Meridian 1

Feature Group D

Description and operation

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Contents

Introduction

This document is a global document. Contact your system supplier or your Nortel Networks representative to verify that the hardware and software described is supported in your area.

Feature Group D (FGD) provides access to corporate networks from off-network sources. Feature Group D defines interconnection rules between the Local Exchange Carrier (LEC) and an Inter-Exchange Carrier (IEC) such as AT&T or MCI. These rules provide Equal Access (EA), which guarantees that all carriers are processed equally by defining level of service and quality of transmission. Feature Group D (FGD) provides the following services:

— Routes calls between Local Access and Transport Areas (inter-LATA calls) from presubscribed telephones to the IEC's Point of Termination (POT). Individual calling customers can designate one IEC to whom inter-LATA calls should be routed.

— Routes all calls prefixed by the Carrier Access Code (CAC) to the user-selected carrier.

— Passes dialed digits, Automatic Number Identification (ANI) digits, and other information to the carrier for billing, screening, routing, and other call services.

Other documentation

Refer to the following documents for additional information:

— *X11 Features and Services* (553-3001-306)

— *X11 Administration* (553-3001-311)

— *Call Detail Recording: Description and Formats* (553-2631-100)

— *Traffic Measurement: Formats and Output* (553-2001-450)

Required packages

Feature Group D (FGD), package number 158, requires the following packages:

— Basic Alternate Route Selection (BARS), package 57

- Network Alternate Route Selection (NARS), package 58, is recommended to support greater flexibility and translation capability.

— Network Class of Service (NCOS), package 32

— Basic Routing (BRTE), package 14

The following packages are required for additional optional capabilities:

— Call Detail Recording Expansion (CDRE), package 151, provides Automatic Number Identification (ANI) information in the records.

— Digit Display (DDSP), package 19, allows Automatic Number Identification (ANI) display.

— Network Authorization Code (NAUT), package 63, provides Network Authorization functions.

- NAUT requires Basic Authorization Code (BAUT), package 25, and Charge Account (CAB), package 24.

— Automatic Trunk Maintenance (ATM), package 84, allows Automatic Trunk Maintenance capabilities. ATM cannot be invoked on trunks controlled by a D-channel (DCH).

- ATM requires Tone Detector (TDET), package 65.

— ISDN Primary Rate Interface (PRI), package 146, or ISDN Signaling Link (ISL), package 147, is required to provide Automatic Number Identification (ANI) digits as Calling Line Identification (CLID).

- ISDN Signaling (ISDN), package 145, is required for either PRI or ISL.

Description

Equipping Meridian 1 switches with Feature Group D (FGD) allows the network owner to operate as an Inter-Exchange Carrier (IEC), subject to Local Exchange Carrier (LEC) regulations. The result is that off-network sources can gain access to corporate networks. A typical Feature Group D (FGD) configuration is shown in Figure 1. In this case, the corporate network contains Meridian 1 switches.

Local network and end office switching

A *calling customer* is the Local Exchange Carrier (LEC) customer that requests an end-to-end connection (originating call). A *called customer* is the LEC customer with whom the calling customer wants to speak (terminating access call).

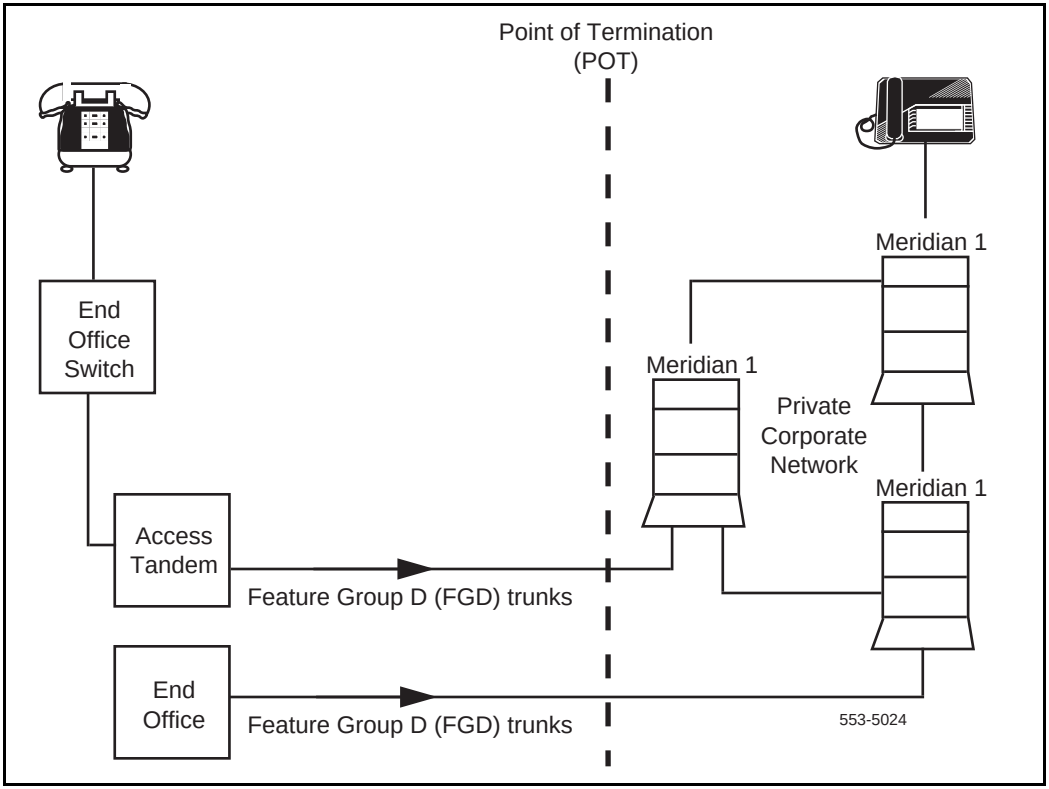
The LEC for FGD has two levels.

— The end office is where the calling customer lines are connected.

— The access tandem is where the switching system (any switch that provides FGD features) distributes traffic among the end offices that use the tandem within the Local Access and Transport Area (LATA).

An end office can access FGD directly or through an access tandem. Services provided for direct and tandem access are the same; calling customer differences are not noted.

Figure 1
Configuration example



Originating features

A calling customer can place only domestic calls. A domestic call originates and terminates within World Zone 1 (WZ1).

> ***Note:*** Currently, a calling customer may not dial outside the North American Dialing Plan. Certain locations outside the continental United States, but still within World Zone 1 (WZ1), may require international dialing and are not supported under the domestic dialing plan. For example, the Caribbean is within WZ1 but requires international dialing capabilities. Therefore, the calling customer in this particular location cannot access the Caribbean.

Domestic dialing plan

Use the following sequence for domestic calls through FGD.

(10XXX) + (0/1) +7/10D

Legend:

() Parentheses	Indicates that the numbers within the parentheses may not be required for dialing.
/ Slash	Indicates that either one or the other may be used.
10XXX	Designates that the call be handled by the IEC network.
0	Requests Nortel Networks Dial 0 services.
1	May be required for some 7-or 10-digit calls. For example, a 1 may indicate 10-digit dialing.
7/10D	Represents the 7 or 10 digit directory number for the called customer.

Presubscription

A presubscription Incoming Call (IEC) is the IEC that the calling customer selects to route domestic calls without a 10XXX designator. By dialing the 10XXX code, you can override this presubscribed IEC.

Service Access Code

Service Access Codes (SACs) are Number Plan Area (NPA) codes assigned for special use. Normally NPA codes are used to identify specific geographical areas. However, some NPA codes within the North American Numbering Plan (NANP) are designated as SAC codes to indicate generic services or access capability.

Currently four NPA codes are designated as SAC codes; each is associated with a specific service or access capability:

— 610 SAC is assigned to Canada for TWX service.

— 700 SAC is reserved for the IEC.

— 800 SAC is assigned for toll-free numbers.

— 900 SAC is reserved for special services such as pay-subscription.

SACs also provide the option to assign access capability to the LEC and IEC network. SACs further divide into categories that define the IEC identification requirements.

Ancillary Carrier identification (10-digit translation)

Access this category by dialing (1) + SAC-NXX-XXXX. Do not enter the 10XXX access code. The full 10 digits are translated to determine the IEC.

Embodied Carrier identification (6-digit translation)

Access this category by dialing (1) + SAC-NXX-XXXX. Do not enter the 10XXX access code. The 6 digits (SAC-NXX) are translated to determine the IEC.

External Carrier identification

Access this category by dialing (10XXX) + (0/1) + SAC-NXX-XXXX. The IEC is determined by the 10XXX access code. If the 10XXX is not dialed, the presubscribed IEC routes the call.

Automatic Number Identification (ANI)

For billing and screening purposes, the IEC can have ANI digits precede the called party address. The ANI includes two information digits, followed by the calling customer's area code and billing number. If the billing number is not available, the information digits are followed by the area code only.

Signaling protocol

FGD can use the following signaling protocols for originating (LEC to IEC) calls:

— Exchange Access North American (EANA) signaling

— Terminating protocol—for test calls only

Carrier test lines

The only test lines supported by Feature Group D (FGD) are those supported by the Meridian 1 system. For a complete description of the carrier test lines, refer to *Transmission Testing Capabilities: Description and Operation* (553-2001-325).

Outpulsing

Exchange access signaling is implemented with overlap signaling or outpulsing.

Terminating features

Only test calls are supported for outgoing FGD calls.

LEC test lines

The following types of test lines may be provided by the LEC:

— balance (100 type)

— nonsynchronous or synchronous

— automatic transmission

— data transmission (107 type)

— measuring (105 type)

— loop around

— short circuit

— open circuit

Interface protocol

Direction

Trunks are characterized according to the direction that supervisory and address signals are applied.

— A one-way outgoing trunk from the LEC carries the originating calls.

Note: One-way outgoing trunks, from the LEC to the IEC, do not provide IEC test capability.

— A one-way incoming trunk to the LEC carries terminating calls.

— A two-way trunk carries both originating and terminating calls.

Signaling protocol

The supported signaling protocols are terminating protocol (for outbound test lines only) and Exchange Access North American (EANA) signaling.

Terminating protocol

In addition to the originating signaling protocol, there is one terminating protocol for line tests as follows:

1 The IEC seizes a trunk to the LEC and applies a connect (off-hook) signal to the trunk.

2 The LEC responds with a wink-start signal, which informs the IEC that the LEC is ready to receive the address field.

3 On receipt of this wink-start signal from the LEC, the IEC will multifrequency (MF) outpulse the address field.

4 The LEC screens and translates the address field. If the terminating call is delivered to the appropriate end office, the LEC completes the call to the proper called test line. An IEC may have to establish more than one Point of Termination (POT) to obtain access to an entire LATA.

5 When the called customer answers, answer supervision (off hook) is passed to the IEC from the LEC. The time that the off-hook signal is received by the LEC is recorded by Automatic Message Accounting (AMA) as the customer answer time.

6 When the call is over, the disconnect sequence is initiated. The time that the on-hook signal is received is recorded by AMA as the disconnect time.

Exchange Access North American (EANA) signaling

Exchange Access North American (EANA) signaling consists of two fields, the identification field and the address field.

— The **identification field** contains the calling customer's identification number or ANI digits.

— The **address field** contains the called number.

This arrangement allows the identification field (ANI digits) to be pulsed to the IEC before the called number. With the addition of overlap pulsing, which initiates pulsing to the IEC before the customer has completed dialing, post-dialing delay is minimized. The originating call process follows:

1 After the customer dials all but the last four digits of the called number, the LEC initiates actions to seize a trunk to the IEC.

2 The IEC responds to the trunk seizure with a wink-start signal when ready to receive pulsing. The time that the wink-start signal is received is recorded by Automatic Message Accounting (AMA) as the IEC connect time.

3 After receiving the wink-start signal from the IEC, the LEC starts MF outpulsing the identification field.

4 When both customer dialing and outpulsing of the identification field are completed, the LEC outpulses the address field.

5 When the IEC receives all the pulsing information, it responds with an acknowledgment wink.

6 After receiving the acknowledgment wink, the LEC connects the talking path from the calling customer to the IEC.

7 After the called customer answers, the answer off-hook signal is sent from the IEC to the originating LEC. The time that the off-hook signal is received is recorded by AMA as the customer answer time.

8 When the call is completed, the disconnect sequence is initiated. The time that the on-hook signal is received is recorded by AMA as the disconnect time.

Carrier classification

Inter-Exchange Carrier (IEC) provides connections between Local Access and Transport Areas (LATAs) and serving areas where the calling and called customers are located in World Zone 1.

International Carrier (INC) provides connections between a customer located in the contiguous 48 United States and a customer located outside World Zone 1.

Consolidated Carrier (IEC & INC) combines the services of Inter-Exchange and International Carriers.

When calls are being forwarded to carriers using exchange access signaling, the protocol is influenced by the classification of the receiving carrier. The IEC and IEC & INC receive calls destined for customers located in World Zone 1 with EANA signaling.

Call categories and pulsing formats

Call categories are based on the information dialed by the originating customer. Table 1 identifies the applicable call categories for FGD switched access service.

Table 1
Call categories

Customer dials	Call category
(10XXX)+(1)+(NPA)+NXX+XXXX - NPA is in area covered by North American Numbering Plan	(Inside WZ 1) 1+
(10XXX)+0+(NPA)+NXX+XXXX - NPA is in area covered by North American Numbering Plan	(Inside WZ 1) 0+
(1)+SAC+NXX+XXXX	1+(Embodied SAC)
(10XXX)+(1)+SAC+NXX+XXXX	1+(External SAC)
(10XXX)+(0)+SAC+NXX+XXXX	0+(External SAC)
95Y+XXXX y = 8 or 9	Test (7 digits)
10X	Test (3 digits)
Legend: ( ) = variable inclusion; whole contents may not be required NPA = area code in North American Numbering plan NXX = end-office code in North American Numbering plan SAC = service access code WZ = World Zone	

Table 2 shows the protocols available for each call category depending on the carrier classification.

Table 2
Interface protocols

Call category	IEC	IEC & INC
(Inside WZ1) 1+	EANA	EANA
(Inside WZ1) 0+	EANA	EANA
10XXX+0	EANA	EANA
1+(Embodied SAC)	EANA	EANA
1+(External SAC)	EANA	EANA
0+(External SAC)	EANA	EANA
Test	EANA	EANA

Legend:

IEC = Inter-Exchange Carrier
IEC & INC = Consolidated Carrier
EANA = Exchange Access North American Signaling
OS-1 = Operator Services Signaling - Inside World Zone 1
OS-O = Operator Services Signaling - Outside World Zone 1

Tables 3 and 4 summarize the pulsing formats by call category for EANA and terminating protocols, respectively.

Table 3
Access North American signaling

Call category	Identification field	Address field
(Inside WZ 1) 1+	KP+(II+3/10D)+ST	KP+(NPA)+NXX+XXXX+ST
(Inside WZ 1) 0+	KP+(II+3/10D)+ST	KP+0+(NPA)+NXX+XXXX+ST
10XXX+0	KP+(II+3/10D)+ST	KP+0+ST
1+(Embodied SAC)	KP+(II+3/10D)+ST	KP+SAC+NXX+XXXX+ST
0+(External SAC)	KP+(II+3/10D)+ST	KP+0+SAC+NXX+XXXX+ST
Test (7D)	none	KP+95Y+XXXX+ST
Test (3D)	none	KP+10X+ST

Legend:

II = 2-digit code for ANI information
3/10D = 3 or 10 digit
Y = 8 or 9
3D = 3 digits
7D = 7 digits

Table 4
Terminating protocols

Call category	Address field
IEC calls to directory numbers within LATA	KP+(NPA)+NXX+XXXX+ST
IEC calls to Directory Assistance Service (555+1212)	KP+(NPA)+555+1212+ST
IEC calls to LEC Test Lines (see note)	KP+95Y+XXXX+ST - Y=8 or 9 or KP+10X+ST
Note: End-office codes other than 95Y can be used with LEC test lines in some areas.	

EANA protocol specifications

LEC-to-carrier pulsing

The format restrictions on the pulsing combinations for calls in the (Inside WZ 1) 1+ and (Inside WZ 1) 0+ categories are as follows:

Identification field	Address field
KP+(II+3/10D)+ST	KP+(0)+7/10D+ST

The format restrictions on the pulsing combinations are as follows:

— The first digit in the identification field after KP is never 1.

— The start pulse at the end of the identification sequence is not primed.

— The 7/10 D in the address field conforms with the NANP.

Variations

When ANI is provided, the structure of the identification field is KP+(II+3/10D)+ST. The variations in the field are Information digits (II).

Table 5 is the default table that shows the digit pair default assignments.

Table 5
Information digits (II)

Information digits	Explanation
00	Regular line
01	4- and 8-party
06	Hotel/Motel
07	Coinless
10	Test call
12–19	Cannot be assigned because of conflicts with 1NX used as first digits in international calls
20	Automatic Identification of Outward Dialing (AIOD) listed directory number sent
27	Coin
95	Test Call

Alternative arrangements

The carrier may elect to receive ANI or not to receive ANI.

The ANI digits are the full 10-digit billing number, including the Number Plan Area (NPA), except when the calling line's billing number cannot be identified. When the calling line's billing number cannot be obtained, a 3-digit NPA, associated with the originating end office, is sent.

Without ANI, the basic format of the pulsing stream received by the carrier is as follows:

— KP+ST+KP+(0)+7/10D+ST

The identification field without ANI is reduced to KP+ST. By eliminating ANI, the two information digits (II) are also eliminated.

Time limits

Wink-start—The IEC returns the wink-start signal within 3.5 seconds (Carrier Switch Time [CSWT]) of the trunk seizure.

Wink-start guard—The end of the wink-start signal must not occur before 210 ms (CSWT) after receipt of the incoming seizure signal. The IEC must be prepared to receive MF pulses 35 ms after the end of the wink-start signal. The LEC waits for 50 ms (Bell Operating Company Switch Time [BSWT]) after the end of the wink-start signal before initiating MF pulsing.

Acknowledgment wink—The IEC responds with the acknowledgment wink between 200 ms (CSWT) and 3.5 seconds (CSWT) after receipt of the complete address field. The IEC should not attempt to use the talking path for communication with the calling customer before returning the acknowledgment wink.

Answer—The IEC provides an on-hook state continuing for at least 250 ms (CSWT) between the acknowledgment wink and the steady off-hook signal indicating called party answer.

EANA protocol example

Tables 6 and 7 show examples of several originating calls using Exchange Access North American (EANA) signaling protocol.

Table 6
EANA protocol: customer dials a World Zone 1 number

Situation Customer dials (10990)+(1)+815+NXX+XXXX Trunk group uses Exchange Access North American signaling protocol		
Interface interactions		
LEC	POT	Meridian 1
Customer dials all but last 4 digits		
Seize	----------><----------	Wink
Identification field KP+00+212+555+XXXX+ST	----------><----------	
Customer finishes dialing		
Address field KP+815+NXX+XXXX+ST	----------><----------	Acknowledgment wink
LEC connects talking path		
	----------<----------	Answer
Disconnect	----------><----------	
	----------<----------	Disconnect
Interpretation Class of service of calling line is Regular (II=00). Billing number of calling line is 212+555+XXXX. Dial 0 calling service is not requested (1+call). Called number is 815+NXX+XXXX.		

Terminating protocol example

Table 7 shows an example of a call to an LEC test line using the FGD terminating protocol.

Table 7
Terminating protocol: carrier call to an LEC test line

Situation Carrier's craftsperson to connect to an LEC test line Trunk group uses terminating signaling protocol		
Interface interactions		
Meridian 1	POT	LEC
Seize	---------->	
	<----------	Wink
Address field		
KP+95Y+XXXX+ST	---------->	
	<----------	Answer
Test		
Disconnect	---------->	
	<----------	Disconnect
Interpretation		
Requests connection of incoming trunk to test line 95Y+XXXX, where Y=8 or 9. Carriers should note that office codes other than 95Y can be used with LEC test lines in some areas.		

Hardware

This section describes the Meridian 1 hardware requirements for FGD.

Trunks

Trunk hardware must support EAM, EM4, or Loop Dial Repeating (LDR) line signaling, including digital channels.

MF signaling

FGD trunks need MF tone receiving hardware for incoming calls and MF tone sending hardware for outgoing calls.

MF tone receiving is provided by a new QPC916 MF Receiving Card (MFRC). MF tone sending is provided by the existing MF loop or by the Meridian 1 Conference/Tone and Digit Switch (TDS) card.

MF senders

For the non-Meridian 1 environment, the existing MF loop provides MF sending capability. In a Meridian 1 environment, the MF sending capability of the Conference/TDS card is used. The generic abbreviation MFS is used throughout this document to denote both kinds of senders.

The Meridian 1 feature provides support for Conference/TDS and MF loop coexistence and coordinated operation:

— Both MF loops and Conference/TDS loops are eligible when MF sending is needed for an outgoing trunk. (This was needed for Central Automatic Message Accounting [CAMA] and Controlled Class of Service Allowed [CCSA] type trunks only prior to the present feature.)

— Both MF loops and Conference/TDS loops can serve Meridian 1 or non-Meridian 1 trunks or both.

— The MF sending services provided by the Meridian 1 feature are used for terminating calls on FGD trunks. Only terminating test calls are supported.

MF receivers

An MF Receiver Card (MFRC) such as the QPC916 is used to service incoming calls on all current FGD trunks.

General description

Each MFRC contains two independent MF receivers that use digital signal processing technology. The card can be plugged into any standard EPE shelf. Table 8 provides the MF receiver (MFR) specifications.

Table 8
MFR specifications

Parameter		Limits	Conditions
1	General:		
	— # of receivers	2	
	— coding	U-Law	
2	Input frequencies (HZ)	700 900 1100 1300 1500 1700	Unless otherwise noted. hi tone: –7 dbm lo tone: –7 dbm Freq: nominal Noise: –25 dbm, white Signal duration: 50 ms Pause duration: 50 ms
3	Frequency discrimination: — must accept	+/– (1.5% + 5Hz)	Noise: –30 dbm
4	Input level:		
	— must accept	0 to –25 dbm per tone	
	— must reject	below –35 dbm per tone	

Table 8
MFR specifications

Parameter		Limits	Conditions
5	Signal duration:		
	— must accept	>30 ms	All signals except KP
	— must reject	<10 ms	
	— must accept (KP)	>55 ms	KP signal
	— may accept (KP)	>30 ms	KP signal
	— must reject (KP)	<10 ms	KP signal
6	Signal interruption		
	— ignore interruption	<10 ms	After minimum length signal has been received
7	Time Shift between two frequencies:		
	— must accept	<4 ms	
	Coincidence between the two frequencies:		
	— must reject	<10 ms	
8	Interdigit pause		A pause means:
	— must accept	>25 ms	signal <–35 dbm
9	Max dialing speed	10 digits per second	
10	Tolerance to twist:		
	— must accept	<6 dbm	One tone relative to the other tone.
11	Reception in presence of disturbances.		
12	Error rate in presence of white noise	< 1/2500 calls	Nominal freq: -23 dbm/tone On/Off = 50/50 ms Signal to noise ratio = (–20 dbm all digits each call) – (10 digits)

Table 8
MFR specifications

Parameter		Limits	Conditions
13	Immunity to impulse noise error rate	< 1/2500 calls	Nominal freq: –23 dbm/tone On/Off = 50/50 ms Signal to noise ratio = –12 dbm ATT Digit simulation test tape #291m from pub. 56201 Duration: 1 hour
14	Power lines:		
	— error rate	< 1/2500 calls	60 Hz signal at –9 dbm or 180 Hz signal at –22 dbm
15	Third freq:		
	— must accept in the presence of third freq. if it is	< -28 dbm	Below each frequency
Note: Digit is accepted if there are only two valid frequencies.			

Feature interactions

The following paragraphs describe the interactions between the listed features and Feature Group D only. For a complete explanation of these features, see *X11 Features and Services* (553-3001-306).

Access restriction

FGD trunks must have answer supervision and disconnect supervision.

Outgoing FGD trunks are supported for testing purposes only.

Incoming FGD trunks have Unrestricted Access (UNR), except that FGD trunks cannot terminate to FR1 tie trunks or FR1 stations because they are, by definition, denied access to and from the exchange network.

Table 9 shows the access summary from FGD trunks for the listed functions.

Table 9
Access summary from FGD trunks

	Conference, Privacy release, Mixed sets	Hunting, Direct Access	Night Posting, Call Pickup, TAFAS, Call Forward	Attendant extended	Hold, Call Transfer
WATS	Access allowed if signaling arrangements permit	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console loop if signaling is not permitted	Access allowed if signaling arrangements permit
FX	Access allowed if signaling arrangements permit	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console loop if signaling is not permitted	Access allowed if signaling arrangements permit
CCSA UNR to SRE	Access allowed if signaling arrangements permit	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console loop if signaling is not permitted	Access allowed if signaling arrangements permit

Table 9
Access summary from FGD trunks

	Conference, Privacy release, Mixed sets	Hunting, Direct Access	Night Posting, Call Pickup, TAFAS, Call Forward	Attendant extended	Hold, Call Transfer
CCSA FRE	Access allowed if signaling arrangements permit	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console loop if signaling is not permitted	Access allowed if signaling arrangements permit
CCSA FR1	Access not allowed	Access not allowed	Access not allowed	Access not allowed	Access not allowed
CCSA FR2	Access not allowed	Access not allowed	Access not allowed	Access not allowed	Access not allowed
DID	Access allowed if signaling arrangements permit	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console loop if signaling is not permitted	Access allowed if signaling arrangements permit
CO	Access allowed if signaling arrangements permit	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console loop if signaling is not permitted	Access allowed if signaling arrangements permit
TIE UNR to SRE	Access allowed if signaling arrangements permit	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console loop if signaling is not permitted	Access allowed if signaling arrangements permit
TIE FRE	Access allowed if signaling arrangements permit	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console loop if signaling is not permitted	Access allowed if signaling arrangements permit
TIE FR1	Access not allowed	Access not allowed	Access not allowed	Access not allowed	Access not allowed
TIE FR2	Access not allowed	Access not allowed	Access not allowed	Access not allowed	Access not allowed

Table 9
Access summary from FGD trunks

	Conference, Privacy release, Mixed sets	Hunting, Direct Access	Night Posting, Call Pickup, TAFAS, Call Forward	Attendant extended	Hold, Call Transfer
STN UNR to SRE	Access allowed if signaling arrangements permit	No restrictions	No restrictions	Access allowed, but call is held on console loop if signaling is not permitted	Access allowed if signaling arrangements permit
STN FRE	Access allowed if signaling arrangements permit	No restrictions	No restrictions	Access allowed, but call is held on console loop if signaling is not permitted	Access allowed if signaling arrangements permit
STN FR1	Access not allowed	Access not allowed	Access not allowed	Access not allowed	Access not allowed
STN FR2	Access not allowed	Access not allowed	Access not allowed	Access not allowed	Access not allowed
PAG	Access not allowed	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console	Only consultation-hold allowed
DICT	Access not allowed	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console	Only consultation-hold allowed
RAN	Access not allowed	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console	Only consultation-hold allowed

Table 9
Access summary from FGD trunks

	Conference, Privacy release, Mixed sets	Hunting, Direct Access	Night Posting, Call Pickup, TAFAS, Call Forward	Attendant extended	Hold, Call Transfer
AIOD	Access not allowed	Access not allowed	Access not allowed	Access not allowed	Access not allowed
CCSA ANI	Access allowed if signaling arrangements permit	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console loop if signaling is not permitted	Access allowed if signaling arrangements permit
CAMA	Access allowed if signaling arrangements permit	TGAR restricted only	TGAR restricted only	Access allowed, but call is held on console loop if signaling is not permitted	Access allowed if signaling arrangements permit

When a fully restricted party receives calls through an unrestricted FGD trunk, the restriction still applies. Table 10 shows that though calling parties have various levels of access (FRE, FR1, and FR2), the restrictions for the FGD trunk apply.

Table 10
Restricted access summary from FGD trunks

Connection type	Allowed or Denied		
	FRE	FR1	FR2
Direct Access	A	D	D
Conference or Transfer	A	D	D
CFO	A	D	D
CFF	A	A	A
Call Forward No Answer	A	D	D
Call Forward Busy	Not applicable		
Hunt	A	D	D
MIX, MULT, Private Line	A	D	D
TAFAS (of W by Z)	A	D	D
Call Pick Up (of W by Z)	A	D	D

Automatic Trunk Maintenance (ATM)

FGD trunks support Automatic Trunk Maintenance (ATM). Automatic test lines are provided by the LEC for T100 and loop lines using a reference and a test trunk. For more information, see LD 92 in the *X11 Administration* (553-3001-311).

Note: ATM is not supported on trunks controlled by a D-channel.

Barge-In

Barge-In is not supported on an FGD trunk.

Call Detail Recording (CDR)

The CDR records can contain ANI information. For a complete discussion, see *Call Detail Recording: Description and Formats* (553-2631-100).

Calling Line ID (CLID)

When an FGD call is routed over ISDN Primary Rate Interface (PRI) or Integrated Services Link (ISL), the complete 10-digit ANI number is provided as the CLID. Three-digit ANI numbers are not treated as CLID.

Call Party Disconnect Control (CPDC)

On an incoming FGD route, Call Party Disconnect Control is allowed but not recommended. If CPDC = YES, any disconnect signal received from the LEC is ignored.

This does not apply to test calls.

Call Party Name Display (CPND)

The name defined for the incoming FGD trunk access code is displayed.

Customer Controlled Routing (CCR)

The ANI is used as the CLID when sent to the CCR processor for displaying the calling party number.

Dialed Number Identification Service (DNIS)

The N digit DNIS modification available with X11 release 24 changes the number of supported DNIS digits from one to seven to one to thirty-one. However, Feature group D will not support 31 digits DNIS. It will support 7 digit of DNIS information. To implement this change, customers must set the NDGT prompt in LD 16 to indicate the number of DNIS digits expected (1–7, with a default of 4).

For every incoming FGD call, the DNIS is saved. Normal FGD termination uses NARS to reach an Automatic Call Distribution Directory Number (ACD DN).

DNIS information can be displayed on a terminating telephone across call modification. If a DNIS trunk call originates from an FGD trunk and the terminating agent performs call modifications within the same switch, the DNIS number appears on the terminating telephone. The number of DNIS digits that appear depends on the software release installed and the number of digit display available on the set. This capability applies to both ACD and non-ACD agents, and to such call modifications as Conference, Transfer, Call Park, and Call Park Recall.

In X11 release 19, the last three or four digits of the FGD address field is the DNIS number displayed and with X11 release 20, the last of the one to seven digits is displayed as the DNIS number.

In X11 release 19 and later, if the DNIS-CDR option of the incoming FGD trunk's Route Data Block is enabled, the DNIS number is appended to the end of the CDR record.

Call Detail Recording (CDR) supports the DNIS number for the FGD trunk. For more information, refer to *Call Detail Recording: Description and Formats* (553-2631-100).

Digit Display

FGD supports Digit Display where allowed.

If more than 16 digits (including delimiters) are displayed, the digits scroll to the left, deleting the left-most digits from the display. The right-most 16 digits remain on the display.

Incoming Digit Conversion (IDC)

Incoming Digit Conversion (IDC) is not supported on FGD trunks.

ISDN PRI and ISL

FGD calls should use ISDN networking capability after a call has reached the network.

Network Alternate Route Selection (NARS)

FGD relies on the NARS feature for call termination. NARS is enhanced by FGD to allow local termination.

Network Call Redirection (NCRD)

If an FGD call is redirected for any reason supported by NCRD, ANI is used for updating the terminating telephone's display.

Malicious Call Trace (MCT)

A field added to the MCT record output contains the identification code (II+ANI) received from the LEC, thus identifying the caller. A second line is added to the MCT printout that lists a header "ANI," the II, and the ANI digits. If no ANI digits are received, an unmodified Malicious Call Trace (MCT) report is printed. An example of the MCT printout is shown below:

```
MCT CUST0       TN 117 3 10 4       *TN 109 3 10 2       15:30:05   12/11/91
ANI  00-2134159661
```

If an incomplete identification field is given, the printout includes all the digits received.

```
MCT CUST0       TN 117 3 10 4       *TN 109 3 10 2       15:30:05   12/11/91
ANI  00-213
```

Minor Alarm

The minor alarm on the attendant console lights up whenever one or more MFR units fails testing.

Private Line Service

FGD trunks should not be defined as Private Lines.

Traffic measurements

See *Traffic Measurement: Formats and Output* (553-2001-450) for a complete description of the traffic measurement printouts.

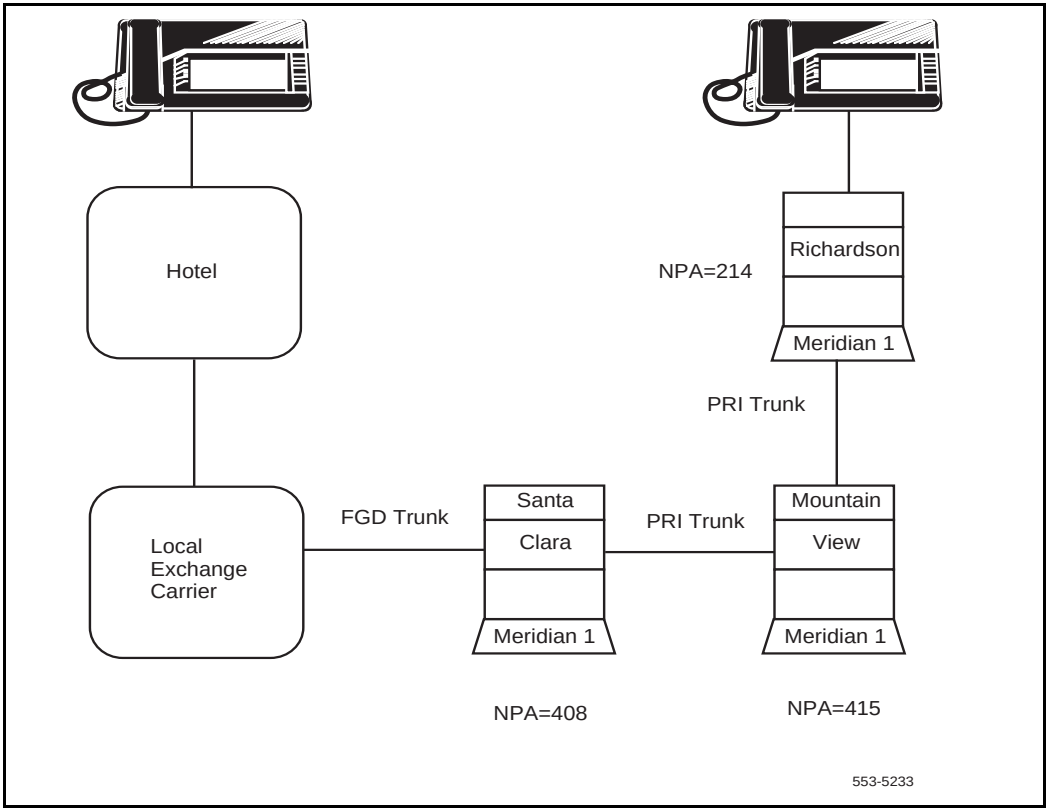
Trunk Group Distinctive Ringing

Trunk Group Distinctive Ringing is supported by FGD trunks when DRNG = YES in the FGD data block.

Trunk Verification from a Station (TVS)

Sets with Trunk Verification from a Station Allowed can access FGD trunks and use the MF capability to dial test numbers of three or seven digits (see Figure 2). There is usually no dial tone provided on FGD trunks.

Figure 2
Trunk verification



Feature operation

The rest of this document describes call direction in the context of Meridian 1 Functionality. Incoming calls are calls from the Local Exchange Carrier (LEC) to the IEC (Meridian 1), and outgoing calls are from the IEC to the LEC. Therefore, incoming calls are *calls coming into* the Meridian 1 network.

Example of using the FGD feature

How to initiate a call

Presubscribed user—The case of a presubscribed user assumes prior arrangements have been made to use a specific long distance network or local telephone company (for example SPRINT, MCI, or the carrier being served by the SL-1 with FGD capability). When the user picks up a presubscribed home or work phone and dials a long distance call in the normal way (for example, 1+area code+phone number), the LEC routes that call to the presubscribed carrier for termination over that carrier's network.

Non-presubscribed user—In the case of a non-presubscribed user, the user dials a 5-digit carrier access code (10XXX) before the address digits. This alerts the LEC that this particular call should be routed to the requested long distance carrier for completion. SPRINT, MCI, AT&T, and others have carrier access codes that are recognized by all LECs.

Incoming call routing

Incoming call processing

Call processing of incoming FGD calls is designed to provide maximum flexibility in call routing to external or local DNs.

For call types other than three-digit test calls and operator calls, FGD uses the existing NARS translation table(s). There are usually two translation tables if the NARS package is equipped:

— The first translation table contains routing and other information about NPAs.

— The second translation table contains similar information about NXXs in the home NPA.

NARS accesses these tables by using two different access codes: AC1 and AC2. However, there is no built-in constraint in relating AC1 (or AC2) to the NPA (or NXX) table.

The FGD database identifies the NARS access codes (AC1 or AC2) as being the LDAC (Long Distance Access Code—the one leading to the desired NPA translation table) or the LAAC (Local Area Access Code—the one leading to the NXX translation table).

If the Basic Alternate Route Selection (BARS) and not the NARS package is equipped, then one translation table exists, and the LDAC and LAAC are identical. This could also be true if the NARS package is equipped but only one translation table is configured.

To convert the addressing information obtained from the FGD trunk into a digit sequence that can be processed by NARS, the FGD software prefixes the access code as either LDAC or LAAC.

Incoming FGD calls are processed as follows:

1 Digit collecting phase in which all incoming MF digits (ID field and address field) are collected

2 Address format validation that checks for valid NPA and NXX and checks that the address fields contain the correct number of digits

The first three digits (or the first four, if the first is a 0) must comply with the following restrictions:

- NPA or NXX, with 2<=N<=9, P=0 or P=1, A or X = 0 to 9

  An invalid address field leads to call interception, except for the cases in which too many digits are received or no ST is received. In these cases, the MF receiver is released, the trunk is locked out, and no intercept occurs.

3 ANI field format validation

The call category determines whether the LEC provides the ANI data.

4 II (information digits) screening

The first two digits of the ID field are the II digits. A list of allowed II digits is contained in the FGD block. If the II digits are not defined, the call is intercepted and an error message is (optionally) issued.

5 ANI screening (optional)

ANI digits are checked, and an NCOS is attached to the call. In the case of an undefined ANI, call interception can occur, and an error message can (optionally) be issued.

6 Address preparation

The address field is retrieved, and one of the NARS access codes is prefixed to it, to make the number conform to the existing Meridian 1 translation tables.

7 Translation and termination

The final address is processed by the existing NARS routing.

Local termination

If the FGD call is to be routed to some other node in the network, the NARS feature can make the conversion. The NARS access code is prefixed to the digits; some additional digit manipulation also occurs.

However, the existing NARS feature is not capable of making the conversion if the call terminates on a DN in the local switch that serves as an interface to the LEC using FGD, and full digit conversion (more than four digits) is required.

In this case, the Local Termination (LTER) entry in the NARS route list block is used for local translation, and is not related to any trunk group. The LTER entry may appear in any route list and can be accessed when route selection takes place. The existing restriction facilities, which include TOD (Time Of Day schedule), FRL, and FCAS, can be applied as usual.

When an LTER entry is selected, NARS considers it a success, regardless of the result of the termination (busy, vacant number). When the LTER entry is not restricted by the facilities mentioned above, the entries following it in the route list will never be selected.

Calls inside World Zone 1 (7 digits)

These calls are characterized by an address field of seven digits. The Meridian 1 inserts the NARS LAAC access code before the address field.

Calls inside World Zone 1 (10 digits)

These calls are characterized by an address field of 10 digits. The Meridian 1 inserts the NARS LDAC access code before the address field, thus allowing routing of the call within the corporate network.

Calls inside World Zone 1 (0+ and 0-)

A call to the operator is distinguished by a digit sequence in which the first digit of the address field is 0.

The address field dialed by the incoming FGD trunk should use one of the following sequences:

— 0+ type call: KP + 0 + (NPA) + NXX + XXXX + ST

— 0+ type call: KP + 0 + SAC + NXX + XXXX + ST

— 0- type call: KP + 0 + ST

An operator DN (or up to 16 digits) is defined through a Service Change (SCH) and all “0-” and “0+” calls are directed to this DN. This can be either the local attendant DN or any DN in the network.

During call processing in the address preparation, the address field received from the FGD trunk is replaced with the operator DN described above. The call is then processed by the DN translation tables.

An option is provided to intercept all “0+” and “0-” calls to a Recorded Announcement Trunk route.

An address field sequence beginning with 0, but followed by an incorrect number of digits, or containing an invalid NPA, will lead to call intercept (invalid address format). In addition, the rest of the address field that follows the “0” is ignored.

Table 11 provides an example of a “0+” call.

Table 11
EANA protocol: customer dials 10XXX+0

Situation Customer dials 10990+0 Trunk group uses Exchange Access North American (EANA) signaling protocol		
Interface interactions		
LEC	POT	Meridian 1
Customer finishes dialing		
Seize	----------><----------	Wink
Identification field KP+0+212+555+XXXX+ST	----------><----------	
Address Field KP+0+ST	----------><----------	Acknowledgment wink
LEC connects talking path		
	----------<----------	Answer
Disconnect	----------><----------	
	----------<----------	Disconnect
Interpretation		
Class of service of calling line is regular (II=00). Billing number of calling line is 212+555+XXXX. Customer did not provide a destination address.		

Information digits screening for incoming calls

The FGD feature allows flexible II type assignment. Table 12 shows the II digits defined as defaults. The interpretation of the various II codes (00–99) is defined by the customer through service changes. The flexibility is per route: the customer defines independent FGD blocks (up to 128) containing the II definitions, then specifies one block index for each FGD route. Each number in the 00–99 range can be defined as pertaining to one of the II-types listed in Table 12. Numbers in the 00–99 range that have not been defined are considered denied.

Table 12
Information digits (II)

Information digits	Explanation
00	Regular line
01	4- and 8-party
06	Hotel/Motel
07	Coinless
10	Test call
12–19	Not assigned because of conflicts with 1NX used as first digits in international calls
20	AIOD listed directory number sent
27	Coin
95	Test Call

Information digit pairs 10, 12–19, and 95 are not generated as ANI information digits by LEC originating end offices.

Because the identification field precedes the address field for exchange access signaling, and because there is no identification field on test calls, the first two digits of the address field for test calls appear to the carrier as ANI information digits. Either a 10 or a 95 in this position tells the carrier that the incoming call is a test call.

Digits 12 to 19 are used for calls outside World Zone 1. These are not used by EANA.

In addition, an Network Class of Service (NCOS) number may be attached to an II. This allows it to bypass ANI screening. If an II has an NCOS attached to it, then

— ANI screening will not be done on calls initiated by customers with II.

— The incoming FGD trunk will have the NCOS stated above.

In the II processing phase, the information related to the call type is retrieved from the FGD block. If intercept treatment is needed (for the invalid II case), intercept treatment is applied as defined for “invalid II.”

FGD call intercept

Intercept treatment is supplied for the following invalid calls:

— Invalid address field format

— Invalid II

— Invalid ANI

The intercept treatment for each of these calls can be defined by Service Change to be Overflow Tone (OVF), a Recorded Announcement (RAN), or termination on a network or local DN.

Incoming test calls (3 and 7 digits)

The line testing facilities currently provided by Meridian 1 to incoming trunks are:

— A 100 test termination DN for simultaneous access by up to four trunks. There is one 100 test termination DN per customer.

— Four pairs of reference trunk termination DNs and test trunk termination DNs.

A test call digit sequence is a 3-digit or 7-digit sequence of the form 10X (3 digits) or 95Y-XXXX (7 digits), where Y is either 8 or 9 (the 10 and 95 prefixes may be modified by service change). There is no identification field; therefore, digits 10 or 95 appear to the carrier as an II code (information digits). The processing after the II type has been identified as a test call type is described below. Also refer to the section "Information digits screening for incoming calls" on page 47.

In the FGD blocks, there are actually two types of test call information digits (II):

— TST3, typically digits 10

— TST7, typically digits 95

In the remainder of this section, reference may be made to either TST3 or TST7, or to their corresponding digits 10 and 95.

The two types of call information are treated differently:

— **10X calls** are interpreted as calls to the T100-line test DN.

— **95Y calls** are routed via NARS/BARS using the LAAC access code.

The possible situations are

— Digits KP + 10X + ST are received on an incoming FGD trunk:

  100 is dialed (X=0); it triggers the T100 line test. Normally an incoming tie dials the T100-line test DN. If X is not 0, the call receives an invalid address treatment.

  Digit sequences starting with 10 but not containing three digits lead to call intercept (invalid address format).

— Digits KP + 95Y + XXXX + ST are received on an incoming FGD trunk.

  The whole number is treated as an address: The LAAC access code is inserted, invoking NARS/BARS translation. The call can be forwarded to the network or handled by local test equipment.

  Digit sequences starting with 95 but not containing seven digits invoke a call intercept (invalid address format).

Authorization Code prompting

FGD routes may be defined to prompt for Authorization Code.

An NCOS is attached to an incoming FGD trunk by one of the following:

— If ANI screening is bypassed, an NCOS is associated with the II type.

— If ANI screening is configured, an NCOS is defined by the ANI screening process.

— The NCOS of the call is the NCOS of the FGD trunk.

LEC trunk grouping and ANI provision by call category

LEC trunk grouping

Calls intended to terminate on an IEC POT can be assigned by the LEC to different trunk groups (for example, trunk routes) according to their category and the class of service (for example, II type) of the calling customer. Up to four such groups may exist.

On the Meridian 1, the FGD block associated with an FGD trunk route contains data regarding the call categories expected. A service change can modify this data to conform to the agreement between the LEC and the IEC. This data, together with the II screening data, serves to verify correct trunk grouping as agreed to with the LEC.

The appropriate error message is issued when a call of an unexpected category reaches the IEC. Table 1 contains a list of call categories.

An IEC switch cannot distinguish between the following two categories:

— Embodied SAC calls

— External SAC calls

If one of them is expected, all SAC calls are considered expected. Test calls are considered expected.

ANI provisions

ANI digits are provided by the LEC based on call category according to the agreement with the IEC.

The FGD block associated with an FGD trunk route determines whether ANI data is to be received on such a call.

Note: ANI data is never received on test calls.

An error message is issued when

— ANI is *not* received on a call when expected.

— ANI is received on a call when *not* expected.

ANI digits screening

This section describes the screening function to be performed on the ANI digits in an identification field.

After the complete digit string (both identification and address fields) is collected, and the call passes the II (information digits) screening, the ANI bypass option is attached to the call's information digits.

If ANI screening is not configured, the call proceeds with the NCOS of the incoming trunk. Otherwise, the following ANI screening is performed.

If the ANI provision is selected by the IEC, the ANI digits are normally 10 digits (or three digits when the calling party cannot be identified).

— NPA+NXX+XXXX (normal case)

— NPA (calling party not identified)

Calls with associated ANI digits from FGD trunks are screened against the ANI database as defined in the Meridian 1 access node.

For each allowed (or recognized) NPA, ANI screening is defined in three levels:

— NPA (3 digits)

— NPA+NXX (6 digits)

— NPA+NXX+XXXX (10 digits)

Each valid ANI is associated with a specific NCOS, which is the calling party's initial NCOS, to be used for determining call termination through Electronic Switched Network (ESN).

10 ANI digits

If the 10 ANI digits (NPA+NXX+XXXX) are received from an incoming FGD trunk, call validation is based on the screening level defined in the ANI database:

— NPA (3 digits) screening level

The received ANI digits NPA must match a defined area code in the database.

— NPA+NXX (6 digits) screening level

The received ANI digits NXX must be within the defined end office number range under the NPA.

— NPA+NXX+XXXX (10 digits) screening level

The received ANI digits XXXX must be within the defined subscriber number range under the NPA+NXX.

A match yields an NCOS to be used later for called number screening and routing. Otherwise, invalid ANI treatment is applied.

Partial ANI digits

If only three ANI digits (NPA) are received from an incoming FGD trunk and:

— The NPA is defined in the ANI database (regardless of the screening level defined):

- 3-digit ANI allowed—*Pass:* extract the specified NCOS.
- 3-digit ANI not allowed—*Fail:* apply invalid ANI treatment.

— The NPA is not defined in the ANI database—*Fail:* apply invalid ANI treatment.

Invalid ANI treatment

Possible invalid ANI treatments include routing to Overflow Tone (OVF), Recorded Announcement (RAN), or a network or local DN or considering it as passed and mapping it to an NCOS that is specified for invalid ANI.

ANI digits as Calling Line ID (CLID)

If an incoming FGD call is routed to a neighboring switch via an ISDN PRI or ISL, the complete 10-digit ANI is used as the Calling Line ID (CLID). It is then sent (in a SETUP message) to the neighboring switch for CLID display. An incomplete 3-digit ANI is not treated as a CLID.

If the SHAN field of the FGD data block associated with the incoming route indicates that the ANI should not be displayed on the terminating telephone, the ANI is still sent over the ISDN PRI or ISL as the CLID. However, the presentation indicator field of the calling party number information element is set to presentation restricted, so the CLID is not displayed on the terminating telephone.

ANI display

For FGD calls terminating in the local switch, the received ANI number is displayed instead of the route access code and member number as is currently displayed for a trunk call. The option is per FGD block.

The implementation of this capability does not modify the operation of the existing Digit Display feature.

The formats of the received ANI number are:

— KP + II + 10 + ST. The display is the 10-digit string.

— KP + II + 3D + ST. The display is the route access code and member number.

— KP + ST (no ANI). The display is the route access code and member number.

The rules and limitations of the Digit Display feature are used.

The ANI display for FGD has the same format and interactions with other features as the CLID display of an E.163 number (as opposed to a private network number).

ANI number display devices

The following devices support ANI number display:

— QCW4, M1250, and M2250 attendant consoles

— SL-1 display telephone

— M3000

— M2009, M2018, M2018S, M2112, and M2317

— M2006, M2008, and M2016S

— M2216ACD-1 and M2216ACD-2

— M2616

Dial pulse dialing on FGD trunks

Dial Pulse (DP) outpulsing on trunks is not allowed on either incoming or outgoing FGDT trunks.

Outgoing test calls

Outgoing test calls are generated by

— dialing the FGD route access code from a Meridian 1 station and a test number consisting of three or seven digits

— dialing the TVS access sequence from a Meridian 1 station to select a specific FGD trunk. For example, dial a special prefix DN, plus the Trunk Verification from a Station (TVS) special function code, plus the route access code, plus the trunk member number, and a test number (three or seven digits).

— dialing automatically from the Automatic Trunk Maintenance overlay (test numbers must contain either three or seven digits)

CDR records

The CDR records for calls in which an incoming FGD trunk was involved can (optionally) include an ANI digits field. The option is per route, defined in its FGD block. To include the ANI digits field requires the Call Detail Recording Expansion (CDRE) package.

For a detailed discussion of CDR output, see *Call Detail Recording: Description and Formats* (553-2631-100).

Transmission characteristics

For the purposes of transmission losses and gains, FGD trunks are treated as tie trunks: analog FGD trunks have PTYP = ATT (port type in LD 16) and digital FGD trunks have PTYP = DTT. These values are imposed by Service Change when defining an FGDT route. In a connection between an analog FGDT trunk and a PRI channel, the PRI channel is treated as a digital tie (DTT), overriding the definition for PRI channels.

Operating parameters

Parameters

The maximum number of Multi-Frequency Receivers (MFRs) that can be defined in the Meridian 1 system is 255.

The maximum number of FGD blocks that can be defined in the Meridian 1 system is 128.

An FGD route can be configured as a DNIS route. In this situation, the route should carry ACD calls only.

FGD trunks will use MF signaling only to establish a call. Dual Tone Multifrequency (DTMF) signaling can be used for in-band signaling after establishing an end-to-end connection. For example, it can be used for Authorization Code entry.

Terminating protocol is limited to test calls only.

FGD is available on all machine types supported by X11 release 17 and later. However, the available Protected Data Store (PDS) and disk storage is limited to the maximum amount of FGD data, particularly ANI data, that can be configured for a given machine type.

For system option 21 and SL-1 ST, the theoretical maximum is 64K words, and, if FGD ANI shares the same physical page with other features, the actual PDS available for FGD ANI is much smaller. For other systems, there is virtually no limit (approximately 2 million words).

The linear and cyclic search methods supported by Meridian 1 are acceptable for FGD trunks.

Transitional configurations

On a transitional basis, if full Meridian 1 support is not available for FGD, systems with Meridian 1 hardware can have non-Meridian 1 MFRC in a non-Meridian 1 peripheral shelf installed (together with non-Meridian 1 PE buffer) in a Meridian 1 cube with Meridian 1 power supply. In that case, MF tone receiving is performed by QPC916 receivers only, whereas MF sending can be performed by both MF loops and/or Conference/TDS cards.

MF Receiver guidelines

The MF Receiver (MFR) receives 26 MF digits from the Equal Access End Office. Holding time for the MF Receiver is estimated at 13 seconds (about 0.5 seconds per digit). When the number of MF trunks are known, the following procedures can be used to estimate the MFR requirements:

— Calculate the number of FGD calls from MF trunks. For example, with 30 CCS per trunk and 180 seconds holding time assumed:

FGD calls (FGDC) = # of MF trunks * 30 * 100/180 = 16.67 * # of MF trunks

— Calculate MFR traffic. For example, with 13 seconds receiver holding time assumed:

MFR traffic in CCS = FGDC * 13/100

Refer to Tables 13, 14, and 15 to determine the number of MFRs to support your system.

Table 13 provides information on multifrequency receiver load capacity with 6 to 15 second holding times.

Table 14 provides information on the multifrequency receiver load capacity with 16 to 25 second holding times.

Table 15 provides the multifrequency receiver requirements with the Poisson 0.1 percent blocking information.

Table 13
Multifrequency receiver load capacity: 6 to 15 second holding time (Part 1 of 2)

Average holding time in seconds	6	7	8	9	10	11	12	13	14	15
Number of MFR										
1	0	0	0	0	0	0	0	0	0	0
2	3	2	2	2	2	2	2	2	2	2
3	11	10	10	9	9	9	9	8	8	8
4	24	23	22	21	20	19	19	19	18	18
5	41	39	37	36	35	34	33	33	32	32
6	61	57	55	53	52	50	49	49	48	47
7	83	78	75	73	71	69	68	67	66	65
8	106	101	91	94	91	89	88	86	85	84
9	131	125	120	116	113	111	109	107	106	104
10	157	150	144	140	136	133	131	129	127	126
11	185	176	170	165	161	157	155	152	150	148
12	212	203	196	190	185	182	178	176	173	171
13	241	231	223	216	211	207	203	200	198	196
14	270	259	250	243	237	233	229	225	223	220
15	300	228	278	271	264	259	255	251	248	245
16	339	317	397	298	292	286	282	278	274	271
17	361	346	335	327	310	313	319	306	392	298
18	391	377	365	356	348	342	336	331	327	324
19	422	409	396	386	378	371	364	359	355	351
20	454	438	425	414	405	398	393	388	383	379
21	1487	469	455	444	435	427	420	415	410	406
22	517	501	487	475	466	456	449	443	438	434

Table 13
Multifrequency receiver load capacity: 6 to 15 second holding time (Part 2 of 2)

Average holding time in seconds	6	7	8	9	10	11	12	13	14	15
Number of MFR										
23	550	531	516	504	494	487	479	472	467	562
24	583	563	547	535	524	515	509	502	497	491
25	615	595	579	566	555	545	537	532	526	521
26	647	628	612	598	586	576	567	560	554	548
27	680	659	642	628	618	607	597	589	583	577
28	714	691	674	659	647	638	628	620	613	607
29	746	724	706	690	678	667	659	651	644	637
30	779	758	738	723	709	698	690	682	674	668
31	813	792	771	755	742	729	719	710	703	696
32	847	822	805	788	774	761	750	741	733	726
33	882	855	835	818	804	793	781	772	763	756
34	913	889	868	850	836	825	812	803	795	787
35	947	923	900	883	867	855	844	835	826	818
36	981	957	934	916	900	886	876	866	857	850
37	1016	989	967	949	933	919	909	898	889	881
38	1051	1022	1001	982	966	951	938	928	918	912
39	1083	1055	1035	1015	999	984	970	959	949	941
40	1117	1089	1066	1046	1029	1017	1002	990	981	972

Note: Load capacity is measured in CCS.

Table 14
Multifrequency receiver load capacity: 16 to 25 second holding time (Part 1 of 2)

Average holding time in seconds	16	17	18	19	20	21	22	23	24	25
Number of MFR										
1	0	0	0	0	0	0	0	0	0	0
2	2	2	2	2	2	2	2	2	2	2
3	8	8	8	8	8	8	8	8	8	8
4	18	18	18	18	18	17	17	17	17	17
5	31	31	31	30	30	30	30	30	30	29
6	47	46	46	45	45	45	45	44	44	44
7	64	63	63	62	62	62	61	61	61	60
8	83	82	82	81	80	80	79	79	79	78
9	103	102	101	100	100	99	99	98	98	97
10	125	123	122	121	121	120	119	119	118	118
11	147	145	144	143	142	141	140	140	139	138
12	170	168	167	166	165	164	163	162	161	160
13	193	192	190	189	188	186	185	184	184	183
14	218	216	214	213	211	210	209	208	207	206
15	243	241	239	237	236	234	233	232	231	230
16	268	266	264	262	260	259	257	256	255	254
17	294	292	290	288	286	284	283	281	280	279
18	322	319	317	314	312	311	309	308	306	305
19	347	344	342	339	337	335	334	332	331	329
20	374	371	368	366	364	361	360	358	356	355
21	402	399	396	393	391	388	386	385	383	381
22	431	427	424	421	419	416	414	412	410	409

Table 14
Multifrequency receiver load capacity: 16 to 25 second holding time (Part 2 of 2)

Average holding time in seconds	16	17	18	19	20	21	22	23	24	25
Number of MFR										
23	458	454	451	448	445	442	440	438	436	434
24	486	482	478	475	472	470	467	465	463	461
25	514	510	506	503	500	497	495	492	490	488
26	544	539	535	532	529	526	523	521	518	516
27	573	569	565	561	558	555	552	549	547	545
28	603	598	594	590	587	584	581	578	576	573
29	631	626	622	618	614	611	608	605	602	600
30	660	655	651	646	643	639	636	633	631	628
31	690	685	680	676	672	668	665	662	659	656
32	720	715	710	705	701	698	694	691	688	686
33	751	745	740	735	731	727	724	721	718	715
34	728	776	771	766	761	757	754	750	747	744
35	813	807	801	796	792	788	784	780	777	774
36	341	835	829	824	820	818	814	810	807	804
37	872	865	859	854	849	845	841	837	834	831
38	902	896	890	884	879	875	871	867	863	860
39	934	927	921	914	909	905	901	897	893	890
40	965	952	952	945	940	936	931	927	923	920

Note: Load capacity is measured in CCS.

Table 15
Multifrequency receiver requirements: Poisson 0.1 percent blocking

Number of MFR	MFR load (CCS)	Number of MFR	MFR load (CCS)	Number of MFR	MFR load (CCS)
1	0	18	276	35	703
2	2	19	299	36	729
3	7	20	323	37	756
4	15	21	346	38	783
5	27	22	370	39	810
6	40	23	395	40	837
7	55	24	419	41	865
8	71	25	444	42	892
9	88	26	469	43	919
10	107	27	495	44	947
11	126	28	520	45	975
12	145	29	545	46	1003
13	165	30	571	47	1030
14	187	31	597	48	1058
15	208	32	624	49	1086
16	231	33	650	50	1115
17	253	34	676		

Implementation

Engineering guidelines

When estimating the total number of call registers required by the system (NCR in LD 17), the following should be taken into account:

— An incoming FGD call uses one additional call register for the whole duration of the call.

— An outgoing FGD call uses one additional call register for the outpulsing stage only (including the subscriber's dialing).

Since the FGD block is per system, the RAN route number(s) and/or network or local DNs given in response to prompts OPER, ADFT, IIT, and ANIT (in Overlay 19) are not associated with any customer. All customers using the FGD feature must define their RAN routes and/or DNs in accordance with FGD block definitions.

The following Service Change (SCH) information shows how to configure FGD capabilities on the Meridian 1 system. The loads shown here are only partial, and apply to FGD only. Only new prompts or prompts and responses required for FGD are shown here.

For a complete description of the service change prompts and responses, see *X11 Administration* (553-3001-311).

LD 13 – Digitone receiver and tone detector

REQ	NEW, CHG	Add, or change
TYPE	MFR	Multifrequency receivers A maximum of 255 MFR units can be defined.
TN	l s c u	loop, shelf, card, unit Only units 0 and 1 can be defined, and the card must be single density.

LD 14 – Trunk data block

REQ	NEW, CHG	Add, or change
TYPE	FGDT	Feature Group D trunk
TN	l s c u	loop, shelf, card, unit Loop Channel is accepted for digital loops
CUST	0–99	Customer number
NCOS	0–99	Network Class of Service
RTMB	nn nn	Route and Member number FGD trunks must belong to FGDT type routes.
MNDN	nnnn	Manual directory number to delete
TGAR	nn	Trunk group access restriction
SIGL	EAM, EM4, LDR	Signal type Only these values are accepted for FGD.
CDEN	(DD), SD	Card Density
STRI	WNK	Start Arrangement must be WNK for FGD trunks.
STRO	WNK	must be WNK for FGD trunks.
CLS	MFR	CLS must be MFR for FGD.

LD 16 – Route Data Block

REQ	NEW, CHG	Add or change
TYPE	RDB	Route Data Block
CUST	0–99	Customer number
ROUT	nnnn	FGD route number
TKTP	FGDT	Feature Group D route
CNTL _TIMR _TIMR _TIMR _TIMER	(NO), YES ICF 0-(512)-32640 OGF 0-(512)-32640 DDL 0-(70)-511 DSI 128-(34944)-499200	Change controls or timers Incoming flash timer Outgoing flash timer Dial delay timer Disconnect supervision timer Only these timers are allowed for FGD trunks.
FGNO	(0)–127	FGD block number

LD 19 – Code restriction (Part 1 of 6)

Note: Ensure that numeric zero is used for mnemonics IN0, NA0, and SA0.

REQ	NEW, CHG	Add or change
TYPE	FGDB	Feature Group D data block
FGNO	0–127	FGD block number IF REQ = NEW, no response is allowed. The next free block number is always defined.
CIC	0000-9999	Carrier ID Response must be 3 or 4 digits.<CR> not allowed when REQ = NEW.
CCLS	IC, CONS	Carrier class Interexchange, or Consolidated <CR> not allowed when REQ = NEW.
PRES	(YES), NO	Presubscription
OVLP	(YES), NO	Overlapped outpulsing by the LEC

LD 19 – Code restriction (Part 2 of 6)

Note: Ensure that numeric zero is used for mnemonics IN0, NA0, and SA0.

CCAN	xxx (YES), NO	Call categories expected on calls to Carrier (xxx), and if ANI is provided (Yes or No). XXX must be one of the following:
	NAM	1 + calls (inside WZ1)
	NA0	0 + calls (inside WZ1)
	INT	1 + calls (outside WZ1)
	IN0	0 + calls (outside WZ1)
	OPR	0 - calls
	SAM	1 + calls (embodied SAC)
	SAX	1 + calls (external SAC)
	SA0	0 + calls (external SAC)
	CUT	cut-through calls
	ALL	All calls (Default when REQ = NEW) When REQ = NEW, default is ALL.
SAC	xxx xxx…	Service Access Code Up to 8 SACs can be defined. 700, 800, 900, and 610 are the defaults defined. X removes the access code.
ANII	xx	ANI data block index 0–31 0 = no ANI screening. Default when REQ = NEW.
CDAN	YES, (NO)	ANI digits provided in CDR
SHAN	YES, (NO)	Show ANI digits on terminal displays
PRTD	(NO), ALL, REJ	Printout control for invalid II, ANI NO = no printouts issued ALL = printout on all invalid II, ANI REJ = printout on all invalid II, but no printout for invalid ANI if ANI screening assigned an NCOS to the call
LDAC	AC1, AC2	Long Distance Access Code Only if NARS is equipped
LAAC	AC1, AC2	Local Area Access Code Only if NARS is equipped

LD 19 – Code restriction (Part 3 of 6)

Note: Ensure that numeric zero is used for mnemonics IN0, NA0, and SA0.

OPER		Treatment for 0+, 0- calls
	DN xxxx. . xx	1–16 digit network or local DN
	RAN xxx	RAN route (0-511)
INTR	(NO), YES	Intercept treatment specified
_ADFT	(OVF), RAN xxx, DN xxx . . xx	for invalid address format (overflow, RAN, or local or network DN)
_IIT	(OVF), RAN xxx, DN xxx . . XX	for invalid IIs (overflow, RAN, or local or network DN)
IITP	xx yyyy zz	Valid II, II type, and NCOS for ANI screening XX is an II range 00-99 YYYY must be one of the following:
	REGU	Regular II
	4A8P	4 and 8 party II
	HOTL	Hotel/Motel II
	CLES	Coinless II
	TST3	Test3 II
	AIOD	AIOD II
	COIN	Coin II
	TST7	Test7 II
		ZZ is an optional NCOS number defining ANI screening bypass range 00–99. ANI screening bypass defaults to “NO” if an NCOS is not entered.
CPAR	(NO), YES	Call Processing parameters

LD 19 – Code restriction (Part 4 of 6)

Note: Ensure that numeric zero is used for mnemonics IN0, NA0, and SA0.

_INIT	0-(7)9	Length of initial string of dialed digits on outgoing calls (enbloc dialing)
_ENBL	1-(12)-30	Long enbloc dialing timeout (before initial string is complete) in seconds
_ENBS	1-(5)30	Short enbloc dialing timeout (after initial string is complete) in seconds
_IFTO	2-(120)-255	Inter FGD field timeout (max time between two FGD fields) in seconds
_DGTO	128-(640)-5000	Inter digit timeout (max time between two FGD digits in same field) in Msec
_MONT	0-(256)-2048	Minimum on hook time (min time between acknowledgment wink and answer off hook signal) in Msec
REQ	new, chg, out, prt	Create, change, remove or print
TYPE	ANI	FGD ANI data block
ANII	xx	ANI data block index (1–31)
These prompts are given when REQ = NEW or CHG:		
ANIT		Invalid ANI treatment:
	OVF	overflow tone (default)
	RAN xxx	Recorded announcement route (0–511)
	DN xxx..xx	1–16 digits, typically a Meridian 1 internal DN
	NCOS xx	NCOS value (0–99)
NPA	xxx	First 3 digits of ANI (in NPA format)
	<CR>	to reprompt REQ
3ANI	DENY	3-digit ANI not allowed (default)-apply invalid ANI treatment
	NCOS xx	3-digit ANI allowed: NCOS value (0–99)

LD 19 – Code restriction (Part 5 of 6)

Note: Ensure that numeric zero is used for mnemonics IN0, NA0, and SA0.

SLV3	NXX	Use 6- or 10-digit screening level; prompt NXX next
	NCOS xx	3-digit screening: all NXX+XXXXs map to NCOS value xx (0–99); reprompt NPA
NXX	xxx “yyy”	Range of end office numbers (NXX) Prompted only if SLV3=NXX xxx—starting or only NXX yyy—ending NXX (optional);
	<CR>	to reprompt NPA
SLV6	SUB	Use 10-digit screening level; prompt SUB next; not allowed if yyy entered.
	NCOS xx	Use 6-digit screening level; all xxxxs map to NCOS value xx (0–99); to reprompt NXX.
SUB	xxxx “yyyy”	Range of subscriber numbers (XXXX); prompted if SLV6=SUB xxxx—starting or only subscriber # xxxx—end subscriber # (optional)
	<CR>	to reprompt NXX
NCOS	xx	NCOS value (0–99) for the subscribers; reprompt SUB

LD 19 – Code restriction (Part 6 of 6)

Note: Ensure that numeric zero is used for mnemonics IN0, NA0, and SA0.

These prompts are given when REQ = PRT:		
NPA	xxx	Specified NPA printed; prompt NXX next
	ALL	All NPAs defined printed; reprompt REQ
	<CR>	to reprompt REQ
NXX	xxx [yyy]	Range of end office numbers (NXX); xxx—starting or only NXX yyy—ending NXX (optional) reprompt NXX if yyy entered. Prompt SUB next if only xxx entered to
	<CR>	reprompt NPA
SUB	xxxx [yyyy]	Range of subscriber numbers (XXXX); xxxx—starting or only subscriber # xxxx—end subscriber # (optional) reprompt SUB.
	<CR>	To reprompt NXX
These prompts are given when REQ = OUT		
ENTER YES TO CONFIRM	YES	To confirm the OUT request - the entire ANI data block is deleted for OUT request.
	(NO)	The OUT request is not executed.

Note 1: To remove (undefine) an NPA, NXX, or a SUB number, precede the number with X. To remove a range of NXX or subscriber numbers, precede the starting number with X.

Note 2: To abort the current line of data entered, press the * key. The system will reprompt the current prompt.

Note 3: To abort the current incomplete prompting sequence, press the * key twice (**).REQ will be reprompted. All the data entered in the previous and complete prompting sequences will remain in the system.

Note 4: To abort active overlay program, enter ****, or END in response to the system prompt REQ. All the data entered in the previous and complete prompting sequences will remain in the system.

Table 16 defines the information digits (II) that are used as defaults in the LD 19 code restriction program.

Table 16
Default IITP values

II	II type	ANI screening bypass
00	REGU	NO
01	4A8P	NO
06	HOTL	NO
07	CLES	NO
10	TST3	NO
20	AIOD	NO
27	COIN	NO
95	TST7	NO

LD 20 – Print routine

REQ	PRT	Print
TYPE	TNB FGD MFR	Includes FGD trunks and MFRs Print FGD trunks Print Multifrequency units
TN	l s c u	loop, shelf, card, unit

LD 21 – Print routine

This print routine is modified to print FGDT route data blocks as defined using LD 16.

LD 22 – Print routine

“FGD” is printed if package 158 is equipped.

LD 29 – Memory management

REQ	ADD	Add, or change
TYNM	MFRR 1–255	Number of multifrequency receivers
	FGD xxx yyy	FGD data blocks xxx = FGD data blocks (1–128) yyy = average number of II entries
	ANI xxx yyyy zzzzz	FGD ANI blocks xxx = number NPAs (1–160) yyyy = number of NXXs (0–9999) zzzzz = number XXXXs (0–30,000)

LD 86 – ESN

Changes are made to LD 86 to allow for definition and a print out of a new type of Route List Entry, which is the Local Termination (LTER) entry. The prompts and responses are listed below.

Prompt		Definition
REQ	new, out, chg, prt, end	
FEAT	rlb	
RLI	0–255	
ENTR	0–63	
LTER	yes/(no)	Local Termination entry
If “yes” is entered, only the following prompts appear for this entry (there is no change in prompt responses):		
TOD		Time of Day Schedule
FRL		minimum Facility Restriction Level
DMI		Digit Manipulation table Index
FCI		Free Calling Area Screening table index
The following prompts do not appear for this entry and they are set to the specified values. This is also true when changing a regular entry to an LTER entry:		
ROUT	0	Route Number
TDET	no	Tone Detector Used
CNV	no	conversion to LDN required
EX	no	expensive route
OHQ	no	Off Hook Queuing allowed
CBQ	no	Call Back Queuing allowed
Note: No new SCH error codes are required in this LD.		

Maintenance and diagnostics

The Meridian 1 software provides maintenance and diagnostics for the Multifrequency Receiver (MFR). They are performed similarly to the Tone Detector (TDET) or Digitone Receiver (DTR).

Maintenance and diagnostics are provided by the Meridian 1 software as Service Change programs that can be run either automatically upon Meridian 1 CPU request or manually.

Maintenance and diagnostics involve the following:

— enabling/disabling an MFR to allow card installation and removal

— self-testing the MFR card

— testing all tones with the help of an MFS loop

— signaling testing

LD 34—Tone and digital switch

The maintenance of MFRs is integrated into LD 34 (maintenance of DTR, TDET).

An MFR test command is introduced with X11 release 17.

The commands in Table 17 apply to MFRs.

Table 17
MFR commands

ENLR	LSC (U)	Enable the specified DTR/MFR card/unit	Note 1
DISR	LSC (U)	Disable the specified DTR/MFR card/unit	Note 1
SDTR	LSC (U)	Display the status of the specified DTR/MFR	Note 1
SDTR		List all the disabled DTR/MFR units	Note 1
STAT		List all the disabled DTR/MFR units (duplicate of SDTR with no parameters)	Note 1
MFR	LSC (U)	Test the specified MFR card/unit	Note 2
MFR	L	Test all the specified MFR units on loop L.	Note 2
MFR	<CR>	Test all MFR units	Note 2

Note 1: The existing command (for DTR) is used for both DTR and MFR.

Note 2: Faulty MFR cards are disabled and an MFRxxx error message is output. Only 50% of all MFR cards in the system may be disabled at one time. If the failure occurred during the midnight routine, a minor alarm is initiated.

Command Description

The following commands are used for maintaining the MFR. They perform enabling and disabling functions, perform tests, and print the current status.

— **ENLR n**—enable MFR “n”

— **DISR n**—disable MFR “n”

— **SDTR n**—print MFR “n” status

— **MFR n**—test MFR “n”

The following commands are used for printing disabled MFR units.

— **STAT**—print disabled MFR units

— **SDTR**—print disabled MFR units

The ENLR, DISR, STAT and SDTR commands are used for both DTRs and MFRs. The Meridian 1 software can distinguish between the two types of receiver, where necessary.

Disabling an MFR (DISR command) that is at present active in a call, disconnects the call. No error messages are given (as for TDET and DTR).

The MFR command performs the following tests:

— response test

— self-test (internal test of the card by its processor)

— valid reception test of all MF tones:
An MFS is connected to the MFR through a network timeslot. The MFS is triggered to send MF tones to the MFR, and the correct reception is checked.

If the MFR is busy, no test is performed (as for TDET and DTR), and the TDS315 message is printed.

During midnight routines, the MFR command is performed.

The following are additional comments on the above section:

— For commands ENLR and DISR: “n” can only be LSC or LSCU

— For command STAT: no other parameters can be given

— For command SDTR: if “n” is specified, it can only be LSC or LSCU. If “n” is not specified, all disabled MFR units are printed.

— For command MFR: “n” can be one of LSC, LSCU, L or <CR> (which causes a test to be performed on all MFRs).

LD 30—Network and signaling diagnostics

— Signaling test of MFRs is supported by this overlay.

— Signaling test of FGDT trunks is supported. The test is performed for all trunks. For example, if all units of the FGDT trunk card are idle, an “existence” message is sent to the card. It is then required to return the same message to the CPU.

Testing FGDT trunks and MFRs during midnight routines is supported.

LD 32—Network peripheral equipment diagnostics

Standard enable, disable, and status commands are supported for MFRs. For FGDT trunks, all applicable trunk commands are supported.

Changes are made for this program to include the following responses where applicable (for example, status of specific card).

Normal responses include

MFR (Multi-frequency receiver)

Mnemonics for trunk types include

FGDT (Feature Group D trunk)

List of terms

AIOD

Automatic Identification of Outward Dialing

ANI

Automatic Number Identification

ATM

Automatic Trunk Maintenance

BARS

Basic Alternate Route Selection

BOC

Bell Operating Company

BSWT

BOC Switch Time

Called customer

The Local Exchange Carrier (LEC) customer receiving the FGD call placed by the calling customer, and usually identified by a public directory

Calling customer

The LEC customer that initiates the FGD call

Carrier

An entity that maintains a public or private long distance network. AT&T or U.S. Sprint are public long distance carriers. Nortel Networks is a private long distance carrier.

CDR

Call Detail Recording

CDRE

Call Detail Recording Expansion

CE

Common Equipment

CIC

Carrier Identification Code. This is the three- or four-digit number dialed by LEC customers to reach a specific carrier's facilities.

CLID

Calling Line Identification

Consolidated carrier (IEC & INC)

Carriers that provide the combined services of Inter-Exchange and International carriers.

COS

Class of Service

CPND

Call Party Name Display

CSWT

Carrier Switch Time

DDD

Direct Distance Dialing

DMI

Digit Manipulation Table Index

DNIS

Dialed Number Identification Services

DTMF

Dual Tone Multifrequency

EA

Equal Access

EAEO

Equal Access End Office

EAIN

Exchange Access International signaling

EANA

Exchange Access North American signaling

Embodied

Embodied Carrier Identification: 6-digit translation is performed by the LEC to determine the IEC

ESN

Electronic Switched Network

E.163

Standard North America Telephony numbering plan

FGD

Feature Group D

FGDT

Feature Group D Trunk

IDC

Incoming Digit Conversion

IEC

Inter-Exchange Carrier

IEC & INC

Consolidated Carrier

II

Information digits

INC

International Carrier

ISDN

Integrated Services Digital Network

ISL

ISDN Signaling Link

Inter-Exchange Carrier (IEC)

Carriers providing connections between LATAs and serving areas where calling and called customers are in World Zone 1.

International Carrier (INC)

Carriers providing connections from customers in the United States and customers outside World Zone 1; they may also provide connections to customers within World Zone 1, but outside of the U.S.

LAAC

Local Area Access Code, the NARS access code leading to the NXX translation tables

LATA

Local Access and Transport Area

LDAC

Long Distance Access Code, the NARS access code leading to the NPA translation tables

LEC

Local Exchange Carrier (for example, Pacific Bell)

KP

Key Pulse

MF

Multifrequency

MFR

Multifrequency Receiver (MFRC) QPC916

MFRC

Multifrequency receiver without DTMF receiving capability

MFS

Multifrequency Sender

NANP

North American Numbering Plan

NARS

Network Alternate Route Selection

NCOS

Network Class of Service

NN

National Number

NPA

Numbering Plan Area: N=2-9; P=0 or 1; A=any

NXX

Office Code: N=2-9; X=0 or 1; X=any

Originating access

Establishing the connection between the calling customer and the Point of Termination

Originating call

A call placed by a calling customer

OS

Operator Services

PE

Peripheral Equipment

POP

Point of Presence

POT

Point of Termination

PRES

Presubscription between the LEC and the IEC

PRI

ISDN Primary Rate Interface

RBOC

Regional Bell Operating Company

SAC

Service Access Code

ST

Start Transmission

TAFAS

Trunk Access from Any Station

TDET

Tone Detector

Terminating access

Establishing the connection between the Point of Termination and the called customer

Terminating call

A call presented by the carrier to the LEC for connection to the called customer

TGAR

Trunk Group Access Restriction

TVA

Trunk Verification from a Station Allowed

TVS

Trunk Verification from a Station

WATS

Wide Area Telecommunications Service

World Zone 1

All countries participating in the North American Numbering Plan (NANP), and dialed with a ten digit address

WZ 1

World Zone 1

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Meridian 1

Feature Group D

Description and operation

Information is subject to change without notice. Nortel Networks reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant. This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules, and the radio interference regulations of Industry Canada. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.
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