run) maintenance and out-of-service limits (time, in secs, for 10 slips)		appears if PREF=<cr>; if AUTO=NO, service must be manually restored
LFAL	1-*17*-10240 1-*511*-10240	loss of frame alignment maintenance and out-of-service limits (daily count)		If condition clears for 15 secs, service is automatically restored.

LD15

Table 1-14, "LD" on page 1-28 is an example of step 2 from Table 1-12.

Step 2: LD15 (CDB)—Define PRI customer.

Table 1-14 LD (Sheet 1 of 2)

Prompt	Options	Description	Requirements	Comments
CUST	0-31			
...awu	<cr>			
ISDN	YES	Change ISDN parameters.		
PNI	1-32700	customer private network identifier	must be unique; must be the same throughout the network; must match PNI in RDB (LD16)	prompted if ISDN=Y in LD17 and at least 1 PRI link is configured
HNPA	100-999	area code for customer's Meridian 1 PBX		
HNXX	100-999	CO prefix (exchange) for customer's Meridian 1 PBX		
HLOC	100-999	home location code (NARS)		
LSC	1-9999 or <cr>	1- to 4-digit local steering code in coordinate dialing plan (CDP); press <cr> to transmit CDP DN.		appears only if user has a 5- or 6-digit dialing plan
CNTP	LDN or *PDN*	Select customer's listed DN or the set's prime DN as default for CLID.		attendant consoles can have only an LDN

Table 1-14 LD (Sheet 2 of 2)

Prompt	Options	Description	Requirements	Comments
RCNT	0-*5*	maximum internode hops in a network redirection call	Enter 0 to disallow network redirection; otherwise, enter a number greater than 0.	The RCNT prompt is only checked for redirected calls when LD15 prompt ISDN is YES.
AC2	aaa NPA NXX INTL SPN LOC	call types that use access code 2 E.164 national E.164 subscriber international special number location code		appear only when ISDN=Y and NARS is installed; multiple responses are permitted. If a call type is not entered here, the system automatically defaults to access code 1.

LD17

Table 1-15, "LD" on page 1-29 is an example of step 3 from Table 1-12.

Step 3: LD17 (CFN)—Configure PRI network loops.

Table 1-15 LD (Sheet 1 of 2)

Prompt	Options	Description	Requirements	Comments
PWD2	*<cr>*			
ISDN	*<cr>*			
PARM	*<cr>*			
CEQU	YES	I*MPORTANT: All PRI network loops must be configured before associating the D-channel for those loops. (See step 4.)*		
...xct				

Table 1-15 LD (Sheet 2 of 2)

Prompt	Options	Description	Requirements	Comments
DLOP	lll dd ff lll=0-159 dd=0 ff=D2-*D3*-D4-ESF	lll=network loop# dd=# of data calls ff=frame format	dd=0 for PRI Bearer capability (voice or data) is handled by basic PRI. No additional parameters need to be configured.	
MODE	PRI			no default
LCMT	*B8S* or AMI	AMI=B7 (or ZCS)B8S=B8ZS	Use B8S for Meridian 1 to Meridian 1. AMI requires 56K for DRAT. B8S requires 64KC for DRAT.	
YALM	*FDL* or DG2	facility data link (FDL) or digit 2 (DG2) yellow alarm signaling	Use FDL with ESF in U.S.; use DG2 with ESF in Canada.	prompted only when frame format is ESF; if not prompted, DG2 was set
TRSH	0-15	PRI threshold set	Same as TRSH, LD73	
DTIC	0-159	starting network loop card slot for PRI	The loop# must be even.	Do not input loop numbers that take the system out of bounds.

LD17 (continued)

Table 1-16, "LD17" on page 1-31 is an example of step 4 from Table 1-12.

Step 4: LD17 (CFN)—Add DCHI and configure D-channel link.

Table 1-16 LD17 (Sheet 1 of 3)

Prompt	Options	Description	Requirements	Comments
PWD2	*<cr>*			
ISDN	YES	I*MPORTANT: All PRI network loops must be configured before associating the D-channel for those loops. (See step 4.)*		
DCHI	1-15	I/O port address of DCHI card (J2) for primary D-channel	must match switch settings on DCHI card	J2 is always odd.
BCHI	1-15	I/O port address of DCHI card (J2) for backup D-channel	must match switch settings on DCHI card	J2 is always odd.
USR	PRA-ISLD-SHA	D-channel signaling mode		no default
RCVP	*NO* or YES	recovery to backup D (N) or primary D when primary re-established (Y)	If this does not match the far end, both sides default to NO.	
ISLM	1-382	count of ISL trunks controlled by the D-channel		prompted if MODE=ISLD or SHA
DCHL	0-159	network loop for primary D-channel	You must configure all PRI network loops served by the D-channel first.	not prompted if USR=ISLD (The D-channel does not require a PRI channel.)
BCHL	0-159	network loop for backup D-channel	You must configure all PRI network loops served by the D-channel first.	not prompted if USR=ISLD
OTBF	1-16-127	# of output request buffers		

Table 1-16 LD17 (Sheet 2 of 3)

Prompt	Options	Description	Requirements	Comments
DRAT	56K-64KC-64KI	D-channel transmission rate: 56 Kbps (56K), 64 Kbps clear		
DRAT	*56K-64KC* -64KI	D-channel transmission rate: 56 Kbps (56K), 64 Kbps clear (64KC), or 64 Kbps restricted, inverted HDLC (64KI).	must match the far end	56K is the default when LCMT=AMI. 64KC is the default when LCMT=B8S.
PRI	lll xx lll=0-159 xx=2-15	lll=network loop for primary D-channel xx=interface ID for identifying multiple DS-1s per trunk group	same as DCHL Must match the far end; a unique xx must be used for each DS-1.	0 (primary D) and 1 (backup D) are assigned automatically for field xx. not prompted if USR=ISLD
IFC	*D100* -ESS4-SL-1-S-100-D250	near end mode		
SIDE	MAS or *SLAV*	identify controlling side for channel allocation in case of all collisions	MAS allocates channels in ascending sequence (1 to 24). SLAV allocates in descending sequence (24 to 1).	prompted if IFC=Meridian 1 PBX
RLS	xx	release ID for the D-channel for network features NRAG, NMS-MC, or NACD	Enter a 1; this applies to Meridian 1, MSL-100, DMS-100, DMS-250, and AT&T switches.	These features are described in separate Network Services Guides.
CLOK	EXT or INT	D-channel clock	Use INT for DCHI loopback testing only.	See PRA Maintenance (553-2901-500).

Table 1-16 LD17 (Sheet 3 of 3)

Prompt	Options	Description	Requirements	Comments
LAPD	NO or YES	Change LAPD parameters (Y) or use defaults (N) for timers T23 through K.		
T23	1-20-31	interface guard timer (timeout for DCHI response to system)	enter in 1/2 sec units (for example, 20=10secs)	appears if LAPD=Y
T200	2-3-40	re-transmission timer	enter in 1/2-second units	appears if LAPD=Y
N200	1-3-8	maximum # of octets in information field		appears if LAPD=Y
N201	4-260	maximum # of octets in information field		appears if LAPD=Y
T203	2-10-40	maximum time (secs) allowed without frame exchange	release 15 requires a non-zero value	appears if LAPD=Y
K	1-7-32	maximum # of NAKS (unacknowledged or outstanding frames)		appears if LAPD=Y

LD16

Table 1-17, "LD16" on page 1-33 is an example of step 5 from Table 1-12.

Step 5: LD16 (RDB)—Configure PRI routes.

Table 1-17 LD16 (Sheet 1 of 4)

Prompt	Options	Description	Requirements	Comments
CUST	0-99	customer #		
ROUT	0-127 or 0-511	route #: 0-511 for system options NT, RT, ST, XT, 21, 51, 61, and 71; 0-127 all others		Route 31 is no longer reserved for private route (release 14 and later).

Table 1-17 LD16 (Sheet 2 of 4)

Prompt	Options	Description	Requirements	Comments
TKTP	COT-FEX-WAT DID-TIE-ISA	ISDN route being configured	TIE is required for Meridian 1 to Meridian 1 (PRI or ISL mode)	Only TIE appears if USR=ISLD or SHA in LD17. Refer to MCDN Integrated Services Guide (555-8001-102) for configuring ISA routes.
...rcls				
DTRK	NO or YES	analog (N) or digital (Y) trunk		
DGTP	DTI or PRI	digital trunk type	Use DTI for ISLD only	prompted if DTRK=Y
ISDN	YES	ISDN customer		prompted if DTRK=Y
MODE	PRA or ISLD	mode of D-channel that controls the ISA route	Use PRA for ISL SHA.	no default; prompted if TKTP=ISA
DCHI	1-15	DCHI port number	Must match DCHI in LD17	prompted only when MODE=ISLD
PNI	1-32700	customer private network identifier	must be unique; must be the same throughout the network; must match PNI in CDB (LD15)	Prompted if ISDN=Y in LD17 and at least 1 PRI link is configured.
IFC	D100-ESS4-SL -1-S100-D250	near end node	same as IFC in LD17	
SRVC	ACC-SDN-M80 0-MEG	service type for AT&T #4ESS connection: accunet data service (ACC), switched digital network (SDN), MEGACOM 800 service (M800), or Megawatts (MEG)	requires TKTP=TIE	prompted if IFC=ESS4
NCNA	No or Yes	network call name allowed		

Table 1-17 LD16 (Sheet 3 of 4)

Prompt	Options	Description	Requirements	Comments
NCRD	No or Yes	allow (Y) network call redirection message (including CLID) or disallow (N)		
CHTY	ABCH or BCH	D-channel (BCH) or AB bit signaling (ABCH) for B-channels	Use BCH for PRI or ISL trunks. ABCH is used for DTI.	prompted if DTRK=Y
CTYP	UKWN-INTL-NPA-NXX-LOC-CDP-SPN	identifies call type for ESN access code insertion at receiving switch: unknown (UKWN), international # (INTL), national # (NPA), subscriber # (NXX), location code (LOC), coordinated dialing plan (CDP), or special # other than international format (SPN)		Prompted if TKTP=TIE; applies only to direct dialing using trunk access codes (not NARS or BARS dialing).
INAC	NO or YES	insert access code to incoming ESN call from a private network		Prompted if TKTP=TIE; if INAC=Y, the digit insertion option (INST) is bypassed.
INAC	NO or YES	insert access code to incoming ESN call from a private network		Prompted if TKTP=TIE; if INAC=Y, the digit insertion option (INST) is bypassed.
ISAR	N	designate ISA route	Enter N for No for dedicated trunks.	See MCDN Integrated Services Guide (555-8001-102) for configuring ISA routes.
IEC	001-999	interexchange carrier ID		Prompted if ISDN=Y and TKTP=COT, FEX, or WAT.

Table 1-17 LD16 (Sheet 4 of 4)

Prompt	Options	Description	Requirements	Comments
SRCH	*LIN* or RRB	linear (LIN) or round robin (RRB) search for outgoing trunk	Coordinate with far end to minimize B-channel glare.	applies to outgoing trunk selection
SIGO	ESN2-ESN3-ESN5-STD-ETN	ESN signaling arrangement: ESN2, ESN3, ESN5, non-ESN (STD), or electronic tandem network (ETN)	requires BARS, NARS, and CDP software	prompted if TKTP=TIE; use ESN5 for DTI for data applications

LD14

Table 1-18, "LD" on page 1-36 is an example of step 6 from Table 1-12.

Step 6: LD14—Configure PRI trunks.

Table 1-18 LD

Prompt	Options	Description	Requirements	Comments
TYPE	COT, FEX, WAT, DID, TIE, ISA	trunk type	TIE is required for Meridian 1 to Meridian 1 (PRI or ISL mode).	Refer to MCDN Integrated Services Access guide (555-8001-102) for configuring ISA trunks.
TN	l ch or lscul=0-159ch=1-23s=0-1c=1-10u=0-7	terminal # address: PRI loop# PRI channel#	Must match DLOP lll in LD17; use loop# and D-channel# for PRI links; use loop# shelf#, card# and unit# for ISL links.	Refer to MCDN Integrated Service Access guide (555-8001-102) for configuring ISA TNs.
...rtmb				
CHID	1-382	channel# for ISL trunk	Must match the far end.	The number of ISL trunks allowed for the D-channel is specified in LD17, ISLM.

LD86

Table 1-19, "LD" on page 1-37 is an example of step 7 from Table 1-12.

Step 7: LD86 (DGT)—Add ESN dialing capability.

Note: Skip this step if you do not require ESN.

Table 1-19 LD

Prompt	Options	Description	Requirements	Comments
CUST	0-99	customer#		
FEAT	DGT	digit manipulation data block	***Note:*** Digit manipulation tables are required for home location codes. Home location code assignments are made in LD90 prompt HLOC.	
DMI	1-255	digit manipulation index (number table) for NARS/BARS		
CTYP	NCHG-INT-NPA-NXX-LOC-CDP-SPN-UKWN	modifies the calltype according to the DMI: no change (NCHG), special international # (INT), area code (NPA), local exchange (NXX), location code (LOC), coordinated dialing plan (CDP), special # (other than international), and unknown (UKWN)	The call type must be recognized by the far end switch.	

PRI datafill dependencies

Table 1-20, "Meridian 1 PRI datafill dependencies" on page 1-38 lists the datafill dependencies in the DS-1 span. These parameters are entered in LD17.

Table 1-20 Meridian 1 PRI datafill dependencies

Signaling	DLOP ff	LCMT	LCMT	YALM	error checking
A/B for D2, D3, D4 (12 frames)(see note)	D2, D3, or D4(SF format)	AMI	56K or 64KI	DG2	BPV
		B8S	64KI	DG2	BPV
A/B/C/D(24 frames)	ESF	B8S	64KC	DG2 or FDL	BPV and CRC

Note: Channel bank format D3 interfaces one DS-1 span; channel bank format D4 interfaces two DS-1 spans.

Correlation tables

Figure 1-4, "Meridian 1 to Meridian 1 correlation table" on page 1-39 and Figure 1-5, "Meridian 1 to MSL-100 correlation table" on page 1-40 represent the correlation tables that show the parameters that must be coordinated with the near end and far end for network service.

Note: Because ISDN is an evolving architecture, there may be some differences in datafill between different product types.

Figure 1-4 Meridian 1 to Meridian 1 correlation table

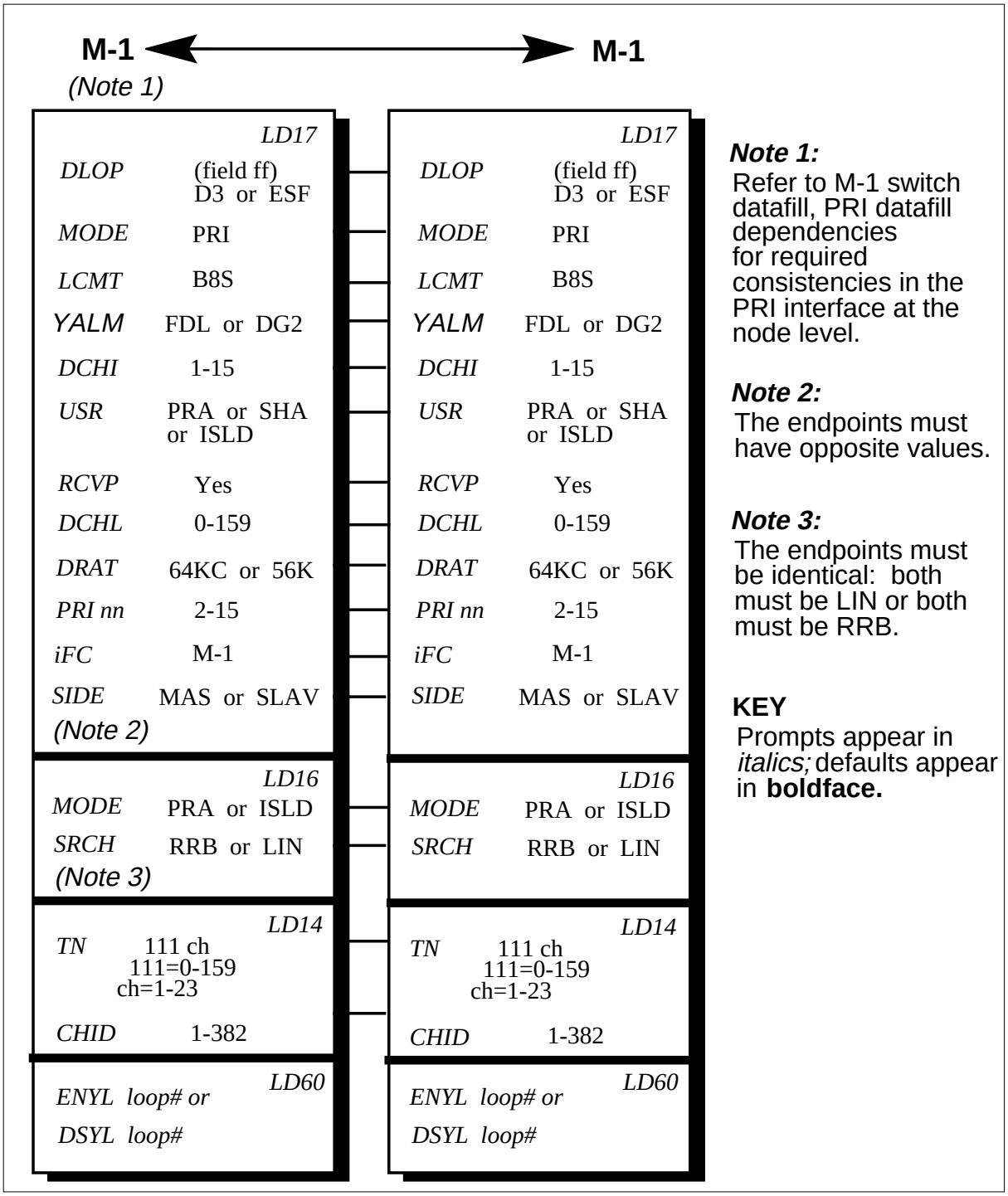
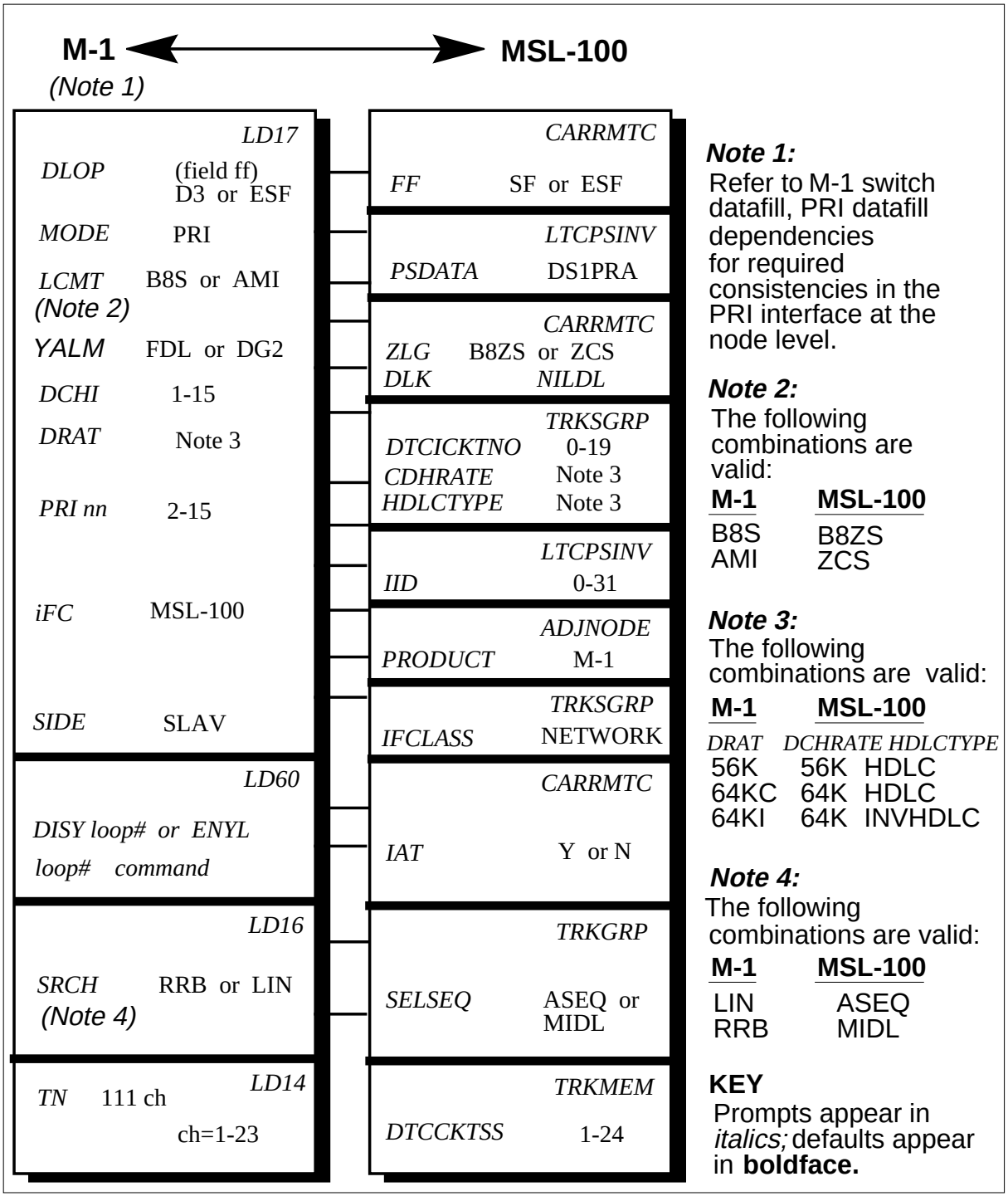


Figure 1-5 Meridian 1 to MSL-100 correlation table



Trunk and route (TFC002)

Traffic measurements on PRI trunk routes are reported as normal according to group number. There are no additional traffic measurements specific to basic call service. The trunk and route report (TFC002) is obtained as part of the scheduled traffic report run.

D-channel statistics (TFS009)

To include D-channel measurements in the scheduled traffic reports, use the set system traffic options (SOPS) command. For example, to enable option 9 use:

- LD2
- SOPS 9

To print current D-channel measurements, use the invoke system traffic (INVS) command. For example, to enable option 9, use:

- LD2
- INVS 9

The TFS009 report (see Figure 1-6, "Meridian 1 TFS009 report format" on page 1-42) provides measurements by D-channel port number.

Figure 1-6 Meridian 1 TFS009 report format

TFS009	
DCH <port#>	
VAS IS <VAS ID#>	
<# inc msgs>	<# out msgs>
<# inc CP msgs>	<# out CP msgs>
<# of inc MGMT msgs>	<# of out MGMT msgs>
<# of inc <MTCE msgs>	<# of out <MTCE msgs>
<avg inc bytes/msg>	<avg out bytes/msg>
<inc DCH usage time>	<out DCH usage time>
<avg queue size RQBUF>	
<# fails output msg (no output req buffer available>	<# of msgs with no EOM>
<# of protocol errors>	
<# times DCH down since last report>	<DCH down time (in 2-sec units, for example, if the value is 10, downtime = 20 sec)>

Circuit traffic

Circuit statistics for PRI links use existing traffic measurements. There are no new statistics for circuit traffic.

Maintenance logs

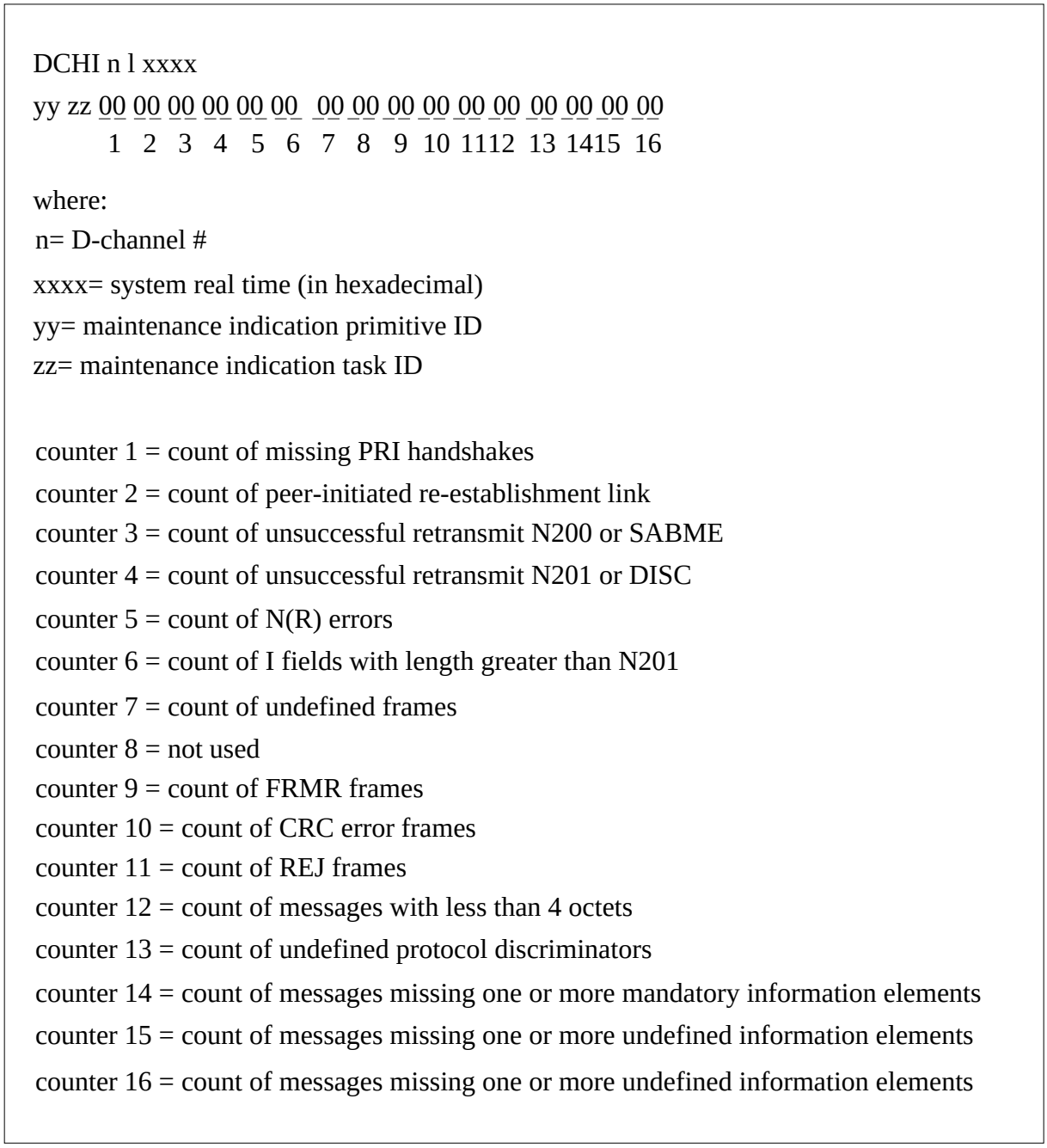
The count of D-channel errors is stored in the protocol log (PLOG). (See Figure 1-7, "Meridian 1 protocol log format" on page 1-43.)

- The PLOG prints automatically when a protocol counter overflows.
- PLOG counters clear after the PLOG prints or the DCHI card enables.
- If there are high error counts in counter 10, there is most likely a problem. If there are low error counts in these counters but high error counts elsewhere, report a protocol problem to the National Support Center.

To print the D-channel statistics log use:

- LD 96
- PLOG DCHI port#

Figure 1-7 Meridian 1 protocol log format



Alarms

Table 1-21, "Meridian 1 alarms" on page 1-44 lists common PRI alarms that affect basic call service. The system provides automatic detection and recovery for most faults.

Table 1-21 Meridian 1 alarms (Sheet 1 of 4)

Message	Effects	Remedy
Yellow alarm (remote alarm) T1 connection exists but far end not ready. (FAR END FAULT)		
DTA005 Yellow alarm	PRI is disabled; YEL and DIS LED on PRI ON; yellow alarm counter incremented.	1. Contact far end 2. PRI is restored when yellow alarm no longer received.
DTA006 24-hr out-of-service limit	PRI is taken out of service when count reaches RALM in LD73; red alarm is raised; the error counter is cleared.	1. Cleared when far end is up. When fault clears, type: *LD60 DISL* loop# *ENLL* loop#2. Run a loopback test.
DTA00 *7* Cleared	PRI is restored.	
DTA008 Disabled		To enable, type:*LD60ENYL* loop#
Red alarm (local alarm) PRI card or transmission fault. (NEAR END FAULT)		
(no message)	PRI is taken out of service; RED and DIS LED on PRI ON; yellow alarm pattern sent to far end.	1. Check PRI status:*LD60STAT* loop#2. Check PRI counters:LD60LCNT loop#The PRI is automatically restored to service when the condition clears, provided the 24-hr threshold is not exceeded.
DCHI alarm: DCHI card disabled (NEAR END FAULT)		

Table 1-21 Meridian 1 alarms (Sheet 2 of 4)

Message	Effects	Remedy
(no message)	DCHI LED is ON. PRI is taken out of service.	Run DCHI self tests. ***Note:*** If both ports are configured, the LED is ON only when both ports are disabled.
Bit error rate alarms: link transmission errors (NEAR END FAULT)		
DTA011 Maintenance limit	Counter is incremented.	Midnight routines print # of errors and clear the counters.
DTA012 Out-of-service limit	PRI is taken out of service; red alarm is raised.	PRI automatically returned to service when rate improves.
DTA013 24-hr out-of-service limit	If BIPC=0 in LD73, trunks restored automatically. Otherwise, PRI taken out of service; red alarm is raised.	To restore service manually, type:*LD60DISL* loop#*ENLL* loop#
DTA014 Cleared	PRI is restored	
Frame slip: clock sync error (NEAR END FAULT)		
DTA015 Maint limit (tracking mode)	Counter is incremented	Midnight routines print # of errors and clear the counters
DTA016 Out-of-service limit (tracking mode)	PRI taken out of service; red alarm is raised.	To restore service, type: *LD60DISL* loop#*ENLL* loop#
DTA017 Maint limit (free run mode)	Counter is incremented	Midnight routines print # of errors and clear the counters
DTA018 Out-of-service limit (free run mode)	PRI taken out of service; red alarm is raised.	Check DLOP, LCMT, DRAT, and YALM (LD17) with far end.To restore service, type:*LD60DISL* loop#*ENLL* loop#

Table 1-21 Meridian 1 alarms (Sheet 3 of 4)

Message	Effects	Remedy
DTA026 Guard timer started for automatic recovery	PRI taken out of service and guard timer started according to SRGT in LD73	1. Disable and enable loop: LD60 DISL loop# ENLL loop#2. Run a loopback test to isolate the problem to the near or far end.
DTA027 guard timer expired	PRI kept out of service.	1. Disable and enable loop: *LD60 DISL* loop# *ENLL* loop#2. Check tracking status in LD60 with the TRCK PCK command.
DTA028 SRIM timer expired without improvement in slip rate; maintenance message count (SRMM in LD73) is exceeded).	PRI kept out of service; guard timer restarted.	same as DTA027
DTA029 The # of allowable maintenance messages (SRMM in LD73) is not exceeded.	PRI is restored.	same as DTA027
Frame alignment: out-of-frame error (NEAR END FAULT)		
DTA019 maint limit		Check DS-1 connection to far end.
DTA020 out-of-service limit	If LFAC=0 in LD73, trunks restored automatically. If not, PRI is taken out of service; red alarm is raised; the error counter is cleared.	1. To restore service, type: *LD60 DISL* loop# *ENLL* loop#2. If alarm is raised again, run a loopback test.
DTA021 Errors continued for 3 secs.	PRI taken out of service	1. To restore service, type: *LD60 DISL* loop# *ENLL* loop#2. Run a loopback test.
DTA022 Errors cleared for at least 15 secs.	PRI service restored.	

Table 1-21 Meridian 1 alarms (Sheet 4 of 4)

Message	Effects	Remedy
DTA023 PRI loop is up *PRI automatic loop test:* status (NEAR END FAULT)		
DTA024 Self test failed.	All channels disabled; red alarm	1. For repeated failures, replace the DTI card. 2. Check all other hardware, including cabling.
DTA025 Self test passed after being disabled.	Channels restored and red alarm removed.	

Table 1-22, "Meridian 1 status messages" on page 1-47 lists common status messages that affect basic call service.

Table 1-22 Meridian 1 status messages (Sheet 1 of 2)

Message	Remedy
Yellow alarm *DTI031* Loop is enabled but PRI is in yellow alarm. *B-channel*	Wait for far end to respond. Contact the far end to resolve the situation.
PR100 loop# ch#The B-channel specified is locked out because far end is using a different channel.	Disable and enable the channel (using the ENCH and DNCH commands) to try to seize the channel. If it fails, contact the far end to resolve the problem.

Table 1-22 Meridian 1 status messages (Sheet 2 of 2)

Message	Remedy
PRI101 loop# ch#B-channel specified is locked out. Cause (c#)=82 channel does not exist; c=44requested D-channel not available; or c=6 alternate section acceptable. *D-channel*	If cause = 82, contact the far end to program the channel.If cause = 44, trace the channel to see if there is a valid call on it. Call the far end to resolve the problem.If cause = 6, check the routing tables.
DCH1003 device# protocol layer# error#protocol error	Check DLOP, LCMT, DRAT, and YALM (LD17) with far end.For D-channel status, see note. *LD96* *STAT DCHI* port# ***Note:*** For ISL links, use *LD36, STAT* loop# shelf# card# unit# to check D-channel status.To print protocol log: *LD96* *PLOG DCHI* port#To test DCHI: TEST 100 channel# TEST 101 channel# TEST 200 channel# TEST 201 channel#
DCH1006 Far end D-channel is down	1. To check D-channel status: *LD96* *STAT DCHI* port#2. Check PRI and DCHI cable.3. Contact the far end.

Table 1-23, "Meridian 1 tests" on page 1-48 lists the tests for verifying network operation at the trunk or link level.

Table 1-23 Meridian 1 tests (Sheet 1 of 2)

Manual tests		
PRI self test (or local loopback test)	Tests transmitted and received DS-1 signal. (XMT signal sent to REC signal on PRI card.)LBK LED is ON.	1. Disable DCHI: *LD96* *DIS DCHI* port#2. Disable PRI and start test: *LD60* *DISL* loop# *SLFT* loop# (all channels) or *SLFT* loop# ch#Responds SLFT OK or DTAxxx if test fails.
DCHI self test		1. Disable DCHI and start test: *LD96* *DIS DCHI* port# *SLFT DCHI* port#2. To test DCHI: *TEST* 100 channel# *TEST* 101 channel# *TEST* 200 channel# *TEST* 201 channel#

Table 1-23 Meridian 1 tests (Sheet 2 of 2)

Manual tests		
Remote loopback test	checks PRI integrity to far end and back causes far end to raise and clear yellow alarm	1. Contact service engineer at the far end to set up loopback mode (specify frame or channel): *LD96 DIS DCHI* port# *LD60 DISL* loop# *RLBK* loop#2. After loopback mode is confirmed, start test: *LD96 DIS DCHI* port# *LD60 DISL* loop# *RMST* loop#A DTIxxx message is received if the test fails.
Automatic tests		
PRI self test	performed when PRI card is plugged	Test failure shows:*DTI009* loop# channel#
PRI automatic loop test	same as PRI self test but run automatically with midnight routines. This automatically clears all counters.	1. Ensure ATLP=1 for all channels or ATLP=0 for one channel (random channel selected) in LD60.

MSL-100 basic call service

The remaining sections describe PRI links for basic call and ESN signaling. Because SS7 is a mature product, SS7 links are not discussed in detail.

Note: This section documents BCS 30 for the MSL-100 switch and release 15 for the Meridian 1 PBX.

MSL-100 network options

The MSL-100 system supports PRI and SS7 links for ISDN networks. An ISDN link includes the signaling link and associated trunks. Table 1-24, "MSL-100 network options" on page 1-50 is a summary of the MSL-100 network options for basic call.

- PRI links use a message-based, Common Channel Signaling protocol, nB + D. The D-channel provides call control signaling (Q.931); the B-channels serve as voice/data trunks. The PRI interface carries the B- and D-channels on one or more DS-1 spans.
- SS7 (or CCS7) links also use a message-based, Common Channel Signaling protocol that separates the signaling link for call control from the voice/data trunks. SS7 trunks are ISDN User Part (ISUP) trunks. ISUP is the call control signaling protocol in SS7.

Note: The signaling link for both PRI and SS7 signaling can reside on the same facility as the voice/data trunks, or it can be a separate facility.

Table 1-24, "MSL-100 network options" on page 1-50 contains network options for the MSL-100 switch.

Table 1-24 MSL-100 network options

Trunk	PRI only		SS7
Mode	PRI only	ITA (PRI + T1 A/B) (see Note 1)	SS7
Restrictions			not available for Meridian 1 to MSL-100
BCS software	BCS 29 minimum		BCS 26 minimum; ESN signaling requires BCS 27.
Capacity	Up to 20 DS-1 spans (1D + 479B) D-channel: 1 min to 32 maxB-channel: 1 min to 479 max (see Note 2) One DS-1 link can carry multiple D-channels.		Refer to the appropriate SS7 NTP.
ESN support	yes		yes

Note 1: With integrated trunk access (ITA), both PRI trunks and PTS trunks (trunks with inband A/B signaling) are allowed on the same DS-1 span. However, special tone receivers (STR) cannot be used on A/B trunks in ITA configurations.

Note 2: One D-channel supports up to 497 B-channels. However, for reliability, a lower D-channel to B-channel ratio (1D:47B or one D-channel per two DS-1 links) is recommended.

PRI interface considerations

Basic call is configured as part of PRI or SS7 interface installation. Table 1-25, "MSL-100 PRI interface summary" on page 1-51 lists PRI interface

requirements and networking considerations and provides a brief overview of PRI datafill for the MSL-100.

Table 1-25 MSL-100 PRI interface summary

Link	PRI
Feature packages	The PRI interface is provided by the DTCI PM. The DTCI is similar to the DTC PM, except that it supports both PRI and non-PRI trunk signaling and does not support the special tone receiver (STR) card. All trunk types valid on DTCs are valid on DTCIs, except for SS7. An ISDN signaling preprocessor (ISP) card provides D-channel signaling for the PRI interface. The B- and D-channels are associated with DS-1 spans in datafill.
Requirements	The DTCI requires the 6X69xx message switch card, the BX01xx ISP card, and a special load that includes the load for the ISP card. Four C-side ports are datafilled in LTCINV to connect the DTCI to the network.
Networking considerations	A DS-1 channel is a B-channel, a D-channel, or a nailed up (provisioned) channel. By convention, the D-channel is assigned to channel 24. A DS-1 span carries multiple B-channels. The D-channels only support B-channels on the same DTCI. Because the DTCI also supports non-PRI trunks, backup trunk groups are configured on the same DTCI. However, for reliability, non-PRI trunk groups are used for backup, preferably on a different PM. All data calls over a PRI B-channel are transported with bit transparency by removing the PADS associated with the PRI trunk.
Database configuration for PRI	A PRI trunk group is defined by:* Entering IBNT2 for the trunk type in table TRKGRP.* Entering ISDN for the signaling type and defining the D-channel in table TRKSGRP.* Defining each B-channel in table TRKMEM.* Assigning an LTID to the PRI interface (as defined in tables LTDEF, LTMAP, and LTCALLS) which routes calls.

MSL-100 basic call considerations

Table 1-26, "need table name" on page 1-52 lists basic call service requirements and networking considerations, and provides a brief overview of datafill for basic call service on the MSL-100.

Table 1-26 need table name (Sheet 1 of 2)

Link	PRI
Feature packages	Requires ISDN PRI feature packages only
Implementation	Basic call is configured as part of PRI installation.
Requirements	No additional
Networking considerations	Route selection should be set up to select the PRI trunk first with overflow re-routing to the non-PRI trunks. Bearer capability allows restriction of trunk groups in order to carry data only, voice only, voiceband data, or a combination of services. If the capability is disallowed, calls requiring that service may not originate or terminate on the PRI interface. Bearer capability is compatible with all existing features, although it is not fully supported in hunt groups. BC is not supported on UCD or ACD lines. For conference calls, only speech BC is supported. All private call originations on a PRI are considered intragroup. This is overridden in IBN translations by datafilling the INTRAGRP flag to N in table IBNXLA.

Table 1-26 need table name (Sheet 2 of 2)

Database configuration for basic call	The call type (received in the setup message NSF IE) and LTID associated with the trunk indexes table LTCALLS for translations and routing. An NPI of private or public is supported. Normal routing applies. Authorized bearer services for the PRI trunk are datafilled in LTDEF as a characteristic of LTID, field OPTIONS. Tables BCDEF, BCCOMPAT, and KSETFEAT define the bearer capabilities, BC compatibilities, and assign BCs for MSL-100 terminals. If the MSL-100 tables show that the BCs are compatible, the call completes. If the BCs are not compatible, the call does not complete and the originator is given a CNAC. No BC screening is done for non-PRI trunks. Access to a particular network is accomplished in several ways:* datafilling the DFLNET option in table NCOS to allow stations within a customer group and NCOS to automatically access a particular network* datafilling the LOGNET option in table IBNXLA to allow stations in a customer group to use dialed codes to access different networks
Feature interactions	None

ESN signaling considerations for MSL-100 switch

ESN signaling in an ISDN network is supported by both PRI and SS7 links. SS7 supports the same ESN features as PRI.

Table 1-27, "MSL-100 summary for ESN signaling" on page 1-53 provides an overview of the MSL-100 switch requirements for implementing ESN signaling on PRI links.

Table 1-27 MSL-100 summary for ESN signaling (Sheet 1 of 2)

Link	PRI
BCS software	BCS 25 minimum
Feature packages	In addition to the ISDN PRI packages, the current ESN packages are required to support ESN on PRI.

Table 1-27 MSL-100 summary for ESN signaling (Sheet 2 of 2)

I*mplementation*	PRI supports all PBX/Centrex ESN features for ISDN networking or provides identical features in MCDN calling services.
Requirements	There are no special datafill requirements for ESN signaling for the MSL-100 switch when connected to a Meridian 1 PBX. Tables PACMAN, COSMAP, and COSDATA must be datafilled to accommodate ESN digits incoming from the Meridian 1 PBX, and table DIGMAN must be datafilled for calls outgoing to the Meridian 1 PBX.
Networking considerations	None additional
Database configuration for ESN	A call type of PRIVATE is defined for the LTID in the table LTCALLS and the translations attributes are obtained from the translations selector (XLARTE) specified in table LTCALLS. Table COSDATA maps TCOS to NCOS for compatibility between two MSL-100 switches.

Software requirements

Table 1-28, "MSL-100 PRI basic call and ESN feature packages" on page 1-54 shows the software dependencies for basic call service and ESN signaling for BCS 30 and above. Only those capabilities related to PRI, basic call service, or ESN signaling on a PRI link are included.

Table 1-28 MSL-100 PRI basic call and ESN feature packages

Number	Description	Comments
NTX790AB	ISDN PRI	* PRI links to Meridian 1, MSL-100, and DMS-250 switches* includes ESN signaling support
NTX794AA	PRI/SS7 interworking	call completion between PRI and SS7 switches

Table 1-29, "MSL software ordering information" on page 1-55 provides MSL software ordering information.

Table 1-29 MSL software ordering information

Order code	Master tracking code (MTC)	Description	Comments
00033464	MSL00105	ISDN PRI	The purchase of the ISDN PRI option provides the right to use (RTU) for all available PRI features.

Hardware requirements

Figure 1-8, "MSL-100 PRI hardware configuration" on page 1-56 shows the basic hardware architecture for PRI links. The necessary equipment includes:

- An ISDN DTCI—the DTCI uses the same two-shelf arrangement used by the DTC.
- A network termination (NT1)—the NT1 performs the terminating functions for the T1 transmission loop and is usually located on the subscriber premises.

The DTCI accommodates both PRI and A/B bit trunks within the same shelf. With ITA, both A/B bit trunks and PRI trunks are provisioned on the same DS-1 span.

Note 1: The DTCI does not support SS7 (CCS7 ISUP) trunks.

Note 2: The ISP16, UTR15, and MSG6X69 are required.

Note 3: The DTCI does not support the STR card.

Figure 1-8 MSL-100 PRI hardware configuration

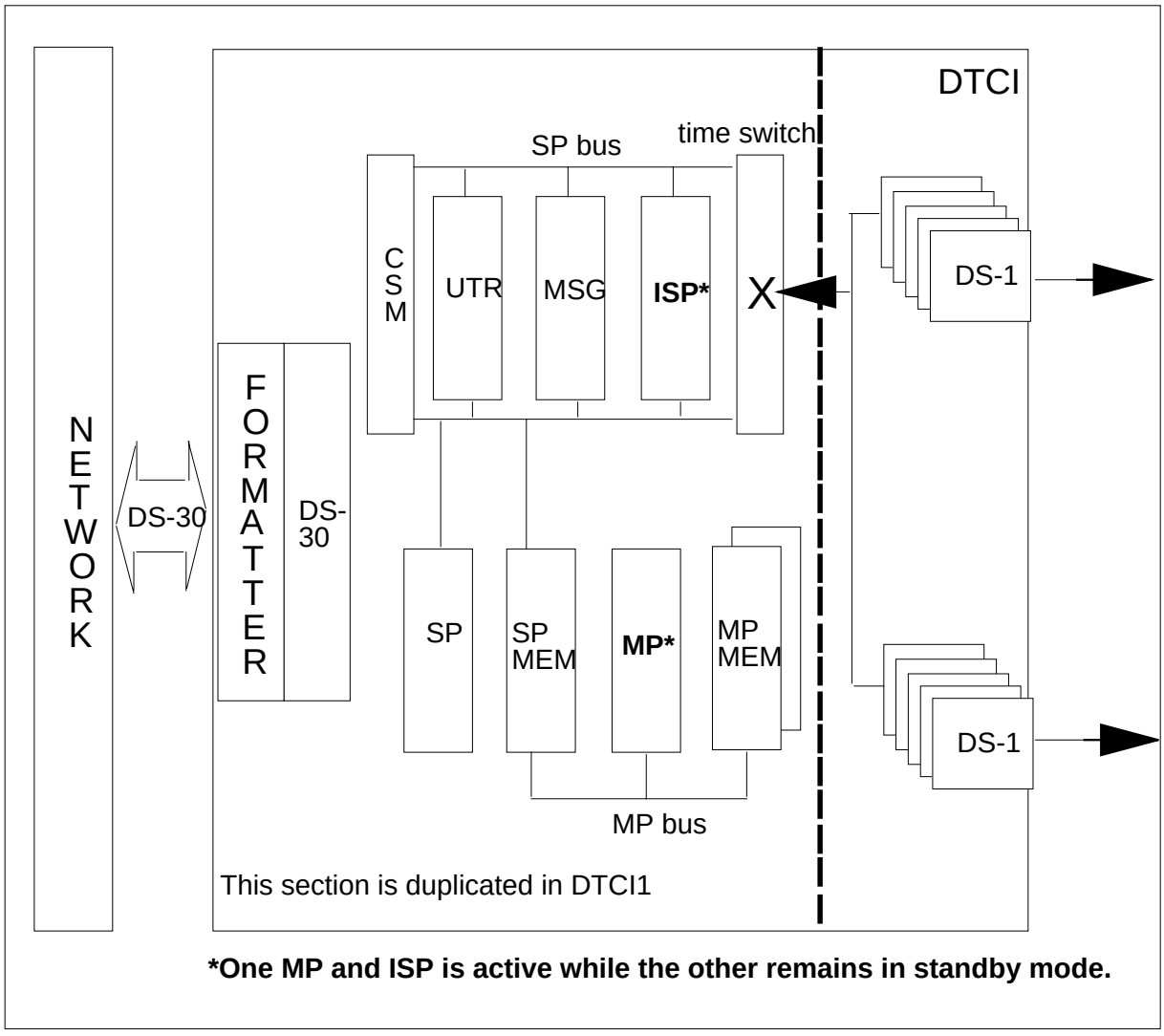


Table 1-30, "MSL-100 PRI hardware description" on page 1-57 shows the important hardware requirements for PRI links.

Table 1-30 MSL-100 PRI hardware description

Card	Abbreviation	NT_PEC	Comments
ISDN common peripheral controllerorISDN cabinet trunk controller	CPEI (MSL-100) (See Note 1.) MCTMeridian 1 (cabinetized MSL-100)	6X01AB NX33AA	up to 2 DTCI units: DTCI and DTC12
ISDN digital trunk controller	DTCI	n/a	The DTCI consists of two shelves (0 and 1) supporting up to 20 DS-1 links (10 DS-1 cards) for 480 channels. DS-1 cards per shelf: 1 min, 5 max Each DS-1 card serves both DTCI units and is controlled by the currently active DTCI unit.
DS-1 interface cards	DS-1	6X50AA or 6X50AB (see Note 2)	slots 0-5 in DTCI Each card supports two DS-1 links (24 channels). Set switch settings according to distance to cross-connect.
ISDN signaling preprocessor	ISP	BX01AA	slot 16 in DTCI supports up to 32 D-channels
Master processor	MP	6X45AC	slot 8 in DTCI

Note 1: The DTEI (used on other equipment types) is essentially the same as the CPEI.

Note 2: NT6X50AB card supports both ZCS (AMI) and B8ZS coding and SF or ESF framing formats. NT6X50AA supports ZCS and SF only.

Installation rules

The following rules and recommendations apply to PRI installations.

Node

1. Install a maximum of 20 DS-1 links for each DTCI.

2. Datafill the MSL-100 with the appropriate entries, as described in the MSL-100 datafill section of this chapter.

3. The following recommendations apply to configuring channels:

- Each 6X50 card supports two DS-1 spans. Install one DS-1 card for every 2 D-channels (assuming 23B + D).
- Distribute the D-channels over as many DS-1 cards as possible.
- A minimum of one D-channel for two DS-1 links is recommended.
- Do not datafill unused B-channels or provision them as PTS trunks.

Note: If the DS-1 link is being configured for ITA, A/B trunks are datafilled on non-PRI channels of the DTCI.

4. After datafill, load the DTCI and return it to service from the PM level of the map terminal using the following commands: PM POST DTCI <DTCI#> BSY PM RTS PM

5. Return the carrier to service using the following commands: MAPCI;TRK;CARRIER POST DTCI <DTCI#> BSY ALL RTS ALL

6. Post the B-channels from the MAP terminal and return the B-channels to service using the following MAP commands:

- to enter the PRADCH level of the MAP terminal— MAPCI;MTC;TRKS;TTP;PRADCH
- to post the B-channels-- POST G <trunk CLLI>
- to MB the DCH if INB-- BSY ALL
- RTS the posted DCH— RTS ALLThe D-channels go to the DMB state (D-channel mode busy).

9. Post the D-channels from the MAP terminal and return the D-channels to service using the following MAP commands:

- to enter the PRADCH level of the MAP terminal— MAPCI;MTC;TRKS;TTP;PRADCH
- to post the D-channel-- POST GD <trunk CLLI> or POST D <circuit#>
- to MB the DCH if INB-- BSY
- RTS the posted DCH-- RTS

10. Run internal continuity tests on the D-channel.

Network

11. When service is available end-to-end, run external continuity tests on the D-channels.

MSL-100 datafill PRI datafill considerations

The following tables show the database parameters associated with configuring PRI and ESN capabilities. These tables describe datafill for dedicated trunking only. To configure ISA on the PRI link, refer to the *MCDN Integrated Services Access Network Services Guide* (555-8001-102).

- Only entries for the DTCI configuration are listed.
- The PRI interface datafill dependencies are listed in Table 1-20, "Meridian 1 PRI datafill dependencies" on page 1-38.
- Correlation tables show the parameters that must be coordinated with the far end for network service. See MSL-100 datafill correlation tables.

Datafill presentation

In the following datafill tables, defaults are presented in boldface. Example tuples are presented at the end of a table. An example that is one continuous record is shown on more than one line due to space limitations. Not all fields in a table are shown. Only those fields important to PRI, basic call service, or ESN signaling are presented.

Important datafill considerations

The following datafill considerations apply:

- The CLLI name for the trunk group must be consistent throughout the datafill tables.
- Before deleting a code from the CLLI table, the code must be deleted from all tables that reference it (except for the CLLI maintenance table, which requires that the name first be deleted from table CLLI).
- To extend the CLLI or TRKGRP table, change the value of the field SIZE for the table in the system data table (SYSDATA) and do a cold restart. To increase the size of table TRKMEM, change field TRKGRSIZ in table CLLI. No restart is required.
- With the table editor in interactive mode, to increase the value of the trunk group size, delete all trunk members in TRKMEM (the trunk group size is set to 0). Then reset to the higher value.
- When changing data for a trunk member, that member must be placed in the INB state.
- A TRKSGRP tuple cannot be changed or deleted unless the D-channel is in INB state.

PRI datafill sequence

Table 1-31, "MSL-100 PRI datafill sequence" on page 1-60 shows the datafill sequence for the PRI interface and basic call service on the MSL-100 system. The PRI interface is configured first (steps 1-10), then the basic call service tables are filled (steps 11-15).

Steps 11 through 15 must be completed to define the type and level of services to be provided on the PRI interface, including bearer capabilities for the PRI trunks. The mapping of these logical attributes to the physical interface is done through table LTMAP.

The bearer services tables are datafilled last.

Table 1-31 MSL-100 PRI datafill sequence (Sheet 1 of 2)

		Initial install	Add a trunk member	Add DS-1 span	Add a C-side link
1. CLLI	Define the trunk group name and size.	X			
2. PADDATA	Define the transmit and receive pad values for the trunk group. (Optional; a default pad set is provided.)	OPT			
3. TRKGRP	Configure the trunk group.	X			
4. OFCENG	Define the number of allowable simultaneous PRI/SS7 calls.	X			
5. LTCINV	Identify the DTCIs to the system software (C-side port #).	X			X
6. CARRMTC	Configure DS-1 carrier and set error rates and alarms. (Optional; a default tuple for 64K clear is provided.)	OPT			
7. LTCPSINV	Identify the DS-1 cards that are associated with a DTCI to the software (P-side port #) and datafill IID for PRI.	X		X	X
8. ADJNODE	Define the connection type and software versions of adjacent nodes.	X			
9. TRKSGRP	(sub of TRKGRP) Define the D-channel for the trunk group.	X			
10. TRKMEM	Define the trunks (B-channels) for the trunk group.	X	X	X	X
11. LTDEF	Define the logical terminal (LT) and access privileges.	X			
12. LTDATA	Specify additional service-related data for the LTID.	X			
13. LTCALLS	Reference the initial translations associated with the call.	X			

Table 1-31 MSL-100 PRI datafill sequence (Sheet 2 of 2)

		Initial install	Add a trunk member	Add DS-1 span	Add a C-side link
14. LTMAP	Maps an LTID to the trunk group CLLI.	X			
15. CUSTNWK	Define the customer networking features, including the display.	X			

CLLI table

Steps 1 through 10 define the PRI facilities for basic call processing.

Step 1: CLLI—Define the trunk group name and size.

Note: The maximum number of CLLI codes is 8191.

Table 1-32, "Table CLLI" on page 1-61 is an example of table CLLI.

Table 1-32 Table CLLI (Sheet 1 of 2)

Field	Entry	Description	Requirements	Comments
CLLI	alphanumeric (up to 12 characters)	trunk group name	Same as GRPKEY in TRKGRP. Use a period (.) or underline (_) to separate fields (leave no blanks).	It is recommended to include PLACE, PROV, BLDG, TRAFUNIT, SUFX in this entry.
ADNUM	0 or 1 less than the CLLI table size	administrative trunk group number		
TRKGRSIZ	0-2047	the # of trunk group members	Use a number greater than the number of initial working trunks.	Because the trunk members must be on the same DTCI, the maximum number of PRI trunks is 480.

Table 1-32 Table CLLI (Sheet 2 of 2)

Field	Entry	Description	Requirements	Comments
ADMININF	alphanumeric (up to 32 characters)	administrative information used by the operating company	Use alphanumeric characters and underscores only. Use a period (.) or underline (_) to separate fields (leave no blanks).	It is recommended that you use TRAFCLS, OFFCLS, TRKGRTYP for this entry.
Example: *K2CPR64CL* *100 24* *PH_43_IT*				

PADDATA table

Step 2: PADDATA—Define the transmit and receive pad values (optional).

Note: Use the default pad values provided or enter new values according to distance and hardware constraints.

Table 1-33, "Table PADDATA" on page 1-62 is an example of table PADDATA.

Table 1-33 Table PADDATA (Sheet 1 of 2)

Field	Entry	Description	Requirements	Comments
PADKEY		= subfields PADGRP1 and PADGRP2	must match field PADGRP in table TRKGRP	Memory is automatically allocated for 64 pad groups. Up to 23 pad groups can be customer defined.
PADGRP1	alphanumeric (up to 4 characters)	pad group 1 name	Enter NPDGP if no PADS are desired.	PRAP is reserved for MSL-100 PRI.
PADGRP2	alphanumeric (up to 4 characters)	pad group 2 name	Enter NPDGP if no PADS are desired.	Use a reserved or a customer-defined pad group.

Table 1-33 Table PADDATA (Sheet 2 of 2)

Field	Entry	Description	Requirements	Comments
PAD1TO2	0 to 14L	the network transmit pad		If a reserved pad group is used, this value is automatically set.
PAD2TO1	0 to 14L	the network receive pad		If a reserved pad group is used, this value is automatically set.
Example: *PRAP PRAP* *0 0*				

TRKGRP table

Step 3: TRKGRP—Configure the trunk group.

Note: Maximum size = 2048 trunk groups; maximum # of LTIDs = 1022.

Table 1-34, "Table TRKGRP" on page 1-63 is an example of table TRKGRP.

Table 1-34 Table TRKGRP (Sheet 1 of 3)

Field	Entry	Description	Requirements	Comments
GRPKEY		= subfield CLLI		
CLLI	alphanumeric (up to 12 characters)	CLLI name for the trunk group	same as trunk group name in CLLI table	
GRPTYP	IBNT2	trunk group type	Use IBNT2 for MSL-100 PRI.	This entry determines what fields are required
TRAFSNO	0-15 or 0-127	Traffic separation number for the trunk group. Allows peg counts by type of call.	If not required, enter 0	0-127 with optional software NTX085AA

Table 1-34 Table TRKGRP (Sheet 2 of 3)

Field	Entry	Description	Requirements	Comments
PADGRP	alphanumeric (up to 10 characters)	pad group name assigned to the trunk group	Enter NPDGRP if no PADS are desired. Must match PADKEY in table PADDATA.	
NCCLS	NCRT, NCTC, NCLT, NOSC, NCBN, NCID, NCOT, NCIT, NCIC, NCON, NCOF	No circuit class type-used to select OM register for unavailable facilities and GNCT		
SELSEQ	ASEQ, DSEQ, or *MIDL*	Select sequence--selects the next idle trunk member in ascending (ASEQ), descending (DSEQ), or most idle (MIDL) sequence.	For MSL-100, DMS-100, and DMS-250: must have opposite values (ASEQ or DSEQ) at each end. For Meridian 1: Use ASEQ with LIN in the Meridian 1, or use MIDL with RRB in the Meridian 1.	used to reduce B-channel glare See MSL-100 datafill correlation tables
NCOS	0-255	Network class of service defines the access privileges of a user.		index to NCOS table
BILLDN		Use CGN (N) or DN (Y) for billing for PRI interface		
LTID	$	= subfields LTGRP + LTNUM	Enter a $ An LTID is required for each trunk CLLI.	This is a read-only field If the trunk group is not associated with an LTID in table LTMAP, this field displays $ and the PRI is inaccessible.

Table 1-34 Table TRKGRP (Sheet 3 of 3)

Field	Entry	Description	Requirements	Comments
LTGRP		logical terminal group name	This field is updated with the LTGRP entry in LTMAP.	not prompted
LTNUM		logical terminal group#	This field is updated with the LTNUM entry in LTMAP.	Not prompted
Example: *K2CPR64CL IBNT2 0 NPDGP NCRT COMNORTE L 0 ASEQ 60 N ... (ISDN 6) $*				

OFCENG table

Step 4: OFCENG—Define the number of allowable simultaneous PRI/SS7 calls.

Table 1-35, "Table OFCENG" on page 1-65 is an example of table OFCENG.

Table 1-35 Table OFCENG

Field	Entry	Description	Requirements	Comments
PARMNAME	NO_OF_HIS_CONTROL_BLKS	parameter name		
PARMVAL	1	parameter value	One HCB per trunk member is recommended.	
PARMNAME	NO_OF_HIS_DATA_BLKS	parameter name		
PARMVAL	1	parameter name	One HDB per trunk member is recommended.	

LTCINV table

Step 5: LTCINV—Identify the DTCIs to the system software (C-side port#).

Note: Memory is automatically allocated for a maximum of 128 tuples.

Table 1-36, "Table LTCINV" on page 1-66 is an example of table LTCINV.

Table 1-36 Table LTCINV (Sheet 1 of 2)

Field	Entry	Description	Requirements	Comments
LTCNAME		= subfields XPMTYPE + XPMNO		automatically adds entries to LTCPSINV
XPMTYPE	DTCI	peripheral module type		
XPMNO	0-127	peripheral module#		
FRTYPE	CPEI	frame type for the XPM		Enter MCTM for cabinetized DMS-100.
FRNO	0-511	frame# for FRTYPE		
SHPOS	18, 32, 51, or 65	shelf position of the frame (inches)		
FLOOR	0-99	floor location of PM		
ROW	A-H, J-N, P-Z, AA-HH, JJ-NN, PP-ZZ	row location of PM		
FRPOS	0-99	floor location of PM		
EQPEC	6X01AB	the PEC of the XPM (CPEI)		
LOAD	alphanumeric (up to 8) characters	issue of the peripheral module software		The ISP load is included in the DTCI load.
EXECTAB	vector with 1-8 members	= TRMTYPE + EXEC subfields	PRAB DTCEX must be entered for PRI. At least one entry is required.	for ITA, the MSL-100

Table 1-36 Table LTCINV (Sheet 2 of 2)

Field	Entry	Description	Requirements	Comments
TRMTYP	PRAB or ABTRK	PM terminal type: ABTRK for A/B bit trunks or PRAB for PRI trunks		
EXEC	DTCEX	Specifies the set of executive programs for TRMTYP.	Maximum # is 8.	
CSLINKTAB	vector with 3-16 members	= subfields NMNO = NMPORT +CONTMARK		
NMNO	0-31	the network module# assigned to XPM	Must correspond to C-side links 0-15 of the PM.	
NMPORT	0-63	network port# for NMNO		
OPTCARD	ISP16, MSG6X69, and UTR15	Defines XPM optional cards.	Enter ISP16, UTR15, and MSG6X69--all are required for the DTCI.	UTRs, if installed, supported only in slot 15
PECS6X45	6X45AC	PEC for master processor	One PEC is required for each unit of the XPM. Enter PEC for unit 0 first.	
OPTATTR	$	optional attributes	Enter $	applies only to DTC CCS7 ISUP trunks
PEC6X40	*6X40AA,* 6X40AB, or 6X40AC	PEC for DS-30 interface card		
Example:*DTCI 0 DTE 0 18 0 A 7 6X01AB DTI29BP1 (PRAB DTCEX) (ABTRK DTCEX) $ (0 20) (0 21)(1 20) (1 22) (0 4) (1 4) (0 6) (1 6) (0 22) (1 21) (0 23) (1 23) (0 5)(1 5) (0 7) (1 7) $ (UTR15) (MSG6X69) (ISP16)$ 6X45AC 6X45AC $ 6X40AC*				

CARRMTC table

Step 6: CARRMTC—Configure DS-1 carrier and set error rates and alarms (optional).

Note 1: You may use the default tuple for 64K clear provided or enter new values in the CARRMTC table. If DEFAULT is entered for CARRIDX in table LTCPSINV, the table does not appear.

Note 2: Data contained in this table is referenced in table LTCPSINV, field CARRIDX. Data in this table must be consistent with the datafill in TRKSGRP.

Table 1-37, "Table CARRMTC" on page 1-68 is an example of table CARRMTC.

Table 1-37 Table CARRMTC (Sheet 1 of 4)

Field	Entry	Description	Requirements	Comments
CSPMTYPE	DTCI	C-side node PM type		
TMPLTBM	*DEFAULT* or alphanumeric (up to 16 characters)	the template name for the PM	DEFAULT is the initial entry provided. DEFAULT templates cannot be deleted and can be changed only by Telco.	Referred to in table LTCPSINV to provide maintenance for DS-1 links If DEFAULT is selected, fields RTSMAL, RTSOL, ATTR, and SELECTOR are omitted.
RTSML	0-*255*	warning limit for times returned to service during the audit interval		Enter 255 to disable this feature.
RTSOL	0-*255*	out-of-service limit for the audit interval		Enter 255 to disable this feature.
ATTR		= subfield SELECTOR		
SELECTOR	DS1	carrier type	Enter DS1 when CSPMTYPE = DTCI.	This entry determines what fields are required.

Table 1-37 Table CARRMTC (Sheet 2 of 4)

Field	Entry	Description	Requirements	Comments
CARD	NT6X50AA, *NT6X50AB*, or NT6X50EC	PEC code for DS-1 card	See MSL-100 datafill, PRI datafill dependencies.	NT6X50AA does not support 64K clear data links or ESF.
If CARD = NT6X50EC, the following field is required:				
ECHOI	ACCESS or NETWORK	specifies that echo cancellers are positioned on the ACCESS side or on the NETWORK side		
The following fields are required for all CARD types:				
VOICELAW	MU_LAW or A_LAW	voice law used by the carrier	Enter MU_LAW	This is the 1.544 Mbps, 24-channel PCM system used in North America. A_LAW is used mainly in international switches.
FF	SF or ESF	frame format: superframe (SF) or extended superframe (ESF)	Must correspond with DS-1 card code.	
ZLG	ZCS or B8ZS	zero logic line coding scheme for the DS-1	Use ZCS if repeaters or near end switch can't handle B8ZS.	ZCS results in 56 Kbps data rate; B8ZS results in 64 Kbps (64K clear).
BERB	BPV or CRC	bit error rate base	See PRI datafill dependencies.	

Table 1-37 Table CARRMTC (Sheet 3 of 4)

Field	Entry	Description	Requirements	Comments
DLK	*NILDL,* FDL1, or FDL2	data link	Enter NILDL for nil data link. See PRI datafill dependencies.	FDL is used for transmitting yellow alarm. Currently, only NILDL is supported.
IAT	Y or *N*	inhibit alarm transit; transmit yellow alarm (N) or inhibit yellow alarm (Y)		
LCGAST	1-*250*-9999	local carrier alarm group set threshold in units of 10 msecs		
LCGACL	1-*1000*-9999	local carrier alarm clear threshold in units of 10 msecs		
RCGAST	1-*50*-9999	remote carrier alarm set threshold in units of 10 msecs	For problems bringing carrier into service, use 1000 (10 secs).	
RCGACL	1-*50*-9999	remote carrier alarm clear threshold in units of 10 msecs	For problems bringing carriers into service, use 1000 (10 secs).	
AISCL	1-*1000*-9999	alarm indicator signal clear threshold in units of 10 msecs		
BEROL	*3* -6	BER out-of-service limit		3=>10K in 6 secs4=>10K in 66 secs5=>10K in 660 secs6=>10K in 6600 secs
BERML	4-*6*-7	BER maintenance limit		4=>10K in 66 secs5=> 10K in 660 secs6=> 10K in 6600 secs7=> 10K in 66000 secs

Table 1-37 Table CARRMTC (Sheet 4 of 4)

Field	Entry	Description	Requirements	Comments
ES	0-*864*-9999	error second threshold in units of 10 msecs		
SES	0-*100*-9999	severe error second threshold in units of 10 msecs		
FRAMEML	0-*17*-9999	maintenance limit for frame loss		Table OFCENG also records this limit.
FRAMEOL	0-*511*-9999	out-of-service limit for frame loss	FRAMEOL should be larger than FRAMEML or only FRAMEOL is used.	Table OFCENG also records this limit.
SLIPML	0-*4*-9999	maintenance limit for frame slip		Table OFCENG also records this limit.
SLIPOL	0-*255*-9999	out-of-service limit for frame slip	SLIPOL should be larger than SLIPML or only SLIPOL is used.	Table OFCENG also records this limit.
Example for 64K clear (this is the default tuple):*DTCI DEFAULT 255 255 DS1 NT6X50AB MU_LAW SF B8ZS BPVNILDL N 250 1000 50 50 150 1000 3 6 864 100 17 511 4 255 $*Example for 64K restricted and 56K:*DTCI ZCS 255 255 DS1 NT6X50AB MU_LAW SF ZCS BPVNILDL N 250 1000 50 50 150 1000 3 6 864 100 17 511 4 255 $*				

LTCPSINV table

Step 7: LTCPSINV—Identify the DTCIs to the system software (P-side port#) and datafill field IID for PRI.

Note: An entry in this table is automatically added when you add a DTCI to table LTCINV. Memory is automatically allocated for a maximum of 128 tuples.

Table 1-38, "Table LTCPSINV" on page 1-72 is an example of table LTCPSINV.

Table 1-38 Table LTCPSINV (Sheet 1 of 2)

Field	Entry	Description	Requirements	Comments
LTCNAME		= subfields XPMTYPE + XPMNO		
XPMTYPE	DTCI	peripheral module type		
XPMNO	0-511	peripheral module#		
PSLNKTAB	vector with 0-19 members	= subfields PSLINK + PSDATA + CARRIDX + ACTION + IID	Use DS1PRA for PRI or ITA. Use DS-1 for AB bit signaling without ISDN.	DTCI supports DS1 and DS1PRA.
PSLINK	0-19	P-side port#		
PSDATA	DS1PRA or NILTYPE	P-side interface	If carrier requires ISDN, enter DS1PRA. Enter NILTYPE if that carrier is not equipped on the DTCI.	DTCI supports DS1 and DS1PRA. For DS1, datafill CARRIDX and ACTION. For DS1PRA, datafill CARRIDX, ACTION, and IID.
CARRIDX	DEFAULT or valid template name datafilled in CARRMTC	index into table CARRMTC	An entry for the PM type must already exist in table CARRMTC.	See MSL-100 datafill, PRI datafill dependencies
ACTION	Y or N	Remove carrier from service if FRAMEOL, SLIPOL, ES, or SES is exceeded.		

Table 1-38 Table LTCPSINV (Sheet 2 of 2)

Field	Entry	Description	Requirements	Comments
IID	0-31	The interface ID identifies the DS-1 spans associated with the D-channel.	For a single DS-1 span, use 0. For multiple DS-1 spans per trunk group, a different IID is required for each DS-1 in the trunk group.	Do not use 1 if connected to the Meridian 1 PBX.
Example: *DTCI 0* *(0 DS1PRA DEFAULT N 0) (1 DS1PRA DEFAULT N 0)* *(2 DS1PRA DEFAULT N 0) (3 DS1PRA DEFAULT N 0)* *(4 DS1PRA DEFAULT N 0) (5 DS1PRA DEFAULT N 0)* *(6 DS1 DEFAULT N) (7 DS1 DEFAULT N)* *(8 DS1 DEFAULT N) (9 DS1 DEFAULT N) $*				

ADJNODE table

Step 8: ADJNODE—Define the connection type and software version of adjacent nodes.

Note 1: The maximum number of tuples is 4096.

Note 2: The tuples in this table are used by many different TRKSGRP entries.

Table 1-39, "Table ADJNODE" on page 1-73 is an example of table ADJNODE.

Table 1-39 Table ADJNODE (Sheet 1 of 2)

Field	Entry	Description	Requirements	Comments
ADJNODEK	alphanumeric (up to 12 characters)	adjacent node key--enter the names for each adjacent switch	It is recommended to use type and version to identify the adjacent switch.	Refer to table TRKSGRP, field ADJNODE.
SIGDATA	PRA	=PRODUCT + VERNUM subfields	Enter PRA for a PRI trunk.	
PRODUCT	For PRI: DMS, Meridian 1, OTHER	adjacent switch type		

Table 1-39 Table ADJNODE (Sheet 2 of 2)

Field	Entry	Description	Requirements	Comments
VERNUM	0 -32767	software version in adjacent switch	Eliminate the decimal if used. This field must be updated if the software is updated in the adjacent node.	Use the BCS for DMS nodes; use the release number for Meridian 1 PBXs.
Example: *PRASL115 PRA Meridian 1 28*				

TRKSGRP table

Step 9: TRKSGRP—Define the D-channel for the trunk group.

Note: Table size is automatically set at two times the number of trunk groups. Maximum size: 2048 trunk subgroups.

Table 1-40, "Table TRKSGRP" on page 1-74 is an example of table TRKSGRP.

Table 1-40 Table TRKSGRP (Sheet 1 of 6)

Field	Entry	Description	Requirements	Comments
SGRPKEY		=CLLI + SGRP subfields		To configure ITA on the DTCI, datafill the non-PRI trunk subgroups in table TRKSGRP along with the PRI trunk subgroups.
CLLI		CLLI trunk group name		
SGRP	0	subgroup#		Only one subgroup (subgroup 0) is allowed per PRI interface.
CARDCODE	DS1SIG	card code	DS1SIG is required for ISDN PRI.	
SGRVAR		=subfields SIGDATA through DCHBCKUP below.		

Table 1-40 Table TRKSGRP (Sheet 2 of 6)

Field	Entry	Description	Requirements	Comments
SIGDATA	ISDN	the call processing protocol	ISDN is the only valid field for a PRI trunk.	This entry determines what fields appear.
PSPDSEIZ	2-30	the time in seconds that the trunk must wait to receive the first digit		applies only to indband DTMF digits
PARTDIAL	2-30	the time in seconds that the trunk must wait to receive each digit after the first digit		applies only to inband DTMF digits
VERSION	87Q931	the D-channel protocol version	This is the only value supported	
CRLENGTH	2	call reference length (# of octets)	The only value supported is 2.	
BCHNEG	Y or N	allow B-channel negotiation (Y) or disallow (N)	The only value supported is N.	not currently supported
BCHGLARE	YIELD or STAND	The near end has priority in call collisions (STAND) or the far end has priority (YIELD).		When a call collision occurs, an entry of YIELD causes the call to be taken down and another trunk is selected.

Table 1-40 Table TRKSGRP (Sheet 3 of 6)

Field	Entry	Description	Requirements	Comments
IFCLASS	NETWORK or USER	The interface class defines the ends of the link for PRI message exchange.	The MSL-100 is always USER with the following exceptions: For MSL-100 to MSL-100 one end must be USER and the other end must be NETWORK. For Meridian 1 to MSL-100, the MSL-100 is NETWORK; the Meridian 1 is USER.	USER always yields to NETWORK.
CONFIG	PT_PT	the broadcast procedure for the PRI interface	PT_PT is the only option supported by PRI.	Broadcast links (PT_MLT_PT) are used with BRA only.
LOCATION	USER	the Q.931 progress indicator (PI IE) location		Datafill the far end according to equipment type: LOCALEO for DMS-100; USER for Meridian 1 or DMS-250.
SAT	Y or N	satellite switched--yes (Y) or no (N)	N is the only value supported.	

Table 1-40 Table TRKSGRP (Sheet 4 of 6)

Field	Entry	Description	Requirements	Comments
ECSTAT	INTERNAL, EXTERNAL, INNOTONE, UNEQ	echo canceller status	Enter INTERNAL when the echo cancellers are equipped on the NT6X50EC card in the DTCI frame and are enabled by call processing when the call is not a data call. This value is not allowed when echo suppressor is enabled. Enter EXTERNAL when echo cancellations are performed by external equipment and no call processing is involved. Use INNOTONE when internal echo cancellers are to be used but the 2100 Hz tone is turned off. This value is not allowed when echo suppressor is enabled. Enter UNEQ when no echo cancellers are equipped on this subgroup.	
TRKGRDTIM	1-*30*-255	trunk guard timer in units of 10 msecs—This is the time that the trunk waits after sending a DISCONNECT message and before putting the trunk into IDLE.	For PRI, a minimum value of 30 (300 msec) is recommended.	If the timer expires again after a second disconnect attempt, the B-channel is put into LO state until a restart procedure is completed.

Table 1-40 Table TRKSGRP (Sheet 5 of 6)

Field	Entry	Description	Requirements	Comments
ADJNODE	alphanumeric (up to 12 characters)	index into table ADJNODE	same as ADJNODEK in table ADJNODE	
L1FLAGS	Y or N	indicates whether or not the DTCI sends Layer 1 flags when the D-channel is in flagfill mode	Enter N for DMS-to-DMS connections and Y for DMS-to-other vendor connections.	
DCHNL		the primary D-channel for this PRI interface; it includes subfields PMTYPE through HDLCTYPE below		This field cannot be changed or deleted unless the D-channel is in INB state.
PMTYPE	DTCI	PM type	Use DTCI for BCS 30 and later.	
DTCINO	0-511	DTCI PM#		
DTCICKTNO	0-19	DS-1 span on the DTCI for the D-channel		
DTCICKTTS	1-24	DS-1 timeslot for the D-channel		
DCHRATE	64K or 56K	D-channel transmission rate	See MSL-100 datafill, PRI datafill dependencies	The D-channel rate should match the data rate datafilled for the DS-1 carrier.
HDLCTYPE	HDLC or INVHDLC	Indicate the bit format for PRI message as follows: HDLC for high level data link or INVHDLC for inverted HDLC.	See MSL-100 datafill, PRI datafill dependencies.	INVHDLC is a format in which all 0's are changed to 1's and vice versa. Some ISDN vendors use INVHDLC for PRI.

Table 1-40 Table TRKSGRP (Sheet 6 of 6)

Field	Entry	Description	Requirements	Comments
DCHBCKUP		the backup D-channel; it includes subfields PMTYPE through HDLCTYPE above	Supported for both NTNA (NI-1) and NI-2	
Example: *K2CPR64CL 0 DS1SIG ISDN 10 20 87Q931 2 N STAND +NETWORK PT_PT USER N UNEQ 30 PRASL115 DTCI 10 0 24 64KHDLC $*				

TRKMEM table

Step 10: TRKMEM—Define the B-channels for the trunk group.

Note: Table size is automatically determined according to field TRKGRPSIZ in table CLLI for each trunk group configured.

Table 1-41, "Table TRKMEM" on page 1-79 is an example of table TRKMEM.

Table 1-41 Table TRKMEM (Sheet 1 of 2)

Field	Entry	Description	Requirements	Comments
CLLI		CLLI name for the trunk group	must match trunk group name in CLLI table	
EXTRKNM	0-9999	the external trunk#	The first digit in the tuple should be the same as the channel# to ensure correct trunk selection.	
SGRP	0	trunk subgroup#	Same as SGRP in table TRKSGRP	always 0 for PRI trunks
MEMVAR		= subfields PMTYPE + DTCNO + DTCCKTNO + DTCCKTTS		
PMTYPE	DTCI	PM type		
DTCNO	0-511	DTCI# for the trunk group	must match DTCINO in table TRKSGRP	The B-channels must be on the same DTCI as the D-channel.

Table 1-41 Table TRKMEM (Sheet 2 of 2)

Field	Entry	Description	Requirements	Comments
DTCCKTNO	0-19	DS-1 span on the DTCI for the B-channel	This carrier must be datafilled in LTCPSINV as DS1PRA.	
DTCCKTTS	1-24	DS-1 timeslot for this trunk member		
Example:K2CPRA64CL 1 0 DTCI 10 0 1K2CPRA64CL 2 0 DTCI 10 0 2				
K2CPRA64CL 3 0 DTCI 10 0 3				
K2KABTRK1 1 0 DTCI 10 0 4				
K2KABTRK1 1 0 DTCI 10 0 5				

LTDEF table

Step 11: LTDEF—Define the logical terminal (LT) and access privileges.

Table 1-42, "Table LTDEF" on page 1-80 is an example of table LTDEF.

Table 1-42 Table LTDEF (Sheet 1 of 2)

Field	Entry	Description	Requirements	Comments
LTKEY		LTID	Same as LTID in table LTDATA	The LT group of the LTID must first be datafilled in LTGRP if anything other than ISDN is used.
LTAP	B	LT access privileges	Enter B for PRI (circuit-switched).	
CLASSREF		= subfield LTCLASS		
LTCLASS	PRA	the LT class		defines the fields required and the services allowed
NUMBCHNL	1-479	the # of B-channels in the trunk group		

Table 1-42 Table LTDEF (Sheet 2 of 2)

Field	Entry	Description	Requirements	Comments
NUMCALLS	1-479	the # of calls allowed on the LTID at one time	This entry should be the same as the NUMBCHNL entry. The sum of the incoming calls and outgoing calls must be less than or equal to the number of calls allowed.	
INCCALLS	0-479	the # of reserved incoming-only calls allowed on the LTID at one time		not used; enter any number
OUTCALLS	0-479	the # of reserved outgoing-only calls allowed on the LTID at one time		not used; enter any number
OPTIONS	vector with up to four members: NOVOICE, NOVBD, NOCMD, NOPMD	defines the bearer capabilities for the LTID; it defines the types of calls not allowed: NOVOICE for no voice calls, NOVBD for no voice-band data calls, NOCMD for no circuit-mode data calls, and NOPMD for no packet-mode data calls	Packet mode data is supported for NTNA and NI-1	applies to incoming and outgoing calls
Example:*ISDN 555 B PRA 5 5 1 1 NOPMD $*				

LTDATA table

Step 12: LTDATA—Specify additional service-related data for the LTID.

Table 1-43, "Table LTDATA" on page 1-82 is an example of table LTDATA.

Table 1-43 Table LTDATA (Sheet 1 of 2)

Field	Entry	Description	Requirements	Comments
LTID		= subfields LTGRP + LTNUM	same as LTKEY in table LTDEF	
LTGRP	ISDN	the LT group type		Non-ISDN groups are datafilled if table LTGRP is datafilled first.
LTNO	1-1022	LT# within the group		
DATATYPE	NIL, DN, or SERV	data type for the services associated with this LTID		
When DATATYPE = DN, the following fields are required.				
DFLTCGN	10 digits: NPA + NNX + XXXX	The 10-digit DN (default) if no CGN is supplied on outgoing calls; with CGN screening, this DN is the only DN that originates calls.	Appropriate digits must be datafilled in table THOUGRP.	Only one 10-digit number is supported. Also used for billing if the BILLDN field in table TRKGRP is Y.
OPTIONS	CUSTGRP	Select CUSTGRP option.	Enter $ if no options are required.	Only one entry allowed. optional when DATATYPE=DN
CUSTGRP	alphanumeric	Enter the customer group name.		
When DATATYPE = SERV, the following fields are required.				

Table 1-43 Table LTDATA (Sheet 2 of 2)

Field	Entry	Description	Requirements	Comments
AUDTRMT	N or Y	Audible treatments; specify whether inband tones and announcements should be provided instead of “disconnect with cause" for treatments from this LTID.		
CGNREQD	N or Y	Specify whether CGN must be provided by the calling user switch.		
CGNDELV	NEVER, SCREENED, ALWAYS	Specify when the CGN must be provided.	Use SCREENED when the CGN should not be sent (when it is screened for privacy).	
CDNDELV	NEVER or ALWAYS	Specify whether the CDN must be delivered to the called interface.		
OPTION	TBO or CHG	Specify the terminating billing option for the trunk CLLI or the charge number in calling number digits when no calling number is available.		up to two entries allowed
CALLCODE	800-999	Enter a generic call code in this range.		Required when OPTION = TBO
SFPRNT	N or Y	Specify whether the service feature is present or not.		Required when OPTION = TBO
SFEATVAL	800-999	Enter a service feature value.		Required when SFPRNT = Y
Example: *ISDN 555 DN 6137221234 $*				

LTCALLS table

Step 13: LTCALLS—Provides the initial translations associated with the call type.

Table 1-44, "Table LTCALLS" on page 1-84 is an example of table LTCALLS.

Table 1-44 Table LTCALLS (Sheet 1 of 3)

Field	Entry	Description	Requirements	Comments
LTID		the LTID from table LTDATA		
CALLTYPE	PUB, PVT, WATS, INWATS, FX, or TIE	Defines the call type allowed on this PRI interface.		If XLARTSEL = XLALEC, the following call types are not valid: PVT, INWATS, and TIE.
XLARTSEL		= subfield XLARTE		
XLARTE	XLAIBN, XLALEC, or RTEREF	The translation route selector: XLALEC for POTS, PBX, or Centrex; XLAIBN for PBX or MDC only; or RTEREF, which refers to a specific table and index, such as OFRT or IBNRTE.		Only one selector is allowed; this entry determines what other fields are required. If CALLTYPE = PRIVATE, XLALEC is not allowed.
When XLALEC is entered, the following fields are required:				
LINEATTR	0-1023	index to table LINEATTR		used to index table LINEATTR for public calls

Table 1-44 Table LTCALLS (Sheet 2 of 3)

Field	Entry	Description	Requirements	Comments
When XLAIBN is entered, the following fields are required: * If CALLTYPE = PUB, then the LINEATTR index is used to index table LINEATTR. * If CALLTYPE = PVT, then CUSTGRP, SUBGRP, and NCOS are used to index IBNXLA.				
CUSTGRP	alphanumeric	customer name associated with an IBN station		
SUBGRP	0-7	subgroup number for the CUSTGRP		
NCOS	0-255	the network class of service, which defines access privileges for the user		
When RTEREF is selected, the following fields are required (CALLTYPE is irrelevant):				

Table 1-44 Table LTCALLS (Sheet 3 of 3)

Field	Entry	Description	Requirements	Comments
RTEID	OFRT or IBNRTE and a number from 1 to 1023	the routing table and index into that table		
OPTIONS	$		Enter $	
Example: *ISDN 555 PUB XLAIBN 52 $*				

LTMAP table

Step 14: LTMAP—Map the LTID to the CLLIs of the PRI trunk groups.

Table 1-45, "Table LTMAP" on page 1-86 is an example of table LTMAP.

Table 1-45 Table LTMAP

Field	Entry	Description	Requirements	Comments
LTID		LTKEY from table LTDEF indexes this table.		automatically updates LTID field in table TRKGRP
MAPTYPE	CLLI			always set to CLLI for PRI
CLLI		the CLLI name for the trunk group	must match CLLI name in table TRKGRP	
OPTIONS	TEI 0	ISDN terminal equipment identifier	Enter TEI 0 for every LTID entry.	TEI is the only supported option for PRI.
Example: *ISDN 555 CLLI K2CPR64CL TEI 0 $*				

CUSTNTWK table

Step 15: CUSTNTWK—Define the customer networking features, including the display.

Note: Table CUSTNTWK is a table within table CUSTENG.

Table 1-46, "Table CUSTNTWK" on page 1-87 is an example of table CUSTNTWK.

Table 1-46 Table CUSTNTWK

Field	Entry	Description	Requirements	Comments
CUSTNAME	alphanumeric (up to 16 characters)	customer group name	must match CUSTNAME in table CUSTENG	
NETNAME	PUBLIC	the network assigned to customer group	Use PUBLIC for MSL-100.	
NETCGID	1-4096	network customer ID#	Use 1 for MSL-100.	
DNREVXLA	$	DN reverse translators	Use $ for MSL-100.	
OPTIONS	CLID or NTWKRAG	MCDN feature options		
CLIDOPT	ONNET or OFFNET	calling line ID options	Enter OFFNET to enable the NETCGID on all networks.	
Example: *GRP1 PUBLIC 1 $ CLID OFFNET*				

Routing tables

The MSL-100 switch uses the following routing tables for basic call service or ESN over PRI: IBNRTE, RTEREF, and OFRT.

- OFRT provides the routing for IBN and POTS calls.
- IBNRTE provides the routing for IBN calls.
- HNPACONT.RTEREF provides the routing for local calls.
- FNPACONT.RTEREF provides the routing for toll calls.

There are no changes to these tables for dedicated trunk routing.

For ISA routing, refer to *MCDN Integrated Services Access Network Services Guide* (555-8001-102).

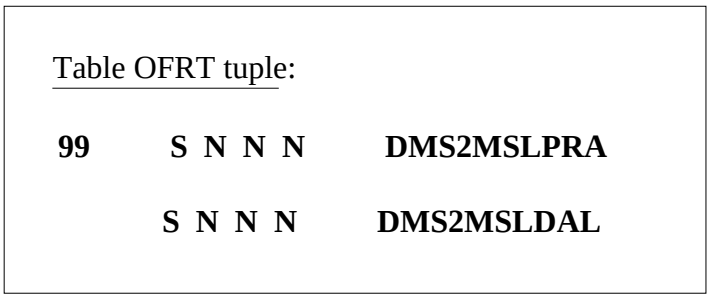
Note: These tables must be datafilled before datafilling table LTCALLS.

Configuring backup trunk groups

Because the DTCI also supports non-PRI trunks, backup trunk groups can be configured on the same DTCI. The backup trunk group can be configured as a single two-way trunk group or as two-way trunk groups.

Figure 1-9, "Table OFRT tuple" on page 1-88 is an example tuple for table OFRT that shows how this can be implemented.

Figure 1-9 Table OFRT tuple



In this example, when a user dials the code for the PRI trunk, the call is routed using route OFRT 99. Calls are first offered using the PRI group DMS2MSLPRA. If this trunk group is 100% busy, out of service, or experiences protocol failure during the call setup, the call is re-offered on the DAL trunk DMS2MSLDAL. Calls incoming on DMS2MSLDAL should be handled the same way as calls incoming on DMS2MSLPRA.

PRI datafill dependencies

The datafill entered for table CARRMTC must be consistent with the datafill in table TRKSGRP.

Table 1-47, "MSL-100 PRI datafill dependencies" on page 1-89 shows the MSL-100 PRI datafill dependencies.

Table 1-47 MSL-100 PRI datafill dependencies

CARRMTC table					**TRKSGRP table**	
CARD	*FF*	*ZLG*	*BERB*	*DLK*	*DCHRATE*	*HDLCTYPE*
NT6X50AA	SF	ZCS	BPV	NILDL	56K or 64K	HDLC or INVHDLC
NT6X50AB	SF	ZCS	BPV	NILDL	56K or 64K	HDLC or INVHDLC
		B8ZS	BPV	NILDL	64K	HDLC or INVHDLC
	ESF	ZCS	CRC	NILDL	56K or 64K	HDLC or INVHDLC
		B8ZS	CRC	NILDL	64K	HDLC or INVHDLC

Note 1: When CRC is entered, both BPV and CRC are used.

Note 2: DLK is used for transmitting yellow alarm. Use NILDL for nil data link, use FLD1 for input from timeslot 2, or FLD2 for input from external interrupt. Currently, only NILDL is supported.

Correlation tables

Figure 1-10, "MSL-100 to Meridian 1 correlation table" on page 1-90 and Figure 1-11, "MSL-100 to MSL-100" on page 1-91 show the parameters that must be coordinated between the near and far end for network service.

Note: Because ISDN is an evolving architecture, there may be some differences in datafill between different product types.

Figure 1-10 MSL-100 to Meridian 1 correlation table

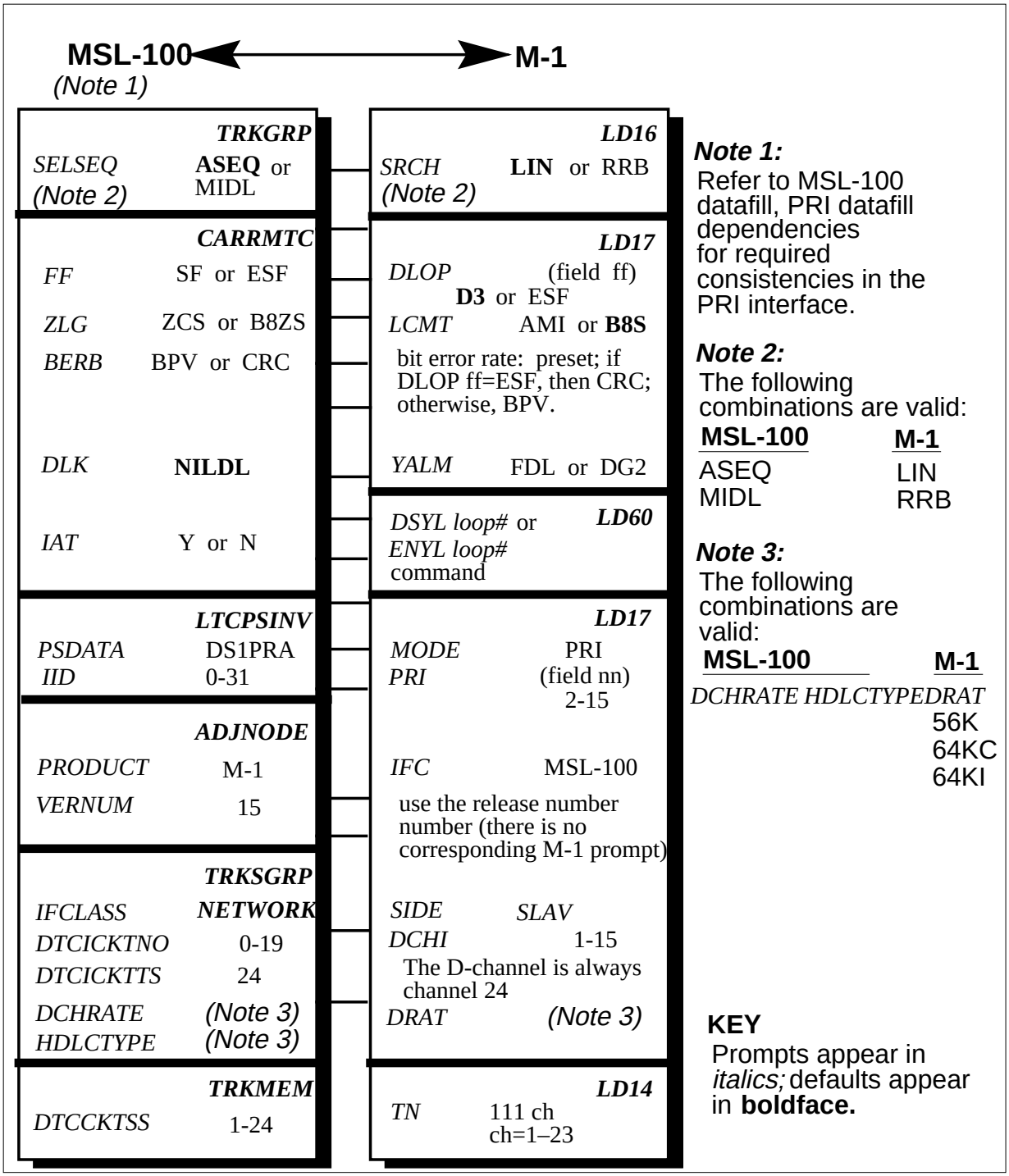
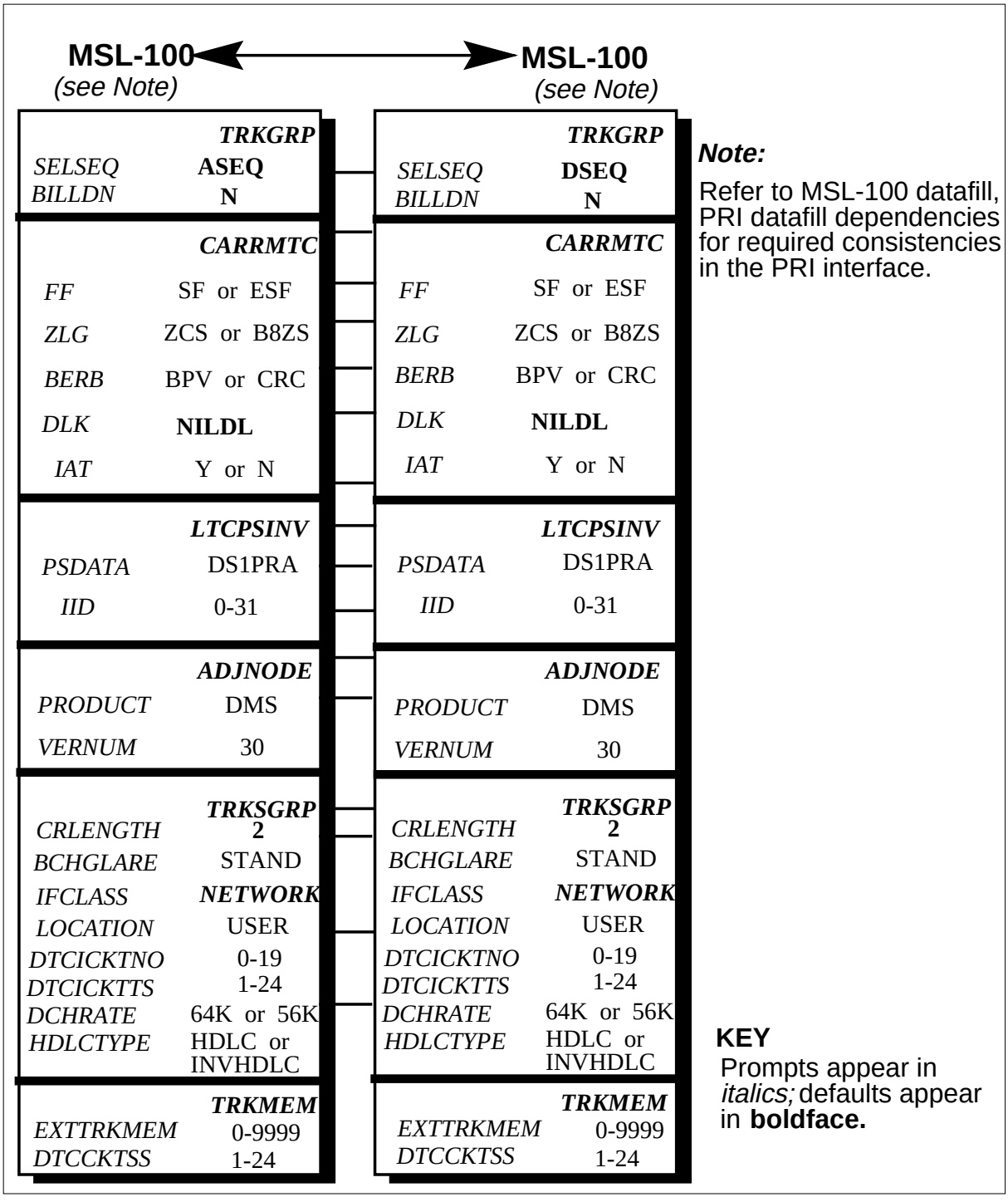


Figure 1-11 MSL-100 to MSL-100



Bearer services datafill considerations

BC screening ensures that calls are connected only between compatible terminals. Tables BCDEF, BCCOMPAT, KSETFEAT, and LTDEF are datafilled to provide the necessary BC parameters:

- Table BCDEF defines the different BCs available.
- Table BCCOMPAT defines what BCs are compatible with one another.
- Table KSETFEAT associates the call (by terminal type) with the bearer capability desired.
- Table LTDEF (for the LTID OPTIONS) defines which BCs are allowed to terminate on a specific PRI trunk group.

These tables must be datafilled for basic call service to work correctly.

Datafill presentation

In the following datafill tables, defaults are presented in boldface. Example tuples are presented at the end of a table. An example that is one continuous record may be shown on more than one line due to space limitations. Not all fields in a table are shown. Only those fields important to bearer services are presented.

Important datafill considerations

The datafill for the bearer service tables are altered if required, with the following exceptions:

- BCs mapped to themselves in table BCCOMPAT cannot be deleted.
- To change a BC of a device in table KSETFEAT, the BC name as defined in table BCDEF must be entered in the OPTIONS field. If the BC OPTIONS is not used, a default BC is used.

Note: All non-ISDN sets (500/2500 sets, EBSs, and ACs) are assumed to have SPEECH BC.

Default BC summary

The default values associated with tables BCDEF, BCCOMPAT, and KSETFEAT are summarized in Table 1-48, "MSL-100 default BC summary"

on page 1-93. The OPTIONS field in table LTDEF is described in the LTDEF table in the MSL-100 PRI datafill section.

Table 1-48 MSL-100 default BC summary

Device	Encoded BC	Compatible incoming BC
500/2500	SPEECH	SPEECH/3_1KHZ
P-phone	SPEECH	SPEECH/3_1KHZ
Attendant	SPEECH	SPEECH/3_KHZ
ADM/SADM/DTI	56KDATA	56KDATA
HSDU	56K/64KDATA	56K/64KDATA (Note 1)
LSDU	19.2KDATA	19.2KDATA
DTI/TRK	SPEECH	SPEECH/3_1KHZ
MODEM PHONE	3_1KHZ	3_1KHZ (Note 2)
ISDN BRAKS	SPEECH	SPEECH/3_1KHZ
ISDN BRAKS	56K/64KDATA	56K/64KDATA (Note 3)

Note 1: Although the BC for data units is sent out as 56K in the call processing messages, this BC can accommodate 56K or 64K data rates. If 64K is to be used, datafill table KSETLINE for 64KDATA.

Note 2: An ISDNKSET is BC datafilled as 3_1KHZ.

Note 3: 56KDATA or 64KDATA must be datafilled in table KSETFEAT for an ISDN BRAKS.

Bearer services datafill sequence

Table 1-49, "MSL-100 BC datafill sequence" on page 1-94 shows the datafill sequence for the bearer service tables.

Table LTDEF, field OPTIONS, is datafilled as part of the service tables datafill sequence.

Table BCDEF must be datafilled before table BCCOMPAT.

Table 1-49 MSL-100 BC datafill sequence

		Initial install	Add a trunk member	Add DS-1 span	Add a C-side link
1. BCDEF	Define the available BCs.	X			
2. BCCOMPAT	Define what BCs are compatible with one another.	X			
3. KSETFEAT	Assign a bearer capability to the terminal type.	X			

BCDEF table

Table BCDEF contains five default bearer capabilities that are available for PRI, datafilled as follows in Table 1-50, "Table BCDEF default BC compatibility" on page 1-94. One of these values is used to define the BC for the line or logical terminal. If a BC other than these five is received, the call is rejected.

Table 1-50 Table BCDEF default BC compatibility (Sheet 1 of 2)

Field	Default bearer capabilities for PRI (See Note.)				
BCNAME	SPEECH	64KDATA	64KREST	56KDATA	3_1KHZ
XFERCAP	SPEECH	UNRESDIG	RESDIG	UNRESDIG	3_1KHZ
XFERMODE	CIRCUIT	CIRCUIT	CIRCUIT	CIRCUIT	CIRCUIT
CODINGST	CCITT	CCITT	CCITT	NETWORK	CCITT
PROTOTYP				DTU	
PROTOCOL				NONE	
SYNC				Y	

Note: Blank fields indicate that that particular parameter does not apply; there are no prompts for those fields that do not apply.

Table 1-50 Table BCDEF default BC compatibility (Sheet 2 of 2)

Field	Default bearer capabilities for PRI (See Note.)
DATARATE	56 Kbps
DISCRIM	

Note: Blank fields indicate that that particular parameter does not apply; there are no prompts for those fields that do not apply.

If it is necessary to change this table, the fields may be datafilled as in Table 1-51, "Table BCDEF summary" on page 1-95.

Note: This table must be defined before table BCCOMPAT is defined.

Table 1-51 Table BCDEF summary (Sheet 1 of 3)

Field	Entry	Description	Requirements	Comments
BCNAME	alphanumeric (up to 7 characters)	bearer capability name		A maximum of 59 BCs are defined.
BCDATA		= subfields XFERCAP + XFERMODE + CODINGST		
XFERCAP	SPEECH, UNRESDIG, RESDIG	the type of data being transmitted: SPEECH is for voice calls, UNRESDIG is for packet mode calls, and RESDIG is for 56 Kbps data calls		
XFERMODE	CIRCUIT, NETWORK	the coding standard for BC: CCITT or a network-specific coding standard		
CODINGST	CCITT, NETWORK	the coding standard for BC: CCITT or a network-specific coding standard		This selector determines what other fields are required.

Table 1-51 Table BCDEF summary (Sheet 2 of 3)

Field	Entry	Description	Requirements	Comments
When CODINGST = NETWORK, the following fields are required:				
PROTOTYP	MODEM, DTU, OTHER	the physical device at the endpoint determines the protocol used		
When PROTOTYP = MODEM, the following fields are required:				
MODEMPRO	alphanumeric	Identify the modem protocol.	The name used must be defined in table MODEMPRO.	
MODEMSNC	Y or N	synchronous (Y) or async (N) communications		
MODEMRTE	75BS,150BS,300BS,600BS,1200BS,2400BS,3600BS,4800BS,7200BS,8KBS,9600BS,14400BS,16KBS,19200BS,32KBS,48KBS,56KBS,AUTO	modem data rate		
When PROTOTYP = DTU, the following fields are required:				
DTUPRO	alphanumeric	protocol name	Must be defined in table DTUPRO.	

Table 1-51 Table BCDEF summary (Sheet 3 of 3)

Field	Entry	Description	Requirements	Comments
DTUSYNC	Y or N	synchronous (Y) or async (N) communications		
DTURATE	75BS,150BS,300BS,600BS,1200BS,2400BS,3600BS,4800BS,7200BS,8KBS,9600BS,14400BS,16KBS,19200BS,32KBS,48KBS,56KBS,AUTO	modem data rate		
When PROTOTYP = OTHER, the following fields are required:				
DISCRIM	0-63	identifies OTHER devices		
Example: *SPEECH SPEECH CIRCUIT CCITT64KDATA UNRESDIG CIRCUIT CCITT3_1KHZ SPEECH CIRCUIT CCITTDATAUNIT RESDIG CIRCUIT NETWORK DTU TLINK YAUTO*				

BCCOMPAT table

Table BCCOMPAT controls the mapping of BC compatibilities. This table shows the mapping of default BCs provided in table BCDEF. Other BC pairs are mapped, provided they are first defined in table BCDEF.

Note: These tuples are entered at load build time. A maximum of 3906 BC pairs may be mapped.

Table 1-52, "Table BCCOMPAT" on page 1-98 is an example of table BCCOMPAT.

Table 1-52 Table BCCOMPAT

Field	Entry	Description	Requirements	Comments
KEY		= subfields CALLBC and TERMBC		used to define compatible combinations By default, any bearer capability is compatible with itself-no tuples need to be entered. For bi-directional compatibility, two tuples must be defined.
CALLBC		BC name	must be defined in BCDEF	
TERMBC		BC name	must be defined in BCDEF	
Example: *64KRES DATAUNITDATAUNIT 64KRES*				

KSETFEAT table

The BC feature is assigned in table KSETFEAT. This table lists the line features assigned to the business sets, data units, and ISDN terminals listed in the KSETLINE table.

- All non-ISDN sets (500/2500 sets, EBSs, and ACs) are assumed to have SPEECH BC.
- SPEECH is used if a data terminal is attached to a terminal adapter.
- ISDN terminals do require a BC because they have the ability to screen incoming calls on the basis of information sent to them by the network. ISDN terminals use the BC assigned to that LTID in table LTDEF.

To change the BC assigned to a terminal in KSETFEAT, the BC feature must be selected and the BC name (as defined in table BCDEF) is entered. If the BC is not defined, a default BC is used.

Table 1-53, "Table KSETFEAT" on page 1-99 is an example of table KSETFEAT.

Table 1-53 Table KSETFEAT

Field	Entry	Description	Requirements	Comments
FEATKEY	= subfields LTGRP + LTNUM + KEY + FEAT			
LTGRP		logical terminal group		
LTNUM		logical terminal number		
KEY	1-69	Enter the number associated with the DN appearance to which the feature is being assigned.		For M2317 telephones, only keys 1-11 are used.
FEAT	BC	selects BC option		
KVAR		= subfield FEAT + BCNAME		
FEATURE	BC	enter BC feature		
BCNAME	SPEECH, 64KDATA, 56KDATA, DATAUNIT, 3_1KHZ, or 64KRES	the bearer capability associated with this line or LTID		The 64KX25 BC does not apply to basic call.
Example:*ISDN 555 8 BC 64KDATA*				

ESN TCOS to NCOS mapping

Table 1-54, "TCOS to NCOS mapping" on page 1-100 shows the datafill used for TCOS compatibility between two MSL-100 switches. These parameters are datafilled in table COSDATA.

- Mapping TCOS to NCOS is one-to-one, for example, the 0-255 NCOSs are mapped one-to-one to 0-7 TCOSs.
- Mapping NCOS to TCOS involves an algorithm that transforms the TCOS value to a number between 0 and 7 for all NCOSs over 7.

Table 1-54 TCOS to NCOS mapping

COSNAME	NCOS	TCOS
ETN	0	0
ETN	1	1
ETN	2	2
ETN	3	3
ETN	4	4
ETN	5	5
ETN	6	6
ETN	7	7
ETN	8	0
ETN	9	1
... and so on		

Operational measurements (OM) DS1CARR OMs

The DS1CARR OMs monitor the performance of DS-1 lines for each carrier. This OM group replaces the CARR OM group. Provisioning for the registers in the DS1CARR group is per DS-1 carrier.

Note: These OMs correspond to layer 1 (physical layer) in the open systems interconnection (OSI) model.

The following OM pegs are accumulated for each DS-1 carrier for 24 hours and are reset when DS1LOF and DS1SLP are reset:

- DS1OMINFO key to digital carrier equipment table
- DS1LCGA DS-1 local carrier group alarm
- DS1RCGA DS-1 remote carrier group alarm

- DS1BER DS-1 bit error rate maintenance or out-of-service limit exceeded
- DS1LOF DS-1 framing lost on the incoming side
- DS1SLP DS-1 frame slip
- DS1SBU DS-1 carrier busied out by the system-originated commands
- DS1MBU DS-1 carrier busied out by commands from the MAP terminal
- DS1CBU DS-1 carrier in CSBY state (DTCI out of service)
- DS1PBU DS-1 carriers in PSBY state
- DS1BER DS-1 bit error ratio (replaces DS1BPV)
- DS1ES DS-1 error second
- DS1SES DS-1 sever error second
- DS1UAS DS-1 unavailable second

DCH OMs

The PRADCHL2 group contains the OMs for the D-channel signaling link (layer 2 protocol). This OM group is pegged in the DTCI and collected from the PM just before the OM transfer from the active to the holding registers.

Note: These OMs correspond to layer 2 (link layer) in the OSI model.

PRADCHL2 registers are as follows:

- PRDDISCT - count of discarded transmit frames accumulated during one minute
- PRDS0RX - count of successfully received SAPI 0 (circuit-switched data) frames accumulated over one minute
- PRDRNRRX - count of RNR (receiver not ready) frames received from peer accumulated over one minute
- PRDCRC - count of frames received with CRC (cyclic redundancy check) errors, accumulated over one minute
- PRDSBMTX - count of link resets caused by ISP accumulated over one minute
- PRDREJTX - count of REJ (reject) frames transmitted by ISP
- PRDDISCR - count of received frames discarded due to other errors, accumulated over one minute
- PRDSBMRX - count of link resets caused by peer accumulated over one minute

- PRDS0TX - count of successfully transmitted SAPI 0 (circuit-switched data) frames accumulated over one minute
- PRDRNRTX - count of RNR (receiver not ready) frames transmitted by ISD to peer accumulated over one minute

TRK OMs

TRK OMs monitor call processing performance of the trunk group. Provisioning for the registers in the TRK group is for each trunk group.

Note: These OMs correspond to layer 3 (network layer) in the OSI model.

The following OM pegs are accumulated over 24 hours and are reset when DS1LOF and DS1SLP are reset.

- OM2TRKINFO - trunk information fields: direction, total circuits, and working circuits
- INCATOT - incoming seizures
- PRERTEAB - abandoned incoming call attempts
- INFAIL - call origination attempts terminated unsuccessfully
- NATTMPT - calls routed to this trunk group
- NOVFLATB - call processing overflows
- GLARE - dropped calls due to glare
- OUTFAIL - unsuccessful outgoing seizures
- DEFLDCA - routed calls prevented from using this trunk group by network management
- DREU - directional reservation activated
- PREU - protective reservation activated
- TRU - trunks found in tk_cp_busy, tk_cp_busy_deload, and tk_lockout
- SBU - trunks found in tk_remote_busy, tk_pm_busy, tk_system busy, tk_carrier_fail, and tk_seized, tk_nwm_busy
- MBU - trunks found to be in tk_man_busy, tk_seized, tk_nwm_busy
- OUTMTCHF - incoming calls initially routed to an outgoing trunk group
- CONNECT - outgoing seizures resulting in successful calls
- TANDEM - incoming calls initially routed to an outgoing trunk group
- AOF - incoming ANI failures (does not apply to PRI trunks)
- TOTU - sum of TRU, SBU, and MBU counts

Treatment OMs

Treatment OMs monitor call processing performance of the trunk group. Treatments are routed to the originating PRI with the cause value in a DISC message.

Peg counts are accumulated according to five groups

- customer unauthorized (CU)
- customer misc (CM)
- equipment related (ER)
- feature related (FR)
- resource shortage (RS)

The treatments are mapped to these groups as follows (important items are in boldface):

- Customer unauthorized: ADBF, ANBB, ANIA, CACE, CCNA, CCNV, CNDT, CNOT, D950, DACD, DCFC, *DNTR*, DODT, FDNZ, *FNAL*, HNPI, ILRS, INAC, INAU, INCC, IVCC, LCAB, MSCA, MSLC, N950, NACD, *NACK*, NOCN, ORSSRSDT, TDND, TESS, TINV, UMOB, UNCA, UNIN, UNOW, UNPR
- Customer misc: ANCT, ANTO, ATBS, ATADT, BLDN, BLPR, CFWV, DISC, OPRT, *PDIL*, *PSIG*, TDBR, TRBL, UNDN, UNDT, VACS, *VACT*, VCCT
- Equipment related: AIFL, *CONP*, ERDS, FDER, INOC, NCFL, NCUN, NMZN, NONT, PNOH, PTOF, RODR, SSTO, STOB, STOC, SYFL
- Feature related: *BUSY*, CCTO, CONF, MANL, MHLD, NCII, NCIX, NCTF, NINT, ORAC, ORAF, ORMC, ORMF, PGTO, PMPT, PRSC, RRPA, SRRR, TRRF
- Resource shortage: CGRO, CQOV, EMR1, EMR2, EMR3, EMR4, EMR5, EMR6, FECG, GNCT, *NBLH*, NBLN, *NCRT*, NECG, NOSC, *NOSR*, SORD, TOVD

Basic call OMs

No OMs specific to basic call are provided in BCS 30. Use the trunk OMs to monitor call processing performance of the trunk group. There are no other PRI OMs that apply.

Logs

Table 1-55, "MSL-100 system logs" on page 1-104 lists the MSL-100 system logs that apply to DS-1 carriers.

Table 1-55 MSL-100 system logs

Report ID	Alarm info	Event type	Event ID	Equip type	Equip ID
PM109	No change	SYSB generated when SYSB due to loss of sync, remote alarms, or DS-1 card is removed	CARRIERCARRIER_NO:line_#REASON:char_string	pmtype	pmnbr
PM110	NOALARM	INFO generated when BPV or SLIP, MTCE, or OOS limits are set or cleared, or when the DS-1 card fails maintenance or is replaced	CARRIERCARRIER_NO:line_#REASON:char_string	pmtype	pmnbr
PM111	NOALARM	INFO generated when a system-busy carrier is returned to service	CARRIERCARRIER_NO:line_#REASON:char_string	pmtype	pmnbr
PM112	NOALARM	INFO generated when a carrier slip counter is initialized	CARRIER_SLIP_INIT	pmtype	pmnbr
PM186	NOALARM	INFO generated as a general information log for carriers	CARRIERCARRIER_NO:line_#REASON:char_string optchar_string	pmtype	pmnbr

Maintenance

Maintenance for the DTCI is the same as for the DTC.

For successful call processing on the MSL-100 system, the following conditions must be met:

- The carrier must be in service (INSV).
- The PRI trunk must be in service (IDL).
- The calling and called lines must be in service (IDL).

DS-1 carrier alarms/display

Table 1-56, "MSL-100 DS-1 carrier alarms/display" on page 1-105 lists DS-1 carrier alarms that are displayed in the CARRIER level of the MAP terminal. To access the carrier level of the MAP terminal, use the following command:*MAPCI;MTC;TRKS;CARRIER*

Alarms are either visual or audible. The system provides automatic detection and recovery for most faults. If the system recovers, the alarm is cancelled and the event is entered into the system log.

The occurrence of errors is controlled by limits entered in table CARRMTC.

Table 1-56 MSL-100 DS-1 carrier alarms/display (Sheet 1 of 2)

Message	Effects	Remedy
RCGA remote carrier group alarm (yellow alarm) FAR END RESULT	Indicates remote alarm detection in receive path; the yellow alarm counter is incremented by 1 for every 10 secs of remote alarm when the counter reaches 34, the counter is no longer incremented and the trunk is removed from service.	Check the far end.
LCGA local carrier group alarm (red alarm) NEAR END FAULT	Indicates a DS-1 card or transmission fault for transmit path; the DS-1 is removed from service; remote alarm pattern sent to far end.	1. Ensure that transmission parameters are correctly set at both ends. (See correlation tables.) 2. Run a loopback test. (See tests.) 3. Run a continuity test (See tests.)
BER approximated bit error rate DS-1 DISPLAY	The counter is incremented for every 1K-bit errors for each day. For ESF, both BPV and CRC errors are reported.	Alarm settings can be altered by changing table CARRMTC.

Table 1-56 MSL-100 DS-1 carrier alarms/display (Sheet 2 of 2)

Message	Effects	Remedy
FRME Frame loss error	Counter is incremented for every 1K bit errors for each day. If frame loss continues for 3 secs or more, the trunk is removed from service. It is restored automatically when frame sync is received continuously for 15 secs.	Alarm settings are altered by changing table CARRMTC
SLIP frame slip (clock sync) error DS-1 DISPLAY	Counter is incremented for each frame slip per day.	Alarm settings are altered by changing table CARRMTC.
ES errored seconds DS-1 DISPLAY		Alarm settings are altered by changing table CARRMTC.
SES Severe errored seconds *UAS* unavailable seconds		Alarm settings are altered by changing table CARRMTC.
State carrier state	Shows INSV, MANB, SYSB, UNEQ (trunks off-line)	

DTCI commands

Table 1-57, "MAP commands" on page 1-107 provides the maintenance commands for the DTCI. This is the same set of commands as those used for the DTC.

Use the following MAP command to enter the DTCI level of the MAP terminal:*MAPCI;MTC;PM;POST DTCI xx*

Table 1-57 MAP commands (Sheet 1 of 2)

Command	Function
POST	places the specified DTCI in the command position of the MAP terminal
LISTSET	displays the current or all PMs in the post set
TRNSL	displays the status, message condition and capability of the C- or P-side links
TST	performs a controller self-diagnostic
BSY	busies the DTCI, one unit, or P-side link
RTS	returns to service the DTCI, one unit, or P-side link
OFFLINE	puts DTCI node off-line (both DTCI must be in MANB first) (See Note.)
LOADPM	loads both units
DISPLAY	displays the PM types and numbers associated with a particular state
NEXT	puts the next PM type in the posted set in the command position of the MAP terminal
QUERYPM	displays the equipment location, load information, and the status of the DTCI
QUERYPM FLT	displays the fault (if any) for each unit of the DTCI

Note: An off-line DTCI remains in this state over all restarts.

Table 1-57 MAP commands (Sheet 2 of 2)

Command	Function
QUERYPM CNTRS	displays the name of the load for the DTCI
SWACT	causes an activity switch to the inactive unit of the DTCI
Note: An off-line DTCI remains in this state over all restarts.	

DS-1 carrier commands

The carrier level performs all maintenance for PRI (DTCI) DS-1s. To access the carrier level of the MAP terminal, use the following command:*MAPCI;MTC;TRKS;CARRIER;POST DTCI xx*

The display option command displays the carrier options for the posted circuit, such as card code, options, and alarm thresholds.

A carrier is looped toward the near (1) or far end (r) by using the following command. The loop is cleared using the (c) option.*LOOP* n <l/c/r>

D- and B-channel commands

Although the PRADCH is designed mainly for D-channel maintenance, it is also used for PRI B-channel maintenance (except for commands CONT and LOOPBK).

Note: The control and post position displays are cleared when exiting the PRADCH level.

Use the following MAP command to enter the PRADCH level of the MAP terminal:*MAPCI;MTC;TRKS;TTP;PRADCH*

Note: The D-channel cannot be posted at the trunk test position (TTP) level of the MAP terminal. It must be posted from the PRADCH level under the TTP level. A B-channel is posted at the TTP, MANUAL, MONITOR, or PRADCH level of the MAP terminal.

Table 1-58, "MSL-100 PRADCH maintenance commands" on page 1-109 lists the MSL-100 system PRADCH maintenance commands.

Table 1-58 MSL-100 PRADCH maintenance commands

Command	Function
POST	Post one or more DS-1 circuits for maintenance. The options supported are:*GD*<CCLI> (post by group—use D-channel CLLI),*BD*<CCLI> (post D and B-channels),*D DTCI*<DTCI#> (post by PM>*D DTCI*<DTCI# CKT> (post by circuit#)*D DTCI*<DTCI# CKT TS> (post by circuit and timeslot)*T*<CLLI> <MEM> (post by trunk member—for B-channels only)The STA (State) field shows the state of the D-channel.
BSY	Busy out a circuit or put a circuit in the INB state using BSY INB.
RTS	Return the specific channel to service. (See Note.)
NEXT	Put the next circuit in the post set in control position.
CONT	Run a continuity test on the posted PRI D-channel (internal or external).
LOOPBK	Set loopback mode so that the far end is able to run an external continuity test.
HOLD	Place circuit in the hold position.
Note: If the DCH is INB, put the DCH in MB state with BSY before RTS.	

DTCI states

Table 1-59, "MSL-100 DTCI states" on page 1-110 lists the possible states for the DTCI. Note that each unit of the DTCI has a separate state and both units can be in the same state. For the states OFFL and CBSY, both units are always be in the same state.

Table 1-59 MSL-100 DTCI states

State	Description
CBSY	Both message links to network are out of service.
INSV	PM is in-service with no problems.
ISTB	One or both units installation busy.PM overloadedPM load name does not match load name in LTCINV.static data mismatchCSlinks out of servicenode redundancy lostmajor CSlink failurecritical CSlink failureWARM SWACT turned offWarm SWACT not OK
MANB	Service engineer has busied the PM.
OFFL	PM is off-line (software state).
SYSB	system busy during CC initializationDiagnostics failed.All C-side links are down.reset while in-servicetrap message received from PMautonomous activity dropunsolicited messages limit exceededSelf-test failed.PM audit detect faultInactive unit lost data sync.REX in progressREX failed.RTS failed.PM SWACTCS cleared RTS.Audit detected inconsistent PM activity.Audit detected inconsistent PM state.no response from XPM during audit require data loadRTS rippling from C-sidemessaging failreset limit exceededESA translation data downloading faileddata message threshold exceededSWER message threshold exceededfault msg threshold exceededload corruption suspecteddata corruption suspected/detectedincoming message overload condition
MANB	manual busy—DS-1 removed from service by engineer for maintenance
INSV	DS-1 is in service; no alarms present
OFFL	The DS-1 is off-line.
SYSB	The DS-1 is system busy from a remote or local alarm.
UNEQ	The p-side port for the DTCI is unequipped (no datafill exists in table LTCPSINV). Any trunks datafilled for that facility are off-line.

DS-1 carrier states

Table 1-60, "MSL-100 DS-1 carrier states" on page 1-111 lists the possible states for the DS-1 carrier.

Table 1-60 MSL-100 DS-1 carrier states

State	Description
MANB	manual busy—DS-1 removed from service by engineer for maintenance
INSV	DS-1 is in service; no alarms present.
OFFL	The DS-1 is off-line.
SYSB	The DS-1 is system busy from a remote or local alarm.
UNEQ	The p-side port for the DTCI is unequipped (no datafill exists in table LTCPSINV); any trunks datafilled for that facility are off-line.

D-channel states

Table 1-61, "MSL-100 D-channel states" on page 1-111 lists the possible states for the D-channels.

Table 1-61 MSL-100 D-channel states

State	Description
CFL	Carrier fail—the carrier is out of service or SYSB.
INB	Installation busy—D-channel is configured in datafill but is not in service.
INSV	D-channel is in service and available.
LO	Lockout—link level (layer 2) or physical level (layer 1) failure
MANB	Manual busy—D-channel removed from service at the MAP terminal.
PMB	Peripheral is MANB.
RNR	Remote not responding—the link is established and ready but the far end is not responding to PRI messages.

B-channel states

Table 1-62, "MSL-100 B-channel states" on page 1-112 lists the possible states for the B-channels.

Table 1-62 MSL-100 B-channel states

State	Description
CFL	carrier failed—associated DS-1 failure
CPB	call processing busy—currently carrying traffic (service busy)
CPD	Call processing deload—circuit carrying traffic but another entity, such as MTCE, has requested to be informed when CP releases circuit.
DEL	Deload—CPD circuit is now available.
DFL	D-channel fail—the D-channel is not in service so no signaling for B-channels can take place.
DMB	D-channel manually busy—the D-channel is MB.
IDL	Circuit in service and available; D-channel is in service.
INB	Installation busy—circuit is installed but not yet in service.
INI	Initialized—CPB circuits are initialized after a system restart.
LO	local failure of a circuit (no response from far end for this circuit)
MB	Manual busy—circuit removed from service by service engineer for maintenance.
NEQ	not equipped—circuit hardware not provided
PMB	peripheral manual busy—the associated DTCI is out of service.
RMB	remote manual busy—trunk for incoming calls removed from service by far end
SB	system busy—circuit removed from service by system maintenance
SZD	seized—circuit is seized for manual or system action.

Tests

Table 1-63, "Tests for verifying network operation" on page 1-113 lists the tests for verifying network operation at the trunk or link level.

Be sure to BSY the PM at the DTCI level of the MAP terminal before running the tests.

Table 1-63 Tests for verifying network operation

Test	Description	Procedure
DTCI diagnostic	performs a self-test on the DTCI PM	1. Enter the DTCI level of the MAP terminal.2. Enter *TST* to test the posted DTCI.3. A card list is generated if the diagnostic fails.4. If test fails, check the PM logs for additional information.
Internal continuity test	verifies D-channel operation at the node level	1. Enter the PRADCH level of the MAP terminal.2. Enter *POST GD* to identify the DCH.3. Enter *CONT INT* to start testing.
External continuity test	verifies D-channel continuity to the far end and back. The loopback at the far end must be set at the far end.	1. Enter the PRADCH level of the MAP terminal.2. Enter *POST GD* to identify the DCH.3. Contact the far end to ensure loopback mode is set using the *LOOPBACK SET* command.4. Enter *CONT EXT* to start testing.5. Ensure that the far end removes loopback mode with the *LOOPBACK TAKEDOWN* command.

TRAVER enhancements

TRAVER is enhanced to include additional translation tables accessed by PRI call processing. These enhancements do not affect translations for non-PRI trunks.

The TRAVER command line format is changed as follows:traver <ORIG> <NPI> <DIGITS> <OPT> <TRACE>

The new fields NPI and OPT are optionally added for PRI. These fields are used for calls originating on a PRI trunk. These fields do not affect any other type of trunk agency even if they are entered. The information contained in the OPT field is:

- NSF (optional)
- BC (optional)

This information, supplied in the PRI call setup message, enables the translation path for PRI.

Troubleshooting

Table 1-64, "Troubleshooting procedures" on page 1-114 provides troubleshooting procedures for common problems.

Table 1-64 Troubleshooting procedures

Symptom	Procedure
If the DCH is locked out (LO)	Verify the datarate in table TRKSGRP matches that of the far end. Verify the IFCLASS in table TRKSGRP. If connected to another DMS-150, the endpoints of the local connection should have opposite values. Otherwise, the DMS-1=250 is always NETWORK. Verify that the appropriate NT6X50 is in the DS-1 and correctly datafilled in table CARRMTC. Verify the correlation of the transmission characteristics for the link: frame format and line encoding, for example. Use the protocol analyzer to verify frame synchronization.
When FF=ESF, yellow alarm indicated when no yellow alarm is being transmitted from the far end	Put the carrier back into SF format. Make sure the far end is not transmitting yellow alarm and wait for the LCGA to clear. Return the carrier to ESF format.

2 Integrated Services Access

This chapter provides information about the Integrated Services Access (ISA) feature on the primary rate interface (PRI) and the information necessary to make ISA work on the Meridian 1 PBX and Digital Multiplex System (DMS) families. The Meridian 1 family includes the Meridian 1 (M-1) PBX and the Meridian SL-100 (MSL-100) switches.

ISA on the Meridian 1 PBX

The ISA gives the Meridian 1 PBX the ability to combine calls of different types on a single DS-1 link. The available call types include terminal interface equipment (TIE), foreign exchange (FX), direct inward dialing (DID), inward wide area telephone service (INWATS), and outward wide area telephone service (OUTWATS). This allows dynamic call-by-call service selection and provides the capability to match trunk requirements to peak periods of call usage.

Figure 2-1, "Meridian 1 PBX Integrated Services Access on PRI" on page 2-116 is an example of ISA on PRI for the Meridian 1 PBX.

Figure 2-1 Meridian 1 PBX Integrated Services Access on PRI

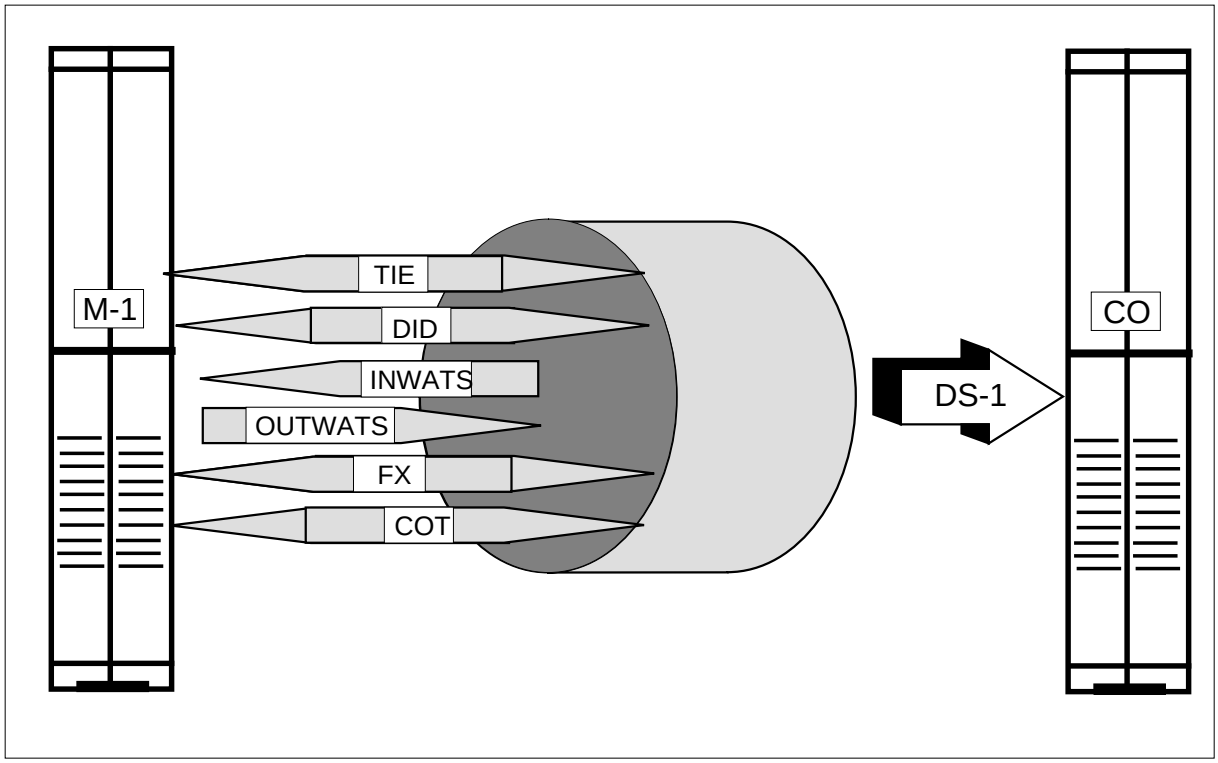
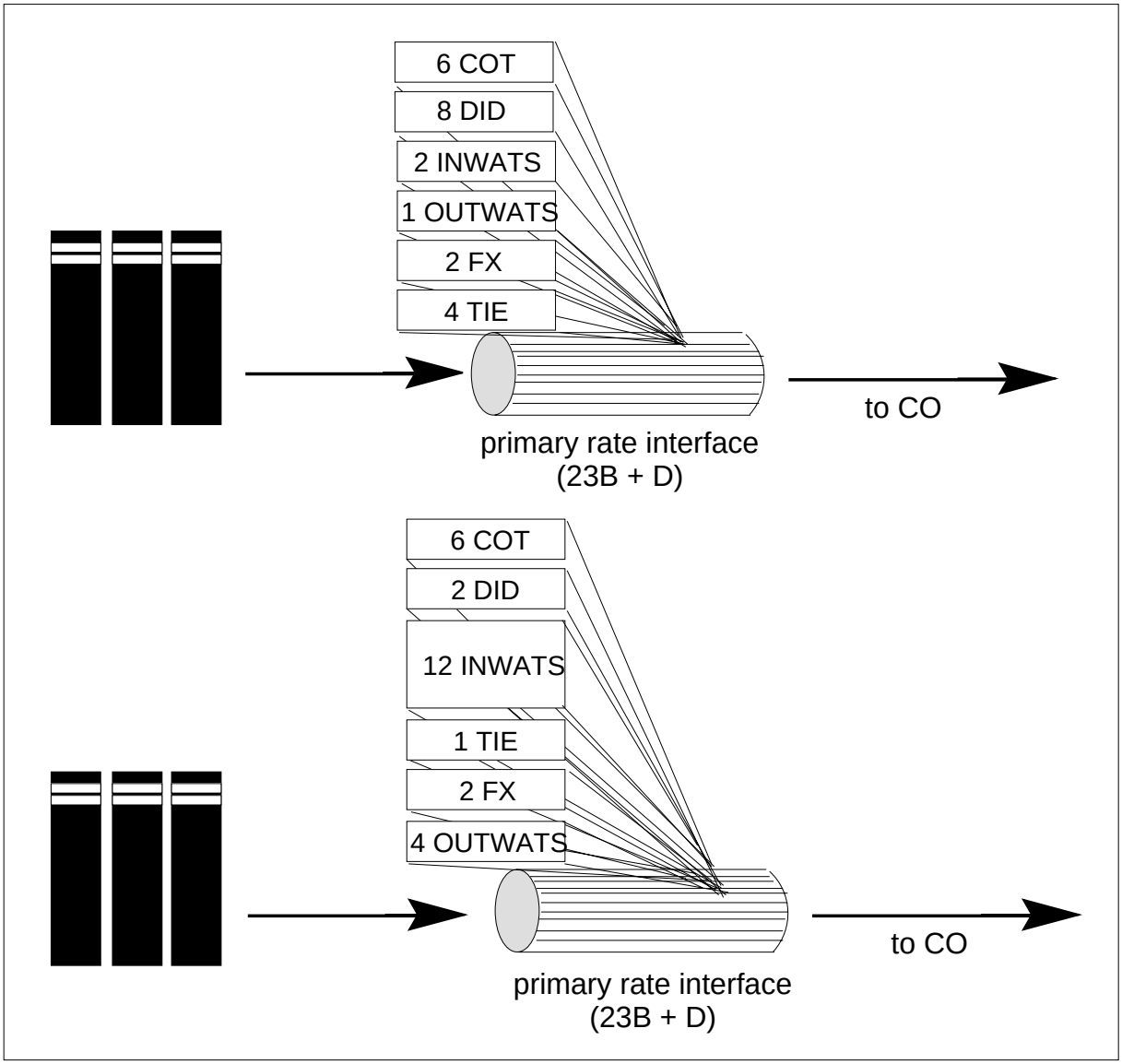


Figure 2-2, "Varying Meridian 1 B-channel assignments by call type" on page 2-117 shows how PRI B-channels can be adjusted to allow a telemarketer more DID calls than COT.

Figure 2-2 Varying Meridian 1 B-channel assignments by call type



The Meridian 1 PBX makes the selection of call type on a per-call basis, which provides a service-based architecture. A SETUP message is sent with each ISA call. This message includes information elements which the Meridian 1 PBX uses to determine call type. Control of ISA features is accomplished by the Meridian 1 PBX through existing overlays.

The ISA feature provides control over trunk usage based on call type. For example, a user can define:

- the maximum and minimum number of simultaneous calls of each type allowed on a PRI trunk
- the total number of calls allowed for each service route
- the number of B-channels reserved for ISA use

The Meridian 1 PBX creates ISA routes through service changes in overlay 16. An ISA route contains a list of PRI B-channels that are available for use.

Routing of ISA calls is controlled by one of two methods:

- Central office (CO) control performs alternate route selection (ARS) on all calls across the PRI interface. Routing tables are set up in the CO by service orders. The Meridian 1 PBX collects dialed digits only. Actual translation and routing is performed by the CO.
- shared, or co-located control, requires routing and translation data to be stored at both the CO and the Meridian 1 PBX. In this case, the Meridian 1 PBX retains control of the routing for leased trunk facilities residing at the CO.

Connectivity

The Meridian 1 PBX provides ISA over the PRI between the following switches:

- Meridian 1 to MSL-100
- Meridian 1 to DMS-100
- Meridian 1 to DMS-250
- Meridian 1 to AT&T #4ESS (Call By Call service)
- Meridian 1 to Lucent #5ESS (Call By Call service)

Meridian 1 to Meridian 1

ISA between Meridian 1 PBXs is not supported.

Meridian 1 to MSL-100

When an MSL-100 switch is serving as a local exchange carrier (Class 5 central office), the Meridian 1 PBX provides ISA selection of the following trunks on a per-call basis:

- TIE
- FX
- DID
- DOD

- COT
- OUTWATS
- INWATS

Hardware provisioning

The Meridian 1 PBX must be provisioned for the PRI. There are no special hardware rules or requirements for ISA on the Meridian 1 PBX.

Installation rules

There are no installation rules for ISA on the Meridian 1 PBX.

Maintenance rules

There are no maintenance rules for ISA on the Meridian 1 PBX.

Software provisioning

Release 23 is required for NI-2 ISA (call by call).

The Meridian 1 PBX requires release 15 and the following options for ISA:

- SW0000X: Base package (old Option 75, PBXI)
- SW0051X: ISDN PRI (old Option 145, ISDN, 146, PRI, 147, ISL, 291, NI-2)
- SW0053X: interexchange carrier (old Option 149, IEC, 117, CBC)

Note: The MSL-100 switch and DMS products require BCS 30 or later for ISA connectivity to the Meridian 1 PBX.

Datafill considerations

Prior to datafilling the Meridian 1 PBX for ISA, all appropriate PRI-related overlays must be complete.

Existing PRI routes are defined as ISA routes by performing the following three-step procedure:

1. Define an ISA route using LD16.
2. Configure ISA trunks using LD14.
3. Configure all the service routes (FX, TIE, INWATS, OUTWATS, COT, DID) using LD16.

   Assign an ISA route number to each service route. (Be sure the route does not have any dedicated trunk members. A B-channel trunk cannot be allocated as a service route.)

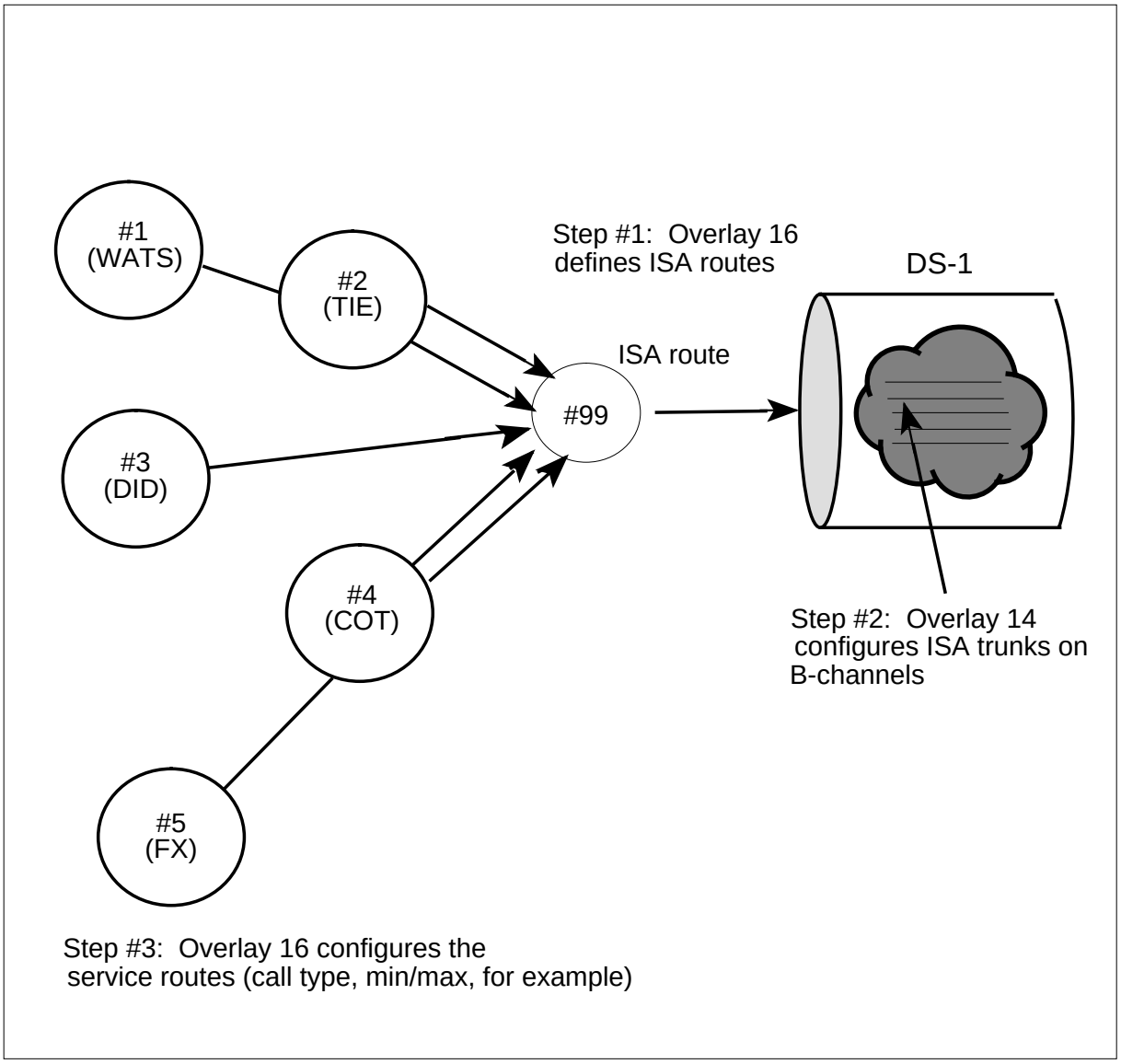
   Record the service identification number of each route, and coordinate routing tables with the local CO. The Meridian 1 PBX uses the service ID to route incoming calls.

   Define the minimum and maximum number of simultaneous calls allowed for each type of service route. Minimum/maximum values apply only when network specific facilities (NSF) = YES. The total minimum value of each service route cannot exceed the total number of ISA trunks defined in LD14. For example, if 15 ISA trunks are defined in LD14, the minimum number of call types guaranteed completion cannot exceed 15.

Note: The IFC of a service route and its ISA route must match.

Figure 2-3, "Creating and defining Meridian 1 PBX ISA routes" on page 2-121 is an example of the previous procedure.

Figure 2-3 Creating and defining Meridian 1 PBX ISA routes



Step 1: Creating ISA routes

Table 2-1, "Creating a Meridian 1 PBX ISA route" on page 2-122 shows how to create ISA routes using LD16. Default values are shown in brackets.

Table 2-1 Creating a Meridian 1 PBX ISA route

Prompt	Range of values	Description
PNI	1-32700	Private number identifier—one per customer. Use the same PNI in both customer data block (LD15) and route data block (LD16).
IFC	[D100]	DMS-100
	ESS4	AT&T #4ESS
	ESS5	Lucent #5ESS
	Meridian 1	Meridian 1 (to Meridian 1)
	D250	DMS-250
srvc		
NSF	[NO], YES	network specific facility—(prompted if IFC is anything other than Meridian 1 PBX. If NSF is YES, min/max is valid)
COTR	nnn	DID/CO route number—(prompted if IFC is anything other than Meridian 1 PBX. If NSF is YES, min/max is valid)
TIER	nnn	TIE route number—(prompted if IFC is anything other than Meridian 1 PBX. If NSF is YES, min/max is valid)
WATR	nnn	WATS route number—(prompted if IFC is anything other than Meridian 1 PBX. If NSF is YES, min/max is valid)
ICOG	IAO	incoming and outgoing trunk
	ICT	incoming trunk
	OGT	outgoing trunk
SRCH	[LIN], RRB	LIN—linear search; RRB - round-robin search (use for outgoing trunks)
Note: The IFC of an ISA route and its associated service route must match.		

Step 2: Configuring Meridian 1 PBX ISA trunks

Table 2-2, "Configuring a Meridian 1 PBX ISA runk" on page 2-123 shows how to configure ISA trunks using overlay 14. Default values are shown in brackets.

Table 2-2 Configuring a Meridian 1 PBX ISA runk

Prompt	Range of values	Description
REQ	NEW, CHG, MOV, OUT	
TYPE	ISA	ISA trunk type
TN	III ch: 0-159 1-24	terminal number—address loop number created in LD17. PRI loop number PRI channel
TOTN	III ch: 0-159 1-24	New loop and channel PRI loop number PRI channel
CUST	xx	customer number
RTMB	0-511, 1-254	route and member numbers

Step 3: Configuring Meridian 1 PBX service routes

Table 2-3, "Configuring a Meridian 1 PBX ISA service route" on page 2-123 shows how to configure service routes using overlay 14. Default values are shown in brackets.

Table 2-3 Configuring a Meridian 1 PBX ISA service route (Sheet 1 of 3)

Prompt	Range of values	Description
REQ	NEW, CHG, OUT	
TYPE	RDB	route data block
CUST	0-99	
ROUT	0-511	route number
Note: The IFC of an ISA route and its associated service route must match.		

Table 2-3 Configuring a Meridian 1 PBX ISA service route (Sheet 2 of 3)

Prompt	Range of values	Description
TKTP		types of ISDN service routes:
	TIE	TIE trunk
	DID	direct inward dialing
	INWATS	inbound WATS
	OUTWATS	outbound WATS
	COT	central office trunk
	FX	foreign exchange
DTRK	YES, [NO]	digital trunk
DGTP	PRI	digital trunk type
ISDN	[NO], YES	ISDN option
MODE	PRA	PRA master route for ISA
IFC	[D100]	DMS-100
	ESS4	AT&T #4ESS
	SL-1	Meridian 1 (to Meridian 1)
	D250	DMS-250
SRVC	[ACC], SDN, M800, MEG	service type for #4ESS (only prompted for #4ESS)
SRPM	0-9	WATS band
ISAR	YES	stepping to ISA allowed. ISAR can only be YES when there are no trunk assignments in LD14.
	[NO]	stepping to ISA not allowed.
RTN	0-127	Select route number of any configured ISA route. Prompted only when ISAR is YES.
FACY	YES, NO	NSF facility
Note: The IFC of an ISA route and its associated service route must match.		

Table 2-3 Configuring a Meridian 1 PBX ISA service route (Sheet 3 of 3)

Prompt	Range of values	Description
SID	0-127, [ROUT]	service identifier for route Prompted if NSF is YES and IFC is other than Meridian 1 PBX. (The SID must match the number at the receiving end.)
MIN	0-254	Minimum number of channels reserved on the ISA route (service-dependent). Prompted if ISAR is YES and IFC is other than Meridian 1 PBX.
MAX	1-254	Maximum number of channels reserved on the ISA route (service-dependent). Prompted if ISAR is YES and IFC is other than Meridian 1 PBX.
ICOG	IAO, ICT, OGT	incoming and outgoing trunkincoming trunk, outgoing trunk
NCOS	0-99	
ACOD	XXXX	trunk route access code
Note: The IFC of an ISA route and its associated service route must match.		

Note: For more detailed information see NTP 553-2901-100.

Further prompts follow the standard sequence for configuring service routes.

Operational measurement considerations

Traffic measurements associated with ISA routes include additional information on ISA trunks used by the route.

Traffic measurements for a trunk route contain information displayed in the following table.

Table 2-4 Trunk route traffic measurements (Sheet 1 of 2)

System ID	TFC002
<Customer Number>	
<Group Number>	COT
<Trunks Equipped>	<Trunks Working>

Table 2-4 Trunk route traffic measurements (Sheet 2 of 2)

System ID	TFC002
<Incoming usage>	<Incoming PC>
<Outgoing usage>	<Outgoing PC>
<Outgoing Overflow>	<All Trunks Busy>
<Outgoing ISA Peg Count>	<Incoming ISA Peg Count>
<Group Number>	ISA
<Incoming usage>	<Incoming PC>
<Outgoing usage>	<Outgoing PC>
<Outgoing Overflow>	<All Trunks Busy>
<Toll PC>	
<Outgoing ISA Peg Count>	<Incoming ISA Peg Count>

Traffic measurements for an ISA route contain information displayed in the format shown in the following table.

Table 2-5 ISA route traffic measurements

System ID	TFC002
<Customer Number>	
<Group Number>	ISA
<Trunks Equipped>	<Trunks Working>
<Incoming usage>	<Incoming PC>
<Outgoing usage>	<Outgoing PC>
<Outgoing Overflow>	<All Trunks Busy>
<Toll PC>	
<Outgoing ISA Peg Count>	<Incoming ISA Peg Count>

Log considerations

There are no log considerations for ISA on the Meridian 1 PBX. For traffic analysis and maintenance purposes, refer to the history file in LD22.

Service order considerations

There are no service order considerations for ISA on the Meridian 1 PBX.

Testing considerations

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

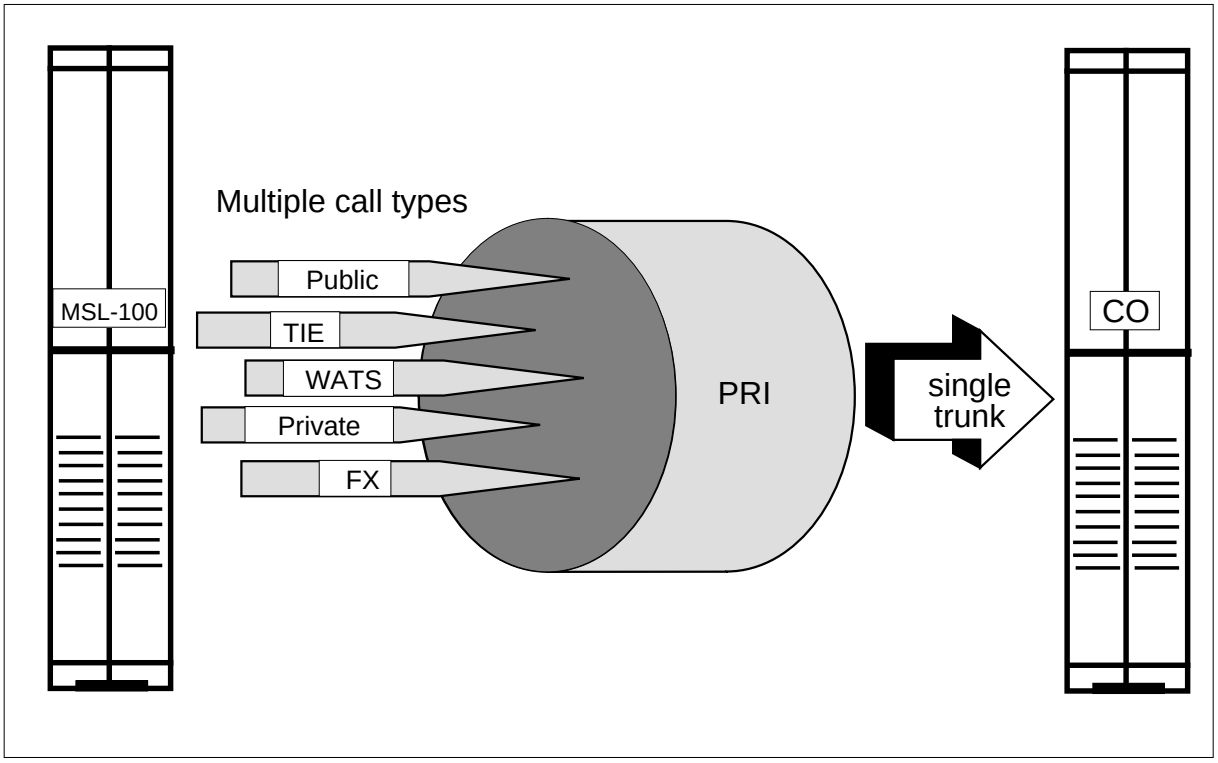
1. Select a PRI to be tested.
2. Access LD60. Start all pertinent B-channels.
3. Set all the Min/Max values in all service routes to 1.
4. Make a test call on a trunk route that accesses the PRI being tested. Be sure the test call is to a valid destination.
5. Use LD80 to ensure a B-channel from the ISA pool is in use. Then:
6. Place the call on hold.
7. Make another call. You should receive an overflow signal (fast busy).
8. Repeat this procedure for every outgoing service route.
9. Disconnect both calls.
10. 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. The terminating end should receive an overflow signal (fast busy).
11. Disconnect both calls.

ISA on the MSL-100 switch

ISA gives the Meridian 1/Meridian SL-100 switch combination the ability to combine calls of different types on a single trunk group. The available call types include PUBLIC, PRIVATE, OUTWATS, INWATS, FX, or TIE. This allows call-by-call service selection and provides the capability to match trunk requirements to peak periods of call usage.

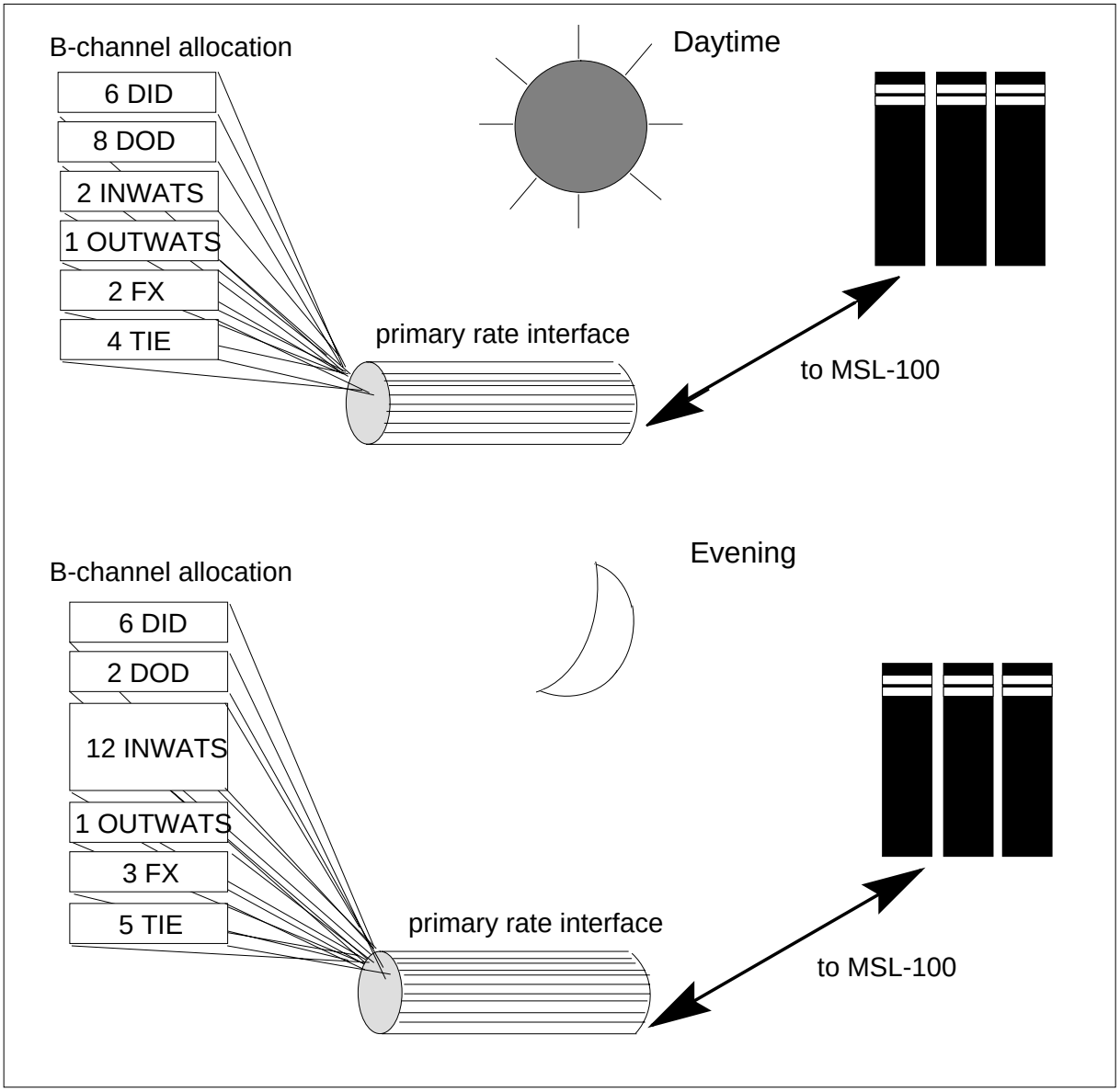
Figure 2-4, "MSL-100 switch Integrated Services Access on PRI" on page 2-128 is an example of ISA on PRI for the MSL-100 switch.

Figure 2-4 MSL-100 switch Integrated Services Access on PRI



PRI B-channels could be adjusted to allow a telemarketer more INWATS calls when needed, as shown in Figure 2-5, "Varying MSL-100 B-channel allocation by call type" on page 2-129.

Figure 2-5 Varying MSL-100 B-channel allocation by call type



The selection of call type is made on a per-call basis, which provides a service-based architecture. A SETUP message is sent with each ISA call. This message includes information elements which the MSL-100 switch uses to determine call type. Control of ISA features is accomplished by adding or modifying the MSL-100 switch datafill through existing tables.

Connectivity

The MSL-100 switch provides ISA over the PRI between the following switch combinations:

- MSL-100 to Meridian 1
- MSL-100 to MSL-100
- MSL-100 to DMS-100

NI-2 ISA call by call is provided for:

- MSL-100 to Meridian 1 switches (for release MSL07 and later)
- MSL-100 to DMS-100
- MSL-100 to MSL-100

Hardware provisioning

The MSL-100 switch must be provisioned for ISDN PRI capability, including the ISDN digital trunk controller (DTCI) for BCS 30 and later.

Software provisioning

ISA requires feature package NTX793AA and BCS 30 or later. The components of NTX793AA are:

- LTCALLS table control
- ISA routing table control

ISA also uses the following related features:

- Trunk Group Tables for PRI
- Call Processing Environment for ISDN PRI
- Signaling Manager for ISDN Functional Signaling
- Connection Manager for ISDN PRI
- PRI 250 to TCAP Interworking
- BELLCORE AMA-ENHANCED ARS Translations

Installation rules

There are no special installation rules for ISA at the network level.

Maintenance rules

There are no special maintenance rules for ISA at the network level.

Datafill considerations

Since ISA is a software feature, accurate datafill is imperative. Although an incoming call defaults to PUBLIC if there is missing ISA data, outgoing calls are blocked unless properly datafilled.

Preliminary datafill

All PRI-related tables should be correctly datafilled before ISA-specific data is added. For MSL-100 switches equipped with the ISDN DTCI, the PRI tables include:

- CARRMTC
- LTCINV
- LTCPSINV
- LTGRP
- LTDEF
- LTMAP
- LTCALLS
- TRKGRP
- TRKSGRP
- TRKMEM

ISA datafill

ISA uses the following tables to define, translate, and route calls:

- LTCALLS (logical terminal calls)
- IBNRTE (integrated business network routing table)
- OFRT (office route table)
- RTEREF (route reference table)
- VIRTGRPS (virtual facility group tables)

Call type significance

The dialed digits determine trunk selection for non-PRI calls. The MSL-100 switch routes ISA calls based on the call type datafilled in tables. However, there is no global significance to the call type at any given point. Different legs of the same call may have different call types.

SETUP message

A SETUP message is included with each call. The information elements are:

- bearer capability
- channel ID
- network specific facilities
- progress indicator

- calling party number
- called party number

Numbering plan indicator

The MSL-100 switch uses the numbering plan indicator (NPI) for translations. The NPI is part of the customer defined network (CDN) element of the SETUP message. The two values for the NPI are PUBLIC and PRIVATE.

NPI = PUBLIC

When the NPI value is E.164 (PUBLIC), the MSL-100 switch uses the public switched telephone network (PSTN) facilities to route the call.

NPI = PRIVATE

When the NPI value is PRIVATE, the MSL-100 switch uses the datafill in existing tables for translations. This datafill includes the use of electronic switching network (ESN) information signal digits. The datafill determines whether private (PVT) or TIE lines are used to route the call.

Network specific facilities

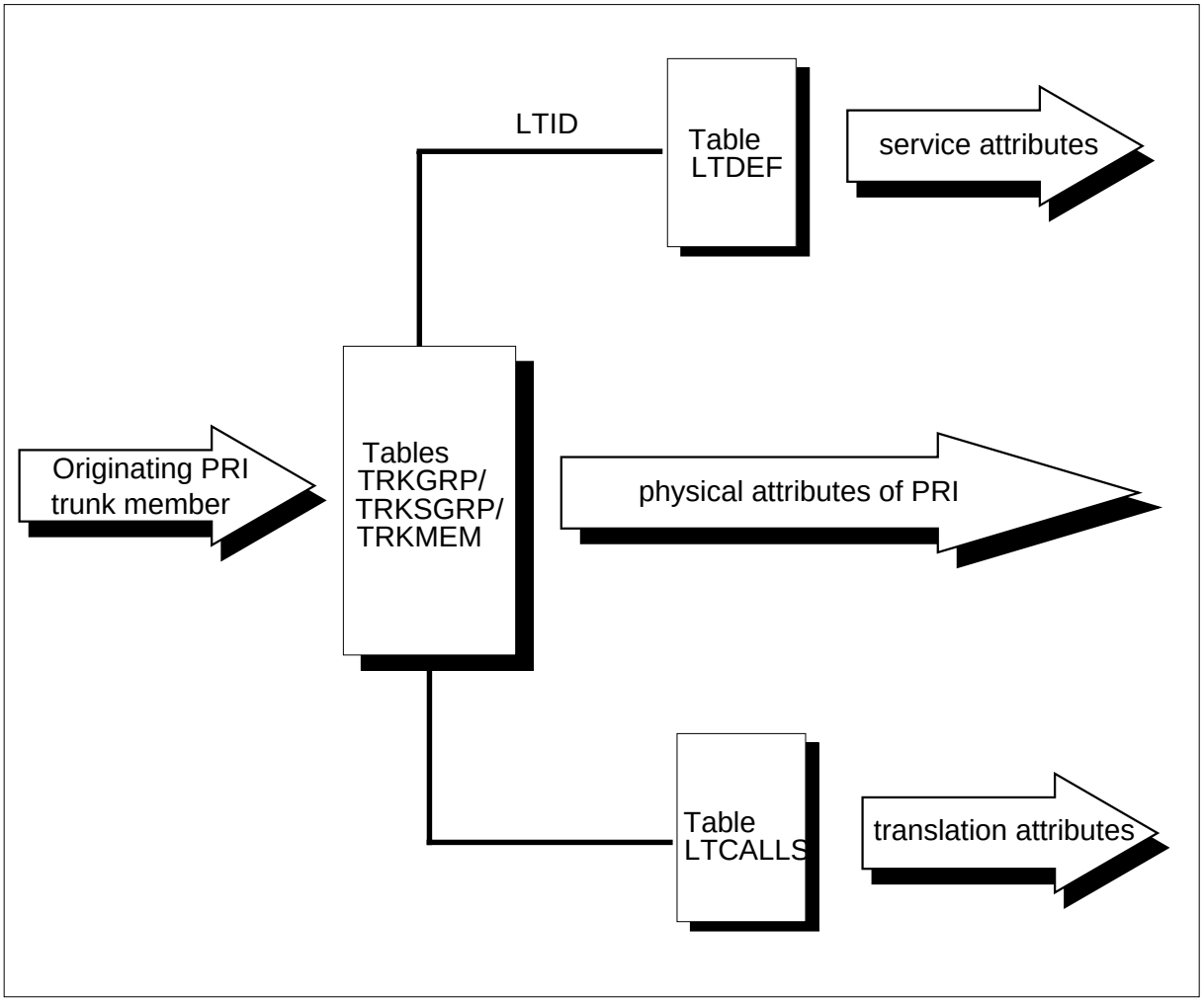
The NSF element indicates which type of service a call requires. The NSF contains two elements:

- The service selector (binary code facility coding value) specifies the type of service requested, such as TIE, WATS, or FX.
- The service identifier is an optional element which specifies the actual facility used to route the call.

Originating ISA table flow

Figure 2-6, "Originating ISA table flow (MSL-100 switch)" on page 2-133 shows the MSL-100 switch tables used when a PRI trunk member originates an ISA call.

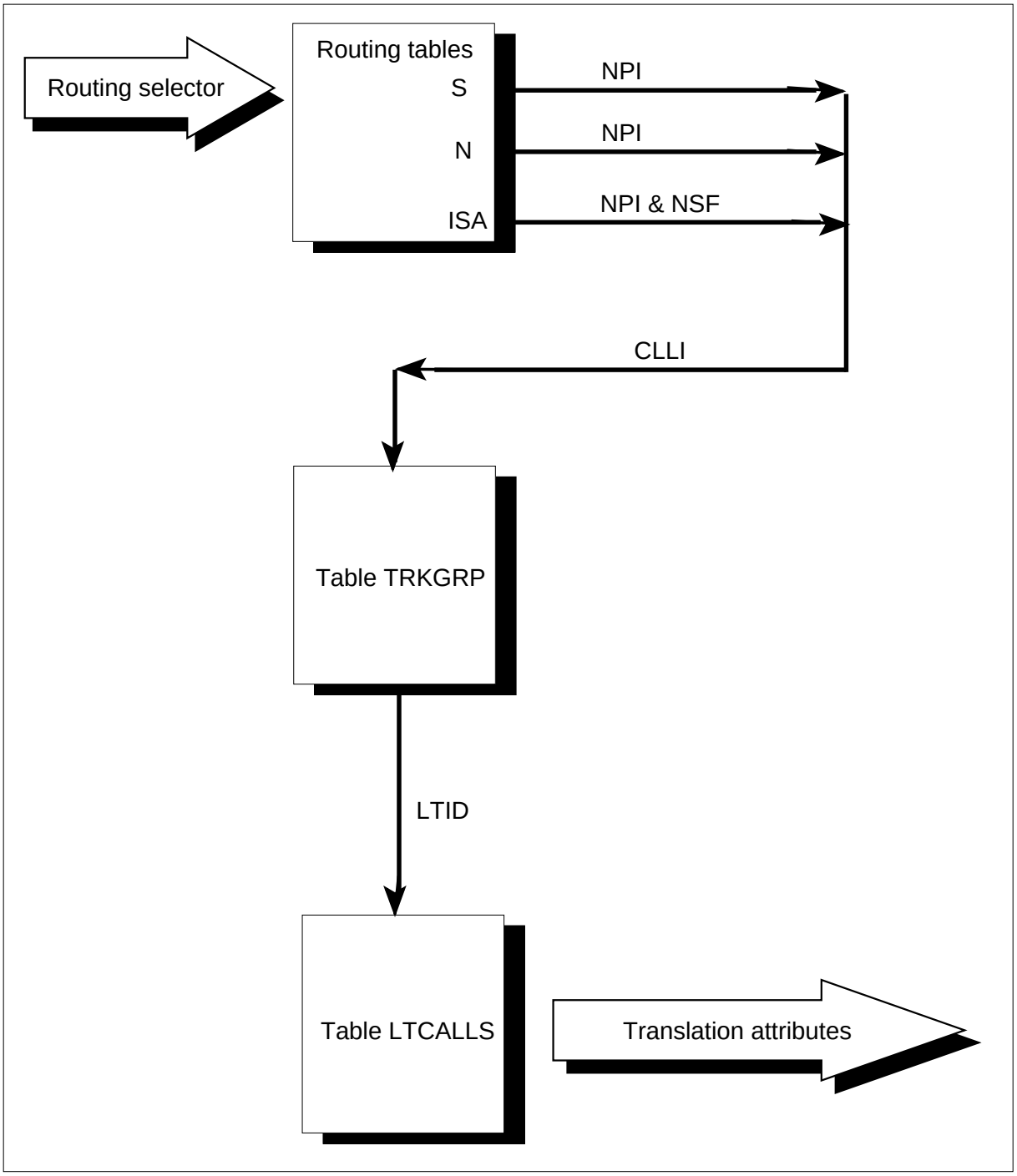
Figure 2-6 Originating ISA table flow (MSL-100 switch)



Terminating ISA table flow

Figure 2-7, "Terminating ISA table flow (MSL-100 switch)" on page 2-134 shows the MSL-100 switch tables used when a PRI trunk member terminates an ISA call.

Figure 2-7 Terminating ISA table flow (MSL-100 switch)



Logical terminal tables

The logical terminal tables provide the MSL-100 switch with identification, service, and translation information about the terminals connected to a PRI.

Nortel Networks recommends that the logical terminal tables be datafilled in the following order:

- LTGRP
- LTDEF
- LTDATA
- LTCALLS
- KSETINV
- KSETLINE
- KSETFEAT
- LTMAP

Note: Although tables KSETINV, KSETLINE, and KSETFEAT are not logical terminal tables, they should be datafilled before table LTMAP.

Figure 2-8, "MSL-100 switch logical terminal tables" on page 2-136 shows the tables that define the physical attributes of an ISA member, and where the service and translation attributes are obtained. An explanation of the datafill for each table follows Figure 2-8, "MSL-100 switch logical terminal tables" on page 2-136.

Figure 2-8 MSL-100 switch logical terminal tables

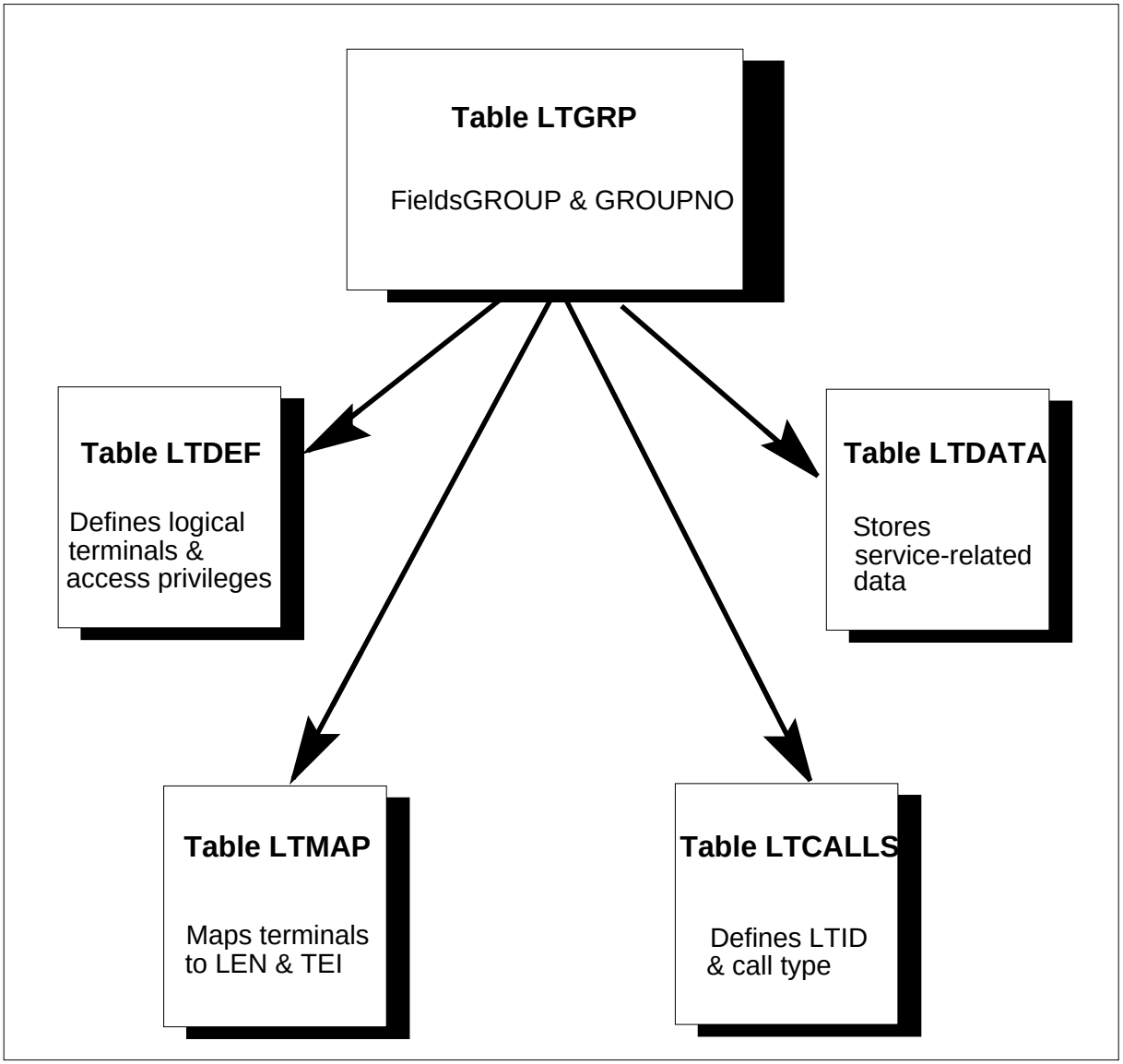


Table LTGRP

Table LTGRP defines a logical terminal group based on terminal type. The options field defines the terminal type for each group. The group ISDN is automatically filled as a permanent entry and cannot be changed or deleted.

Note: Table LTGRP must be datafilled before tables LTDEF, LTDATA, LTCALLS, and LTMAP.

Table 2-6, "MSL-100 switch table LTGRP parameters" on page 2-137 shows the fields and values for table LTGRP.

Table 2-6 MSL-100 switch table LTGRP parameters

Field name	Range of values	Default value	Description
GROUP	8 characters: A-Z, 0-9	ISDN	Name of a group of logical terminals
GROUPNO	0-31	Default group ISDN is automatically assigned GROUPNO 0.	Number assigned to a group name
OPTIONS	SAPI16, $	$	The type of terminals allowed in a group; the only current option is SAPI16, to allow packet and circuit switched terminals.
Note: The default group ISDN is automatically assigned as SAPI16.			

The GROUP field is an important element in four other logical terminal tables:

- LTDEF
- LTMAP
- LTDATA
- LTCALLS

These tables control how the MSL-100 system processes ISA calls. The datafill for these tables must match the value for GROUP in table TRKGRP.

Example of datafill

The following figure is an example of a tuple for table LTGRP.

Figure 2-9 Table LTGRP tuple

group	groupno	options
ISDN	0	SAPI16

Table LTDEF

Table LTDEF defines logical terminals and specifies access privileges. Table 2-7, "MSL-100 table LTDEF parameters" on page 2-138 shows the fields and values for table LTDEF.

Table 2-7 MSL-100 table LTDEF parameters

Field name	Range of values	Description
LTKEY	alphanumeric	consists of subfields LTGRP and LTNUM
(subfield) LTGRP	alphanumeric, 8 characters	The name of the logical terminal group. Must match GROUP field in table LTGRP.
(subfield) LTNUM	1-1022	assigns a number to individual terminals within groups
LTAP	B, D, BD, PB	assigns the access privilege for each terminal: B = circuit switched; D = D-channel packet switched; BD = combined switching; PB = B-channel packet switching
LTCLASS	BRAKS, BRAFS, PRI	Assigns the set of services allowed for a terminal. ISA requires PRI.

When the value of LTCLASS is specified as PRI, the subfields shown in Table 2-8, "MSL-100 switch table LTCLASS subfields" on page 2-138 appear.

Table 2-8 MSL-100 switch table LTCLASS subfields (Sheet 1 of 2)

Subfield name	Range of values	Description
NUMBCHNL	1-383	The number of B-channels this terminal can use at one time. The sum of this value for all LTIDs must not exceed the number of B-channels specified for the interface.
NUMCALLS	1-383	Number of calls allowed on the interface. Must be greater than or equal to the sum of INCCALLS and OUTCALLS.
INCCALLS	1-383	the number of reserved incoming-only calls allowed at one time
OUTCALLS	0-383	the number of reserved outgoing-only calls allowed at one time

Table 2-8 MSL-100 switch table LTCLASS subfields (Sheet 2 of 2)

Subfield name	Range of values	Description
OPTION	NOVOICE, NOVBD, NOCMD, NOPMD	NOVOICE = no voice calls; NOVBD = no voice band data calls; NOCMD = no circuit mode data calls; NOPMD = no packet mode data calls.
CONTMARK	+, $	Continuation mark; enter a plus mark (+) when the data continues to next line. Enter $ to signify end of string.

Example of datafill

The following figure is an example of a tuple for table LTDEF.

Figure 2-10 Table LTDEF tuple

```
ltgrp    ltnum    ltap    ltclass
                                                num     num     inc     out     options
                                                        bchnl   calls   calls   calls
ISDN     7        B       PRI     6       6       3       2       NOPMD   $
```

Table LTDATA

Table LTDATA stores service-related data for logical terminals. The terminals are defined by the LTGRP and LTNUM. The values entered in these fields of table LTDATA must match those in tables LTDEF, LTGRP, LTCALLS, and LTMAP.

Table 2-9, "MSL-100 switch table LTDATA parameters" on page 2-139 shows the fields and values for table LTDATA.

Table 2-9 MSL-100 switch table LTDATA parameters (Sheet 1 of 2)

Field name	Range of values	Description
LTDKEY	alphanumeric	logical terminal datakey consists of subfields LTGRP, LTNUM, and DATATYPE
(subfield) LTGRP	alphanumeric, 8 characters	logical terminal group name

Table 2-9 MSL-100 switch table LTDATA parameters (Sheet 2 of 2)

Field name	Range of values	Description
(subfield) LTNUM	1-1022	logical terminal number of the individual member of the group
(subfield) DATATYPE	DN	logical terminal datatype the only valid entry is DN
LTDRESULT	alphanumeric	logical terminal result consists of the DATATYPE and DFLTCGN subfields
(subfield) DFLTCGN	10-digit DN	Default calling party number Enter the 10-digit DN to which call will default if no CGN is supplied on originations. When CGN screening is enabled, this is the only DN that can originate calls on this interface.
OPTIONS	alphanumeric	consists of the subfields OPTIONS and CUSTGRP
(subfield) OPTIONS	CUSTGRP	options enter the option CUSTGRP
(subfield) CUSTGRP	alphanumeric	customer group name

Examples of datafill

The following figure is an example of a tuple for table LTDATA.

Figure 2-11 Table LTDATA tuple

LTDKEY			LTDRESULT		OPTIONS	
ltgrp	ltnum	datatype	datatype	dfltcgn	options	custgrp
ISDN	7	DN	DN	7035693781	CUSTGRP	NAVCC

Table LTCALLS

Table LTCALLS creates the logical terminal identifier (LTID) from the LTGRP and LTNUM values. This table also assigns a call type to each terminal, and controls ISA translations.

Tables LINEATTR, STDPRTCT, HNPACONT, ZONEORDR, OFRT, IBNRTE, LTGRP, LTDEF, and LTDATA must be datafilled before LTCALLS.

Table 2-10, "MSL-100 switch table LTCALLS parameters" on page 2-141 shows the fields and values for table LTCALLS.

Table 2-10 MSL-100 switch table LTCALLS parameters (Sheet 1 of 2)

Field name	Range of values	Description
LTID	alphanumeric	logical terminal identifier consists of the subfields LTGRP, LTNUM, and CALLTYPE
(subfield) LTGRP	alphanumeric, 8 characters	logical terminal group name must match the values in tables LTGRP, LTDEF, LTDATA, and LTMAP
(subfield) LTNUM	1-1022	the logical terminal number of the member within the group must match the values in tables LTGRP, LTDEF, LTDATA, and LTMAP
(subfield) CALLTYPE	PUB, PVT, WATS, INWATS, FX, TIE	defines the call type assigned to a terminal PUB = public; PVT = private; WATS = Outbound WATS; INWATS = Inbound WATS; FX = foreign exchange; TIE = private lines between PBXs.
XLARTE	XLALEC, XLAIBN, XLAIEC, RTEREF	selects the translation route XLALEC = local exchange carrier; XLAIBN = integrated business network; XLAIEC = inter exchange carrier; RTEREF specifies translations by a routing table, such as OFRT and IBNRTE.
LINEATTR	0-1023	selects the index used to access table LINEATTR for service-related data
If the XLARTE selector is XLAIBN, the following subfields appear:		
LINEATTR	0-1023	selects the index used to access table LINEATTR for service-related data
CUSTGRP	alphanumeric	customer group name
SUBGRP	0-7	subgroup number used to further define CUSTGRP

Table 2-10 MSL-100 switch table LTCALLS parameters (Sheet 2 of 2)

Field name	Range of values	Description
NCOS	0-255	network class of service determines the facilities to which each terminal has access
If the XLARTE selector is RTEREF, the following subfields appear:		
RTEID	1-1023	route index the index number used to select a route within the table specified in XLARTE
OPTIONS	$	options Enter $ to end entry. No options are currently available.

Examples of datafill

The following figure is an example of a tuple for table LTCALLS if the XLARTE selector is XLALEC.

Figure 2-12 Table LTCALLS tuple

LTID

ltgrp	ltnum	calltype	xlarte	lineattr
ISDN	7	PVT	XLALEC	37

The following tuple is an example of the datafill for table LTCALLS if the XLARTE selector is XLAIBN.

LTID

ltgrp	ltnum	calltype	xlarte	lineattr	custgrp	subgrp	ncos
ISDN	7	PVT	XLAIBN	37	NAVCC	4	4

The following tuple is an example of the datafill for table LTCALLS if the XLARTE selector is RTEREF:

LTID

ltgrp	ltnum	calltype	xlarte	rteid	options
ISDN	7	PVT	RTEREF	12	$

Table LTMAP

Table LTMAP maps the logical terminals defined in the previous tables to a line equipment number (LEN) and a terminal equipment interface (TEI). This table also uses the LTKEY used in the previous logical terminal tables, and must be datafilled with the same values found in LTGRP and LTNUM for a given tuple.

Table LTMAP must be datafilled after tables LTGRP, LTDEF, LTDATA, and LTCALLS.

Table 2-11, "MSL-100 switch table LTMAP parameters" on page 2-144 shows the fields and values for table LTMAP.

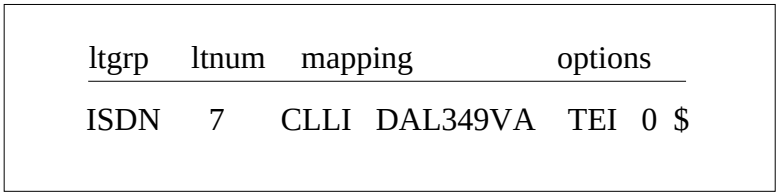
Table 2-11 MSL-100 switch table LTMAP parameters

Field name	Range of values	Description
LTKEY	alphanumeric	logical terminal key consists of the subfields LTGRP and LTNUM
(subfield) LTGRP	alphanumeric, 8 characters	logical terminal group name
(subfield) LTNUM	1-1022	the logical terminal number of the member within the group
MAPPING	LEN, CLLI	logical terminal mapping For PRI, the mapping must be to CLLI.
CLLI	alphanumeric, 16 characters	the common language location identifier of the PRI trunk to which the terminal is assigned
LEN	alphanumeric	consists of the subfields SITE, FRAME, UNIT, DRAWER, and CIRCUIT
(subfield) SITE	alphanumeric or blank	consists of the subfields SITE, FRAME, UNIT, DRAWER, and CIRCUIT
(subfield) UNIT	0-99	line module frame number the line module or line concentrator module unit number
(subfield) DRAWER	0-23	line drawer or line subgroup the number of the line drawer of the LM unit, or the line subgroup of the LCM unit
(subfield) CIRCUIT	0-31	line card circuit number the line card circuit number of the line drawer or line subgroup shelf to which the line is assigned
OPTION	TEI, PHI, BCH, DCHCHNL, LTBYTE	Only TEI is valid for PRI.
If the OPTION selector is TEI, the following subfield appears.		
TEI	0-63	terminal endpoint identifier number

Examples of datafill

The following figure is an example of a tuple for table LTMAP.

Figure 2-13 Table LTMAP tuple



Routing ISA calls

The MSL-100 system obtains ISA routing information from tables IBNRTE, OFRT, and RTEREF. These tables are indexed by ISA routing selectors contained in the logical terminal tables. The ISA routing selector uses the CLLI to route calls to a specific trunk group.

Table IBNRTE provides routing information for integrated business network (IBN) calls. Table OFRT provides routing for IBN calls, as well as plain old telephone service (POTS) calls. Table RTEREF is a subtable of tables HNPACONT, FNPACONT, and FNPASTS.

The fields and values of all three tables are the same, with the exception of the first field. For table IBNRTE, the name of the first field is IBNRTESEL. For tables OFRT and RTEREF, the name of the first field is RTESEL. The function and values of these fields are the same for all three tables.

Tables IBNRTE, OFRT, and RTEREF

Table 2-12, "MSL-100 switch tables IBNRTE, OFRT, and RTEREF parameters" on page 2-145 shows the fields and values for tables IBNRTE, OFRT, and RTEREF.

Table 2-12 MSL-100 switch tables IBNRTE, OFRT, and RTEREF parameters (Sheet 1 of 2)

Field name	Range of values	Description
RTESEL, (IBNRTE: table IBNRTE only)	ISA, N, S	route selector
OHQ	NO, YES	selects off-hook queuing
CBQ	NO, YES	selects call-back queuing
EXP	NO, YES	designates this route as expensive
CLLI	alphanumeric, 8 characters	designates the PRI trunk group that routing terminates on
Note: Only CLLIs defined as PRI (in table CLLI) are valid entries in this field.		

Table 2-12 MSL-100 switch tables IBNRTE, OFRT, and RTEREF parameters (Sheet 2 of 2)

Field name	Range of values	Description
CALLTYPE	TIE, INWATS, WATS, FX, PVT, PUB	ISA call type
(subfield) FX, TIE		
FACNUM	0-1023	the facility number to be included in NSF selector
DMI	0-32767	digit manipulation index—used to modify CDN before transmission
(subfield) WATS		
ZONE	0-9, A, B, C, AUTO	OUTWATS zone number to be included in NSF selector
DMI	0-32767	digit manipulation index—used to modify CDN before transmission
(subfield) INWATS		
DMI	0-32767	digit manipulation index—used to modify CDN before transmission
(subfield) PVT		
NPI	E164, PVT	selects type of numbering plan
DMI	0-32767	dIgit manipulation index—used to modify CDN before transmission
(subfield) PUB		
OATYPE	NONE, 0P, 0M	type of operator access required
TNS	0-999, N, C	transit network number to be requested in SETUP message if none is required, specify N If TNS should be determined from call's originator, specify C.
DMI	0-32767	digit manipulation index—used to modify CDN before transmission
Note: Only CLLIs defined as PRI (in table CLLI) are valid entries in this field.		

Examples of datafill

The following figure shows an example of the datafill for tables IBNRTE, OFRT, and RTEREF.

Figure 2-14 Tables IBNRTE, OFRT, and RTEREF datafill

rtesel	ohg	cbg	exp	clli	calltype	(facnum dmi)
ISA	N	N	N	DAL349VA	TIE	402 8

Special datafill for ISA INWATS routing to a Meridian 1 PBX

The following datafill must be used when specifying routing for an INWATS call to a station on a Meridian 1 PBX.

- Route INWATS trunk incoming calls from table DN to an IBNRTE that uses the IW selector and a datafilled virtual facility group (VFG) previously assigned in table VIRTGRPS.
- Datafill table DIGMAN to remove the incoming digits and include a new DN. See the following figures.
- If a customer group is used, use POTS digit collection in table IBNXLA and route the call to an INW LINEATTR, as shown in the following figures.
- Use table DN to route the new DN to a previously assigned IBNRTE that has the ISA selector for the desired PRI trunk group and specifies call type TIE.
- Return to table DIGMAN. Remove the previous new DN and substitute the actual four digit extension of the Meridian 1 PBX station.

Note 1: The incoming DMS INWATS call is sent to the Meridian 1 PBX as a TIE call. The INWATS automatic message accounting (AMA) record is generated correctly by the DMS.

Note 2: The IBNRTE TIE FACNUM must match the service identifier (SID) parameter in the Meridian 1 PBX TIE service route.

Note 3: The Meridian 1 PBX does not need an INWATS service route. Four digits are always sent to the PBX.

Note 4: This workaround cannot be used if the customer needs both TIE and INWATS services.

Figure 2-15, "MSL-100 to Meridian 1 PBX INWATS TRAVER examples" on page 2-148 and Figure 2-17, "MSL-100 to Meridian 1 PBX INWATS TRAVER examples" on page 2-150 contains examples of translations verifications (TRAVER) showing the datafill used to route ISA INWATS calls to stations on a Meridian 1 PBX.

Figure 2-15 MSL-100 to Meridian 1 PBX INWATS TRAVER examples

```
traver tr tcvr2w 6344300 b

TABLE TRKGRP
TCVR2W T2  61  TLD  NCRT MI LIDL 0 Y N INC0 NSCR 702 NLCL Y
7  7
TABLE STDPRTCT
INC0  (1)    (0)
     *  SUBTABLE STDPRT
     *  63  6490000 N NP 0 NA
     *  SUBTABLE AMAPRT
     *  KEY NOT FOUND
     *  DEFAULT VALUE IS:  NONE N
TABLE HNPACONT
702 445  0  (53)    (1)    (0)
     *  SUBTABLE HNPACODE
     *  634 634 DN 702 634
TABLE THOUGRP
702 634 4 Y C
TABLE DN
702 634 4300 T IBNRTE 182
TABLE DNATTRS
TUPLE NOT FOUND
TABLE IBNRTE
182 IW 10 732 IWPRI 169
     *  TABLE DIGMAN
     *  169  (CL BEG)    (REM7)    (INC 7328021)
     *  EXIT TABLE DIGMAN
EXIT TABLE IBNRTE

+++ TRAVER:  SUCCESSFUL CALL TRACE +++
```

Figure 2-16 MSL-100 to Meridian 1 PBX INWATS TRAVER examples (continued)

```
DIGIT TRANSLATION ROUTES
1 VFG:  IWPRI                7328021

1 OVFLTONE

+++ TRAVER:  SUCCESSFUL CALL TRACE +++
```

Figure 2-17 MSL-100 to Meridian 1 PBX INWATS TRAVER examples

```
traver tr v iwpri 7328021 b

TABLE VIRTGRPS
IWPRI SIZE 2 IBN 7026344300 IBTS 0 0 2 Y N N $
TABLE NCOS
IBTS 2 0 10 INWATS  (XLAS  IBX2  NXLA  NDGT)  $
TABLE CUSTHEAD:  CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA,
VACTRMT, DIGCOL
IBTS NXLA IBX1 NXLA 1 NDGT
TABLE DIGCOL
NDGT specified:  digits collected individually
TABLE IBNXLA:  XLANAME IBX2
IBX2 7328021 NET N N 0 N POTS N Y DOD N 10 NONE
TABLE DIGCOL
POTS specified:  POTS digit collection
TABLE LINEATTR
10 INW WAT0 NT NSCR 0 702 NPRT NLCA NONE N 16 NIL NILSFC
NILLATA 0 NIL NIL 00
TABLE HNPACONT
702 445 0 (53)    (1)    (0)
      *  SUBTABLE HNPACODE
      *  7328 7329 DN 702 732
TABLE THOUGRP
702 732 8 Y C
TABLE DN
702 732 8021 T IBNRTE 167
TABLE DNATTRS
TUPLE NOT FOUND
TABLE DNGRPS
TUPLE NOT FOUND
TABLE IBNRTE
```

Figure 2-18 MSL-100 to Meridian 1 PBX INWATS TRAVER examples

```
167 ISA N N N PRITEST TIE 3 E164 172
      * TABLE TRKGRP
      * PRITEST PRA 10 NPDGRP NCRT ASEQ N (ISDN 1)  $
      * TABLE LTCALLS
      * ISDN 1 TIE XLAIBN 0 IBTS 0 1 $
      * TABLE DIGMAN
      * 172  (CL BEG)    (REM 7)    (INC 7919)
      * EXIT TABLE DIGMAN
 EXIT TABLE IBNRTE


 +++ TRAVER:  SUCCESSFUL CALL TRACE +++

 DIGIT TRANSLATION ROUTES

 1 PRITEST                E164 7919 TIE 3 BC SPEECH

 TREATMENT ROUTES.  TREATMENT IS:  GNCT
 1 OVFLTONE


+++ TRAVER:  SUCCESSFUL CALL TRACE +++
```

Operational measurement considerations

There are no operational measurement considerations for ISA on PRI.

Log considerations

There are no log considerations for ISA on PRI.

Service order considerations

There are no service order considerations for ISA on PRI.

Testing considerations

Testing of ISA calls requires functioning PRI hardware with an ISDN DTCI.

A valid PRI trunk must be used to test an ISA originating and terminating call for each of the six call types (PUB, PVT, WATS, INWATS, FX, and TIE). The TRAVER is performed first to check datafill. However, a successful TRAVER does not necessarily indicate that a call completed. TRAVERs are used as part of a complete testing plan and not a guarantee. Each call must be verified by actual completion.

Call type verification

The following lists give information on using the table routing selectors to establish a test route for each originating and terminating call type. Remember that the test call must use a valid PRI trunk. Check the datafill in all PRI-related tables, as well as those specific to ISA.

Public call type verification (originating PRI)

The following list gives information on the XLARTE routing selector:

- Set the XLARTE selector in table LTCALLS to XLALEC. Be sure the CALLTYPE selector is set to PUB and verify that a call completes using this route.
- Set the XLARTE selector in table LTCALLS to XLAIBN. Be sure the CALLTYPE is set to PUB and verify that a call completes using this route.
- Set the XLARTE selector in table LTCALLS to RTEREF. Be sure the CALLTYPE is set to PUB and verify that a call completes using this route.

Public call type verification (terminating PRI)

The following list gives information on PUB ISA calls:

- Verify that a PUB ISA call completes to a PRI trunk using a route defined in table RTEREF.
- Verify that a PUB ISA call completes to a PRI trunk using a route defined in table IBNRTE.
- Verify that a PUB ISA call completes to a PRI trunk using a route defined in table OFRT.

Private call type verification (originating PRI)

The following list gives information on the XLARTE route selector:

- Set the XLARTE selector in table LTCALLS to XLAIBN. Be sure that the CALLTYPE selector is set to PVT and verify that a call completes using this route.
- Set the XLARTE selector in table LTCALLS to RTEREF. Be sure the CALLTYPE selector is set to PVT and verify that a call completes using this route.

Private call type verification (terminating PRI)

The following list gives information on PVT ISA calls:

- Set the NPI to PVT. Verify that a PVT ISA call completes to a PRI trunk using a route defined in table IBNRTE.
- Set the NPI to PVT. Verify that a PVT ISA call completes to a PRI trunk using a route defined in table OFRT.
- Set the NPI to E164. Verify that a PVT ISA call completes to a PRI trunk using a route defined in table OFRT.

OUTWATS call type verification (originating PRI)

OUTWATS calls must be verified for user-specified zone, PBX autobanding, and CO autobanding.

- Set the XLARTE selector in table LTCALLS to XLALEC. Be sure the CALLTYPE selector is set to PUB and verify that a call completes using this route.
- Set the XLARTE selector in table LTCALLS to XLAIBN. Be sure the CALLTYPE selector is set to PUB and verify that a call completes using this route.
- Set the XLARTE selector in table LTCALLS to RTEREF. Be sure the CALLTYPE selector is se to PUB and verify that a call completes using this route.

OUTWATS call type verification (terminating PRI)

The following list gives information on OUTWATS call type verification (terminating PRI):

- Verify that a PUB ISA call completes to a PRI trunk using a route defined in table RTEREF.
- Verify that a PUB ISA call completes to a PRI trunk using a route defined in table IBNRTE.
- Verify that a PUB ISA call completes to a PRI trunk using a route defined in table OFRT.

INWATS call type verification (originating PRI)

The following list gives information on INWATS call type verification (originating PRI):

- Set the XLARTE selector in table LTCALLS to XLAIBN. Be sure the CALLTYPE selector is set to PUB and verify that a call completes using this route.
- Set the XLARTE selector in table LTCALLS to RTEREF. Be sure the CALLTYPE selector is set to PUB and verify that a call completes using this route.

INWATS call type verification (terminating PRI)

The following list gives informatin on INWATS call type verification (terminating PRI):

- Set the XLARTE selector in table LTCALLS to XLAIBN. Verify that a PUB ISA call completes to a PRI trunk using a route defined in table IBNRTE.
- Set the XLARTE selector in table LTCALLS to RTEREF. Verify that a PUB ISA call completes to a PRI trunk using a route defined in table OFRT.

TIE call type verification (originating PRI)

The following list gives information on TIE call type verification (originating PRI):

- Set the XLARTE selector in table LTCALLS to XLAIBN. Be sure the CALLTYPE selector is set to PUB and verify that a call completes using this route.
- Set the XLARTE selector in table LTCALLS to RTEREF. Be sure the CALLTYPE selector is set to PUB and verify that a call completes using this route.

TIE call type verification (terminating PRI)

The following list gives information on TIE call type verification (terminating PRI):

- Verify that a PUB ISA call completes to a PRI trunk using a route defined in table IBNRTE.
- Verify that a PUB ISA call completes to a PRI trunk using a route defined in table OFRT.

FX call type verification (originating PRI)

The following list gives information on FX call type verification (originating PRI):

- Set the XLARTE selector in table LTCALLS to XLALEC. Be sure the CALLTYPE selector is set to PUB and verify that a call completes using this route.
- Set the XLARTE selector in table LTCALLS to XLAIBN. Be sure the CALLTYPE selector is set to PUB and verify that a call completes using this route.
- Set the XLARTE selector in table LTCALLS to RTEREF. Be sure the CALLTYPE selector is set to PUB and verify that a call completes using this route.

FX call type verification (terminating PRI)

The following list gives information on FX call type verification (terminating PRI):

- Verify that a PUB ISA call completes to a PRI trunk using a route defined in table RTEREF.
- Verify that a PUB ISA call completes to a PRI trunk using a route defined in table IBNRTE.
- Verify that a PUB ISA call completes to a PRI trunk using a route defined in table OFRT.

Translation verification (TRAVER)

A TRAVER is run for originating and terminating PRI calls of each call type. The format for entering a TRAVER from the MAP terminal is:traver <ORIG> <NPI> <DIGITS> <OPT> <TRACE>

Figure 2-19, "Sample MSL-100 switch TRAVER command format" on page 2-155 is an example of the command format for a MSL-100 switch TRAVER.

Figure 2-19 Sample MSL-100 switch TRAVER command format

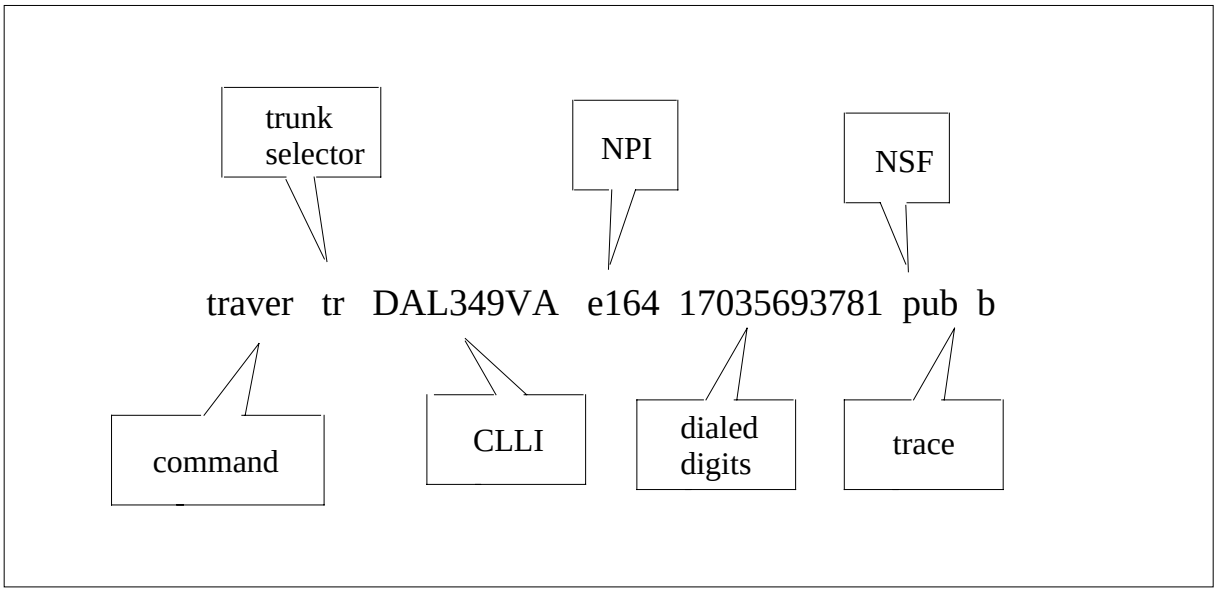


Table 2-13, "MSL-100 switch TRAVER parameters and values" on page 2-156 shows the range of values and descriptions of the parameters of a TRAVER.

Table 2-13 MSL-100 switch TRAVER parameters and values

Field name	Range of values	Description
ORIG		
trunk	TR trunk originator	CLLI name
CGN	string	calling party number for line calls
NPI	E164, PVT, PUB	numbering plan indicator
Digits	string	called party number
OPT		options
NSF	FX, TIE, WATS, PUB, PVT	network specific facility
FACNUM	0-1023 (FX & TIE only)	facility number
ZONE	0-9, A, B, C (OWT only)	OUTWATS zone
BC	string?	bearer capability
TRACE	T, NT, B	T—trace all tables used NT—display outpulsed digits B—display tables and digits

Sample TRAVERs

The following examples show sample TRAVERs for each ISA call type. A TRAVER is shown for both terminating and originating ISA calls, where applicable.

MSL-100 switch public call type TRAVER (terminating)

The following TRAVER shows a public ISA call using routing from table OFRT.

traver l 7224020 `406211234' bTABLE KSETLINEHOST 00 0 00 16 1 DN Y 7224020 COMNORTEL 0 25 613 (RAG)TABLE DNATTRSTUPLE NOT FOUNDTABLE DNGRPS613 722 4020 4020(PUBLIC (NAME COMI) $) $TABLE NCOSCOMNORTEL 25 0 0 KPRA (XLAS KPRA25 KPRA25 NDGT) (OHQ 0)TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLATABLE DIGCOLKDK 4 COL L 2TABLE IBNXLA: XLANAME KPRA25KPRA25 40 ROUTE N N 2 Y 3 15 NDGT N T OFRT

400TABLE DIGCOLNDGT specified: digits collected individuallyTABLE OFRT400 ISA N N N ATOB PUB NONE N 0 TABLE TRKGRP ATOB PRA 0 PRAC NCRT ASEQ N (ISDN 952) $ TABLE LTCALLS ISDN 952 PUB XLALEC 0 $EXIT TABLE OFRT+++ TRAVER: SUCCESSFUL CALL TRACE +++ATOB E164 6211234 NIL_NSF BC SPEECHTREATMENT ROUTES. TREATMENT IS: GNCT1 *OFLO2 LKOUT+++ TRAVER: SUCCESSFUL CALL TRACE +++

MSL-100 switch public call type TRAVER (originating)

The following TRAVER shows an originating public ISA call.

traver tr btoa `6211234' bNOTE: NPI=PUB is the default and is therefore not needed in the inputTABLE TRKGRPBTOA PRA 0 PRAC NCRT DSEQ N (ISDN 953) $TABLE LTCALLSISDN 953 PUB XLALEC 0 $TABLE LINEATTR1FR NONE NT FR01 0 613 P621 L613 TSPS N 10 NIL NILSFCTABLE STDPRTCTP621 (1) (0) SUBTABLE STDPRT 621 632 N NP 0 NA SUBTABLE AMAPRT KEY NOT FOUND DEFAULT VALUE IS: NONE NTABLE HNPACONTE 613 601 1 (32) (1) (84) SUBTABLE HNPACODE 621 621 DN 613 621TABLE THOUGRP613 621 1 Y CTABLE DN613 621 1234 L HOST 00 0 14 00**TABLE LCASCRCN613 L613 (11) OPTL N SUBTABLE LCASCR 621 622TABLE PFXTREATOPTL NP Y NP UNDTTABLE CLSVSCRCKEY NOT FOUNDDEFAULT IS TO LEAVE XLA RESULT UNCHANGED+++ TRAVER: SUCCESSFUL CALL TRACE +++DIGIT TRANSLATION ROUTESLINE 6136211234TREATMENT ROUTES. TREATMENT IS: GNCT1 *OFLO+++ TRAVER: SUCCESSFUL CALL TRACE +++

MSL-100 switch private call type TRAVER (terminating)

The following TRAVER shows a terminating private ISA call.

traver l 7224020 `443325020' bTABLE KSETLINEHOST 00 0 00 16 1 DN Y 7224020 COMNORTEL 0 0 613 (RAG)TABLE DNATTRSTUPLE NOT FOUNDTABLE DNGRPS613 722 4020 4020 (PUBLIC (NAME COMI) $) $TABLE NCOSCOMNORTEL 0 0 0 KDK0 (OHQ 0 TONE_OHQ) (CBQ 0 3 N 2) $TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLATABLE IBNXLA: XLANAME KPRA25KPRA25 44 NET N N 2 Y NDGT N Y GEN (LATTR 0) (RTE OFRT 406)TABLE DIGCOLNDGT specified: digits collected individuallyTABLE LINEATTR1FR NONE NT FR01 0 613 P621 L613 TSPS N 10 NIL NILSFCTABLE STDPRTCTP621 (1) (0) SUBTABLE STDPRT 3 407 N NP 0 NA SUBTABLE AMAPRT KEY NOT FOUND DEFAULT VALUE IS: NONE NTABLE HNPACONT613 601 1 (30) (1) (84) SUBTABLE HNPACODE 332 332 LRTE 601 SUBTABLE RTEREF 601 N D A5TOB3 0 N N N D A3TOB3 0 N N EXIT TABLE RTEREFEXIT TABLE HNPACONTTABLE LCASCRCN613 L613 (11) OPTL N SUBTABLE LCASCRTUPLE NOT FOUND. DEFAULT IS

NON-LOCALTABLE PFXTREATOPTL NP N DD UNDTTABLE CLSVSCRCKEY NOT FOUNDDEFAULT IS TO LEAVE XLA RESULT UNCHANGEDUSING ROUTE FROM IBNXLA GEN SELECTOR RTE OPTION+++ TRAVER: SUCCESSFUL CALL TRACE +++

MSL-100 switch private call type TRAVER (originating)

The following TRAVER is an example of an originating private ISA call.

traver tr ctob pvt `3325020' prvt bTABLE TRKGRPCTOB PRA 0 PRAC NCRT DSEQ N (ISDN 952) $TABLE LTCALLSISDN 952 PVT XLAIBN 0 CENTESN 0 25 $TABLE IBNXLA: XLANAME CPRA25CPRA25 332 EXTN N Y 613 722 7 $TABLE THOUGRP613 722 5 Y CTABLE DN613 722 5020 ILC HOST 00 0 09 07TABLE DNATTRSTUPLE NOT FOUNDTABLE DNGRPS613 722 5020 5020 (PUBLIC (NAME COMI) $)$+++ TRAVER: SUCCESSFUL CALL TRACE +++DIGIT TRANSLATION ROUTES1 LINE 6137225020TREATMENT ROUTES. TREATMENT IS: GNCT1 *OFLO+++ TRAVER: SUCCESSFUL CALL TRACE +++

MSL-100 switch TIE call type TRAVER (terminating)

The following TRAVER is an example of a terminating TIE ISA call.

traver l 7224020 `4627020' bTABLE KSETLINEHOST 00 0 00 16 1 DN Y 7224020 COMNORTEL 0 0 613 (RAG)TABLE DNATTRSTUPLE NOT FOUNDTABLE DNGRPS613 722 4020 4020 (PUBLIC (NAME COMI) $)$TABLE NCOSCOMNORTEL 0 0 0 KDK0 (OHQ 0 TONE_OHQ) (CBQ 0 3 N 2) $TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLATABLE DIGCOLKDK OCT RPTNCOS OCT XLA name is NIL. Go to next XLA nameTABLE IBNXLA: XLANAME KPRA25KPRA25 46 ROUTE N N 2 Y 3 15 NDGT N T OFRT 402TABLE DIGCOLNDGT specified: digits collected individuallyTABLE OFRT402 ISA N N N ATOB TIE 7 0 TABLE TRKGRP ATOB PRA 0 PRAC NCRT DSEQ N (ISDN 953) $ TABLE LTCALLS ISDN 242 TIE XLAIBN 0 COMNORTEL 0 25 $EXIT TABLE OFRT+++ TRAVER: SUCCESSFUL CALL TRACE +++DIGIT TRANSLATION ROUTES1 ATOB PVT 27020 TIE 7 BC SPEECHTREATMENT ROUTES. TREATMENT IS: GNCT1 *OFLO2 LKOUT+++ TRAVER: SUCCESSFUL CALL TRACE +++

MSL-100 switch TIE call type TRAVER (originating)

The following TRAVER is an example of an originating TIE ISA call.

traver tr ctob pvt `27020' tie bTABLE TRKGRPBTOA PRA 0 PRAC NCRT ASEQ N (ISDN 240) $TABLE LTCALLSISDN 241 TIE XLAIBN 0 COMNORTEL 0 25 $TABLE IBNXLA: XLANAME KPRA25KPRA25 2 EXTN N Y 613 722 5 $TABLE THOUGRP613 722 7 Y CTABLE DN613 722 7020 IMC SCA 3TABLE DNATTRSTUPLE NOT FOUNDTABLE

DNGRPS613 722 7020 7020 (PUBLIC (NAME COMI) $)$+++ TRAVER: SUCCESSFUL CALL TRACE +++DIGIT TRANSLATION ROUTES1 LINE 6137227020TREATMENT ROUTES. TREATMENT IS: GNCT1 *OFLO+++ TRAVER: SUCCESSFUL CALL TRACE +++

MSL-100 switch OUTWATS call type TRAVER

The following TRAVER is an example of an OUTWATS ISA call.

traver l 2993333 65005503333 bTABLE KSETLINEHOST 00 0 00 28 1 ACD Y 2993333 COMNORTEL 0 0 200 INCALLS Y NACDA 0 N (RAG) (MSB) (ACDNR) $TABLE DNATTRS200 299 3333 (BNR (NAME GEORGE BRODY) $) (PUBLIC (NAME G_BRODY) $) $ $TABLE DNGRPS200 299 3333 3333 (BNR (ADDRESS DDD 220 NNNN) $)$TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOLCOMNORTEL NXLA PXLA FXLA 0 KDKTABLE DIGCOLKDK 6 COL L 7TABLE IBNXLA: XLANAME C000C000 6 NET N N 1 Y NDGT N Y GEN (LATTR 0) (ESN) $TABLE LINEATTR0 IBN NONE NT NSCR 0 100 POTS NLCA N NONE N 0 NIL NILSFC LATA1 0 NIL NIL 00 NLCABILL OFF - BILLING DONE ON BASIS OF CALLTYPETABLE STDPRTCTPOTS (1) (0)* SUBTABLE STDPRT* KEY NOT FOUND* DEFAULT VALUE IS: N NP 0 NA* SUBTABLE AMAPRT* KEY NOT FOUND* DEFAULT VALUE IS: NONE OVERNONE NTABLE HNPACONT100 64 0 (20) (1) (0) (0)* SUBTABLE HNPACODE* 50 50 HNPA 0* 55 55 LRTE 14* SUBTABLE RTEREF* 14 ISA N N N S100AD100APR WATS 0 E164 0* TABLE TRKGRP* S100AD100APR IBNT2 0 NPDGP NCRT COMNORTEL 0* ASEQ 5 N ANSDISC 0 Y N N N N N Y Y 0 10 N 0* 0 0 0 N N N N N N N N N (LTID ISDN 501) $* TABLE LTCALLS* ISDN 501 WATS XLALEC 0 $* EXIT TABLE RTEREFEXIT TABLE HNPACONTLATA IS NIL, THEREFORE NOT AN EQUAL ACCESS CALL+++ TRAVER: SUCCESSFUL CALL TRACE +++DIGIT TRANSLATION ROUTESS100AD100APR N CDN E164 5005503333 OWT 0 BC 3.1KHZ_AUDTREATMENT ROUTES1 T1202 LKOUT+++ TRAVER: SUCCESSFUL CALL TRACE +++

MSL-100 switch INWATS call type TRAVER

The following TRAVER is an example of an INWATS ISA call.

traver tr btoa 7224020 iwt bTABLE TRKGRPBTOA PRA 0 NPDGRP NCRT DSEQ N (ISDN 241) $TABLE LTCALLSISDN 241 INWATS XLAIBN 0 COMNORTEL 0 25 $TABLE LINEATTR0 1FR NONE NT FR01 0 613 P621 L613 TSPS N 10 NIL NILSFCTABLE STDPRTCTP621 (1) (0) SUBTABLE STDPRT 7 810 N NP 0 NA SUBTABLE AMAPRT KEY NOT FOUND DEFAULT VALUE IS: NONE NTABLE HNPACONT613 601 1 (54) (1) (84) SUBTABLE HNPACODE 722

722 DN 613 722TABLE THOUGRP613 722 4 Y CTABLE DN613 722 4020 IMC SCA 3TABLE DNATTRS613 722 4020 (PUBLIC (NONUNIQUE) $) $TABLE DNGRPSTUPLE NOT FOUNDTABLE LCASCRN613 L613 (11) MNDT N SUBTABLE LCASCR TUPLE NOT FOUND. DEFAULT IS NON-LOCALTABLE PFXTREATTUPLE NOT FOUND. DEFAULT IS TO LEAVE XLA RESULT UNCHANGEDTABLE CLSVSCRCKEY NOT FOUNDDEFAULT IS TO LEAVE XLA RESULT UNCHANGED+++ TRAVER: SUCCESSFUL CALL TRACE +++DIGIT TRANSLATION ROUTES1 LINE 6137224020TREATMENT ROUTES. TREATMENT IS: GNCT1 T120+++ TRAVER: SUCCESSFUL CALL TRACE +++

MSL-100 switch call type TRAVER

The following TRAVER is an example of an FX ISA call.

traver l 2993333 65005303333 bTABLE KSETLINEHOST 00 0 00 28 1 ACD Y 2993333 COMNORTEL 0 0 200 INCALLS Y NACDA 0 N (RAG) (MSB) (ACDNR) $TABLE DNATTRS200 299 3333 (BNR (NAME GEORGE_BRODY) $) (PUBLIC (NAME G_BRODY $) $ $TABLE DNGRPS200 299 3333 3333(BNR (ADDRESS DDD 220 NNN) $) $TABLE NCOSCOMNORTEL 0 0 0 C000 (XLAS C000 NXLA NDGT) $TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOLCOMNORTEL NXLA PXLA FXLA 0 KDKTABLE DIGCOLKDK 6 COL L 7TABLE IBNXLA: XLANAME C000C000 6 NET N N 1 Y GEN (LATTR 0 (ESN) $TABLE DIGCOLNDGT specified: digits collected individuallyTABLE LINEATTR0 IBN NONE NT NSCR 0 100 POTS NLCA N NONE N 0 NIL NILSFC LATA1 0 NIL NIL 00 NLCABILL OFF - BILLING DONE ON BASIS OF CALLTYPETABLE STDPRTCTPOTS (1) (0)* SUBTABLE STDPRT* KEY NOT FOUND* DEFAULT VALUE IS: N NP 0 NA* SUBTABLE AMAPRT* KEY NOT FOUND* DEFAULT VALUE IS: NONE OVRNONE NTABLE HNPACONT100 64 0 (20) (1) (0) (0)* SUBTABLE HNPACODE* 50 50 HNPA 0* 56 56 LRTE 15* SUBTABLE RTEREF* 15 ISA N N N S100AD100APR FX 0 E164 0* TABLE TRKGRP* S100AD100APR IBNT2 0 NPDGP NCRT COMNORTEL 0 ASEQ* 5 N ANSDISC 0 Y N N N N N Y Y 0 10 N 0 0 0 * 0 N N N N N N N N N (LTID ISDN 501) $* TABLE LTCALLS* ISDN 501 FX XLALEC 0 $* EXIT TABLE RTEREFEXIT TABLE HNPACONTLATA IS NIL, THEREFORE NOT AN EQUAL ACCESS CALL+++ TRAVER: SUCCESSFUL CALL TRACE +++DIGIT TRANSLATION ROUTES1 S100AD100APRN CDN E164 5005603333 FX 0 BC 3.1 KHZ_AUD TREATMENT ROUTES, TREATMENT IS: GNCT1 T1202 LKOUT+++ TRAVER: SUCCESSFUL CALL TRACE +++

Billing information

For ISA, billing options must be set for three call types:

- PVT
- TIE
- FX

Table 2-14, "MSL-100 switch billing options" on page 2-161 shows the billing options for ISA call types.

Table 2-14 MSL-100 switch billing options

ISA call type	Billing option
PUB	None
PVT	Tandem TIE trunk
OUTWATS	None
INWATS	None
TIE	Tandem TIE trunk
FX	FX

3 Network Ring Again

Network Ring Again (NRAG)

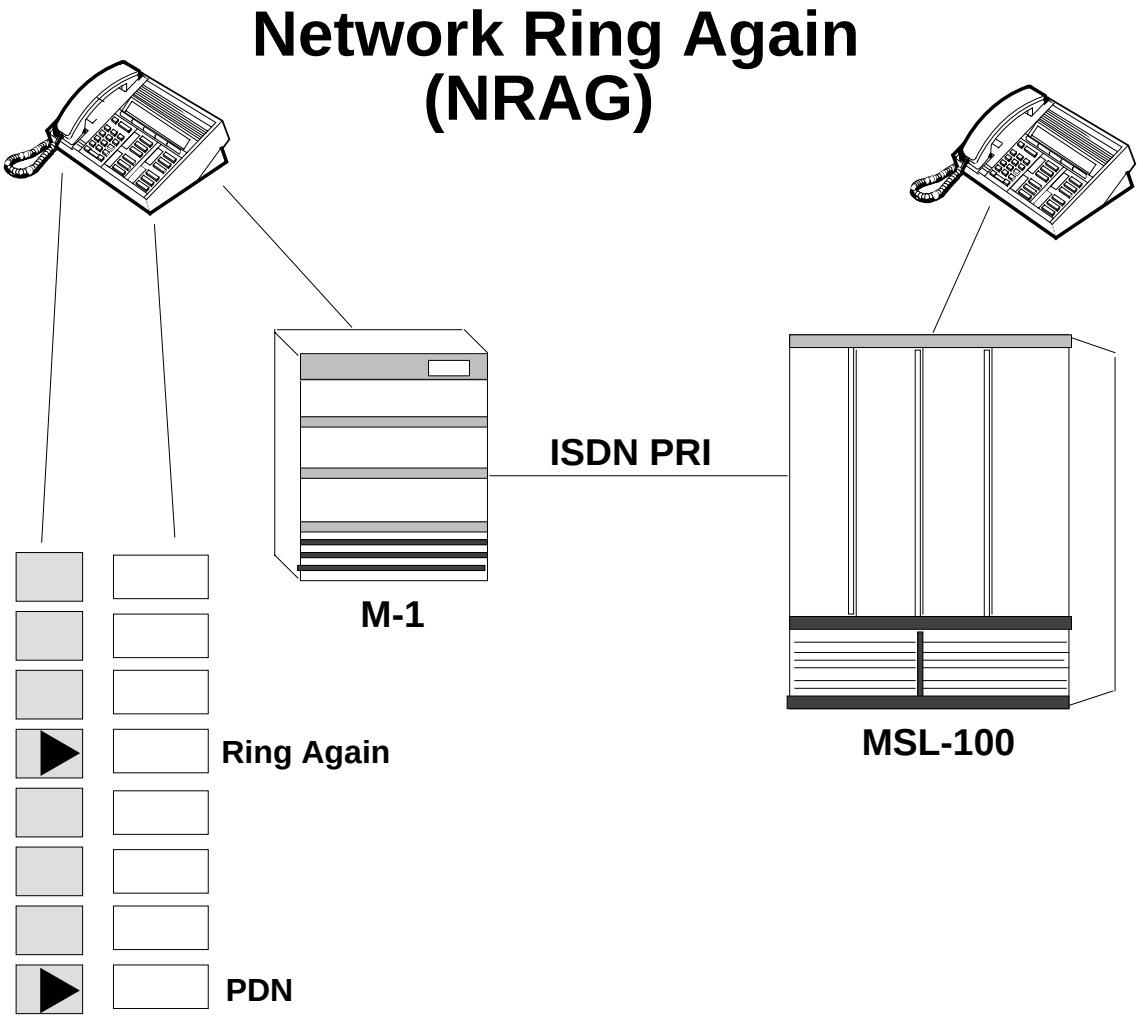
This section describes activation of the MCDN Network Ring Again (NRAG) feature in a network that consists of the Meridian 1 and the MSL-100 switches.

The NRAG feature extends the local, or nodal, Ring Again feature to members of the same customer group residing on different Nortel Networks switches.

An NRAG sequence originates and terminates at sets served by either a Meridian 1 or an MSL-100 switch serving as a centralized exchange (CENTREX). If user A receives a busy signal at set B, the user presses a designated NRAG key or dials a SPRE code (for a 500 set). When user B's set becomes idle, user A's set rings. User A acknowledges the recall and the call is set up normally.

Figure 3-1, "NRAG within a Meridian 1/MSL-100 network" on page 3-2 gives an example of NRAG in this type of network.

Figure 3-1 NRAG within a Meridian 1/MSL-100 network



- **Network Ring Again within the PRI network**
- **The terminating switch determines when the called party becomes idle and notifies the originating switch using an alert tone, therefore notifying the originator.**
- **NRAG uses facility messages on ISDN PRI for transporting the TACP information.**

NRAG on the Meridian 1 PBX

NRAG enables a user who receives a busy signal at a destination set on a different switch, but within the same network, to have the PBX notify the user when the set of the called party goes on hook.

Note: NRAG on the Meridian 1 requires PRI from end to end.

The following is a successful NRAG sequence:

1. User A (the originator) calls user B (the terminator) and receives a busy signal.
2. User A activates the NRAG feature and receives a tone that confirms the activation. User A returns on hook.
   a. When user A activates NRAG, T5, the originating switch's message response timer, begins to count. When user A receives the confirmation tone, T5 stops and T6 begins. T6, the originating switch's duration timer, limits the amount of time an NRAG request may remain outstanding.
   b. When the terminating switch accepts user A's NRAG request, it starts T7, the terminating switch's duration timer. T7 stops counting either when user B's set is free and user A accepts the recall or when the NRAG request is cancelled.
3. When user B goes on hook, user A's set rings with a special cadence and the Ring Again lamp flashes for digital sets. User A goes off hook and the call is automatically set up to user B.
   a. When user B goes on hook, T6 stops and T2 starts. T2, the recall timer, limits the amount of time user A has to answer the special ringing cadence. When user A accepts the recall and initiates the call set-up, T2 stops.

   Note: If user A's 500 set is busy when the recall arrives, the NRAG request is cancelled.

4. User B's set rings.

   Note: NRAG cannot be initiated from an attendant station.

If one of the timers expires before an NRAG sequence completes, the NRAG request is cancelled.

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 (four seconds) expires.

Once NRAG is activated, the called party status is monitored until one of the following events occurs:

1. The line is idle and a new call setup is tried.
2. The call is deactivated when a customer-defined timer expires.
3. The caller manually deactivates the call.

NRAG requires a number of timers to control the feature functions on both the originating and terminating switches.

Terminals that carry NRAG

The Meridian 1 software release 14 is the first to support NRAG for 500/2500 phone sets. All other sets carry NRAG beginning with release 12 except those sets which require a later software release to work (such as M2008 which is supported only as of release 14).

Incomplete NRAG sequences

The following descriptions are some of the possible reasons for an incomplete NRAG sequence. User A is considered the originating set, user B the terminating set.

- Having been notified that user B is free, user A initiates the call set-up and finds that user B has once again become busy.
- User A is busy when the terminating switch communicates that user B is idle.
- User A cancels a pending NRAG request.
- The terminating switch rejects user A's NRAG request.
- The terminating switch cancels an NRAG request after accepting its activation.
- The originating switch's duration timer (T6) expires.
- The terminating switch's duration timer (T7) expires.
- The originating switch receives no response to its NRAG request.
- User A fails to answer the notification that user B is idle.
- User B's set is subject to a call modification (such as Call Forward).
- User A's request encounters a conflicting feature at user B's set.

Meridian 1 originating switch NRAG functions

The Meridian 1 originating switch performs the following functions to support the NRAG feature:

- handles NRAG activations
  - — receives and recognizes the NRAG activation request from user A (for example the switchhook flash and reset circuit group acknowledgement (RGA) button) and generates the INVOKE NRAG REQUEST to the terminating switch
- From information available within itself and that gained from the terminating switch, verifies the following:
  - — the authority of the originating user's group and/or set to make an NRAG request
  - — the presence of an end-to-end ISDN PRI connection to the terminating switch
  - — the existence of a route capable of transporting a facility message with Transaction Capabilities Application Part (TCAP) information to and from the terminating switch
  - — the presence of an active, compatible NRAG package on the terminating switch
  - — the ability of the terminating switch to process an NRAG transaction
- Starts and stops the NRAG originating switch duration timer (T6) and generates a cancellation message when the timer expires.
- Denies an NRAG request by not activating the RGA lamp, not providing feature confirmation messages, and by delivering denial tones (which vary with the Meridian 1 set).
- Receives the calling party's NRAG cancellation and passes it to the terminating switch. Also cancels an NRAG request when notified that the terminating switch's duration timer (T7) expires.
- Receives from the terminating switch the CALLED PARTY FREE notification and passes it to the originator. The form of the notice to the user varies with the set type.
- Delays an NRAG offer to a 500/2500 set when the calling party's set is busy and cancels a request when the originator duration timer (T6) expires. For a now-busy calling party with any other kind of set, enables that party to accept the NRAG offer or to ignore it and re-try the NRAG call later.
- Provides interfaces for different sets.

Meridian 1 originating switch timers

The timers listed in Table 3-1, "Meridian 1 originating switch timers" on page 3-6 control the NRAG functions of the Meridian 1 PBX when it is acting as an originating switch. The NRAG software controls the duration of the timers.

Note: When one of the timers expires during an NRAG request, that request is cancelled.

Table 3-1 Meridian 1 originating switch timers

Designation	Timer name and function	Duration
T2	Recall timer; limits the time between the notification of the originating user that the destination set is free and the acceptance by the originating user of that recall.	30 seconds
T5	Message response timer; limits the time between an originating switch's NRAG request and the acceptance or rejection of that request by the terminating switch.	4 seconds
T6	Originating switch duration timer; limits the time the originating switch waits for notification that the destination set is free.	30 minutes

Meridian 1 terminating switch NRAG functions

The Meridian 1 terminating switch performs the following functions to support the NRAG feature:

- handles NRAG requests, such as the following:
  - — receiving the INVOKE NRAG REQUEST from the network
  - — sending the originating switch an NRAG REQUEST REJECT if it is unable to honor an NRAG request; giving the originating switch a reason for failing to honor the request
- puts the INVOKE NRAG REQUEST into a queue against the destination directory number (DN) on a first come, first serve basis
- monitors the idle/busy status of the destination set and notifies the originating switch when the set becomes idle
- generates the NRAG cancellation message when the termination switch duration timer (T7) expires or when the switch experiences difficulties and is unable to honor an NRAG request
- runs the queue advance timer (QAT) that allows the originating switch time to recall user A and then to respond with a new call set-up
- handles feature interactions; allows the user of the terminating set to activate Meridian 1 features while an NRAG request is pending against it

Meridian 1 terminating switch timers

The timers shown in Table 3-2, "Meridian 1 terminating switch timers" on page 3-7 control the NRAG functions of the Meridian 1 PBX when it is acting as a terminating switch. The NRAG software controls the duration of the timers.

Note: When one of the timers expires during an NRAG request, that request is cancelled.

Table 3-2 Meridian 1 terminating switch timers

Designation	Timer name and function	Duration
T7	terminating switch duration timer; limits the time between the acceptance of the NRAG request and either the acceptance of the recall by the originating switch or the cancellation of the request	30 seconds
QAT	queue advance timer; limits the time between the Called Party Free message to the originating switch and the cancellation of the NRAG request in the absence of an acceptance by the originating switch of the recall	4 seconds

Originating switch scanning

The Meridian 1 switch does not support scanning of the destination set by the originating switch.

Multiple activation of NRAG

A single line phone may maintain only one NRAG request active at a time. Activating a second NRAG request with one already pending overwrites the first request.

It is possible for a multiline phone to keep more than one NRAG request active at the same time but the set must use a separate NRAG key for each request.

Maximum number of NRAG activations on Meridian 1 switch

The number of pending incoming and outgoing NRAG requests on a Meridian 1 is limited to 25 percent of the call register.

NRAG deactivation

Having made an NRAG request, the originator of the request may cancel it at any time.

Connectivity

The Meridian 1 switch provides NRAG connectivity to the following Nortel Networks switches:

- Meridian 1 to Meridian 1
- Meridian 1 to MSL-100
- MSL-100 to DMS-100
- Meridian 1 through DMS-250

When a user requests the NRAG feature, the network verifies the following:

- the presence of end-to-end SS7 and/or PRI signaling
- the capability of both the originating and terminating switches and stations to process the NRAG feature

Signaling

The successful operation of the NRAG feature depends on a PRI communication system that supports a TCAP equivalent over PRI.

The NRAG response time between Meridian 1 PBXs on a network depends of the number of signaling links and their characteristics.

NRAG Meridian 1 network configurations

Figure 3-2, "Meridian 1 to Meridian 1 network" on page 3-8 and Figure 3-3, "Meridian 1 to MSL-100 network" on page 3-9 show the Meridian 1 and MSL-100 network configurations supporting NRAG.

Figure 3-2 Meridian 1 to Meridian 1 network

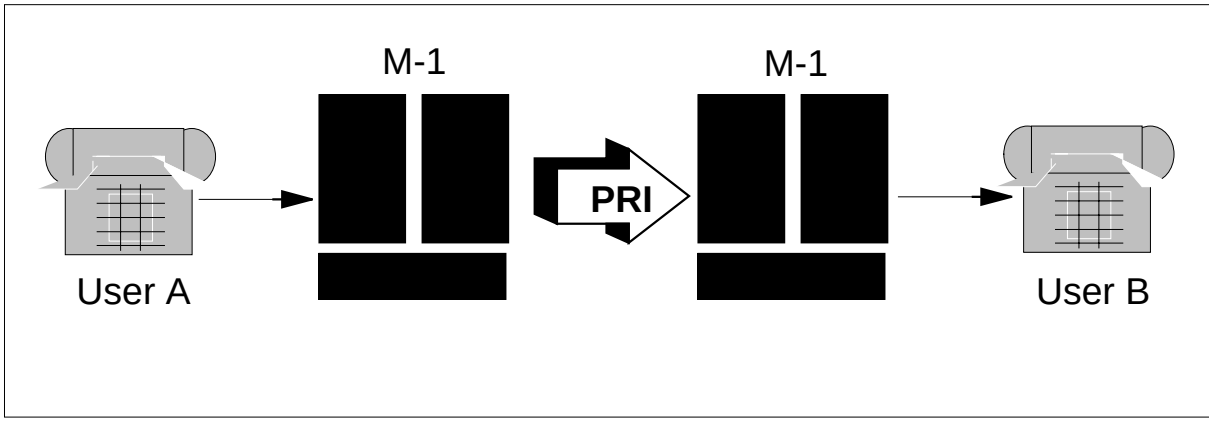
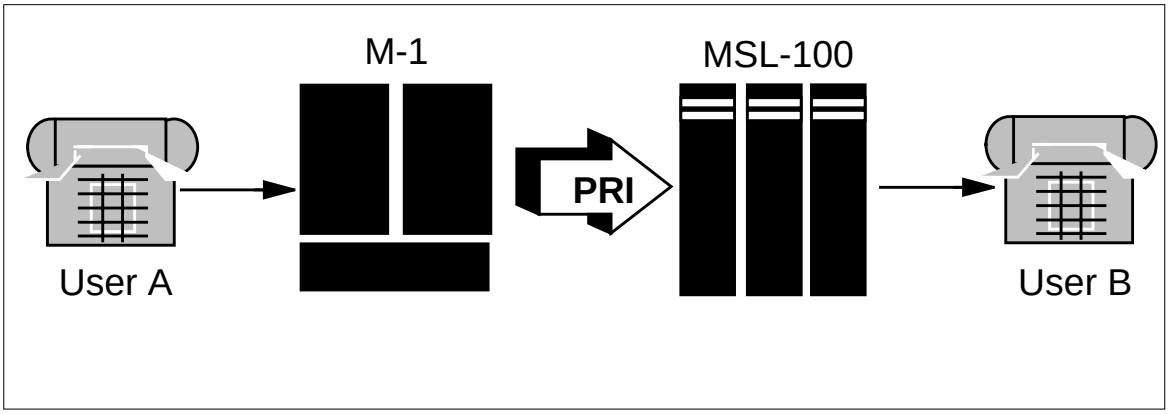


Figure 3-3 Meridian 1 to MSL-100 network



Software requirements

NRAG software Generic X11, release 12, is the first release to support the NRAG feature. Subsequent releases also support it.

Note 1: Release 14 is the first to support NRAG for 500/2500 sets.

Note 2: The NRAG package number is 148.

The prerequisites of the NRAG package are the following:

- DTI—package 75
- ISDN—package 145

Hardware provisioning

To support NRAG the Meridian 1 PBX must have the PRI and D-channel interface (DCHI) cards (for DCHI, at least firmware version 2.1).

Installation rules

No installation rules apply to the NRAG feature on the Meridian 1 PBX.

Maintenance

The NRAG feature requires no maintenance on the Meridian 1 PBX.

Datafill and translations

Datafill is a DMS term and is not typically used in the Meridian 1 environment. It's used in this context to mean service change initializing Meridian 1 overlays.

Service changes are necessary to set up the database to enable a network to support NRAG. These service changes are shown in the following tables.

LD10 and LD11, for 500/2500 sets and digital sets respectively, must be programmed to enable those sets to activate NRAG.

Overlay 10—programmed 500/2500 set administration

Table 3-3, "LD10 - single-line set entries for NRAG" on page 3-10 gives an example of the LD10 500/2500 entries used for NRAG.

Table 3-3 LD10 - single-line set entries for NRAG

Field	Range of values	Description
REQ	CHG	CHANGE
TYPE	500	Type of telephone set
TN	lll s cc uu	Terminal number
ECHG	YES	Easy change
ITEM	CLS XRA	CLS = Ring Again allowed

Overlay 11—multi-line set administration

To specify a key on multi-line sets to initiate an NRAG request, modify LD11 as shown in Table 3-4, "LD11 - multi-line set entries for NRAG" on page 3-10.

Table 3-4 LD11 - multi-line set entries for NRAG

Field	Range of values	Description
REQ	CHG	CHANGE
TYPE	xxx	Type of telephone set
TN	lll s cc uu	Terminal number
ECHG	YES	Easy change
ITEM	KEY xx RGA	xx = key number RGA = Ring Again key

The PNI in overlays 15 (customer data block) and 16 (route data block) allow the entering of a private network identifier, which allows the NRAG feature to work.

Note 1: Nortel Networks recommends making the PNI value for each Meridian 1 customer and route within a customer's network, even though it is not necessary to do so.

Note 2: When it's not possible to make the PNI value for each customer and route on a network the same, a route must have the same PNI as the customer PNI in the switch to which it leads.

Figure 3-4, "Same PNI value within a network" on page 3-11 gives an example of Meridian 1 PBXs and routes that have the same PNI value within a network. Figure 3-5, "Different PNI value within a network" on page 3-11 shows different PNI values within the same network.

Figure 3-4 Same PNI value within a network

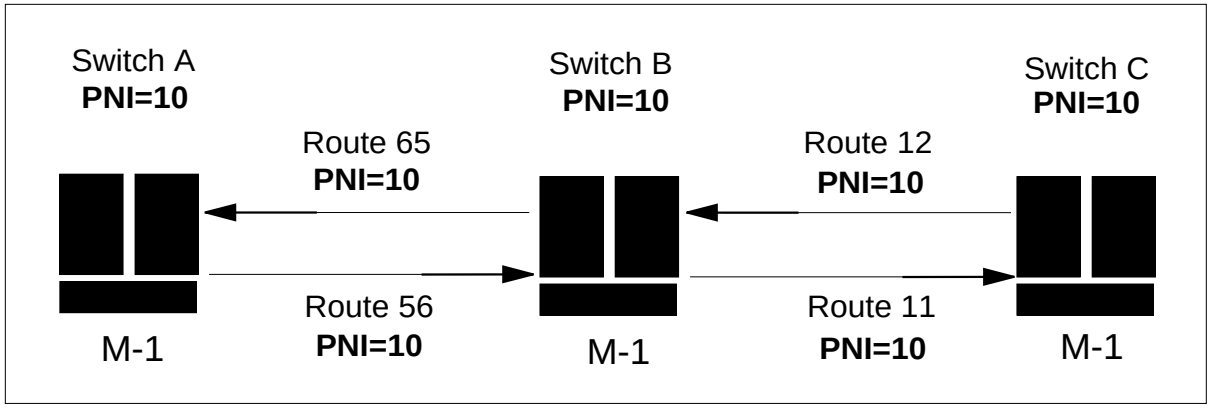
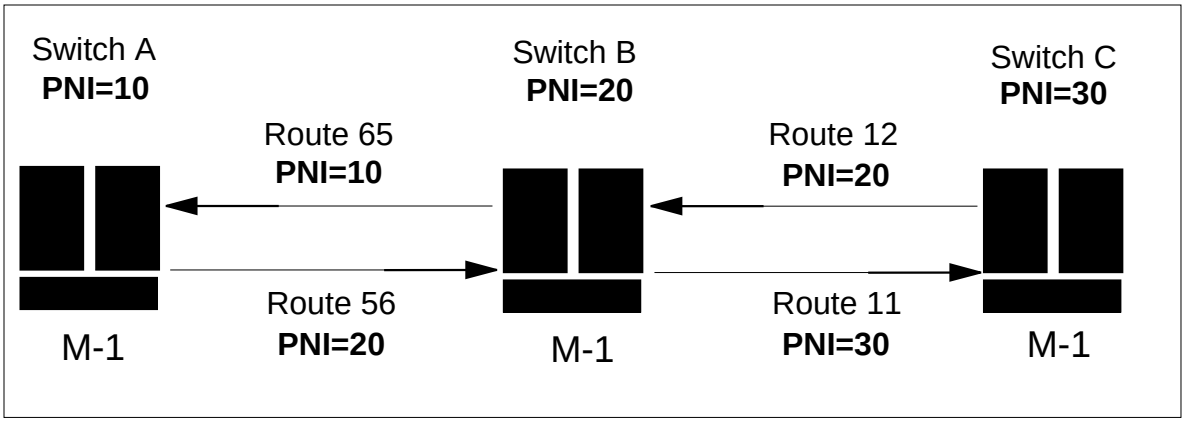


Figure 3-5 Different PNI value within a network



Note that in Figure 3-5, "Different PNI value within a network" on page 3-11 the PNI value of each route is the same as the next Meridian 1 PBX it encounters.

Note: Each customer group within the same Meridian 1 must have a unique PNI.

Overlay 15—customer data block

Set up privacy network identifier (PNI) mapping between call type translator home location code (HLOC), local steering code (LSC), home numbering plan area (HNPA), or HNXX for proper calling line identification (CLID) construction. Proceed in LB15 as in Table 3-5, "LD15 - customer data block NRAG entries" on page 3-12.

Table 3-5 LD15 - customer data block NRAG entries

Field	Range of values	Description
REQ	CHG	CHANGE
TYPE	CDB	customer data block
CUST	0 - 99	customer number
ISDN	YES	Answer YES to make the PNI prompt appear.
PNI	1 - 32700	Private network identifier; enables the NRAG feature to work.

Note: For a network alternate route selector (NARS) call, a home location code (HLOC) must be specified; for coordinated dialing plan (CDP) a local steering code (LSC). For ESN, if a switch is receiving public call types over the same PRI route at the terminating switch, those call types under access code 2 (AC2) must be specified.

Overlay 16—route data block

Set up duration timer NRAG, PNI, insertion of electronic switching network (ESN) insert net access codes (INAC). A PNI value is entered for each route that enters a switch. For example, switch B in Table 3-6, "LD16 - route data block NRAG entries" on page 3-13 requires a PNI value for both route 12 and

for route 56. For LD16, proceed as follows in Table 3-6, "LD16 - route data block NRAG entries" on page 3-13.

Table 3-6 LD16 - route data block NRAG entries

Field	Range of values	Description
REQ	CHG	CHANGE
TYPE	RDB	route data block
CUST	0 - 99	customer number
ROUT	0 - 511	route number
TKTP	XXX	trunk route type
ISDN	YES	answer YES to make the PNI prompt appear
IFC	D100 = DMS-100 D250 = DMS-250 SL1 = Meridian 1 S100 = MSL-100 ESS = AT&T ESS4 SS12 = Norwegian SYS112	switch to which this route connects
PNI	1 - 32700	private network identifier must be the same as the switch to which this route leads

Note: To permit the automatic adding of an ESN access code to an incoming ESN call, the INAC field must be used.

Overlay 17—configuration record

The software release or BCS number and the interface switches are specified by modifying LD17 as in Table 3-7, "LD - 17 configuration record NRAG entries" on page 3-13. Set the software release ID of the far end.

Table 3-7 LD - 17 configuration record NRAG entries (Sheet 1 of 2)

Field	Range of values	Description
REQ	CHG	CHANGE
TYPE	CFN	configuration data block

Table 3-7 LD - 17 configuration record NRAG entries (Sheet 2 of 2)

Field	Range of values	Description
ISDN	YES	Answer YES to make the RLS prompt appear.
RLS	XX	release number or BCS number of the switch at the far end of the D-channel
IFC	D100 = DMS-100 D250 = DMS-250 SL1 = Meridian 1 S100 = MSL-100 ESS = AT&T ESS4 SS12 = Norwegian SYS112	switch to which this switch connects

Overlay 21—print routine

Use LB21 to print the customer and route data blocks as they are modified with LB15 and LB16.

Overlay 22—print package (D2PRT)

Use LB22 to print the Meridian 1 print package.

NARS calls

The HLOC needs to be specified in overlay 15 for NRAG to work for NARS calls.

Coordinated dialing plan (CDP)

The following entries must be made for CDP calls:

- overlay 15—LSC
- overlay 86, ESN data block:
  - — CDP
  - — maximum number of steering codes (MXSC)
  - — number of digits in CDP DN (NCDP)
- overlay 87—LSC
  - — distant steering code (DSC)

Feature testing

To verify NRAG, the following steps are required:

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 that the far end has disconnected.
5. Initiate NRAG capabilities.
6. Calling party answers.
7. Disconnect call.

Note: Verify this procedure against different terminal types.

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 is sent.

NRAG on the MSL-100 switch

How NRAG sends signaling information

NRAG messages are sent over SS7 links or the PRI. NRAG on SS7 uses the TCAP for signaling. The TCAP message is then included in the Signaling Connection Control Part (SCCP) for transmission over SS7 links.

NRAG on PRI also uses TCAP messages, which are included with the PRI facility message (FAC). The facility message contains the network ID of the destination switch, along with the DN of the called number.

When the TCAP information is received at the destination switch it is stripped from the FAC message. Further processing and scanning of the busy line is performed by the destination switch, as in nodal RAG.

Hardware and software requirements

NRAG requires the PRI or SS7 base packages. NRAG requires BCS 30 or later and software package NTXA36AA01; NTX791AA02 for PRI.

Datafill and translations

NRAG transmits signaling information to other switches using either SS7, PRI, or a combination of both (interworking). Proper datafill is imperative at each switch on the network to prevent an NRAG request or recall from being blocked.

MSL-100 NRAG-related tables

The significant tables for NRAG on PRI are tables NETNAMES, CUSTNTWK, MSGRTE, DNGRPS, and TCAPTRID.

Table NETNAMES

Table NETNAMES gives a unique name and numerical ID for each switch on the private network. It also provides a field for specifying interworking of NRAG messages between PRI and SS7.

Table 3-8, "Fields and values for table NETNAMES" on page 3-16 is an example of the fields and values for table NETNAMES.

Table 3-8 Fields and values for table NETNAMES (Sheet 1 of 2)

Field	Range of values	Description
NETNAME	alphanumeric, 1-32 characters	The private network name. This name must be consistent on all switches or NRAG does not work.
EXTNETID	1-32767	The external network identifier. Each switch must have a unique number.

Table 3-8 Fields and values for table NETNAMES (Sheet 2 of 2)

Field	Range of values	Description
NETDIGS	0-10	a value representing the number of digits used by the logical network; used to extract the correct number of digits from the stored DN
NETOPTS	$, NINTNRAG, NMRTNRAG, FACREJ, NMDSP, SUPPRESS	Network options. Enter $ to allow interworking of NRAG messages between PRI & SS7. Choose NINTNRAG to send signaling messages to the NRAG subsystem instead of the INTERWRK subsystem. Choose NMRTNRAG to prevent table MSGRTE from routing NRAG on SS7 messages. A tuple is rejected if NINTNRAG is chosen without also selecting NMRTNRAG. FACREJ determines whether the facility reject message is sent to the originator when the PRI facility message cannot be routed to the destination. NMDSP and SUPPRESS are not used by NRAG.

Datafill sequence

There is no change to the datafill sequence.

Sample datafill

Figure 3-6, "Sample datafill for table NETNAME" on page 3-17 provides sample datafill for table NETNAME.

Figure 3-6 Sample datafill for table NETNAME

netname	extnetid	netdigs	netopts	netopts
NETWORK1	125	7	(NINTNRAG)	(NMRTNRAG)

Table CUSTNTWK

Table CUSTNTWK associates a customer name with the NETNAME defined in table NETNAMES, assigns a global customer group identifier, and provides a field for selecting the NRAG option.

Table 3-9, "Fields and values for table CUSTNTWK" on page 3-18 shows the fields and values for table CUSTNTWK.

Table 3-9 Fields and values for table CUSTNTWK

Field	Range of values	Description
CUSTNAME	alphanumeric, 1-16 characters	the customer group name
NETNAME	alphanumeric, 1-32 characters	must be the same as the NETNAME datafilled in table NETNAMES
NETCGID	1-4096	network customer group identifier
DNREVXLA	$	DN reverse translators. Enter $
OPTIONS	NTWKRAG	Enter NTWKRAG to enable NRAG. No other options currently available.

Datafill sequence

There is no change to the datafill sequence.

Sample datafill

Figure 3-7, "Sample datafill for table CUSTNTWK" on page 3-18 provides sample datafill for table CUSTNTWK.

Figure 3-7 Sample datafill for table CUSTNTWK

custname	netname	netcgid	dnrvxla	options
NTELCOM	NETWORK1	39	$	NTWKRAG

Table MSGRTE

Table MSGRTE provides the routing information for the FAC message used to transmit NRAG signaling messages. This table also provides a selector to specify PRI or SS7 routing for the signaling messages.

Table 3-10, "Fields and values for table MSGRTE" on page 3-19 is an example of the fields and values for table MSGRTE.

Table 3-10 Fields and values for table MSGRTE

Field	Range of values	Description
NETID	alphanumeric, 1-32 characters	Network identifier. Enter the same value specified in the NETNAMES field of table NETNAMES.
FROMDIGS	numeric	For NRAG, this is the outpulsed digits of the calling party. For other applications, FROMDIGS specifies the first number of a range of digits.
TODIGS	numeric	For NRAG, enter the same value as in FROMDIGS. For other applications, TODIGS specifies the last number of a range of digits.
MSGRTSEL	LOCAL, PRA, SS7	Message route selector. Enter PRA or SS7 if message is to be routed over a specific D-channel or SS7 route set. Enter LOCAL if message is to be terminated at this switch.
(LOCAL subfield) DELDIGS	numeric	number of digits to be deleted
(LOCAL subfield) PREDIGS	numeric	the digit string to be prefixed to the destination address
(PRA subfield) DELDIGS	numeric	number of digits to be deleted from destination address
(PRA subfield) PREDIGS	numeric	the digit string to be prefixed to the destination address
(PRA subfield)	alphanumeric	Enter NEWNET
(SS7 subfield) DPC	alphanumeric	Destination point code. Enter the CLLI name.
(SS7 subfield) DELDIGS	0-10	number of digits to be deleted from destination address
(SS7 subfield) PREDIGS	numeric	the digit string to be deleted from destination address
(SS7 subfield) OPTIONS	alphanumeric	Enter NEWNET

Datafill sequence

The NETNAME must be datafilled in table NETNAMES before the NETID field can be assigned in table MSGRTE.

Sample datafill

Figure 3-8, "Sample datafill for table MSGRTE" on page 3-20 provides sample datafill for table MSGRTE.

Figure 3-8 Sample datafill for table MSGRTE

netid	fromdigs	todigs	msgrtsel	
NETWORK1	515	815	SS7	DALLASPC 0 N $

Table DNGRPS

Table DNGRPS is necessary if the terminating switch contains a tuple for an ADDRESS option for a called party's NETNAME.

Table 3-11, "Fields and values for table DNGRPS" on page 3-20 contains the fields and values for table DNGRPS.

Table 3-11 Fields and values for table DNGRPS

Field	Range of values	Description
SNPA	numeric, 3 digits	serving numbering plan area; the first three numbers of the DN
OFC	numeric, 3 digits	stands for office code; the next three numbers of the DN
FROMDIGS	numeric, 4 digits	beginning number of a range of the last four digits of DNs
TODIGS	numeric, 4 digits	ending number of a range of the last four digits of DNs
NETOPTS	NETNAME, OPTION, NAME, ADDRESS, NONUNIQUE	Network options; consists of subfields OPTION and NETNAME. Use OPTION to assign a calling party's NAME and ADDRESS.

Datafill sequence

The NETNAME must be datafilled in table NETNAMES before it can be assigned in the NETOPTS field of table DNGRPS.

Sample datafill

Figure 3-9, "Sample datafill for table DNGRPS" on page 3-21 provides sample datafill for table DNGRPS.

Figure 3-9 Sample datafill for table DNGRPS

```
snpa    ofc    fromdigs    todigs    netopts
214     301    2000        5000      BNR  NAME
```

Table TCAPTRID

Table TCAPTRID assigns the number of TCAP identifiers required by NRAG. To calculate the number of IDs required, multiply the number of incoming calls receiving busy tone by the percentage of these calls attempting NRAG. Then, multiply the result by 2.

For example:

```
   240   calls receiving busy tone
 x 10%   requesting NRAG
------
    24
 x   2
------
    48   TCAPTRIDs required
```

Table 3-12, "Fields and values for table TCAPTRID" on page 3-21 contains the fields and values for table TCAPTRID.

Table 3-12 Fields and values for table TCAPTRID

Field	Range of values	Description
TCAPAPPL	ACBAR, DNVAL, NACD, NMS, NRAG, PVN, NIL, CMS, NSSTCN, MAP, MAX	Type of TCAP application. Enter NRAG.
NUMTRIDS	0-32767	number of transaction IDs

Datafill sequence

There is no change to the datafill sequence.

Sample datafill

Figure 3-10, "Sample datafill for table TCAPTRID" on page 3-22 provides sample datafill for table TCAPTRID.

Figure 3-10 Sample datafill for table TCAPTRID

tcapappl	numtrids
NRAG	20
PVN	10
ACBAR	35
DNVAL	12
NMS	10

CAUTION

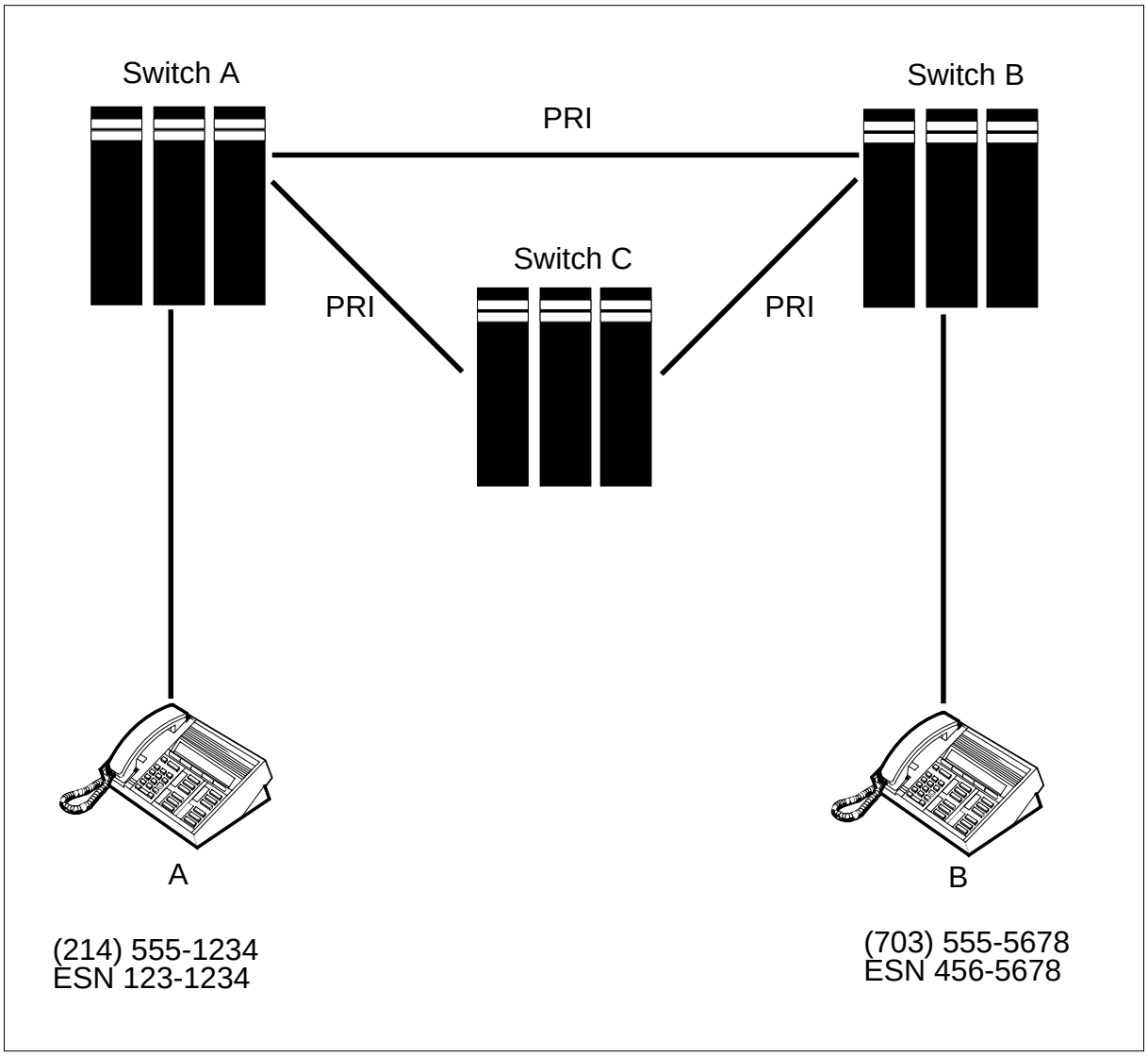
Cold restart required

Changes or additions to table TCAPTRID do not take effect until after a cold restart.

Sample MSL-100 datafill for NRAG on PRI

The following figure and examples represent the datafill necessary for implementing NRAG on PRI. The datafill examples refer to the sample network shown in Figure 3-11, "MSL-100 NRAG on example PRI network" on page 3-23.

Figure 3-11 MSL-100 NRAG on example PRI network



User A is in CUSTGRPA on switch A, while user B is in CUSTGRPB on switch B. Assume user A calls user B by dialing 6-456-5678. The digit 6 is stripped off during translation and the prefix 111 is added.

Before datafilling the switches, keep the following in mind:

- Datafill table MSGRTE with the private DNs in the origination and destination elements of the FAC message.
- Datafill table MSGRTE so that the digits leaving the originating station are the ESN DN of the called party (user B).
- If the FAC message is routed through an intermediate switch (such as switch C in the previous figure), only the ESN codes of the originating and terminating stations are needed in that switch's datafill, not the public DNs.

Switch A datafill

The following figure shows the datafill necessary to enable NRAG on switch A in the example shown in Figure 3-12, "Switch A datafill" on page 3-25.

Figure 3-12 Switch A datafill

Table NETNAMES

netname	extnetid	netdigs	netopts
NETABC	63	0	$

Table CUSTNTWK

custname	netname	netcgid	dnrevxla	options
CUSTABC	NETABC	121	$	NTWKRAG

Table MSGRTE

msgrtkey	msgrtres
NETABC 111456 111456 (outpulsed digits)	PRA PRAATOB 3 N $ PRA PRAATOC 3 N $
NETABC 123 123 (incoming digits)	LOCAL 3 214555
NETABC 456 456 (reply digits DNGRPS)	PRA PRAATOB 0 N $ PRA PRAATOC 0 N $
NETABC 555 555 (reply digits norm.)	PRA PRAATOB 3 456 $ PRA PRAATOC 3 456 $

The reply digits tuple (NETABC 456 456) is necessary if table DNGRPS on the terminating switch (B) contains a tuple for a range of DNs that contains user B's DN with an ADDRESS option for network NETBAC as shown in Figure 3-13, "Table DNGRPS (on switch B)" on page 3-25.

Figure 3-13 Table DNGRPS (on switch B)

snpa		ofc	fromdigs	todigs	netopts
703	555	0000	9999	NETBAC (ADDRESS 000 456 NNNN) $	

Switch B datafill

The following Figure 3-14, "Switch B datafill" on page 3-26 shows the datafill necessary to enable NRAG on switch B.

Figure 3-14 Switch B datafill

Table NETNAMES

netname	extnetid	netdigs	netopts
NETBAC	63	0	$

Table CUSTNTWK

custname	netname	netcgid	dnrevxla	options
CUSTBAC	NETBAC	121	$	NTWKRAG

Table MSGRTE

msgrtkey	msgrtres
NETBAC 111123 111123 (outpulsed digits)	PRA PRABTOA 3 N $ PRA PRABTOC 3 N $
NETBAC 123 123 (reply digits DNGRPS)	PRA PRABTOA 0 N $ PRA PRABTOC 0 N $
NETBAC 456 456 (incoming digits)	LOCAL 3 703555
NETBAC 555 555	PRA PRABTOA 3 456 $

The reply digits tuple (NETBAC 123 123) is necessary if table DNGRPS on the terminating switch (A) contains a tuple for a range of DNs that contains user A's DN with an ADDRESS option for network NETABC as follows in Figure 3-15, "Table DNGRPS (on switch A)" on page 3-27.

Figure 3-15 Table DNGRPS (on switch A)

snpa	ofc	fromdigs	todigs	netopts
214	555	0000	9999	NETABC (ADDRESS 000 123 NNNN) $

Switch C datafill

Figure 3-16, "Switch C datafill" on page 3-27 shows the datafill necessary to enable NRAG on switch C.

Figure 3-16 Switch C datafill

Table NETNAMES

netnames	extnetid	netdigs	netopts
NETCAB	63	0	$

Table MSGRTE

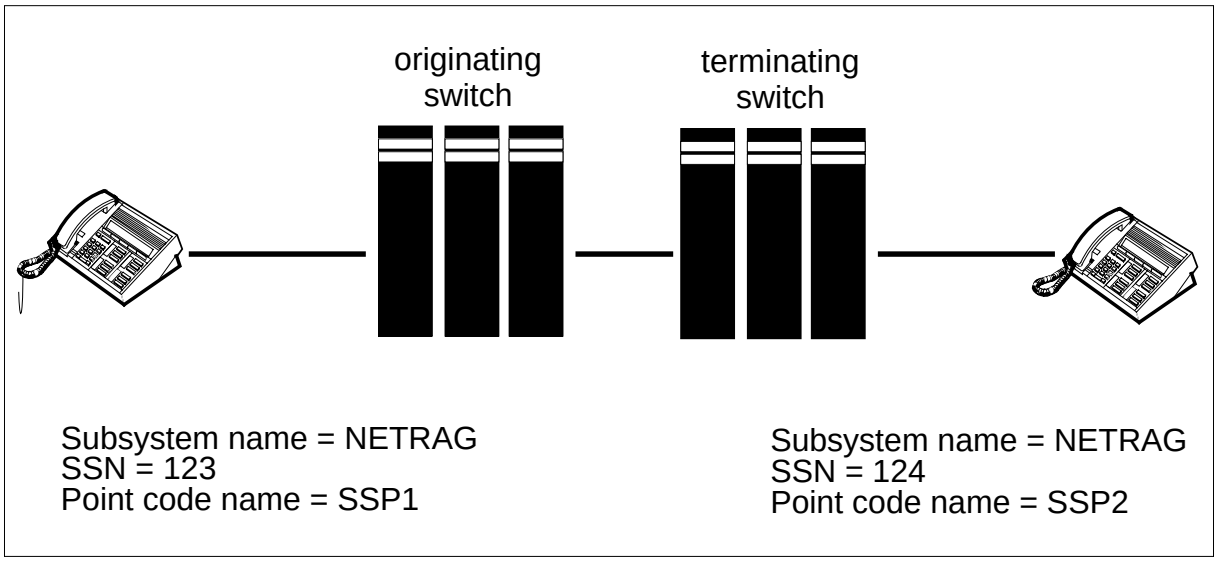
msgrtkey	msgrtres
NETCAB 123 (incoming digits) 123	PRA PRACTOA 0 N $
NETCAB 456 (incoming digits) 456	PRA PRACTOB 0 N $

Sample MSL-100 datafill for NRAG on SS7

In addition to table MSGRTE, described in the preceding section. Tables C7LOCSSN and C7NETSSN must be filled to ensure correct routing of NRAG messages over SS7 links. Each switch must have the same subsystem name, with a unique subsystem number.

Refer to Figure 3-17, "MSL-100 NRAG on example SS7 network" on page 3-28 and examples for the datafill necessary for implementing NRAG on SS7.

Figure 3-17 MSL-100 NRAG on example SS7 network



Datafill at originating switch

Table C7LOCSSN Table C7NETSSNNETRAG 123
1 N N $ SSP2 NETRAG 124

Datafill at terminating switch

Table C7LOCSSN Table C7NETSSNNETRAG 124
1 N N $ SSP1 NETRAG 123

Feature interactions

Table 3-13, "Feature interaction summary for NRAG on MSL-100" on page 3-28 describes the interactions between NRAG and the called party's features.

Table 3-13 Feature interaction summary for NRAG on MSL-100 (Sheet 1 of 2)

Feature	Limitations/Interactions
Call Forwarding	No interaction if called party has Call Forward Universal (CFU), Call Forward Intragroup (CFI), or Call Forward Don't Answer (CFD). NRAG request is forwarded if called party has CFB. NRAG on SS7 cannot be requested if forwarded to station is busy. NRAG recalls are not forwarded if originator has CFU, CFI, or CFD.
Call Pickup	No interaction with called party's Call Pickup function. NRAG recalls cannot be picked up by originator.
Call Waiting/Attendant Camp-On	NRAG is requested if called party has call/calls waiting. Any calls waiting take precedence over NRAG recalls. Same limitation is present on Attendant Camp-On.

Table 3-13 Feature interaction summary for NRAG on MSL-100 (Sheet 2 of 2)

Feature	Limitations/Interactions
Three-Way/Conference Calling	* Originator activates NRAG against a station involved in Three-Way/Conference Call. * Originator does not activate NRAG while on second leg of Three-Way call. * 500/2500 set does not activate NRAG while on second leg of Three-Way call. * EBS user may deactivate NRAG at any time except during recall.
Make Set Busy/Do Not Disturb	* Originator may receive NRAG recalls even if MSB/DND is activated. * Originator receives reject message if called party has MSB/DND activated.
Hunt Groups	Originator may activate NRAG request against any station in a Directory Number Hunt (DNH), Multiline Hunt (MLH), or Distributed Line Hunt (DLH) group. The request applies to any member in the logical group. When any member becomes free, originator is recalled.
Uniform Call Distribution	NRAG cannot be activated against any UCD directory number of a UCD group. NRAG can be activated against the individual station's DN.
Automatic Call Distribution	NRAG cannot be activated against any ACD directory number in an ACD group.
Multiple Appearance Directory Number	NRAG is assigned on a line-by-line basis. Only one NRAG request allowed on each MADN member.
Call Back Queuing	CBQ and NRAG/RAG are activated by the same method, depending on type of set. DMS determines which feature to use. * If originator receives busy treatment, DMS uses nodal RAG. * If destination is an ISUP trunk and originator receives busy treatment, DMS uses NRAG. * If destination is trunk and user receives Generalized No Circuit Treatment (GNCT), DMS uses CBQ. Only one NRAG/RAG or CBQ request may be pending at one time.
Attendant Console	NRAG cannot be activated against an attendant console. NRAG can be activated against a busy station talking to an attendant console.

Interaction with call types

NRAG supports the PRIVATE call type only. An MSL-100 switch using the MCDN ISA application, however, is allowed to specify a terminal interface equipment (TIE) call type.

Operational measurements

NRAG on PRI provides operational measurements (OM) of the message traffic generated on PRI D-channels. These OMs are part of the primary rate access facility (PRAFAC) group and include origination, termination, and tandem messages. The OM register increases each time an event occurs.

Table 3-14, "MSL-100 OM registers for PRAFAC" on page 3-30 shows the individual registers in the PRAFAC group.

Table 3-14 MSL-100 OM registers for PRAFAC

Register	Description
FACMSGOR	the number of facility messages originated at a switch
FACMSGTM	the number of facility messages terminated at a switch
FACMSGTR	the number of facility messages transmitted by a switch
DISNORTX	the number of facility messages discarded because no route list was found in table MSGRTE
DISCNGST	the number of facility messages discarded due to congestion at the switch
DISRTUNA	the number of facility messages discarded because no outgoing route was available (D-channel not in service)
REJCNGST	the number of facility reject messages rejected due to application or network congestion at the switch
REJMSGOR	the number of facility reject messages originated at a switch
REJMSGTM	the number of facility reject messages terminated at a switch
REJMSGTR	the number of facility reject messages transmitted by a switch
REJMSGDS	the number of facility reject messages discarded by a switch
REJNORTX	the number of facility reject messages rejected by a switch because no routing translation exists for the destination
REJRTUNA	the number of facility reject messages discarded because no outgoing route was available

Logs

There are no special log considerations for NRAG on the MSL-100 switch.

Service orders

The NRAG option on the MSL-100 switch is datafilled on a line-by-line basis using the customer group RAG option assigned to the set.

Testing

There are no special testing considerations for NRAG on the MSL-100 switch.

Billing

There are no special billing considerations for NRAG on the MSL-100 switch.

4 Network Message Waiting

Feature description

Network Message Waiting (NMW) extends voice message capabilities across a hybrid network of Meridian 1 (M-1) and MSL-100 switches. The message center may reside at either a Meridian 1 or MSL-100 node. Subscribers to the message center may be located at any node and may either be local or remote users.

How NMW works

Figure 4-1, "Meridian 1 host to MSL-100 switch" on page 4-34 through Figure 4-4, "MSL-100 host to Meridian 1 switch" on page 4-37 are examples of how NMW works, with the Meridian 1 host to the MSL-100 switch and the MSL-100 host to the Meridian 1 switch.

Figure 4-1 Meridian 1 host to MSL-100 switch

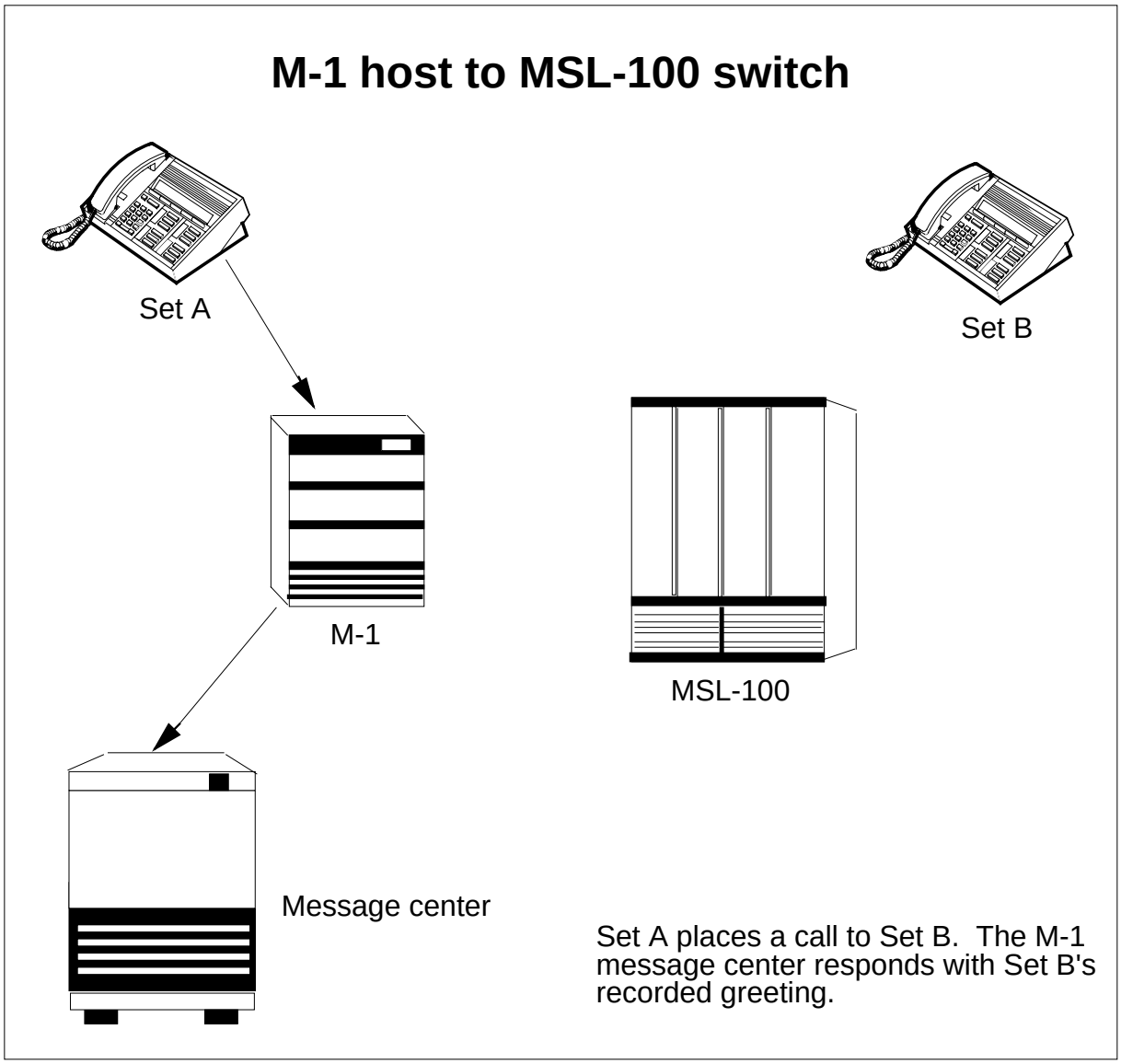


Figure 4-2 Meridian 1 host to MSL-100 switch

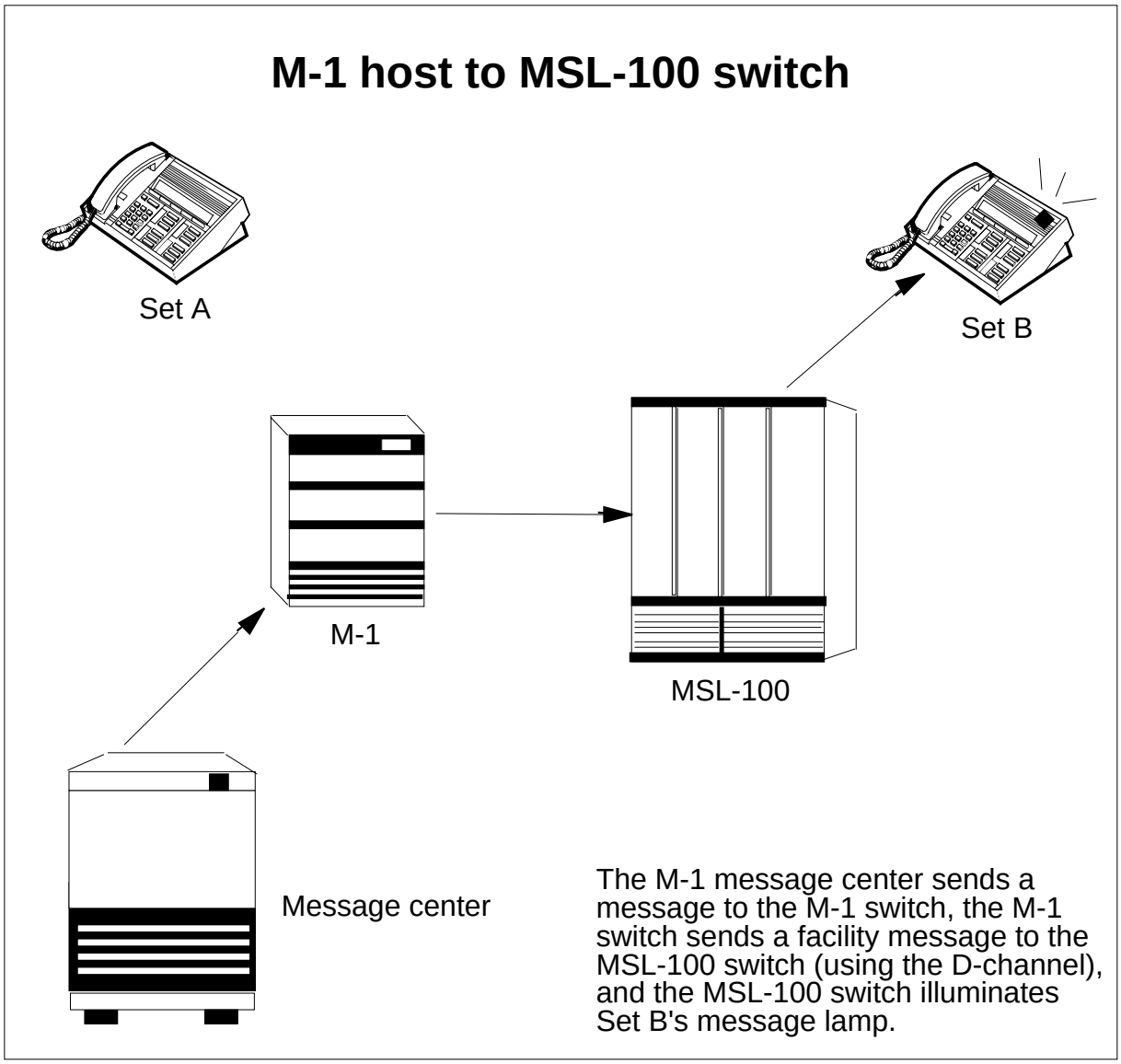


Figure 4-3 MSL-100 host to Meridian 1 switch

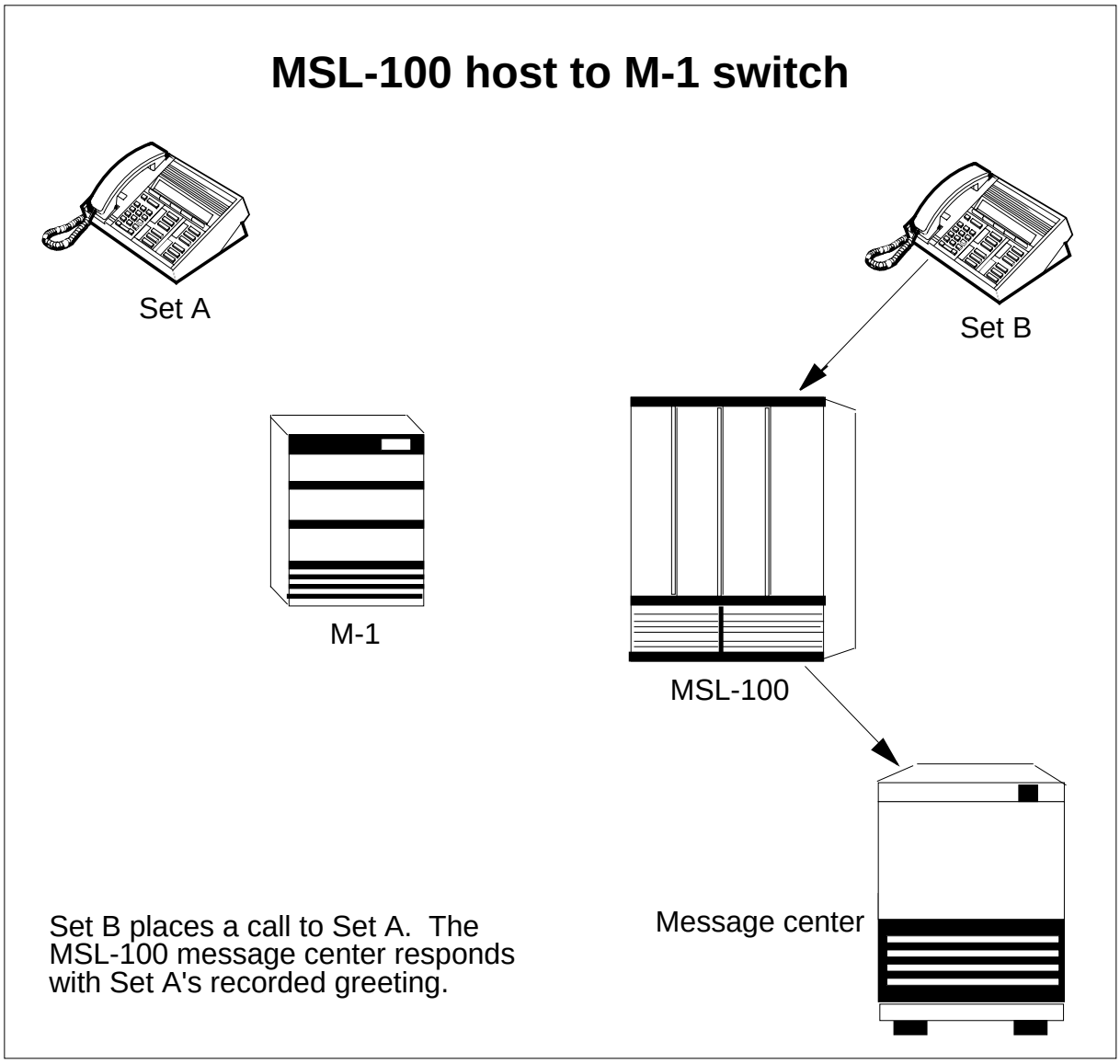
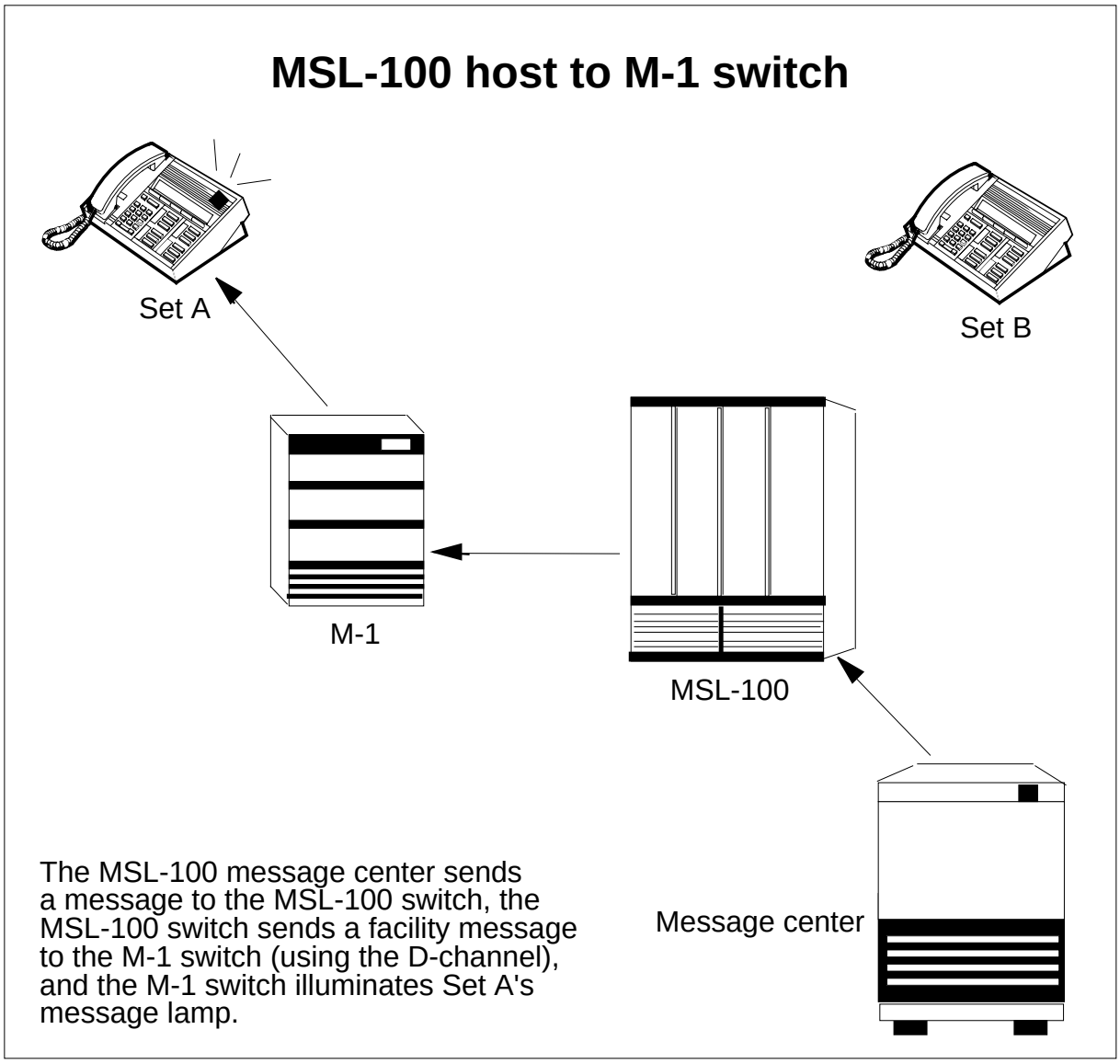


Figure 4-4 MSL-100 host to Meridian 1 switch



Software requirements

NMW requires release 19 software on a Meridian 1 switch and BCS36 or greater software on a MSL-100 switch, plus certain software packages.

Meridian Mail requires either release 7 or 8, depending on the host node.

Meridian 1 software requirements

Message center host node

NMW requires software release 19 or later and the following software packages for a Meridian 1 message center host node:

- Package 219 message waiting indication (MWI), if connected to a DMS switch with BCS 36 software
- Package 10, end-to-end signaling (EES)
- Package 35, integrated message system (IMS)
- Package 40, basic automatic call distribution (BACD)
- Package 45, automatic call distribution (ACD)-A (ACDA)
- Package 46, message center (MWC)
- Package 77, command status link (CSL)
- Package 145, integrated services digital network (ISDN) signaling
- Package 146, ISDN PRI (PRI)or
- Package 147, ISDN signaling link (ISL), for Meridian 1 to Meridian 1 switches
- Package 148, ISDN advanced network service (NTWK)
- Package 175, network message service (NMS)

Message center remote/tandem nodes

NMW requires software release 19 and the following software packages for Meridian 1 message center remote nodes.

- Package 219 MWI, if connected to DMS BCS 36 *
- Package 10, EES
- Package 40, BACD
- Package 45, ACD-1—required only if the ACD-DN is the message center directory number (DN)
- Package 46, MWC
- Package 145, ISDN *
- Package 146, ISDN PRI (PRA) *

  or

- Package 147, ISL for Meridian 1 to Meridian 1 switches *
- Package 148, NTWK *
- Package 175, NMS

Note: Asterisks designate those packages needed for tandem nodes.

MSL-100 software requirements

Message center remote/tandem nodes

NMW on the MSL-100 switch requires BCS 36 or later software. In addition, message center user and tandem nodes require the following:

- NTX797AA—PRI: MWI

  NTXN34AA: ISUP/PRA to Simplified Message Desk Interface (SMDI) interworking

- NTX791AA—PRI: Network Ring Again (NRAG)

  NTX000AA: Bilge

  NTX001AA: Common basic

  NTX100AA: IBN basic

  NTX101AA: Enhanced features IBN

  NTX119AA: Message Service

  NTX106AA: Electronic telephone sets (if using business sets)

  NTX750AB: ISDN Basic Access

  NTX790AB: ISDN PRI

  NTX901AA: Local features 1

  NTX167AB: Common Channeling System No.7 (CCS7) trunk signaling (if using CCS7)

- NTXA68AA01—Network Message Service

  NTX550AA02: CCS7 Transaction Service Support

Message center host nodes

NMW on the MSL-100 switch requires BCS 36 or later software. In addition, message center host nodes require the following:

- NTX732AA— SMDI

  NTX000AA: Bilge

  NTX001AA: Common basic

  NTX100AA: IBN basic

  NTX101AA: Enhanced features IBN

  NTX119AA: Message Service

  NTX730AA: Multilink ASCII device driver

  NTX901AA: Local features 1

- NTX791AA—PRI: NRAG

  NTX106AA: Electronic telephone sets (if using business sets)

  NTX750AB: ISDN Basic Access

  NTX790AB: ISDN PRI

  NTX901AA: Local features 1

Meridian Mail software

Remote and host nodes

Meridian 1 and MSL-100 remote nodes require only ISDN software packages and none specific to Meridian Mail.

An MSL-100 host with an SMDI link must have Meridian Mail release 8 or later to support the transfer of 10 digits.

A Meridian 1 host must have Meridian Mail release 7 or later.

In addition to the Meridian Mail base software (release 8, 7000D or release 9, 7000E), Meridian 1 host nodes require the 7008 (NMS) software package.

In addition to the GP Meridian Mail software, MSL-100 host nodes serving multiple customers require the 7041B (release 8, multi-customer) or the 7041C (release 9, multi-customer) software package.

Hardware requirements

The NMW feature requires special hardware only at the voice message host node of a network. Remote nodes require only standard ISDN hardware.

Meridian 1 hardware requirements

NMW on the Meridian 1 switch requires the following hardware:

- a voice message unit on a Meridian 1 host node
- a Meridian Mail link on a Meridian 1 host node
- PRI and public telephone service (PTS) trunks

MSL-100 hardware requirements

NMW on the MSL-100 switch requires the following hardware:

- a message interface in the form of an SMDI link between the MSL-100 host node and the voice mail unit
- MSL-100 system lines
- PRI, CCS7, and PTS trunks

Installation

There are no special installation considerations for NMW on the Meridian 1 or MSL-100 switch.

NMW maintenance

There are no special maintenance considerations for NMW on the Meridian 1 or MSL-100 switch.

NMW datafill

On a Meridian 1 voice message host node, a value-added server must be specified in the virtual segment ID (VSID) field in LD17, which the VSID fields in LD15 and LD23 recognize. So datafill LD17 before LD15 and LD23.

For the MSL-100 system, while the datafill for tables IBNLINES, IBNFEAT, and KSETFEAT is included here, these tables are datafilled by service order (and it is recommended that they be so datafilled).

The MSL-100 switch tables NETNAMES and MSGRTE require a public tuple in order for the NMW feature to work. The example MSGRTE tuples in this chapter show public and private network tuples for both incoming and outgoing facility messages.

Meridian 1 switch datafill

Overlay 17—Configuration record

Use LD17 to enable the D-channel to handle Message Waiting at an adjacent switch. This datafill presumes the existence of a PRI link between the Meridian 1 switch and an MSL-100 switch.

REQ field—Change the configuration record.

Value: CHG

TYPE field—Configuration record

Value: CFN

ADAN field—Change the primary D-channel.

Note: Before making this change, disable the D-channel.

Value: CHG DCH xx

CHG=change

DCH=D-channel

xx=0-63

RLS field—Release number or BCS release of the switch at the adjacent node

Value: 19 or 36

RCAP field—Specify the NMW capability of a D-channel to a remote switch.

Value: MWI

Overlay 15—Customer data block

Modify the customer data block to enable the message service (OPT field), to configure access code 2 (AC2 field) to insert an electronic switching network (ESN) access code at the terminating node, and to enter a PNI value (PNI field).

REQ field—Change the customer data block.

Value: CHG

TYPE field—Customer data block

Value: CDB

CUST field—Customer number

Range of values: 0-99

ATDN field—Attendant directory number

Value: xxxx

OPT field—Option; enable the message center; MCI=message center included

Value: MCI

IMS field—Enable the integrated messaging system (IMS).

Value: YES

FNAD field—Forward no-answer direct inward dialing (DID) calls to flexible Call Forward No Answer (CFNA) DN.

Value: FDN

FNAT field—Forward no-answer non-DID calls to flexible CFNA DN.

Value: FDN

FNAL field—Forward no-answer local calls to flexible CFNA DN (with CFCT activated).

Value: FDN

CFTA field—Call Forward to trunk access code

Value: YES

MDID field—Route DID no-answer calls to the message center.

Value: YES

NDID field—Route no-answer non-DID calls to the message center.

Value: YES

MWFB field—Route DID calls to busy sets to the message center.

Value: YES

VSID field—ID of the value-added server that provides voice messaging service; must be the same as the value already entered in the VSID field in LD17.

Range of values: 0-15

AC2 field—Enter the call types that use access code 2. Multiple entries are allowed. No entry defaults to access code 1.

Values: numbering plan area (NPA)=E.164 national

```
NXX=E.164 subscriber

INTL=internationalSPN=special numberLOC=location code
```

ISDN field—Change ISDN options.

Value: YES

PNI field—Private network identifier; each customer group within the same Meridian 1 network must have a unique PNI. While it is recommended that the customer and trunk route PNI value be the same, it is not required.

For an outgoing message, when these PNI values are different, the route PNI (LD16) must match the customer PNI (LD15) on the Meridian 1 switch or the EXTNETID table NETNAMES on the MSL-100 switch at the adjacent node.

For an incoming message, the customer PNI (LD15) must match the route PNI (LD16) on the Meridian 1 switch or the EXTNETID table NETNAMES on the MSL-100 switch at the adjacent node.

Range of values: 1-32700

HNPA field—Home number plan area code; area code of the Meridian 1 switch.

Range of value: 100-999

HNXX field—Prefix of the central office.

Range of values: 100-9999

HLOC field—Home location code (ESN).

Value: 100-999

LSC field—The local steering code (LSC) is set up in the coordinated dialing plan (CDP). This field appears only in the case of a five- or six-digit dialing plan.

Range of values: 1-9999

Overlay 23—Automatic Call Distribution (ACD)

Define an ACD group for the voice messaging DN. Datafill other ACD fields to fit your ACD group requirements. Set Voice Message, Express Messaging,

and Voice Menu ACD groups to Night Call Forward at the message center DN. Assign no agents to these ACD groups.

On a voice message Meridian 1 remote node, the IMS, CMS, IMA, AVMS, VSID, and ALOG fields do not appear.

REQ field—Add or change the ACD data block.

Value: ADD or CHG

TYPE field—ACD data block

Value: ACD

CUST field—Customer number

Range of values: 0-99

ACDN field—ACD directory number; for a Meridian 1 host, enter the ACD DN of the remote node.

For a Meridian 1 remote node, enter the DN of the voice mail service.

Value: A switch with the DNXP package allows up to seven digits. Otherwise, only four digits are allowed.

MWC field—Message waiting center, for a Meridian Mail Meridian 1 host

Value: YES

IMS field—Integrated messaging for Meridian 1 Meridian Mail host. Field appears if MWC=YES.

Value: YES

CMS field—For Meridian Mail Meridian 1 host, command and status link; appears if MWC=YES.

Value: YES

IMA field—For Meridian Mail Meridian 1 host, enables the IMS attendant; appears if MWC=YES and IMS=YES.

Value: YES

IVMS field—For Meridian Mail Meridian 1 host, integrated voice messaging service; prompted if MWC=YES and IMS=YES.

Value: YES

VSID field—For Meridian Mail Meridian 1 host, value-added server ID; must match VSID field in LD17. Prompted if IMS=YES

Range of values: 0-15

MAXP field—For Meridian Mail Meridian 1 host, maximum number of agent positions; equal to or greater than the number of voice channels in the voice processor cards.

Range of values: 1-1000 for options XT and 71

```
1-500 for options NT, 51 and 61

1-240 for options XN, RT, VLE, XL, and 211-120 for options LE,
N, or ST1-70 for options M, S, or MS
```

ALOG field—Provide automatic log-in for ACD agents associated with this DN. Prompted if IMS=YES

Value: YES

NCFW field—Night Call Forward to DN of main ACD queue for direct access to Meridian Mail. Do not specify an agent for the automatic call redirection to the ACD Night Call Forward DN when the message center DN is defined.

Value: Up to 23 digits:

```
-a public DN (10 digits) prefixed by an ESN access code

-an ESN number prefixed by an ESN access code
```

Overlay 11—Multi-line telephone set administration

Use LD11 to define an agent of the message service ACD group and a voice mail subscriber. An agent is assigned only to the message service ACD group and not to the other voice service ACD groups.

REQ field—Add or change a telephone set

Value: NEW or CHG

TYPE field—Type of telephone set

Value: xxxx

TN field—Terminal number

Range of values:

```
l s c u

l (loop) = 0-159s (shelf) = 0-3c (card) = 1-10u (unit) = 0-15
```

CUST field—Customer number

Range of values: 0-99

CLS field—Class of service

For an ACD agent, server voice messaging allowed.

Values: VMA

For a voice mail subscriber, hunt allowed; message waiting allowed, call forward no-answer allowed; call forward busy allowed.

Values: HTA, MWA, FNA, FBA

FDN field—Flexible Call Forward No-Answer to message center DN. This field requires a CLS value of MWA or FNA and is used only if one or more of the following are specified in LD15:

FNAD = FDN

FNAT = FDN

FNAL = FDN

Value: xxx . . . x

EFD field—Flexible Call Forward No-Answer DN for external calls, when CLS = CFTA. This field is used only if one or more of the following are specified in LD15:

FNAD = FDN

FNAT = FDN

FNAL = FDN

Value: xxx . . . x

EHT field—External hunt DN; accepted only if CLS = CFTA

Value: xxx . . . x

HUNT field—Hunt to message center DN

Value: xxx . . . x

KEY field—For an ACD agent:

Specify an ACD agent key.

Value: xx ACD yyyy zzzz

xx = key number

yyyy = ACD DN or message center DN

zzzz = agent position ID

Specify keys for Make Set Busy (MSB), Not Ready (NRD), Call Transfer (TRN), Conference (A03 or A06), and Release (RLS).

For a voice mail subscriber:

Specify a single-call ringing DN key.

Value: xx SCR yyyy

xx = key number

yyyy = single-call ringing DN

Specify a message-waiting key.

Value: xx MWK yyyy

xx = key number

yyyy = ACD DN or message center DN

Overlay 16—Route data block

Modify the datafill for the trunk route that connects to a DMS or a Meridian 1 switch.

REQ field—Change the route data block.

Value: CHG

TYPE field—Route data block

Value: RDB

CUST field—Customer number

Range of values: 0-99

ROUT field—Route number

Range of values: 0-511

ISDN field—ISDN PRI option; appears if ISDN = YES in LD15; accesses the PNI, NCRD, and INAC fields.

Value: YES

PNI field—Private network identifier; each customer within the same Meridian 1 network must have a unique PNI.

Within one network, the PNI must be the same in LD15 and LD16. When interworking other networks, the LD16 PNI of this switch must match the LD15 PNI of the remote switch.

Range of values: 1-32700

NCRD field—Allow the sending of call redirection messages.

Value: YES

INAC field—Allow an ESN access code to be added automatically to an incoming ESN call from a private network. This field appears only if the route is a TIE trunk.

Value: YES

INST field—Insert digits in front of leading digits when a non-TIE trunk connects to a DMS.

Value: 0-99999999

Overlay 90—ESN translation tables

Use LD90 to configure a home location code and a home NPA for a facility message to terminate at a user's switch from either a Meridian 1 or a DMS message center.

Use it also to configure a home location code for a private ESN uniform dialing plan. For the public numbering plan, where a 10-digit public number is used, configure LD90 to terminate the facility message at the user's DN.

REQ field—Add or change the record.

Value: ADD or CHG

CUST field—Customer number

Range of values: 0-99

FEAT field—Specify the network translation tables.

Value: NET

TRAN field—Specify access code 1 or 2.

Value: AC1 or AC2

TYPE field—Specify the type of translation.

Value: HLOC = home location code

HNPA = home NPA translation

NXX = office code translation

HLOC field—Specify the home location code.

Value: 3-7 digits

HNPA field—Specify the home NPA.

Range of values: 100-999

NXX field—Office code translation (for central office translation)

Ranges of values: 200-999 for three-digit numbers;

1200-1999 for 1-plus dialing

RLI field—Route list index (for central office translation)

Range of values: 0-255

SDRR field—Supplemental restriction or recognition; specify local DID codes (for central office translation).

Value: LDID

DMI field—Digit manipulation index. The DMI should delete three digits for the NXX.

Range of values: 1-255

LDID field—Local DID number recognized within the NPA and NXX.

Value: XXX

Overlay 22—Print program

Use LD22 to print the configuration record.

REQ field—Print system information.

Value: PRT

TYPE field—Configuration record

Value: CFN

RLS field—Release number or BCS release of the switch at the far end of the D-channel.

Values: 19 or 36

RCAP field—Specify the remote NMW D-channel capability.

Value: MWI

MSL-100 switch datafill

Table TERMDEV

Table TERMDEV defines the parameters of the SMDI link to the voice messaging system.

Datafill sequence There is no change to the datafill sequence.

Sample datafill

MCSMDI 1 4 SMDI B1200 EIA 1X67FA EVEN N NONE ALL

Figure 4-5, "TERMDES field in table TERMDEV" on page 4-52 through Figure 4-15, "COMCLASS field in table TERMDEV" on page 4-62 provide information about the individual fields in the table TERMDEV sample tuple.

Figure 4-5 TERMDES field in table TERMDEV

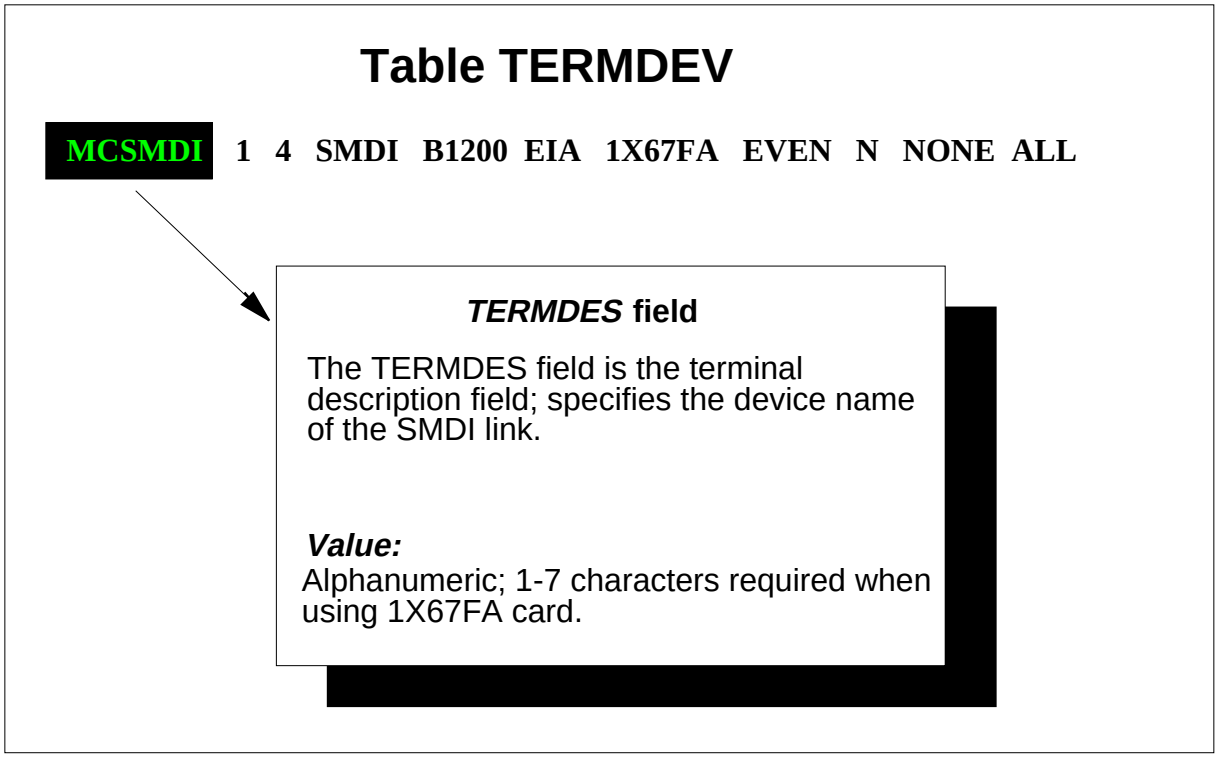


Figure 4-6 IOCNO field in table TERMDEV

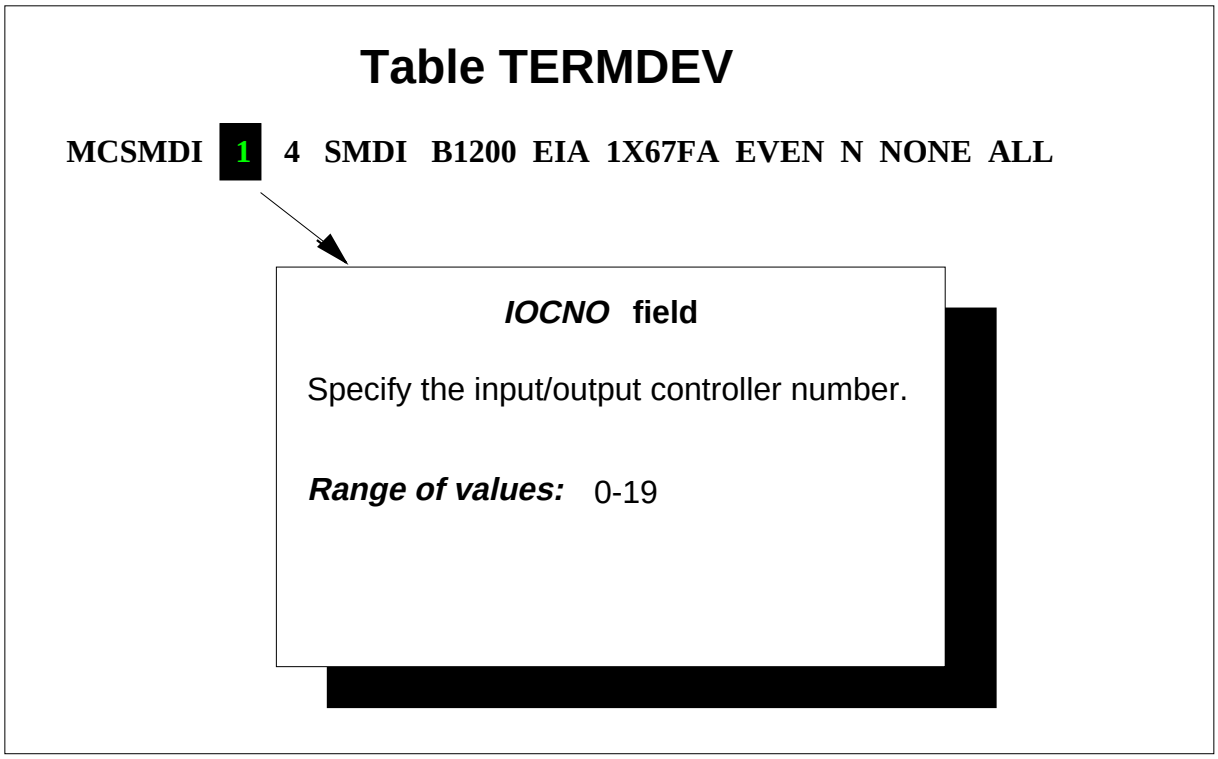


Figure 4-7 CKTNO field in table TERMDEV

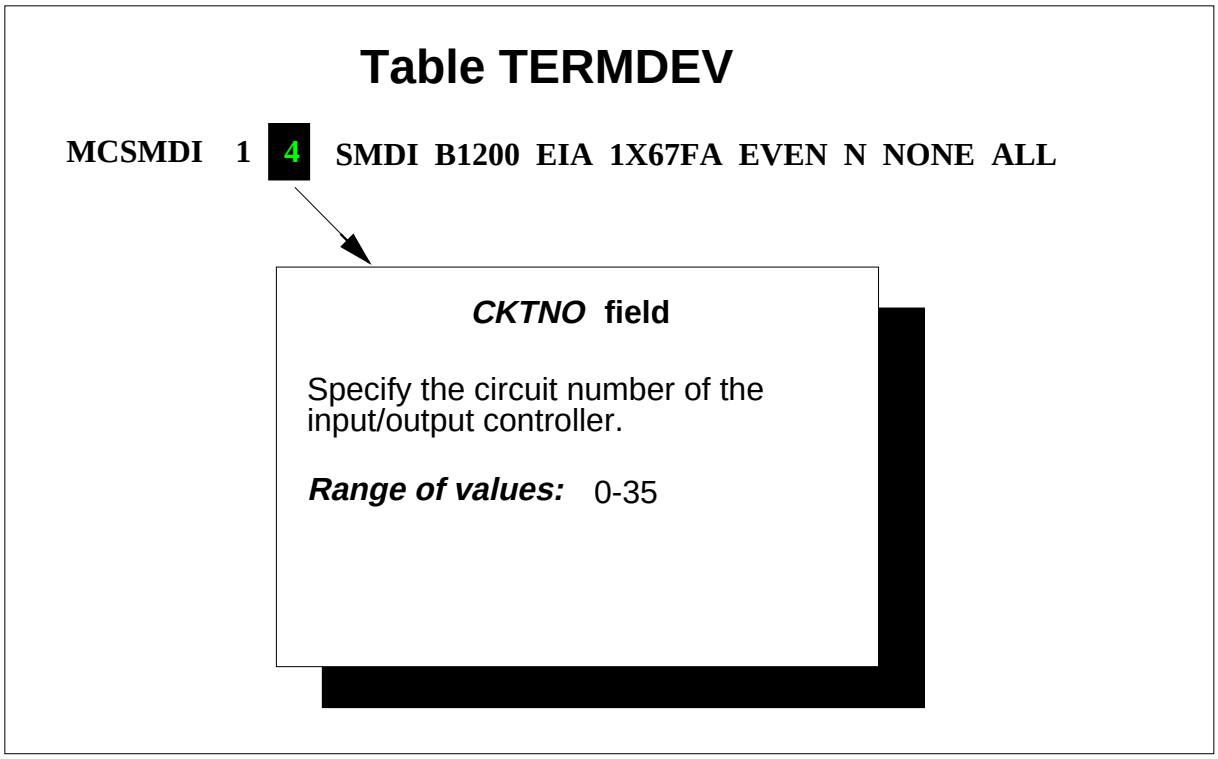


Figure 4-8 NETOPTS field in table TERMDEV

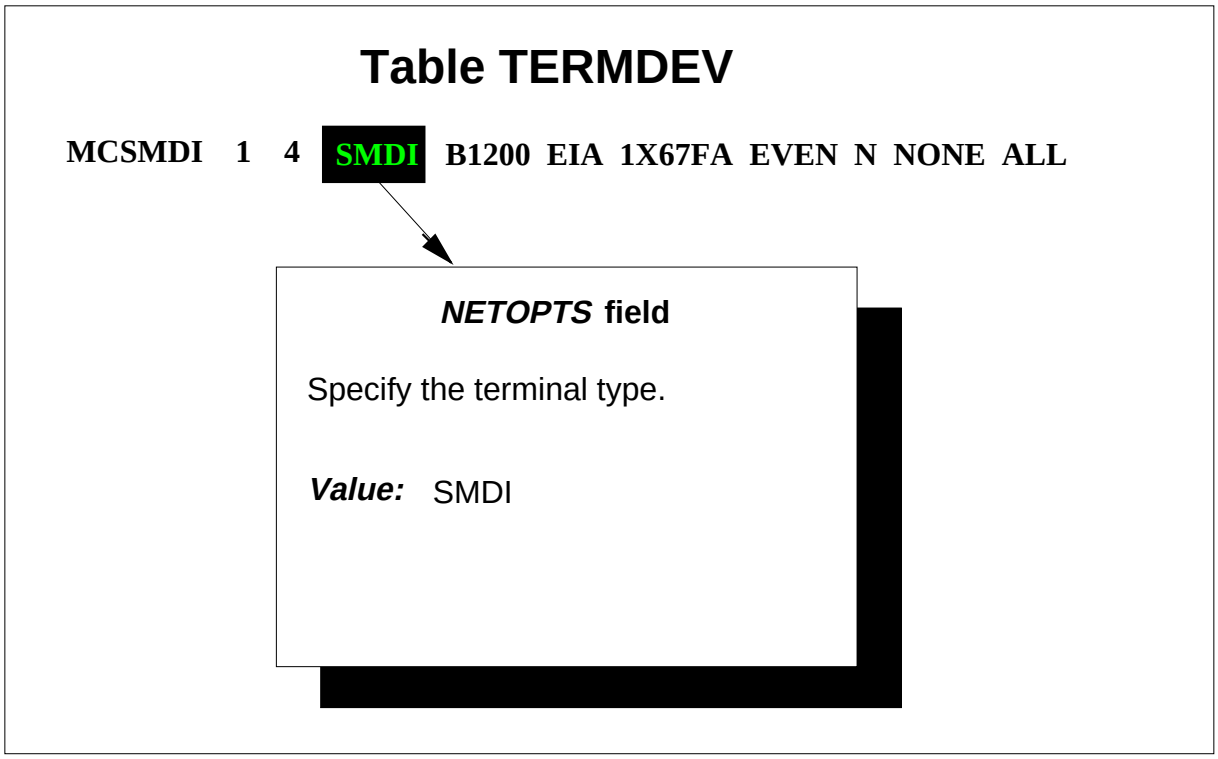


Figure 4-9 BAUDRT field in table TERMDEV

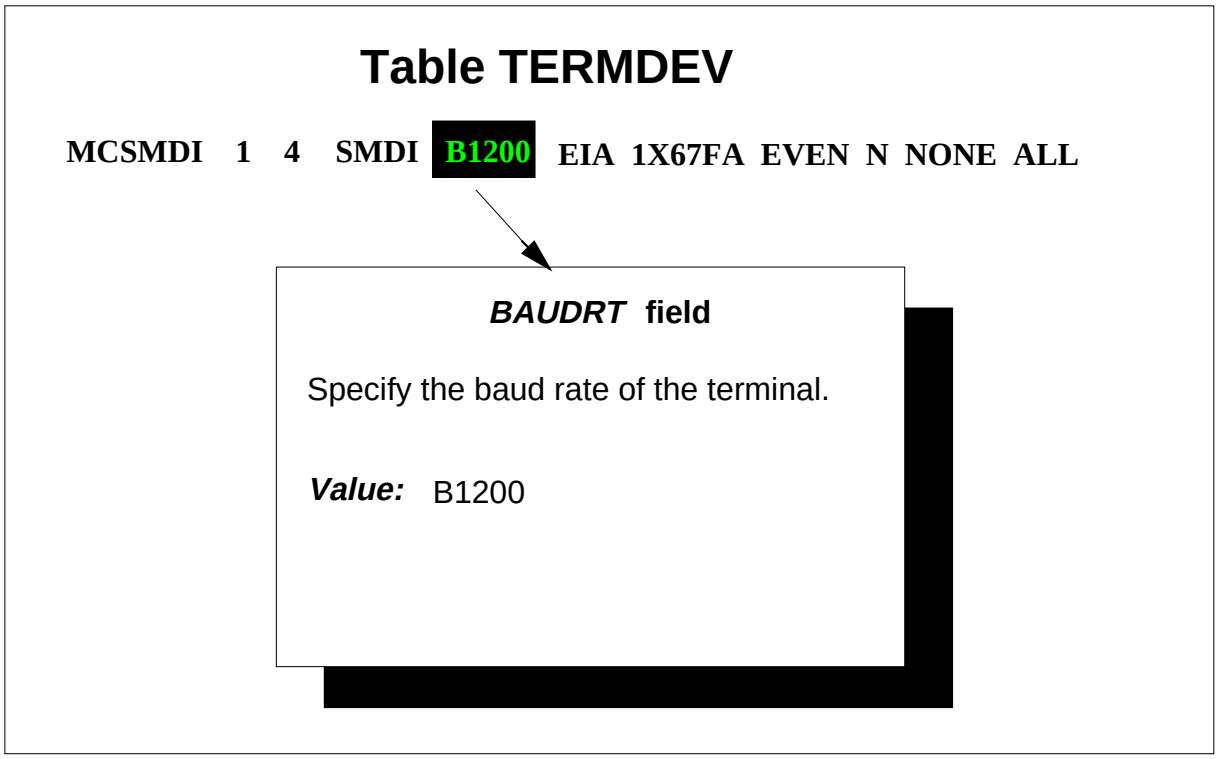


Figure 4-10 INTYP field in table TERMDEV

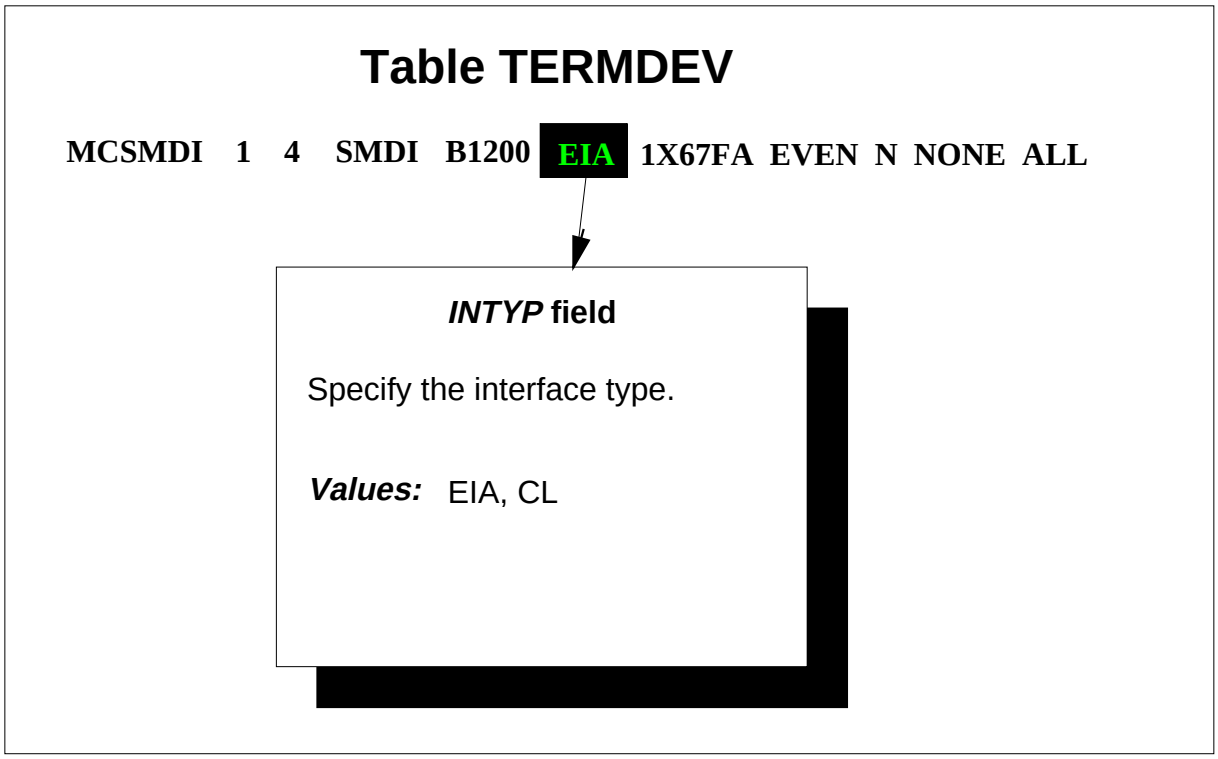


Figure 4-11 PECCODE field in table TERMDEV

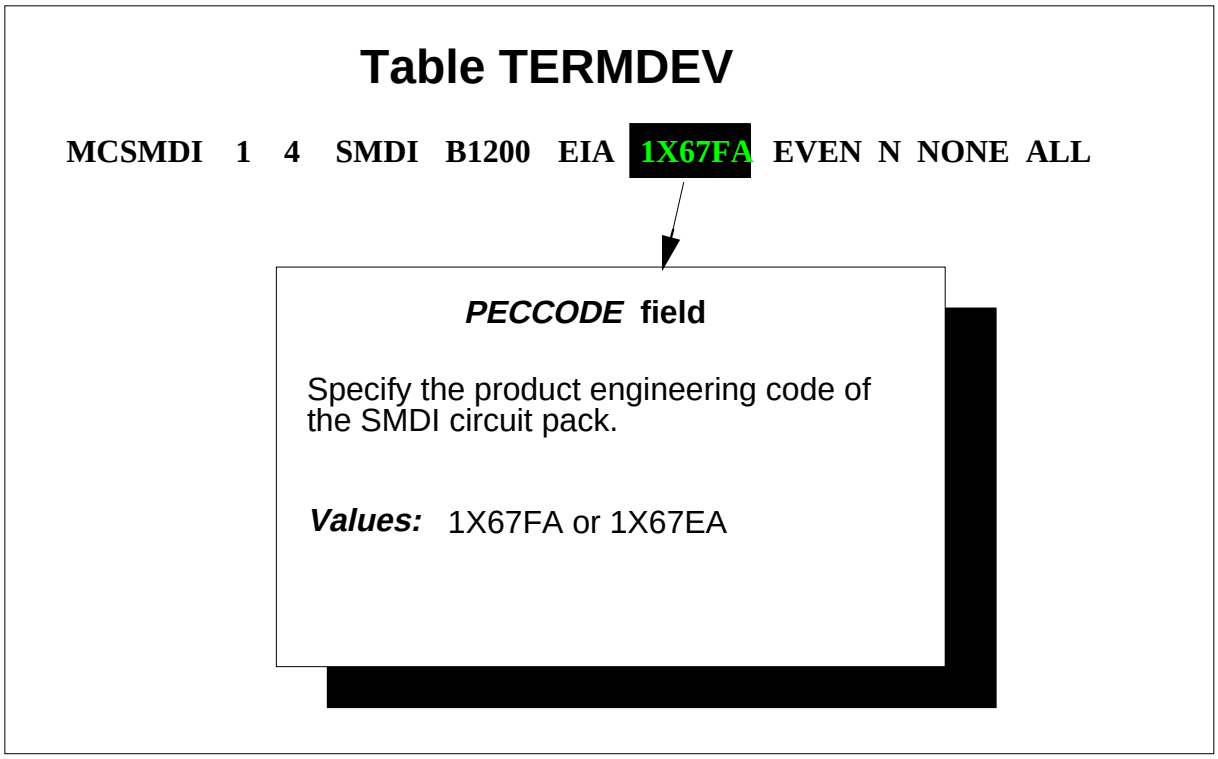


Figure 4-12 PRTY field in table TERMDEV

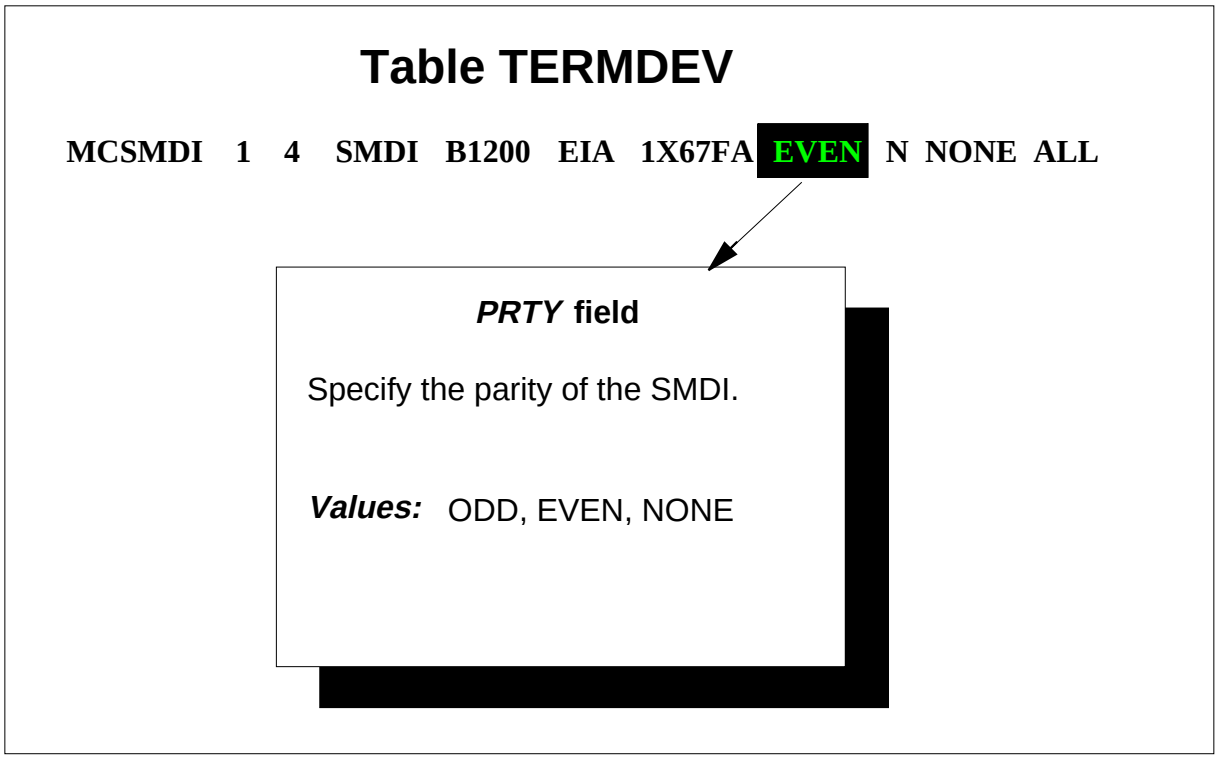


Figure 4-13 GAUR field in table TERMDEV

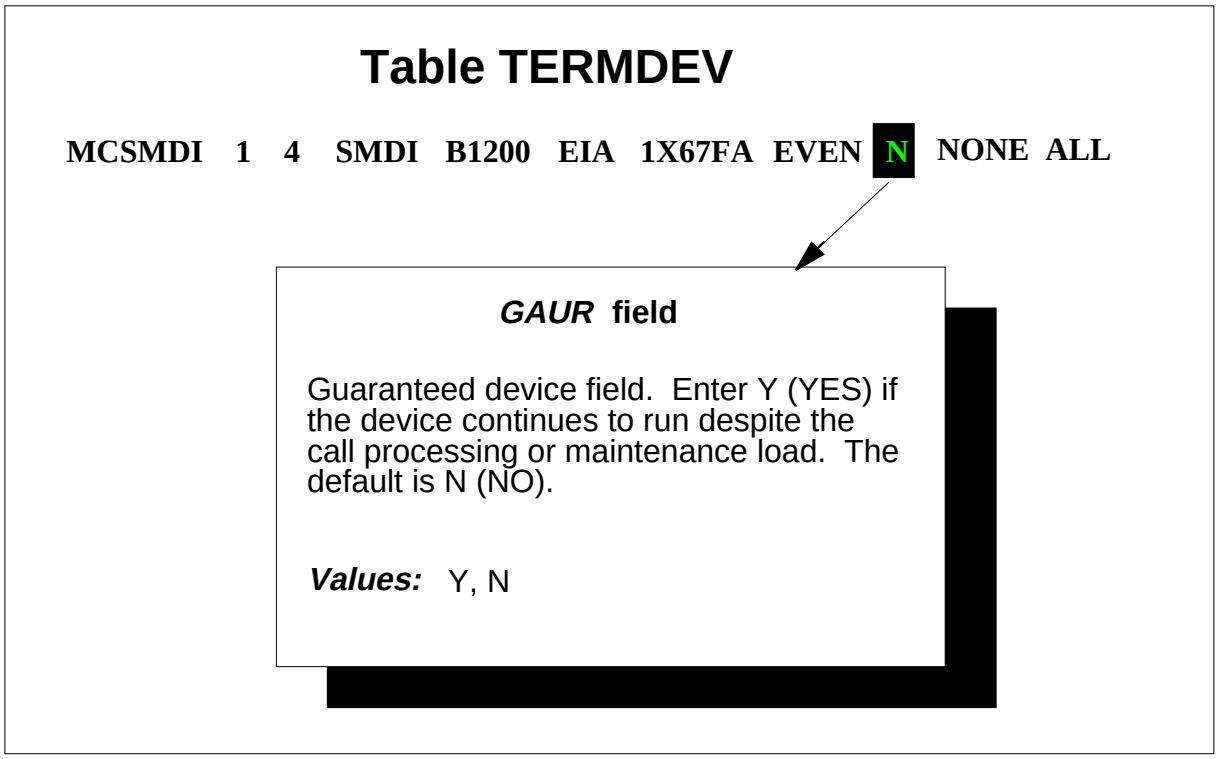


Figure 4-14 MODEM field in table TERMDEV

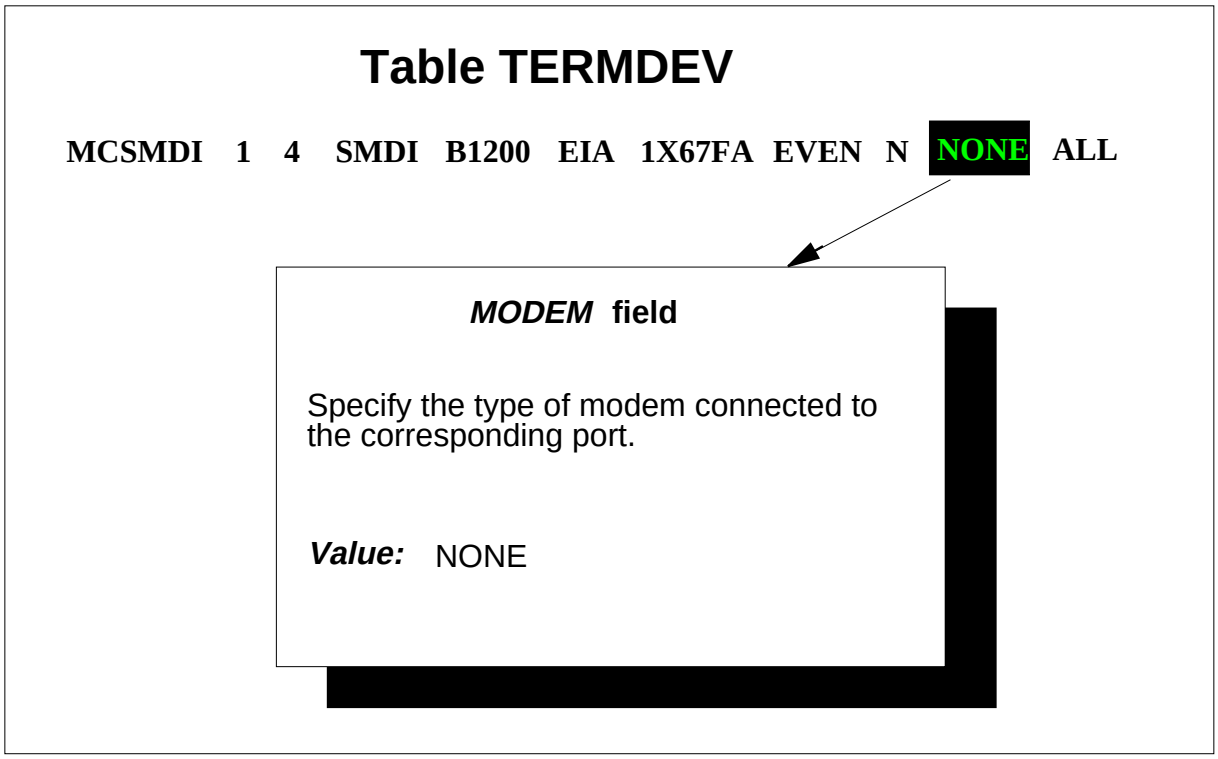


Figure 4-15 COMCLASS field in table TERMDEV

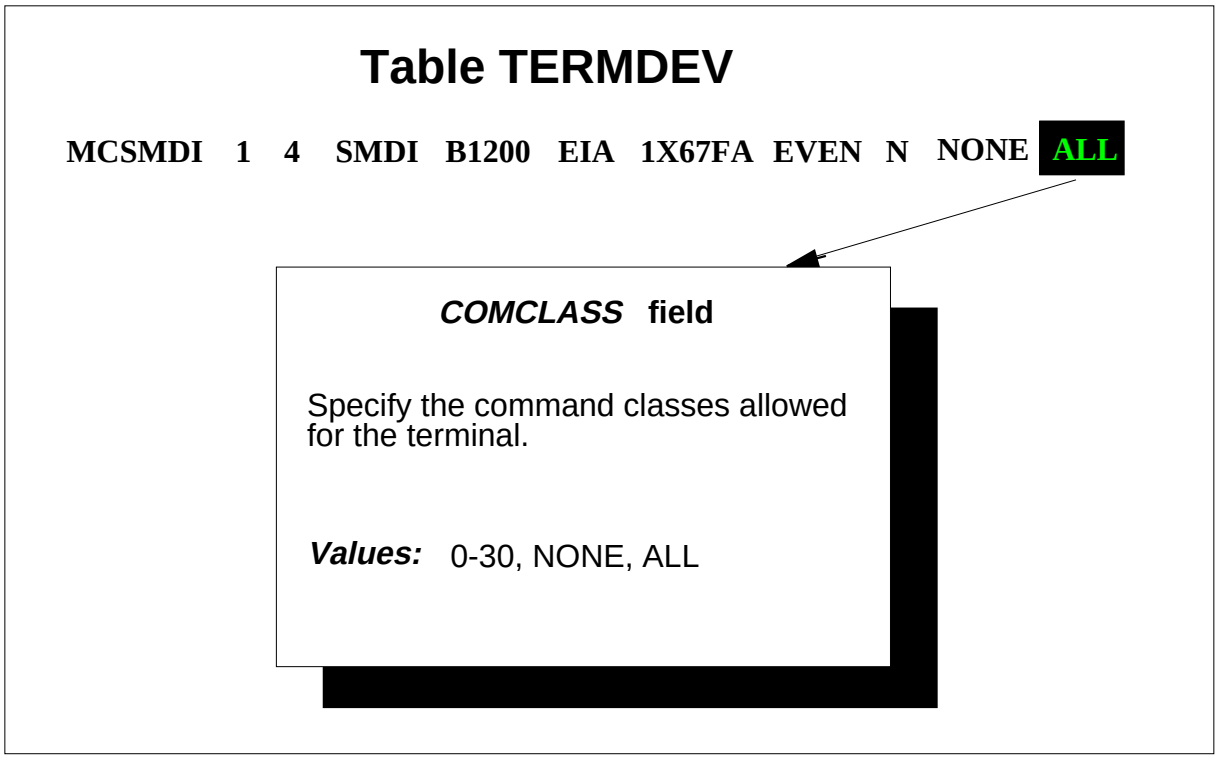


Table SLLNKDEV

Table SLLNKDEV specifies the characteristics of the SMDI datalink defined in table TERMDEV.

Datafill sequence The SMDI link in table TERMDEV must be defined before datafilling table SLLNKDEV.

Sample datafill

MCSMDI 1X67 NONE NONE INOUTLK SMDIDATA NMSPVT
10 NUMDIGS

Figure 4-16, "DEVNAME field in table SLLNKDEV" on page 4-63 through Figure 4-22, "OPTION field in table SLLNKDEV" on page 4-69 provide information about the individual fields in the table SLLNKDEV sample tuple.

Figure 4-16 DEVNAME field in table SLLNKDEV

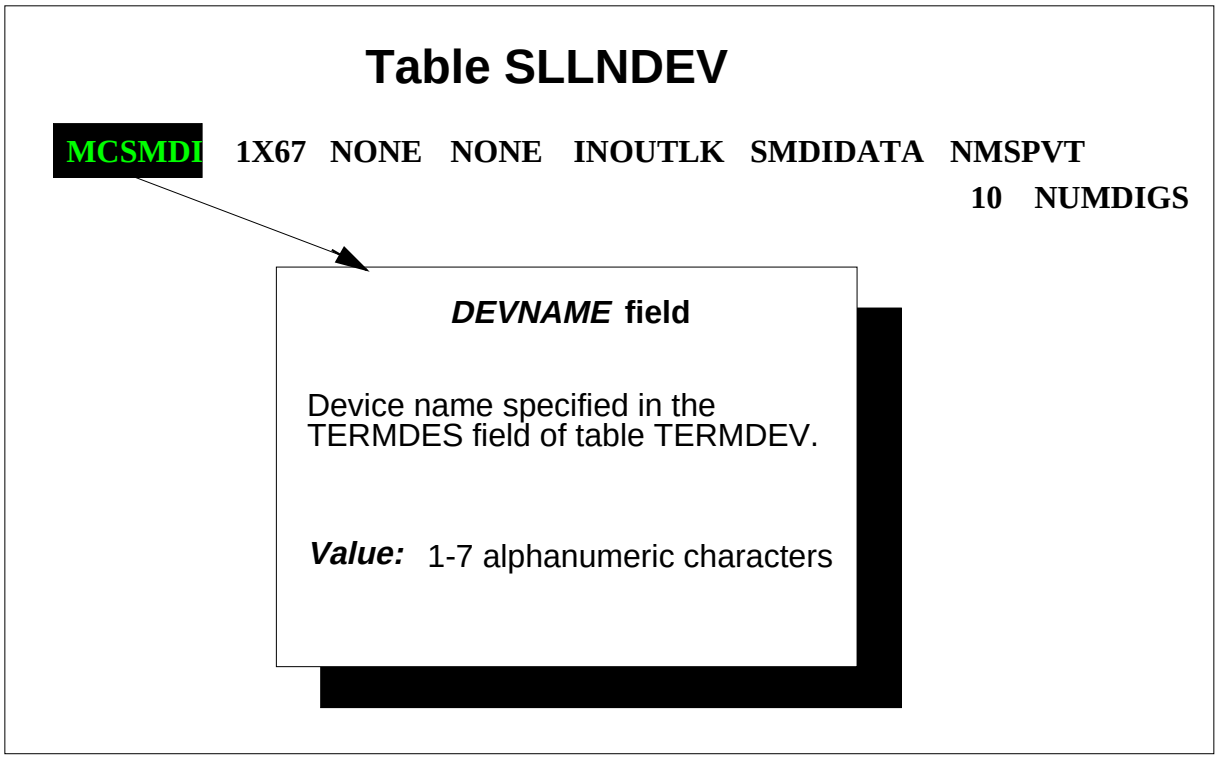


Figure 4-17 DEVTYPE field in table SLLNKDEV

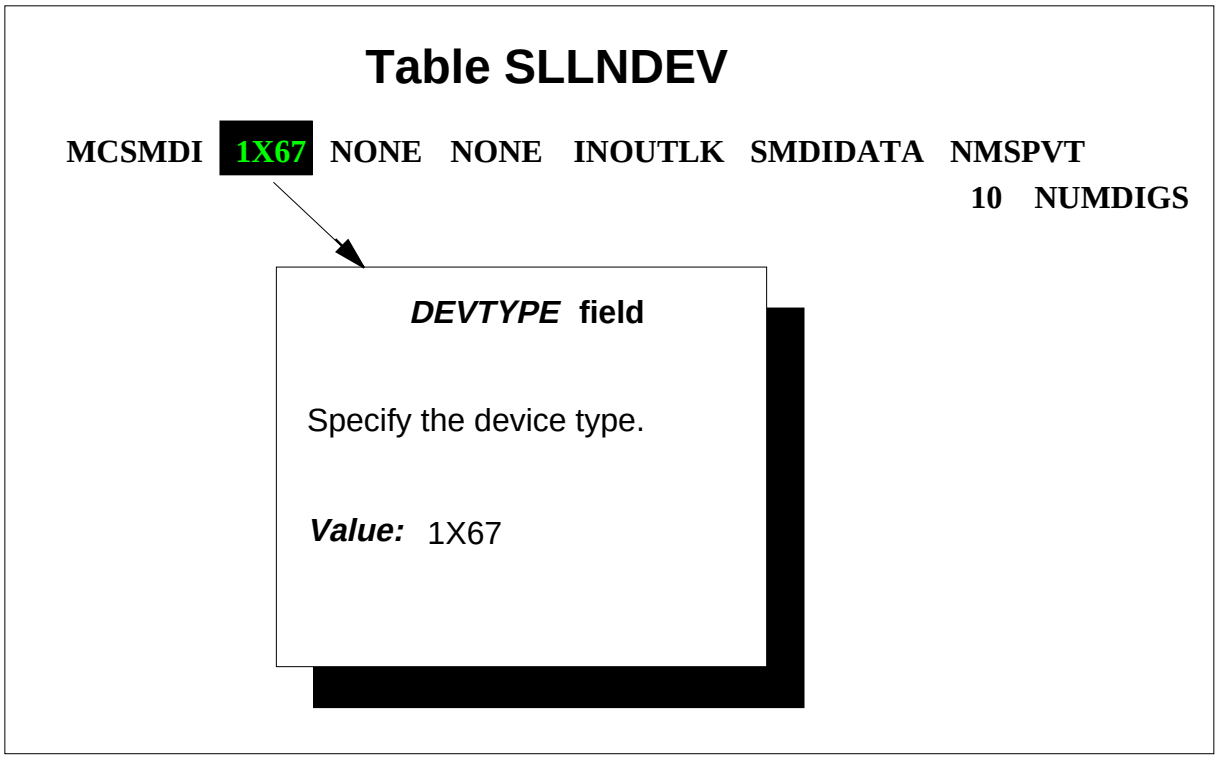


Figure 4-18 XLATION field in table SLLNKDEV

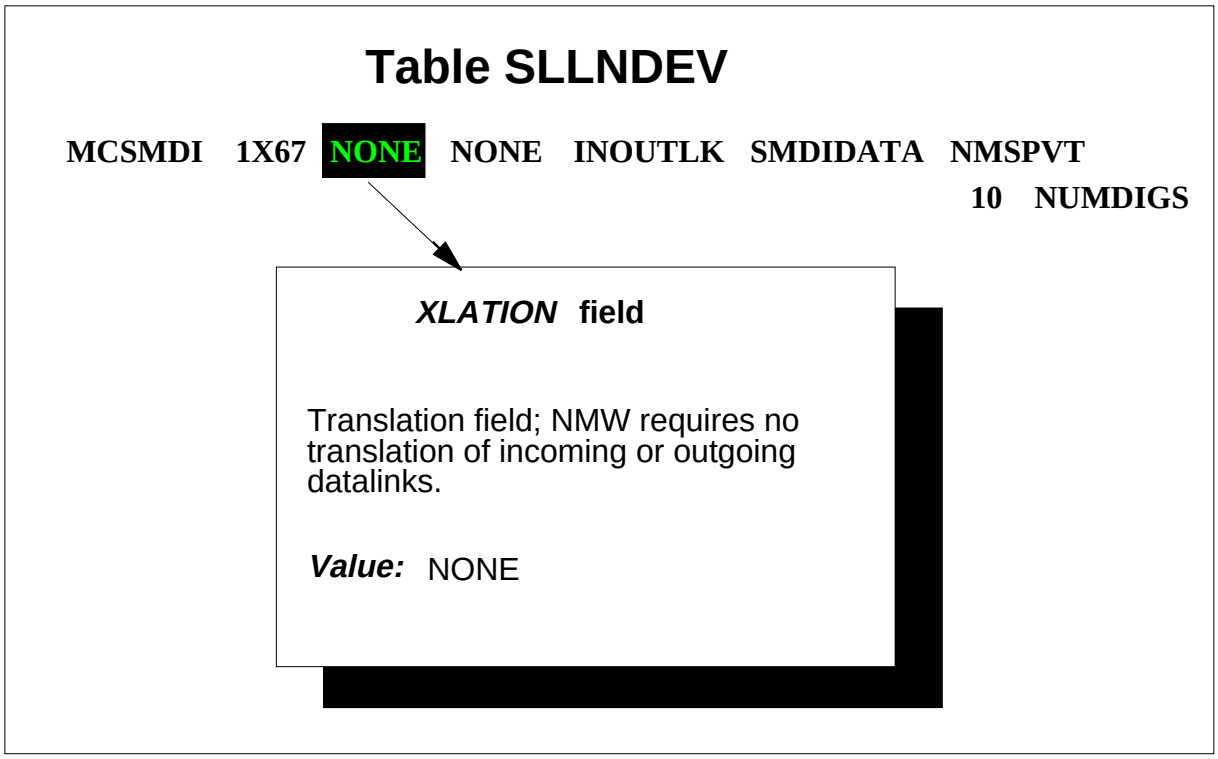


Figure 4-19 PROTOCOL field in table SLLNKDEV

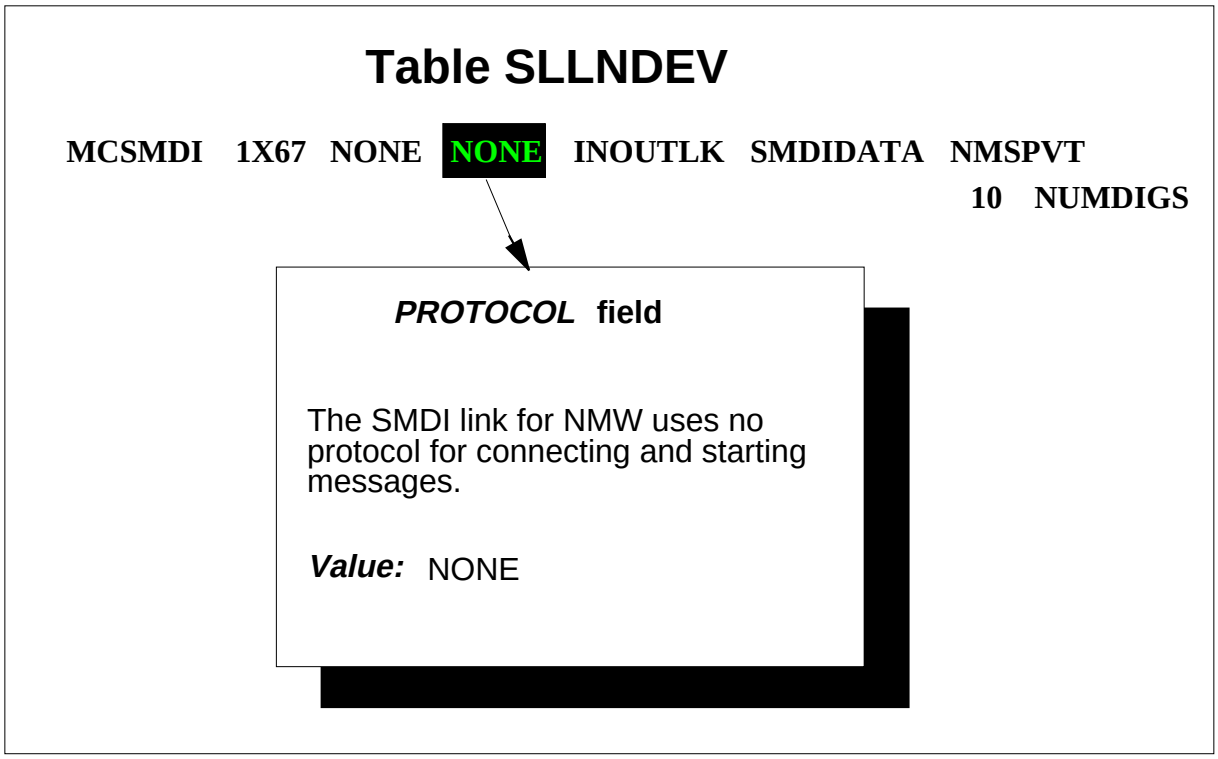


Figure 4-20 DRECTION field in table SLLNKDEV

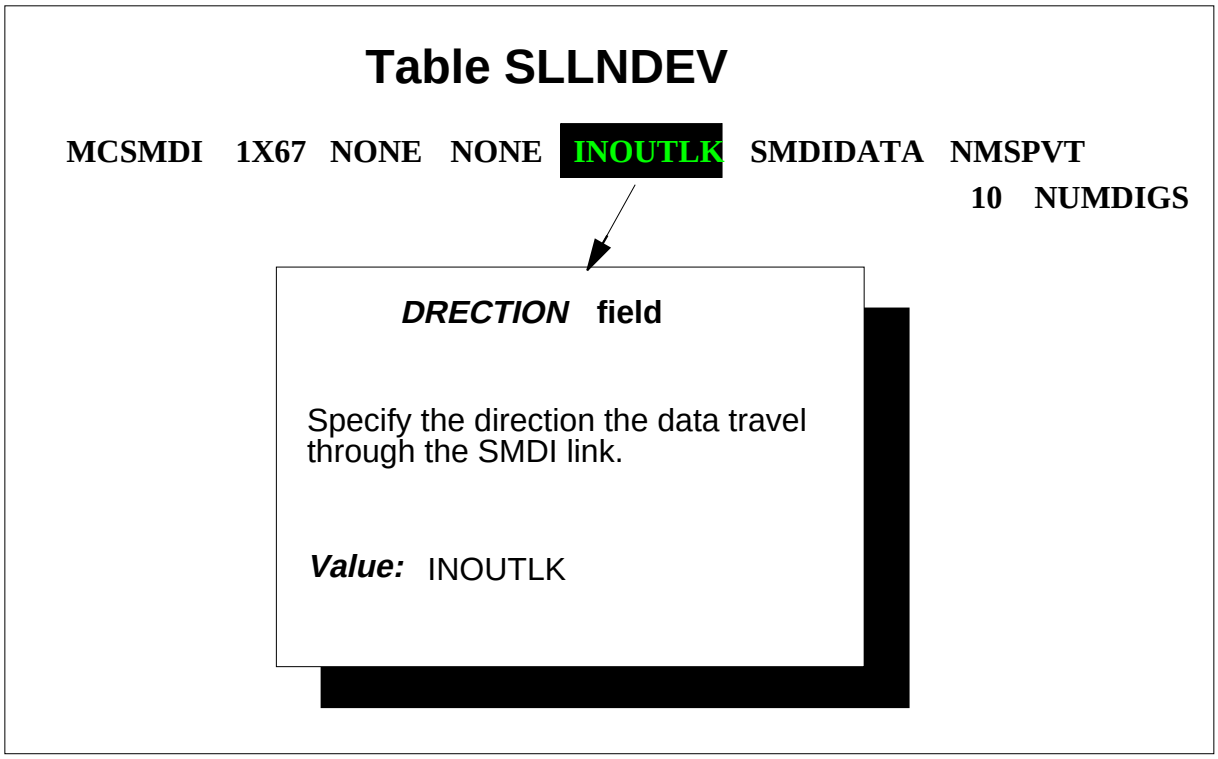


Figure 4-21 XFERS field in table SLLNKDEV

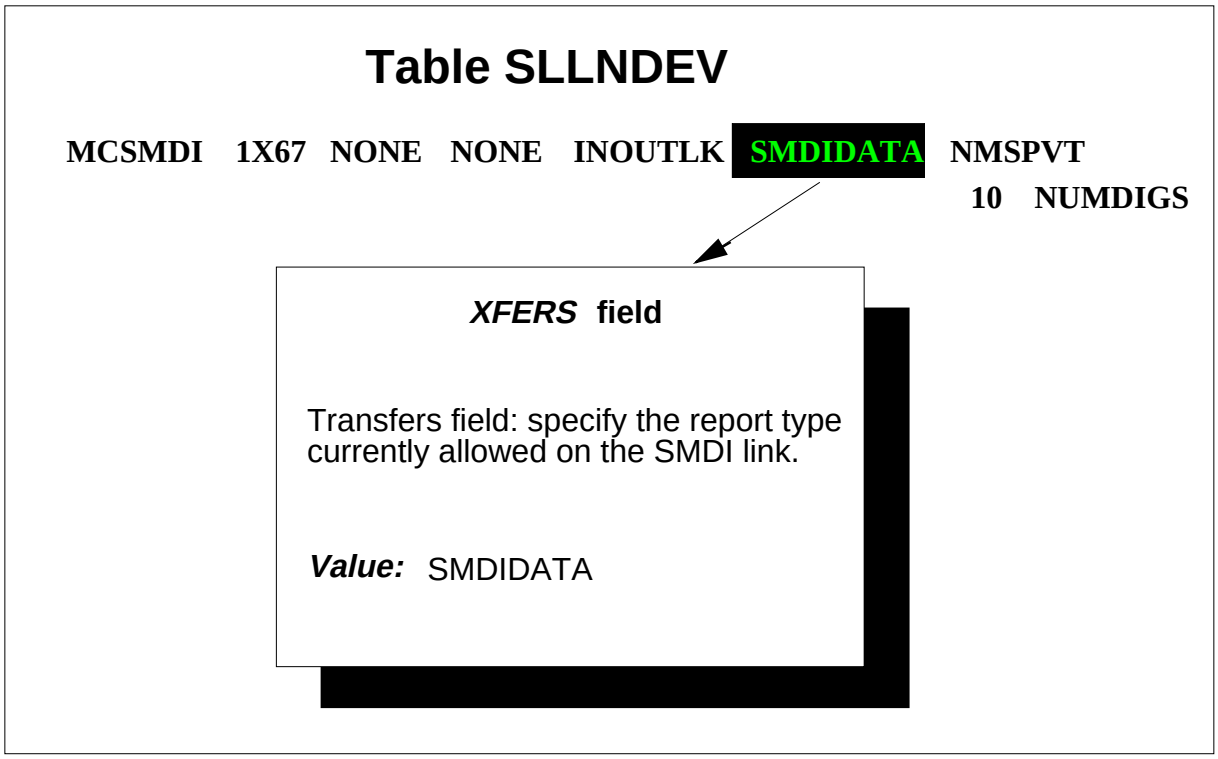


Figure 4-22 OPTION field in table SLLNKDEV

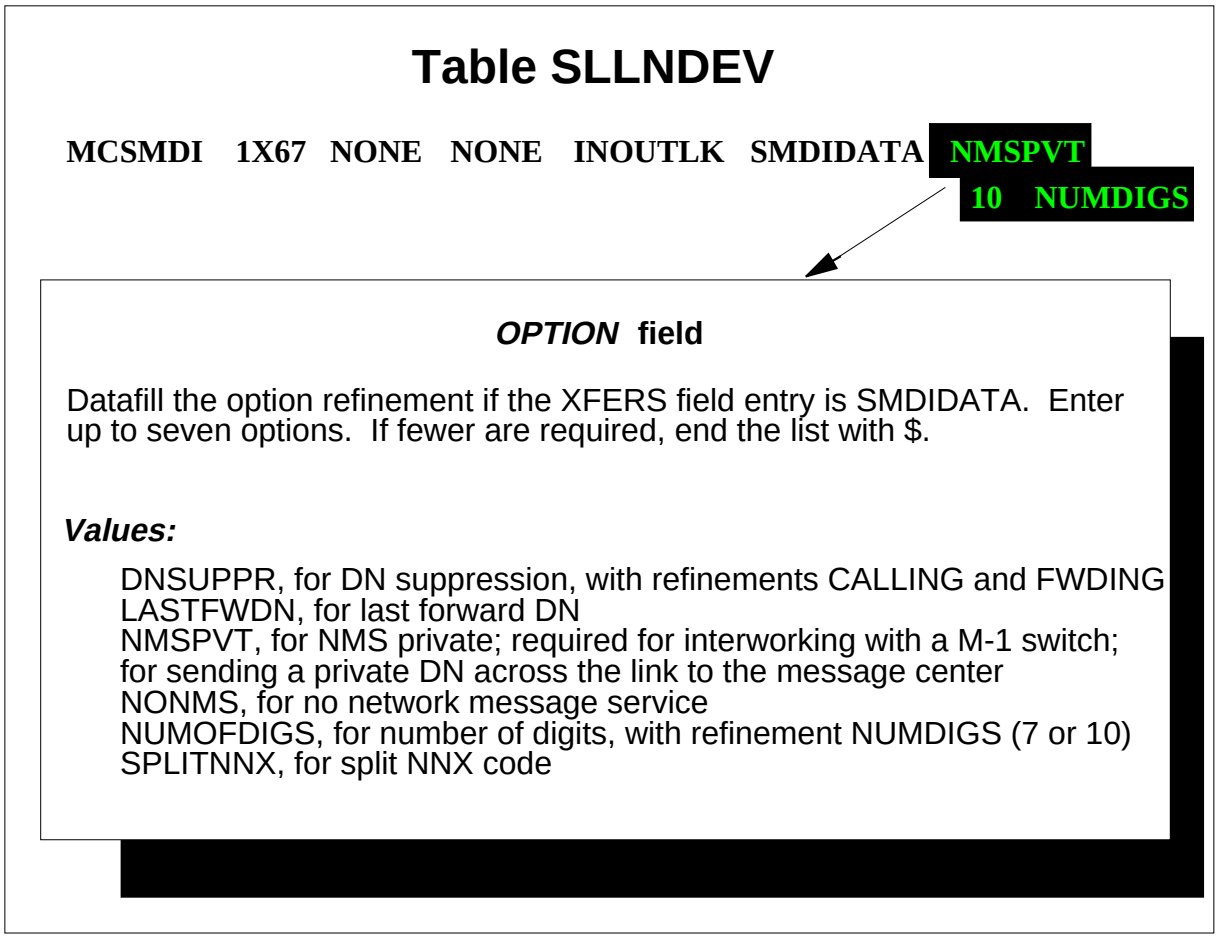


Table LNINV

Table LNINV defines the line circuits used for voice ports to the voice message system.

Datafill sequence There is no change to the datafill sequence.

Sample datafill

2 0 0 2 6X18AB STDLN WORKING Y NL Y

Figure 4-23, "LEN field in table SLLNKDEV" on page 4-70 through Figure 4-29, "MNO field in table SLLNKDEV" on page 4-76 provide information about the individual fields in the table LNINV sample tuple.

Figure 4-23 LEN field in table SLLNKDEV

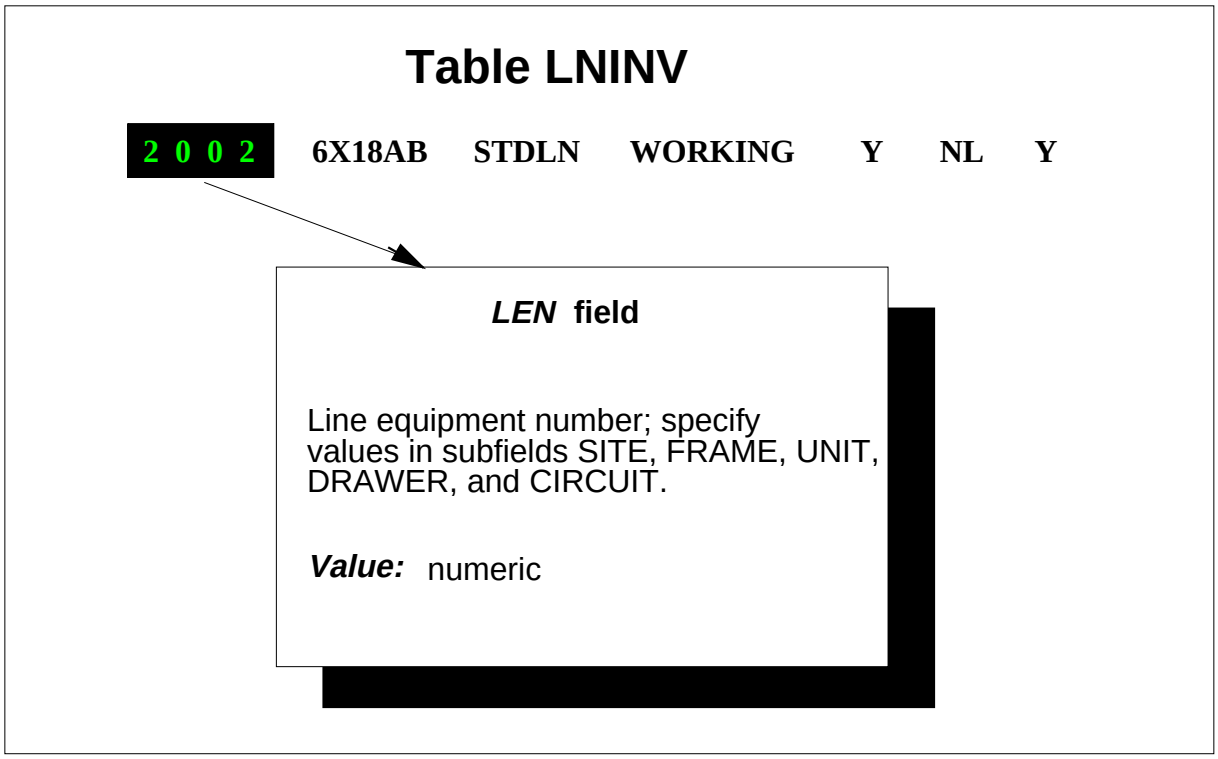


Figure 4-24 CARDCODE field in table SLLNKDEV

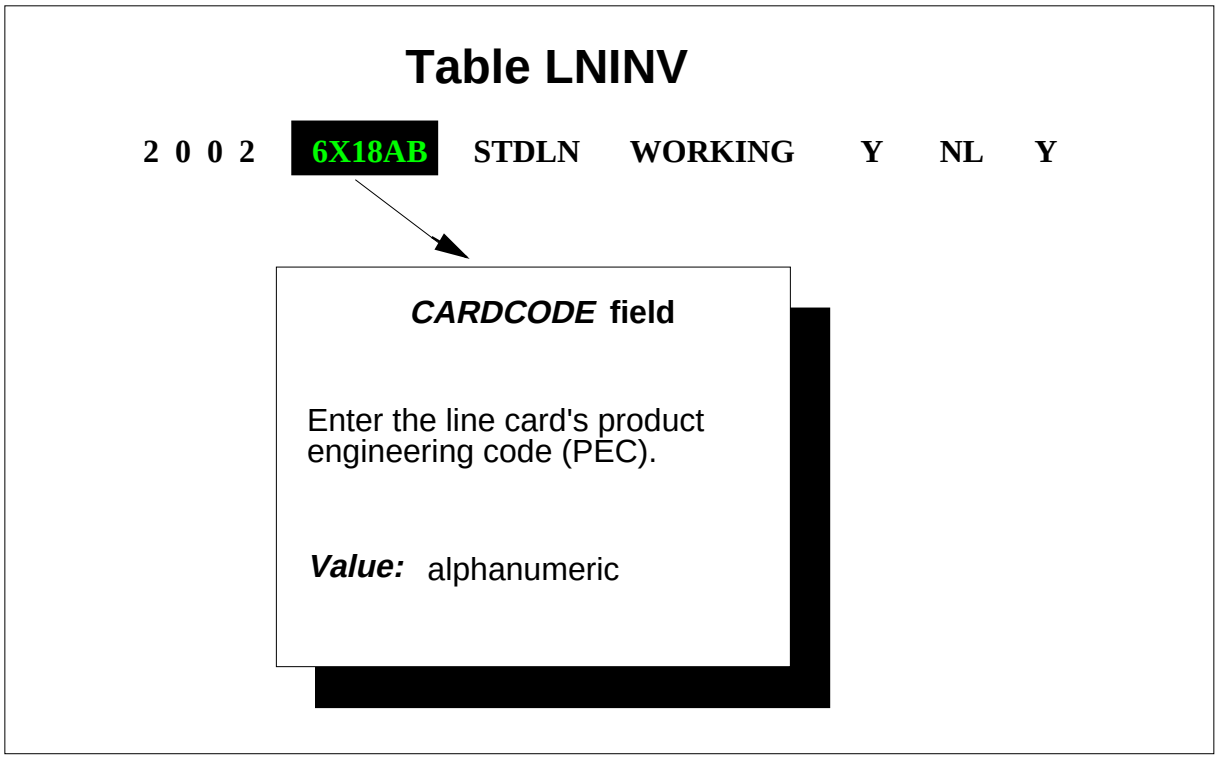


Figure 4-25 PADGRP field in table SLLNKDEV

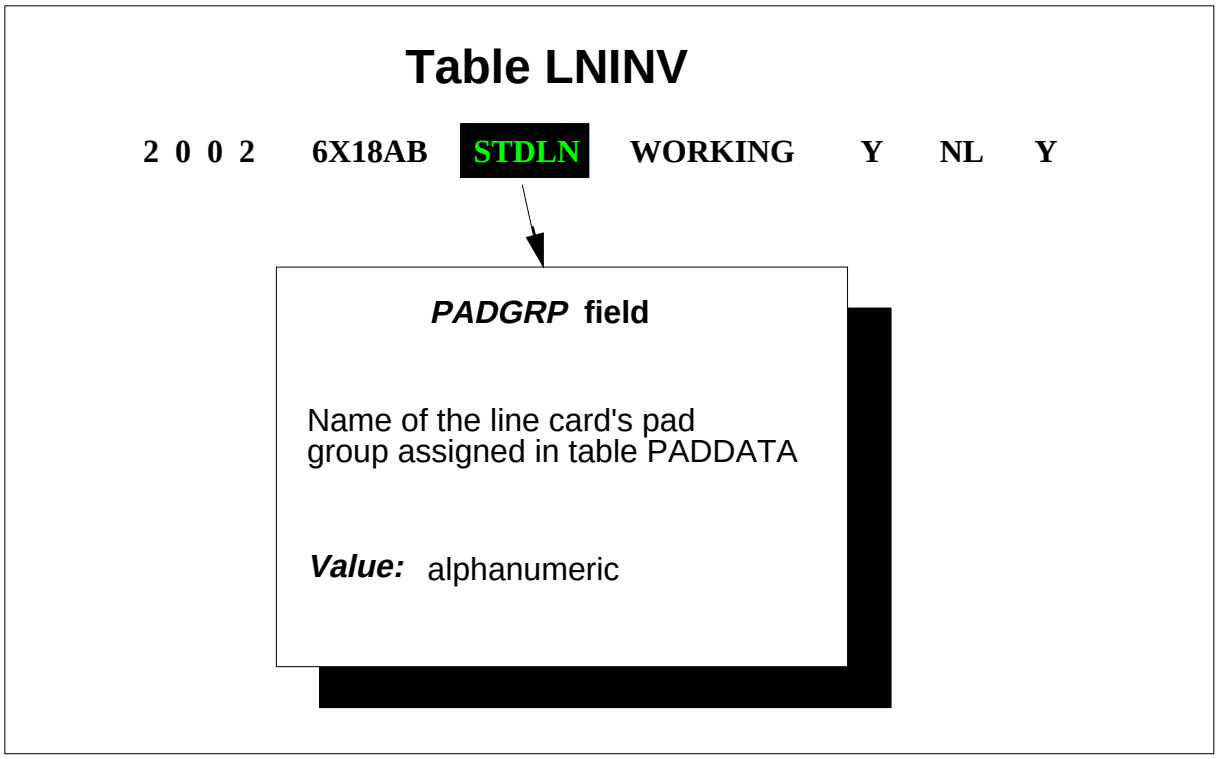


Figure 4-26 STATUS field in table SLLNKDEV

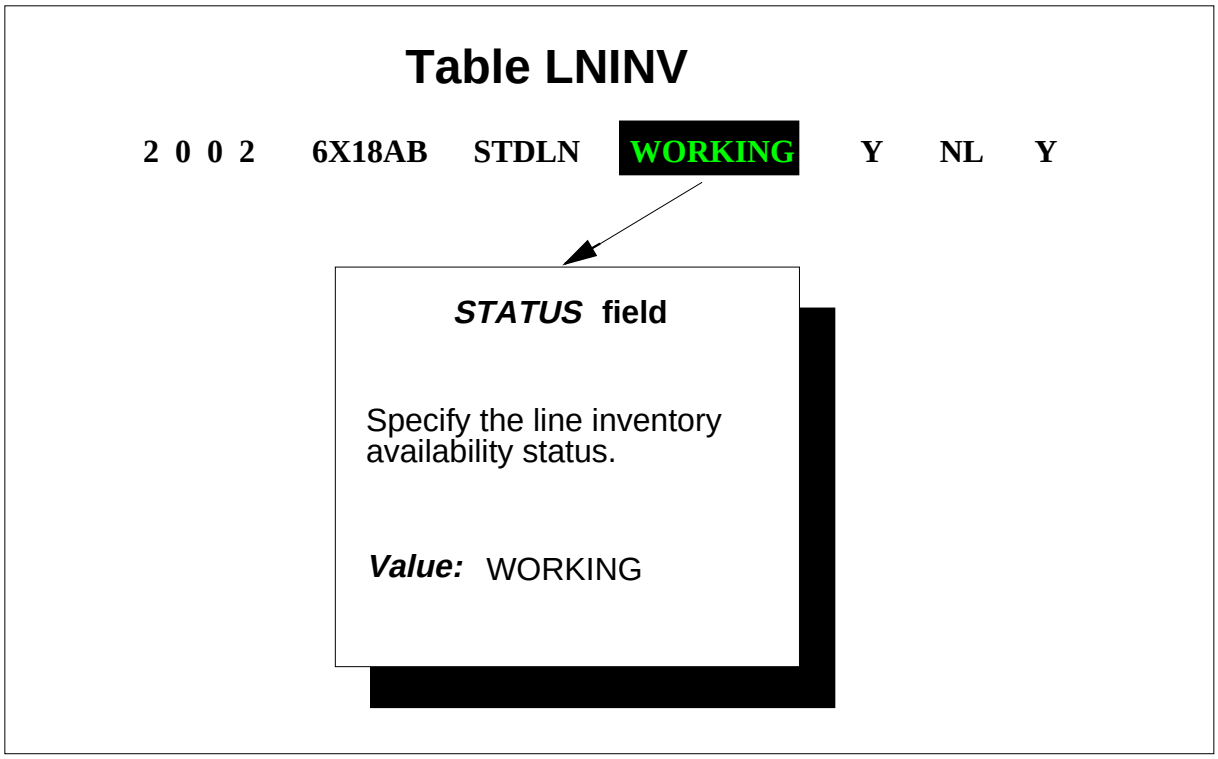


Figure 4-27 GND field in table SLLNKDEV

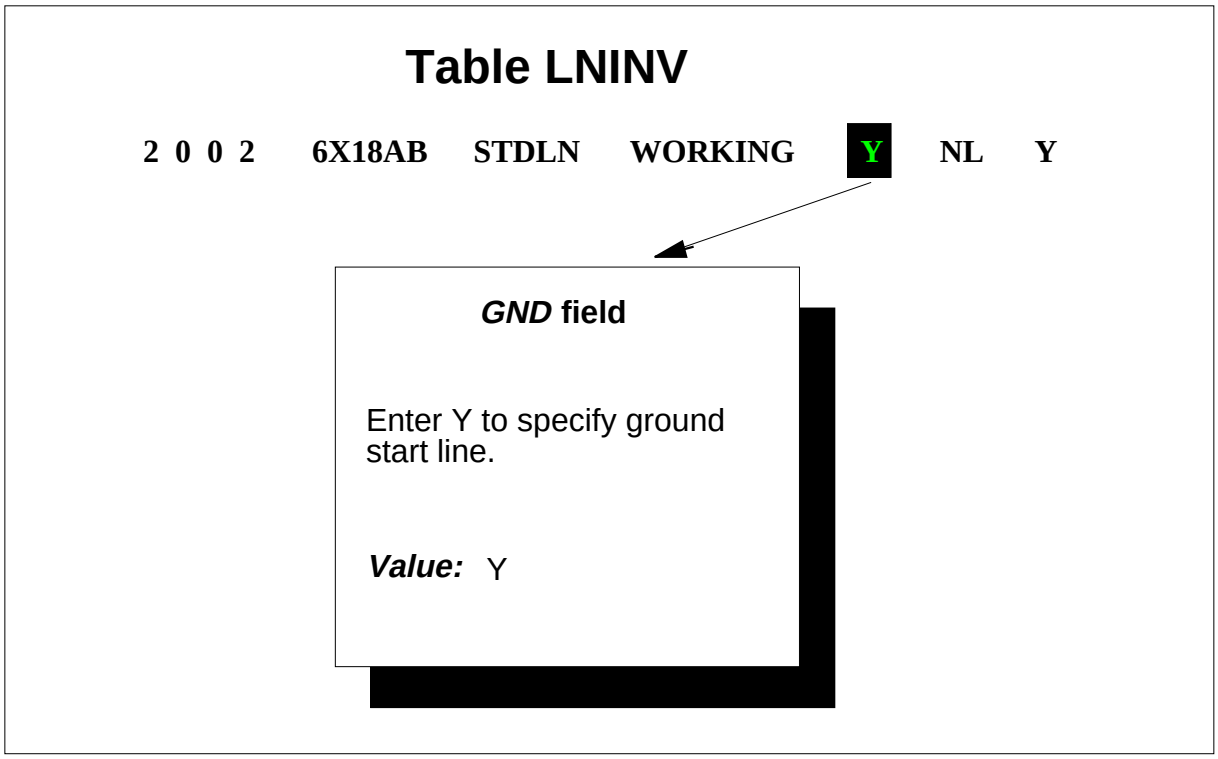


Figure 4-28 BNV field in table SLLNKDEV

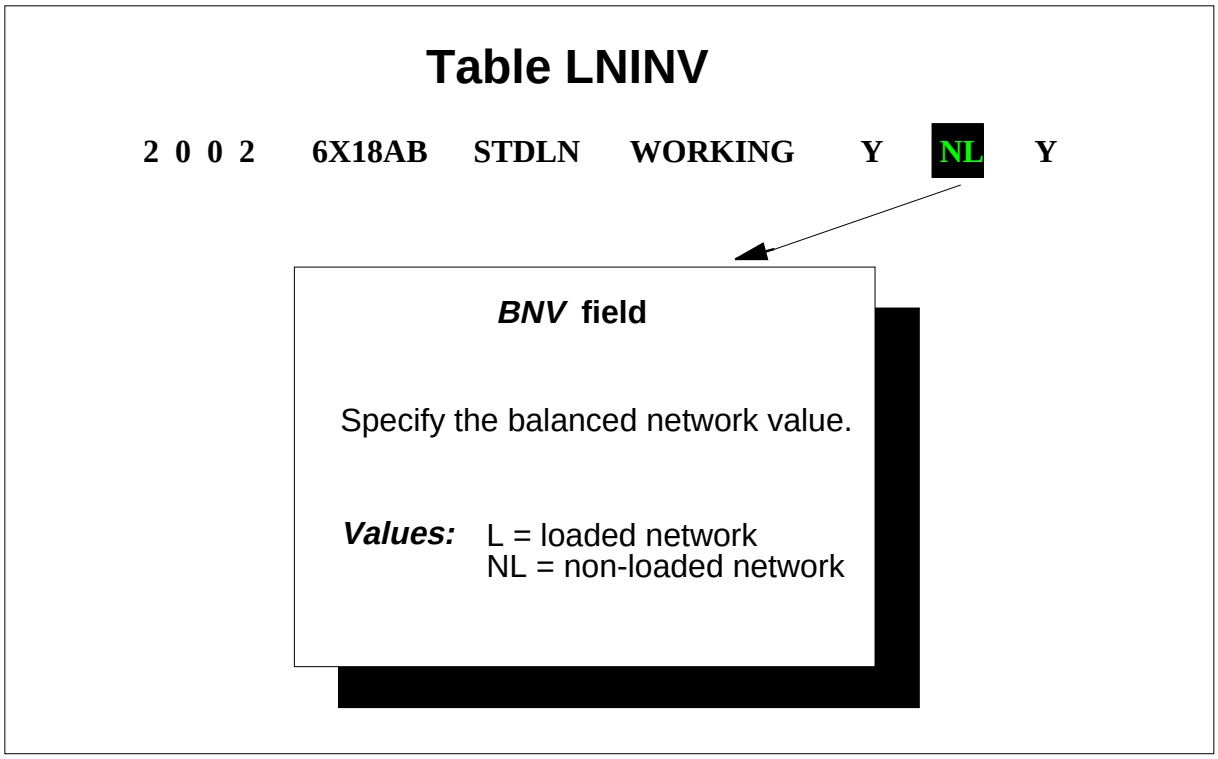


Figure 4-29 MNO field in table SLLNKDEV

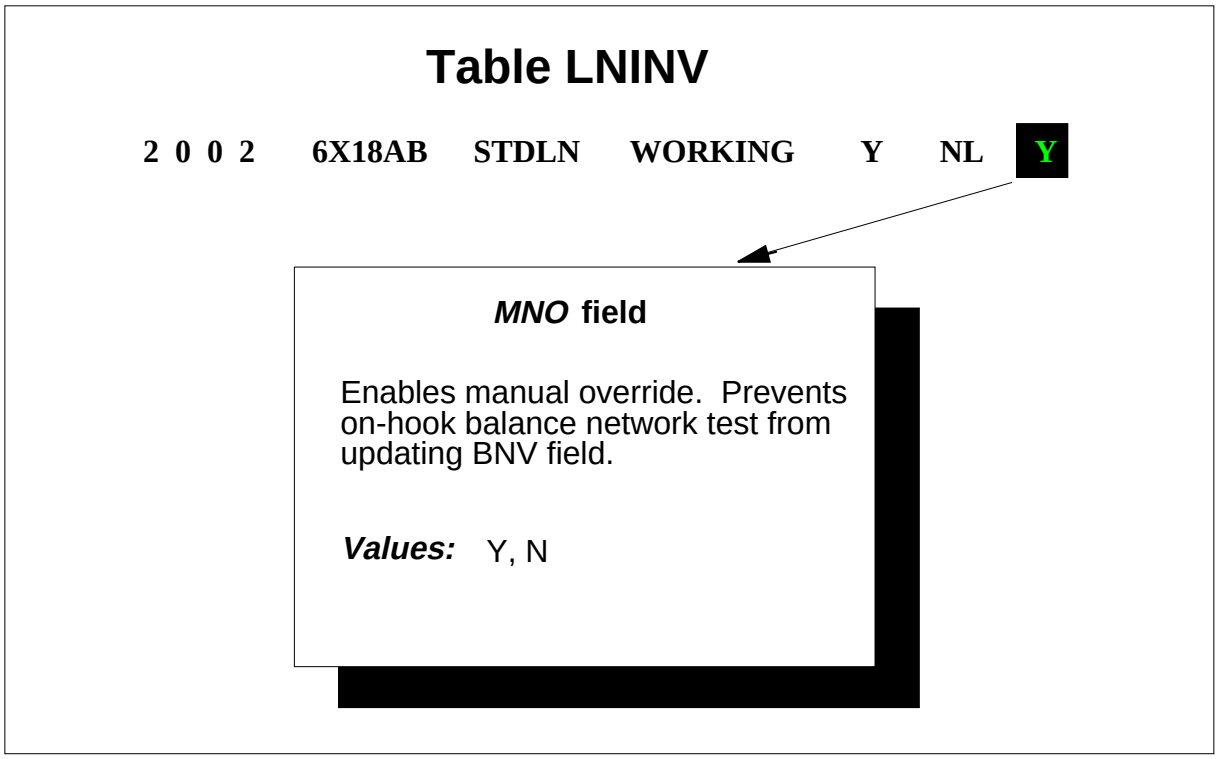


Table UCDGRP

Use table UCDGRP to specify a universal call distribution (UCD) group for access to the voice message system. The voice message group that is created must use message desk number 63.

Datafill sequence Datafill this table before doing table DNROUTE.

Sample datafill

VSGROUP N NORTH 10 60 10 Y 0 5 90 90 UCD_SMDI MCSMDI 63

Figure 4-30, "UCDNAME field in table UCDGRP" on page 4-77 through Figure 4-43, "DSKNO field in table UCDGRP" on page 4-90 provide information about the individual fields in the table UCDGRP sample tuple.

Figure 4-30 UCDNAME field in table UCDGRP

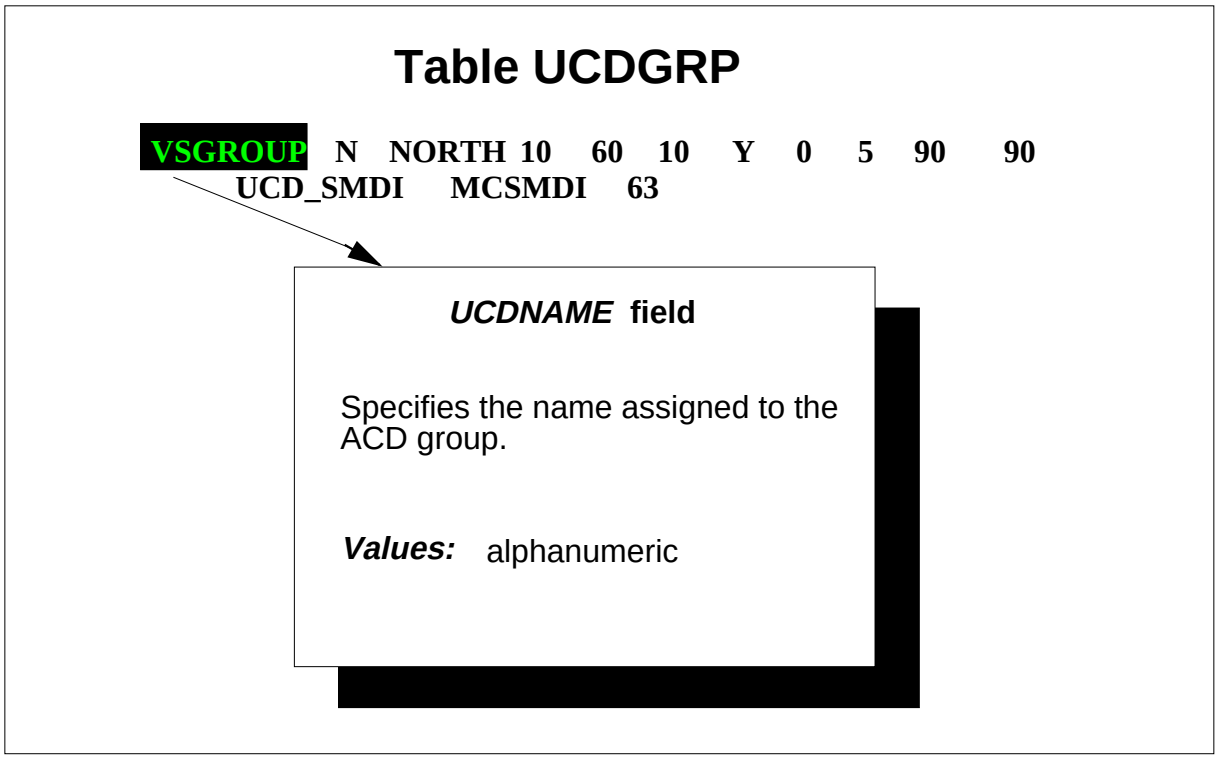


Figure 4-31 ACD field in table UCDGRP

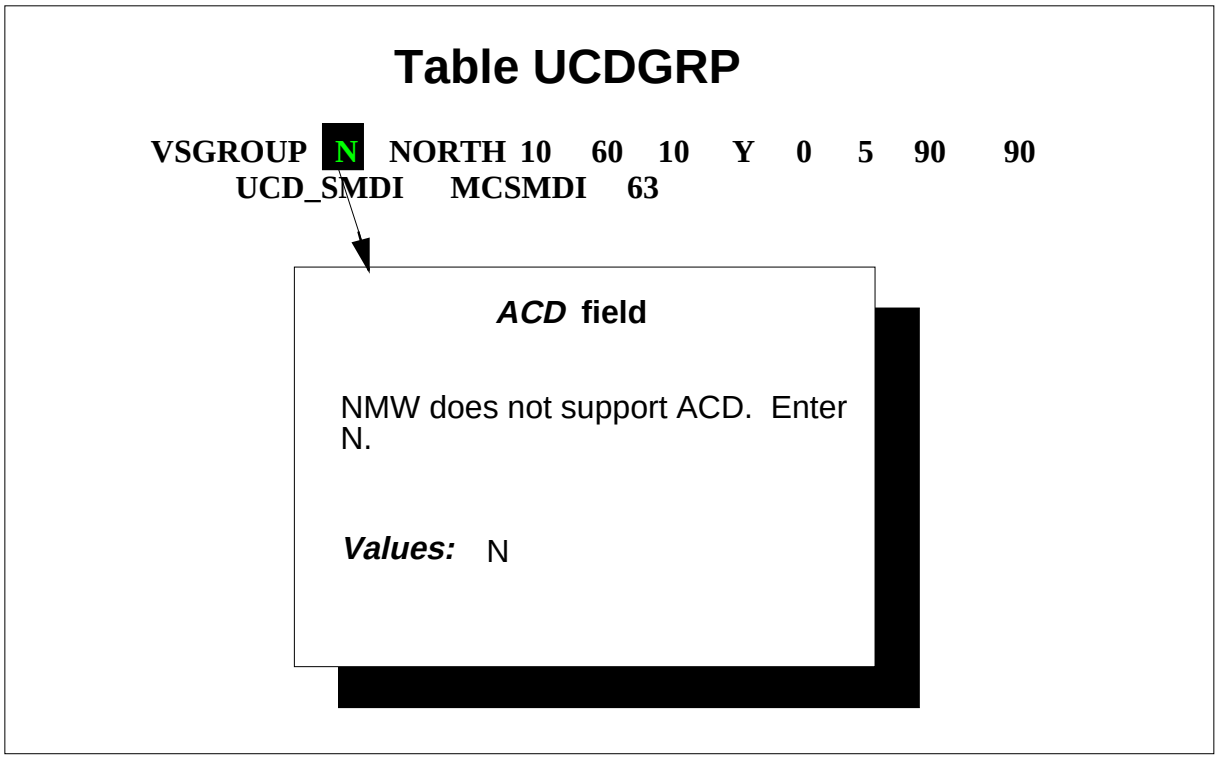


Figure 4-32 CUSTGRP field in table UCDGRP

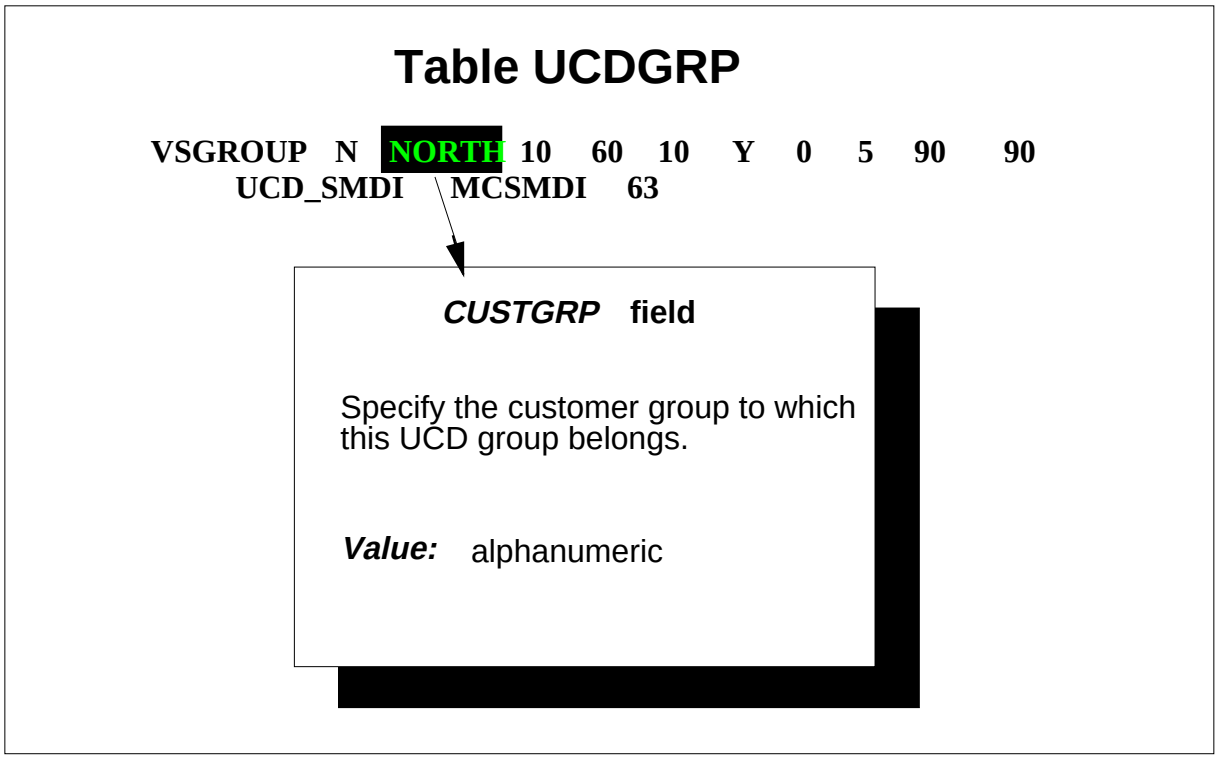


Figure 4-33 UCDRNGTH field in table UCDGRP

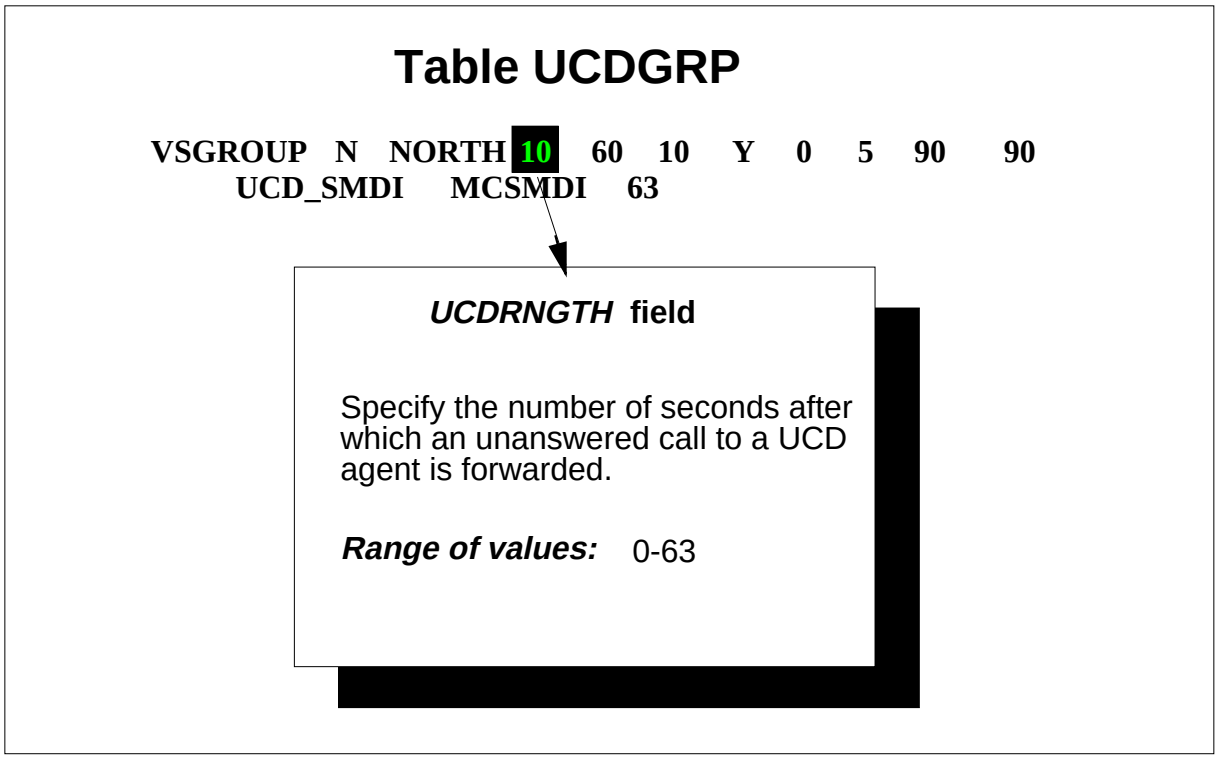


Figure 4-34 PRIOPRO field in table UCDGRP

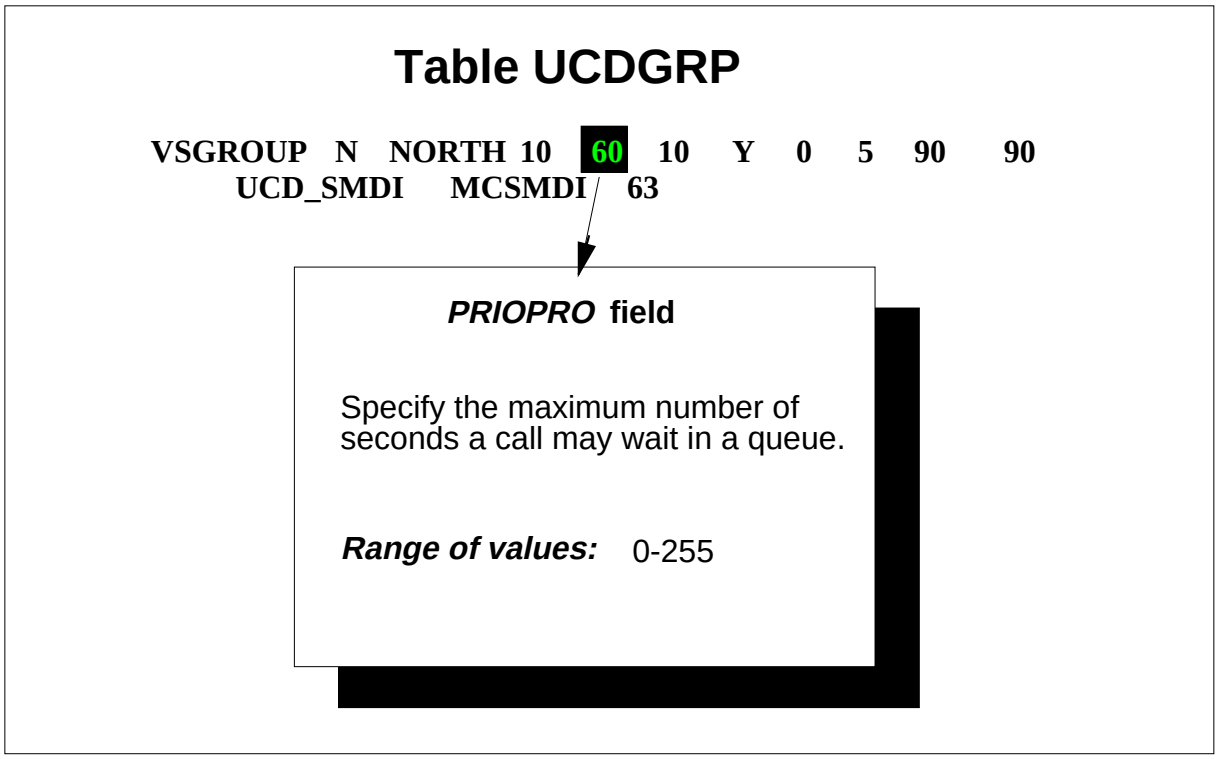


Figure 4-35 MAXPOS field in table UCDGRP

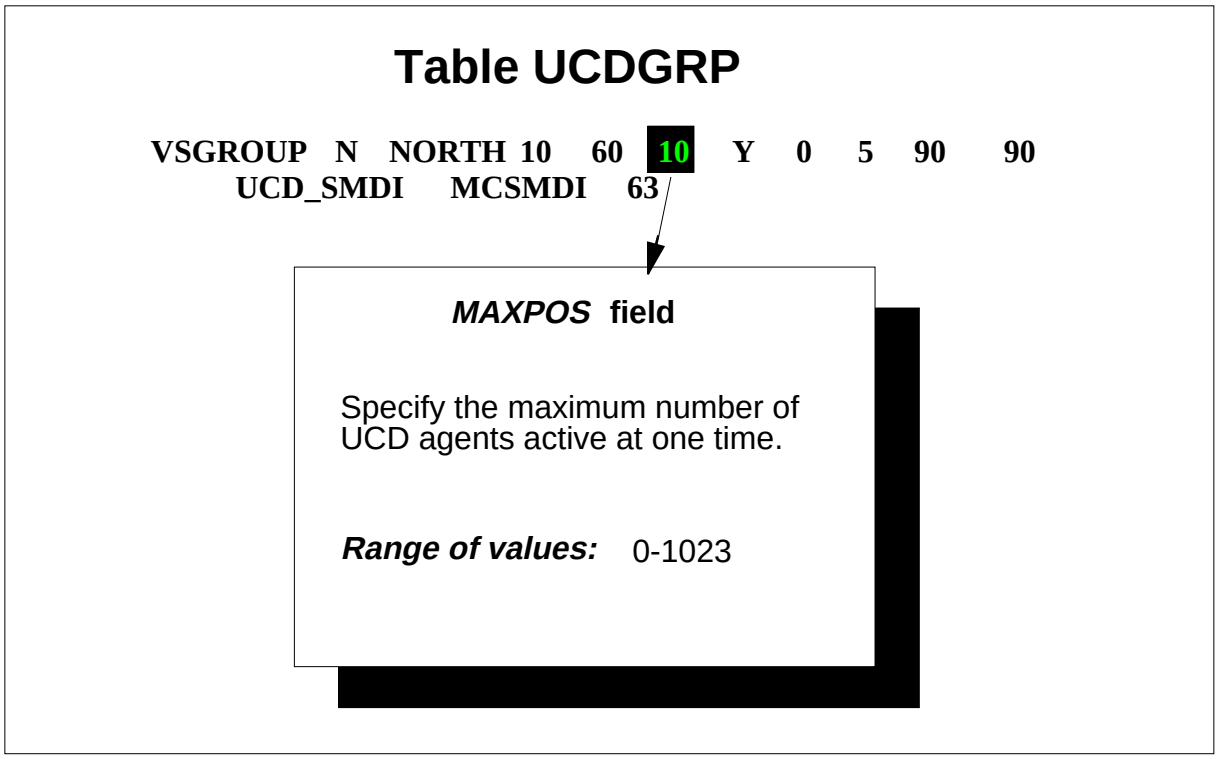


Figure 4-36 DBG field in table UCDGRP

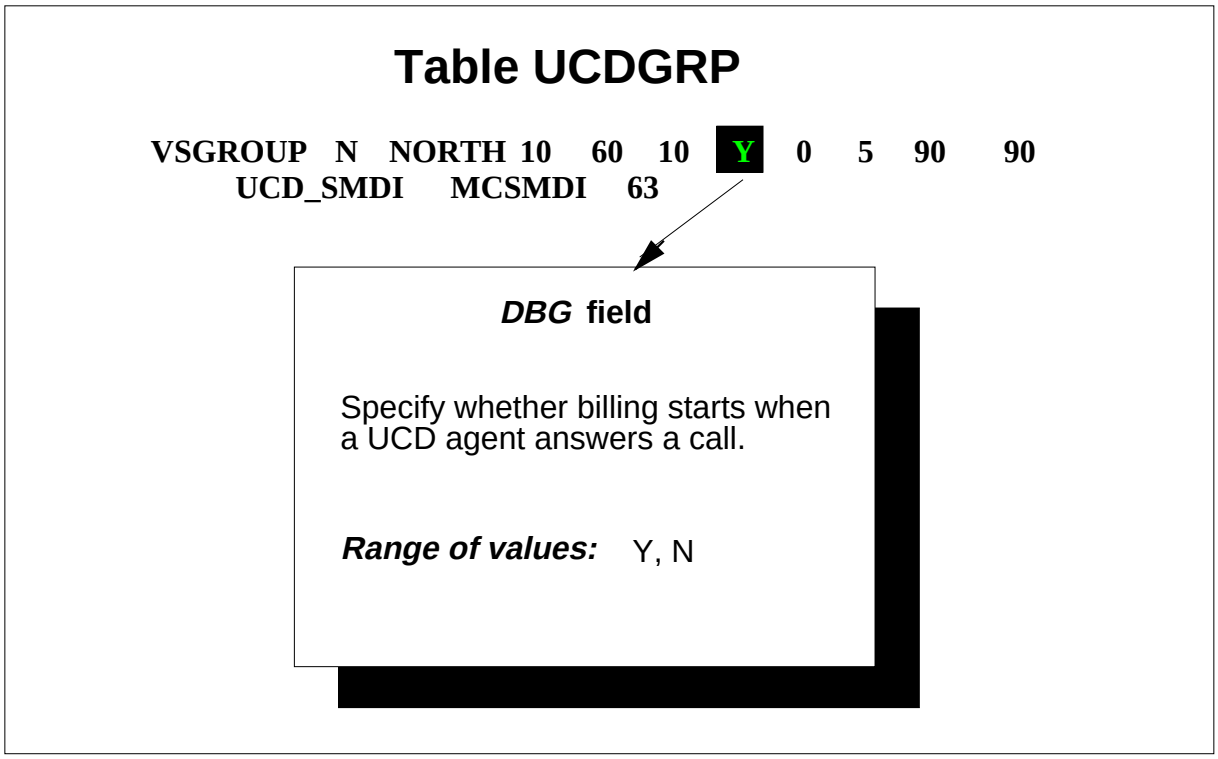


Figure 4-37 DEFPRIO field in table UCDGRP

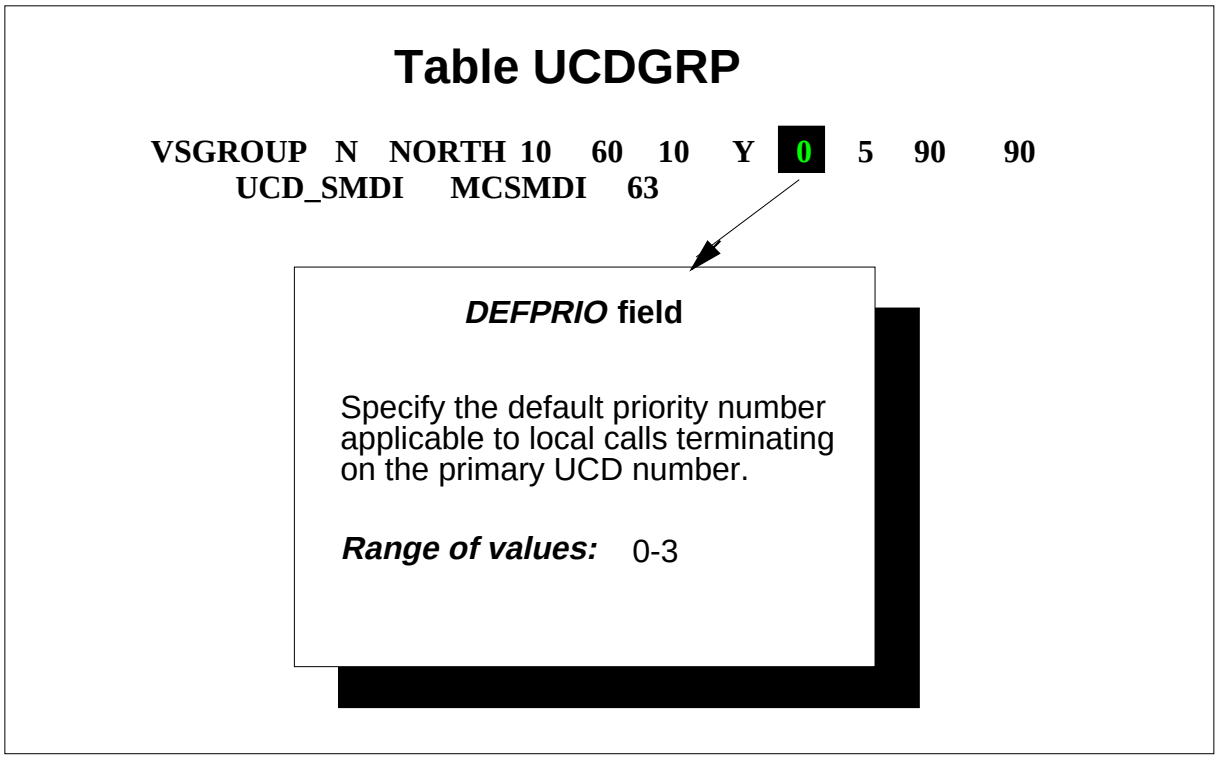


Figure 4-38 RLSCNT field in table UCDGRP

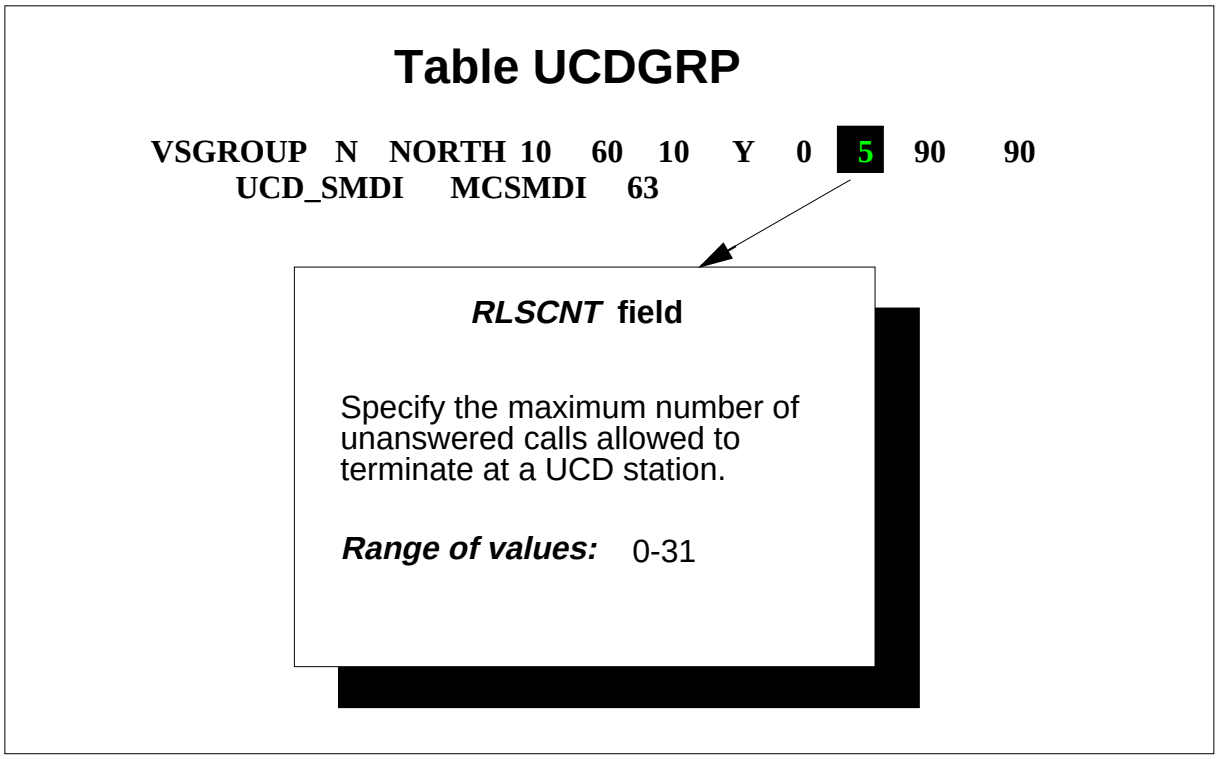


Figure 4-39 MAXCQSZ field in table UCDGRP

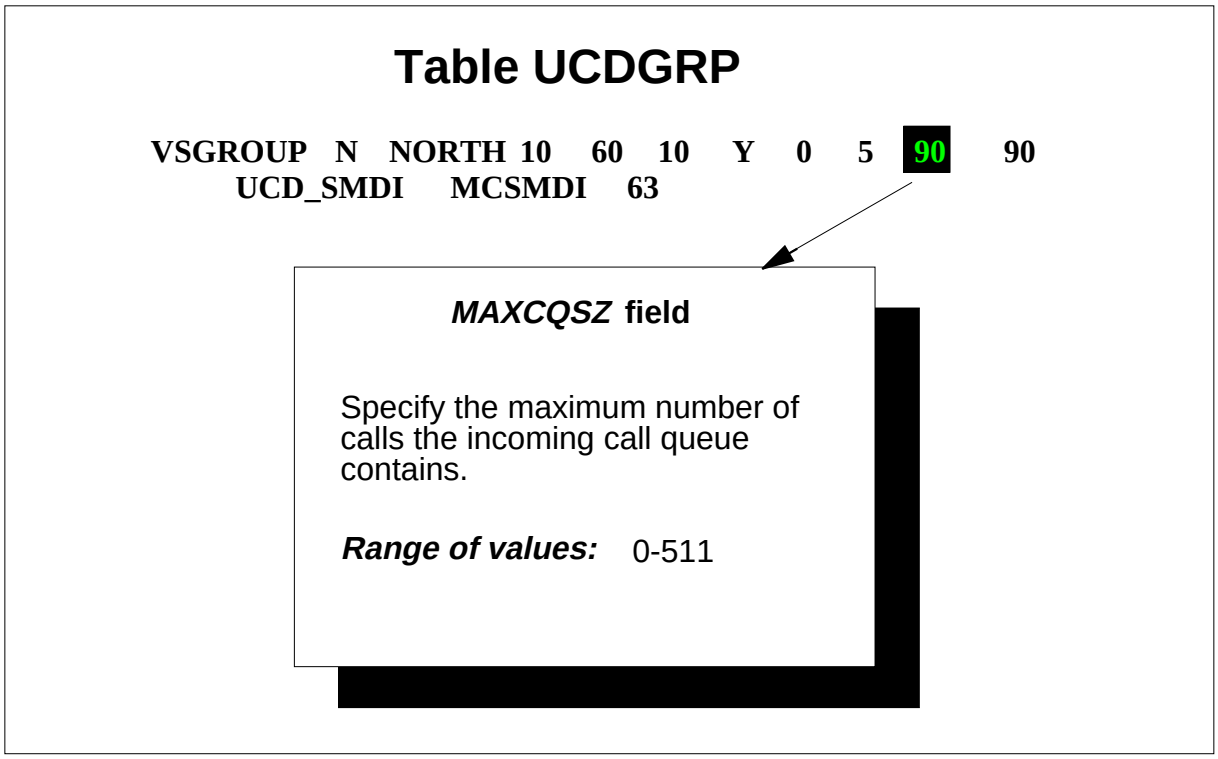


Figure 4-40 MAXWAIT field in table UCDGRP

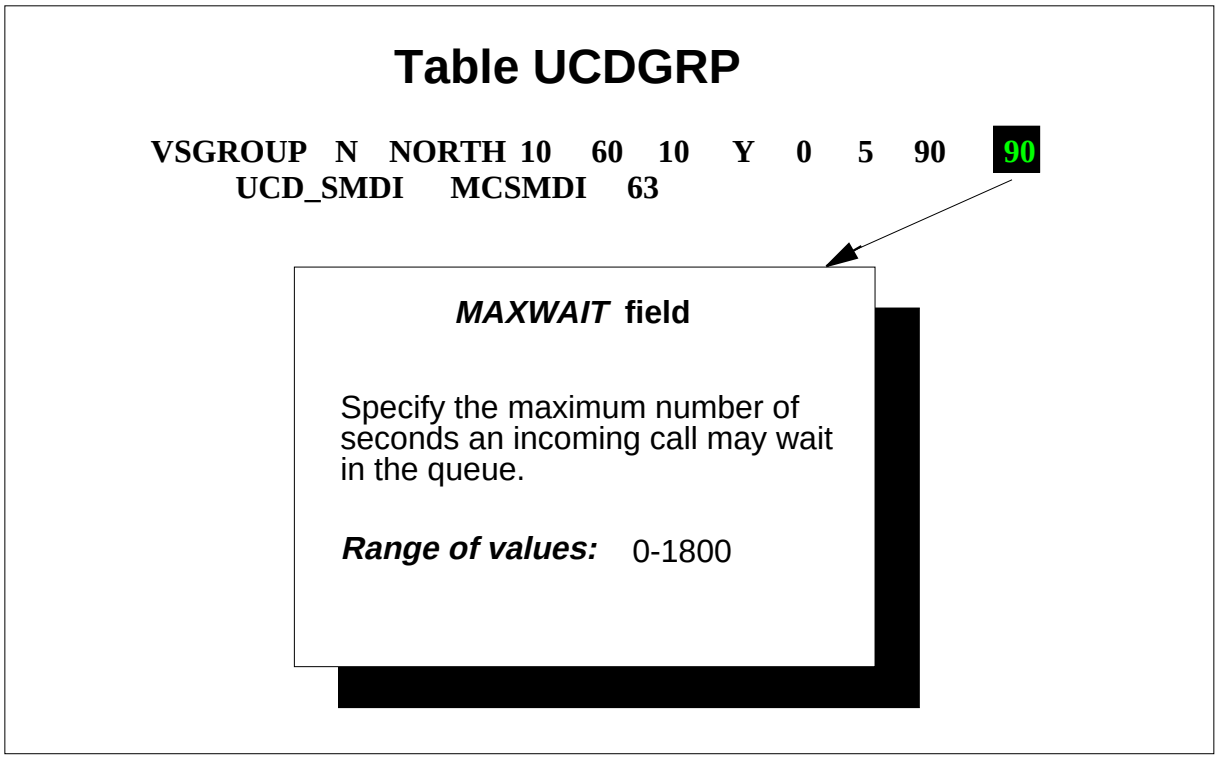


Figure 4-41 OPTIONS field in table UCDGRP

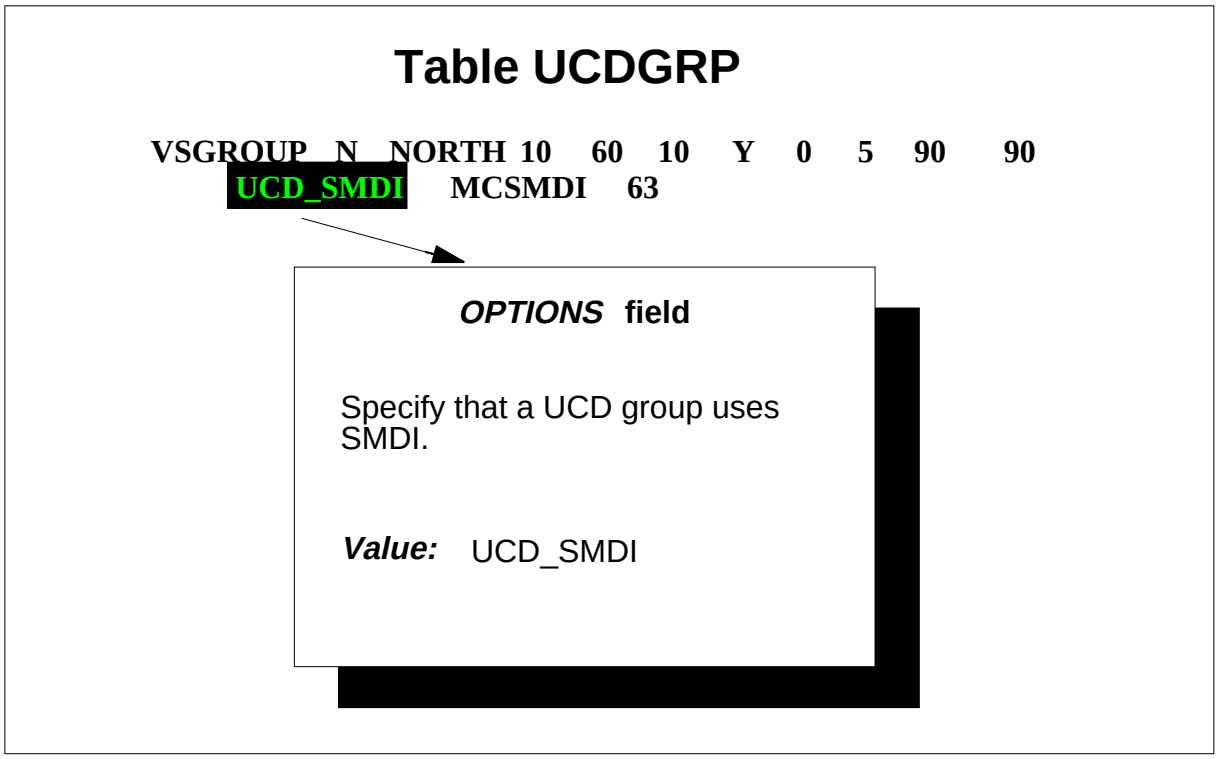


Figure 4-42 TERMDES field in table UCDGRP

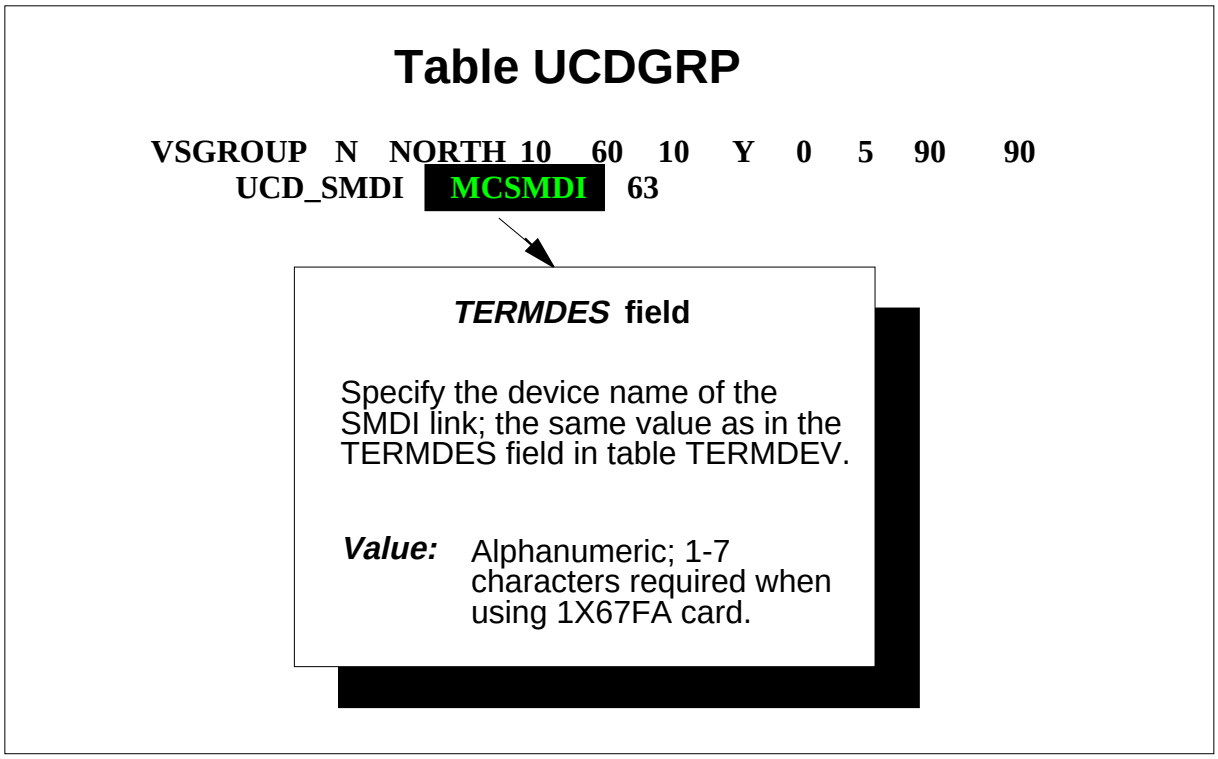


Figure 4-43 DSKNO field in table UCDGRP

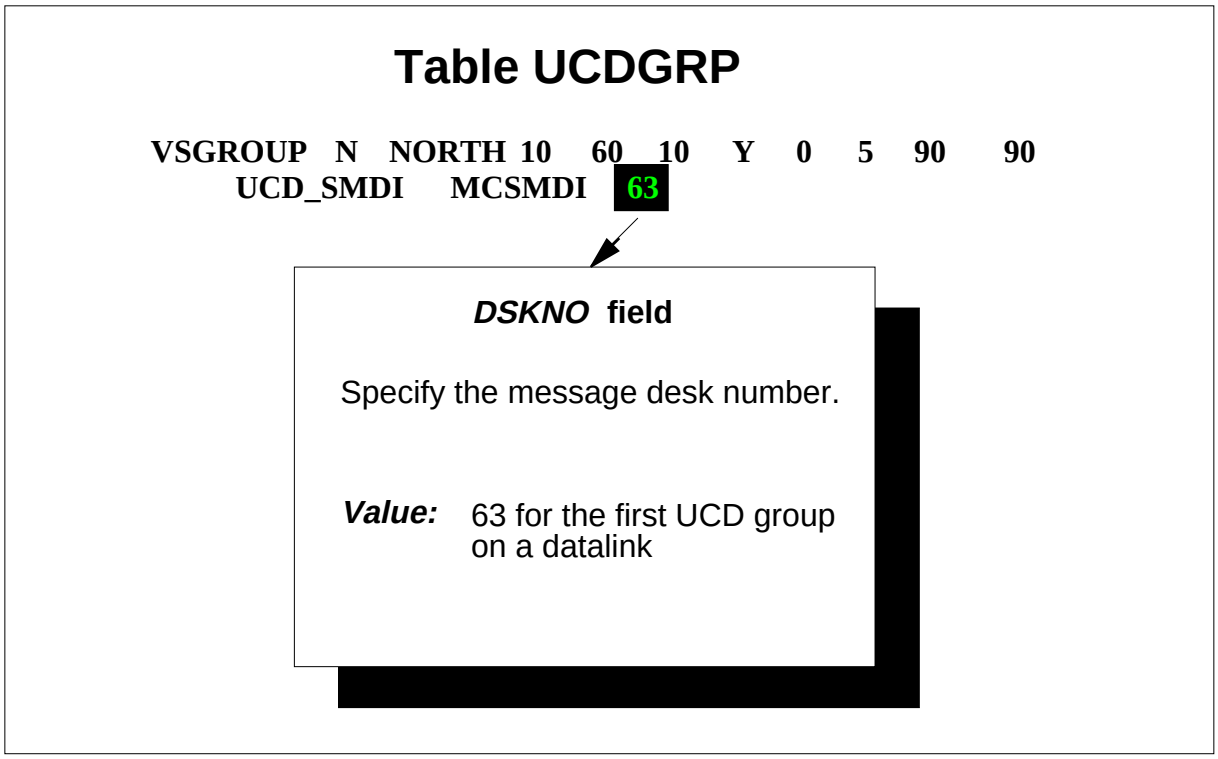


Table IBNLINES

Use table IBNLINES to define the UCD voice agents for the voice messaging UCD group. Specify UCD and cutoff on disconnect (COD) in the OPTLIST field to create a voice agent. This information may also be entered using SERVORD.

Datafill sequence There is no change to the datafill sequence.

Sample datafill

2 0 0 2 0 DT STN IBN 6845051 NORTH 0 0 214 COD UCD

Figure 4-44, "LEN field in table IBNLINES" on page 4-91 through Figure 4-54, "OPTLIST field in table IBNLINES" on page 4-101 provide information about the individual fields in the table IBNLINES sample tuple.

Figure 4-44 LEN field in table IBNLINES

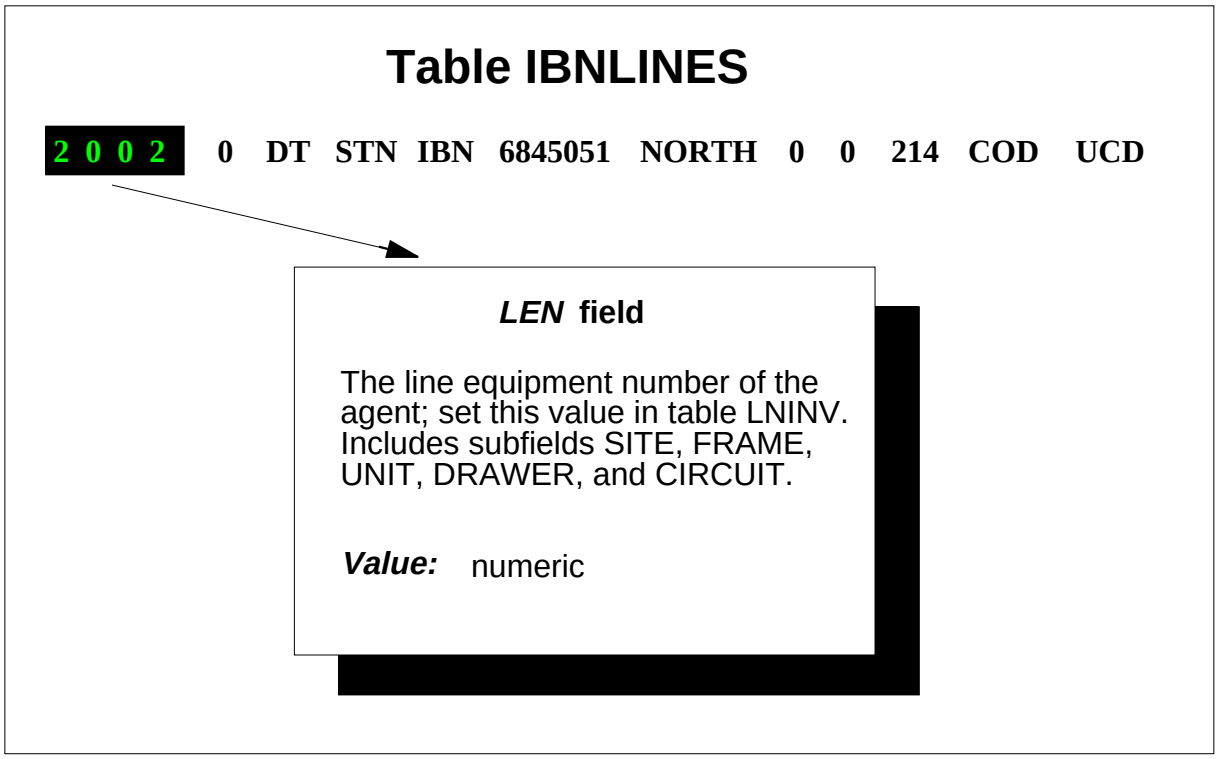


Figure 4-45 DNNO field in table IBNLINES

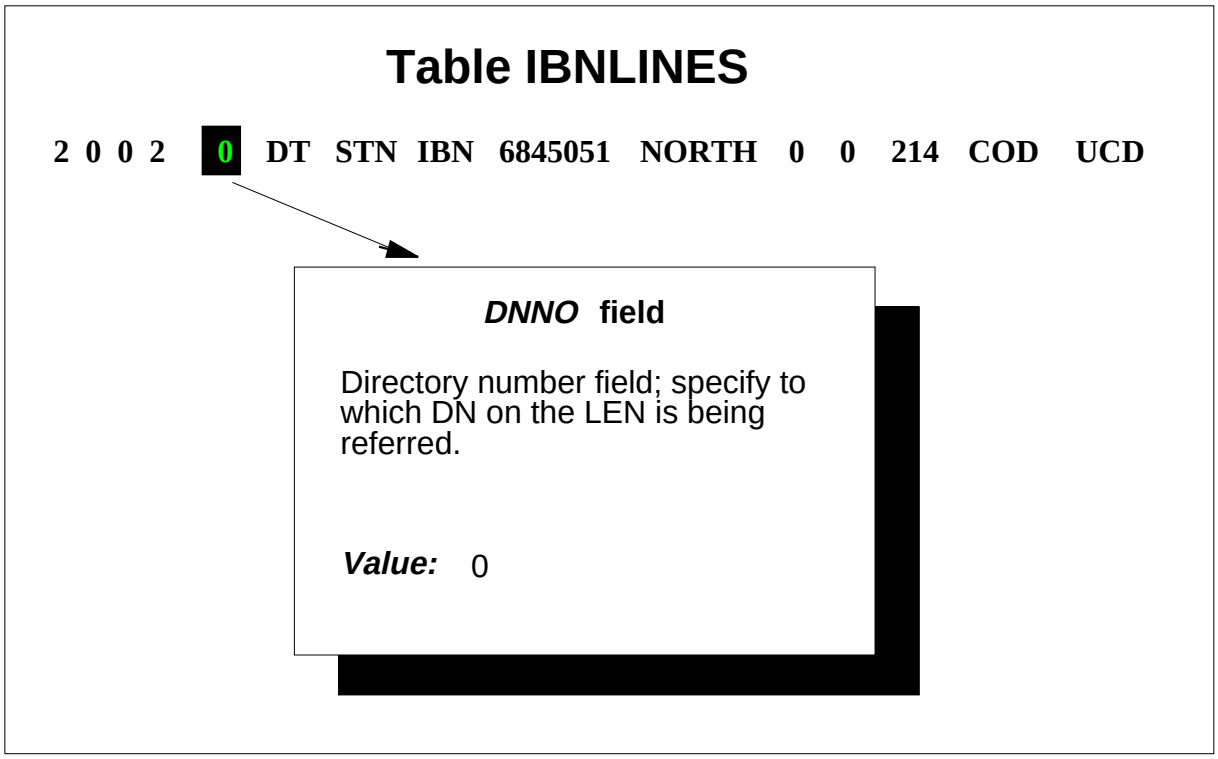


Figure 4-46 SIGTYPE field in table IBNLINES

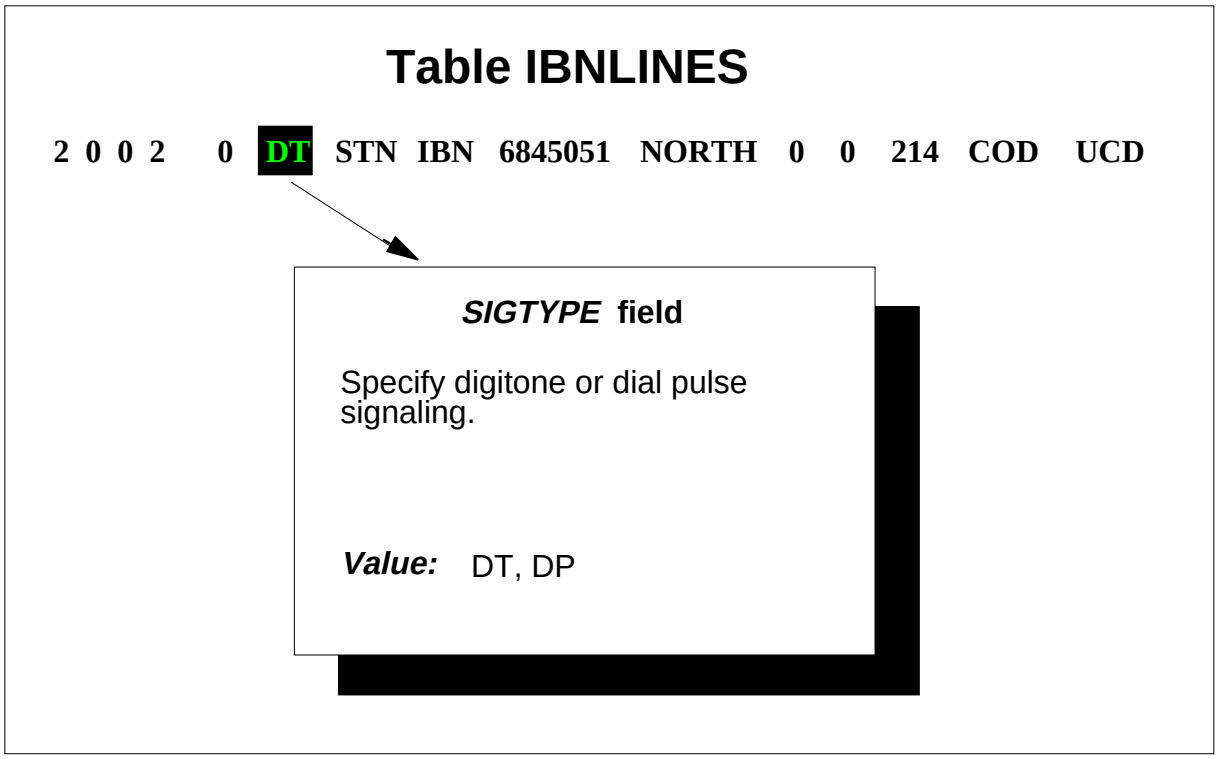


Figure 4-47 FORMAT field in table IBNLINES

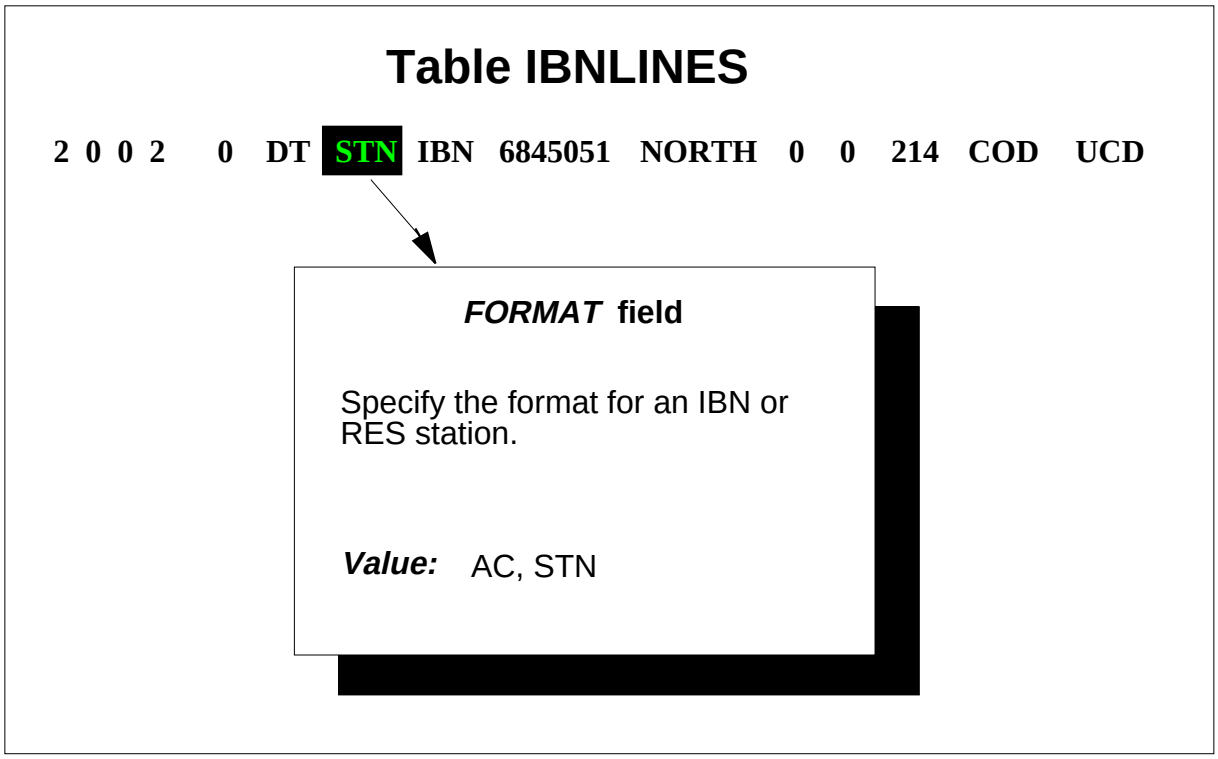


Figure 4-48 LCC field in table IBNLINES

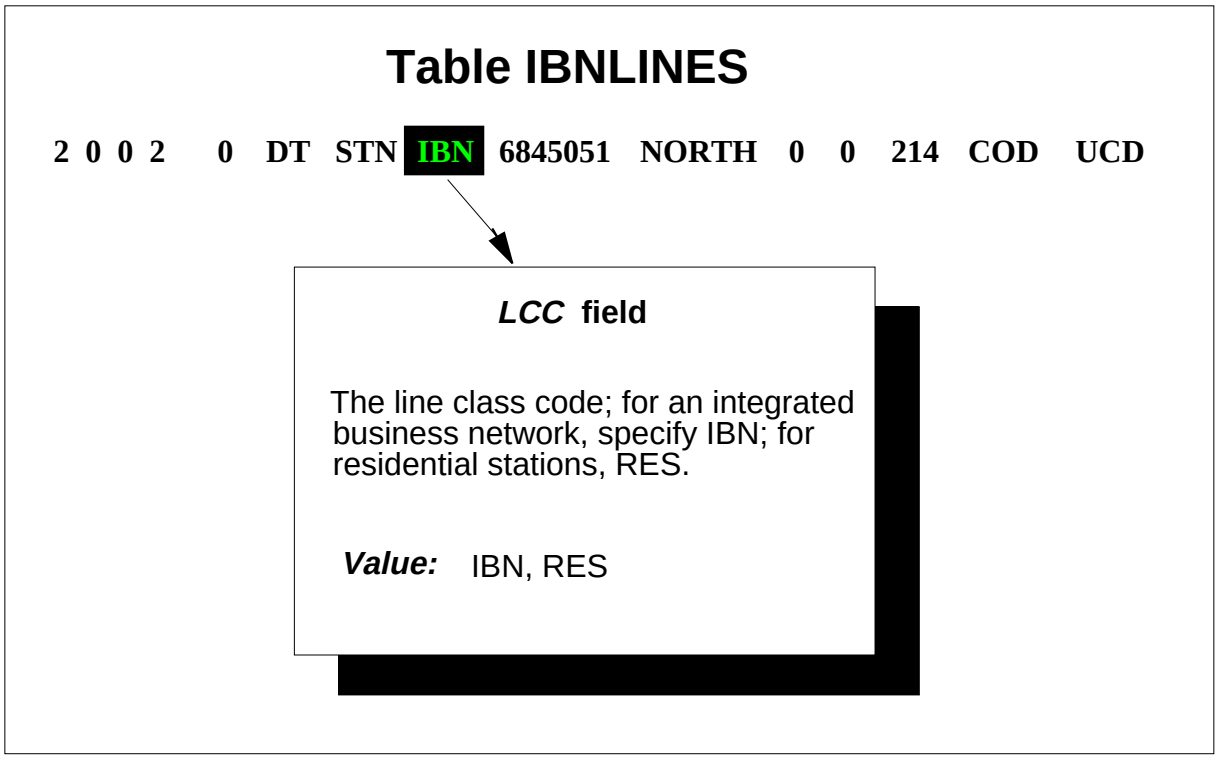


Figure 4-49 DN field in table IBNLINES

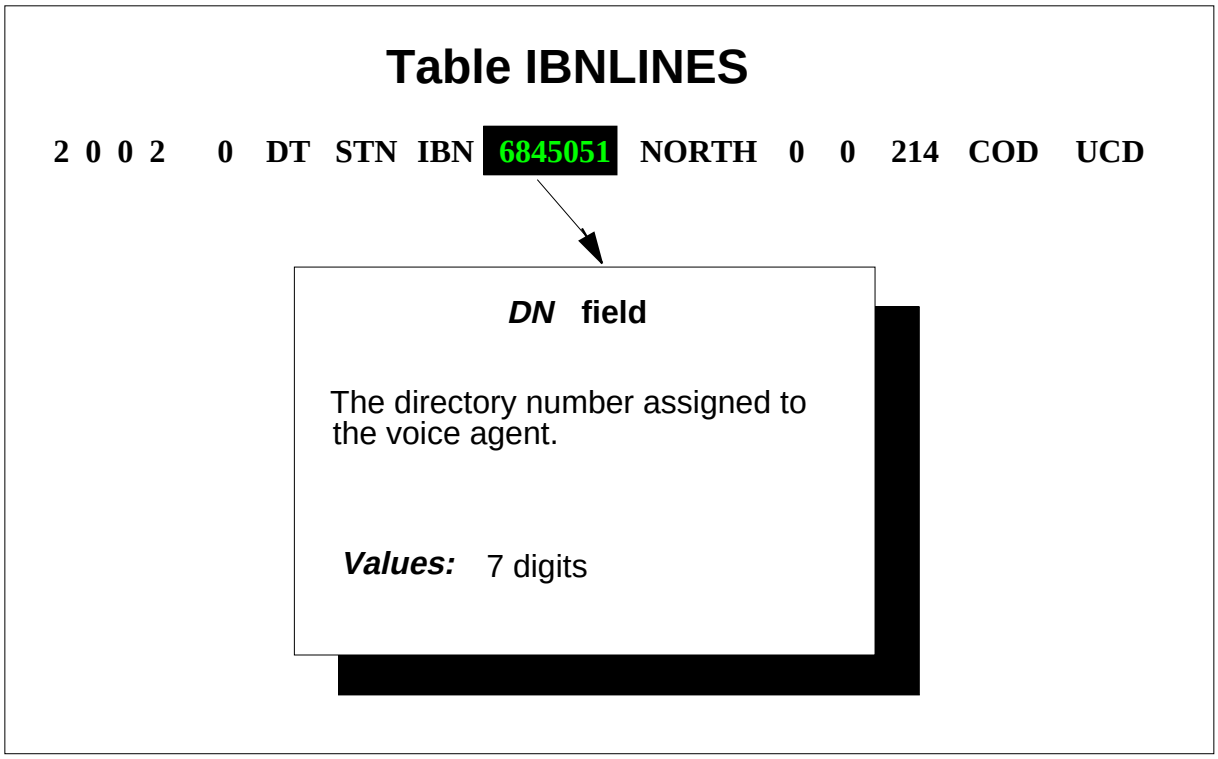


Figure 4-50 CUSTGRP field in table IBNLINES

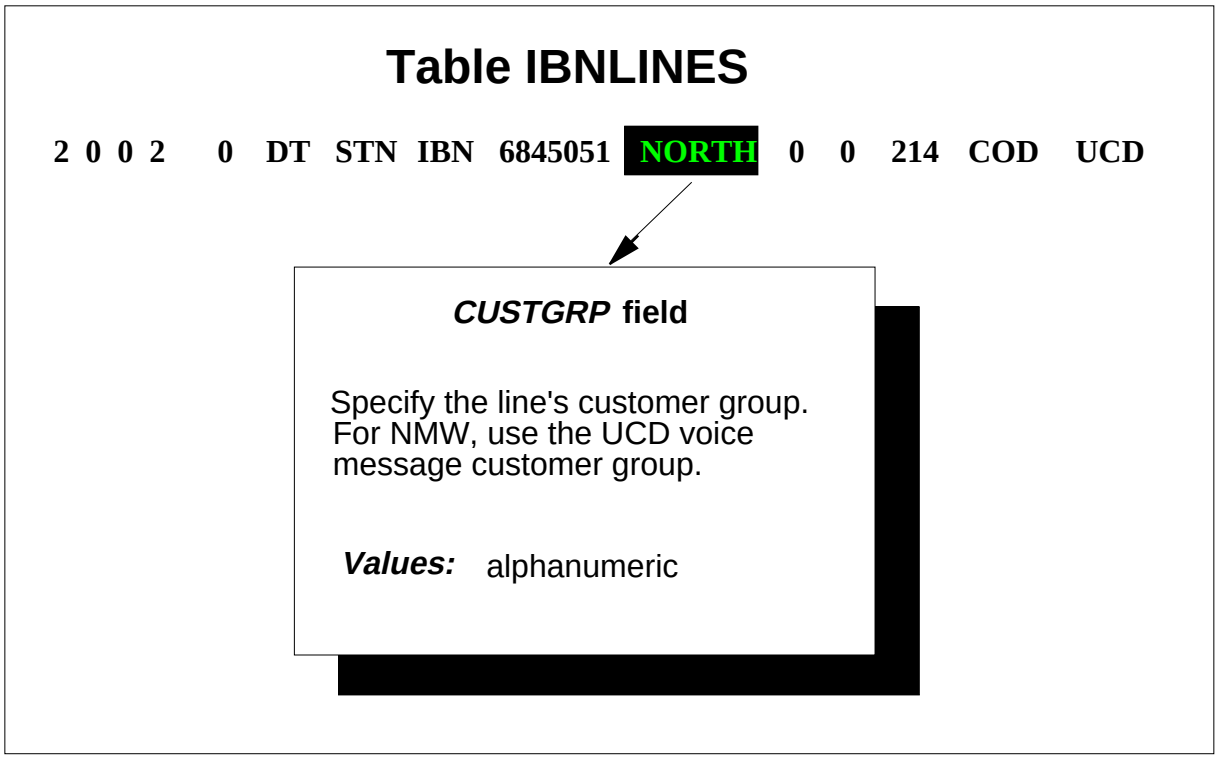


Figure 4-51 SUBGRP field in table IBNLINES

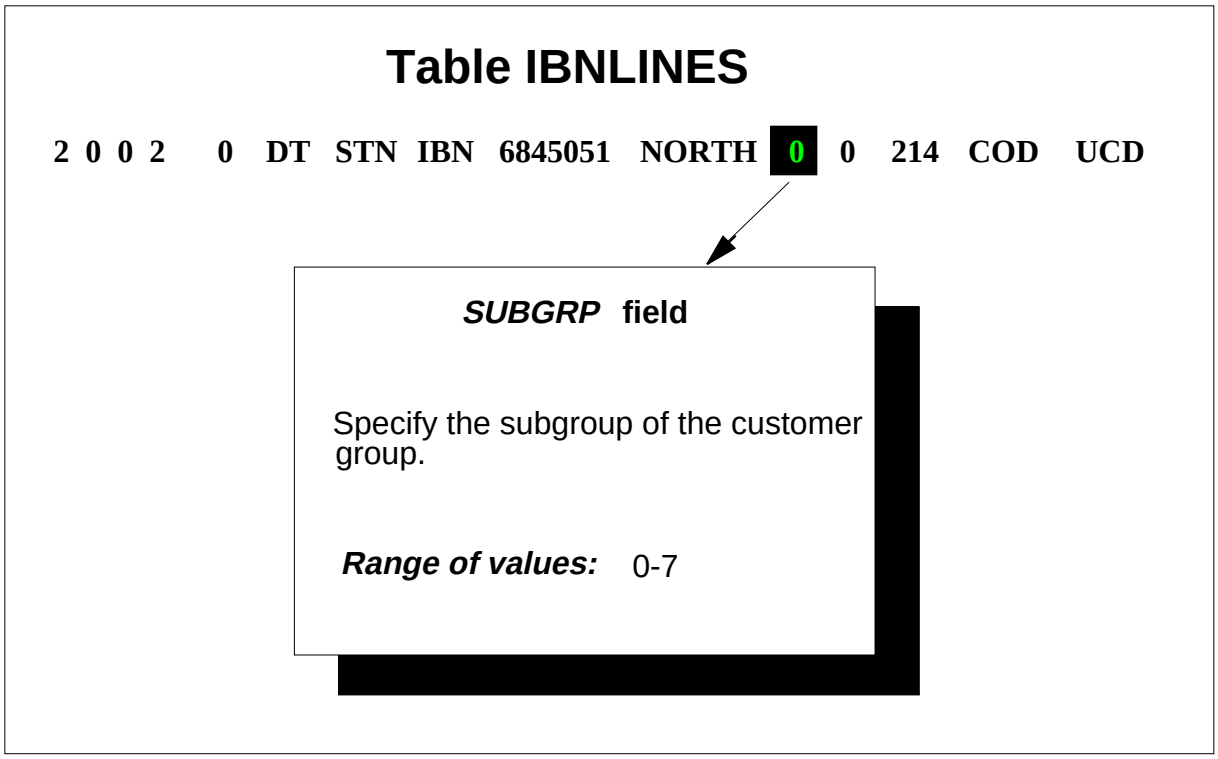


Figure 4-52 NCOS field in table IBNLINES

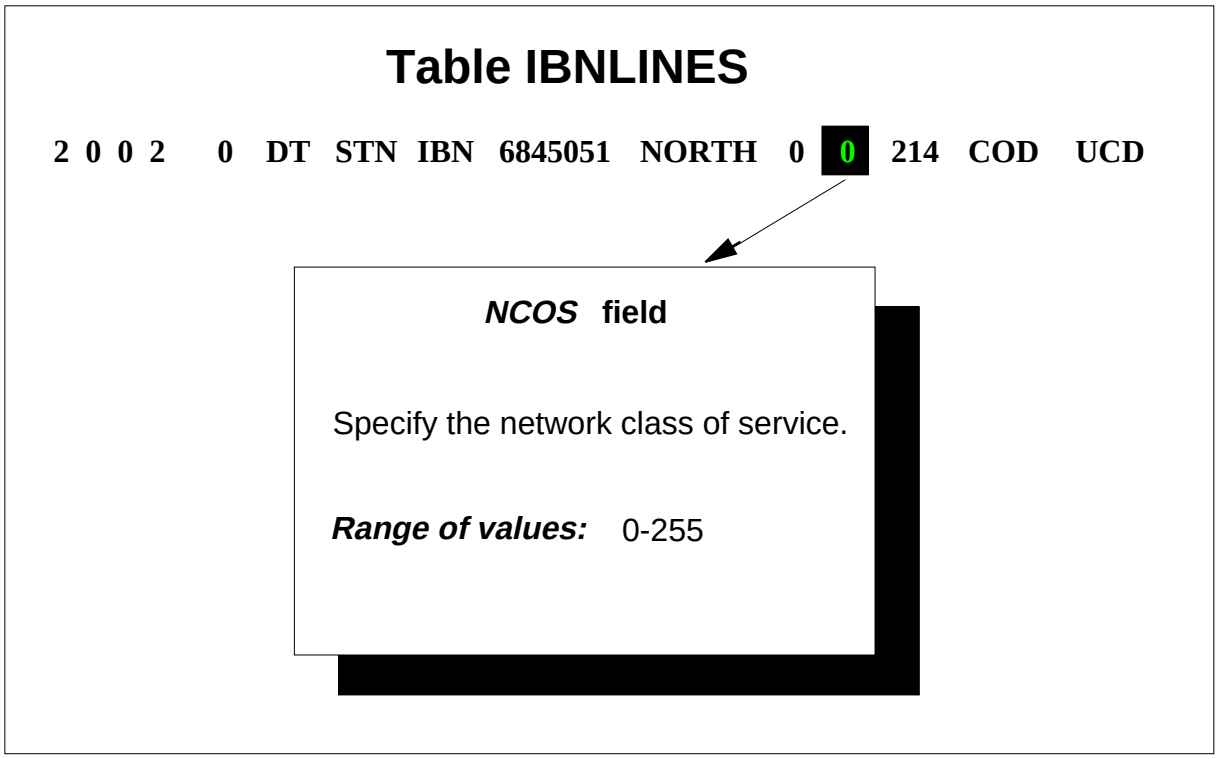


Figure 4-53 SNPA field in table IBNLINES

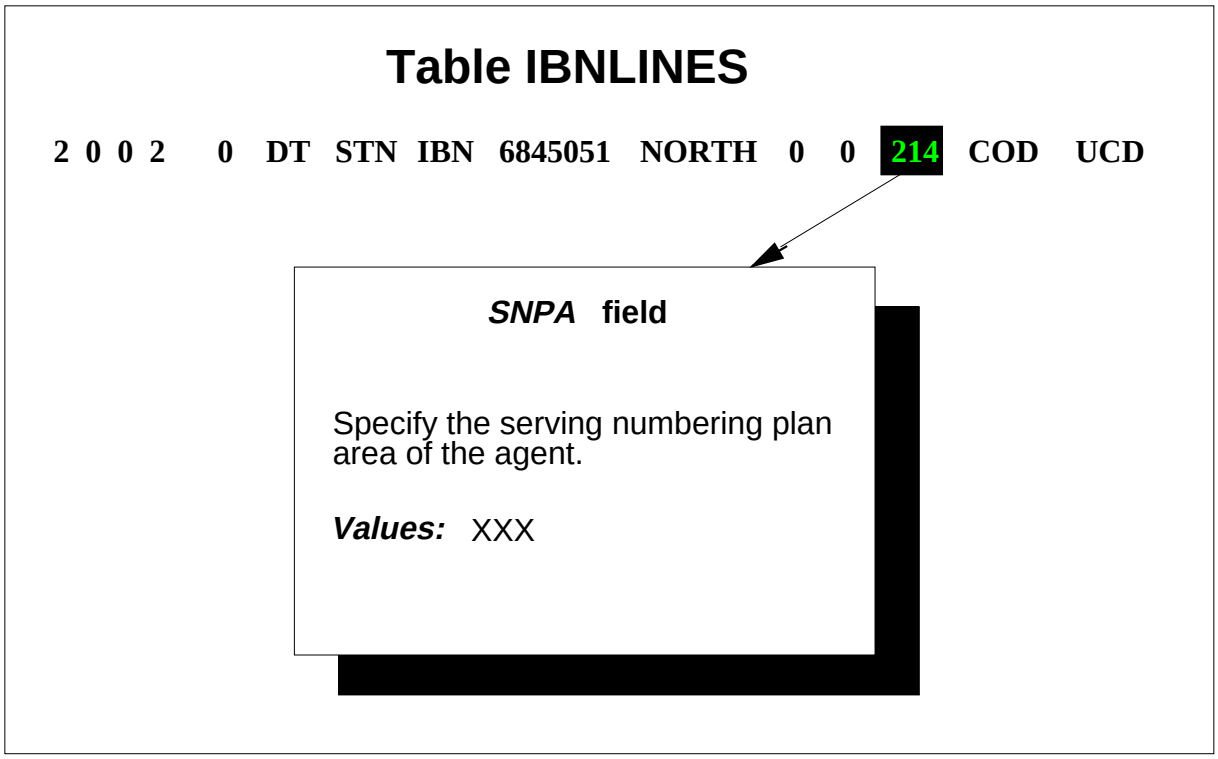


Figure 4-54 OPTLIST field in table IBNLINES

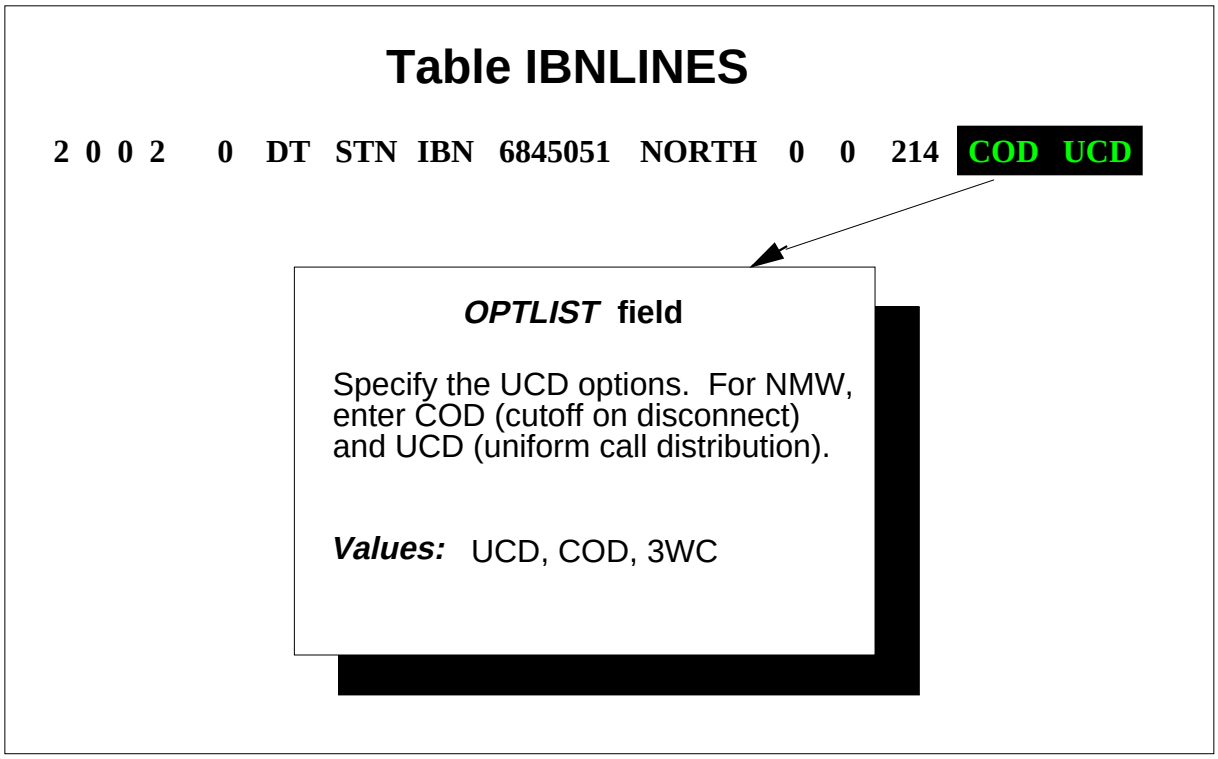


Table IBNFEAT

Use table IBNFEAT to assign SMDI, CNF C06, and EMW options to UCD agents. This information may also be entered by using SERVORD.

Datafill sequence There is no change to the datafill sequence.

Sample datafill

2 0 0 2 0 SMDI 1 USGROUP Y2 0 0 2 0 CNF CNF3 0 0 3 0 MWT MWT4 0 0 4 0 EMW EMW MWL CLASSA

Figure 4-55, "LEN field in table IBNFEAT" on page 4-102 through Figure 4-63, "MAILBOX field in table IBNFEAT" on page 4-110 provide information about the individual fields in the table IBNFEAT sample tuple.

Figure 4-55 LEN field in table IBNFEAT

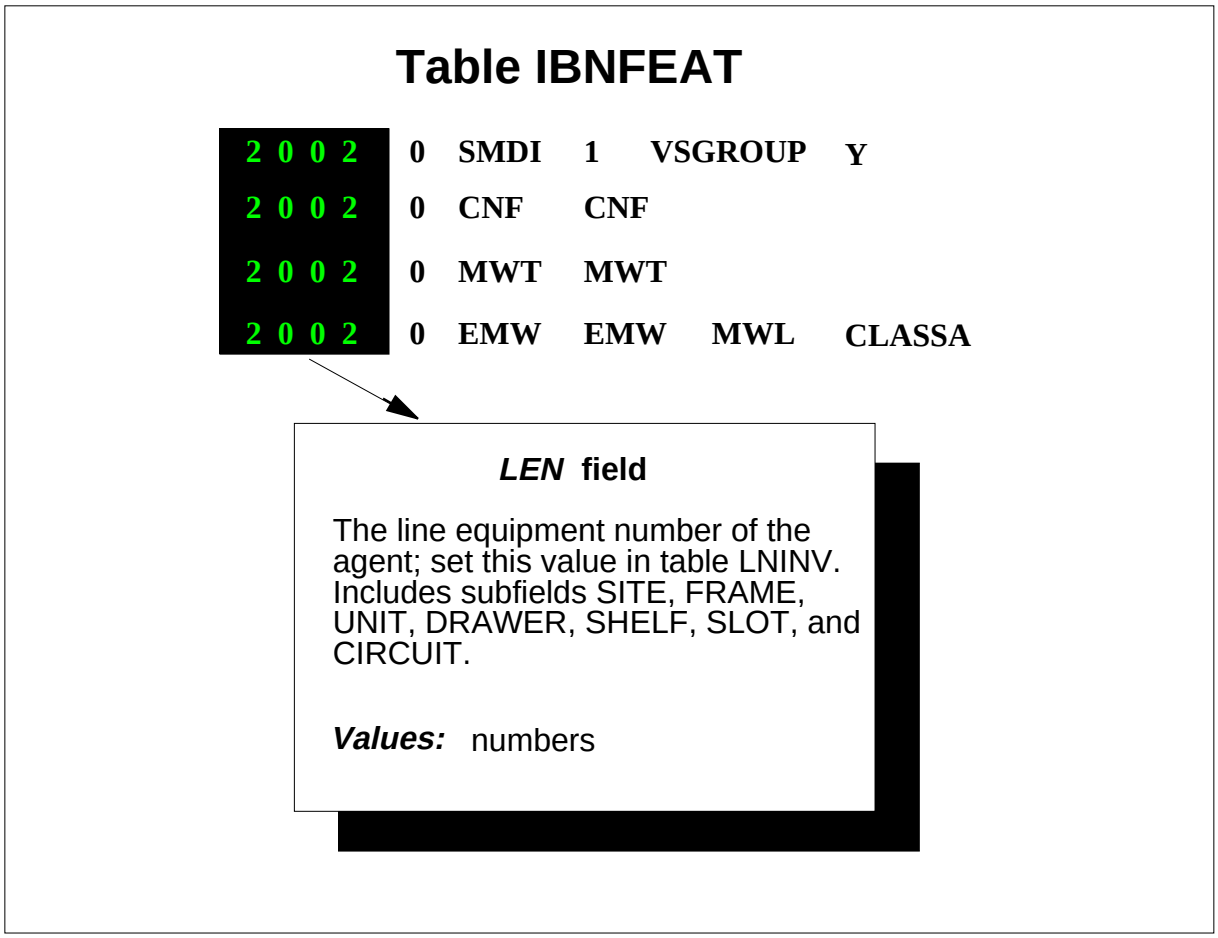


Figure 4-56 DNNO field in table IBNFEAT

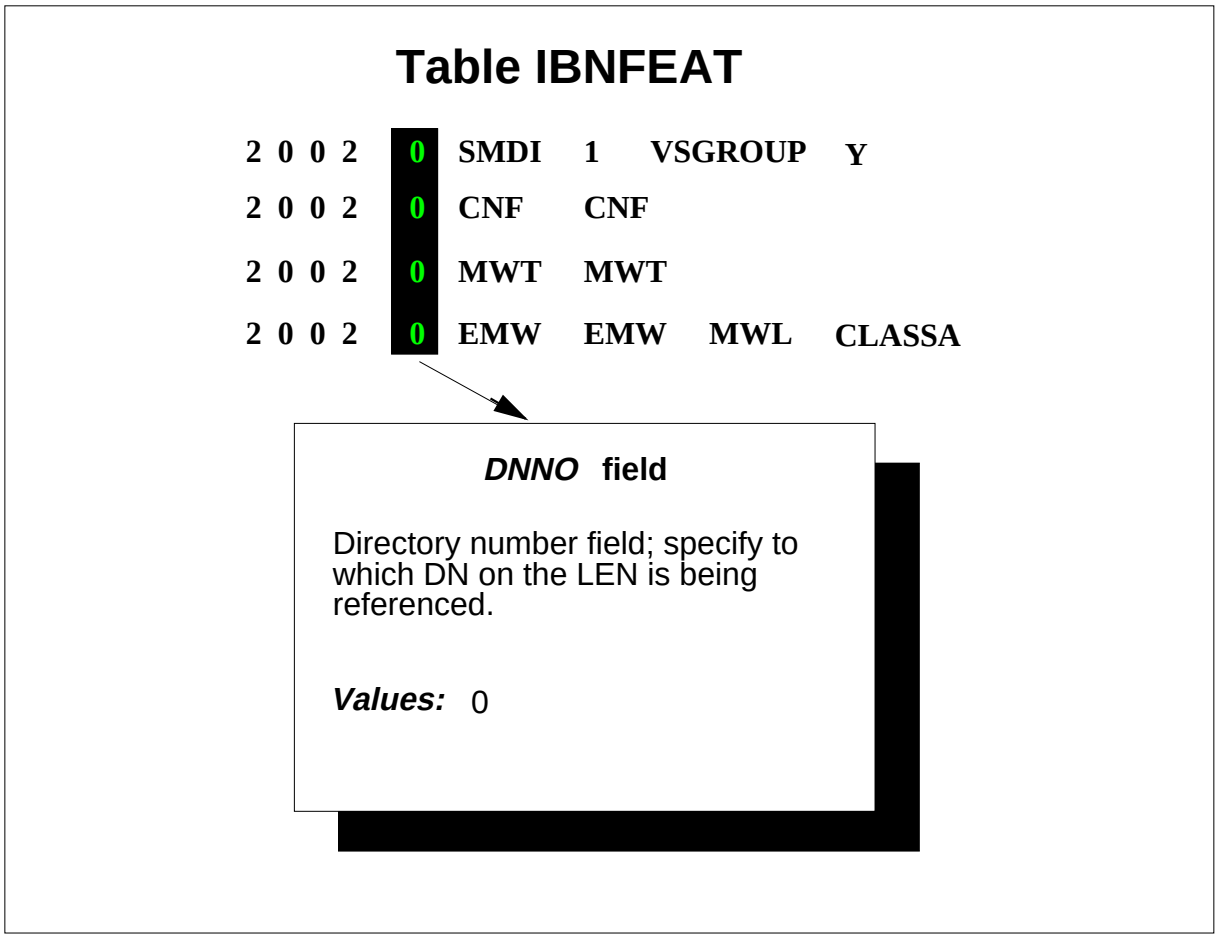


Figure 4-57 DF field in table IBNFEAT

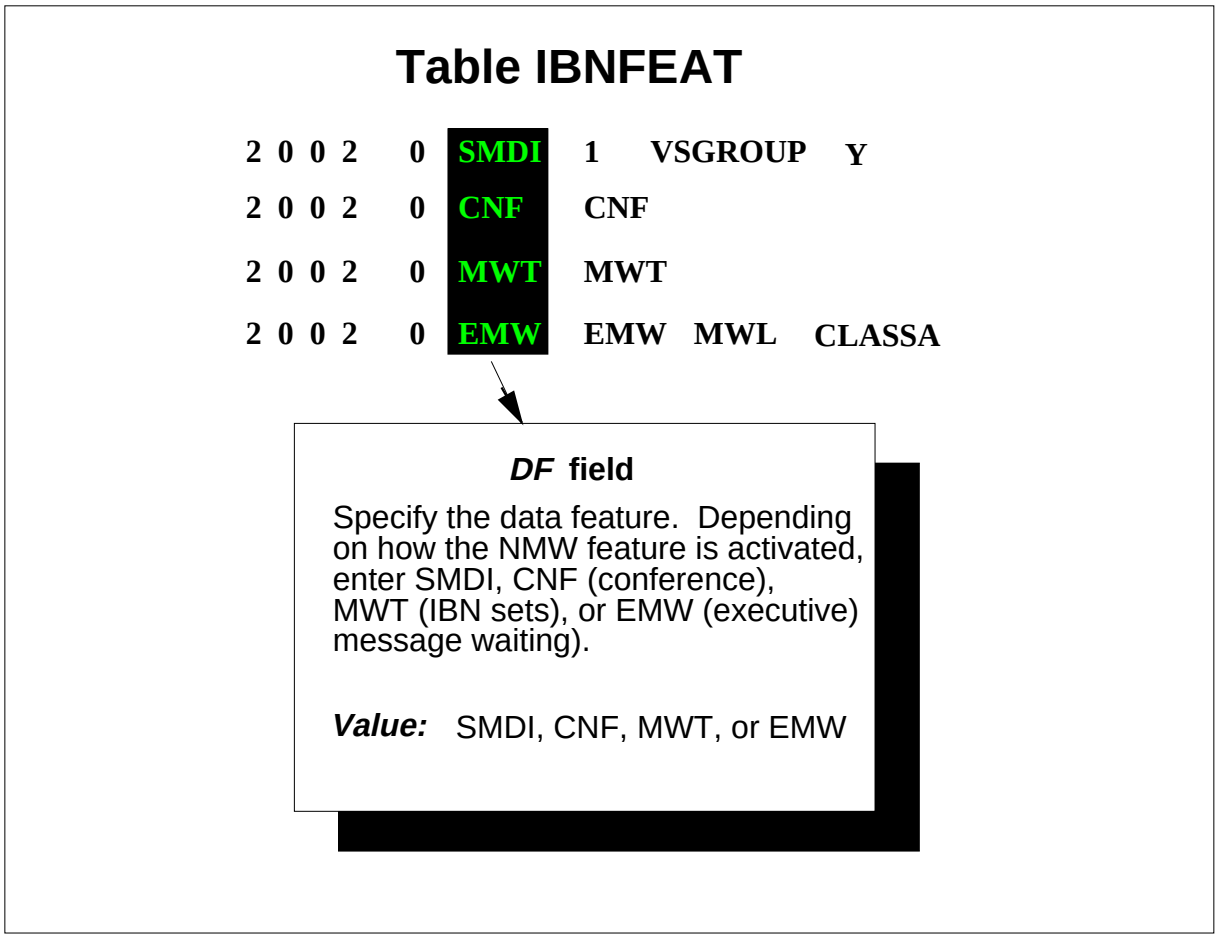


Figure 4-58 LINENO field in table IBNFEAT

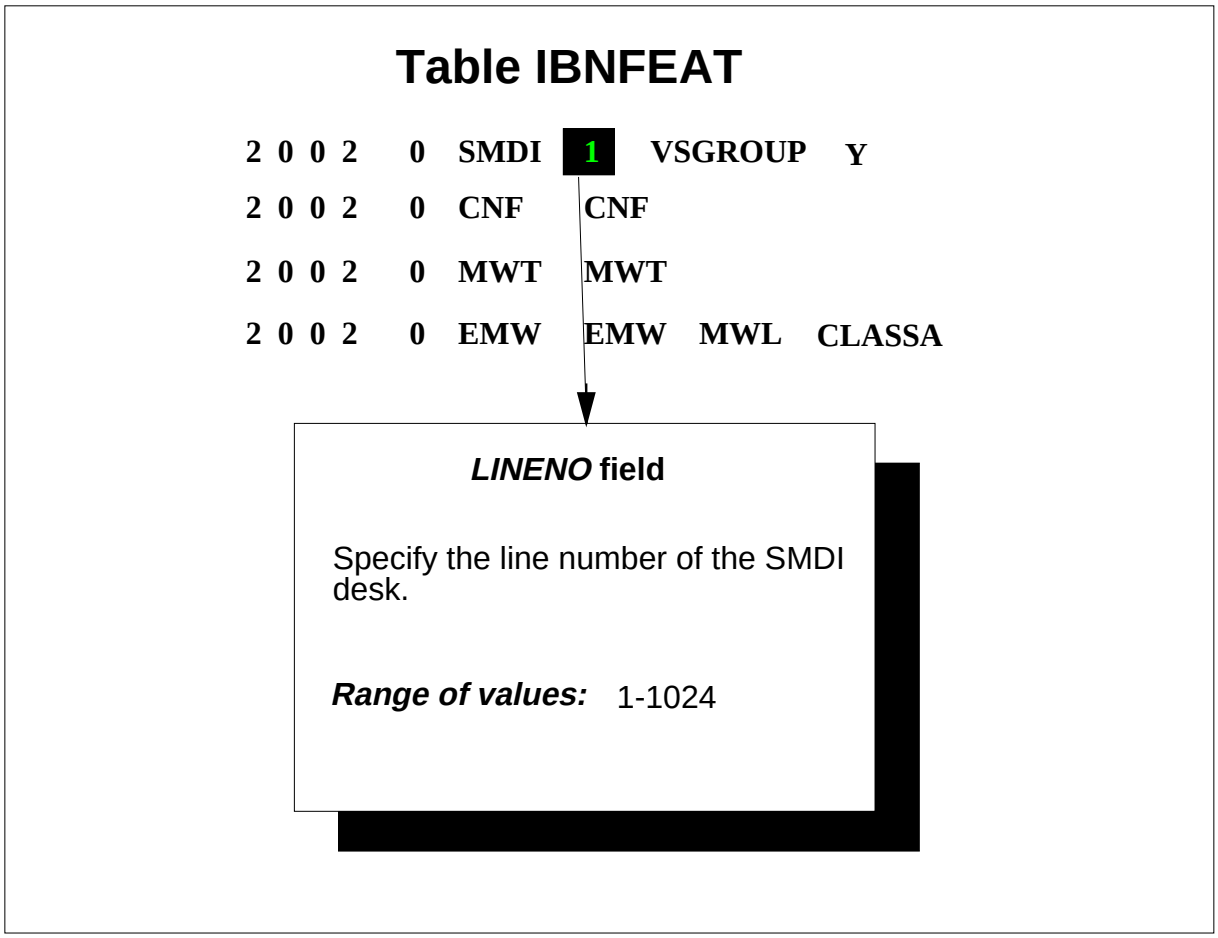


Figure 4-59 FEATURE field in table IBNFEAT

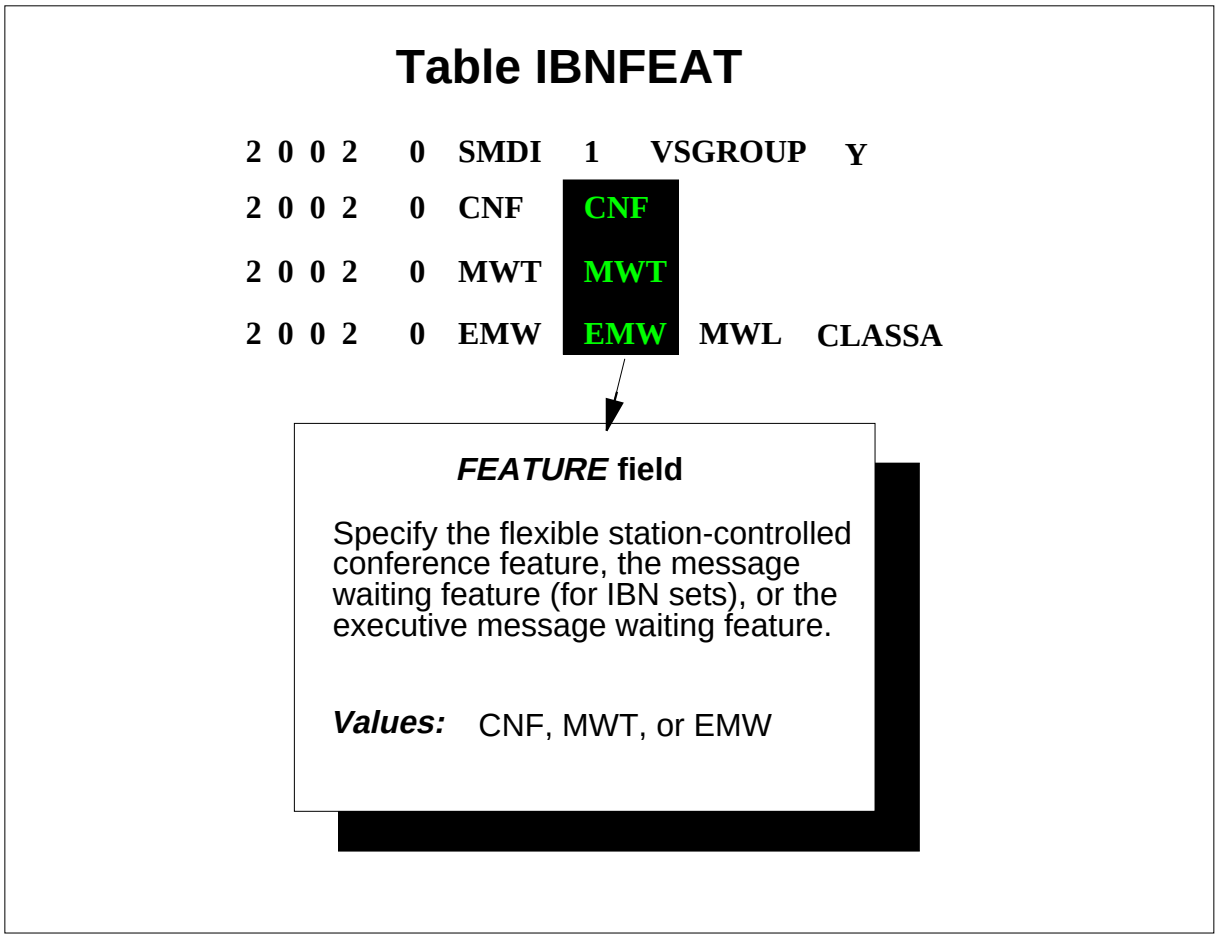


Figure 4-60 UCDGRP field in table IBNFEAT

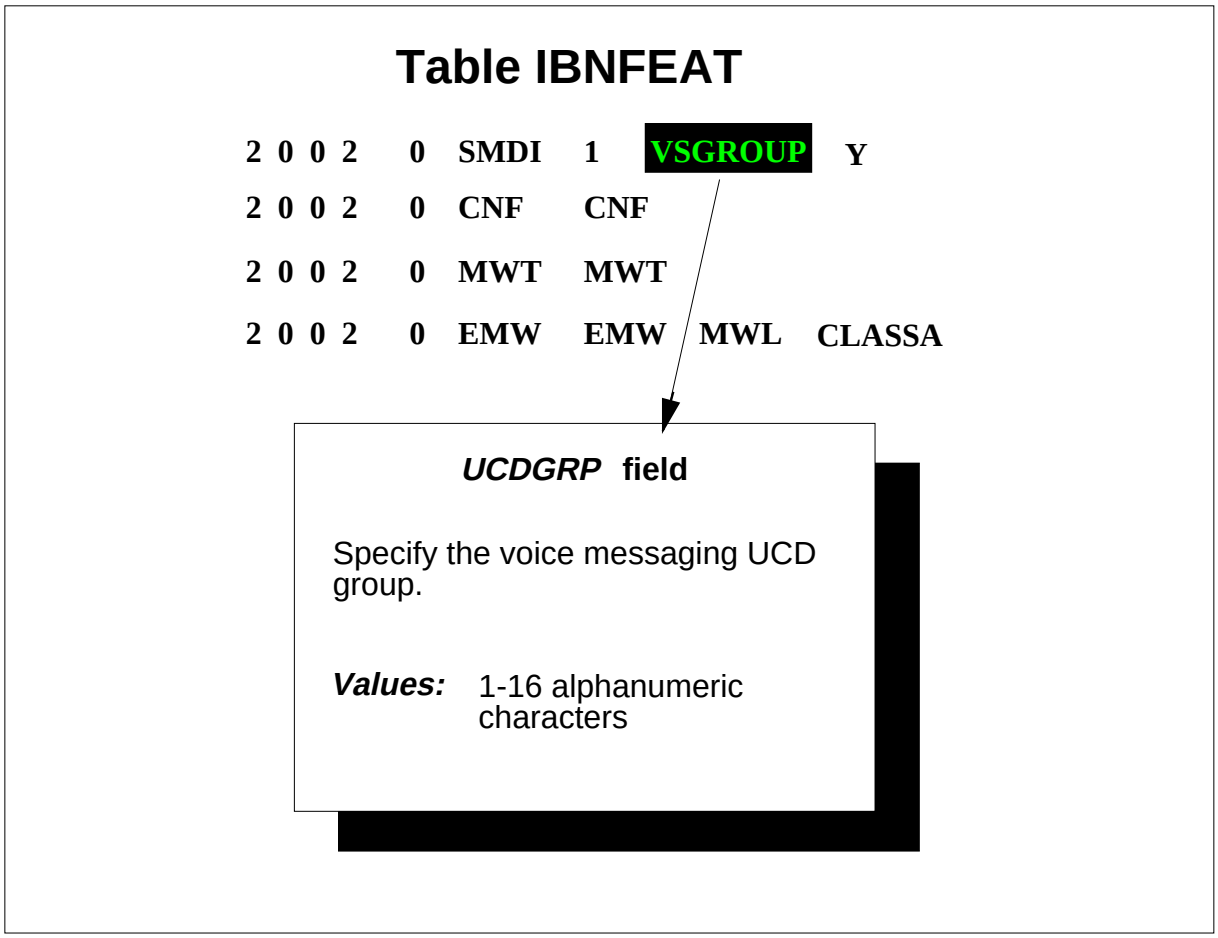


Figure 4-61 NOTICE field in table IBNFEAT

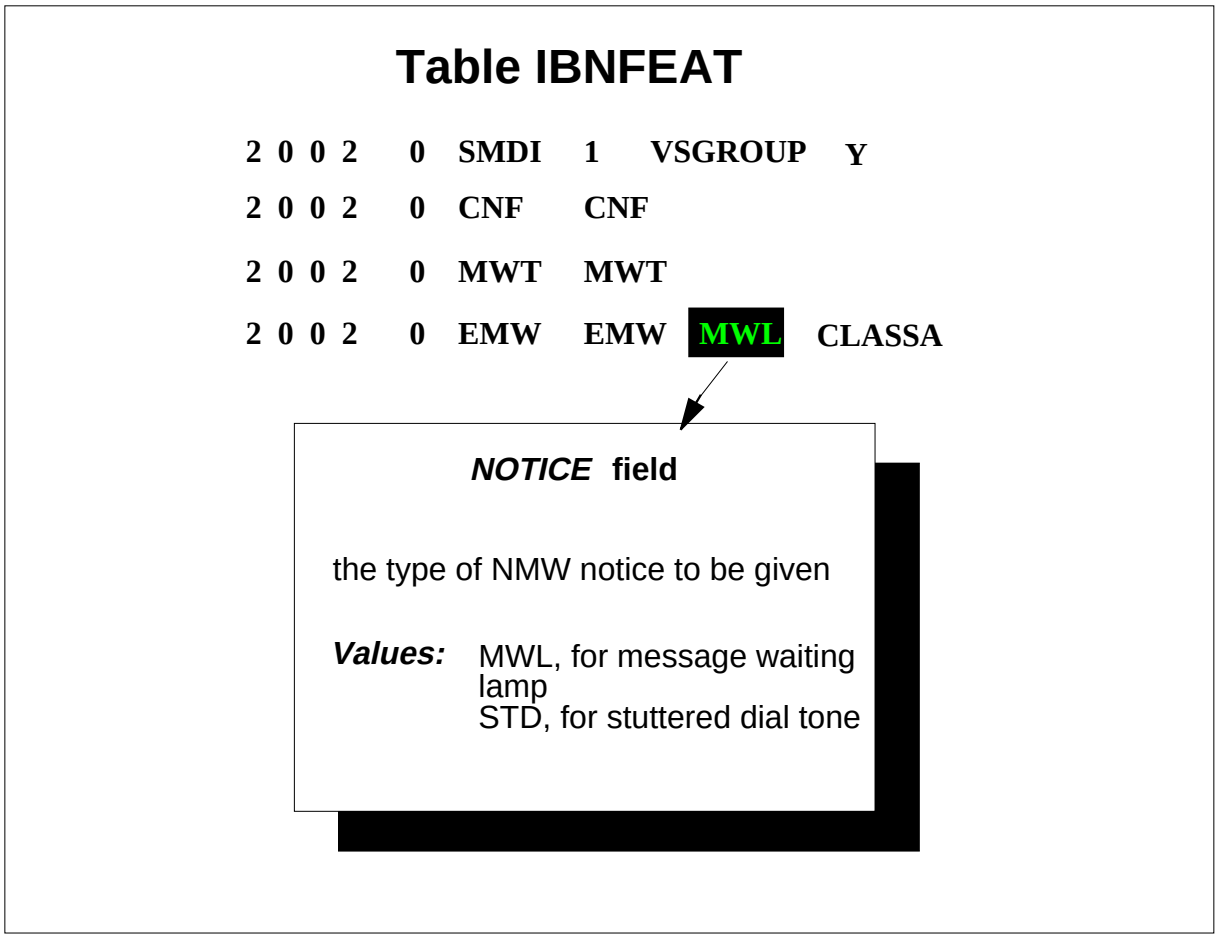


Figure 4-62 AUTOLOG field in table IBNFEAT

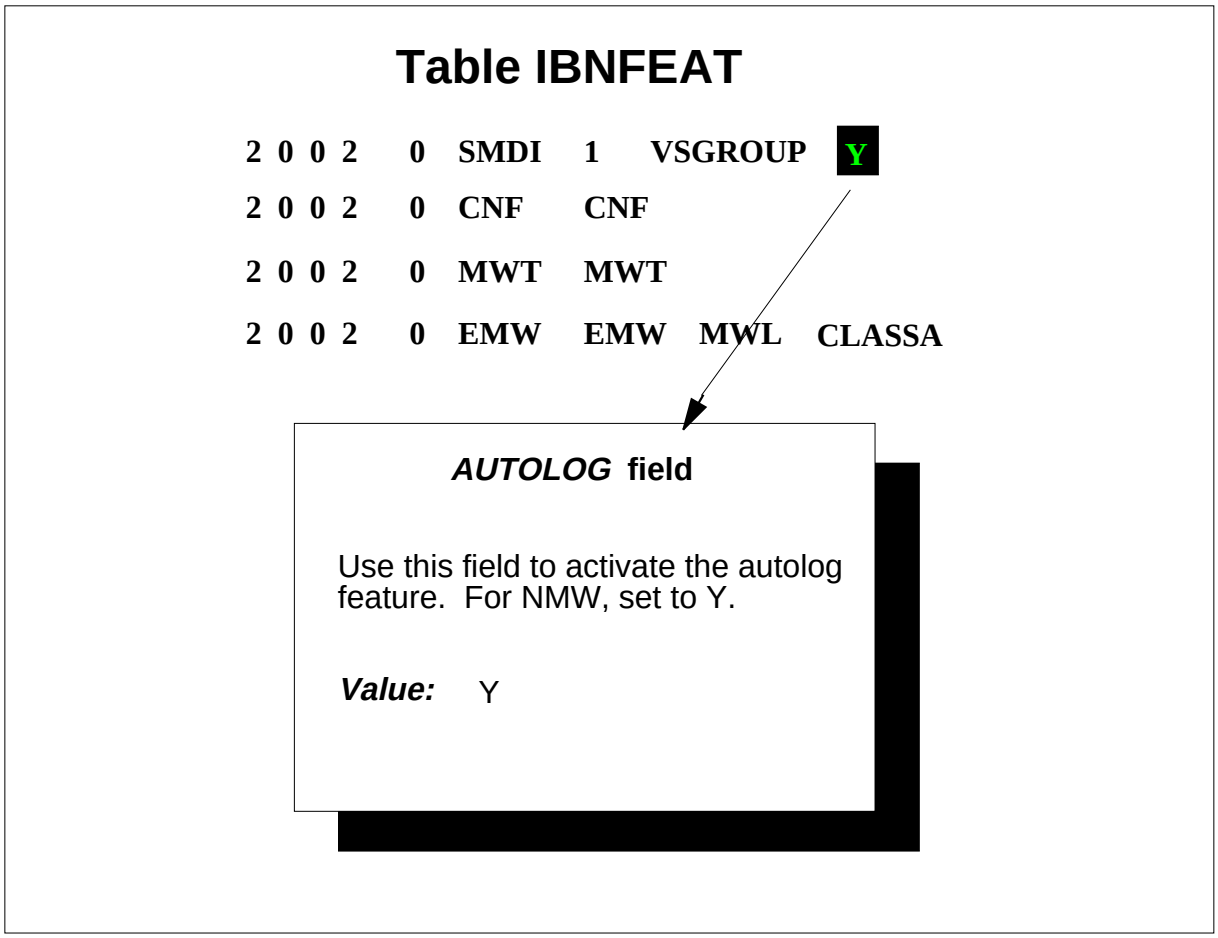


Figure 4-63 MAILBOX field in table IBNFEAT

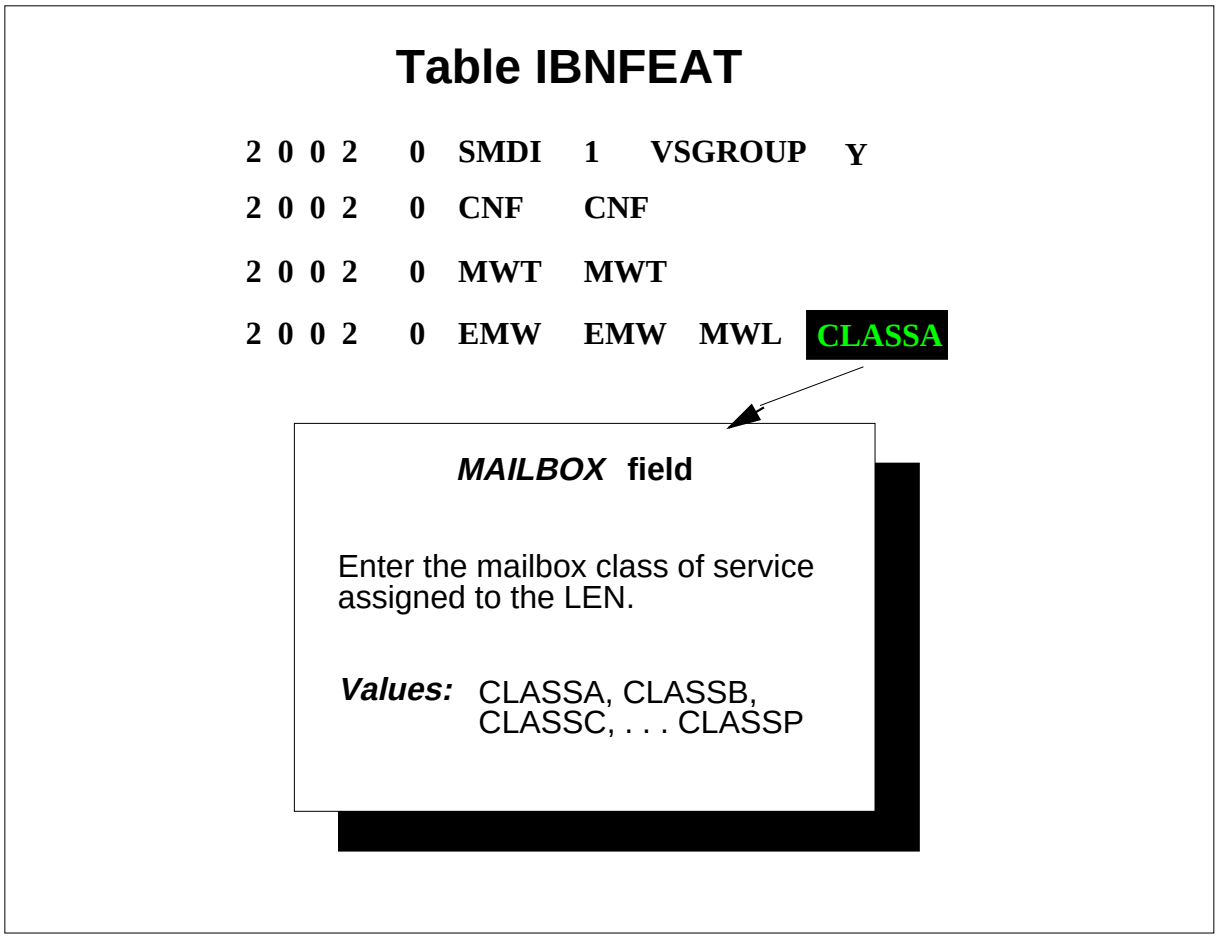


Table DNROUTE

Use table DNROUTE to define the message service DN for the voice message UCD group on the host node.

Datafill sequence Datafill table UCDGRP before table DNROUTE.

Sample datafill

214 684 5000 FEAT UCD USGROUP PRIM 0

Figure 4-64, "AREACODE field in table DNROUTE" on page 4-111 through Figure 4-71, "TOLLPRI field in table DNROUTE" on page 4-118 provide information about the individual fields in the table DNROUTE sample tuple.

Figure 4-64 AREACODE field in table DNROUTE

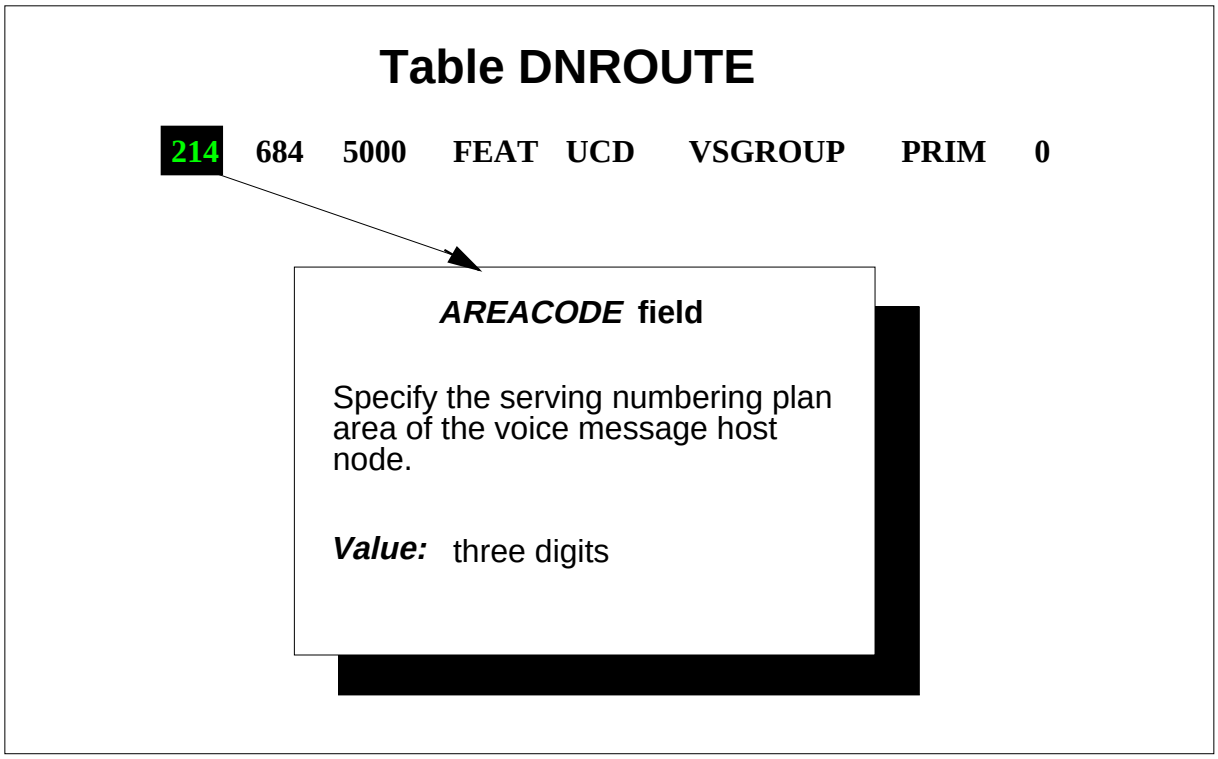


Figure 4-65 OFCCODE field in table DNROUTE

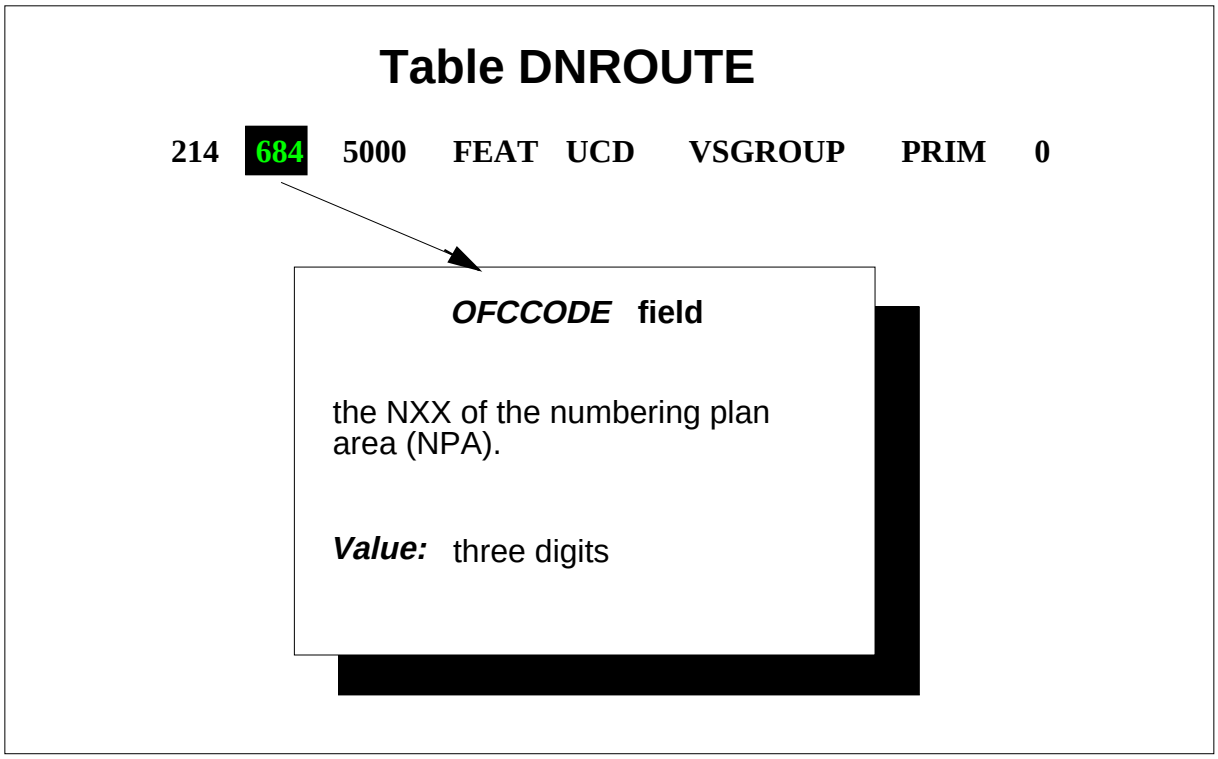


Figure 4-66 STNCODE field in table DNROUTE

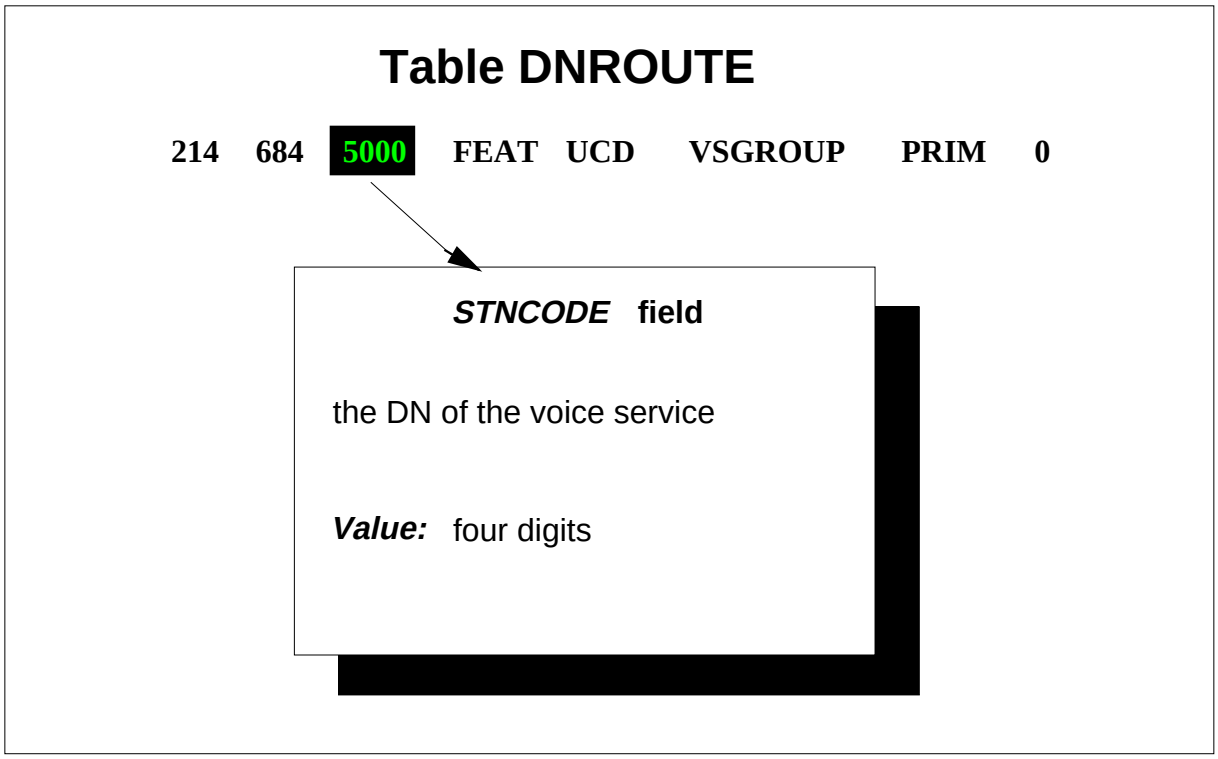


Figure 4-67 DNSEL field in table DNROUTE

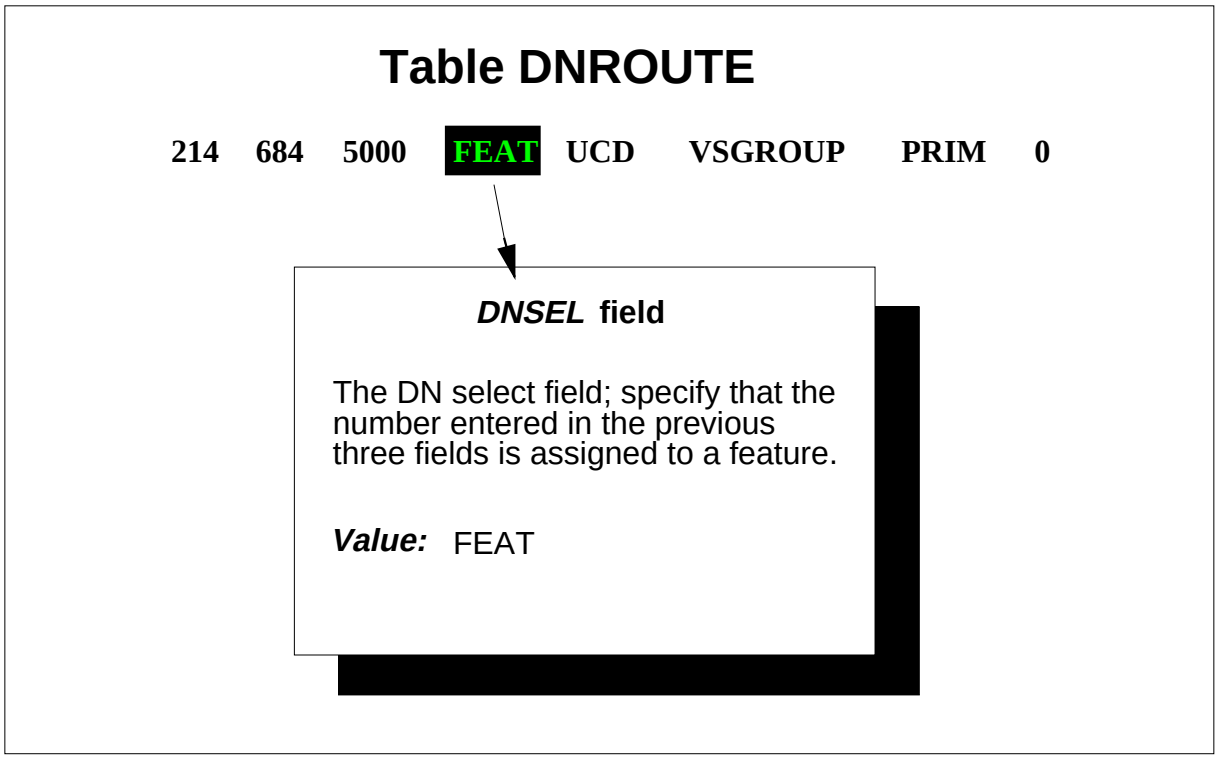


Figure 4-68 FEAT field in table DNROUTE

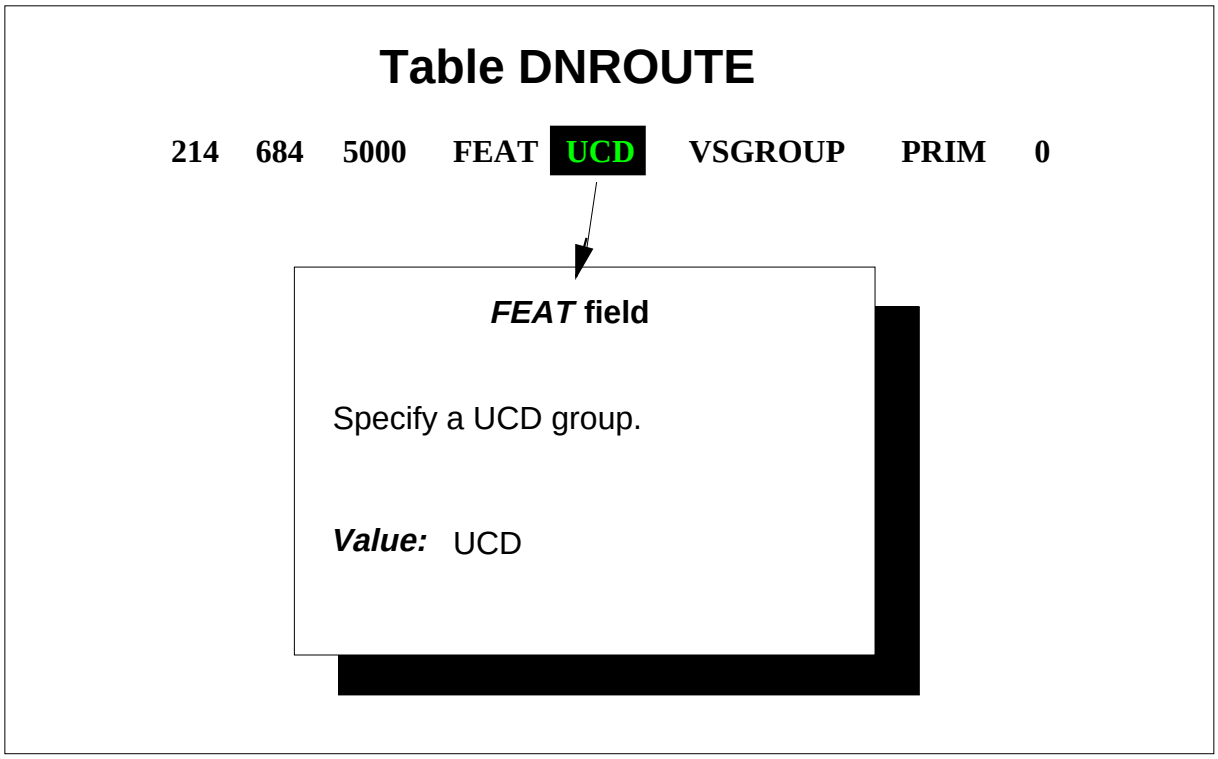


Figure 4-69 UCDGRP field in table DNROUTE

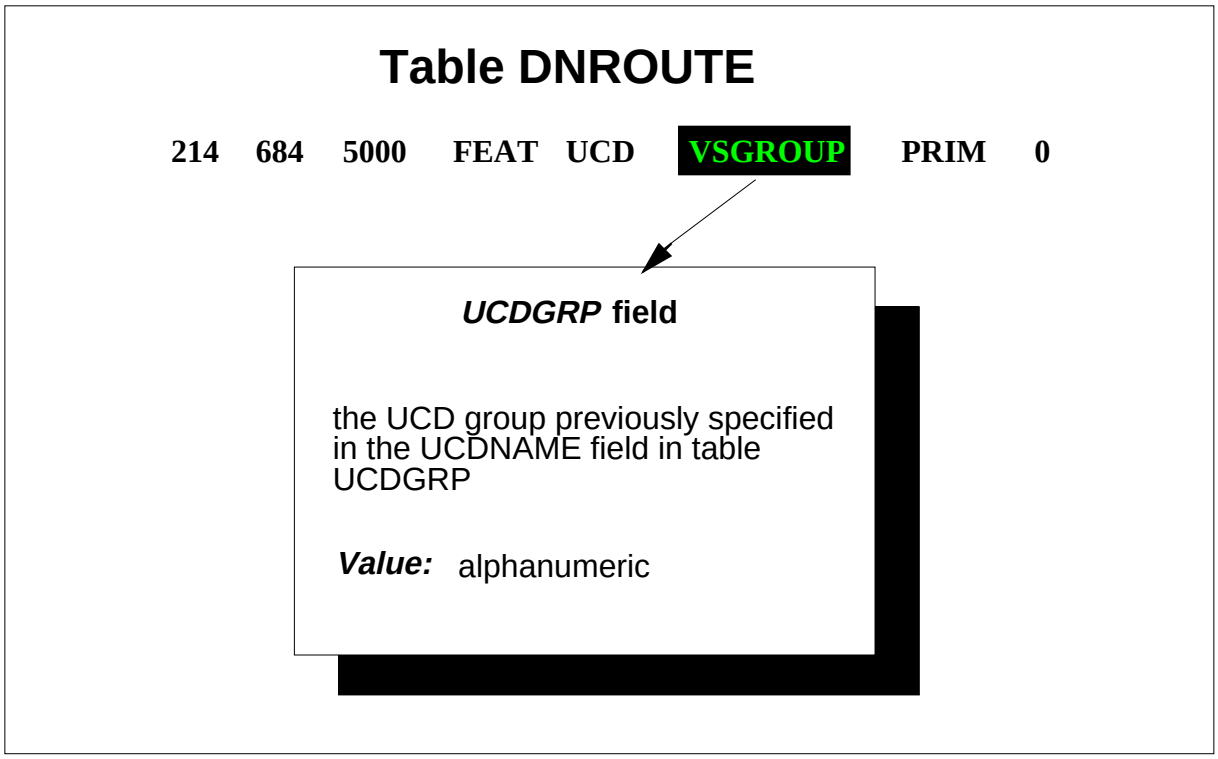


Figure 4-70 DNTYPE field in table DNROUTE

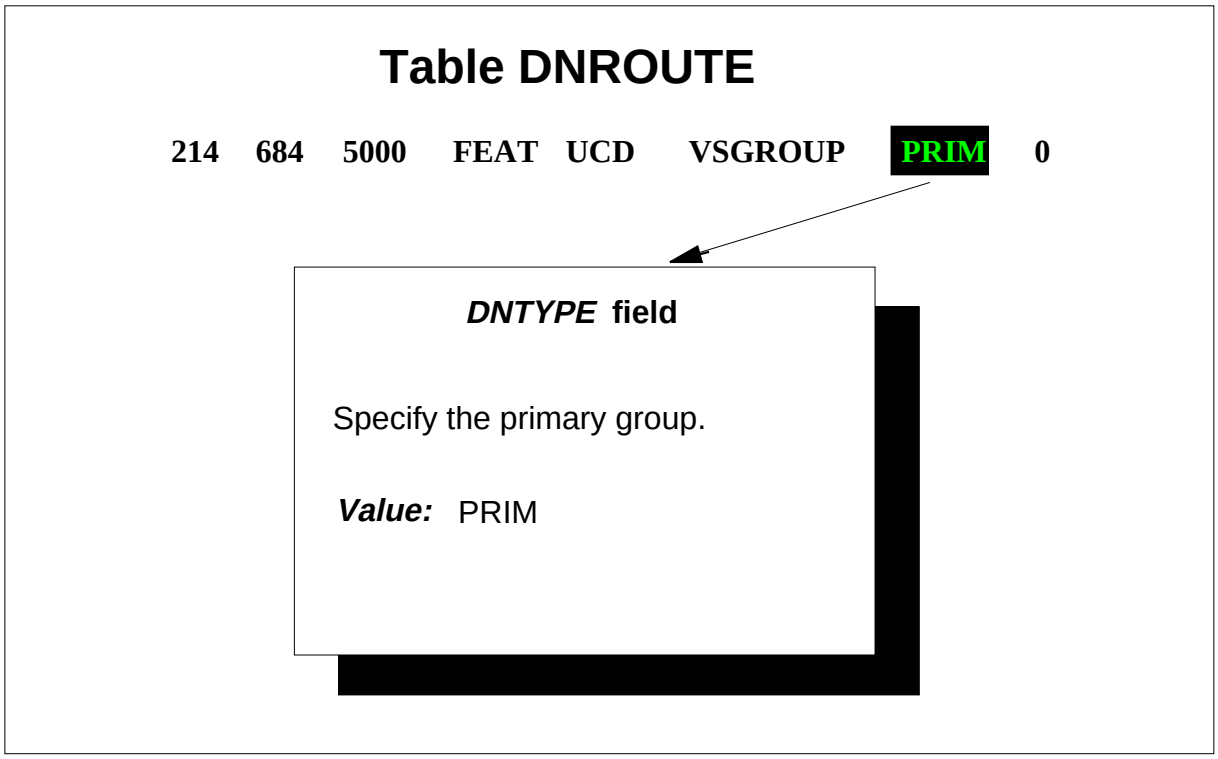


Figure 4-71 TOLLPRI field in table DNROUTE

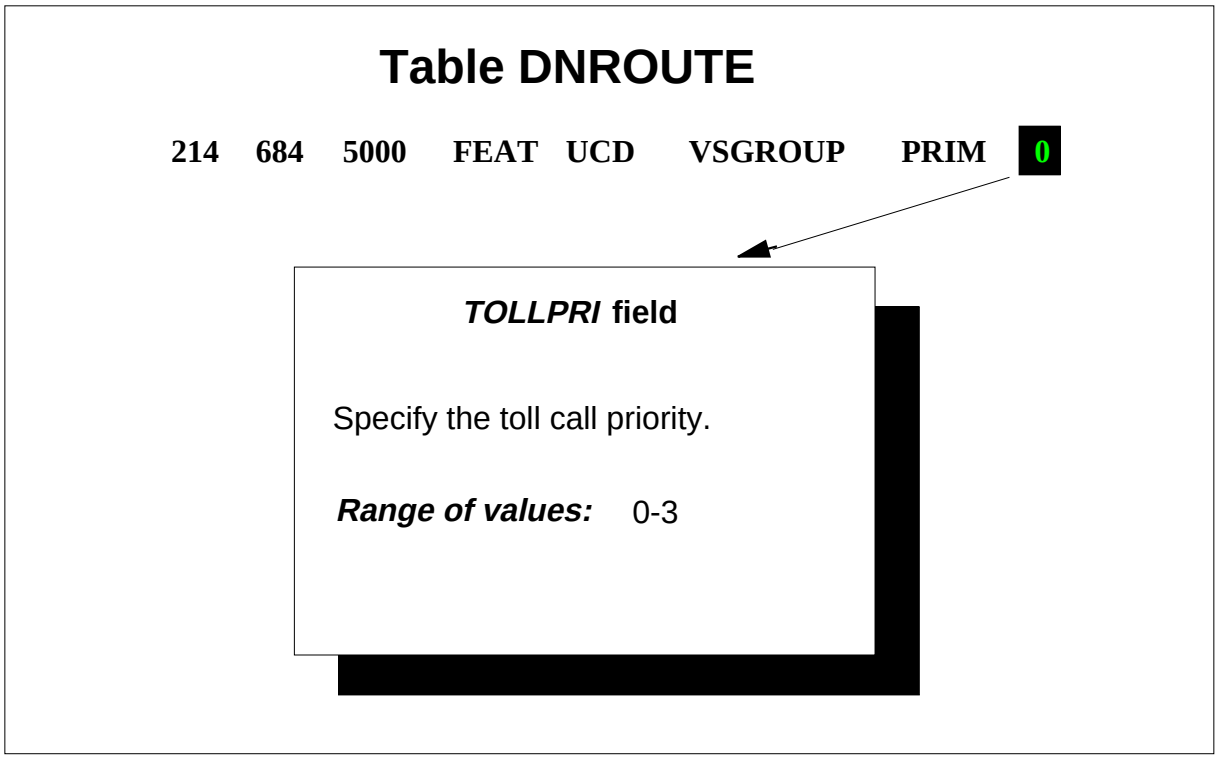


Table NMSDATA

Use table NMSDATA to differentiate customers on a message center host node with multiple customers.

Datafill sequence There is no change to the datafill sequence.

Sample datafill

2146841000 NORTHPVT 2146842384

Figure 4-72, "KEY field in table NMSDATA" on page 4-119 through Figure 4-74, "NMSID field in table NMSDATA" on page 4-121 provide information about the individual fields in the table NMSDATA sample tuple.

Figure 4-72 KEY field in table NMSDATA

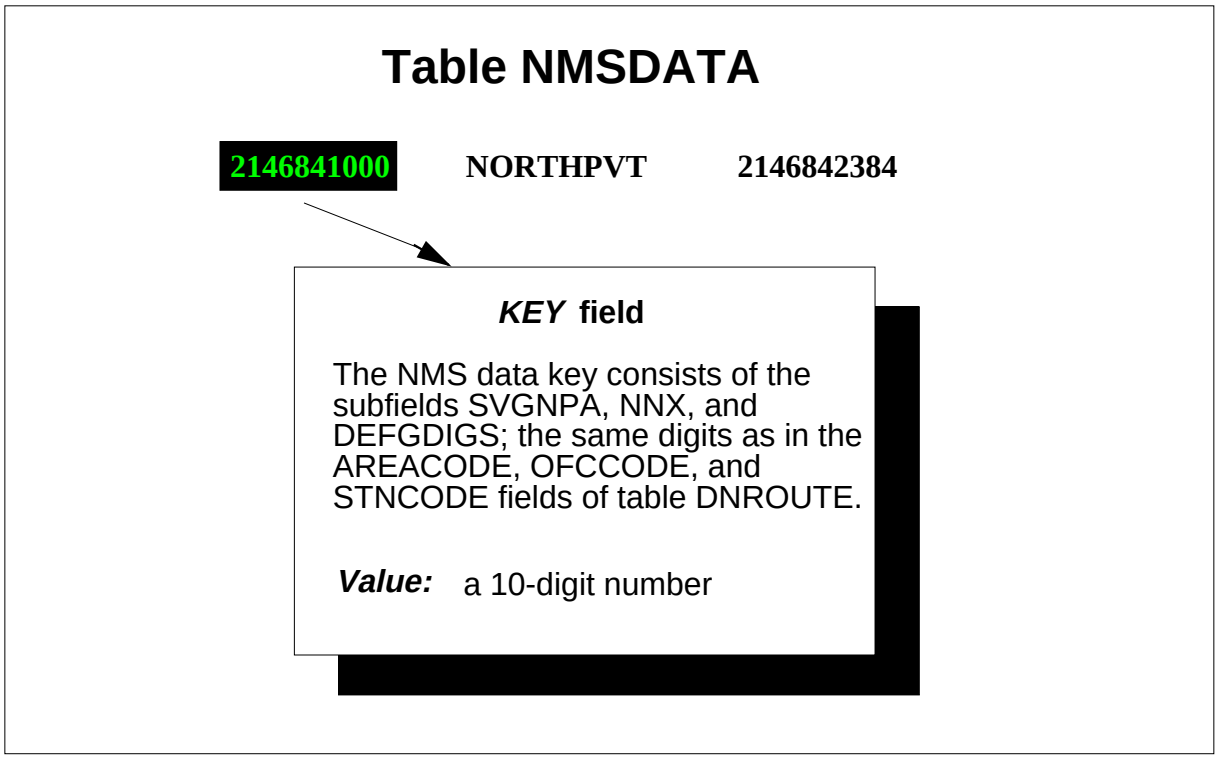


Figure 4-73 NETNAME field in table NMSDATA

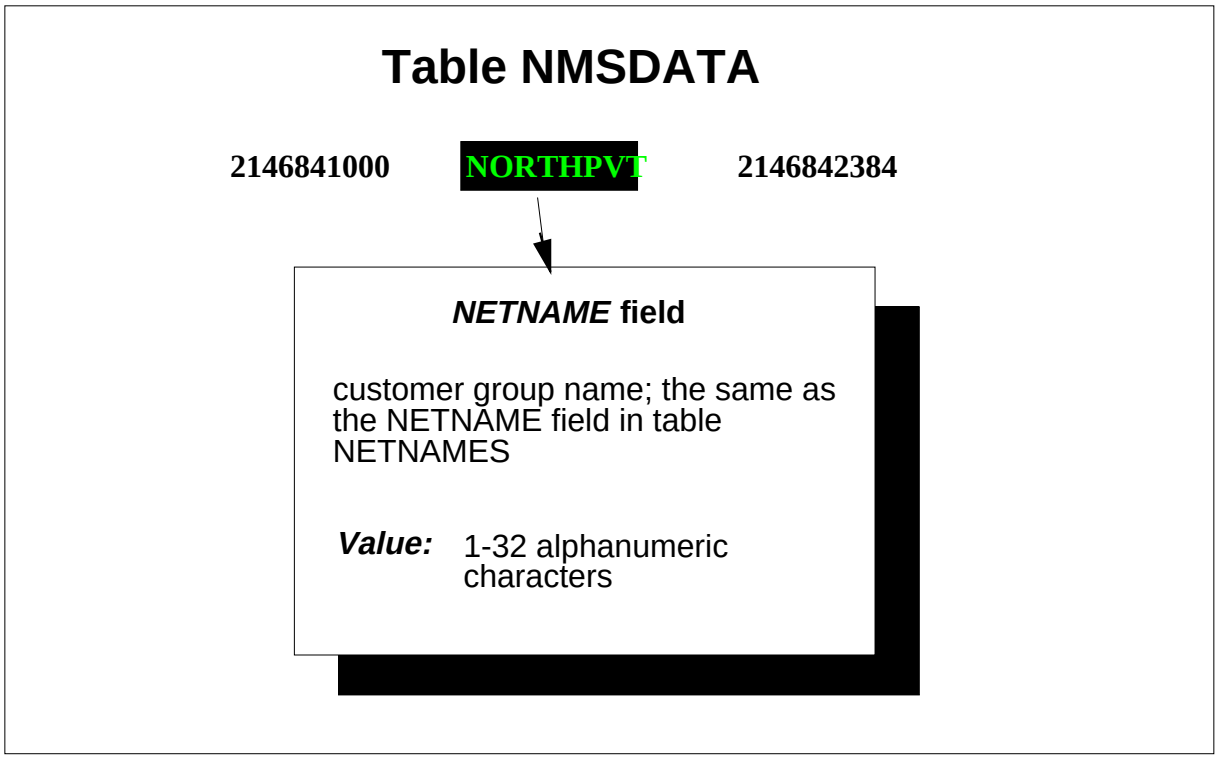


Figure 4-74 NMSID field in table NMSDATA

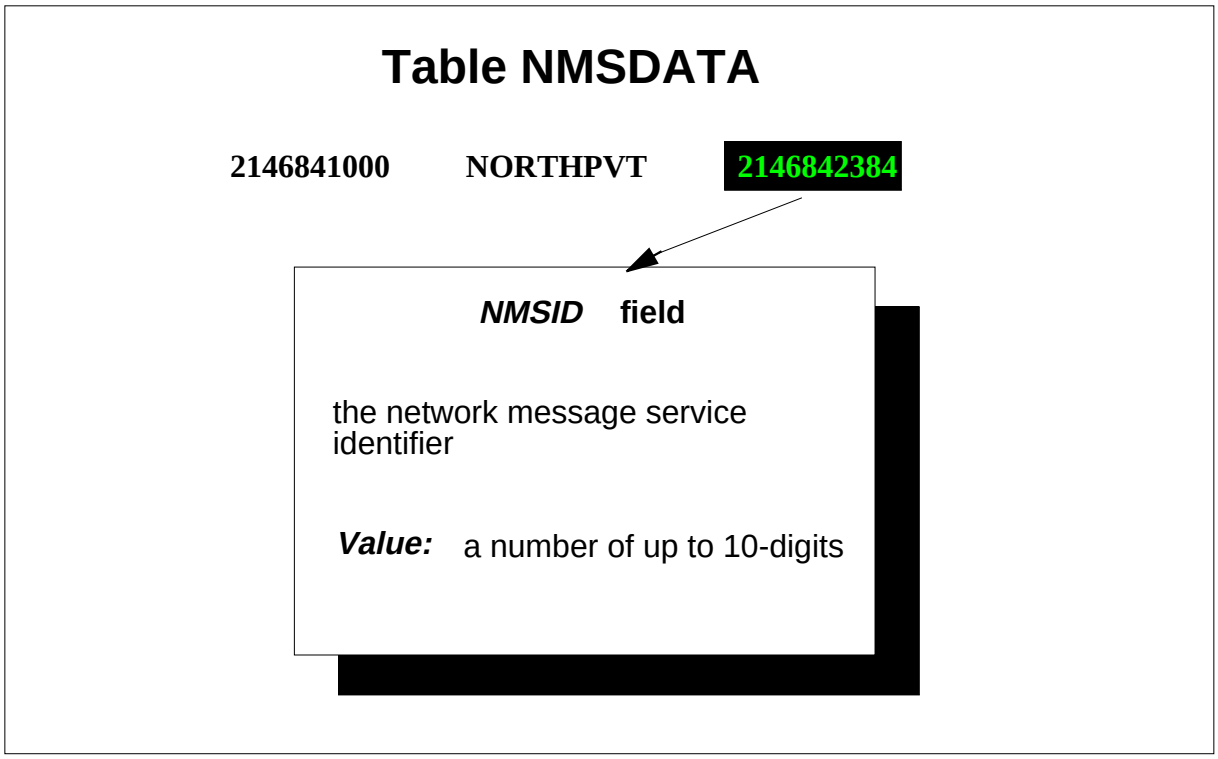


Table KSETFEAT

Use table KSETFEAT to assign the MWI key to voice message subscribers with key sets. This information may also be entered using SERVORD.

Datafill sequence There is no change to the datafill sequence.

Sample datafill

4 0 0 0 8 MWT YES ALL NO

Figure 4-75, "LEN field in table KSETFEAT" on page 4-122 through Figure 4-80, "CRX field in table KSETFEAT" on page 4-127 provide information about the individual fields in the table KSETFEAT sample tuple.

Figure 4-75 LEN field in table KSETFEAT

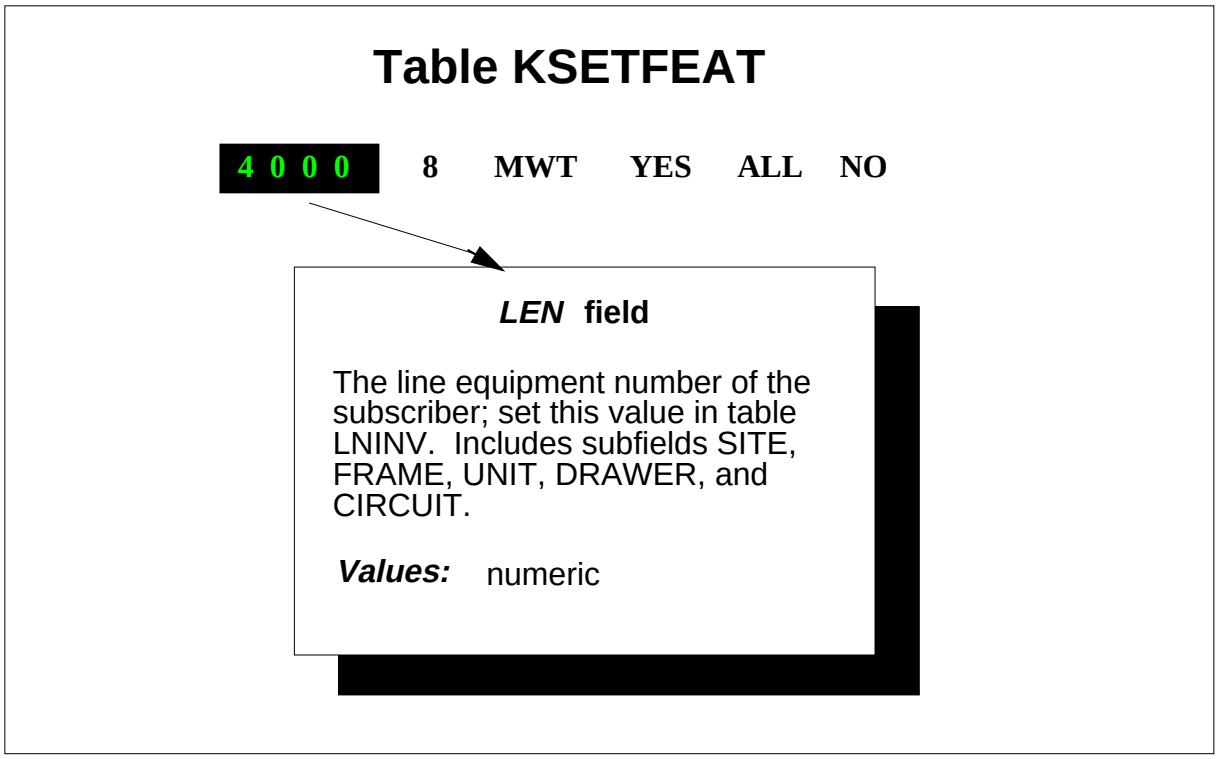


Figure 4-76 KEY field in table KSETFEAT

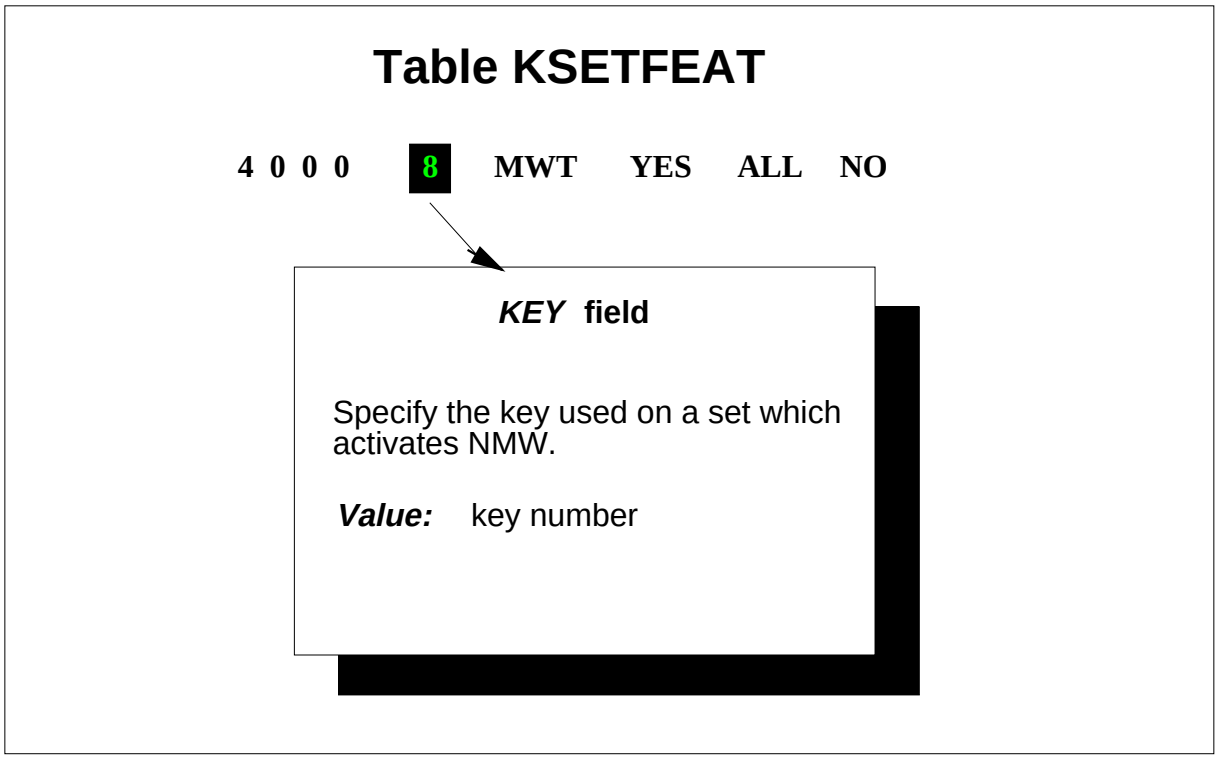


Figure 4-77 FEAT field in table KSETFEAT

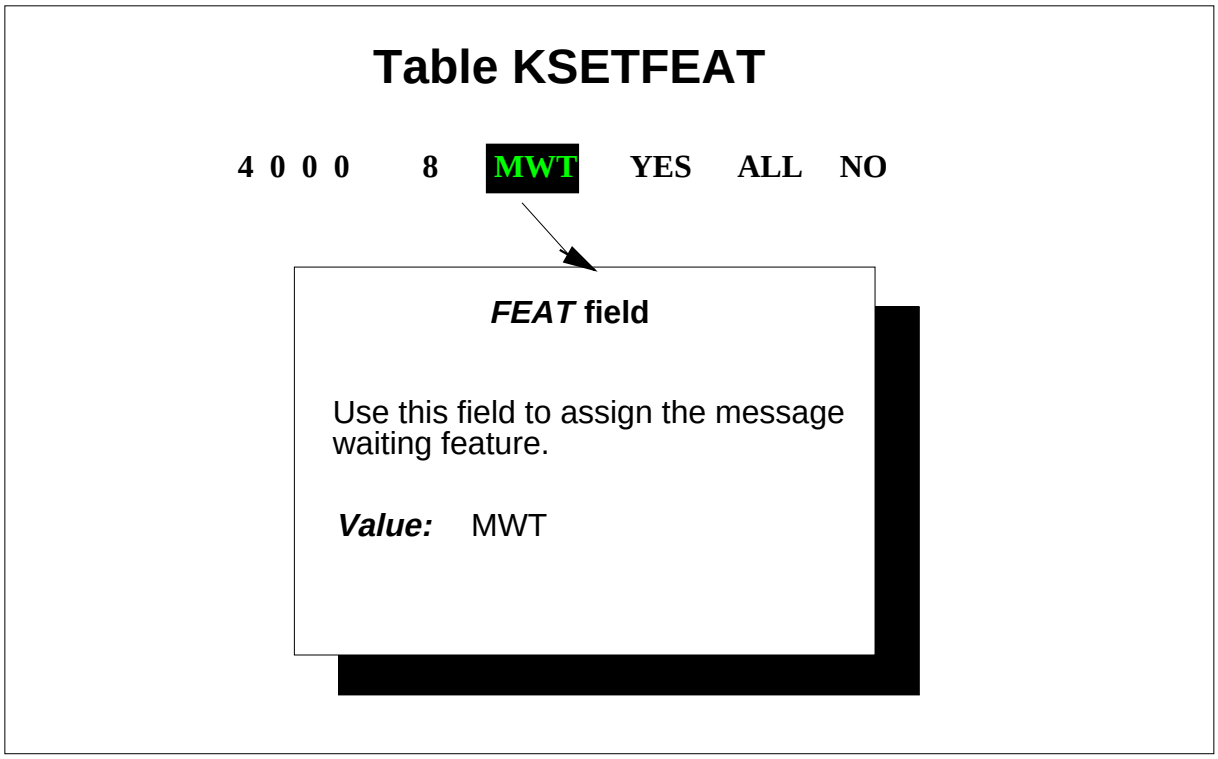


Figure 4-78 CAR field in table KSETFEAT

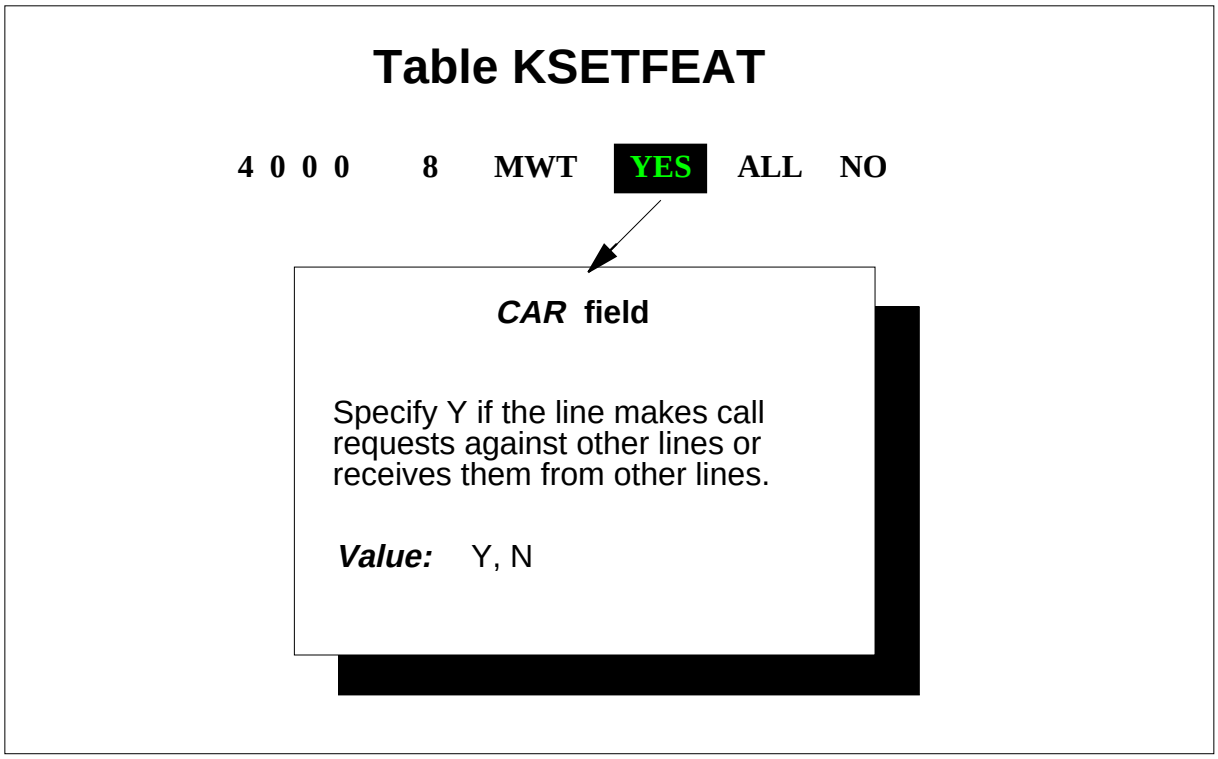


Figure 4-79 CRRCFW field in table KSETFEAT

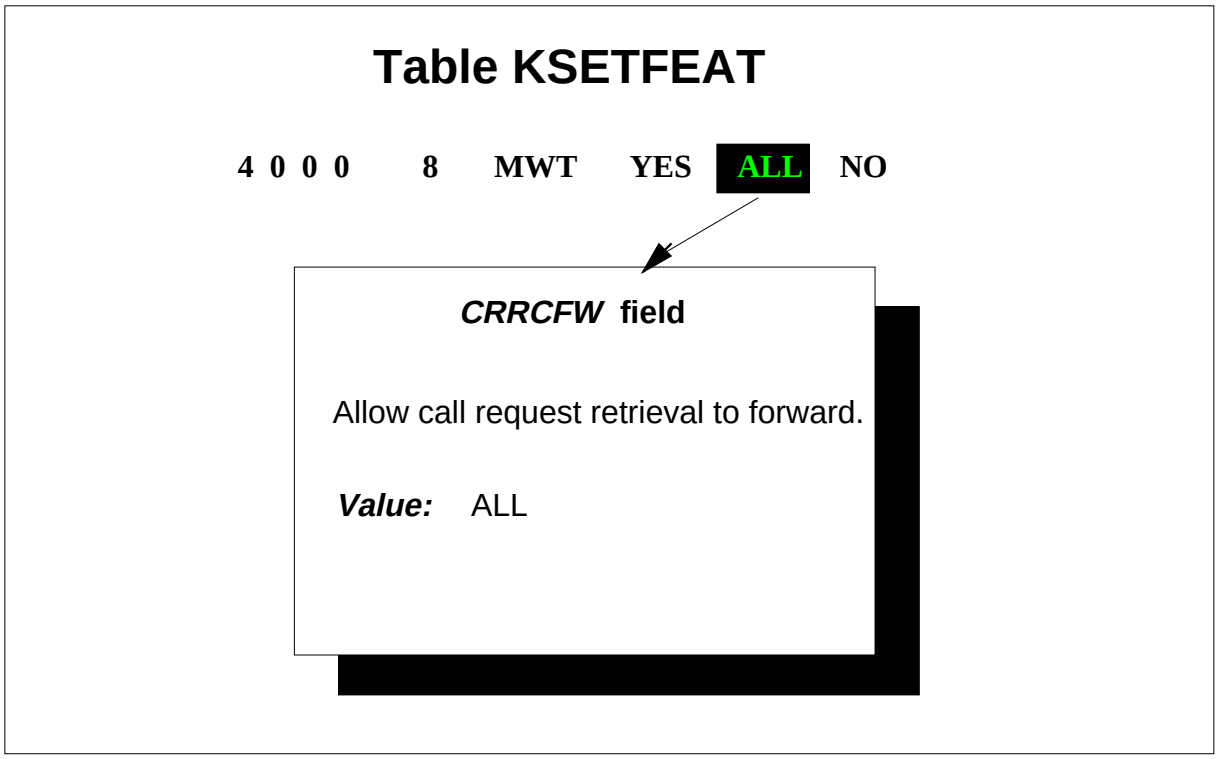


Figure 4-80 CRX field in table KSETFEAT

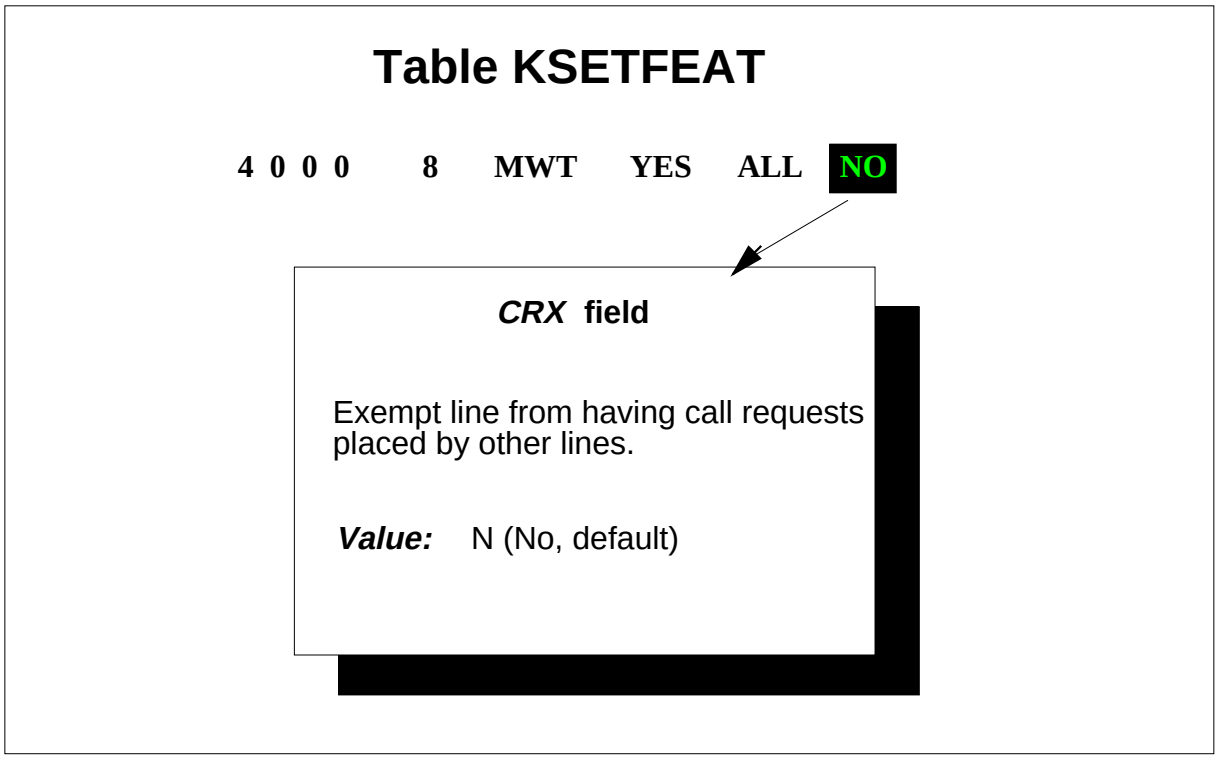


Table NETNAMES

Table NETNAMES allows assignment of a unique name and numerical ID to each switch on a private network. NMW requires a public tuple.

Datafill sequence There is no change to the datafill sequence.

Sample datafill

NORTHPVT 1 7 ? FACREJ NMSTBRTEPUBLIC 1 7 ? FACREJ NMSTBRTE

Figure 4-81, "NETNAME field in table NETNAMES" on page 4-128 through Figure 4-84, "NETOPTS field in table NETNAMES" on page 4-131 provide information about the individual fields in the table NETNAMES sample tuple.

Figure 4-81 NETNAME field in table NETNAMES

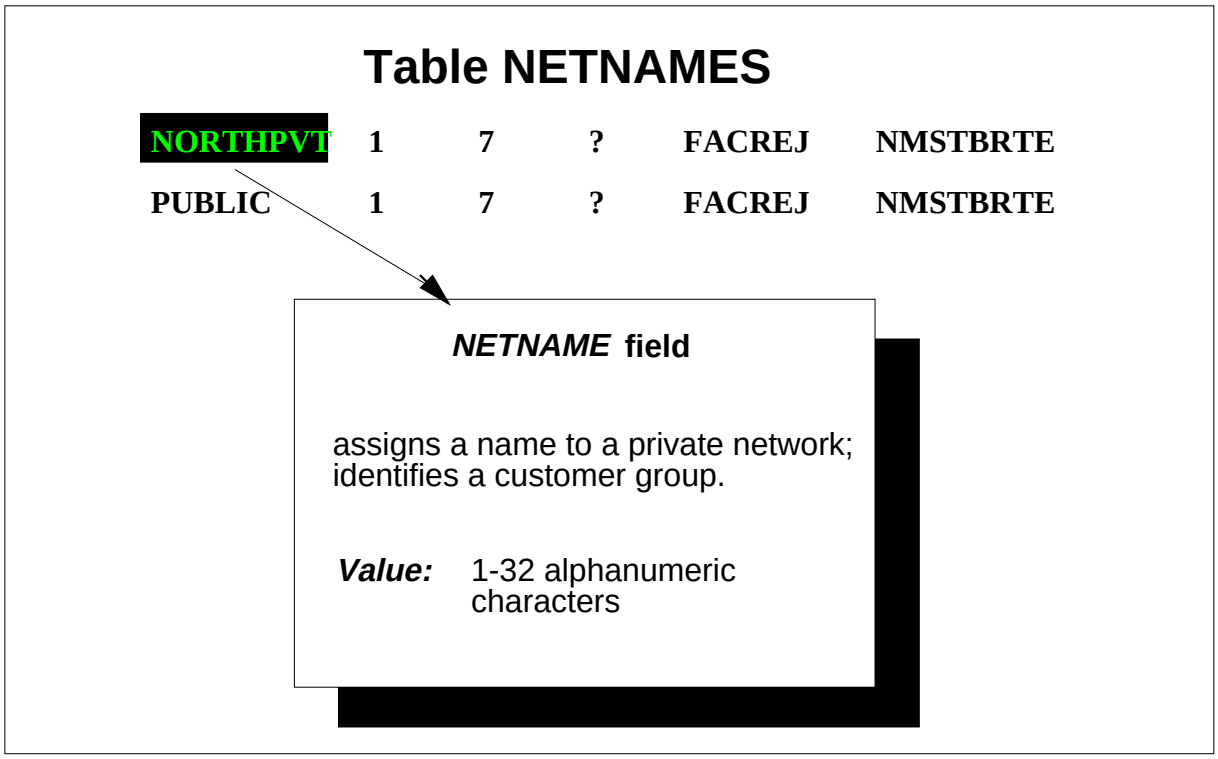


Figure 4-82 EXTNETID field in table NETNAMES

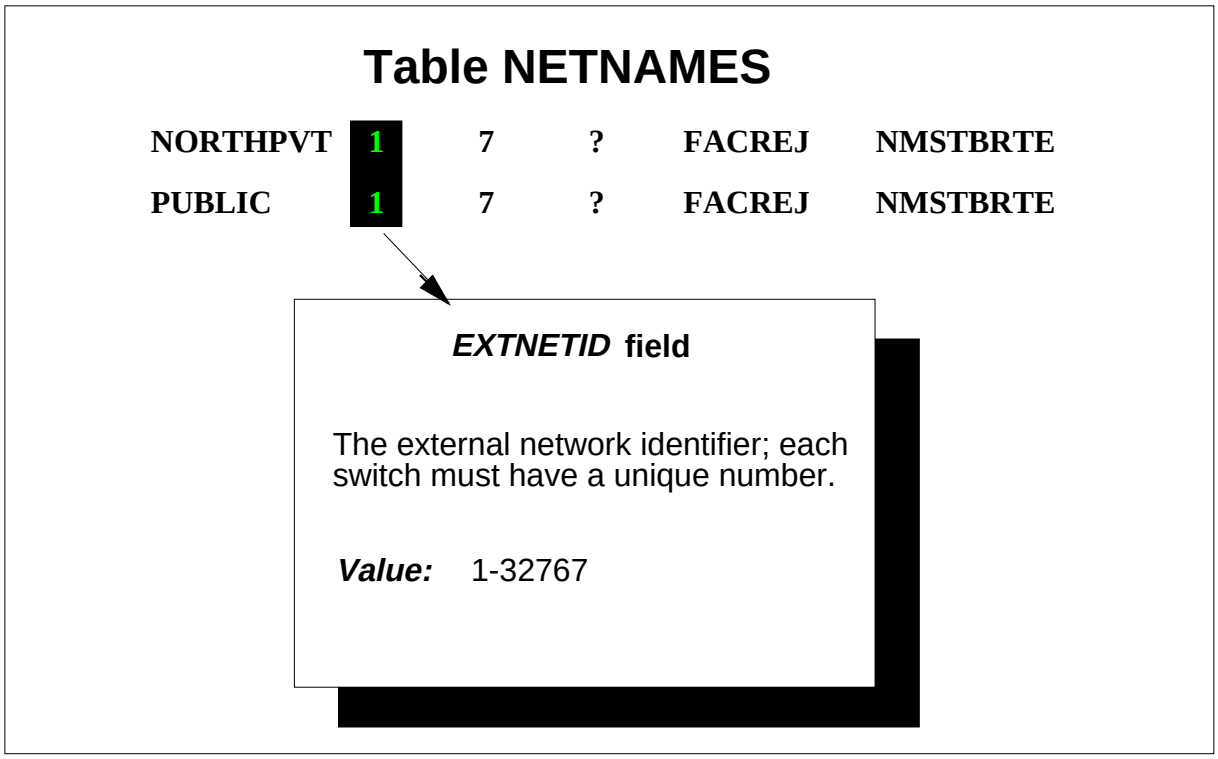


Figure 4-83 NETDIGS field in table NETNAMES

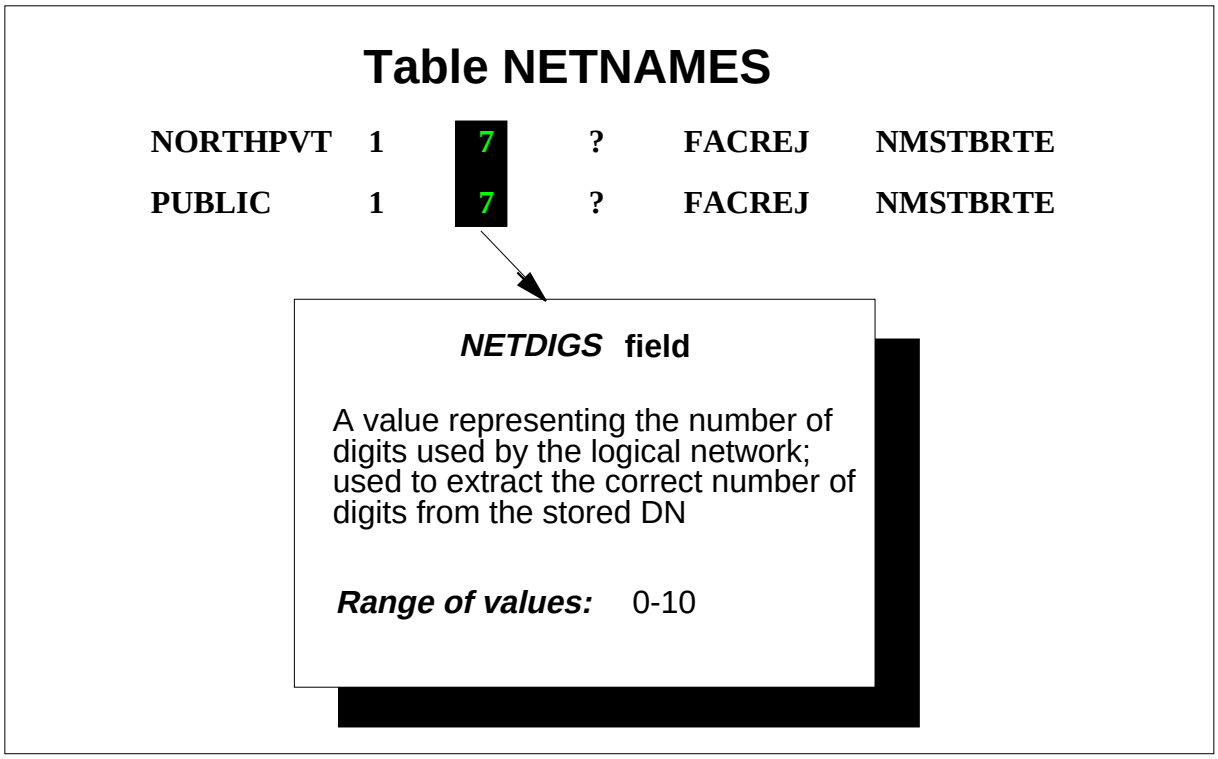


Figure 4-84 NETOPTS field in table NETNAMES

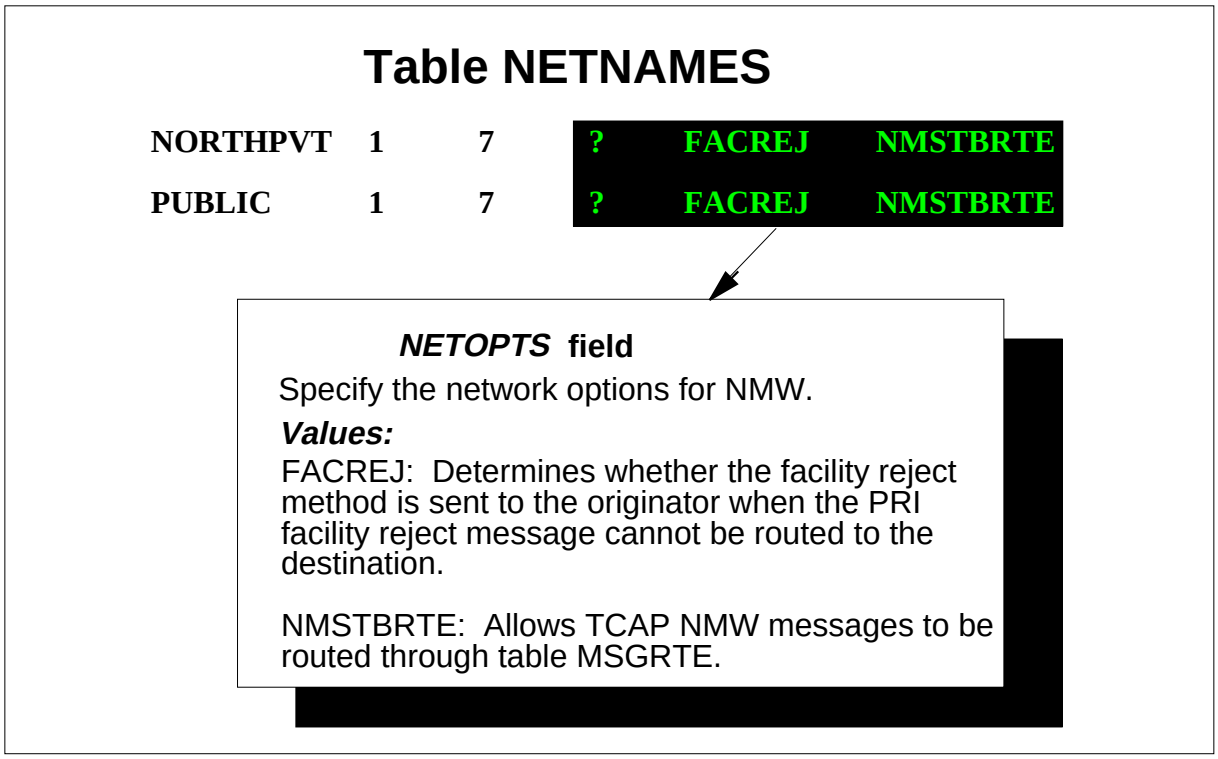


Table CUSTNTWK

Table CUSTNTWK associates a customer name with the NETNAME defined in table NETNAMES and assigns a global customer group identifier.

Datafill sequence Datafill the NETNAME field in table NETNAMES before doing this table.

Sample datafill

NORTH NORTHPVT 1 ?

Figure 4-85, "CUSTNAME field in table CUSTNTWK" on page 4-132 through Figure 4-88, "OPTION field in table CUSTNTWK" on page 4-135 provide information about the individual fields in the table CUSTNTWK sample tuple.

Figure 4-85 CUSTNAME field in table CUSTNTWK

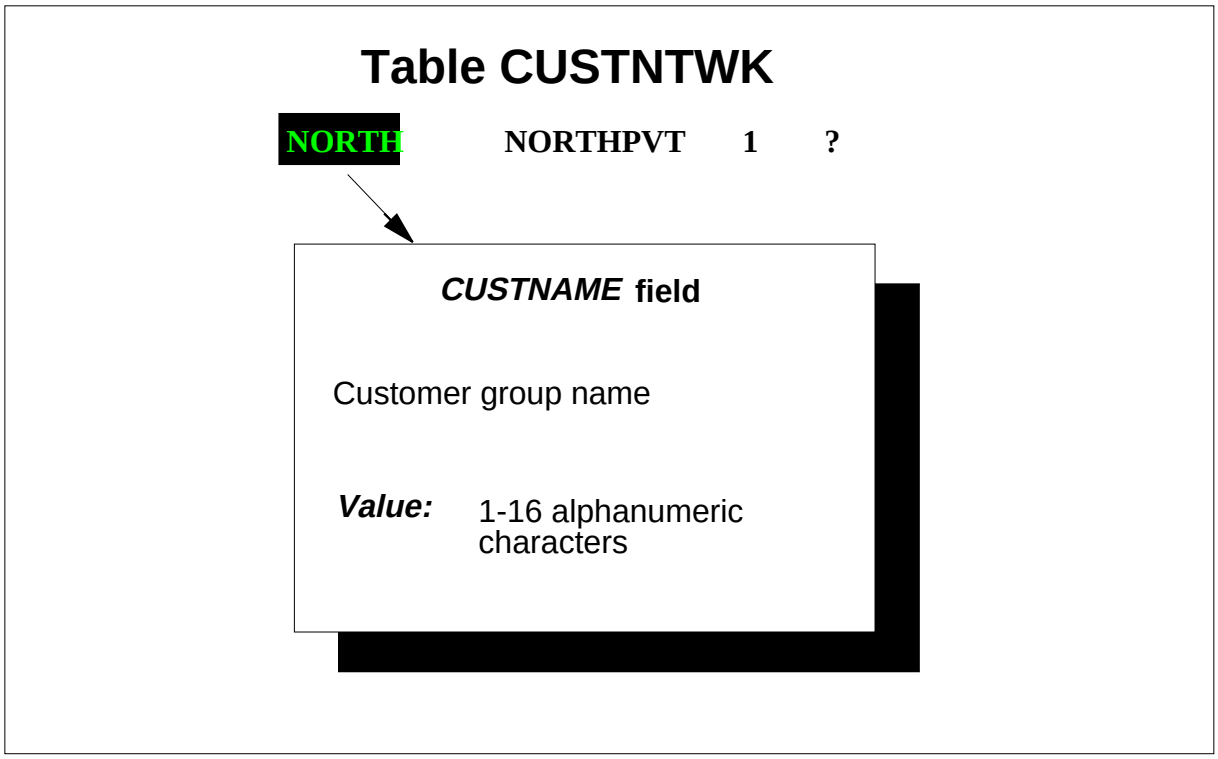


Figure 4-86 NETNAME field in table CUSTNTWK

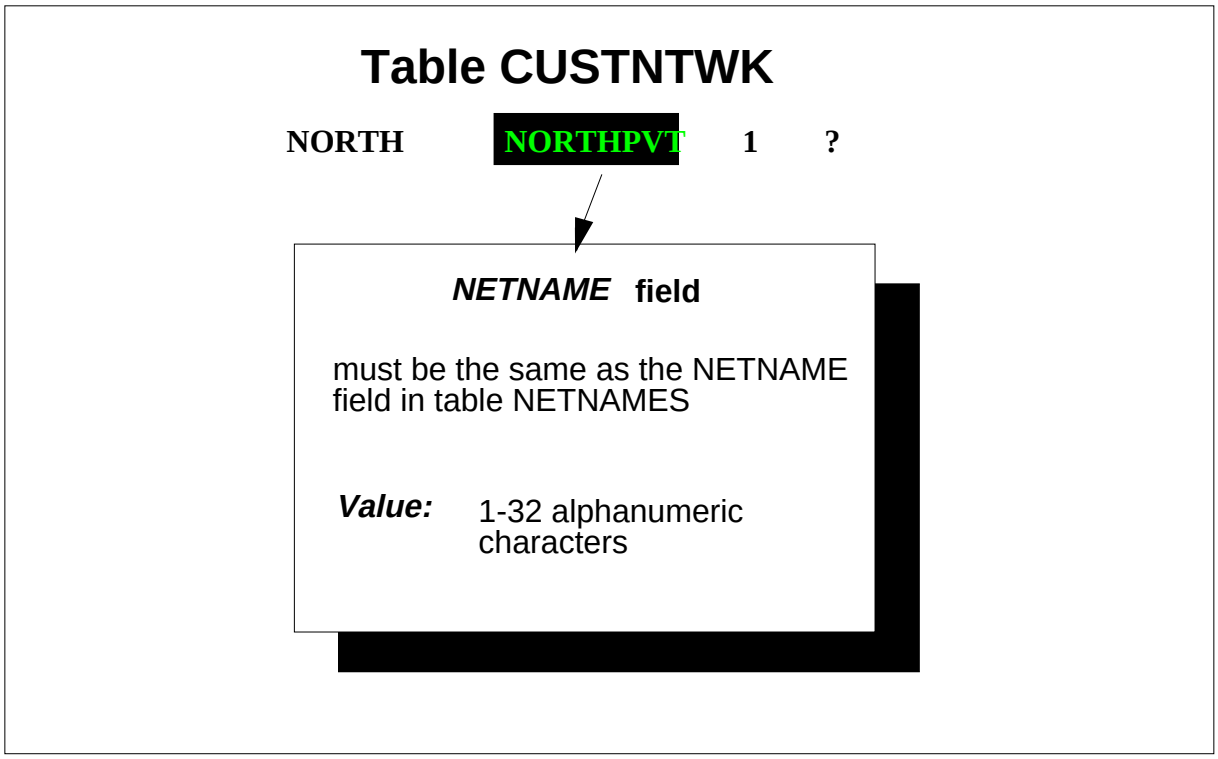


Figure 4-87 NETCGID field in table CUSTNTWK

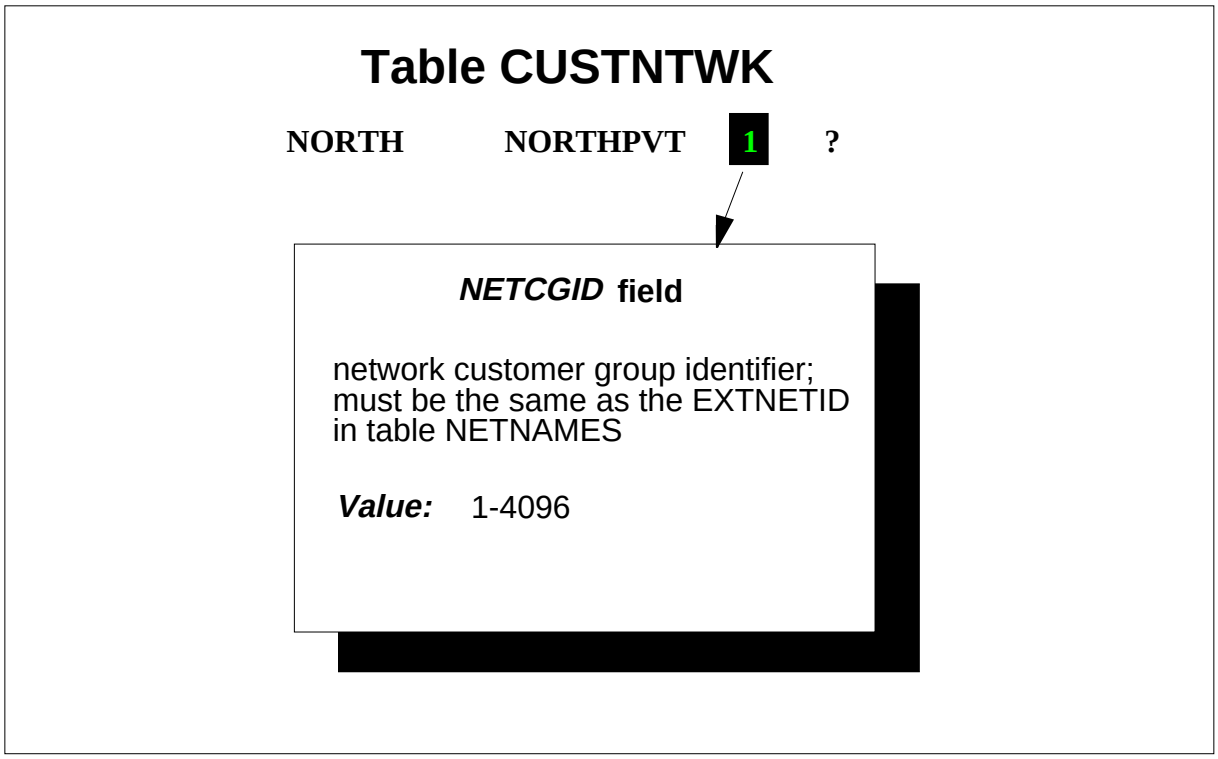


Figure 4-88 OPTION field in table CUSTNTWK

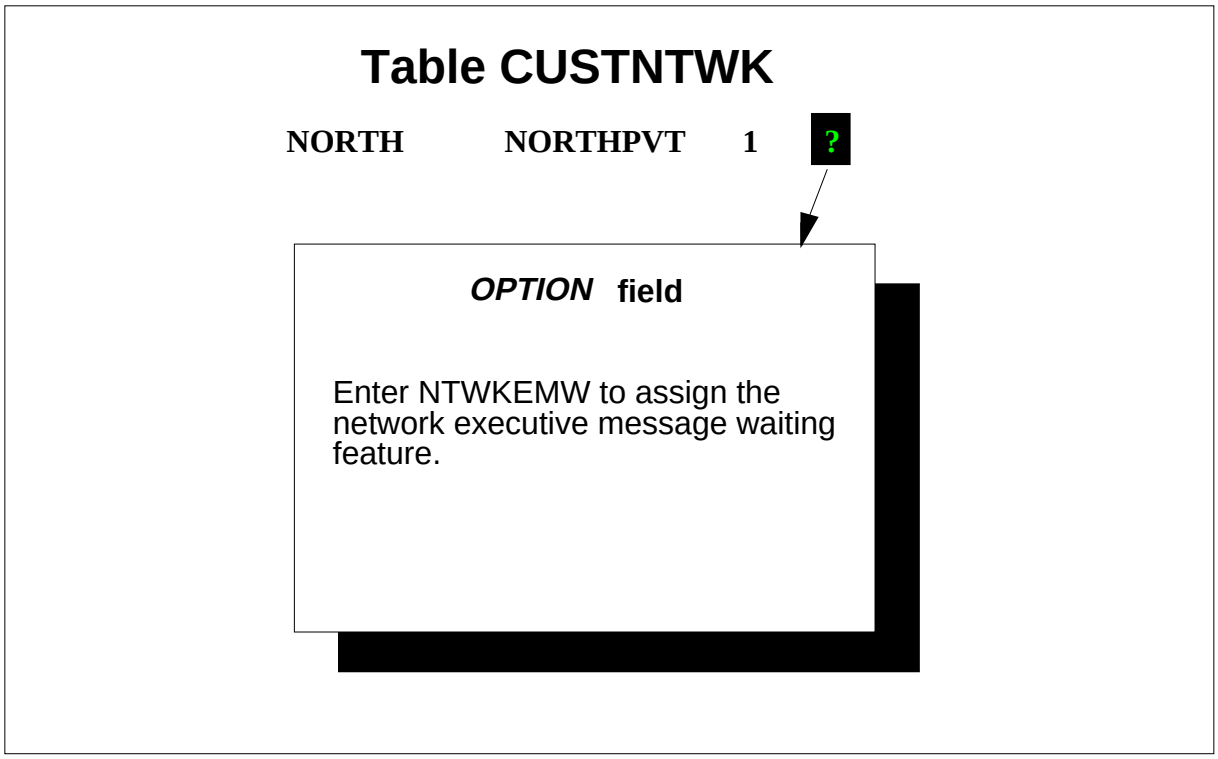


Table MSGRTE

Table MSGRTE provides the routing information for the facility message. It determines whether the message terminates on the local switch or is sent to another switch. NMW requires a public network tuple.

Datafill sequence The network name must be datafilled in table NETNAMES before assigning the NETID field in table MSGRTE.

Sample datafill

Note: The first and third tuples route messages to a remote node. The second and fourth tuples route facility messages from a remote node.

MSGRTKEY MSGRTRESNORTHPVT 646 646 (PRA PRITRK 0 N $) $NORTHPVT 444 444 (LOCAL 3 214684) $PUBLIC 684 684 (PRA PRITRK 0 N $) $PUBLIC 444 444 (LOCAL 3 214684) $

Figure 4-89, "MSGRTKEY field in table MSGRTE" on page 4-136 through Figure 4-97, "MSGRTSEL (LOCAL) field in table MSGRTE" on page 4-144 provide information about the individual fields in the table MSGRTE sample tuple.

Figure 4-89 MSGRTKEY field in table MSGRTE

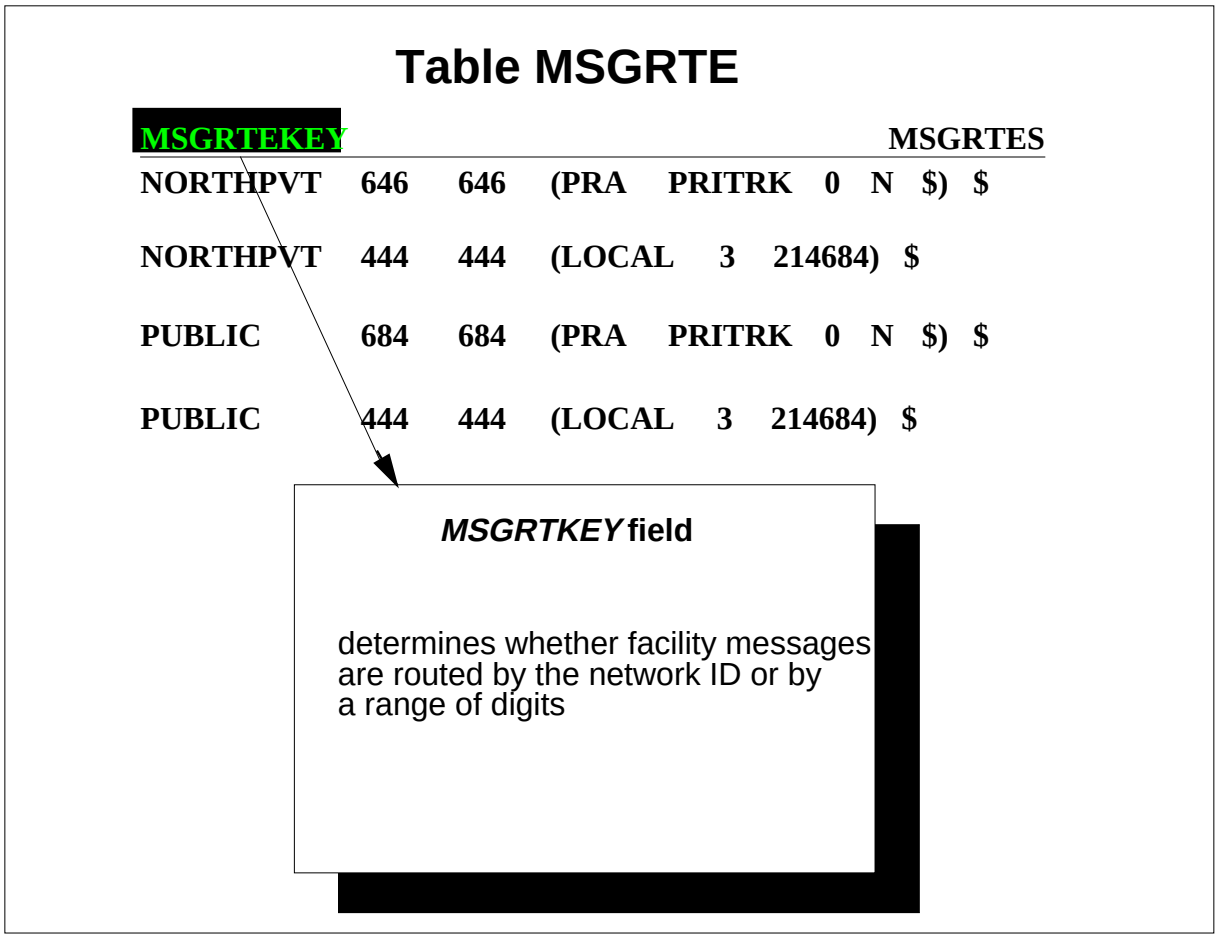


Figure 4-90 MSGRTRES field in table MSGRTE

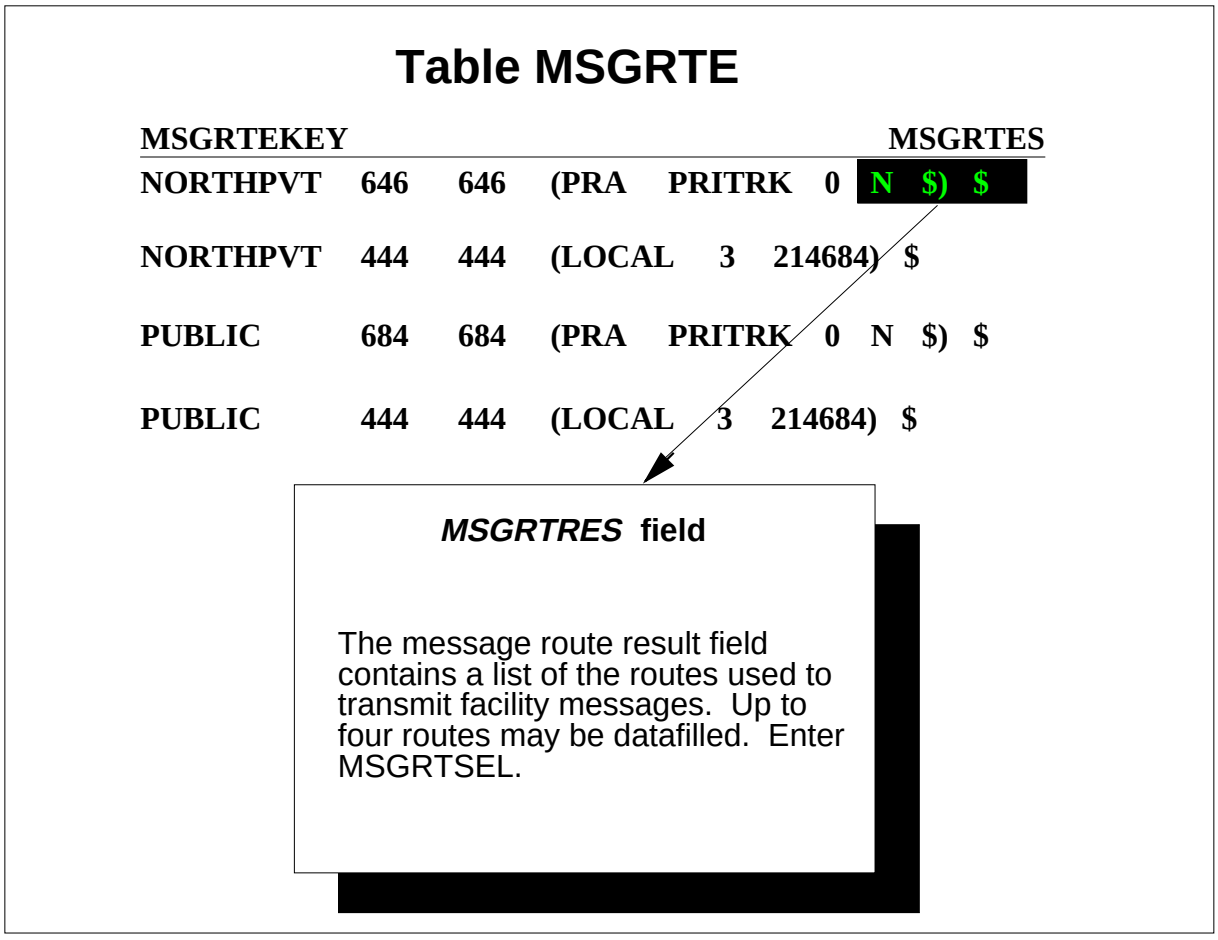


Figure 4-91 NETID field in table MSGRTE

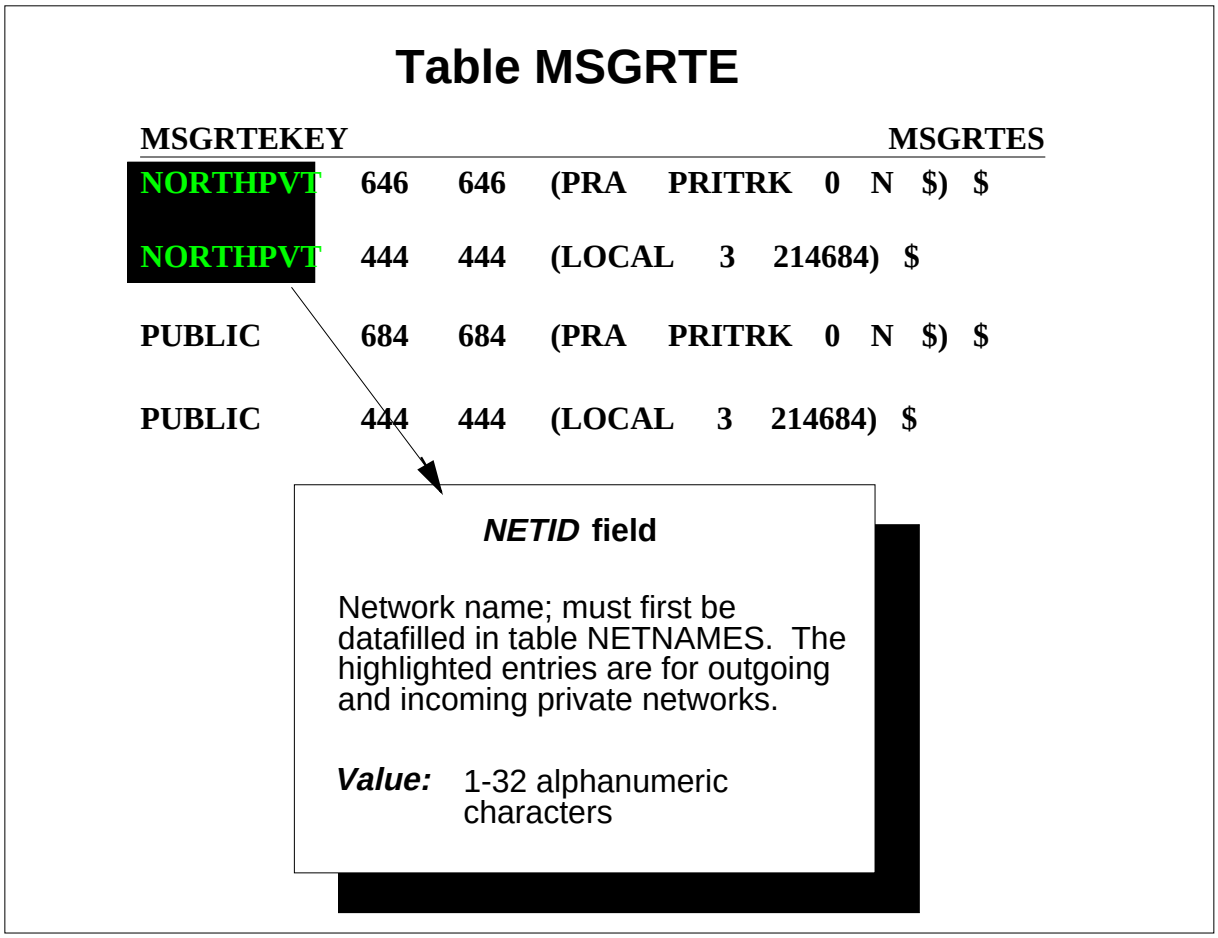


Figure 4-92 FROMDIGS field in table MSGRTE

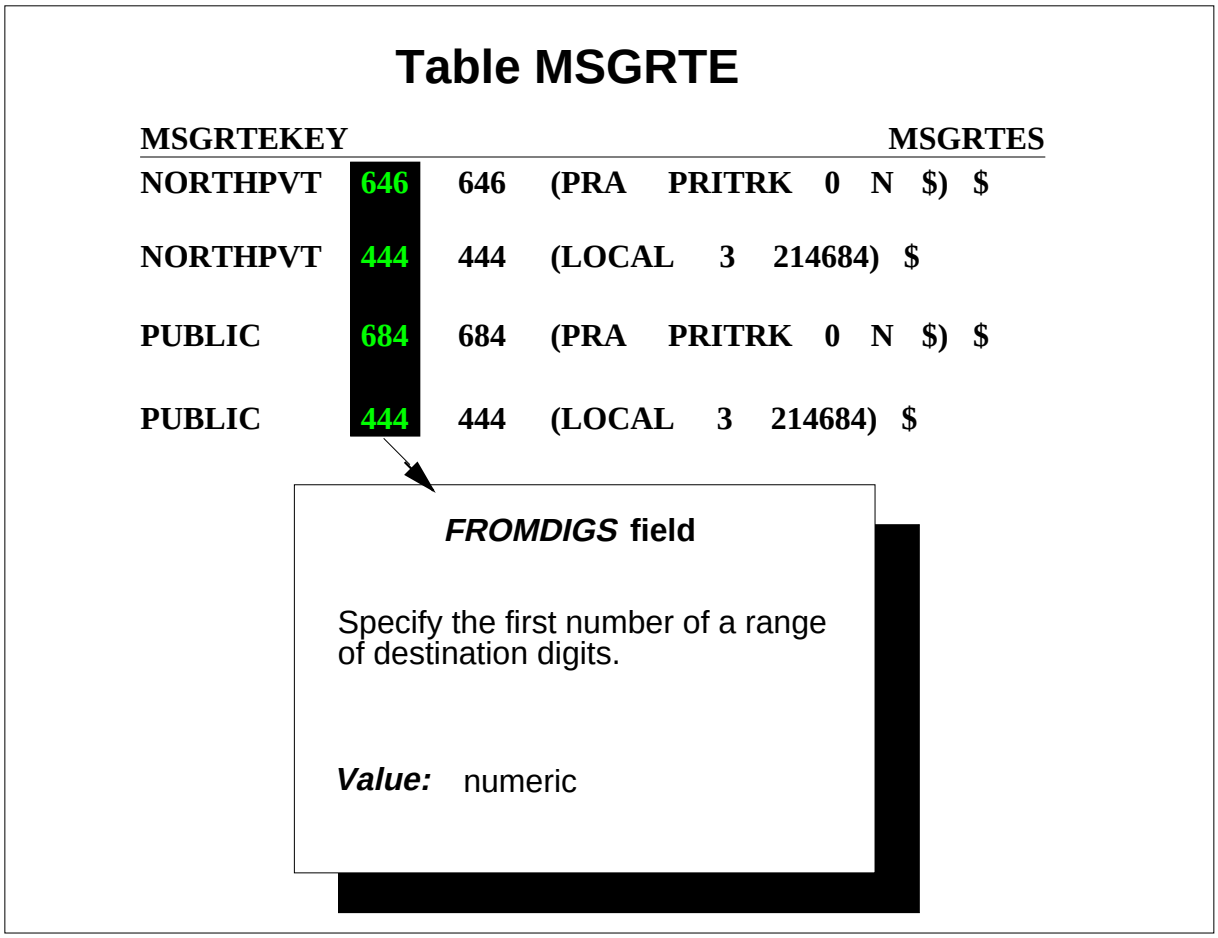


Figure 4-93 TODIGS field in table MSGRTE

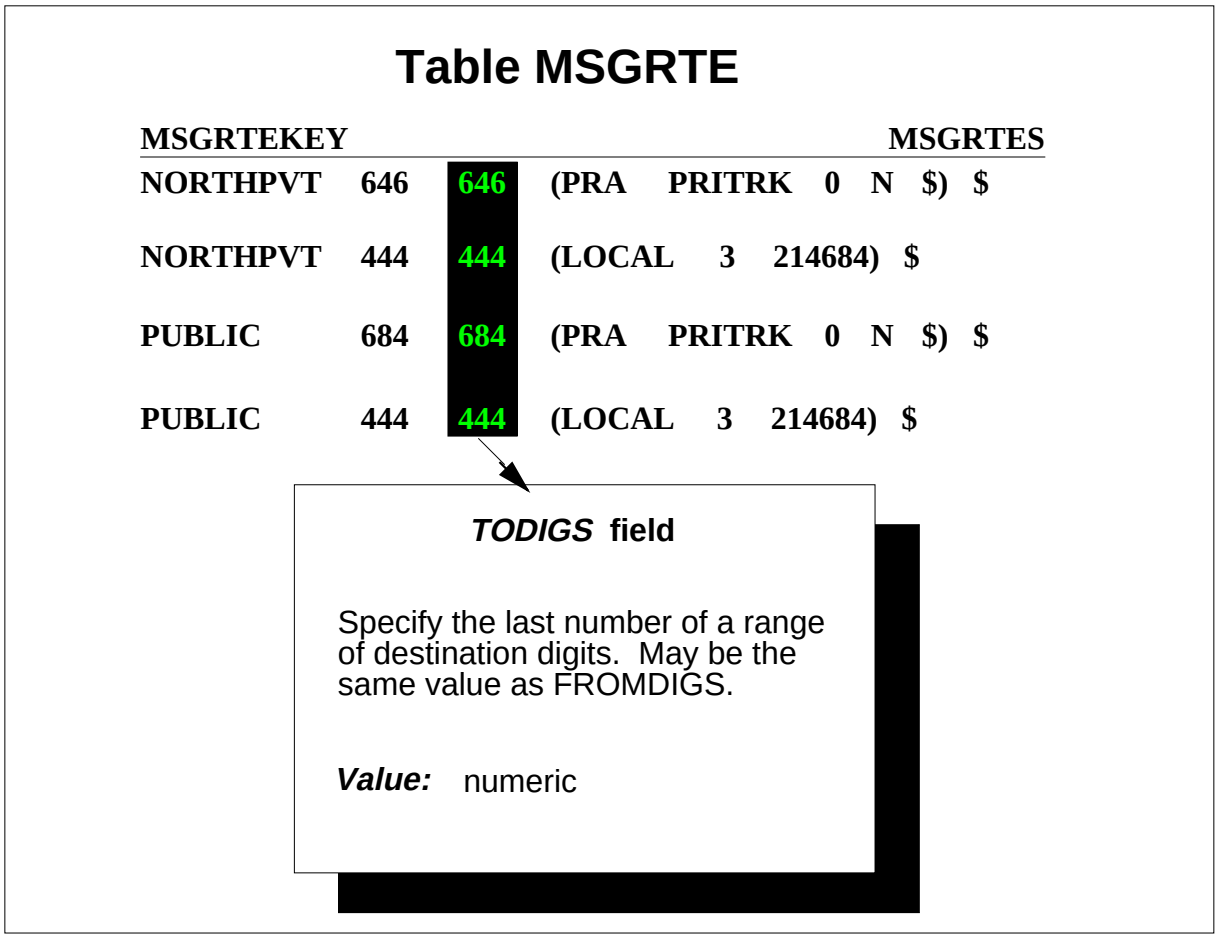


Figure 4-94 MSGRTSEL (PRA) field in table MSGRTE

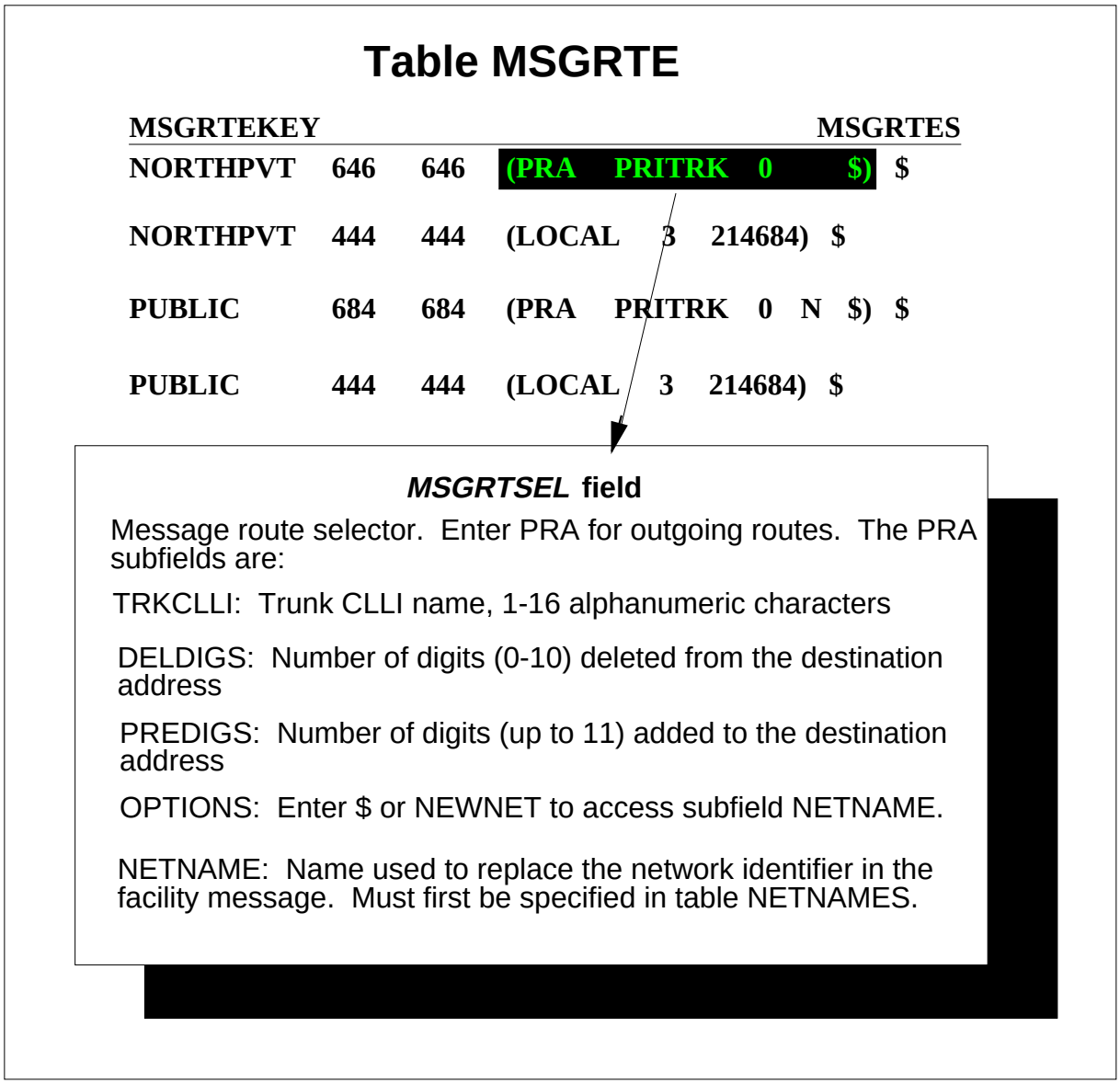


Figure 4-95 MSGRTSEL (LOCAL) field in table MSGRTE

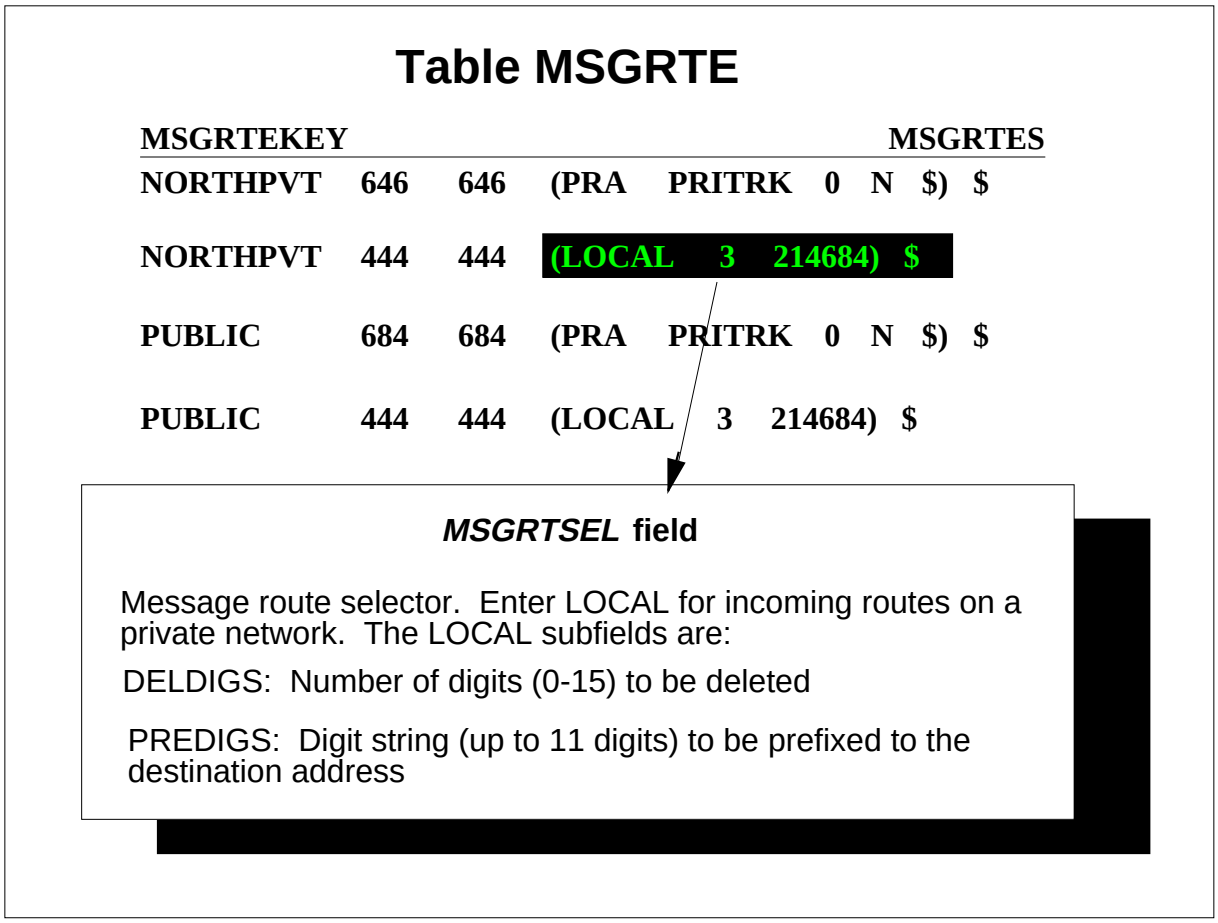


Figure 4-96 MSGRTSEL (PRA) field in table MSGRTE

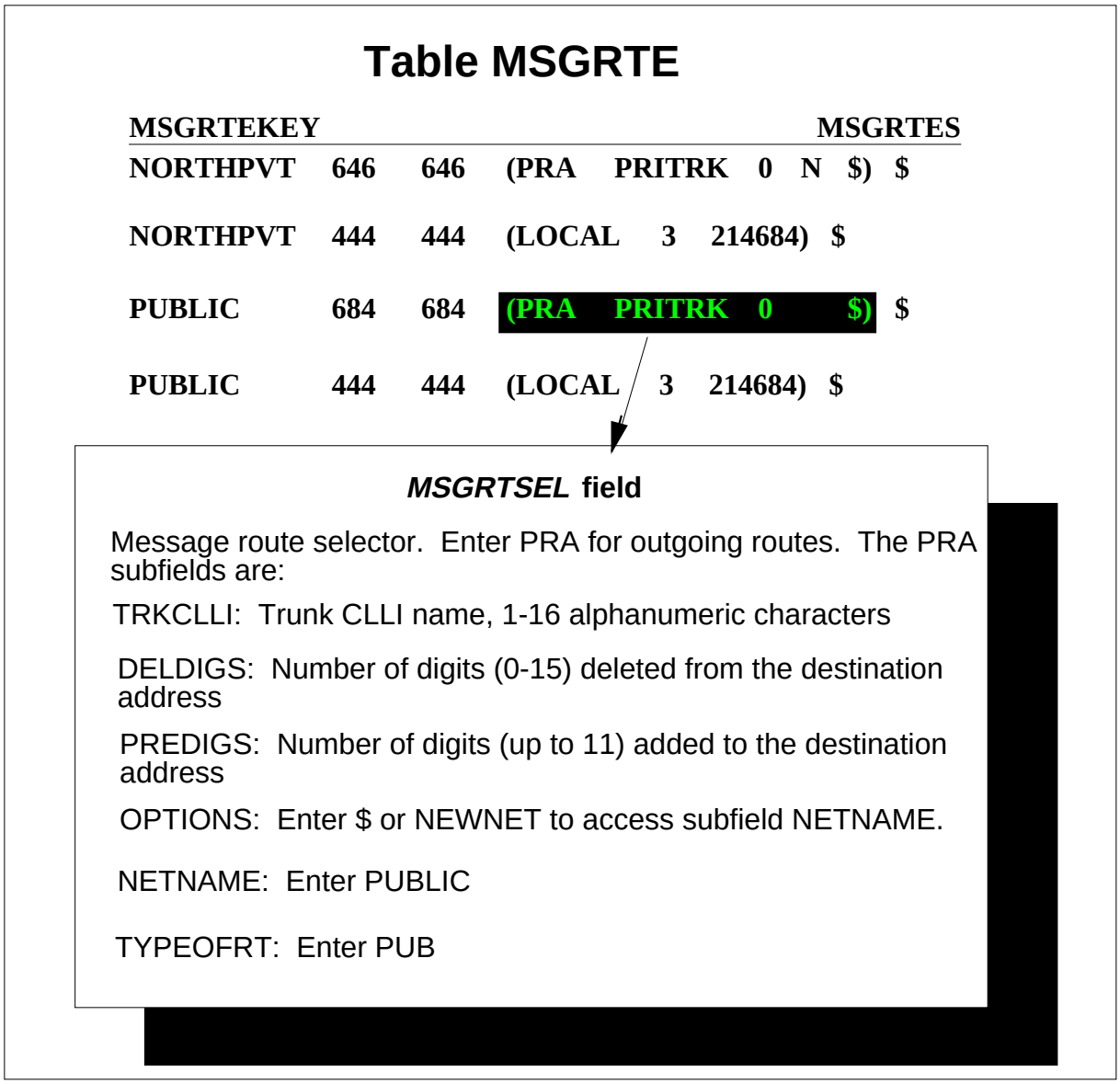
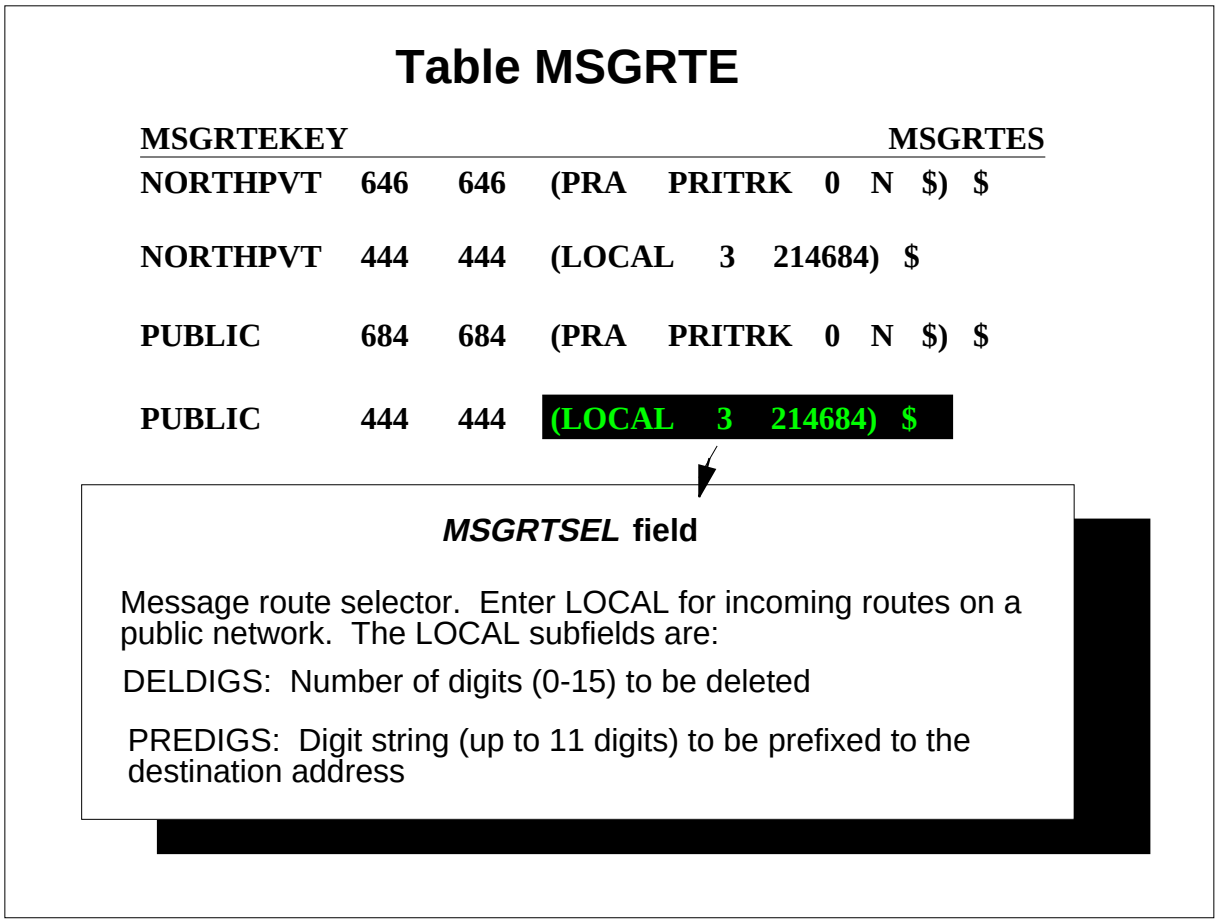


Figure 4-97 MSGRTSEL (LOCAL) field in table MSGRTE



Feature interactions

NMW creates interactions with Network Call Redirection and Meridian Mail.

Network Call Redirection

NMW uses the calling party and original call party (OCN) information elements created by the Network Call Redirection feature.

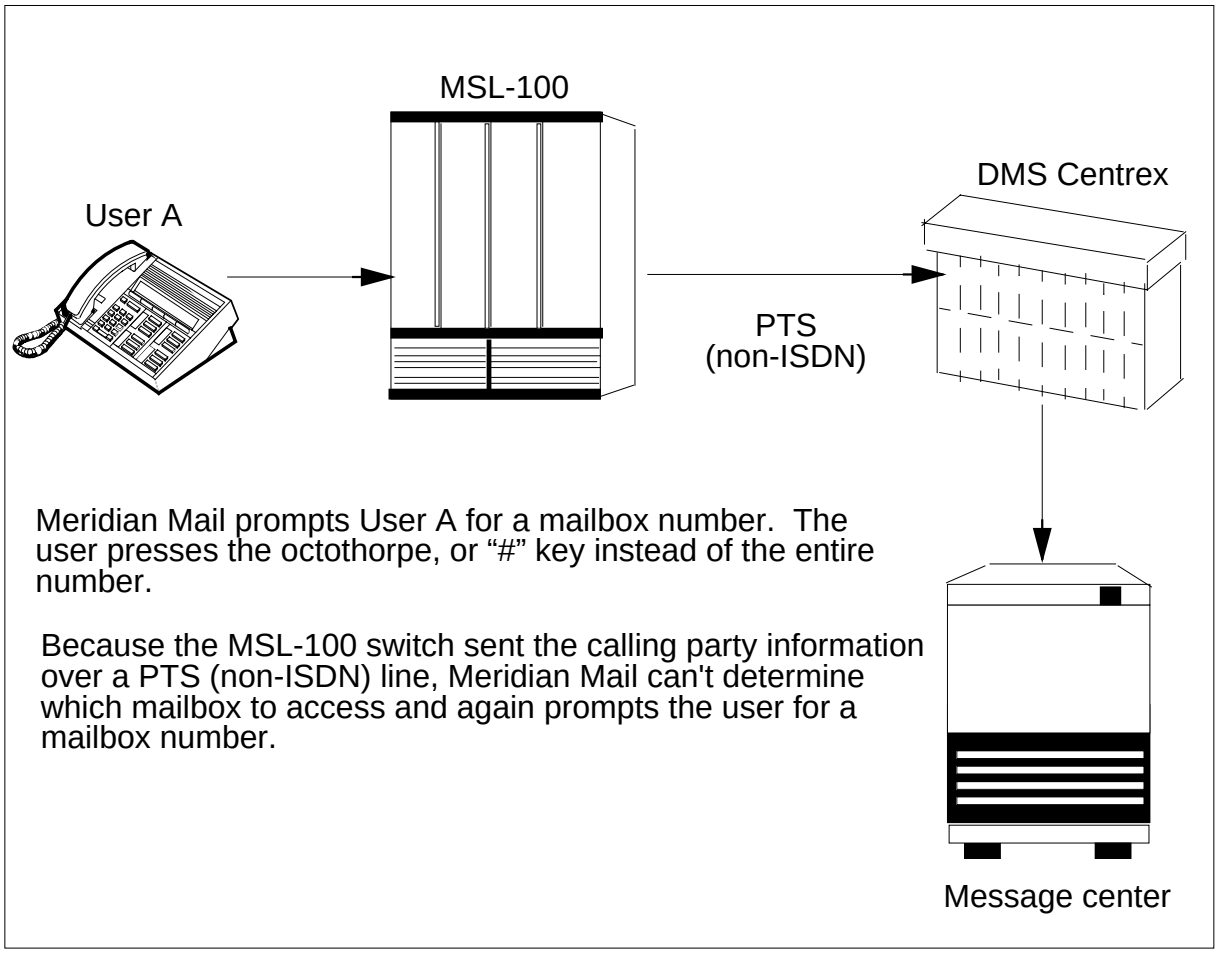
During redirected calls to Meridian Mail Meridian Mail uses the OCN of the first redirecting party. The OCN determines whether a valid mailbox exists and whether Meridian Mail uses an internal or external greeting.

During direct calls to Meridian Mail Meridian Mail uses the calling party information to determine whether the user must enter a mailbox number during the logon procedure.

Meridian Mail: Unknown mailbox number

Figure 4-98, "Meridian Mail: Unknown mailbox number" on page 4-145 shows what happens when Meridian Mail doesn't receive calling party information and can't determine which mailbox to access.

Figure 4-98 Meridian Mail: Unknown mailbox number



Operational measurements

Meridian 1 operational measurements

There are no NMW operational measurements on the Meridian 1 switch.

MSL-100 operational measurements

The following operational measurements on the MSL-100 switch relate to NMW:

- TCAPUSAG—TCAP messages sent to activate NMW
- TCAPERRS—TCAP errors
- SLLNK—MSL-100 outgoing link; peg count of NMW by customer group

- SLLNKINC—MSL-100 incoming link; peg count of NMW by customer group
- MWTCAR—Message waiting call request; peg count of NMW feature use, traffic measurements, and software or hardware failures that affect NMW feature use
- MWTCAR2—Message waiting call request; peg count of the number of times a message is queued against a line with NMW

Logs

There are NMW logs on the Meridian 1 switch or the MSL-100 switch.

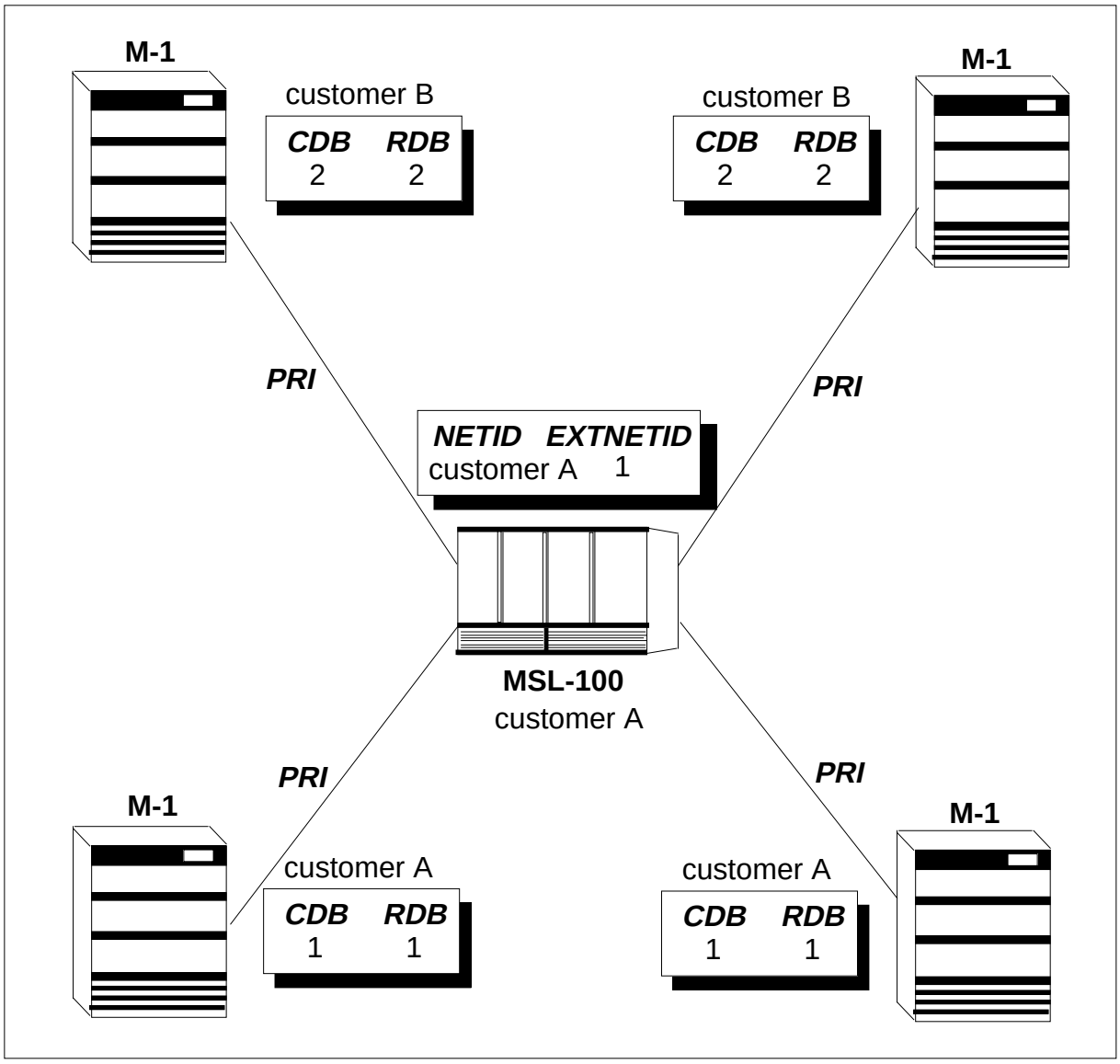
Service orders

For the MSL-100 switch, while the datafill for tables IBNLINES, IBNFEAT, and KSETFEAT is included in the datafill and translation section of this chapter, these tables are datafilled by service order (SERVORD).

Interworking

Figure 4-99, "EXTNETID and PNI values on a Meridian 1/MSL-100 switch network" on page 4-147 shows the MSL-100 EXTNETID values and the Meridian 1 PNI values in a hypothetical, multi-customer network.

Figure 4-99 EXTNETID and PNI values on a Meridian 1/MSL-100 switch network



5 Anti-Tromboning interworking between MSL-100 and Meridian 1 systems

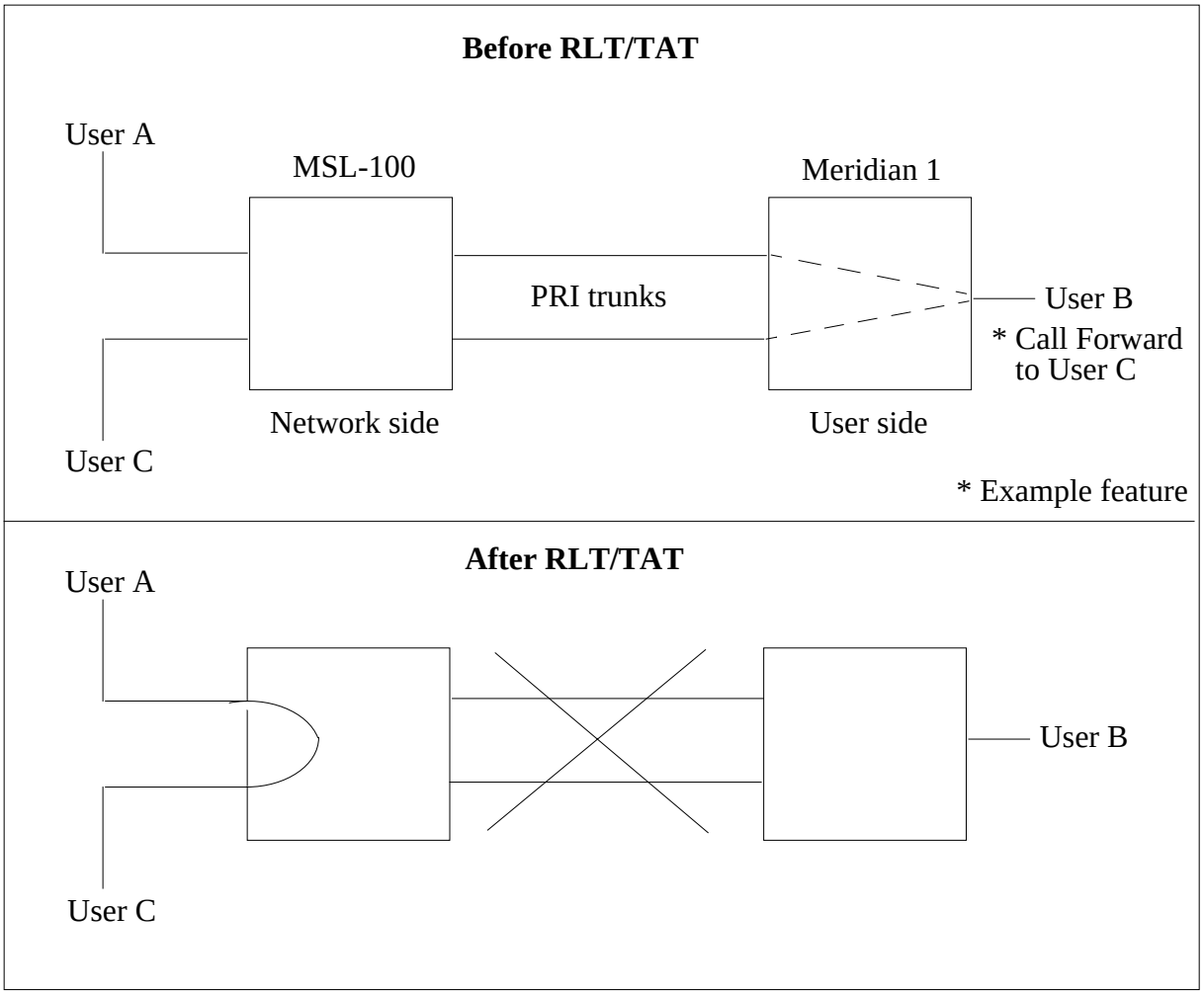
Background

Tromboning is a situation in which two trunks are being used in parallel for the same call. One trunk 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 trunk 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, for example, 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 call modification such as Call Transfer and Conference. These tromboned trunks are redundant.

Release Link Trunk (RLT) was developed on the MSL-100 switch in MSL07 to release two PRI trunks while it bridges one call originating from the MSL-100 switch, redirected back from the Meridian 1 switch and terminating to a second call on the MSL-100 switch after the call is answered. Trunk Anti-Tromboning (TAT) was developed on the Meridian 1 switch in release 21.35 to provide the same functionality as RLT on the MSL-100 switch, to eliminate the redundant trunks after the call is answered. TAT can interface to a DMS-100, DMS-250, MSL-100 switch using RLT, and another Meridian 1 switch using TAT.

RLT works as network side Integrated Services Digital Network (ISDN) protocol to a TAT user side protocol on the Meridian 1 switch. The trunks must be setup this way for RLT and TAT to work.

Figure 5-1 Example of RLT/TAT



Setup for MSL-100 switch

Software requirements:

- MSL07
- ISDN Base platform support NI000007
- ISDN PRI platform support NI000022

Hardware requirements:

- NTX6X50AB T1 circuit pack, one slot in ISDN Digital Trunk Controller (DTCI)
- NTBX01AB enhanced ISDN signaling processor, one slot in DTCI

Table datafill

The following figure shows table TRKGRP datafill needed for RLT.

Figure 5-2 Table TRKGRP datafill

```
TABLE: ISDNPARM
Heading
NAME    MSGTYPE    MSGDIR    DFLTACT    PARMACT
TEST        SETUP        BOTH          MAP        $
Table TRKGRP
   Heading
   CLLI                                                                  OPTION
RLTTEST    IBNT2  0  ELO  NCRT  CUSTGRP 0 0 5551212 ANDISC ...MRLT

TABLE: TRKSGRP
Heading
  CLLI
RLTTEST 0 DS1SIG ISDN 15 15 87Q931 2 N STAND NETWORK PT_PT USER N UNEQ
16 N  TEST DTCI 0 6 18 64K HDLC $ $
```

The MRLT option allows the RLT functionality to be enabled on that trunk group. RLT, however, is only activated if it is turned on using software optionality control (SOC).

Figure 5-2, "Table TRKGRP datafill" on page 5-3 also shows the datafill for table ISDNPARM. This table was datafilled so that the setup message was understood from the Meridian 1 switch. Note that the name TEST is the name used in table TRKSGRP. This is what maps the two together.

Setup for Meridian 1 switch

Software requirements:

- Release 21.35
- Package 312 Trunk Anti-Tromboning (TAT)
- Package 222 Multi-purpose Serial Data Link (MSDL)
- Package 145 Integrated Services Digital Network (ISDN)

- Package 146 1.5 Mbps Primary Rate Access (PRA) or Package 147 Integrated Services Digital Network Signaling Link (ISL)
- Package 148 Advanced ISDN Network Services (NTWK)

Hardware requirements:

- Option 51-81C
  - — NT6D80xx Multi-purpose Serial Data Link (MSDL circuit pack) used for the D-channel
  - — QPC720 DTI/PRI circuit pack
  - — QPC414 Network circuit pack
  - — NTBX51xx D-channel daughter circuit pack may be inserted into the NT5D12
- Option 11, 11E, and 11C
  - — NTAK09 DTI/PRI circuit pack. Occupies one slot in the IPE shelf 1-9. Requires NTBK51 downloadable D-channel daughter board.

Meridian 1 switch datafill

Overlay 17—Configuration record

The following table gives an example of Overlay 17—Configuration record.

Table 5-1 Overlay 17 - Configuration record (Sheet 1 of 2)

Prompt	Response	Description
REQ	CHG	change existing data
Type	ADAN	type of change
- ADAN		action device and number
	NEW DCH xCHG DCH x	Add D-channel x.Change D-channel x.
CTYP		card type
	MSDL	MSDL=Multi-purpose Serial Data Link (for Options 51C, 61C, 81, and 81C)MSDL=Downloadable D-channel for Option 11
CDNO	1-10	For Option 11 onlythe card number for the downloadable D-channel
PORT	0-3	port number on MSDL cardsOnly port 1 is valid for Option 11.
- IFC	SL1S100D100D250	Interface type for D-channel; either SL1, S100, D100, or D250 may be entered.

Table 5-1 Overlay 17 - Configuration record (Sheet 2 of 2)

Prompt	Response	Description
-RLS	xx	release ID of the switch at the far end of the D-channelRelease 21 or higher must be entered.
-RCAP	*TAT*	remote capabilitiesTAT must be entered to enable Trunk Anti-Tromboning.

Functional overview

The following scenarios are taken from the MSL-100 switch standpoint.

The RLT/TAT functionality implements the network side of RLT on a MSL-100 switch over PRI. This functionality was designed to work with the Meridian 1 PBX TAT feature, but can work with other devices that follow the user side RLT protocol described in ISDN Primary Rate User-Network interface specification, NIS A211-1.

In all cases, RLT and TAT involves the release of two B-channels that run between the network side at the MSL-100 office and the user side at the Meridian 1 PBX. These two B-channels can be on the same PRI trunk group or on different PRI trunk groups on the MSL-100 switch. If the B-channels are on different PRI trunk groups, they must connect to the same MSL-100 office and Meridian 1 switch. The two Meridian 1 switch B-channels must belong to the same customer group and same D-channel. One B-channel carries a call that originates from the network side and terminates on the user side. This channel is referred to as channel 1. The call that is carried over the channel 1 is referred to as call 1.

The other B-channel carries a call that originates from the user side and terminates on the network side. This channel is referred to as channel 2. The call that is carried over channel 2 is referred to as call 2.

For RLT/TAT to be invoked, the trunk groups that may involve RLT/TAT traffic must be datafilled for RLT on the MSL-100 switch and TAT on the Meridian 1 switch.

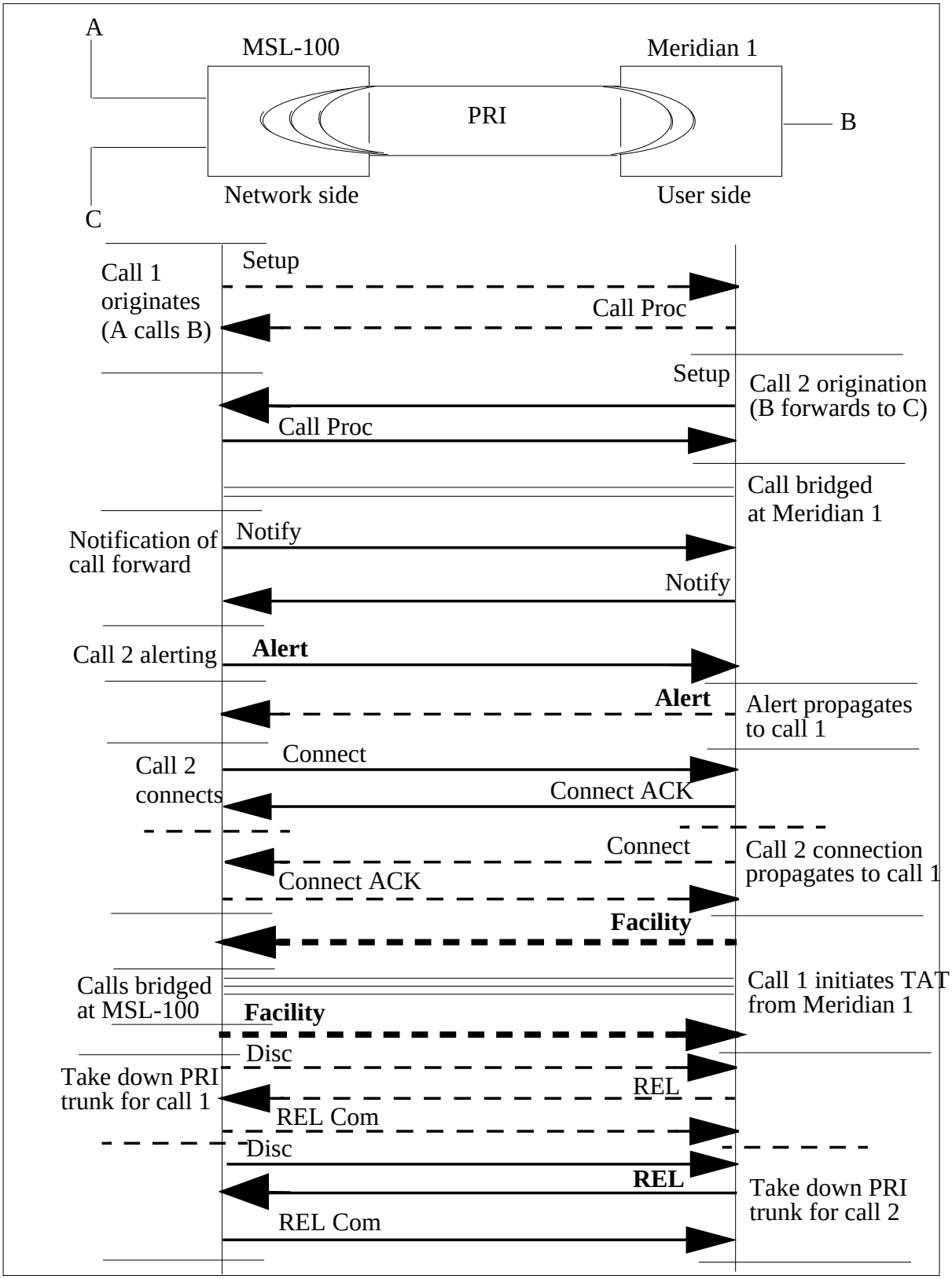
Messaging sequences

Figure 5-3, "Typical call scenario with RLT and TAT" on page 5-7 details messaging sequences that describe ways in which RLT/TAT is typically used. In this figure, a dashed line indicates a message associated with call 1, and a solid line indicates a message associated with call 2. The messages that are in bold type have facility information elements (IE) relating to RLT included in them. RLT uses the Q.932 facility message and facility IEs to provide the RLT capability. The facility message is used to transfer higher layer protocols. Two

of these protocols are Transaction Capabilities Application Part (TCAP) and Remote Operations Service Element (ROSE). All facility messages contain facility IE. They are used as part of alerting, progress, and setup messages.

Figure 5-3, "Typical call scenario with RLT and TAT" on page 5-7 gives an example of a typical call scenario with RLT and TAT.

Figure 5-3 Typical call scenario with RLT and TAT



Despite the previous examples, it is important to note that it doesn't matter whether call 1 is originated before or after call 2. It is possible for call 2 to be set up for RLT before call 1 arrives, if the Meridian 1 switch predicts a need for a future transfer.

When RLT is invoked, calls 1 and 2 must both be connected. The calls must also be bridged at the Meridian 1 switch. This ensures that user A receives the appropriate tones and announcements from call 2. In the previous examples, suggestions are made as to the appropriate time to bridge the calls at the Meridian 1 switch. In both call forward scenarios, the call should be bridged immediately after call 2 has received a CALL PROCEEDING message. This allows user A to hear the tones and announcements for the call. In the call transfer scenario, the bridging may wait until just before RLT is invoked. This ensures that the call stays up even if RLT fails. Note that no user may be associated with the call at the Meridian 1 switch when RLT is being invoked. Otherwise, the user would be disconnected from the call when RLT takes down the two PRI trunks.

There are two separate phases of messaging required to invoke RLT. The first phase occurs when call 2 is originated. If the Meridian 1 switch wants to involve call 2 in RLT, it must include a Facility IE in the SETUP message when originating call 2.

When the network side receives a SETUP message with a Facility IE requesting RLT, it will respond by adding its own Facility IE to the ALERTING or PROGRESS message associated with call 2. This Facility IE contains the call ID of call 2.

Any time after call 2 is originated and before RLT is invoked, the user side must bridge calls 1 and 2. It must also disconnect any of the users at the user side who are involved in either call.

When the above criteria have been met, and provided that call 2 is connected, the user side may invoke RLT. The user side may send a FACILITY message associated with call 1 to the network side. This FACILITY message must contain a Facility IE with the call ID that was sent back from the network side previously. (The exact contents of the FACILITY message are described in the *ISDN Primary Rate User-Network Interface Specification*, NIS A211-1.)

Upon receiving this FACILITY message, the network side bridges the two calls. It then sends DISCONNECT messages associated with each call to the user side. The user and network sides then proceed to release the two channels in the usual way.

The end result of this action is that the two calls are bridged at the network side. No B- or D-channels between the network side and the user side are involved in either call. The user side is not involved in either call at this point.

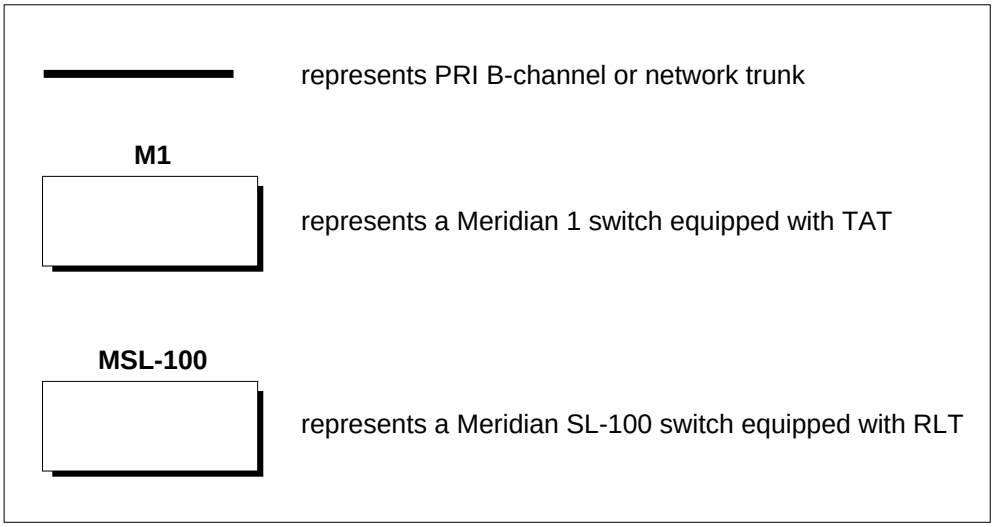
Error conditions

Error conditions can occur and are described in the “RLT and PRI layer 3 messages" section. These error conditions do not, however, interfere with call processing. The system merely disallows RLT. Because the calls are already bridged at the Meridian 1 switch, the call stays up. In general, there are two places where an error condition occurs: after receiving the SETUP message or after receiving the FACILITY message.

RLT/TAT anti-tromboning scenarios

The following information provides examples of various anti-tromboning scenarios as applied with Meridian 1-to-MSL-100 interworking with the MSL-100 switch equipped with RLT functionality.

Note that in the following figures, the following legend describes the connectivity depicted.



RLT/TAT anti-tromboning operation for network call redirection (example 1)

In Figure 5-4, "RLT/TAT anti-tromboning for network call redirection (example 1)" on page 5-10, RLT/TAT is applied to a network call redirection scenario (using call forward) with two Meridian 1 switches interworking with an MSL-100 switch:

1. Station A is located at an originating switch (public CO or PBX) node and makes an internodal call through the MSL-100 switch and a tandem Meridian 1 node to Station B located at the terminating Meridian 1 node.

This is represented in Figure 5-4, "RLT/TAT anti-tromboning for network call redirection (example 1)" on page 5-10 as the first call.

2. Station B, which is located at the terminating Meridian 1 node, is call-forwarded through the tandem Meridian 1 node and the MSL-100 switch to Station C, which is located at the originating switch. This is represented in Figure 5-4, "RLT/TAT anti-tromboning for network call redirection (example 1)" on page 5-10 as the redirected call.
3. Station C answers.
4. Station A connects to Station C.

Figure 5-4 RLT/TAT anti-tromboning for network call redirection (example 1)

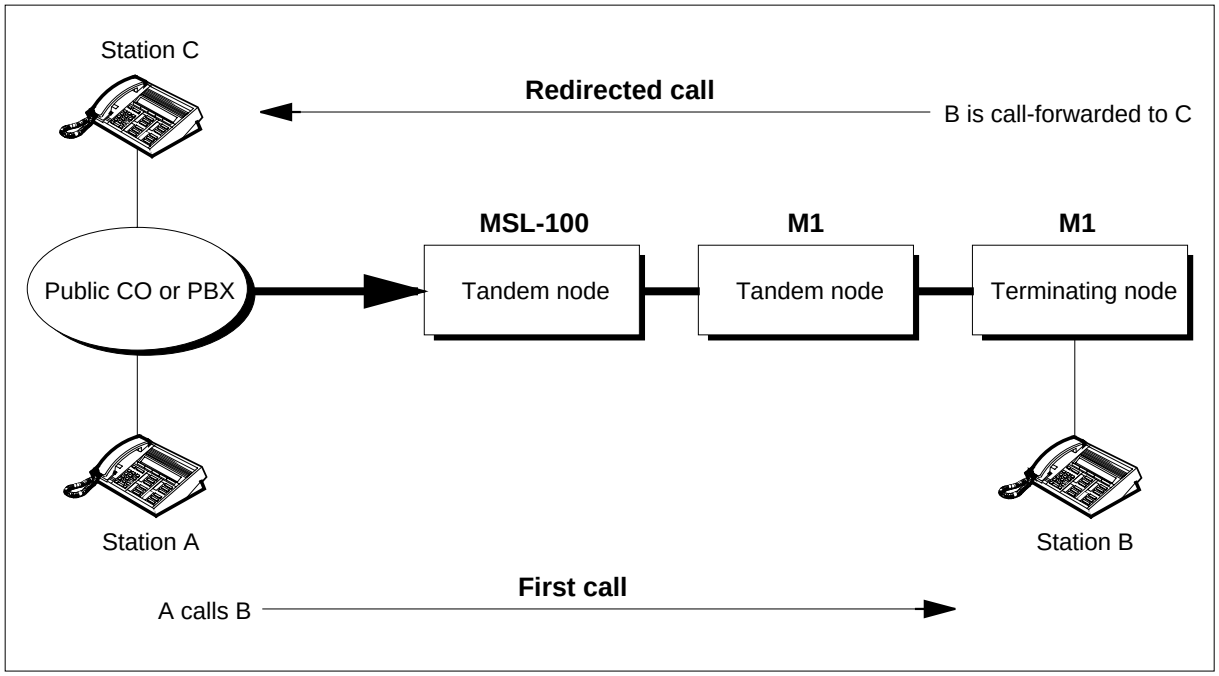
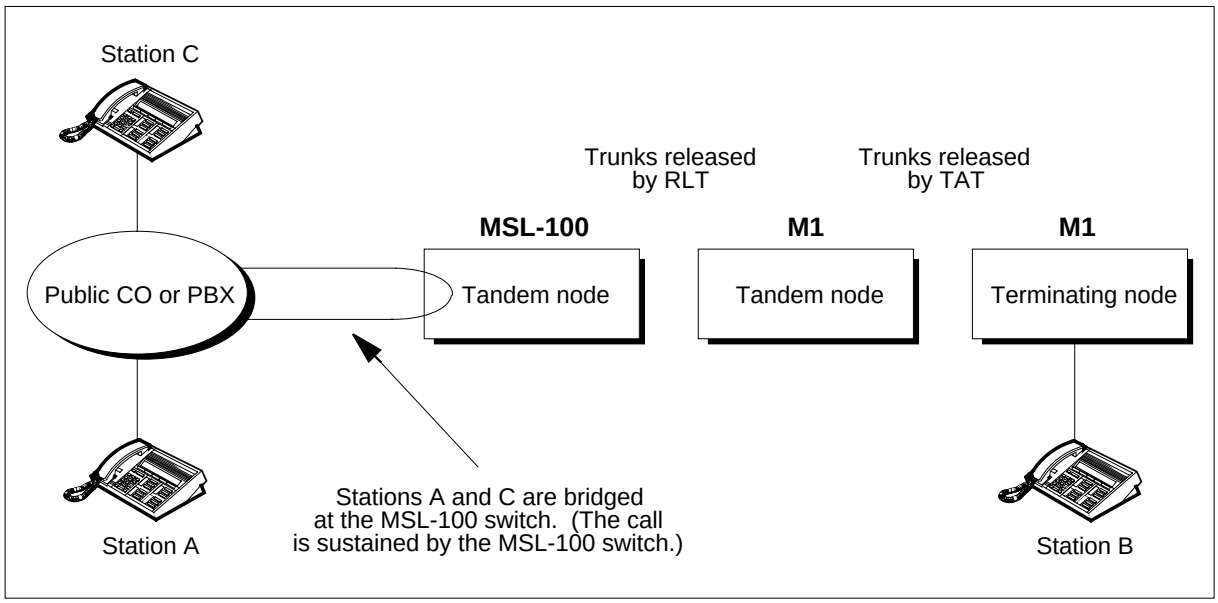


Figure 5-5, "Results of RLT/TAT anti-tromboning for network call redirection (example 1)" on page 5-11 shows the results of anti-tromboning *after Station C answers the call*.

1. The call is bridged at the MSL-100 tandem node between Stations A and C.
2. TAT releases the trunks between the terminating Meridian 1 node and the tandem Meridian 1 node.
3. RLT releases the trunks between the tandem Meridian 1 and MSL-100 nodes.

Figure 5-5 Results of RLT/TAT anti-tromboning for network call redirection (example 1)



RLT/TAT Anti-tromboning operation for network call redirection (example 2)

Figure 5-6, "RLT/TAT anti-tromboning for network call redirection (example 2)" on page 5-12 provides another example of RLT/TAT optimizing redundant trunks due to call forwarding. In this example, the trunks between a terminating Meridian 1 node and a tandem Meridian 1 node are optimized. The MSL-100 switch acts as the originating node, and Station C is a centralized attendant or a Meridian Mail position.

1. Station A is located at an originating switch (public CO or PBX) and makes an internodal call through tandem MSL-100 and Meridian 1 nodes to Station B, which is located at a terminating Meridian 1 node. This is represented in Figure 5-6, "RLT/TAT anti-tromboning for network call redirection (example 2)" on page 5-12 as the first call.
2. Station B, which is located at the terminating Meridian 1 node, is call-forwarded to Station C at the tandem Meridian 1 node. Station C is either a centralized attendant or Meridian Mail position. This is represented in Figure 5-6, "RLT/TAT anti-tromboning for network call redirection (example 2)" on page 5-12 as the redirected call.
3. Station C answers.
4. Station A connects to Station C.

Figure 5-6 RLT/TAT anti-tromboning for network call redirection (example 2)

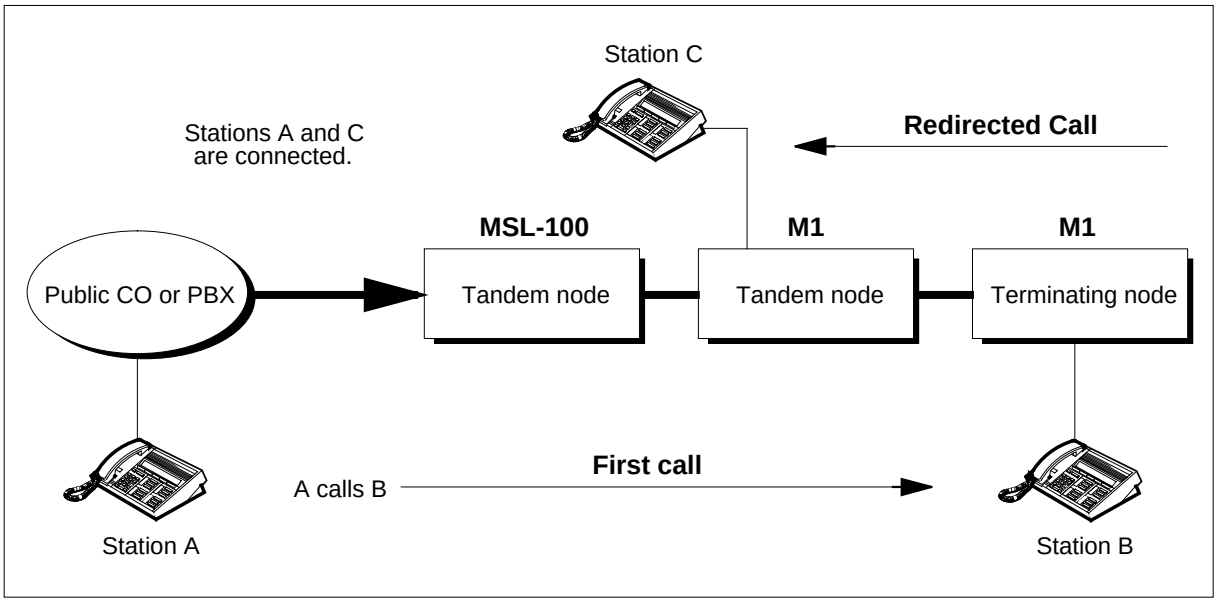
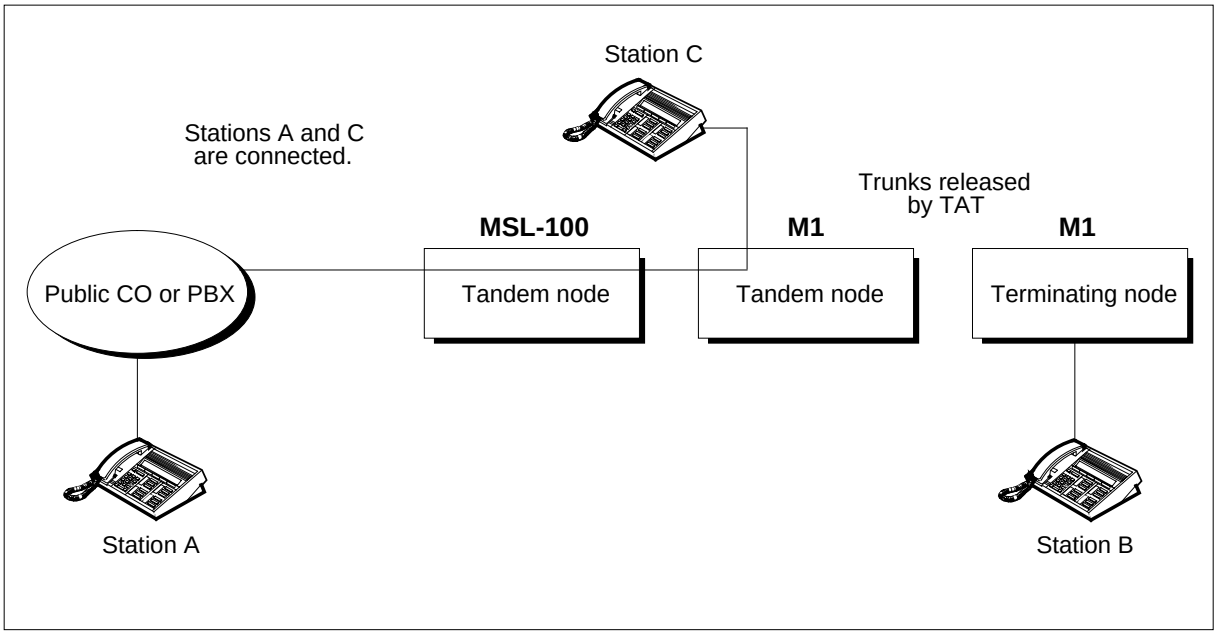


Figure 5-7, "Results of RLT/TAT anti-tromboning for network call redirection (example 2)" on page 5-13 shows the results of anti-tromboning *after Station C answers the call*.

1. TAT releases the trunks between the terminating Meridian 1 node and the tandem Meridian 1 node.
2. Stations A and C remain connected.

Figure 5-7 Results of RLT/TAT anti-tromboning for network call redirection (example 2)



RLT/TAT Anti-tromboning operation for call modification

Figure 5-8, "RLT/TAT anti-tromboning for call modification" on page 5-14 shows RLT/TAT as applied to a call modification scenario with an MSL-100 switch interworking with a Meridian 1 switch (using call transfer). Note that the same effect would occur if Station B conferences Station C into the call then drops out. This would still leave Stations A and C connected.

1. Station A is located at an originating Meridian 1 node and makes an internodal call through a tandem MSL-100 node to Station B, which is located at a terminating Meridian 1 node. This is represented in Figure 5-8, "RLT/TAT anti-tromboning for call modification" on page 5-14 as the first call.
2. Station B, which is located at a terminating Meridian 1 node, answers the call and initiates a call transfer, through the tandem MSL-100 node, to Station C, which is located at the originating Meridian 1 node. This is represented in Figure 5-8, "RLT/TAT anti-tromboning for call modification" on page 5-14 as the second call.
3. Station C answers.
4. Station B completes the call transfer.

Figure 5-8 RLT/TAT anti-tromboning for call modification

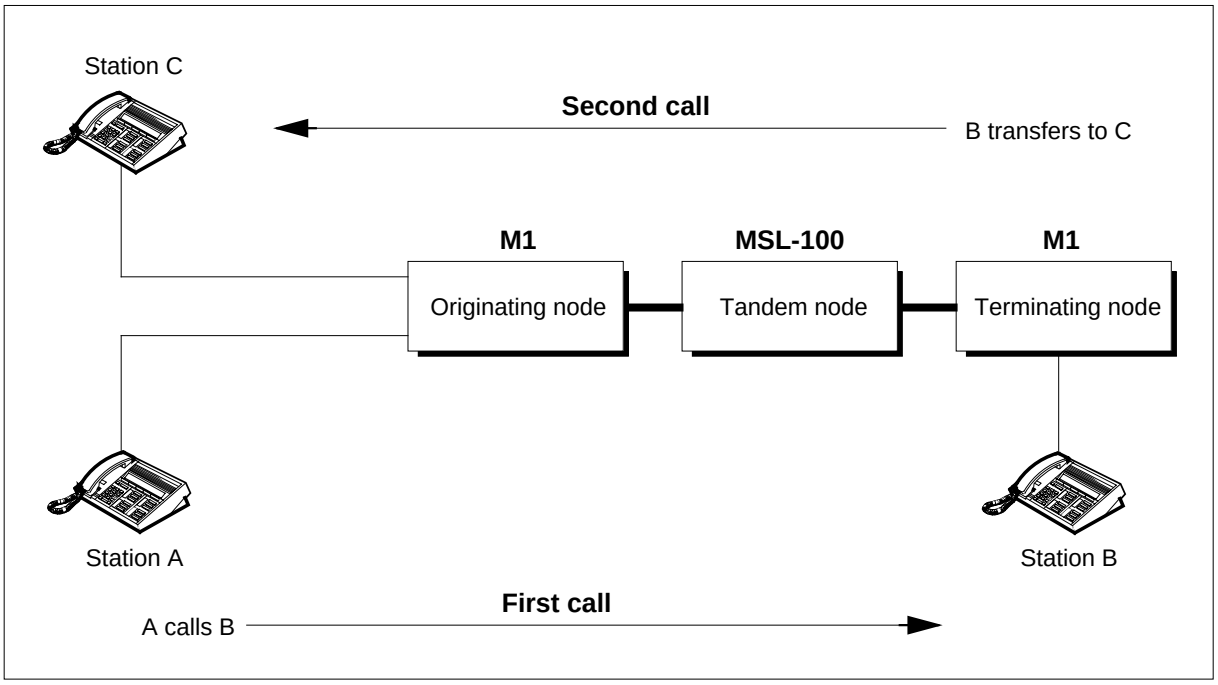
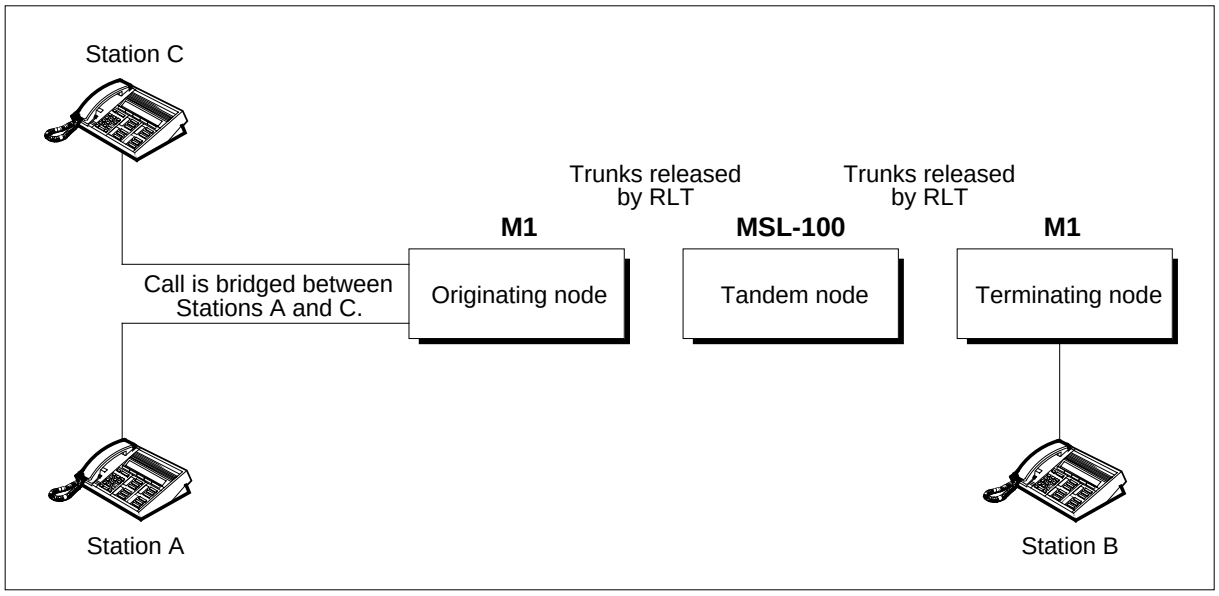


Figure 5-9, "Results of RLT/TAT anti-tromboning for network call transfer" on page 5-15 shows the results of RLT/TAT anti-tromboning *after Station C answers the call*.

1. The call is bridged at the Meridian 1 originating node between Stations A and C.
2. RLT releases the trunks between the Meridian 1 terminating node and the MSL-100 node and between the MSL-100 node and the Meridian 1 originating node.

Figure 5-9 Results of RLT/TAT anti-tromboning for network call transfer



Operating parameters

The system performs anti-tromboning only after the third party answers provided that the tromboned 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.

The system does not perform anti-tromboning 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 protocol is for the Meridian 1-to-Meridian 1 interface, and the other protocol is for an Meridian 1-to-MSL-100 interface in which the MSL-100 office is equipped with the RLT feature.

If non-ISDN trunks are involved in a call transfer call, ISDN signaling messages cannot be sent, and anti-tromboning is not performed.

The system does not perform anti-tromboning for tromboned trunks associated with a call originated on a set that is routed back to the same set.

TAT can cause a momentary interruption in data transmission during optimization. When TAT operations are performed at multiple tandem nodes, this effect is cumulative (in the milliseconds range). Therefore the impact of this loss is dependent on the terminals on each end of the transmission and may be recovered through re-transmission.

Feature interactions

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 is aborted.

Automatic Call Distribution (ACD)

The TAT feature performs 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 is aborted.

If an incoming PRI call that is in the ACD queue is answered by a recorded announcement, then the anti-tromboning operation is performed only after an ACD agent answers the call.

Call Park Network Wide

The RLT/TAT feature is invoked if programmed at all interim PBXs involved in the call.

Conference

If the Conference feature is activated, the RLT/TAT feature performs 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.

External Recorded Announcement

If an attendant originates a call that, through call modification or call redirection, creates tromboned trunks and eventually terminates on recorded announcement equipment, TAT does not optimize the trunks. (TAT does not release tromboned trunks resulting from an attendant initiating an outgoing call.)

Meridian Mail

The RLT/TAT feature does not release tromboned trunks arising from the application of 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.

Network Attendant Service (NAS)

If both TAT and NAS are equipped in the network, the NAS feature takes precedence over TAT, if NAS is equipped end-to-end. (There is no interworking between NAS and TAT.)

Network Call Pickup

The TAT feature optimizes tromboned trunks arising from the operation of the Network Call Pickup feature.

Network Call Redirection

The RLT/TAT features eliminate tromboned trunks resulting from the operation of any of the following Network Call Redirection features of the Meridian 1:

- Network Call Forward Unconditional
- Network Call Forward No Answer
- Network Call Forward Busy
- Network Call Forward by Call Type
- Network Hunt
- Internal Call Forward

6 Managing the switch

Introduction

The Meridian 1 (M-1) and Meridian SL-100 (MSL-100) switches have tools for managing the maintenance and administration activities. The Meridian Administration Tool (MAT) is the system administration tool for use with an M-1 PBX. Switch Manager is the system administration tool for MSL-100 switches.

ESN ART retrieves the ESN configuration from a Meridian 1 system, and converts the overlay based data into a PC database. Using the Windows user interface, you can easily view, modify, and print the data. The PC-based data can then be transmitted back to the Meridian 1 switch.

Switch Manager can run on the same PC that runs Meridian Administration Tools 6.1 or higher. You can manage your MSL-100 and Meridian 1 systems from the same PC.

This chapter provides information on both management tools and describes how the application can be used together.

Switch Manager 1.0 for MSL-100 Switches

Switch Manager 1.0 is a Java application that provides graphical tools for monitoring a Meridian SL-100 switch. Switch Manager runs on a PC with either the Windows 95, Windows 98, or NT 4.0 operating system.

The Switch Manager PC connects to the MSL-100 switch through an Ethernet LAN. Status messages and SNMP traps send information to Switch Manager, which displays the information in a graphical, easy-to-read format.

Switch Manager runs as a stand-alone application, but it can also be launched from MAT.

For detailed information on installation and operation of Switch Manager, refer to the *Switch Manager User's Guide.*

Switch Manager capabilities

Switch Manager provides switch administrators with the following capabilities:

- event log browsing with filtering
- trunk, DN, carrier, line, and node monitoring
- MAP terminal access through telnet
- on-line help
- system security

Event browsing

The Event Browser can display Meridian SL-100 system events such as information messages, SWERRs, and Traps in real time. Events consist of log

report information that is obtained from SNMP traps sent from the switching system to the Switch Manager application.

Trunk, carrier, DN, line, and node monitoring

Switch Manager monitors the following types of switch equipment:

- Carriers—Carriers are T1 lines within a digital carrier equipment (DCE) frame that provide speech and signaling interfaces for a number of digital trunks.
- Directory numbers—A directory number (DN) is the full complement of digits required to designate a user's station within a numbering plan area (NPA). The DN consists of a three-digit NPA, a three-digit central office (CO) code followed by a four-digit station number.
- Line equipment numbers—LENs are physical termination points for station lines.
- Nodes—A node is the terminating point of any link. For example, the CPU, network module (NM), and peripheral modules (PM) are examples of nodes on an MSL-100 switch.
- Trunks—Trunks are transmission channels that run between switching systems or modules within a switching system.

Double-clicking on the icon for the equipment displays the property sheet that lists relevant device information.

Switch Manager prevents the monitoring of line equipment numbers (LEN), directory numbers (DN), trunks, and carriers when the user is monitoring a DMS-100, DMS-250, or a DMS-500 carrier switch. This prevention is required because the DMS carrier switches SNMP agents are not compatible with the MSL-100 SNMP agents. Switch Manager will only monitor nodes and C-side links of DMS carrier switches.

MAP terminal access

Switch Manager provides the capability to open a MAP Telnet window to perform maintenance functions.

On-line help

The on-line help lets users access to information about how to use Switch Manager to monitor MSL-100 switches.

System security

System security requires users to provide a user ID and password before accessing the system. Switch Manager provides both a user access level and an administrator access level. The user access level is for monitoring the MSL-100 switch. The administrator access level can add users, delete users, and set user privileges.

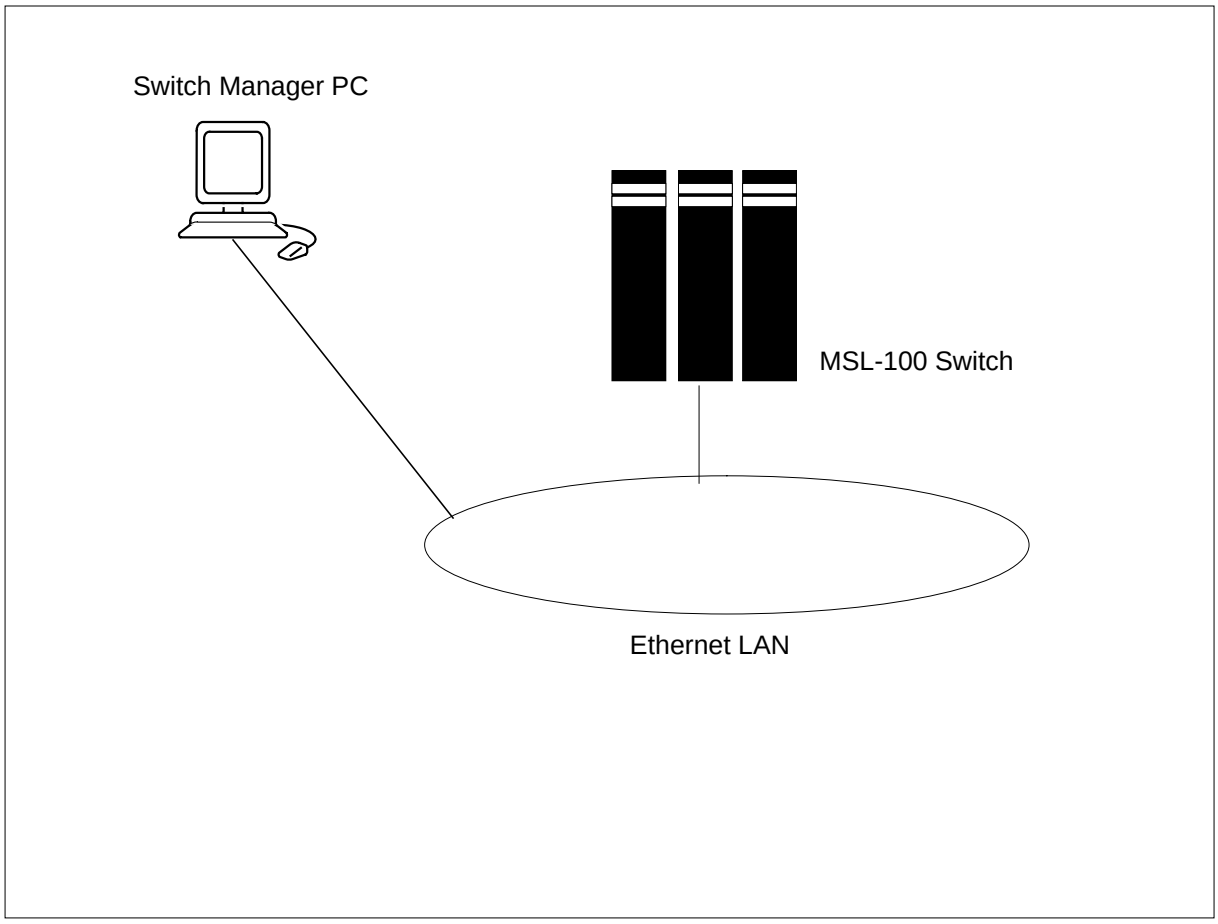
Switch Manager architecture

The Switch Manager PC connects to the MSL-100 system over an Ethernet LAN. Refer to Figure 1 for a diagram of the system architecture.

Switch Manager polls the switching system in five-second intervals for status information. The application keeps a database of switch equipment information. Switching system configuration information is updated by synchronizing the database with the MSL-100 switch.

The first time you connect to a switch, you must synchronize the Switch Manager database with the switch. Synchronization is required for subsequent connections to that switch only if the switch configuration is changed (for example, new equipment is added).

Figure 6-1 Switch Manager system architecture



MSL-100 system requirements

Ensure that you have the switch hardware and software version needed to run Switch Manager. The MSL-100 system must have the following configuration.

- MSL08 software release or higher, with the following software patches:
  - CXA05
  - DMN50
  - DMN42
  - ITN15
  - ITN17
- MSL09 software requires the following software patches:
  - DMN42
  - ITN15
  - ITN17
- Telnet access

Note 1: If you plan to connect the MSL-100 switch to a corporate network, an Ethernet gateway or router is recommended to separate the MSL-100 switch from the corporate network.

Note 2: If you plan to run Switch Manager on the PC that has the system administration tool for an M-1 switch installed, be sure to install the administration tool for the M-1 switch first. Refer to *MAT Common Services User's Guide* for MAT installation procedures.

Telnet access

To start a MAP session from Switch Manager you must access the IP address of the MSL-100 switch. Refer to the instructions in the Switch Manager User Guide for more information.

Meridian Administration Tools (MAT) for M1 Switches

The Meridian Administration Tools (MAT) is a portfolio of Microsoft Windows based applications designed to provide a user-friendly graphical user interface (GUI) system management tool for the Meridian 1 switch.

MAT consists of the following applications and services:

- Common Services
- Maintenance Windows
- Alarm Management
- ESN Analysis and Reporting Tool (ART)

- Station Administration
- Traffic Analysis
- Call Accounting
- Call Tracking

MAT is designed for telecommunications equipment administrators with a working knowledge of Meridian 1 switches and general telecommunications concepts.

MAT supports two levels of access:

- Administrator access allows unrestricted use of MAT and its functions. The system administrator configures the MAT system, sets up the connections to the Meridian 1 switch, and defines user access to MAT application modules.
- User access allows read only, read and write, or no access to sites, systems, or applications, as defined by the MAT administrator. The administrator can create a broad range of access levels for various users.

Note: For more information on the MAT system, refer to the MAT user guides that are included with MAT.

MAT Release 6.5

MAT Release 6.5 is the supported version. It is available for the following systems:

- systems running X11 Releases 19 - 24
- Option 11 systems running X11 Release 18
- Option 11C Compact systems running X27 Release 1 - 2
- systems running X11 Releases 14 or 17
- systems running X11 International Releases 16.9xG or 18.4xH
- IP Telephony Gateway IP Trunks (ITG 1.0)
- IP Telecommuter (ITG 1.0+ Lineside)
- Switch Manager 1.0
- CallPilot 1.0

MAT Release 6.5 can be run as a standalone installation or as a client on the following operating systems:

- Windows 95
- Windows 98
- Windows NT Workstation 4.0

Common Services

MAT Common Services provide the following applications:

- using the Navigator and System windows-the Navigator is the interface through which all MAT systems and services are accessed using a tree-based user interface that organizes managed equipment into sites and systems. System windows are launched from the Navigator providing access to individual systems. A tree-based user interface is used to organize and launch management applications.
- defining the MAT environment, including Meridian 1 sites and systems
- using the MAT scheduler
- using the system terminal-the system terminal consists of Overlay Passthru and VT220. The Overlay Passthru application provides access to the Meridian 1 overlays using Ethernet or point-to-point protocol (PPP). The VT220 application provides access to the Meridian 1 overlays and any other VT220 compatible system using a serial connection.
- using MAT communications services
- communicating between the MAT user and MAT applications with windows displaying system information

Note: For more information on Common Services, refer to the *MAT Common Services User's Guide*, P0902372.

Maintenance Windows

Maintenance Windows provides a GUI replacement for the overlay based hardware maintenance commands. Maintenance Windows is accessed using the Core Equipment icon under a Meridian 1 system in the System Window.

Some of the applications supported by MAT Maintenance Windows includes:

- Core CPU
- I/O Ports
- Network Groups
- Network Loops (includes B- and D-channels)
- PE Shelves
- PE Cards
- PE Units

Some of the benefits of Maintenance Windows includes:

- view the equipped hardware
- select an item from the hardware list and apply a maintenance command from the popup menu

- print the hardware list or copy it to a spreadsheet
- select a terminal number (TN) or directory number (DN) and print the TN/DN block
- see Enabled/Disabled status in real time

Note: For more information on Maintenance Windows, refer to the *MAT Maintenance Windows User's Guide*, P0902372.

Alarm Management

Alarm Management consists of a number of components: Events, Alarm Banner, Alarm Notification, Event Default Table, and Event Preference Table. These components improve handling of system generated events. The Event Log is preserved through a system SYSLOAD and initialization of a Meridian 1 switch, and can then be uploaded to the PC and the alarm list viewed through the Events application. The Event Default Table specifies the default severity for events; and the Event Preference Table then provides a user interface to modify these severity defaults and to define escalation and suppress thresholds for each event on a system-by-system basis.

Events

The Event Log Browser provides a graphical user interface to view the contents of a Meridian 1 system's event log. A system event log contains alarms, which are action events (having a severity of critical, major, or minor), as well as non-action events (having a severity of informational).

Alarm Banner

An Alarm Banner is provided on the PC to summarize the number of new critical, major, and minor alarms contained in the system event log. In addition, the receipt of a new critical alarm will cause the outline of the count of critical alarms count to flash and if configured, an audible notification is also provided.

Note: For more information on Alarm Management, refer to the *MAT Alarm Management User's Guide*, P0902372.

ESN Analysis and Reporting Tool

The ESN Analysis and Reporting Tool (ESN ART) is a MAT application designed to assist the system administrator in configuring, analyzing, and managing large and complex ESN databases.

ESN ART retrieves the ESN configuration from a Meridian 1 system, and converts the overlay-based data into a PC database. Using the Windows user interface, you can easily view, modify, and print the data. The PC-based data can then be transmitted back to the Meridian 1 switch.

Note: For more information on ESN Analysis and Reporting Tool, refer to the *MAT ESN Analysis and Reporting Tool User's Guide*, P0902372.

Station Administration

Station Administration simplifies day-to-day station adds, moves, and changes to single- and multi-line telephones. Station Administration enables system users to configure telephone sets, program features, and assign DNs and TNs for single sets or groups of telephones. Station programming is accomplished using the PC, and then uploaded to the Meridian 1, either immediately or at a scheduled date and time.

Note: For more information on Station Administration, refer to the *MAT Station Administration User's Guide*, P0902372.

Traffic Analysis

Traffic Analysis performs the following functions:

- collects traffic data from a specific system's Meridian 1
- maintains a database of collected traffic data
- defines report and graph parameters
- generates reports to extract significant information from raw traffic data, such as trunk usage, peak periods, process loads, and junctor and loop traffic

Note: For more information on Traffic Analysis, refer to the *MAT Traffic Analysis User's Guide*, P0902372.

Call Accounting

Call Accounting enables comprehensive call detail recording (CDR) reporting for call costing. It is used to provide details on the actual usage of the system for assessing the effectiveness of telephone services or to itemize calls to specific groups for individual billing purposes and other types of cost allocation. Call Accounting is integrated with Station Administration, eliminating the need to re-enter employee data that already exists within Station Administration.

Note: For more information on Call Accounting, refer to the *MAT Call Accounting User's Guide*, P0902372.

Call Tracking

Call Tracking is an on-line call monitor program for the examination of call usage patterns leading to toll fraud detection and notification. Graphs are used to indicate trends and provide displays of unusual calls, enabling the user to adjust equipment and services to maximize resources. Multiple filtering templates allow the customization of toll fraud criteria. When the filter criteria have been met, Call Tracking provides a number of alarm notification options

to alert the system administrator (using fax or modem, for example). Call Tracking is integrated with Call Accounting.

Note: For more information on Call Tracking, refer to the *MAT Call Tracking User's Guide*, P0902372.

Meridian 1 system requirements

The Meridian 1 switch must have the following configuration:

- X11 Releases 19 - 24
- X11 software packages:
  - — Alarm Management: 164, 242, 243, 296(an additional package for Alarm Notification: 315)
  - — Maintenance windows: 164, 242, 243, 296
  - — System Terminal - Ovelay Passthru: 164, 242, 296
  - — Ethernet Connection for Station Administration, Traffic Analysis and ESN ART: 164, 242, 296
  - — Data buffering and access (DBA): 296 and 351
- 48MB or greater of memory on the Meridian 1
- for Ethernet communications and Release 22 or Release 23:
  - — IOP cards (NT6D63BA or later), IOP/CMDU cards (NT5D20BA or later)

    Note: not applicable to Option 11C systems, Release 22, or IODU/C cards (NT5D61AB).

  - — one or two Ethernet AUI cables (NT7D90DA or later). You will attach one cable to each IOP, IOP/CMDU, or IODU/C
  - — for Option 11C, an NTDK27AA Ethernet cable

Ethernet networks requirements

The Ethernet network must have the following configuration:

- one or two Ethernet transceivers (different types for 10BaseT and 10Base2 cabling). Attach one transceiver to each AUI cable.
  - — Ethernet communications cable: 10BaseT cabling requires category 5 cable with RJ45 connectors
  - — 10Base2 cabling requires RG58 cable with BNC connectors
- If you are using the 10BaseT interface, an Ethernet hub is required.

Ethernet networks requirements

The PPP network must have the following configuration:

- Hayes command compatible modem
- modem cables
- M1 SDI ports require user type MTC and SCH be set in LD17

Note: For more information on MAT requirements, refer to the *MAT Installation and Upgrades User's Guide*, P0902372.

Adding Switch Manager as a MAT system

To add Switch Manager as a MAT system, use the Add System command on the Configuration menu. Specify Meridian SL-100 as the system type in the Add System dialog box.

Use the General tab and the Communications tab on the New System properties dialog box to identify the MSL-100 system and define the communications as Ethernet.

Launching Switch Manager from MAT

Meridian Administration Tools (MAT) provides applications to administer and maintain Meridian 1 switches. The MAT system consists of MAT Common Services and a portfolio of related applications. If you use Switch Manager and MAT, you can manage both Meridian 1 systems and MSL-100 systems from the same PC. MAT 6.4 or higher is required for using both tools on the same PC.

To launch Switch manager from MAT, open the Navigator window and find the switch icon that represents the MSL-100 switch in the Navigator tree. Double-click the icon to display MAT’s System window for the MSL-100 switch and access the applications associated with that switch.

For more information about the Navigator and System windows, see the MAT Common Services User Guide.

7 Feature comparisons and compatibilities

Feature comparisons

Table 7-1shows maintenance and testing comparisons between the Meridian 1 (M-1) and the Meridian SL-100 (MSL-100) switches, and their interworking capabilities.

Note: X11 represents the Meridian 1 Option 11 switch, and X81 represents the Meridian 1 Option 81.

Table 7-1 Meridian 1 compatibility with connectivity to MSL-100, Custom DMS-100, and DMS-250 switches (Sheet 1 of 3)

Maintenance and testing function	Meridian 1	M SL-100
Interface	maintenance and administration: terminal/printer	Maintenance and Administration Position (MAP)
	Meridian Manager option	Optivity Telephony Manager (OTM) for MSL-100
	Meridian Administration Tools (MAT)	
Hardware fault detection capabilities	automatically detected by internal facilities	automatically detected by internal facilities
	maintenance and error messages generated and used with fault clearing procedures	log report generated
Diagnostic programs	automatically identify and isolate faulty hardware units	automatically identify and isolate faulty hardware units and status on MAP
	maintenance and error messages generated and used with fault clearing procedures	error messages generated
		identify faulty circuit on line

Table 7-1 Meridian 1 compatibility with connectivity to MSL-100, Custom DMS-100, and DMS-250 switches (Sheet 2 of 3)

Maintenance and testing function	Meridian 1	M SL-100
Real-time activity indicator	system services peg count and usage	system services peg count and usage
	CPU occupancy	CPU occupancy
	trunks and network traffic by way of holding register dump	trunks and network traffic by way of holding register dump
		on-line status by way of MAP
System software integrity	sanity test is in active CPU against software and firmware	sanity tests in both CPUs against software and firmware
	loop errors and CC audits	loop errors, CC, and PE audits
Automatic trunk testing	trunk seizure and hold thresholds	trunk seizure and hold thresholds with killer trunk
	integrity testing (digital)	integrity testing (digital)
		bit error rate testing (BERT)
Automatic line testing	N.A.	individual or group
Alarms	audible and visual indicators	audible and visual indicators
	remote alarms using TSB AT-1	remote alarms using TSB AT-1
		optional remote alarm circuit
		scan and signal points I/F
Transmission testing	test trunks for noise and loss	test trunks and lines for 100 series
ROTL	provision for Heidemian System access	interfaces for CAROT, Heidemian
Trunk test position	manual testing in-board, automatic testing out-board	manual and automatic testing in-board
Metallic test access	using external test sets and patch panels	using MAP and test sets
Remote maintenance testing	using remote terminal/printer and modem	using remote MAP and modem
Voice station testing	electronic hybrid and digital hybrid	electronic hybrid, digital hybrid, and digital ISDN

Table 7-1 Meridian 1 compatibility with connectivity to MSL-100, Custom DMS-100, and DMS-250 switches (Sheet 3 of 3)

Maintenance and testing function	Meridian 1	M SL-100
Data station testing	digital hybrid data units	digital hybrid data units, digital ISDN data units, and BERT
Network diagnostics	network circuit (DS-30)	network circuit (DS-30)
	network path-junctors, PE	network path-specific
		network fabric-automatic testing
		all paths, both planes

Feature compatibilities

Table 7-2, "Meridian 1 compatibility with connectivity to MSL-100, Custom DMS-100, and DMS-250 switches" on page 7-3 through Table 7-4, "Meridian 1 compatibility with connectivity to MSL-100, Custom DMS-100, and DMS-250 switches" on page 7-5 show Meridian 1 switch compatibility with connectivity to MSL-100, custom DMS-100, and DMS-250 switches.

Table 7-2 Meridian 1 compatibility with connectivity to MSL-100, Custom DMS-100, and DMS-250 switches (Sheet 1 of 2)

Feature	R16	R17	R18	R19	R20	R21	R22	R23	R24	720A	720B
Backup D-channel	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
nB+D	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Basic Call Service	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
CLID in CDR	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
DPN access	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
DTI, ESF, CRC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

* The QPC720D was not introduced in North America (it is only used in Hong Kong).** The QPC720F was 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

Table 7-2 Meridian 1 compatibility with connectivity to MSL-100, Custom DMS-100, and DMS-250 switches (Sheet 2 of 2)

Feature	R16	R17	R18	R19	R20	R21	R22	R23	R24	720A	720B
DTI Compatibility	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
ISA	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NND	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NCRD											
—NCFAC	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
—NCFB	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
—NCFNA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
—NHNT	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
NRAG (TIE)	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y

* The QPC720D was not introduced in North America (it is only used in Hong Kong).** The QPC720F was 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

Table 7-3 Meridian 1 compatibility with connectivity to MSL-100, Custom DMS-100, and DMS-250 switches (Sheet 1 of 2)

Feature	720C/E*	720F**	757A	757B	757C	757D	757E
Backup D-channel	Y	Y	N	N	N	Y	Y
nB+D	Y	Y	N	N	N	N	Y
Basic Call Service	Y	Y	Y	Y	Y	Y	Y
Calling Line ID	Y	Y	Y	Y	Y	Y	Y

* The QPC720D was not introduced in North America (it is only used in Hong Kong).** The QPC720F was 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.

Table 7-3 Meridian 1 compatibility with connectivity to MSL-100, Custom DMS-100, and DMS-250 switches (Sheet 2 of 2)

Feature	720C/E*	720F**	757A	757B	757C	757D	757E
CLID in CDR	Y	Y	Y	Y	Y	Y	Y
DPN access	Y	Y	N	Y	Y	Y	Y
DTI, ESF, CRC	Y	Y	-	-	-	-	-
DTI Compatibility	Y	Y	-	-	-	-	-
ESN over PRI	Y	Y	Y	Y	Y	Y	Y
ISA	Y	Y	Y	Y	Y	Y	Y
NND	Y	Y	N	N	N	N	Y
NCRD							
—NCFAC	Y	Y	N	Y	Y	Y	Y
—NCFB	Y	Y	N	N	Y	Y	Y
—NCFNA	Y	Y	N	Y	Y	Y	Y
—NHNT	Y	Y	N	N	Y	Y	Y
NRAG (TIE)	Y	Y	N	N	Y	Y	Y

* The QPC720D was not introduced in North America (it is only used in Hong Kong).** The QPC720F was 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.

Table 7-4 Meridian 1 compatibility with connectivity to MSL-100, Custom DMS-100, and DMS-250 switches (Sheet 1 of 2)

Feature	NT6D80AA***	NT6D80AB***	NT5D12DDP****
Backup D-channel	Y	Y	Y
nB+D	Y	Y	Y

* The QPC720D was not introduced in North America (it is only used in Hong Kong).** The QPC720F was 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

Table 7-4 Meridian 1 compatibility with connectivity to MSL-100, Custom DMS-100, and DMS-250 switches (Sheet 2 of 2)

Feature	NT6D80AA***	NT6D80AB***	NT5D12DDP****
Basic Call Service	Y	Y	Y
Calling Line ID	Y	Y	Y
CLID in CDR	Y	Y	Y
DPN access	Y	Y	Y
DTI, ESF, CRC	-	-	-
DTI Compatibility	-	-	Y
ESN over PRI	Y	Y	Y
ISA	Y	Y	Y
NND	Y	Y	Y
NCRD			Y
—NCFAC	Y	Y	Y
—NCFB	Y	Y	Y
—NCFNA	Y	Y	Y
—NHNT	Y	Y	Y
NRAG (TIE)	Y	Y	Y

* The QPC720D was not introduced in North America (it is only used in Hong Kong).** The QPC720F was 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

8 Feature implementation

Table 8-1, "Station feature implementation for Meridian digital telephones" on page 8-1 shows the station feature implementation for some of the features for the Meridian 1 (M-1) and the MSL-100 switches.

Table 8-1 Station feature implementation for Meridian digital telephones (Sheet 1 of 6)

Feature	Meridian 1	M SL-100
Answering a call	Key 0 is referred to as PDN.	Key 1 is referred to as PDN.
Voice Call	calls a DN that is automatically answered	Individual page from the Group Intercom (GIC) feature is similar. Dial the GIC number. After the first ring, press the GIC key, a one-way connection is established; then talk over the speaker.
Last Number Redial	Press DN key twice or press DN key and Last Number Redial key. System will redial last number dialed from that phone.	Press DN key and dial access code or press DN key and dial ##. System will redial last number dialed from that particular DN.
Malicious Call Hold	Called Malicious Call Trace. Press the Trace key, enter SPRE code plus 83 or Trace FFC. Keep the caller on the line. Call is not put on hold. Trace is sent to maintenance TTY.	Press Malicious Call Hold key, call is put on hold. Press DN key to return to call. Can be activated using feature access code and Transfer key.
Automatic Dial	To erase a number stored against an autodial key, dial the autodial deactivate FFC.	To erase a number stored against an autodial key press (#).
AutoDial	To display the AutoDial number, press the Display key.	To display the AutoDial number, press the AutoDial key.
Hotline/Automatic	Dial operation same as MSL-100	Dial operation same as Meridian 1 switch uses Automatic Line (AUL) feature.

Table 8-1 Station feature implementation for Meridian digital telephones (Sheet 2 of 6)

Feature	Meridian 1	M SL-100
Call Forward	operation same as MSL-100	same as Meridian 1 switch
Call Join	During conversation, press the Conference key, press the flashing DN key that is on hold, press the conference key to activate Call Join	same as Meridian 1 switch
Call Park	Use the Park key, Transfer key, or Conference to park a call.	Use the Park key or Directed Call Park key to park a call.
	To park a call, press the Park key once.	To park a call, press the Call Park key, or Directed Call Park key (and then dial a DN or use the system defined DN)
	Press Conference or Transfer, enter SPRE 71 or FFC; press Conference or Transfer again.	not available
—unpark	To unpark a call, press Park or SPRE 71 or FFC, dial extension where call is parked.	To unpark a call, press the feature access code, then the DN.
Call Pickup		
—Group	operation same for both switches	operation same for both switches
(your group)		
—Directed Phone Pickup	For DN pickup without key, dial SPRE+94+DN.-with key operation the same	For DN pickup without key, dial the Call Pickup feature access code+DN-with key operation the same
	For group pickup without key, dial SPRE+95+group number-with key operation the same	For group pickup without key dial, enter DCPU feature access code+DN.-with key operation the same
—Group (another Call Pickup Group)	Press Group Pickup key and dial Group Pickup number of ringing phone	not available
Displaying key information	The Display key is used.	The Inspect key is used, or may be automatically displayed.
Special prefix (SPRE) or flexible feature codes	To use a feature on a telephone set, you may need to enter a SPRE or flexible feature code.	To use a feature, you may need to enter a feature access code if a feature key is not assigned.

Table 8-1 Station feature implementation for Meridian digital telephones (Sheet 3 of 6)

Feature	Meridian 1	M SL-100
Automatic Hold	same as MSL-100 switch when the Auto Hold feature is assigned	To answer another line (DN key) on a telephone set with multiple DNs, press the flashing DN and your call is automatically put on hold.
Attendant Recall	Press Att Recall key during a call. Stay on the line until attendant answers. Replace handset and caller is connected to the attendant.	Use Transfer feature to transfer a call to the attendant.
Call Transfer DN	Press Transfer key. If no answer, return to original DN key to continue conversation. If the party answers, press the Transfer key again, talk to the party privately, then hang up; or press transfer when ringing tone is heard. Hang up. Call is transferred.	Press Transfer key. If no answer, hit Release key then return to original key. Uses 3-way conference feature. If the party answers, press the Transfer key again, all three parties are connected. Press Release key. Hang up. Call is transferred; or when ring tone is heard, hang up and call is transferred.
Auto Dial Transfer DN	Press Trunk Switchhook Flash key, press Auto Dial key. Hang up or press Release key.	Press Transfer key, then press Auto Dial key. Press Release key.
Message	Flashing icon by Message key and Message Waiting Light is activated.	same as Meridian 1 switch
Multiple Message Waiting Indication	same as MSL-100 switch	Allows a secondary telephone set to provide an indication that messages are waiting on the primary telephone set. Supports multiline and single line analog and business IBN sets (which support CLASS messaging).
Conference	During conversation, press Conference key and call next number. If no answer, return to original DN key and continue conversation. If call is answered, press Conference key.	During conversation, press Conference key and call next number. If no answer, hit Release key, then return to original DN key for conversation. If call is answered, press Conference key.

Table 8-1 Station feature implementation for Meridian digital telephones (Sheet 4 of 6)

Feature	Meridian 1	M SL-100
Electronic Lock	Meridian Digital Telephones may be locked with a password and a flexible feature code.	Feature not available on Meridian SL-100 switch.
Remote Call Forward	From outside the system, dial the DISA number and enter the Remote Call Forward FFC. Enter the Electronic Lock password. Dial extension, number and number to forward calls. Press #.	From outside the system, dial a remote access number. Prompted to enter DN and then the Call Forward Remote authorization code. User can then activate, deactivate, or change CF.
Call Waiting	To answer an incoming call during a telephone call, the Hold key must be pressed before Call Waiting.	To answer an incoming call during a telephone call, press Call Waiting. Other party automatically held.
	To return to first telephone call, press Hold, then DN.	To return to first call, press DN. The other party is automatically held.
Calling Number	To create a charge account record, press Calling Number key, dial account number, press Calling Number again.	To create a charge account record, use switchhook and enter feature code, then enter account number.
Charge/Forced Charge	Charge allows user to charge to a specific account. Force Charge allows user to charge long distance from restricted set.	Account Code allows user to enter a billing number. Account code can be prompted because of called number, NCOS, station's attributes, or auth code.
Centrex/Exchange Line Switchhook Flash	allows user to signal central office (CO) during a call to use a Centrex service such as call transfer or three-way calling	not available; MSL-100 switch provides the same features as most COs
Forced Camp-on	User dials telephone number and hears busy signal. Press Override key or enter FFC on multiline set.	Station Camp-on allows a set to camp on to a busy station
Group Call	Press Group Call key or enter FFC on multiline set.	Use Preset Conference feature. Dial specific DN for Preset Conference.
Hot Line	Press Hot Line key on multiline set.	Press Automatic Line key.

Table 8-1 Station feature implementation for Meridian digital telephones (Sheet 5 of 6)

Feature	Meridian 1	M SL-100
Radio Paging	Some Meridian 1 systems may be equipped with an on-site Radio Paging System. Use Radio Paging FFC to alert pager.	MSL-100 systems may be equipped with a Paging System, however, special radio page features are not available
Ring Again—Busy Line	operation same for both switches	operation same for both switches
Ring Again—No Answer	redial number that did not answer	not available
Virtual Office Worker (VOW)	Available on M3903 and M3904 sets. Dial Virtual Office Terminal Log In (VTLN) FFC. Enter password using dial pad.	Available on M2000, M5000 and M3900 series sets. Dial Virtual Office Worker In (VOWIN) FAC. Enter VOW authorization code, if required. Enter personal authorization code.
Speed Call - Store	operation same for both switches	operation same for both switches
Speed Call - Change	operation same for both switches	operation same for both switches
Speed Call - Erase	press *	press #
Speed Call - Make Call	operation same	operation same
Speed Call - Private Lines	press Private Line key	not available
Speed Call - System	system	Network Speed Call
Stored Number	Use Stored Number key or FFC.	Use Automatic Dial (AUD) feature key; feature code activation not available.
Timed Reminder Recall	Timed Reminder Recall rings to remind user of a transferred call that has not answered.	Blind Transfer Recall rings to remind user of a transferred call that has not answered.
Override	Override key or Override FFC	Busy Override key or feature access code
Enhanced Override	Allows to override call after attempted Forced Camp-on	not available
Priority Override	Allows to override call and join a call in progress.	Busy Override provides this capability.
Hospitality Features:		

Table 8-1 Station feature implementation for Meridian digital telephones (Sheet 6 of 6)

Feature	Meridian 1	M SL-100
Automatic Wake-up	Dial Automatic Wakeup FFC. Dial wake-up time in twenty-four hour format.	Dial Wake-up Request FAC; when you receive the second dial tone, enter four consecutive digits to specify hour and minute.
Maid Identification	Maid enters room information.	
Message Registration	Read and change meters that log calls.	not available
Room Status		not available
	Read status of room-vacant/occupied.	not available
Anonymous Caller Rejection	not available	Dial feature access code (FAC) for ACRJ
Automatic Callback	not available	Dial feature access code for ACB
Automatic Recall	not available	Dial FAC for AR
Customer Originated Trace	not available	Press CustOrigTr key or dial FAC for COT
Calling Name/Number Delivery Blocking	not available	Dial FAC
Selective Call Forward	not available	Dial FAC

Table 8-2, "Feature implementation" on page 8-6 shows the Meridian digital telephones M3900 series differences between the Meridian 1 (M-1) and the MSL-100 switches.

Table 8-2 Feature implementation (Sheet 1 of 2)

M3900 feature	Meridian 1	MSL-100
Downloading	System software X11 Release 25 and above	Uses Optivity Telephony Manager (OTM) release 2 MSL11 and above
Software bundling	yes	inclusive with system
Meridian communication adapter (MCA)	manufacture discontinued	not available
Set to set messaging	X11 Release 25	not available
Corporate directory	X11 Release 25 (controlled release) uses MAT version 6.6 and above	available post MSL12 and above; server application

Table 8-2 Feature implementation (Sheet 2 of 2)

M3900 feature	Meridian 1	MSL-100
Release 1 M3900 Series	X11 Release 24	not available
Release 2 M3900 Series, M3901, M3902, M3903 and M3904; Release 1 M3905	X11 Release 25	MSL11 and above with XPM 13 and above
M3905 Release 2	not available	MSL11 and above with XPM 13 and above
Icon Based Display Indication	not available	MSL12 and above
Software bundling	Release 24 and up	not available
IPE Controller	XPEC (NT8D01)	Enhanced XPEC (NT7D07BA) or later

9 Differences

Overview of differences

This section is a high-level overview of some of the differences between the Meridian 1 (M-1) switch and the MSL-100 switch. The figures in this section represent differences in system management, call center, computer telephony integration (CTI), and open integrated voice recognition (IVR).

System management

Figure 9-1, "System management (Meridian 1/MSL-100" on page 9-2 and Figure 9-2, "System management (Meridian 1/MSL-100)" on page 9-3 give examples of the differences in system management between the Meridian 1 and MSL-100 switches.

Figure 9-1 System management (Meridian 1/MSL-100

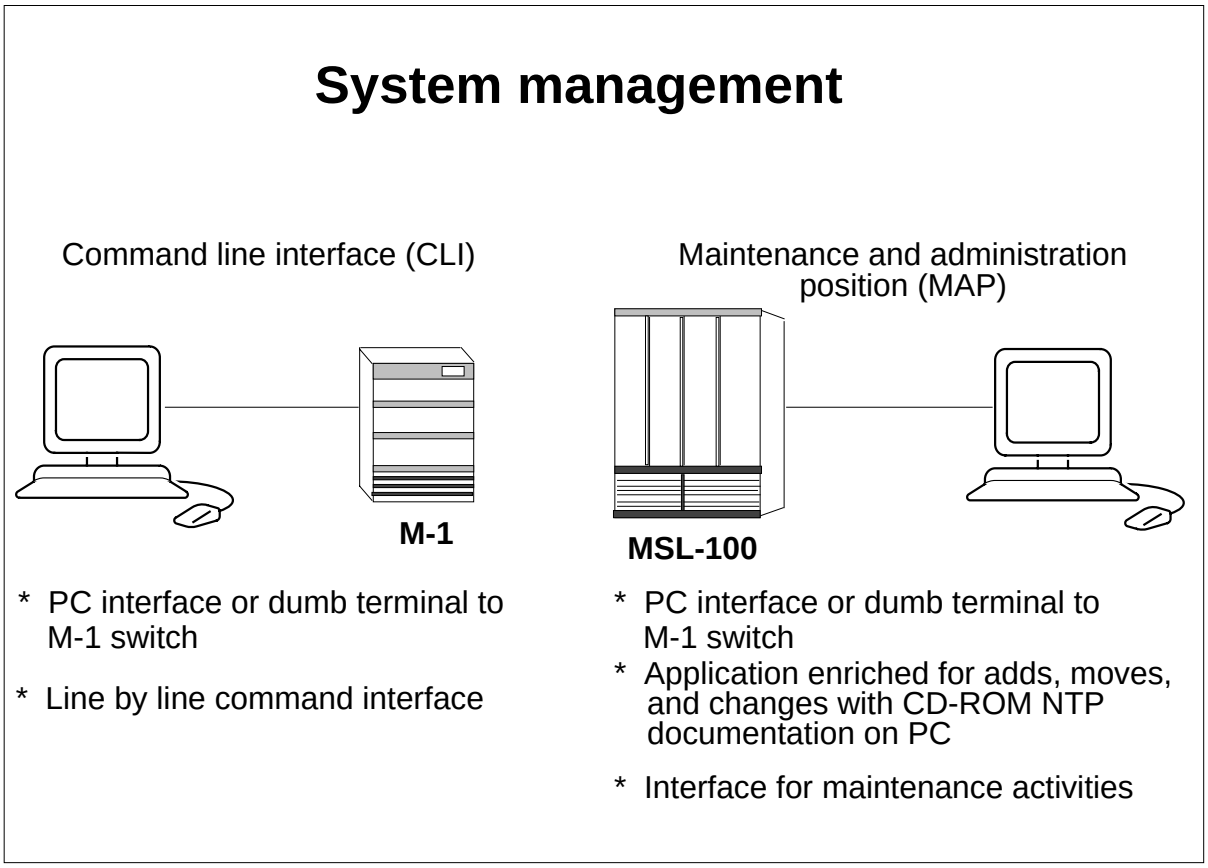
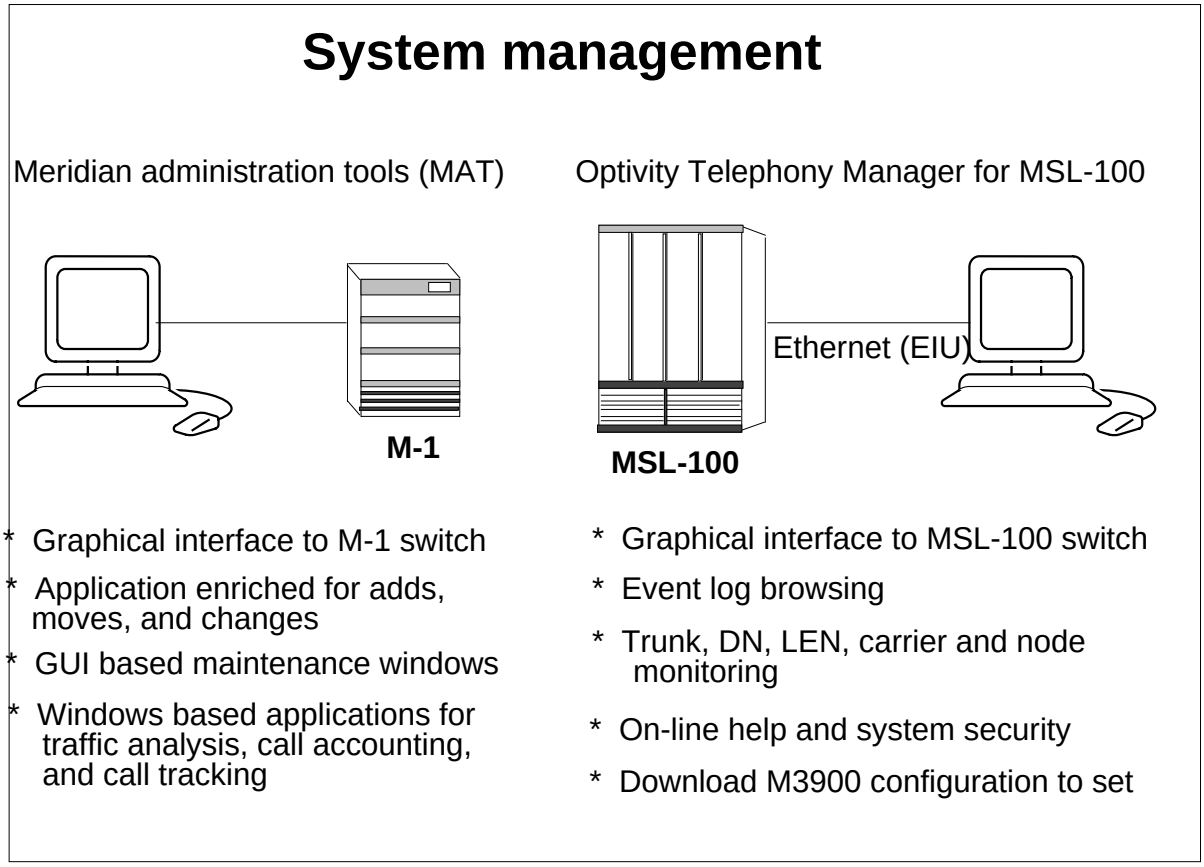


Figure 9-2 System management (Meridian 1/MSL-100)



Call centers

Figure 9-4, "Call centers (Meridian 1/MSL-100)" on page 9-5 through Figure 9-6, "Call centers (Meridian 1/MSL-100)" on page 9-7 are examples of the differences in the Meridian 1, and the MSL-100 switch call centers.

Figure 9-3 Call centers (Meridian 1/MSL-100)

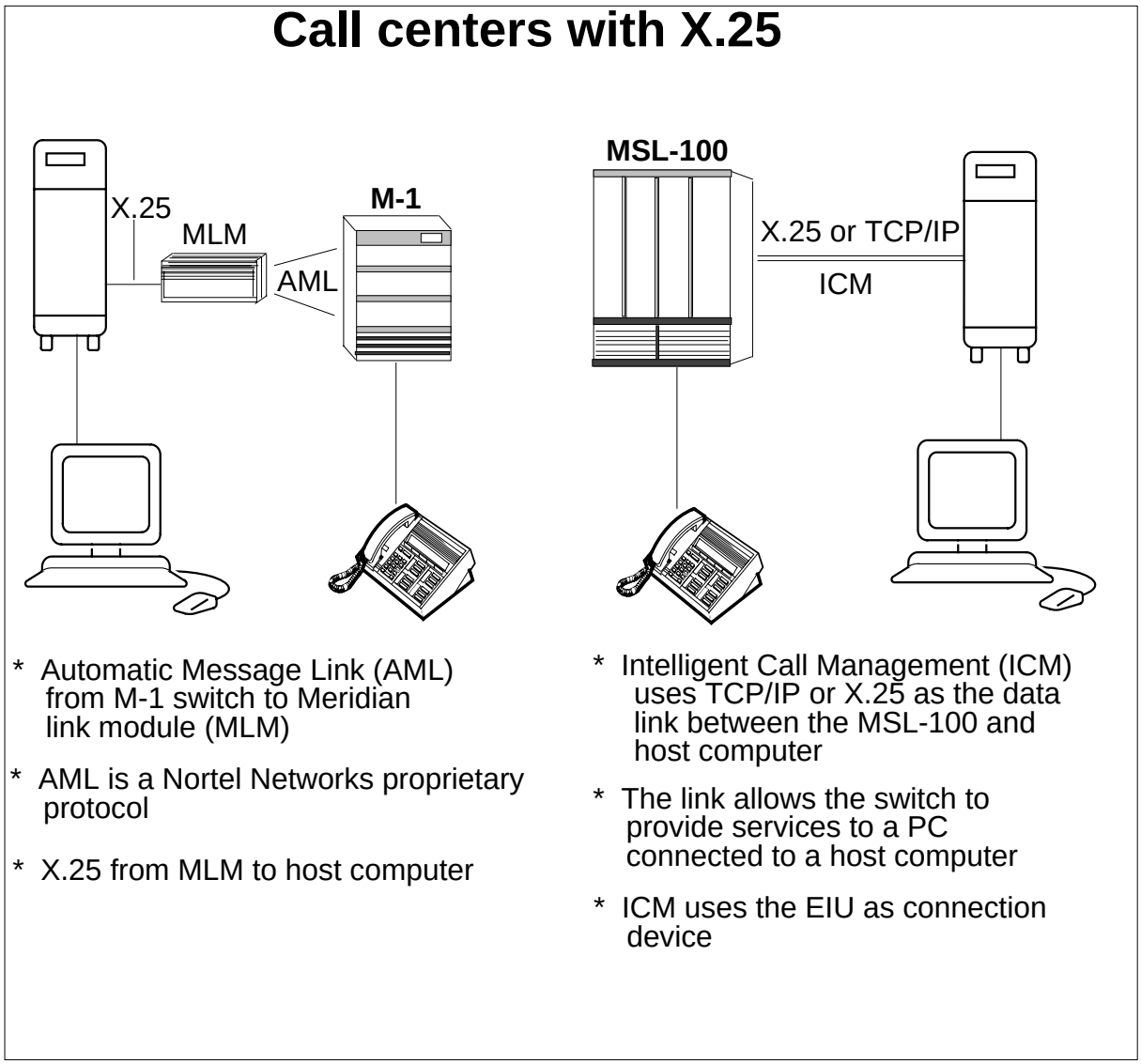


Figure 9-4 Call centers (Meridian 1/MSL-100)

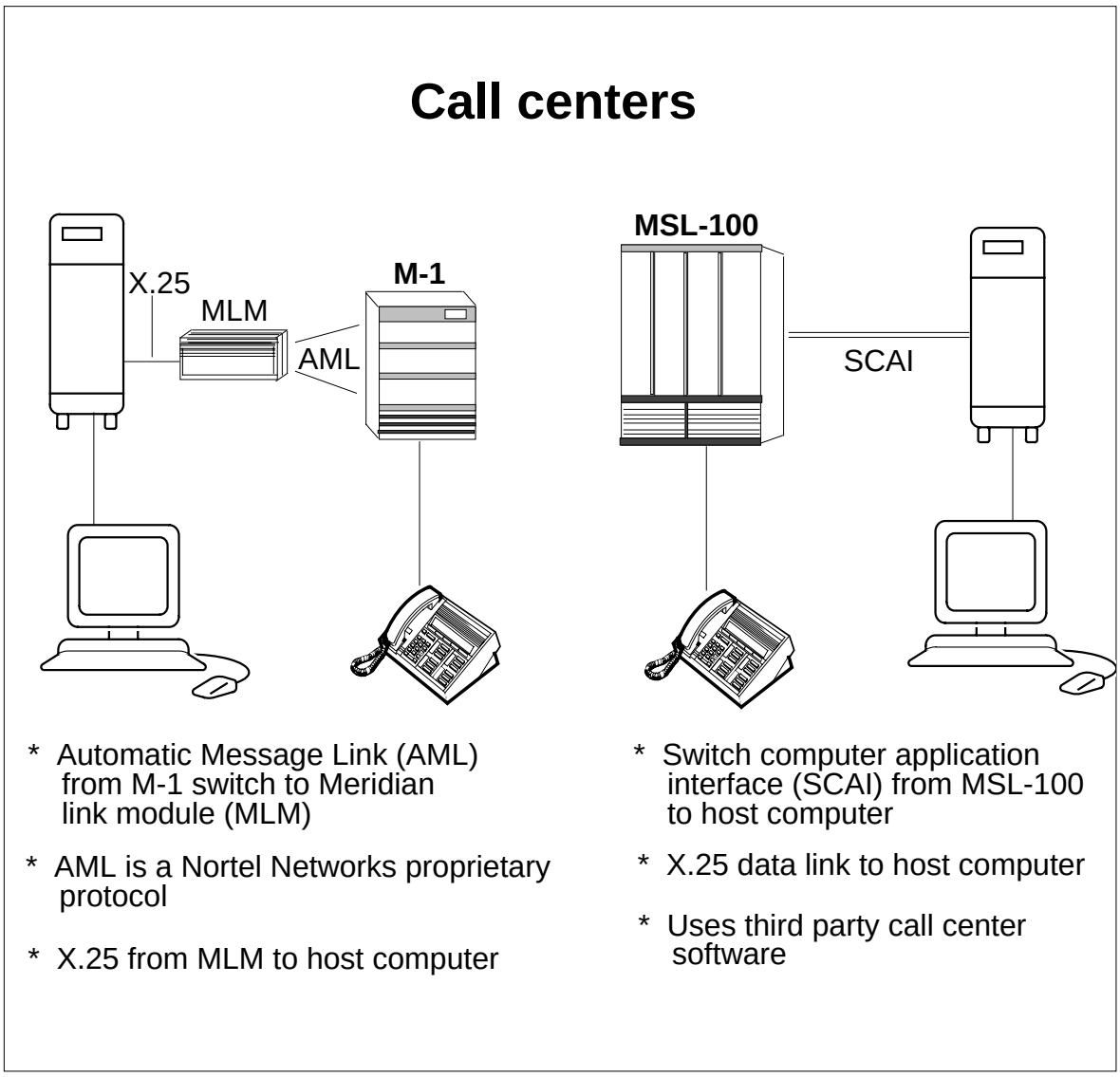


Figure 9-5 Call centers (Meridian 1/MSL-100)

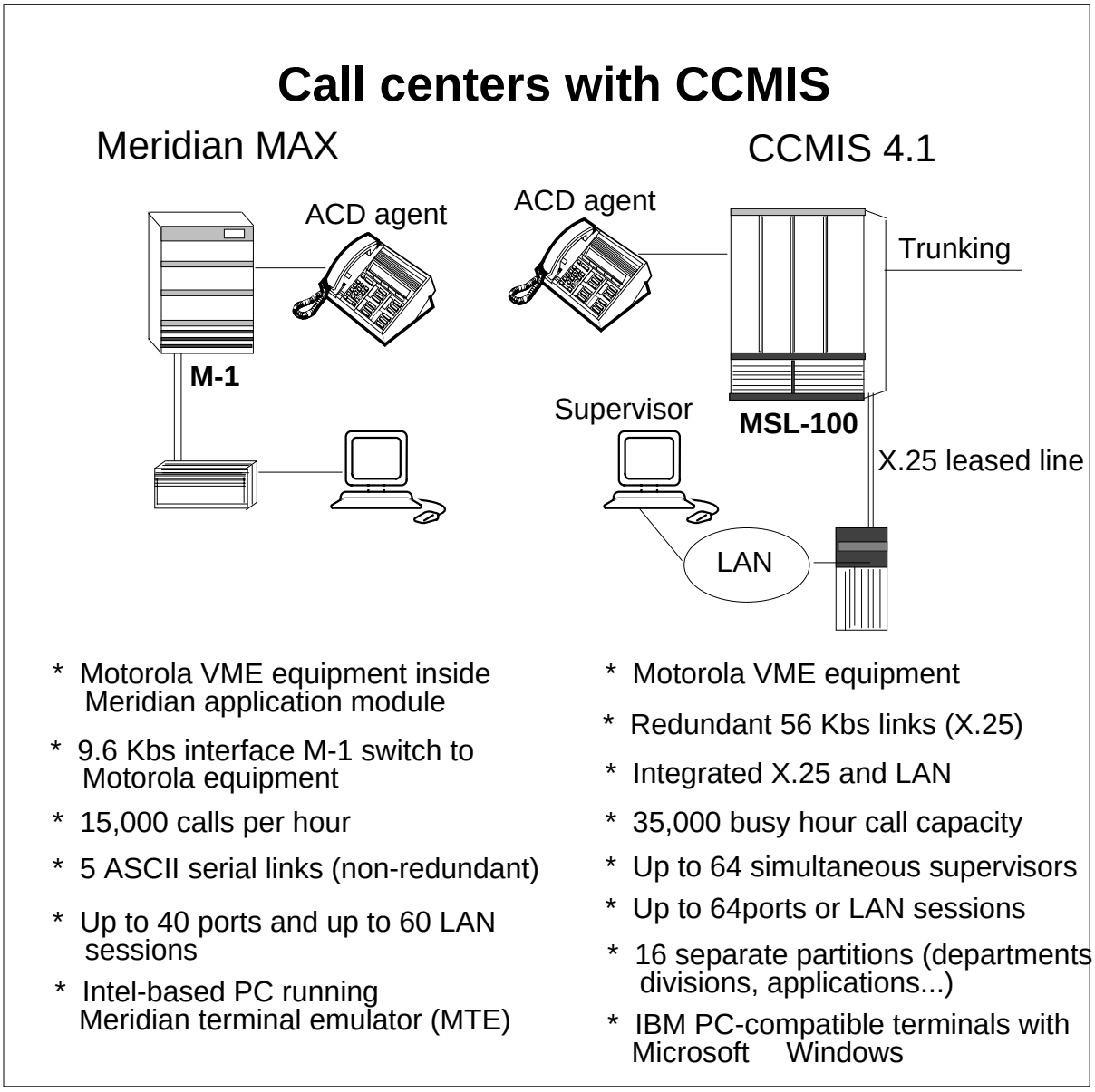
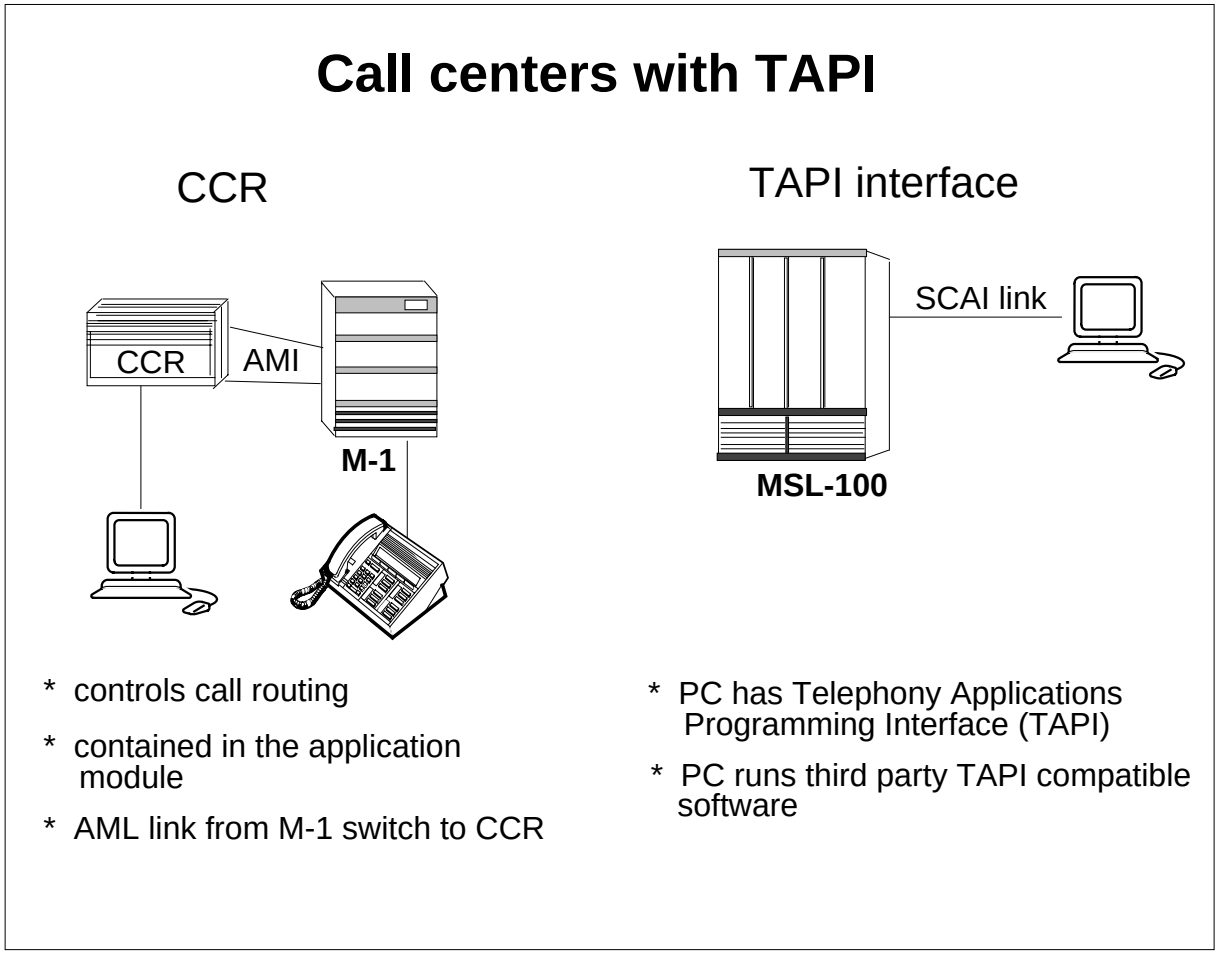


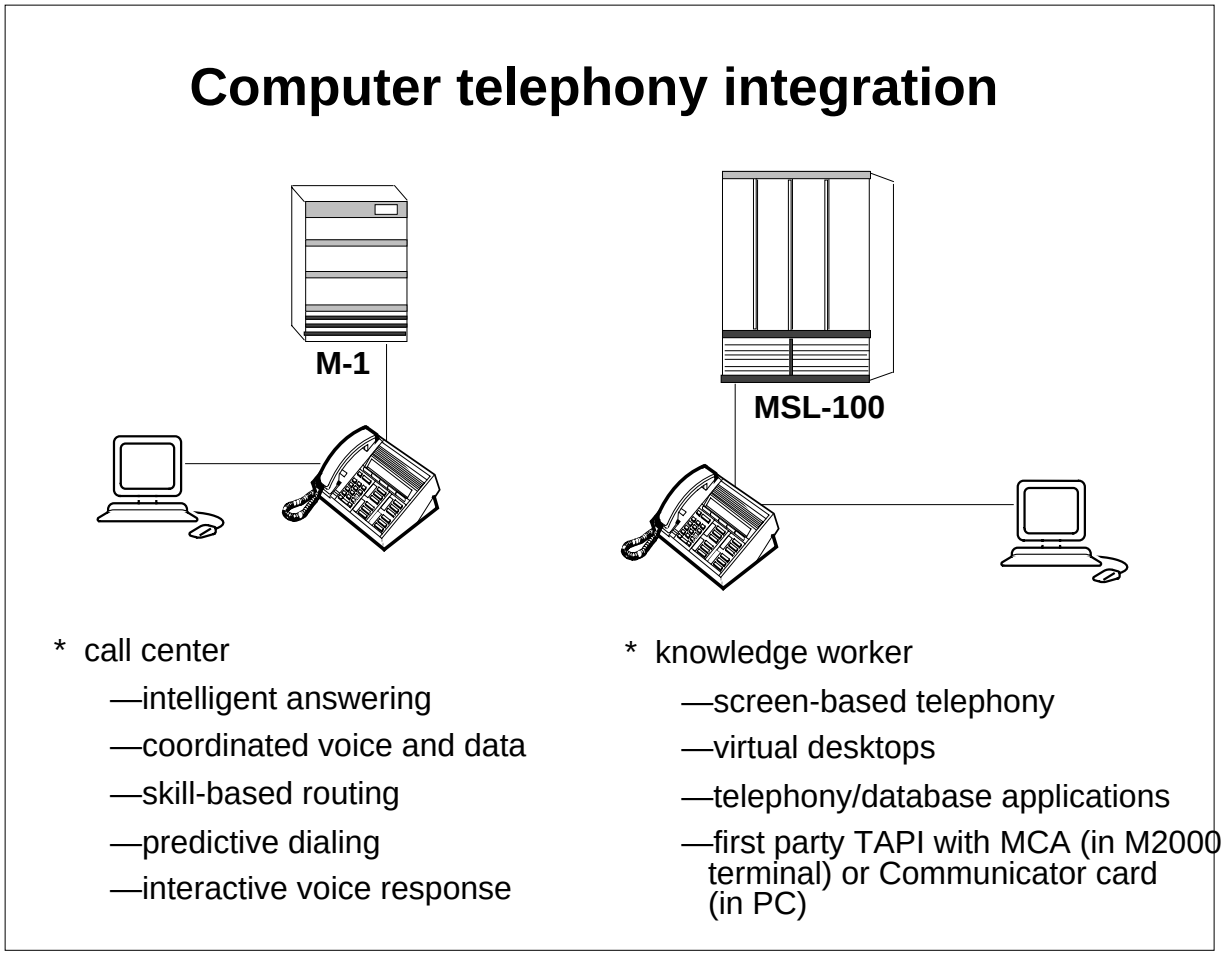
Figure 9-6 Call centers (Meridian 1/MSL-100)



Computer telephony integration

Figure 9-7, "Computer telephony integration (Meridian 1/MSL-100)" on page 9-8 is an example of the differences in the Meridian 1, and the MSL-100 switch computer telephony integration.

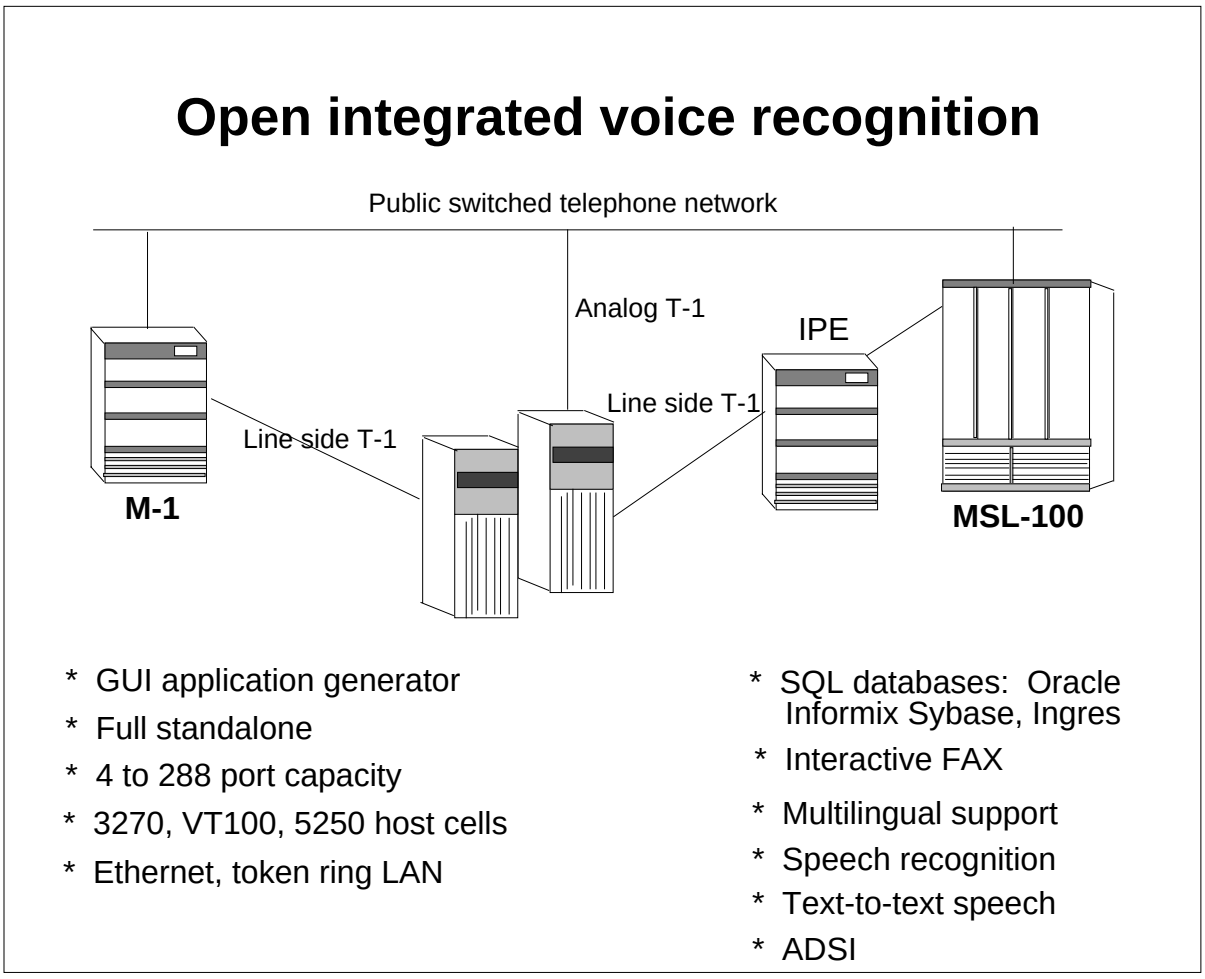
Figure 9-7 Computer telephony integration (Meridian 1/MSL-100)



Open integrated voice recognition (IVR)

Figure 9-8, "Open integrated voice recognition (IVR) (Meridian 1/MSL-100)" on page 9-9 is an example of the differences in the Meridian 1, and the MSL-100 switches open IVR.

Figure 9-8 Open integrated voice recognition (IVR) (Meridian 1/MSL-100)



Meridian Super Node

Meridian SL-100

M1 Interworking Services Guide

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NORTEL NETWORKS™