Meridian 1
Succession 1000
Succession 1000M
Succession 3.0 Software

Dialing Plans
Description

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Revision history

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Standard 1.00. This document is a new NTP for Succession 3.0. It was created to support a restructuring of the Documentation Library, which resulted in the merging of multiple legacy NTPs. This new document consolidates information previously contained in the following legacy documents, now retired:

- Coordinated Dialing Plan (553-2751-102)
- Flexible Numbering Plan (553-2751-105)
- Feature Group D (553-2901-102)

Contents

About this document

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

Subject

This document includes description, operation, implementation, administration and maintenance information about Coordinated Dialing Plan, Flexible Numbering Plan and Feature Group D.

Applicable systems

This document applies to the following systems:

- Meridian 1 Option 11C Chassis
- Meridian 1 Option 11C Cabinet
- Meridian 1 Option 51C
- Meridian 1 Option 61
- Meridian 1 Option 61C
- Meridian 1 Option 61C CP PII
- Meridian 1 Option 81
- Meridian 1 Option 81C
- Meridian 1 Option 81C CP PII
- Succession 1000
- Succession 1000M Chassis

- Succession 1000M Cabinet
- Succession 1000M Half Group
- Succession 1000M Single Group
- Succession 1000M Multi Group

Note that memory upgrades may be required to run Succession 3.0 Software on CP3 or CP4 systems (Options 51C, 61, 61C, 81, 81C).

System migration

When particular Meridian 1 systems are upgraded to run Succession 3.0 Software and configured to include a Succession Signaling Server, they become Succession 1000M systems. Table 1 lists each Meridian 1 system that supports an upgrade path to a Succession 1000M system.

Table 1
Meridian 1 systems to Succession 1000M systems

This Meridian 1 system...	Maps to this Succession 1000M system
Meridian 1 Option 11C Chassis	Succession 1000M Chassis
Meridian 1 Option 11C Cabinet	Succession 1000M Cabinet
Meridian 1 Option 51C	Succession 1000M Half Group
Meridian 1 Option 61	Succession 1000M Single Group
Meridian 1 Option 61C	Succession 1000M Single Group
Meridian 1 Option 61C CP PII	Succession 1000M Single Group
Meridian 1 Option 81	Succession 1000M Multi Group
Meridian 1 Option 81C	Succession 1000M Multi Group
Meridian 1 Option 81C CP PII	Succession 1000M Multi Group

Note the following:

- When an Option 11C Mini system is upgraded to run Succession 3.0 Software, that system becomes a Meridian 1 Option 11C Chassis.
- When an Option 11C system is upgraded to run Succession 3.0 Software, that system becomes a Meridian 1 Option 11C Cabinet.

For more information, see one or more of the following NTPs:

- *Small System: Upgrade Procedures* (553-3011-258)
- *Large System: Upgrade Procedures* (553-3021-258)
- *Succession 1000 System: Upgrade Procedures* (553-3031-258)

Intended audience

This document is intended for individuals responsible for configuring dialing plans.

Conventions

Terminology

In this document, the following systems are referred to generically as "system":

- Meridian 1
- Succession 1000
- Succession 1000M

The following systems are referred to generically as "Small System":

- Succession 1000M Chassis
- Succession 1000M Cabinet
- Meridian 1 Option 11C Chassis
- Meridian 1 Option 11C Cabinet

The following systems are referred to generically as “Large System”:

- Meridian 1 Option 51C
- Meridian 1 Option 61
- Meridian 1 Option 61C
- Meridian 1 Option 61C CP PII
- Meridian 1 Option 81
- Meridian 1 Option 81C
- Meridian 1 Option 81C CP PII
- Succession 1000M Half Group
- Succession 1000M Single Group
- Succession 1000M Multi Group

The call processor in Succession 1000 and Succession 1000M systems is referred to as the “Succession Call Server”.

Related information

This section lists information sources that relate to this document.

NTPs

The following NTPs are referenced in this document:

- *Features and Services* (553-3001-306)
- *Software Input/Output: Administration* (553-3001-311)
- *Traffic Measurement: Formats and Output* (553-3001-450)
- *Call Detail Recording: Description and Formats* (553-3001-350)
- *ISDN Primary Rate Interface: Features* (553-3001-369)
- *Basic Network Features* (553-3001-379)

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Coordinated Dialing Plan description

Contents

This section contains information on the following topics:

Introduction

The Coordinated Dialing Plan (CDP) feature enables a customer with a system to coordinate the dialing plan for stations at these switches.

When implemented, the CDP feature enables a station at one switch to call a station at another switch within the CDP group by dialing a unique 3 to 7 digit number, without access codes and associated pauses for dial tone. When equipped with the Directory Expansion (DNXP) package, this number can have up to ten digits.

CDP software provides the translation and digit manipulation capability required to implement the CDP. Calls dialed with the CDP format can be terminated locally after digit translation or digit deletion. Alternatively, calls can be routed to a remote switch in the CDP group following digit translation, route selection, and digit deletion or insertion. Figure 1 on page 17 illustrates how a coordinated dialing plan can be implemented at two customer locations.

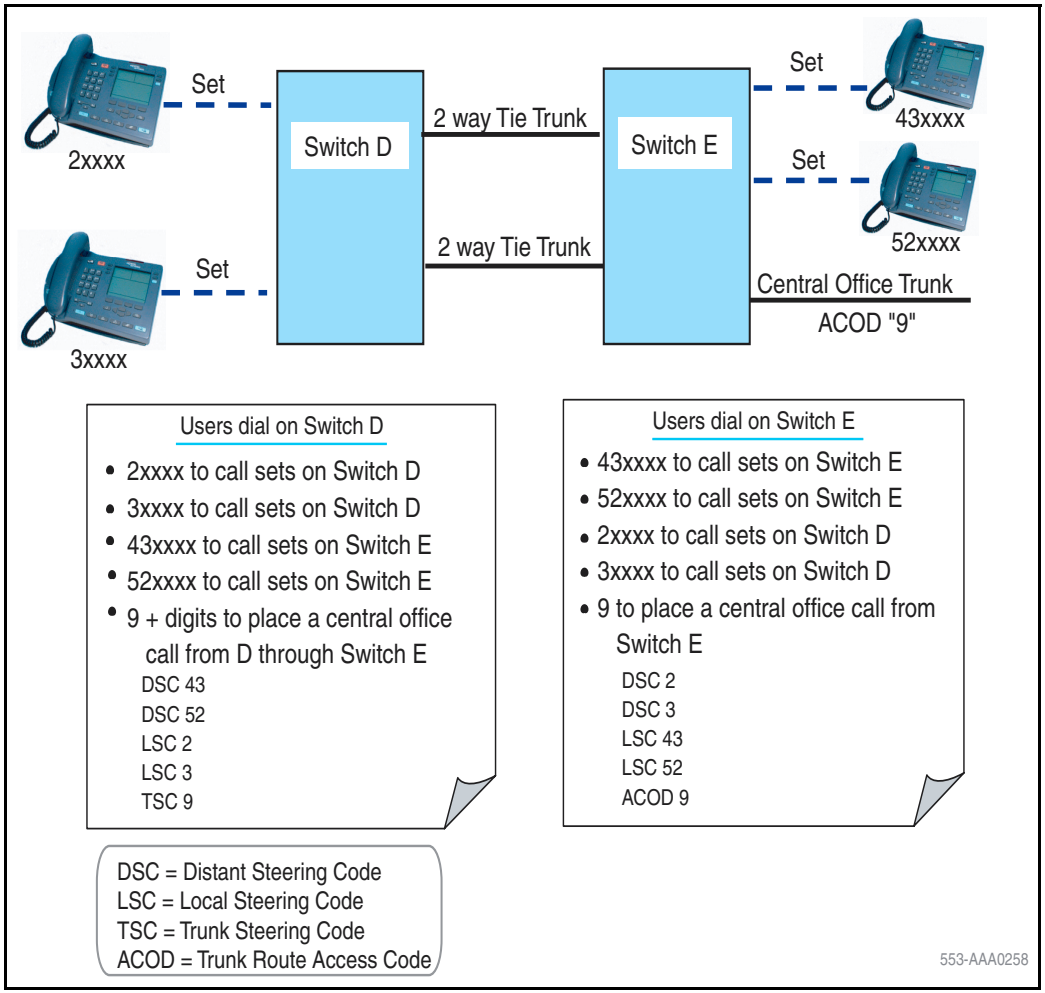
Required packages

Coordinated Dialing Plan (CDP), requires Directory Expansion (DNXP) package to enable stations at different switches within the CDP group to dial using a unique number up to 10 digits.

Steering codes

In Figure 1, end users at Location D can call stations at Location E by dialing 43XXX or 52XXX. Similarly, end users at Location E can call stations at Location D by dialing 2XXXX or 3XXXX. If an end user at Location D dials 43XXX or 52XXX to reach a station at Location E, Location D uses the digits “43” or “52” as a Distant Steering Code (DSC) to select the trunk group to Location E. Similarly, if an end user at Location E dials 2XXXX or 3XXXX to reach a station at Location D, Location E uses the digit 2 or 3 as a Distant Steering Code (DSC).

Figure 1
Example of a Coordinated Dialing Plan



The same format is used for calling local stations. For example, end users at Location E dial 43XXX or 52XXX to reach local stations at Location E. In this case, the system interprets the digits 43 or 52 as a Local Steering Code (LSC) and deletes them from the dialed number to terminate the call locally.

The maximum number of leading digits that can be deleted from a local steering code is four. However, if the DNXP package (150) is equipped, steering codes can be up to seven digits long and therefore up to 7 digits can be deleted from the Local Steering Code SPRE (LSC).

If the system at Location E provides centralized access to the public exchange network, the digit 9 at Location E is a Trunk access code for public exchange access. At Location D, the digit 9 is a Trunk Steering Code (TSC) that uses digit manipulation to insert the required digits to route the call through Location E to the public exchange network.

The CDP feature supports up to 10 000 steering codes. Steering codes can be composed of one, two, three, or four digits. At each switch in the CDP group, the steering codes must be distinct from any other assigned DNs codes.

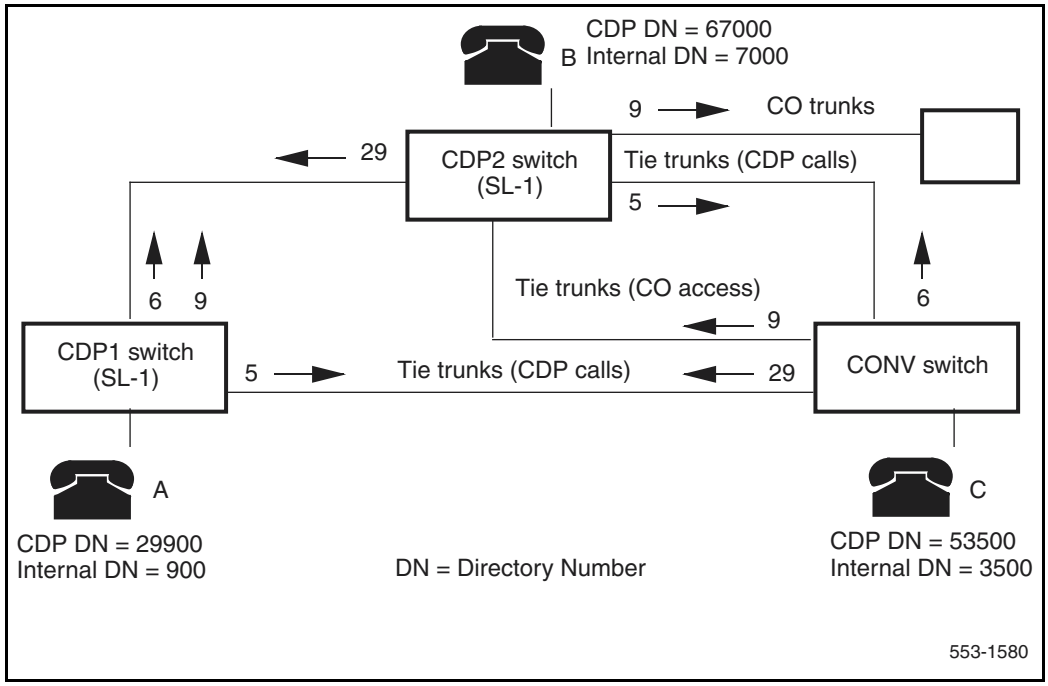
As Figure 1 shows:

- 0 is reserved as the attendant access code
- 1 is reserved as the Special Service Prefix (SPRE)
- 7 is reserved as a system trunk access code
- 8 is reserved as a Basic Alternate Route Selection / Network Alternate Route Selection (BARS/NARS) access code
- 9 is reserved as the public exchange network access code

There are five digits that can be used as the leading digits of steering codes - 2, 3, 4, 5, and 6. Switch D chooses 2 and 3; switch E uses 4 and 5.

A CDP Directory Number (DN) consists of an internal DN prefixed with the appropriate steering code. The CDP DN can support up to seven digits; but, if the DNXP package is equipped, the CDP DN can support up to ten digits. A typical CDP configuration is shown in Figure 2 on page 19.

Figure 2
A typical CDP Configuration



Conventional switch access

If a conventional (CONV) switch without the CDP software is integrated as part of a CDP group (see Figure 2 on page 19), the steering codes defined at a CDP switch to access the conventional switch can be inserted or deleted by the CDP switch. The steering codes are inserted if the conventional switch is identified by more than one steering code; they are deleted if all the station numbers at the conventional switch begin with the same steering code.

Calls to a CDP switch from the conventional switch are made by dialing the desired CDP DN. The CONV switch uses the digit 6 as a trunk access code for the tie trunk route to switch CDP2. After tie trunk seizure, the CONV switch outpulses the remaining digits (7000) to CDP2. At CDP2, the digit 6 is inserted on the incoming tie trunk from the CONV switch, prior to receipt of any digits from the CONV switch, and the call completes to station E.

Local calls at the CONV switch are made by dialing only the internal DN (3500), rather than the CDP DN (53500), unless the CONV switch can be arranged to absorb the digit 5 or is based on a 5-digit numbering plan.

As shown in Figure 2, switch CDP2 is arranged to provide centralized access to the public exchange network. For end users at the CONV switch to access this capability, a separate tie trunk route must be provided to switch CDP2. This is because switch CDP2 is arranged to insert the digit "6" on the incoming tie trunk route from the CONV switch used for CDP calls. For public exchange network calls, the digit 9 must be inserted on the incoming tie trunk route from the CONV switch. Similarly, if end users at the CONV switch support access to the ESN capabilities (BARS/NARS) at switch CDP2, another tie trunk route must be provided for this purpose.

Network Class of Service

Network Class of Service (NCOS) is an integral part of the CDP feature. NCOS provides the means to control the following:

- which trunk routes can be accessed to complete the CDP call
- whether or not queuing is offered to the call originator
- whether or not the originator of a CDP call receives an Expensive Route Warning Tone (ERWT) when an expensive trunk route is selected to complete the call

A switch equipped with CDP can accommodate four NCOS groups (0–3), each group with different route-access characteristics. See Table 2.

Table 2
Summary of CDP parameters (Part 1 of 2)

Parameter	CDP stand-alone	CDP with BARS	CDP with NARS
Network Class of Service Groups (Note 3)	0–3 (0–99)	0–7 (0–99)	0–15 (0–99)
Facility Restriction Levels	0–7	0–7	0–7
Time-of-Day schedules	0–1	0–7	0–7

Table 2
Summary of CDP parameters (Part 2 of 2)

Parameter	CDP stand-alone	CDP with BARS	CDP with NARS
Digit Manipulation tables	1–31	1–255	1–255 [1–999]
Route lists	0–31 0–127	0–127	0–255 [0–999]
Route list entries	0–6	0-63	0-63
Supplemental Digit Restriction tables	—	0–255	0–511
Steering codes	5000 10000	5000 10000	5000 10000 [32000]

Note 1: The BARS/NARS features are described in detail in the *Basic Network Features* (553-3001-379).

Note 2: If New Flexible Code Restriction (NFCR) is equipped in conjunction with CDP, the number of available NCOS groups is 100.

Note 3: Values in brackets [] apply if the Flexible Numbering Plan (FNP) package (160) is equipped.

BARS/NARS feature is also equipped. Once each NCOS group is defined through a service change, then line, trunk, and attendant groups are assigned to the NCOS group that best meets their requirements. The NCOS group to which each line, trunk, or attendant group is assigned is independent of the regular Class of Service assigned to them.

A CDP equipped switch can accommodate 100 NCOS groups (0–99) whether it is equipped with BARS/NARS, or the NFCR.

Compatibility with ETN switches

The Traveling Class of Service (TCOS) is equivalent to the Traveling Class Mark (TCM) used at Electronic Tandem Network (ETN) switches. It provides a mechanism through which the system can control route access Facility Restriction Level (FRL) and off-hook queuing (OHQ) eligibility for calls placed to or through another Node, or ESN Main. TCOS also enables the switch to interface with ETN switches.

When a Distant Steering Code (DSC) call is made from an Electronic Switched Network (ESN) node to an ETN switch, the dialed digits, together with the TCOS number (0–7), are sent to the connected ETN switch. Similarly, when a DSC call is made from an ETN switch to an ESN Node, the dialed digits, together with the TCM number (0–7), are sent to the connected ESN Node. On a tandem connection to the ESN Node interprets the received TCM as a TCOS number. The received TCM replaces the FRL of the NCOS assigned to the incoming trunk group from the ETN switch.

Assumptions

The assumptions are as follows:

- Only DSC calls, not Trunk Steering Code (TSC) calls, are supported.
- When a DSC call is terminated on a switch as a Local Steering Code (LSC) call, the transmitted TCOS/TCM number from the connected ETN switch is not collected and saved by the terminating switch.

Facility Restriction Level

Included as part of each NCOS group is a Facility Restriction Level (FRL) number that ranges from 0 (low-privilege) to 7 (high-privilege). CDP software uses the FRL to determine the alternate route selection choices available for CDP call attempts by end users within an NCOS group.

Example

A station user assigned in an NCOS group with an FRL of 3 can only access alternate route selection choices with an FRL of 3 or less. That is, access to trunks with an FRL greater than 3 is denied.

Routing

Thirty-two route lists (0–31) can be defined at a switch equipped with CDP. See Table 2 on page 20 for other parameters if CDP is equipped with BARS or NARS. A route list is used to define the alternate route choices for CDP calls to a particular destination. Route choices in a route list are called route list entries. There can be up to seven (0–6) route list entries associated with each route list.

Route lists are associated with each Distant Steering Code (DSC) and Trunk Steering Code (TSC) that can be dialed at a CDP switch. Local Steering Codes (LSC) are not associated with route lists. Each code is defined to the CDP software, together with the route list number that must be accessed for call completion to the destination indicated by the steering code. The entries in the specified route list are then searched sequentially for an available and eligible trunk route.

Software enables CDP to route Direct Inward Dialed (DID) calls over CO and WATS trunks using a DSC. The feature is controlled by an option defined in the Customer Data Block (LD 15) found in *Software Input/Output: Administration* (553-3001-311). This enhancement applies to CO, WATS, DTI and ISDN type trunks.

Digit manipulation

Route list entries can be associated with digit manipulation tables. There can be 32 (0–31) digit manipulation tables defined at a CDP switch. See Table 2 on page 20 if BARS/NARS is also equipped. Every digit manipulation table except 0 can be defined to delete up to 15 digits from a dialed CDP number, and to insert up to 24 leading digits, including the asterisk. Digit manipulation table 0 is used as an indication to the CDP software that no digit manipulation is required.

Time of day schedules

Two (0–1) time of day (TOD) schedules can be defined at a CDP switch. See Table 2 on page 20 if BARS/NARS is also equipped. Each route list entry is associated with a TOD schedule. When a route list entry is selected for a CDP call, the CDP software compares the current time with the TOD schedule assigned to the route list entry. If the current time is within the schedule, the route list entry is used for the call. If the current time is not in the schedule or if the TOD schedule is turned OFF, the route list entry is not used for the call. Each TOD schedule can be turned ON or OFF by the customer through service change.

Queuing

Queuing against local stations is provided by the standard Ring Again (RGA) feature. Refer to *Features and Services* (553-3001-306). For calls directed to a remote CDP switch, Ring Again can be applied if all local outgoing trunk routes to the remote CDP switch are busy or blocked. Ring Again cannot be applied against busy or blocked telephones, or consoles at the remote CDP switch. Ring Again is only available on trunks if CCBQ or CBQM are equipped. Intercept treatment is not provided until the full CDP number (or trunk steering code) is dialed.

For local and network queuing descriptions, refer to *Basic Network Features* (553-3001-379). For ESN operations in an ISDN environment, refer to *ISDN Primary Rate Interface: Features* (553-3001-369).

CDP traffic measurements

Traffic measurement data related to CDP feature usage is available on a system equipped with the Network Traffic (NTRF) feature. Refer to *Traffic Measurement: Formats and Output* (553-3001-450).

Feature interactions

AIOD and ANI

Calls made to the public exchange network when the Automatic Identification of Outward Dialing (AIOD) or Automatic Number Identification (ANI) feature is equipped will have either the internal DN recorded if the call originates at the CDP switch interfacing to the public network or the trunk access code if the call originates at another CDP switch.

Attendant features

If a user at a local CDP switch calls the local attendant, the local user's internal DN (not the full CDP DN) displays. If a user at a CDP switch calls an attendant at another CDP switch, the trunk access code and member number are part of the incoming trunk display.

The following attendant features are supported at a local CDP switch but are not supported between CDP switches:

- automatic timed recall
- barge-in, busy verify
- camp-on
- interposition calling

BARS/NARS

The CDP feature can be implemented at a switch equipped with the BARS/NARS software features. If this is the case, the following considerations apply:

- Steering codes for CDP calls must be distinct from the assigned BARS/NARS access codes.
- CDP numbers can be integrated with the NARS Uniform Dialing Plan (UDP). For example, a five-digit CDP number can be the same as the last five digits of a seven-digit UDP number.
- BARS/NARS route lists, digit manipulation tables and TOD schedules can be shared by CDP calls.

- Users eligible for the Off-Hook Queuing (OHQ) and Call-Back Queuing (CBQ) features can use them when placing CDP calls.
- Free Calling Area Screening (FCAS) does not apply to CDP calls.
- Routing Control can be applied to CDP calls. Refer to *Basic Network Features* (553-3001-379).

Call modification

Call modification (call transfer, call forward, conference) is allowed for CDP calls. When using these features, the end user dials within the CDP format.

Call Detail Recording

The local internal DN (not the complete CDP DN) is recorded in the normal CDR manner. The full CDP DN is shown in the dialed number field. The maximum internal DN length remains at four digits.

Code Restriction

Code restriction is applied to calls made only from stations with a Toll Denied (TLD) class of service. Code Restriction or New Flexible Code Restriction (NFCR) can be applied on a trunk route basis to public exchange network trunk calls.

Collect Call Blocking

New classes of service and prompts are introduced to inhibit specific end users from receiving collect DID and CO calls.

- When tandem calls are made, the source node determines the Collect Call Blocking (CCB) treatment for all outgoing calls.
- For CDP routed calls, the CCBA prompt associated with the DSC or TSC is checked.
- For non-CDP routed calls (UDP, Access code, RAN, or Music Route), the CCBA prompt in the route data block is checked.

The system provides the CCB answer signal to the CO for all incoming DID and CO calls from routes with CCB enabled that are answered by CCB end users. The CCB answer signal can only be sent in cases where answer supervision is provided by the system. For CDP routed calls, this happens regardless of the far end's class of service. If the call is collect the CO will disconnect it. The decision to send the CCB answer signal is made on the source node (the node closest to the CO) and based on the CCB user hierarchy shown in Table 3. In both cases, the DID/CO route must have CCB enabled.

Table 3
CCB User Hierarchy

1	The setting of incoming routes CCB prompt.
2	The source (first) ACD queue's setting of the CCBA prompt.
3	The CCB option in the customer data block for NAS routing.
4	The CDP steering code's setting of the CCBA prompt.
5	The outgoing route's setting of the CCBA prompt.
6	The COS of the terminating set. If attendant answers the call, then the CCBA option in CDB.
7	The DISA data block's setting of CCBA.

Common Control Switching Arrangement

A CDP number can be part of a Common Control Switching Arrangement (CCSA) dialing plan. Digit absorption and manipulation for CCSA calls is handled as usual by the switch. A CCSA call can terminate at a switch in a CDP group other than the switch that hosts the CCSA network. This operation is transparent to the originator of the CCSA call.

COS/TGAR Treatment

For CDP calls, all Class of Service (COS) treatment remains the same as standard treatment with the exception of conditionally toll-denied (CTD) and conditionally unrestricted (CUN) COS, which are treated as unrestricted (UNR). Users with an FR2 class of service can originate local CDP calls but cannot originate CDP calls to distant switches. Trunk Group Access Restrictions (TGAR) are ignored for the purpose of routing CDP calls.

Direct Inward Dialing

Because a CDP DN can be up to 10 digits, the capability of inserting up to 8 leading digits on a DID trunk is supported.

Display

The following lists how a digit display telephone handles CDP calls.

- **Outgoing CDP Call** — The complete dialed CDP DN displays at the originating set.
- **Incoming CDP Call —** The trunk access code and member number of the incoming trunk route display.
- **Internal CDP Call —** At the originating telephone, the complete dialed CDP DN displays. If the call hunts or is picked up by another station, the internal DN of the answering station displays. At the terminating telephone, the internal DN of the originating telephone displays.
- **Network Call Transfer** — NXFER interacts with CDP calls in the same manner as ESN network calls. Refer to *Basic Network Features* (553-3001-379) for a full description of NXFER.

End-to-End Signaling

End-to-End Signaling is allowed for CDP calls.

Hunting

Hunting across different switches in a CDP group is not supported. Standard Hunting can be applied to local CDP calls.

Interchangeable Numbering Plan Area codes

Because the Interchangeable Numbering Plan Area (NPA) codes plan removes the requirement that the second digit in an NPA is a zero (0) or a one (1), the Toll Denied (TLD) class of service is no longer a reliable way to toll-deny sets. To reliably toll-deny sets, the Code Restriction or New Flexible Code Restriction (NFCR) feature must be used.

Message Center

The message center capability is not supported across CDP switches. However, it operates as normal locally.

Federal Communication Commission Equal Access Carrier Access Code Expansion impact

In May 1991, the Federal Communications Commission (FCC) mandated that Call Aggregators (CA) allow customers *Equal Access* to interexchange carriers. This allows callers to use interexchange carriers regardless of the CA's prescribed carrier. As a concession to CAs, the FCC allowed the optional restriction of direct dialed Equal Access toll calls.

Any call preceded by a Carrier Access Code (CAC) is considered to be an Equal Access call. The CAC consists of an Equal Access identifier and a Carrier Identification Code (CIC) that identify the desired interexchange carrier for a given call. The FCC Equal Access CAC Expansion allows the Equal Access identifier to be expanded from two to three digits, and the CIC to be expanded from three to four digits. Table 4 provides examples of both the original and expanded CAC formats.

Table 4
Original and expanded CAC formats

CAC formats	Equal Access Identifier	Carrier Identification Code
Original	10	XXX
Expanded	101	XXXX

Along with the introduction of the expanded CAC the FCC Equal Access CAC Expansion feature also eliminates the Selective Carrier Restriction method capabilities, while retaining the General Carrier Restriction capabilities. This results in a single restriction method which will be referred to as Equal Access toll call restriction.

Dialing Plan considerations

The CAC formats and time frames that are supported are provided in Table 5. This table assists Network Dial Plan Administrators in planning for the CAC expansion. See Table 6 on page 31 for the CAC format interactions.

Table 5
CAC supported formats

Operator-assisted dialing to North American and International locations:
101XXXX + 0
101XXXX + 0 + NPA + NXX + XXXX
101XXXX + 0 + NXX + XXXX
101XXXX + 0 + SAC + NXX + XXXX
101XXXX + 01 + CC + NN
Direct Distance Dial (DDD) dialing to North American and International locations:
101XXXX + 1 + NPA + NXX + XXXX
101XXXX + 1 + NXX + XXXX
101XXXX + 011 + CC + NN

When original and expanded CAC formats are supported it should be noted that the original CICs will be supported by the expanded CAC format if “0” is dialed before the original CIC. Table 6 shows the interactions between CAC formats during the various time frames.

Table 6
CAC format interactions

Supported CAC formats	Dialing sequences	Example
Original only	10XXX +...	10123 + 1 + NPA + NXX + XXXX
Original and Expanded	10XXX +... 1010XXX +...	10123 + 1 + NPA + NXX + XXXX 1010123 + 1 + NPA + NXX + XXXX
Expanded only	1010XXX +...	1010123 + 1 + NPA + NXX + XXXX

Carrier Access Codes dialing sequences with special characters

The system recognizes two special characters in any dialing sequence. These characters are the * (star or asterisk) and # (number sign, pound, or octothorpe). The *, when detected in a dialing sequence, causes a pause in the outpulsing of digits, while the #, when detected in a dialing sequence, indicates end-of-dialing, that is, no further digits are required to process the call.

Because of an interaction with Equal Access if the system is configured to restrict international toll calls, then direct-dialed Equal Access operator calls (101XXXX + 0) cannot be terminated with an #. If an Equal Access operator call is terminated with an #, the call is restricted. See Table 7 for an example.

Table 7
Octothorpe with Equal Access interaction

If	101XXX + 011 + CC + NN	calls are restricted
Then	101XXX + 0 + #	calls will also be restricted
But	101XXXX + 0	will not be restricted

Configuring Equal Access within a network

Equal Access toll restriction is intended for use on an outgoing route from a system to a Central Office. This feature is not intended for restriction of calls which terminate on a network node. Therefore, network signaling (ESN3, ESN5, or ETN) is not supported.

Within a network Equal Access toll calls should be restricted at the outgoing node (the node which is directly connected to the Central Office).

Flexible Numbering Plan description

Contents

This section contains information on the following topics:

Introduction

Flexible Numbering Plan (FNP) accommodates Global Numbering Plan (GNP) requirements by modifying the Electronic Switched Network (ESN) dialing plan. The dialing plans are divided into two areas:

- **On-net dialing —** Involves all possible dialing situations required when dialing to a station located within the Local (private) Network.
- **Off-net dialing** — Involves all possible dialing situations required when dialing to a station that is not part of the Local Network (typically the Public Numbering Plan).

FNP is enhanced to include the ability to inhibit the time-out handling process for:

- ESN Basic Alternate Route Selection (BARS)
- Network Alternate Route Selection (NARS), Special Numbers (SPN)
- Coordinated Dialing Plan (CDP), Trunk Steering Codes (TSC)

The FNP enhancement ensures that all digits are collected prior to trunk seizure. This enhancement meets Chinese requirements.

Network Alternate Route Selection (NARS) package 58 is a prerequisite for FNP. FNP interacts with both NARS and CDP to introduce:

- Universal Numbering Plan (UNP)
- Transferable Directory Numbers (TNDN)
- Group Dialing Plan (GDP)
- Arbitrary length DNs on a node
- Free Special Number Screening (FSNS)

Required packages

Flexible Numbering Plan (FNP), requires Network Alternate Route Selection (NARS), package 58.

On-net dialing

This section deals with the dialing required to reach a station that is located in the same network.

Flexible Numbering Plan (FNP) allows the length of Location Codes (LOC) to vary from node to node. As well, the total number of digits dialed to get to a station can vary from station to station.

FNP allows flexible length Directory Numbers (DN) throughout the network. For instance, the number of digits that make up a DN can vary from station to station. This capability allows existing networks to modify their dialing plan. An existing four digit network can go to five or six digit numbers when adding new switches, while keeping the existing four digit plan as is.

When Uniform Dialing Plan (UDP) is in effect, stations calling other stations on the same switch can skip the node identification digits. The on-net Location Codes can be one to seven digits in length, while the total number of digits dialed can be one to ten. To use UDP, a station user dials the Location Code of the desired node, then the DN of the station at that node. The digits dialed to get to a station can be the same from any switch in the network.

When Coordinated Dialing Plan (CDP) is used, stations on any switch are represented by unique three to ten digit numbers. A station on one switch can call a station at another switch within the CDP group by dialing the unique three to ten digit number without access codes and associated optional pauses for dial tone. With existing features, the number of digits dialed to a particular node (NCDP) must be the same for all stations on that node. If fewer digits than NCDP are dialed, the system times out and gives overflow tone. With Flexible Numbering Plan (FNP), any station on any switch is represented by a unique one digit to ten digits number. Moreover, DNs of different lengths can coexist on the same switch. Termination is attempted when the system times out, even if the expected number of digits is not dialed.

When the Transferable DN (TNDN) scheme is used, a user can move from one location to another while retaining their DN. The TNDN scheme is supported on a one to seven digit CDP.

Off-net dialing

This section deals with the dialing required to reach a location that is not part of the local network, typically a public exchange station, and stations that are part of another private network.

FNP is used to accommodate dialing plans which are not based on a fixed length number of digits as the North American Numbering Plan (NANP) is. In North America the dialing plans are fixed length, NXX + XXXX or NPA + NXX + XXXX and ESN dialing plan formats are designed to respond to these consistent dialing patterns. Since this is not the case internationally, FNP is introduced to allow users to dial numbers of varying lengths to terminate at a destination. Flexibility of the number of digits dialed is achieved by using Special Numbers (SPNs) that utilize the Supplemental Digit restriction or Recognition (SDRR) capability.

ESN allowed a customer to dial off-network numbers. These numbers were recognized at a NARS or BARS switch and translation of the Numbering Plan Area (NPA), Office Code (NXX), or SPN with SDRR determined the treatment for the call.

SDRR is applied *after* translating the NPA, NXX, or SPN at an intelligent NARS or BARS switch.

> ***Note:*** The use of the Alternate Routing Remote Number (ARRN) SDRR capability increases the maximum number of digits that can be analyzed for a SPN from 11 to 16.

Call processing stops until the expected digits have been received. The expected digits are then compared to the numbers defined in the SDDR table:

- If a match is found and specified as a recognized DID or DDD number terminating at a Conventional Main switch (recognition takes place at the last intelligent NARS or BARS switch), Route Selection with the Route List Index defined for the NPA, NXX, or SPN number is performed. A special digit manipulation is applied so that the proper numbers are outpulsed to terminate directly at the station or attendant of the Conventional Main switch. If the trunk is any trunk type other than Tie, then the termination is processed by the current software with Digit Manipulation if necessary.
- Otherwise, the call is passed to Route Selection with the Route List Index (RLI) associated with that NPA, NXX, or SPN number.

ESN did not allow alternate routing for these numbers. In countries not on the North American continent, this was a major drawback because it led to configuration problems for SPN numbers.

With FNP a new type of number is introduced in the SDRR block. It is called an Alternate Routing Remote Number (ARRN). Following each SPN (and only SPNs), a customer can configure ARRNs. For each of these numbers, it is also possible to configure an Alternate Route List Index (ARLI).

Call processing follows the same steps as previously mentioned. The expected digits are compared to the numbers defined in the SDRR table and one of the following occurs:

- If a match is found and specified as a recognized ARRN number, Route Selection with the ARLI defined for that number is performed.
- If a match is not found, Route Selection is called with the RLI found in the table. (One RLI per SPN number).

Flexible Numbering Plan operation

Contents

This section contains information on the following topics:

On-net dialing

This section deals with the dialing required to reach a station which is located in the same network. Any station in the network is represented by a flexible number of digits. This includes the use of Uniform Dialing Plan (UDP) such as Location Code (LOC) + Directory Number (DN), or Universal Numbering Plans; for example, Coordinated Dialing Plan (CDP).

Location Code (LOC)

Flexible length LOC allows three to seven digit LOCs. Currently, the flexible length LOC code does not change the length of the number that a user is allowed to dial, but only changes which portions of the number are recognized as different components. Therefore, if a LOC is dialed, seven digits are expected before any attempt is made to terminate the call.

The Flexible Numbering Plan (FNP) feature allows the specification of the total number of digits, up to ten, which are required to terminate on a station at a particular node. As well, one to seven digit LOCs are allowed.

When a LOC is dialed, a Route List Block (RLB) is used to make routing decisions. The number of digits expected is defined by the response to the Flexible Length (FLEN) prompt, prompted when the LOC is defined. FLEN allows the length of the number dialed to be up to 10 digits. If the user dials a DN shorter than FLEN, termination is attempted when the octothorpe (#) is pressed or when the Network Alternate Route Selection (NARS) interdigit timer times out. If the FNP package (160) is not equipped or the response to the FLEN prompt is zero (0), then digit analysis is performed as it was prior to the introduction of FNP.

End-of-dial timing

All NARS end-of-dial timing procedures apply to FNP along with the FNP unique FLEN processing. If the user dials the number of digits as defined by the response to the FLEN prompt, then the software considers dialing as being complete and analyzes the digits for call processing purposes.

Note: FLEN is not supported for authcode LAST.

Table 8 illustrates when FNP attempts termination for various FLEN settings, LOC lengths, and digits dialed.

Table 8
Termination for FLEN, LOC lengths and digits dialed

LOC	+	DN	
number of digits	m = 1 - 7		FLEN - m
Digits expected (FLEN)	Length of LOC	Digits dialed	Termination
7	3	7	right away
7	3	6	following # or time out
7	2	7	right away
7	2	6	following # or time out
10	7	10	right away
10	5	9	following # or time out
10	5	4	not possible
10	7	18	when 10 digits are dialed according to CDP, BARS, or NARS operation

Coordinated Dialing Plan

When Coordinated Dialing Plan (CDP) is used, stations are represented by unique three to ten digit numbers. CDP uses Local Steering Codes (LSC), Distant Steering Codes (DSC), or Trunk Steering Codes (TSC) that are one to seven digits long, to determine how dialed numbers are reached. A station at one location can call a station at another location within the CDP group by dialing the unique three to ten digit number without access codes and associated optional pauses for dial tone.

Without FNP, the Number of CDP (NCDP) digits dialed to reach a particular location must be the same for all stations at that location. If fewer digits than NCDP are dialed, the system times out and gives overflow tone.

With FNP, any station at any location is represented by a unique one to ten digit DN. DNs of different length can coexist at the same location. Termination is attempted when the system times out or when the octothorpe (#) is pressed, even if the expected number of digits (FLEN) are not dialed.

Table 9 on page 42 illustrates when FNP attempts termination for various FLEN settings, DSC or LSC or TSC lengths, and digits dialed.

Note: FLEN is not supported for authcode LAST.

Table 9
Termination for DSC, LSC or TSC lengths and digits dialed (Part 1 of 2)

DSC or LSC or TSC + DN			
number of digits	**m = 1 - 7**		**FLEN - m**
up to maximum of:	**10 digits for DSC** **16 digits for TSC** **no limit for TSC if FLEN=0**		
Digits expected (FLEN)	**Length of DSC or LSC or TSC**	**Digits dialed**	**Termination**
7	3	7	right away
7	3	6	# or time out
7	2	7	right away
7	2	6	# or time out
10	7	10	right away
10	5	9	# or time out

Table 9
Termination for DSC, LSC or TSC lengths and digits dialed (Part 2 of 2)

DSC or LSC or TSC + DN			
number of digits	**m = 1 - 7**		**FLEN - m**
up to maximum of:	**10 digits for DSC 16 digits for TSC no limit for TSC if FLEN=0**		
Digits expected (FLEN)	**Length of DSC or LSC or TSC**	**Digits dialed**	**Termination**
10	5	4	not possible
10	7	11	when 10 digits are dialed according to CDP, BARS, or NARS operation

End-of-dial timing

All NARS end-of-dial timing procedures apply to FNP along with the FNP unique FLEN processing. If the user dials the number of digits as defined by the response to the FLEN prompt, then the software considers dialing as being complete and analyzes the digits for call processing purposes.

For TSC the default value for Inhibit Time Out Handler (ITOH) is ‘NO’, which initiates an attempt to terminate the call. If ITOH is set to ‘YES’ then the call is not terminated if the NARS Interdigit Timer (NIT) expires before the number of digits dialed reaches the FLEN value.

Universal Numbering Plan

Currently, CDP is capable of using LSC, DSC, or TSC that are one to seven digits long. The Global Networking Requirement calls for three to seven digit Transferable DNs (TNDNs) across the network. Furthermore, the TNDNs must be able to have variable lengths, even on the same node. In order to fulfill this requirement, one to seven digit steering codes are used. The maximum number of digits allowed was expanded from four to seven digits, and the maximum number of steering codes allowed was expanded from 5000 to 10 000. With the introduction of FNP the maximum number of steering codes has again been increased to 32 000.

Figure 3 shows an example of the Universal Numbering Plan (UNP) network with TNDNs. This network uses three-digit DSC and LSC.

Figure 3
Universal numbering plan with transferable DNs

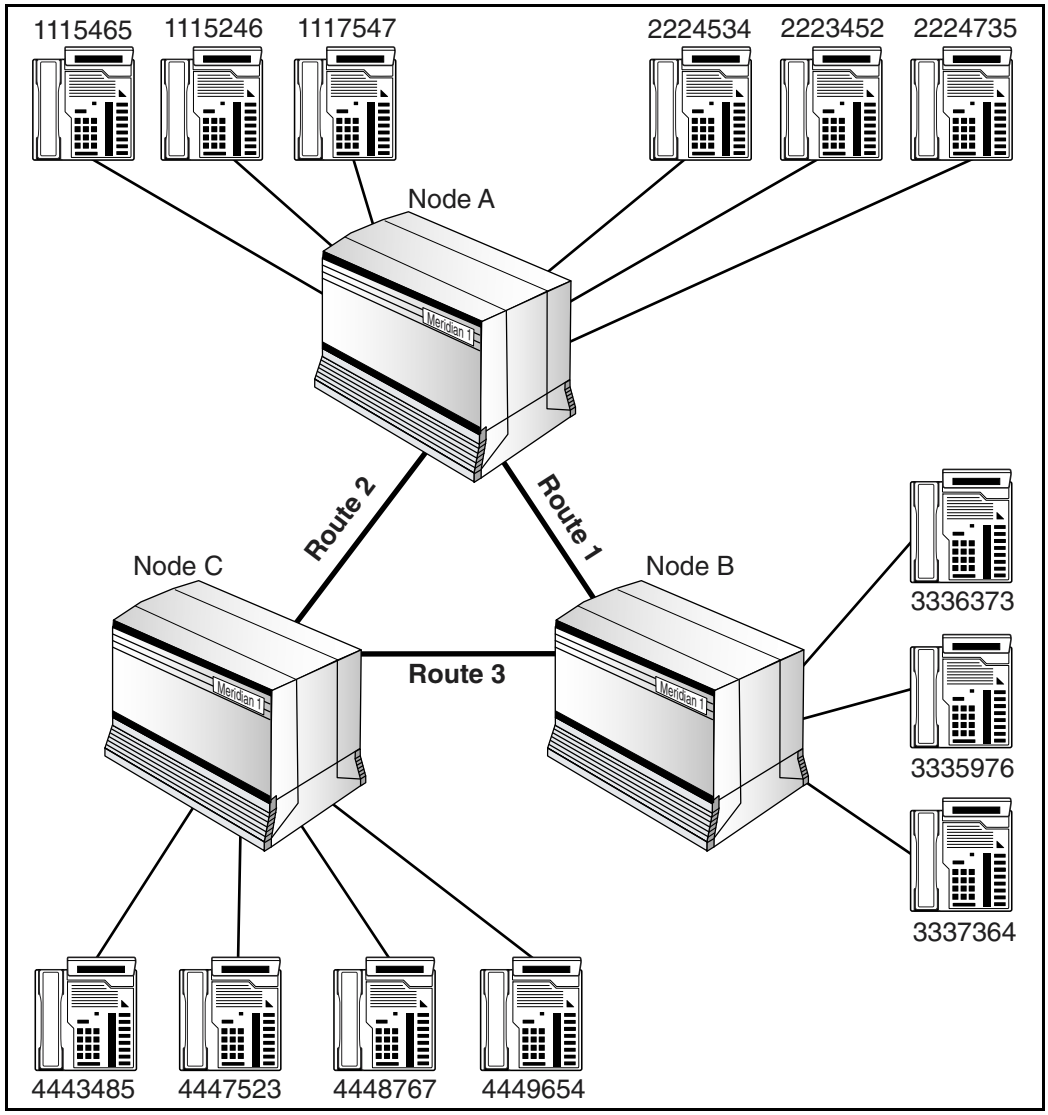


Table 10 provides an overview of the software configuration required to route calls between nodes.

Table 10
Call Routing software configuration

	Distant steering code	Route block list	Entry	Route number	Digit manipulation index	Digits to delete
A to B:	333	1	1	1	1	3
		1	2	2	2	0
A to C:	444	2	1	2	1	3
		2	2	1	2	0
B to A:	111	1	1	1	1	3
		1	2	3	2	0
	222	1	1	1	1	3
		1	2	3	2	0
B to C:	444	2	1	3	1	3
		2	2	1	2	0
C to A:	111	1	1	2	1	3
		1	2	3	2	0
	222	1	1	2	1	3
		1	2	3	2	0
C to B:	333	2	1	3	1	3
		2	2	2	2	0

	Local steering code	Digit manipulation index	Digits to delete	Directory Numbers
A to A:	111	1	3	2565, 5246, 7547
	222	1	3	4534, 3452, 4735
B to B:	333	1	3	6373, 5976, 7364
C to C:	444	1	3	3485, 7523, 8767, 9654

Figure 4 shows the network following the move of TNDN 1117547 from node A to node B.

Figure 4
Universal numbering plan network following transferable DN move

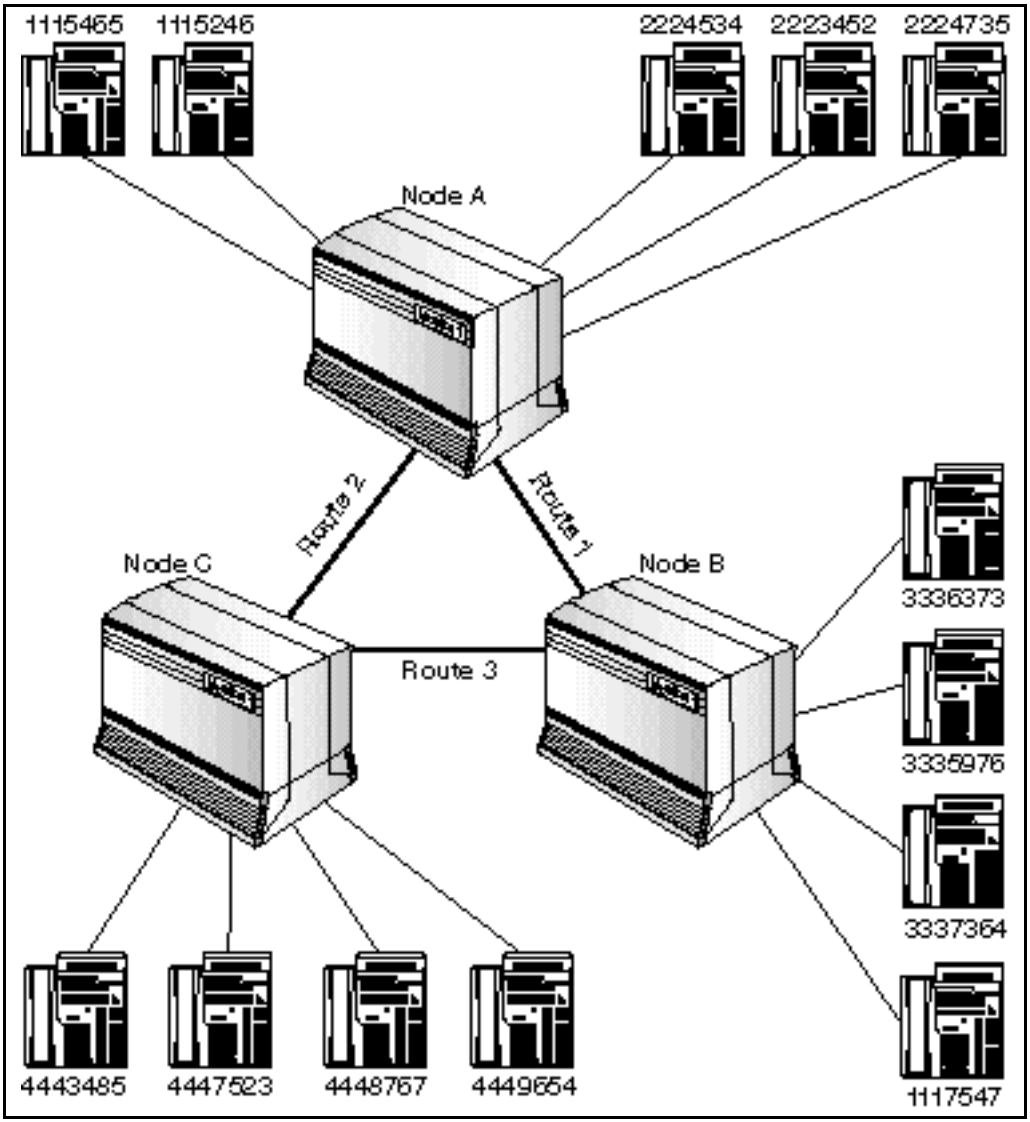


Table 11 provides an overview of the software configuration following the move of TNDN 1117547.

Table 11
Software configuration after move of TNDN 1117547 (Part 1 of 2)

	Distant Steering code	Route block list	Entry	Route number	Digit manipulation index	Digits to delete
A to B:	333	1	1	1	1	3
		1	2	2	2	0
	1117547	2	1	1	2	0
		2	2	2	2	0
A to C:	444	2	1	2	1	3
		2	2	1	2	0
B to A:	1112	3	1	1	2	0
		3	2	3	2	0
	1115	3	1	1	2	0
		3	2	3	2	0
	222	1	1	1	1	3
		1	2	3	2	0
B to C:	444	2	1	3	1	3
		2	2	1	2	0

Table 11
Software configuration after move of TNDN 1117547 (Part 2 of 2)

	Distant Steering code	Route block list	Entry	Route number	Digit manipulation index	Digits to delete
C to A:	1112	3	1	2	2	0
		3	2	3	2	0
	1115	3	1	2	2	0
		3	2	3	2	0
	222	1	1	2	1	3
		1	2	3	2	0
C to B:	1117547	2	1	3	2	0
		3	2	2	2	0
	333	2	1	3	1	3
		2	2	2	2	0

	Local steering code	Digit manipulation index	Digits to delete	Directory numbers
A to A:	222	1	3	4534, 3452, 4735
				1112565, 1115246
B to B:	333	1	3	6373, 5976, 7364
				1117547
C to C:	444	1	3	3485, 7523, 8767, 9654

Group dialing plan

Group Dialing Plan (GDP) enables coordinated dialing within a larger network that using Location Codes (LOC).

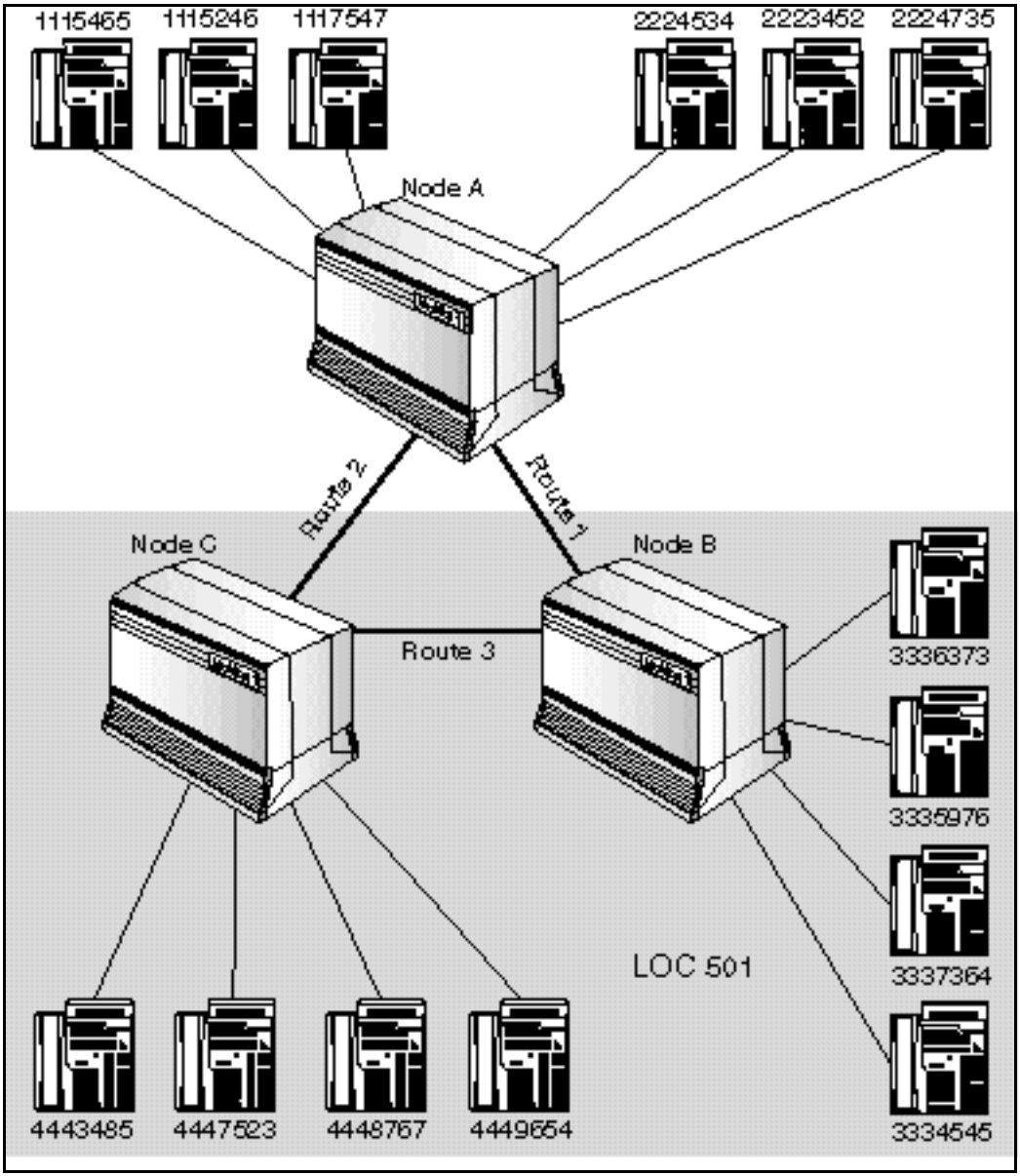
Each group has an LOC that has to be dialed from outside the group as a prefix to the group CDP: that is, have LOC and CDP working together. In this case, the number dialed to a station can be different when dialed from different locations.

When GDP is used, the maximum number of digits allowed for either LOC+DN, LSC+DN, or DSC+DN cannot exceed 10 digits if the dialing plan is to perform properly. Figure 5 on page 52 illustrates a GDP network.

In order to get to station 6373 on node B:

- User 2565 on node A dials 501-3336373.
- User 3485 on node C dials 3336373.
- User 5976 on node B dials 6373.

Figure 5
Group dialing plan



Digit display with Integrated Services Digital Network

Within an Integrated Services Digital Network (ISDN), the digit display sent or received varies depending on the digits dialed to activate the routing. This depends on the method used to configure the digits dialed (that is, LOC, DSC). Currently, if a LOC is dialed the HLOC is sent as a prefix to the DN. Similarly, if a DSC is dialed, the LSC is prefixed before the DN. This method creates very inconsistent display formats in situations where GDPs are used. To solve this problem, a new option is introduced to the DSC prompt sequence that allows a user to identify what prefixes the DN sent. The options are HLOC, LSC, or nothing.

LOC+DN dialing

Dialing Party sees: LOC+DN of answering party.
Called Party sees: LOC+DN of dialing party.

CDP dialing

Dialing Party sees: LSC+DN of answering party.
Called Party sees: LSC+DN of dialing party.

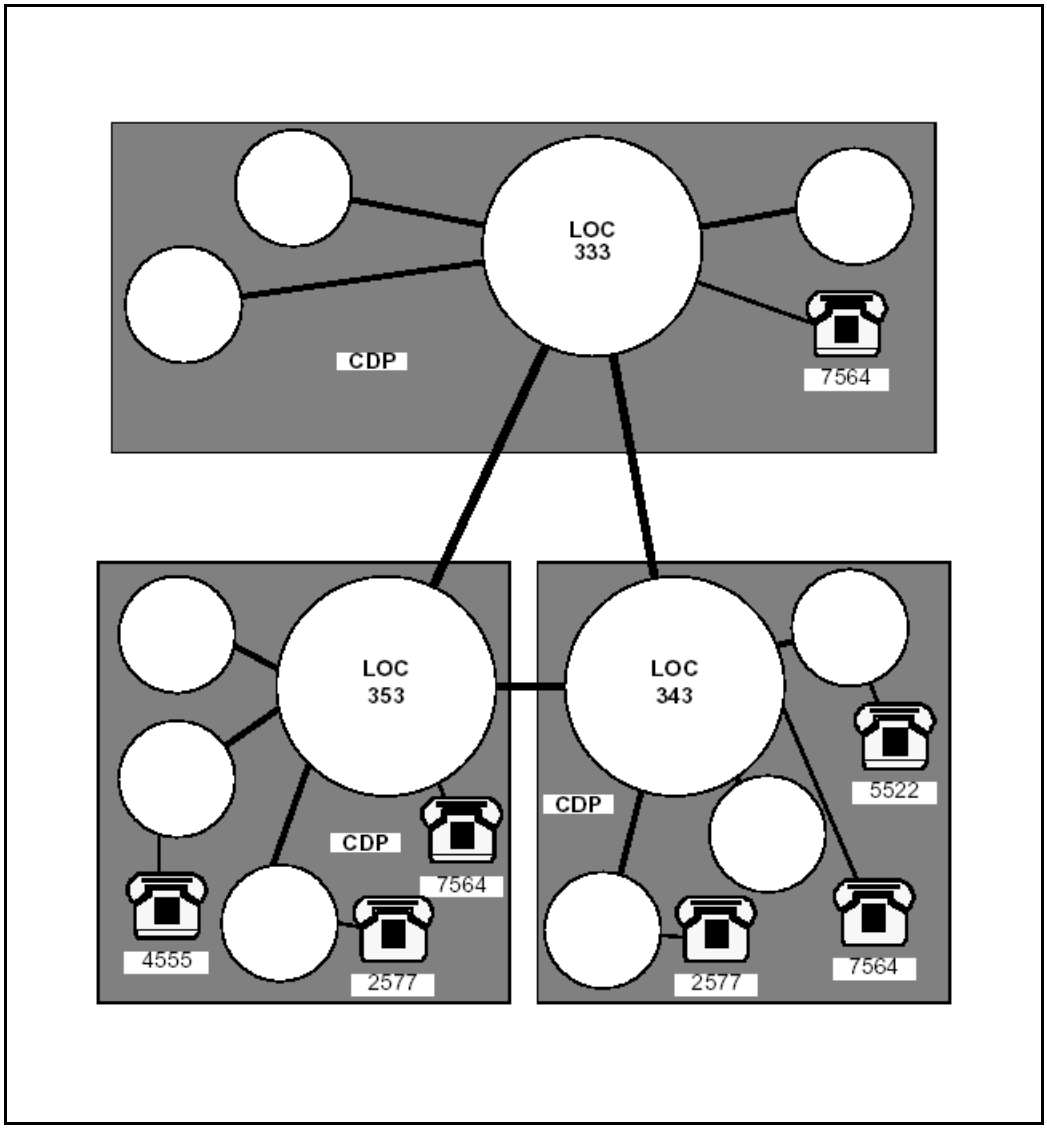
Group dialing

Depending on the option chosen on a per DSC basis, any of the following can be seen:

Dialing Party sees: LOC+DN or LSC+DN or DN of answering party.
Called Party sees: LOC+DN or LSC+DN or DN of dialing party.

Figure 6 on page 54 is an example of a network that uses the GDP. This sample network is used to show what various sets within the network display.

Figure 6
Sample GDP network



The following are samples of the information displayed by different sets in the network.

1 Station A (7564 at location 333) trying to reach station B (7564 at location 353).
Station dials:63537564
Station A sees:63537564
Station B sees:H3337564
Station B answers.
Station A sees:H3537564
Station B sees:H3337564

2 Station A (7564 at location 353 trying to reach station B (2577 at location 353).
Station A dials:63532577
Station A sees:63532577
Station B sees:H3337564
Station B answers.
Station A sees:H3532577
Station B sees:H3337564

3 Station A (7564 at location 333) trying to reach station B (2577 at location 353).
Station A dials:2577
Station A sees:2577
Station B sees:H7564 or H3337564 (depending on option in DSC)
Station B answers.
Station A sees:H2577 or H3532577 (depending on option in DSC)
Station B sees:H7564 or H3337564 (depending on option in DSC)

4 Station A 333-7564 trying to reach station B 353-4555.
Station A dials:4555
Station A sees:4555
Station B sees:H3337564(LOC option chosen in DSC)
Station B answers.
Station A sees:H3534555(LOC option chosen in DSC)
Station B sees:H3337564(LOC option chosen in DSC)

Off-net dialing

This section deals with dialing required to reach a location which is not part of the local network. This is typically a public exchange station, but it also includes stations that are part of another private network.

FNP introduces alternative routing for Direct Inward Dialing (DID) or Direct Distant Dialing (DDD) Special Numbers (SPNs). The main purpose of alternative routing for DID or DDD SPN numbers is to define and enable alternate routing for calls recognized as remote DID or DDD SPN numbers within a private network. It also allows for low cost routing of off-net numbers.

Alternative routing for DID or DDD SPN numbers introduces a new type of number in the Supplemental Digit Restriction or Recognition (SDRR) block: Alternate Routing Remote Number (ARRN). Each ARRN has an Alternate Route List Index (ARLI) defined for it.

SDRR is applied after translating the SPN at an intelligent NARS or BARS switch. If a match is found and specified as an ARRN number, Route Selection is performed with the ARLI defined for that number.

Special Numbers (SPN)

Currently, the length of an SPN can be 1 to 11 digits. When the SPN is dialed, the trunk is seized immediately. Any digits dialed afterwards are outpulsed. With the FNP feature, the system waits for FLEN of digits up to a maximum of 16 digits before attempting termination. If the user dials fewer than the FLEN of digits, termination is only attempted when the octothorpe # is pressed or when the NARS interdigit timer times out. If the FNP package is not equipped or if the value of FLEN is 0, then current operations are followed.

Note: FLEN is not supported for authcode LAST.

Note: If the SPN in question is 0, 00, 01, 011, 411, 611, 911, 800 or 1800 then the North American operation can be altered by setting the INPL prompt to YES. This allows a flexible number of digits to be dialed and termination to be attempted only when the octothorpe # is pressed or when the NARS interdigit timer times out. For example, if SPN 00 is

defined with FLEN = 0 and INPL = NO, termination can be attempted immediately after the SPN is entered and additional dialed digits are NOT outpulsed.

Table 12 illustrates when FNP attempts termination for various FLEN settings, SPN lengths, and digits dialed.

Table 12
Termination for FLEN settings, SPN lengths, and digits dialed

SPN + DN			
Number of digits	m = 1 -1 11		FLEN - m
Digit expected (FLEN)	**Length of SPN**	**Digits dialed**	**Termination**
1	1	1	right way
3	3	3	right away
7	2	7	right away
7	2	6	# or time out
12	11	12	right away
16	7	16	right away
16	5	9	# or time out
16	5	4	not possible
0			according to CDP, BARS, or NARS operation

An off-net number is recognized at a NARS or BARS intelligent switch. Translation of the SPN number identifies the method of treatment for the call.

If the response to SDRR in LD 90 is any response other than NONE, SDRR is applied. Then one of the following occurs:

- If the number is "denied" (that is, response to SDRR is DENY): standard call blocking takes place.
- If the number is defined as terminating at the local switch (that is, response to SDRR is LDID or LDDD):
  the call is terminated at the station DN for DID and at the Attendant DN for DDD.
- If the number is defined as terminating at a remote system or Conventional Main switch (that is, response to SDRR is DID or DDD): Route Selection with the Route List Index (RLI) defined for that SPN is performed. The call is then routed to the dialed station for DID numbers or to the attendant for DDD numbers.
  - If the trunk route used to route the call is a Tie trunk route, then a special digit manipulation is applied so that the proper numbers are outpulsed to terminate directly at the station or attendant of the Conventional Main switch.
  - If the trunk route used to route the call is any trunk route other than a Tie trunk route, then the call is processed by the current software with digit manipulation if necessary.
- If the number is defined as an Alternate Routing Remote Number (that is, response to SDRR is ARRN):
  Route Selection with the ARLI defined for that ARRN is performed. Numbers declared as ARRN are leftwise unique.

Alternate Routing Remote Number (ARRN)

FLEN set to 0

When the response to the FLEN prompt in overlay 90 is "0" then:

- SPN can be between 3 and 11 digits in length.
- SDRR table entry length is limited:
  - To an absolute maximum of seven digits.
  - For any given SPN, to 11-X, where X is the digit length of the SPN.

FLEN is nonzero

When a response other than “0” is entered in response to the FLEN prompt, then:

- The maximum FLEN can be set to is 16.
- The maximum number of digits that can be entered in response to the SPN prompt is 11.
- The maximum number of digits that can be entered in the SDRR table is 7.

The SPN must be nine digits in length to effectively use the SDRR facility for a FLEN of 16.

In practice, for International calls, fourteen digit number translation is the maximum required. Table 13 summarizes the options available when the response to the FLEN prompt is a value in the range 1-16.

Table 13
FLEN prompt options

FLEN	SPN	SDRR
9	9	0
9	3	6
10	10	0
10	3	7
10	7	3
14	7	7
16	9	7
16	10	6
16	11	0
14	5	7

The system translation capability is illustrated in the following example:

An end user has offices in Holland and the United Kingdom (UK).

It is commonplace for calls to be placed from the customer's UK offices to their Dutch offices by dialing the international Public Service Telephone Network (PSTN), even though private circuits and a private numbering plan exist for the routing of such calls.

The customer requires that the dialed digits be analyzed down to the third to last digit, in order to recognize their assigned Direct Dial Inward (DDI) range.

The international PSTN number is: 010 31 250 3731XX

The FLEN, determined by the actual full number length is, 14.

Enter the following in LD 90:

LD 90 – Define Special Number translation.

Prompt	Response	Description
SPN	010 31	Special Number translation ***Note:*** Only one needed for Holland.
SDRR	ARRN	Supplemental Digit Restriction or Recognition
ARRN	250 373 1	Alternate Routing Remote Number

Note: To ensure proper operation in the previous example the value input in response to the FLEN prompt must be at least 14. To obtain this result, add the number of digits entered in response to the SPN and ARRN prompts to the number of remaining digits required to route the call correctly. In the previous example five digits were entered in response to the SPN prompt, seven digits were entered in response to the ARRN prompt, and two digits were required to terminate the call at the correct number yielding a total of 14 digits. If FLEN were set to 12 in the previous example, then the last two digits would be lost, and the call would not terminate.

End-of-dial timing

For SPN codes, the default value for ITOH is ‘NO’ allowing termination of the call to be attempted. If ITOH is set to ‘YES’ then the call is not terminated if the NIT timer expires before the number of digits dialed reaches the value entered for FLEN.

Numbering Plan Area (NPA) and NXX

Flexible length Numbering Plan Area (NPA) and NXX codes allow 3 to 10 digit (4 to 11 for 1+ dialing) NPAs and NXXs. The flexible length NPAs and NXXs do not change the number of digits a user is allowed to dial, but only change which portions of the number are recognized as different components. If an NPA is dialed, 10 digits (11 for 1+ dialing) are expected before an attempt to terminate is made. If an NXX is dialed, 7 digits (8 for 1+ dialing) are expected before an attempt to terminate is made. The FNP feature does not change the operation of NPA and NXX dialing.

NPA + NXX + XXXX
total of 10 digits (11 digits for 1+ dialing)

NXX + XXXX
total of 7 digits (8 digits for 1+ dialing)

Figure 7 on page 62 illustrates a network where both off-net and on-net dialing are used.

Figure 7
Sample network to illustrate off-net dialing

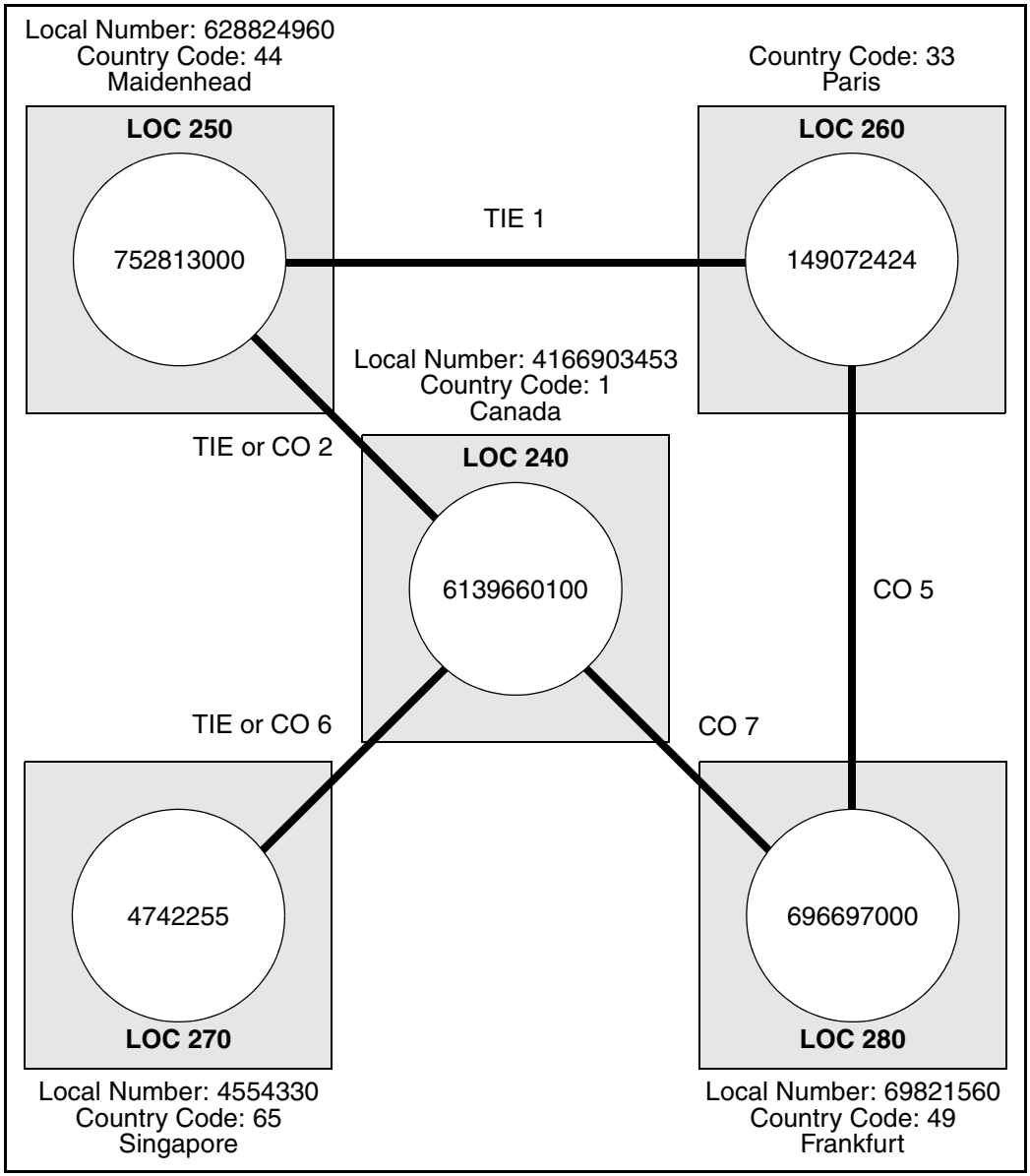


Table 14
On-net dialing and associated software setting

Canada to Maidenhead	AC1	LOC	TIE		DELETE	INSERT	FLEN
62501234	6	250	2		3	NONE	7
Canada to Paris	AC1	LOC	TIE		DELETE	INSERT	FLEN
62602234	6	260	2		NONE	AC1	7
Canada to Singapore	AC1	LOC	TIE		DELETE	INSERT	FLEN
62703234	6	270	6		3	NONE	7

Table 15
Off-net dialing and associated software settings (Part 1 of 2)

Canada to Maidenhead	AC2	SPN	TIE	CO	DELETE	INSERT	FLEN
9-44-628824960	9	44	2		2	AC2	11
	9	44		2	NONE	011	11
Canada to Frankfurt	AC2	SPN	TIE	CO	DELETE	INSERT	FLEN
9-49-69821560	9	49		7	NONE	011	10
Canada to Singapore	AC2	SPN	TIE	CO	DELETE	INSERT	FLEN
9-65-4554339	9	65	6		2	AC2	9
	9	65		6	NONE	011	9

Table 15
Off-net dialing and associated software settings (Part 2 of 2)

Canada to Maidenhead	AC2	SPN	TIE	CO	DELETE	INSERT	FLEN
Paris to Frankfurt	AC2	SPN	TIE	CO	DELETE	INSERT	FLEN
9-49-69821569	9	49		5	NONE	19	10

End-of-dial timing

There can be cases where the requirements dictate that the DNs at a particular location are of varying lengths. In this case, the value of FLEN is set to the maximum DN length for that particular location before termination is attempted. If the number of digits dialed is less than the maximum DN length defined, the expiration of a timer, or the use of the “fast connect” key is required to attempt termination.

A new NARS Interdigit Timer (NIT) is introduced in the customer data block. The NIT is packaged within the NARS package. Therefore, the FNP package is not required for NIT. During dialing, until a valid Network Access Code, LSC, DSC, or TSC is recognized, interdigit timing is done in the same way as it is for a regular call. Once NARS has been accessed, the NIT timer is used to perform interdigit timing. If the NIT timer expires before FLEN digits have been dialed, or an octothorpe (#) has been entered to indicate that all digits have been dialed, then an attempt is made to terminate the call.

For TSC and SPN codes if the NIT timer expires before FLEN digits have been dialed, or an octothorpe (#) has been entered to indicate that all digits have been dialed, then operation depends on the response to the ITOH prompt. The ITOH option is set for TSC using LD 87 and SPN using LD 90.

If ITOH = NO (default) an attempt is made to terminate the call.
If ITOH = YES then the call is not terminated.

Vacant Number Routing

In order to keep the Transferable Numbering Plan at a manageable level, Vacant Number Routing (VNR) is introduced. Instead of changing the numbering trees and steering codes at each location, all the routing information can be kept at one central location. When a DN is transferred from one location (A) to another (B), routing information at the two locations involved do not have to be changed. Instead all routing information can be stored at a third location (C) and this would be the only location to have its routing information updated.

If a vacant number is dialed, the call is routed to location C. This location decides where the station is located, if the station cannot be located then vacant number treatment at the terminating location is given. The DN is not treated as invalid at the location where vacant number dialing is in effect.

Administration of the Transferable Numbering Plan can be located at central switches and smaller switches can be alleviated of having to administer the entire numbering plan.

Free Calling Area Screening

The Free Calling Area Screening (FCAS) feature currently allows a six digit NPA-NXX translation which excludes “0” and “1” as the leading digit for NXX. The FCAS operation is not changed with FNP equipped.

NPA	NXX
3 digits	3 digits

Free Special Number Screening

A new screening capability, Free Special Number Screening (FSNS), is introduced with the FNP feature. 1 to 11 digit SPNs can be screened against three digit XXXs to allow or restrict calls going to particular XXXs. XXX can be any string of digits from 000 to 999.

SPN	XXX
1-11 digits	3 digits

The following is an example of how to use a one to five digit SPN associated with a five to one digit XXX for screening purposes:

Input in FSNS table		**Real**	
SPN	XXX	SPN	XXX
545	192	5	45192
545	192	54	5192
545	192	545	192
545	192	5451	92
545	192	54519	2

Capacity expansion

RLB and DMI expansion

In order to support UNP, the maximum number of RLBs and digit manipulation tables allowed is increased from the current maximum of 255 to 1000. This is necessary as the need for more routes and digit manipulation is required for Global Networking. Digit manipulation is allowed for LSC as a result of the existing Local Steering Code Manipulation (LSCM) feature.

LOC, LSC, DSC TSC expansion

The maximum number of LOC allowed were increased from 255 to 10 000. The maximum number of steering codes allowed were increased from 10 000 to 32 000.

AC1 and AC2 expansion

Prior to the introduction of FNP, AC1 and AC2 were either one- or two-digit codes. With FNP equipped, AC1 and AC2 can be one- to four-digit codes.

Feature interactions

Digital Access Signaling System 2 (DASS2) and Digital Private Network Signaling System 1 (DPNSS1)

It is not possible to use NARS on incoming DASS2 and DPNSS1 calls. Therefore, an intelligent NARS or BARS switch must be the first DPNSS switch if the call is routed over an DPNSS network.

Directory Number (DN) entries

All translation entries in the same NARS or BARS translator must be leftwise unique as is the requirement for all existing translators.

ESN feature interactions

ESN features operate the same way they did prior to the introduction of FNP if FLEN is set to zero. When used along with ISDN, FNP supports features that are currently supported jointly by ESN and ISDN.

Group Dialing Plan

When Group Dialing Plan (GDP) is used, the maximum number of digits allowed for either LOC+DN, LSC+DN, or DSC+DN cannot exceed ten digits.

Integrated Services Digital Network

ISDN requires the dialing of all the digits before the number is sent out in the D-channel "SETUP" message. In order to support ISDN with FNP, the dialed digits are sent when the Interdigit Timer (IDT) times out, the maximum number of digits required is dialed, or an octothorpe (#) is dialed.

Vacant Number Routing

With Flexible Numbering Plan Enhancement (FPE), Vacant Number Routing (VNR) is available only when FNP is enabled (FNP = YES). Therefore, VNR is only prompted in LD 15 when FNP = YES. When FNP is disabled, VNR is also disabled.

The FNP feature allows the user to define what is to be sent as Calling Line Identification (CLID) and what is to be displayed on the telephone set on a per-DSC basis. The following shows what is transmitted as CLID when a particular type of number is dialed:

Type of number dialed	CLID sent
SPN	Home NPA + Home NXX+DN
NPA	Home NPA + Home NXX+DN
NXX	Home NXX + DN
LOC	Home LOC +DN
DSC, TSC	LSC + DN or LOC+DN or DN

Supplemental Digit Restriction or Recognition

The Supplemental Digit Restriction or Recognition (SDRR) feature blocks unnecessary looping through the Central Office (CO) or Public Exchange at the terminating switch when an off-net number is dialed. This feature applies to NPA, NXX, and SPN calls and works as it always has. However, the restrictions are changed to allow a variable number of digits up to eleven digits in the digit restriction table, independent of the number of digits entered for the NPA, NXX, or LOC prompts.

The size of the SDRR block for a given SPN number is limited to 64 entries.

With the introduction of the ARRN, up to 16 digits can be analyzed for SPNs.

Transferable DNs

Transferable DNs are supported on a one to seven digit CDP. They are not supported when the eight to ten digit CDP is used.

Varying length DNs

For a location with DNs of different lengths (for example, five and six digit DNs), the expected number of digits for the route going to that location is set to the number of digits of the longest DN at that location. Termination to the shorter length DNs can only happen when an octothorpe is entered or when the NIT times out.

Flexible Numbering Plan administration

Contents

This section contains information on the following topics:

Introduction

There are six steps to configuring Flexible Numbering Plan:

1 Configure Network Control (NCTL) data block in LD 87 (ESN2) as required.

2 Configure Route Data Blocks (RDB) and trunks as required.

3 Configure Electronic Switched Network (ESN) data block through LD 86 (ESN1) and ensure the following parameters are configured. See "Electronic Switched Network (ESN) data" on page 72.

4 Configure Coordinated Dialing Plan (CDP) and Free Special Number Screening (FSNS) as required in Electronic Switched Network (ESN) data block through LD 87 (ESN2). See "Electronic Switched Network 2 (ESN2) data" on page 74.

5 Configure Network Translations as required in Electronic Switched Network 3 (ESN3) Translation Tables data block through LD 90 (ESN3). See "Electronic Switched Network (ESN) translation tables" on page 78.

6 Configure Vacant Number Routing (VNR) as required in Customer Data Block through LD 15. See "Customer data block administration" on page 84.

Electronic Switched Network (ESN) data

LD 86 - The ESN data block administration overlay has been modified to add the Maximum Free Special (MXFS) and Free Special Number screening Index (FSNI) prompts, enabling the creation of up to 1000 Route List Blocks and Digit Manipulation Indices (DMIs), and limiting the number of FSNS tables to 255. It is also changed to accept one to four digit access codes AC1 and AC2.

LD 86 – Configuring Electronic Switched Network (ESN) data block. (Part 1 of 2)

Prompt	Response	Description
REQ	NEW CHG PRT	New, Change, or Print
CUST		Customer number, as defined in LD 15
FEAT	ESN	Electronic Switched Network data block
MXIX	xxx	Maximum number of Incoming Trunk Group exclusion tables
MXDM	0-1000	Maximum Digit Manipulation tables
…		
MXFC	0-256	Maximum number of Free Calling area screening tables
MXFS	0-255	Maximum Free Special number screening tables
CDP	(YES) NO	Coordinated Dialing Plan

LD 86 – Configuring Electronic Switched Network (ESN) data block. (Part 2 of 2)

Prompt	Response	Description
- MXSC		Maximum Steering Codes
	0–10000	Range for North America
	0–32000	Range outside North America
…		
MSCC	0-7	Maximum number of Special Common Carrier entries
AC1	x…x	Enter one to four digit Access Code 1 (On-net access code)
AC2	x…x	Enter one to four digit Access Code 2 (Off-net access code)

LD 86 – Configuring Digit Manipulation Index. (DMI)

Prompt	Response	Description
REQ	NEW CHG PRT	New, Change, or Print
CUST	xx	Customer number, as defined in LD 15.
FEAT	DGT	Digit manipulation
DMI	(0)-999	Digit Manipulation Index

LD 86 – Configuring route list block. (Part 1 of 2)

Prompt	Response	Description
REQ	NEW CHG PRT	New, Change, or Print
CUST	xx	Customer number, as defined in LD 15.
FEAT	RLB	Route List Block
RLI	0–999	Route List Index

LD 86 – Configuring route list block. (Part 2 of 2)

Prompt	Response	Description
FRL	(0)-7	Facility Restriction Level
DMI	0–999	Digit Manipulation Index
FCI	xxx(0)	Free Calling Area Screening Index number
FSNI	(0)–255	Free Special Number screening Index Prompted only if FNP package (160) equipped

Electronic Switched Network 2 (ESN2) data

LD 87 - The Electronic Switched Network 2 (ESN2) data block administration overlay is modified to accept Route List Index (RLI) entries from 0 to 999 and DMI entries from 0 to 999 and prompt for Flexible Length (FLEN), Inhibit Time Out Handling (ITOH), and Calling Line Identification (CLID) display format. LD 87 is also modified to allow the creation, modification and printing of FSNS tables.

LD 87 – Configuring Digit Manipulation Index. (DMI)

Prompt	Response	Description
REQ	NEW CHG PRT	New, Change, or Print
CUST	xx	Customer number, as defined in LD 15.
FEAT	CDP	Coordinated Dialing Plan
TYPE	LSC	Local Steering Code
LSC	x…x	Local Steering Code x…x can be one to four digits in length if DNXP package (150) is not equipped, or one to seven digits if DNXP package (150) is equipped
- DMI	0–999	Digit Manipulation Index

LD 87 – Configuring Trunk Steering Code. (TSC)

Prompt	Response	Description
REQ	NEW CHG PRT	New, Change, or Print
CUST	xx	Customer number, as defined in LD 15.
FEAT	CDP	Coordinated Dialing Plan
TYPE	TSC	Trunk Steering Code
TSC	x…x	Trunk Steering Code x…x can be one to four digits in length if DNXP package (150) is not equipped, or one to seven digits if DNXP package (150) is equipped
- FLEN	(0)–16	Flexible Length Enter the maximum number of digits expected. When this number of digits is dialed, dialing is considered to be complete and end-of-dial processing begins. Default is zero (0) digits
- ITOH	(NO) YES	Inhibit Time out Handling Prompted if FLEN set to any valid value other than zero (0) Enter NO to allow call processing to begin when the NIT timer has expired. Enter YES to allow call processing to begin only after the number of digits defined by the response to FLEN have been dialed. Default setting is (NO).
…		
- RLI	0–999	Route List Index Enter Route List Index for this TSC.

LD 87 – Configuring Distant Steering Code (DSC). (Part 1 of 2)

Prompt	Response	Description
REQ	NEW CHG PRT	New, Change, or Print
CUST	xx	Customer number, as defined in LD 15.
FEAT	CDP	Coordinated Dialing Plan
TYPE	DSC	Distant Steering Code
DSC	x…x	Distant Steering Code x…x can be one to four digits in length if DNXP package (150) is not equipped, or one to seven digits if DNXP package (150) is equipped
- FLEN	(0)–10	Flexible Length Enter the maximum number of digits expected. When this number of digits is dialed, dialing is considered to be complete and end-of-dial processing begins. Default is zero (0) digits.

LD 87 – Configuring Distant Steering Code (DSC). (Part 2 of 2)

Prompt	Response	Description
- DSP	(LSC) LOC DN	Display Used to define the display format that the far-end receives (Calling Line Identification [CLID]) when ISDN or ISL trunks are involved in the connection. Prompted if ISDN package (145) is equipped. Enter LSC if the Local Steering Code plus user Directory Number (DN) are to be displayed at the far end. Enter LOC if the Location Code plus user Directory Number (DN) are to be displayed at the far end. Enter DN if the user Directory Number (DN) is to be displayed at the far end. Default setting is LSC.
- RLI	0–999	Route List Index Enter Route List Index for this DSC.

LD 87 – Configuring Free Special Number Screening. (FSNS) (Part 1 of 2)

Prompt	Response	Description
REQ	NEW CHG PRT	New, Change, or Print
CUST	xx	Customer number, as defined in LD 15.
FEAT	FSNS	Free Special Number Screening
FSNI	1–255	Free Special Number Index
SPN	x…x	Special Number x…x can be one to eleven (1-11) SPN is re-prompted until only a <CR> (Carriage Return) is entered.

LD 87 – Configuring Free Special Number Screening. (FSNS) (Part 2 of 2)

Prompt	Response	Description
XXX	ALOW DENY	XXX codes to be allowed or denied. Enter ALOW to configure Special Number codes that are to be allowed. Enter DENY to configure Special Number codes that are to be denied.
- ALOW	xxx	Allow codes Prompted if response to XXX was ALOW xxx can be entered as a three (3) digit code, (that is, 123, where the number 123 is allowed) or as a range of three (3) digit codes, (that is, 100 199, where all numbers in the range 100 to 199 are allowed)
- DENY	xxx	Deny codes Prompted if response to XXX was DENY xxx can be entered as a three (3) digit code, (that is, 123, where the number 123 is denied) or as a range of three (3) digit codes, (that is, 100 199, where all numbers in the range 100 to 199 are denied)

Electronic Switched Network (ESN) translation tables

LD 90 - Electronic Switched Network 3 (ESN3) Translation Tables is modified to accept RLI entries from 0 to 999 and DMI entries from 1 to 999 and prompt for FLEN, ITOH, ARRN, and ARLI.

LD 90 – Configuring network translator. (Part 1 of 2)

Prompt	Response	Description
REQ	NEW CHG PRT	New, Change, or Print
CUST	xx	Customer number, as defined in LD 15.

LD 90 – Configuring network translator. (Part 2 of 2)

Prompt	Response	Description
FEAT	NET	Network Translator
TRAN	AC1 AC2	Translator
TYPE	LOC	Location Code
LOC	x...x	Location code
- FLEN	(0)–24	Flexible Length Enter the maximum number of digits expected. When this number of digits is dialed, dialing is considered to be complete and end-of-dial processing begins. Default is zero (0) digits
- RLI	0–999	Route List Index Enter Route List Index for this LOC.

LD 90 – Configuring network translator.

Prompt	Response	Description
REQ	NEW CHG PRT	New, Change, or Print
CUST	xx	Customer number, as defined in LD 15.
FEAT	NET	Network Translator
TRAN	AC1 AC2	Translator
TYPE	HLOC	Home Location Code
HLOC	x...x	Home Location code (3 digits) or extended code (3-7 digits)
DMI	1–999	Digit Manipulation Index

LD 90 – Configuring network translator.

Prompt	Response	Description
REQ	NEW CHG PRT	New, Change, or Print
CUST	xx	Customer number, as defined in LD 15.
FEAT	NET	Network Translator
TRAN	AC1 AC2	Translator
TYPE	NPA	Numbering Plan Area code
NPA		Numbering Plan Area code translation, extended NPA code translation (a leading zero is not allowed).
	xxx xxx yyy	Area code translation Extended NPA code translation 3-10 digits or 4-11 digits with 1+ dialing. Enter the NPA code (xxx) and the extended code (yyy) separated by a space.
	1xxx 1xxx yyy	Area code translation (1+ dialing) Extended NPA code translation (1+ dialing) Where: xxx & yyy = 200 - 999
…		
- RLI	0–999	Route List Index Enter Route List Index for this NPA
- SDRR	LDID	Recognized Local Direct Inward Dial codes
- DMI	1–999	Digit Manipulation Index

LD 90 – Configuring numbering plan exchange.

Prompt	Response	Description
REQ	NEW CHG PRT	New, Change, or Print
CUST	xx	Customer number, as defined in LD 15.
FEAT	NET	Network Translator
TRAN	AC1 AC2	Translator
TYPE	NXX	Numbering plan exchange code
NXX		Numbering Plan Exchange (Central Office) (A leading zero is not allowed)
	xxx 1xxx xxx yyy	Office code translation Office code translation (1+ dialing) Extended NXX code translation
		3-7 digits or 4-8 digits with 1+ dialing. Enter the NXX code (xxx) and the extended code (yyy) separated by a space.
	<CR>	Return to REQ
…		
- RLI	0–999	Route List Index Enter Route List Index for this NXX.
- SDRR	LDID	Recognized Local Direct Inward Dial codes
- DMI	1–999	Digit Manipulation Index

LD 90 – Configuring Special Number (SPN). (Part 1 of 2)

Prompt	Response	Description
REQ	NEW CHG PRT	New, Change, or Print
CUST	xx	Customer number, as defined in LD 15.
FEAT	NET	Network Translator
TRAN	AC1 AC2	Translator
TYPE	SPN	TYPE of translation: Special Number
SPN		Special Number
	x…x	Enter Special Number. Number can be from 1 to 11 digits
- FLEN	(0)–16	Flexible Length Enter the maximum number of digits expected. When this number of digits is dialed, dialing is considered to be complete and end-of-dial processing begins. Default is zero (0) digits
- ITOH	(NO) YES	Inhibit Time out Handling Prompted if FLEN set to any valid value other than zero (0). Enter NO to allow call processing to begin when the NIT timer has expired. Enter YES to allow call processing to begin only after the number of digits defined by the response to FLEN have been dialed. Default setting is (NO).
- RLI		Route List Index
	0–999	Enter Route List Index for this SPN.

LD 90 – Configuring Special Number (SPN). (Part 2 of 2)

Prompt	Response	Description
- CLTP		Type of call that is defined by the special number
	(NONE)	No call type
	LOCL	Local
	NATL	National
	INTL	International
	SSER	Special Service
	SERH	Special Service Hold
- SDRR		Supplemental Digit Restriction or Recognition
	ARRN	Alternate Routing Remote Number
	<CR>	Enter a Carriage Return by itself to have ITEI prompted.
- ARRN		Alternate Routing Remote Number
	x…x	Enter zero to seven digit Alternate Routing Remote Number.
		Note: The number of digits defined in response to SPN plus the number of digits defined in response to ARRN cannot exceed the number of digits defined by the response to FLEN, (that is, Number of SPN digits + number of ARRN digitsð number of digits defined by response to FLEN).
	<CR>	Enter a Carriage Return by itself to have ITEI prompted. Precede Alternate Routing Remote Number with X to remove.
- ARLI		Alternate Route List Index (Prompted if the response to ARRN is a number)
	0 - 999	Enter any Route List Block number defined in LD 86 except the number entered in response to the previous RLI prompt.
	<CR>	Enter a Carriage Return by itself to leave the existing ARLI entry unchanged.

Customer data block administration

LD 15 – The Customer Data Block administration overlay is modified to allow or deny VNR and modify the NIT.

LD 15 – Configuring customer data block. (Part 1 of 3)

Prompt	Response	Description
REQ	NEW CHG	New or Change
TYPE	NET	Networking
CUST		Customer number
	0-99	For Large Systems
	0-31	For Small Systems and Succession 1000 systems
OPT	a…a	Options
AC2		Access Code 2
	NPA	E.164 National
	NXX	E.164 Subscriber
	INTL	International
	SPN	Special Number
	LOC	Location Code

LD 15 – Configuring customer data block. (Part 2 of 3)

Prompt	Response	Description
VNR	(NO) YES	Vacant Number Routing Prompted only if FNP package (160) is equipped. Enter NO if vacant numbers are not to be routed to another node for treatment. Enter YES if vacant numbers are to be routed to another node for treatment. For nodes connected by trunks that use in-band signaling (DTI, DTI2, or analog trunks): The VNR setting in the terminating node's Customer Data Block determines whether or not to use Vacant Number Routing. For nodes connected by trunks that use out-of-band signaling (ISDN or ISL trunks): The VNR setting in the originating node's Customer Data Block determines whether or not to use Vacant Number Routing. Default is (NO).
- RLI	0-999	Route List Index Enter route list, defined in LD 86, to be used by Vacant Number Routing.
- FLEN	1-(16)	Flexible length of digits expected
- CDPL	1-(10)	Coordinated Dialing Plan Length Enter the maximum number of Coordinated Dialing Plan (CDP) digits expected by Vacant Number Routing. Default is (10) digits.

LD 15 – Configuring customer data block. (Part 3 of 3)

Prompt	Response	Description
- LOCL	1-(10)	Location Code Length Enter the maximum number of Location (LOC) digits expected by Vacant Number Routing. Default is (10) digits.
NIT	2-(8)	NARS (Network Alternate Route Selection) Interdigit Timer Prompted if NARS package (58) is equipped. Enter the number of seconds allowed between CDP or LOC digits before end-of-dial processing is invoked. Default is eight (8) seconds.

Customer data block administration

LD 15 – Enable/disable the FNP feature.

LD 15 – Configuring Flexible Numbering Plan (FNP). (Part 1 of 2)

Prompt	Response	Description
REQ	CHG	Change existing data
TYPE	NET	Networking data
CUST	 0-99 0-31	Customer number For Large Systems For Small Systems and Succession 1000 systems
...		
AC2		Access Code 2
	NPA	E.164 National
	NXX	E.164 Subscriber

LD 15 – Configuring Flexible Numbering Plan (FNP). (Part 2 of 2)

Prompt	Response	Description
	INTL	International
	SPN	Special Number
	LOC	Location Code
FNP	(YES)	Enable the Flexible Numbering Plan feature (Default).
	NO	Disable the Flexible Numbering Plan feature.
...		
VNR	(NO) YES	Vacant Number Routing enabled (disabled). VNR is only prompted when FNP = YES. When FNP = NO, VNR is automatically set to NO and is, therefore, restricted.
- RLI	0-999	Route List Index Enter route list, defined in LD 86, to be used by Vacant Number Routing.
- FLEN	1-(16)	Flexible length of digits expected.
- CDPL	1-(10)	Coordinated Dialing Plan Length Enter the maximum number of Coordinated Dialing Plan (CDP) digits expected by Vacant Number Routing. Default is (10) digits.
- LOCL	1-(10)	Location Code Length Enter the maximum number of Location (LOC) digits expected by Vacant Number Routing. Default is (10) digits.

Feature Group D description

Contents

This section contains information on the following topics:

Introduction

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.

Equipping systems 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 8. In this case, the corporate network contains Meridian 1 switches.

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.

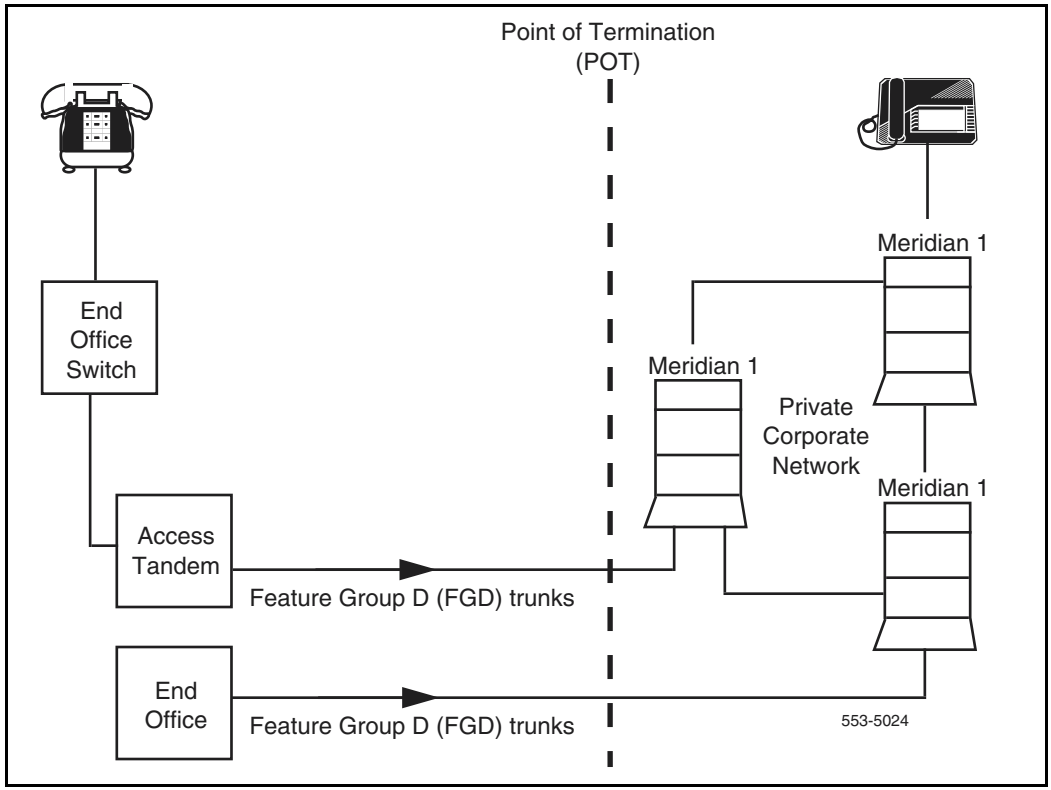
- Automatic Trunk Maintenance (ATM), package 84, allows Automatic Trunk Maintenance capabilities. ATM cannot be invoked on trunks controlled by a D-channel (DCH).

  — 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.

Figure 8
Configuration example



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.

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.

Table 16
Domestic Dialing Plan

(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.

Pre-subscription

A pre-subscription 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 Succession 1000M, Succession 1000 and Meridian 1 systems. 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 multi frequency (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 17 identifies the applicable call categories for FGD switched access service.

Table 17
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 18 shows the protocols available for each call category depending on the carrier classification.

Table 18
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 19 and 20 summarize the pulsing formats by call category for EANA and terminating protocols, respectively.

Table 19
Access North American signaling (Part 1 of 2)

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

Table 19
Access North American signaling (Part 2 of 2)

Call category	Identification field	Address field
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 20
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
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 21 is the default table that shows the digit pair default assignments.

Table 21
Information digits (II) (Part 1 of 2)

Information digits	Explanation
00	Regular line
01	4- and 8-party
06	Hotel/Motel
07	Coinless
10	Test call

Table 21
Information digits (II) (Part 2 of 2)

Information digits	Explanation
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 22 and 23 show examples of several originating calls using Exchange Access North American (EANA) signaling protocol.

Table 22
EANA protocol: customer dials a World Zone 1 number (Part 1 of 2)

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		

Table 22
EANA protocol: customer dials a World Zone 1 number (Part 2 of 2)

	----------<----------	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 23 shows an example of a call to an LEC test line using the FGD terminating protocol.

Table 23
Terminating protocol: carrier call to an LEC test line (Part 1 of 2)

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	----------><----------	

Table 23
Terminating protocol: carrier call to an LEC test line (Part 2 of 2)

----------<----------	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 hardware requirements for Feature Group D (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 MF Receiving Card (MFRC). MF tone sending is provided by the existing MF loop or by the Conference/Tone and Digit Switch (TDS) card.

MF senders

In a third party environment, the existing MF loop provides MF sending capability. In a Succession 1000, Succession 1000M, or 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 MF 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 Nortel Networks PBX or third party PBX trunks.
- The MF sending services are used for terminating calls on FGD trunks. Only terminating test calls are supported.

MF receivers

An MF Receiver Card (MFRC) 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 an IPE shelf. Table 25 provides the MF receiver (MFR) specifications.

Table 24
MFR specifications (Part 1 of 3)

Parameter	Limits	Conditions
General:		
— # of receivers	2	
— coding	U-Law	
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
Frequency discrimination:	+/– (1.5% + 5Hz)	Noise: –30 dbm
— must accept		
Input level:		
— must accept	0 to –25 dbm per tone	
— must reject	below –35 dbm per tone	

Table 24
MFR specifications (Part 2 of 3)

Parameter	Limits	Conditions
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
Signal interruption		
— ignore interruption	<10 ms	After minimum length signal has been received
Time Shift between two frequencies:		
— must accept	<4 ms	
Coincidence between the two frequencies:		
— must reject	<10 ms	
Interdigit pause		A pause means:
— must accept	>25 ms	signal <–35 dbm
Max dialing speed	10 digits per second	
Tolerance to twist:		
— must accept	<6 dbm	One tone relative to the other tone.
Reception in presence of disturbances.		

Table 24
MFR specifications (Part 3 of 3)

Parameter	Limits	Conditions
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)
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
Power lines:		
— error rate	< 1/2500 calls	60 Hz signal at –9 dbm or 180 Hz signal at –22 dbm
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 *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 25 shows the access summary from FGD trunks for the listed functions.

Table 25
Access summary from FGD trunks (Part 1 of 4)

	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
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

Table 25
Access summary from FGD trunks (Part 2 of 4)

	Conference, Privacy release, Mixed sets	Hunting, Direct Access	Night Posting, Call Pickup, TAFAS, Call Forward	Attendant extended	Hold, Call Transfer
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 25
Access summary from FGD trunks (Part 3 of 4)

	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
AIOD	Access not allowed	Access not allowed	Access not allowed	Access not allowed	Access not allowed

Table 25
Access summary from FGD trunks (Part 4 of 4)

	Conference, Privacy release, Mixed sets	Hunting, Direct Access	Night Posting, Call Pickup, TAFAS, Call Forward	Attendant extended	Hold, Call Transfer
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 26 shows that though calling parties have various levels of access (FRE, FR1, and FR2), the restrictions for the FGD trunk apply.

Table 26
Restricted access summary from FGD trunks (Part 1 of 2)

	Allowed or Denied		
Connection type	**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

Table 26
Restricted access summary from FGD trunks (Part 2 of 2)

	Allowed or Denied		
Connection type	**FRE**	**FR1**	**FR2**
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 *Software Input/Output: 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* (553-3001-350).

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 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 digits 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.

The DNIS number displays the last one to seven digits of the FGD address field.

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* (553-3001-350).

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* (553-3001-450) for a complete description of the traffic measurement printouts.

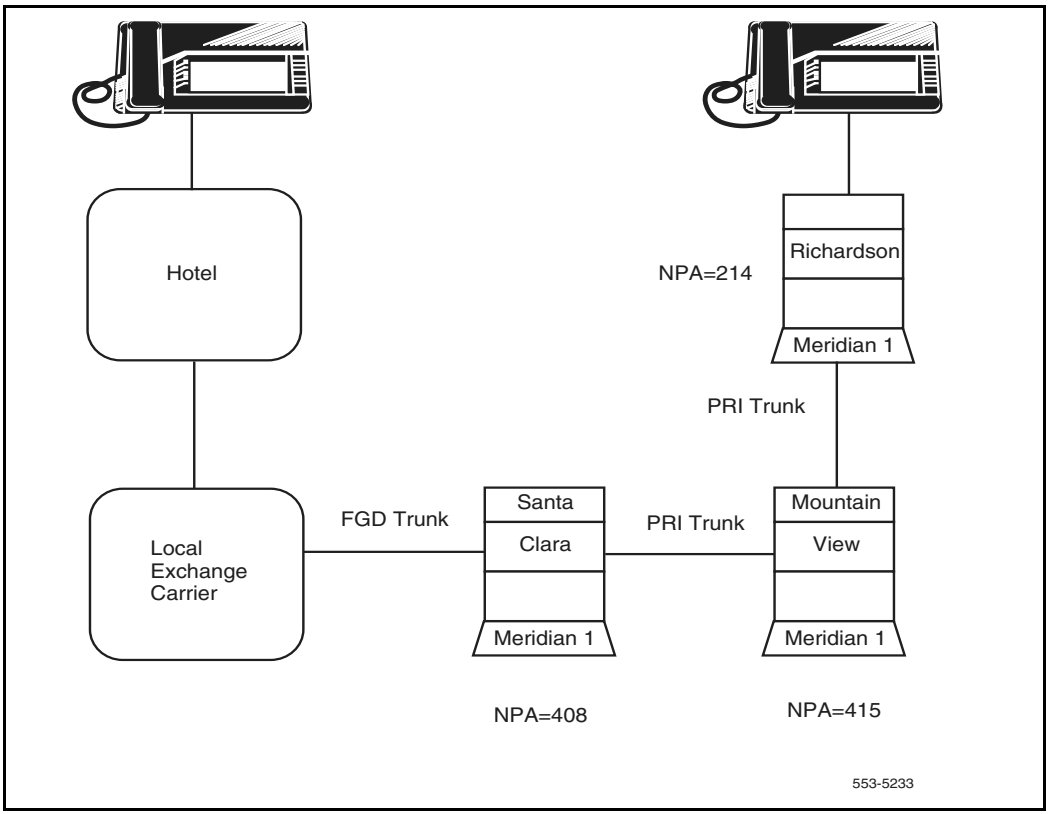
Trunk Group Distinctive Ringing

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 9). There is usually no dial tone provided on FGD trunks.

Figure 9
Trunk verification



Feature Group D operation

Contents

This section contains information on the following topics:

Example: Using Feature Group D

This section describes call direction. Incoming calls are calls from the Local Exchange Carrier (LEC) to the IEC (Succession 1000, Succession 1000M, or Meridian 1), and outgoing calls are from the IEC to the LEC. Therefore, incoming calls are *calls coming into* the private network.

How to initiate a call

Pre-subscribed 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 Nortel Networks PBX with Feature Group D [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 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 Succession 1000, Succession 1000M, or 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 Succession 1000, Succession 1000M, or 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 27 provides an example of a "0+" call.

Table 27
EANA protocol: customer dials 10XXX+0 (Part 1 of 2)

Situation **Customer dials 10990+0** **Trunk group uses Exchange Access North American (EANA) signaling protocol**		
Interface interactions		
LEC	POT	Succession 1000, Succession 1000M, or Meridian 1
Customer finishes dialing		

Table 27
EANA protocol: customer dials 10XXX+0 (Part 2 of 2)

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 28 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 28. Numbers in the 00–99 range that have not been defined are considered denied.

Table 28
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 the system 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 127.

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.

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 17 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 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:

- 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 station and a test number consisting of three or seven digits
- dialing the TVS access sequence from a 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* (553-3001-350).

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 a system is 255.

The maximum number of FGD blocks that can be defined in a 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 Multi frequency (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. 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.

The linear and cyclic search methods are acceptable for FGD trunks.

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 29, 30, and 31 to determine the number of MFRs to support your system.

Table 29 provides information on Multi-frequency receiver load capacity with 6 to 15 second holding times.

Table 29
Multi-frequency receiver load capacity: 6 to 15 second holding time (Part 1 of 3)

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

Table 29
Multi-frequency receiver load capacity: 6 to 15 second holding time (Part 2 of 3)

Average holding time in seconds	6	7	8	9	10	11	12	13	14	15
Number of MFR										
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
23	550	531	516	504	494	487	479	472	467	562

Table 29
Multi-frequency receiver load capacity: 6 to 15 second holding time (Part 3 of 3)

Average holding time in seconds	6	7	8	9	10	11	12	13	14	15
Number of MFR										
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 30 provides information on the Multi-frequency receiver load capacity with 16 to 25 second holding times.

Table 30
Multi-frequency receiver load capacity: 16 to 25 second holding time (Part 1 of 3)

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

Table 30
Multi-frequency receiver load capacity: 16 to 25 second holding time (Part 2 of 3)

Average holding time in seconds	16	17	18	19	20	21	22	23	24	25
Number of MFR										
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
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

Table 30
Multi-frequency receiver load capacity: 16 to 25 second holding time (Part 3 of 3)

Average holding time in seconds	16	17	18	19	20	21	22	23	24	25
Number of MFR										
40	965	952	952	945	940	936	931	927	923	920

Note: Load capacity is measured in CCS.

Table 31 provides the Multi-frequency receiver requirements with the Poisson 0.1 percent blocking information.

Table 31
Multi-frequency receiver requirements: Poisson 0.1 percent blocking (Part 1 of 2)

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

Table 31
Multi-frequency receiver requirements: Poisson 0.1 percent blocking (Part 2 of 2)

Number of MFR	MFR load (CCS)	Number of MFR	MFR load (CCS)	Number of MFR	MFR load (CCS)
14	187	31	597	48	1058
15	208	32	624	49	1086
16	231	33	650	50	1115
17	253	34	676		

Feature Group D implementation

Contents

This section contains information on the following topics:

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 LD 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 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 *Software Input/Output: Administration* (553-3001-311).

LD 13 – Digitone Receiver and Tone Detector.

Prompt	Response	Description
REQ	NEW CHG	Add or Change
TYPE	MFR	Multi-frequency receivers A maximum of 255 MFR units can be defined.
TN	 l s c u c u	Terminal Number. For Large Systems For Small Systems and Succession 1000 systems

LD 14 – Trunk Data Block. (Part 1 of 2)

Prompt	Response	Description
REQ	NEW CHG	Add or Change
TYPE	FGDT	Feature Group D trunk
TN	 l s c u c u	Terminal Number For Large Systems For Small Systems and Succession 1000 systems
CUST	xx	Customer number, as defined in LD 15.
NCOS	0–99	Network Class of Service
RTMB	 0-511 1-510 0-127 1-510	Route and Member number For Large Systems For Small Systems and Succession 1000 systems
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

LD 14 – Trunk Data Block. (Part 2 of 2)

Prompt	Response	Description
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.

Prompt	Response	Description
REQ	NEW CHG	Add or Change
TYPE	RDB	Route Data Block
CUST	xx	Customer number, as defined in LD 15.
ROUT	 0-511 0-127	Route number For Large Systems For Small Systems and Succession 1000 systems
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.

Prompt	Response	Description
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	a…a	Carrier class Where IC = Interchange, CONS = Consolidated. <CR> not allowed when REQ = NEW.
PRES	(YES) NO	Pre-subscription
OVLP	(YES) NO	Overlapped outpulsing by the LEC
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.

LD 19 – Code restriction. (Part 2 of 6)

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

Prompt	Response	Description
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	(NO) YES	ANI digits provided in CDR
SHAN	(NO) YES	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
OPER 	 DN xxxx. . xx RAN xxx	Treatment for 0+, 0- calls 1–16 digit network or local DN 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)

LD 19 – Code restriction. (Part 3 of 6)

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

Prompt	Response	Description
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
-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

LD 19 – Code restriction. (Part 4 of 6)

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

Prompt	Response	Description
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)
		1–16 digits, typically a Meridian 1 internal DN
	DN xxx..xx	NCOS value (0–99)
	NCOS xx	
3ANI	DENY	3-digit ANI not allowed (default)-apply invalid ANI treatment
		3-digit ANI allowed: NCOS value (0–99)
	NCOS xx	
SLV3	NXX	Use 6- or 10-digit screening level; prompt NXX next
		3-digit screening: all NXX+XXXXs map to NCOS value xx
	NCOS 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

LD 19 – Code restriction. (Part 5 of 6)

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

Prompt	Response	Description
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 # yyyy - end subscriber # (optional)
	<CR>	to reprompt NXX
NCOS	xx	NCOS value (0–99) for the subscribers; reprompt SUB
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 reprompt NPA
	<CR>	
SUB	xxxx yyyy	Range of subscriber numbers (XXXX); xxxx—starting or only subscriber # yyyy—end subscriber # (optional) reprompt SUB.
	<CR>	To reprompt NXX

LD 19 – Code restriction. (Part 6 of 6)

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

Prompt	Response	Description
These prompts are given when REQ = OUT		
ENTER YES TO CONFIRM	YES (NO)	To confirm the OUT request - the entire ANI data block is deleted for OUT request. 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 32 defines the information digits (II) that are used as defaults in the LD 19 code restriction program.

Table 32
Default IITP values (Part 1 of 2)

II	II type	ANI screening bypass
00	REGU	NO
01	4A8P	NO
06	HOTL	NO
07	CLES	NO
10	TST3	NO

Table 32
Default IITP values (Part 2 of 2)

II	II type	ANI screening bypass
20	AIOD	NO
27	COIN	NO
95	TST7	NO

LD 20 – Print Routine.

Prompt	Response	Description
REQ	PRT	Print
TYPE	TNB	Includes FGD trunks and MFRs
	FGD	Print FGD trunks
	MFR	Print Multifrequency units
TN		Terminal Number
	l s c u	For Large Systems
	c u	For Small Systems and Succession 1000 systems

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.

Prompt	Response	Description
REQ	ADD	Add or Change
TYNM	MFRR 1–255 FGD xxx yyy ANI xxx yyyy zzzzz	Number of Multi-frequency receivers FGD data blocks xxx = FGD data blocks (1–128) yyy = average number of II entries FGD ANI blocks xxx = number NPAs (1–160) yyyy = number of NXXs (0–9999) zzzzz = number XXXXs (0–30 000)

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.

LD 86 – ESN. (Part 1 of 2)

Prompt	Response	Description
REQ	a…a	Request, where a…a = CHQ, END, LCHQ, NEW, OUT, or PRT.
FEAT	RLB	Feature = RLB (Route list)
RLI	0–255	Route List Index to be accessed
ENTR	0–63	Entry number for NARS/BARS Route list
LTER	(NO) YES	Local Termination entry If YES is entered only the following prompts appear:

LD 86 – ESN. (Part 2 of 2)

Prompt	Response	Description
TOD	0–7	Time of Day Schedule
FRL	(0)–7	Facility Restriction Level
DMI	(0)–999	Digit Manipulation Index
FCI	(0)–255	Free Calling Area Screening Index number
		Whether LTER is set to YES or (NO), the following prompts do not appear and are automatically set to default values:
ROUT	0	Route number
TDET	(NO)	Tone Detector used
CNV	(NO)	Conversion to LDN
EXP	(NO)	Expensive route
OHQ	(NO)	Off-Hook Queuing
CBQ	(NO)	Call back Queuing

Note: No new SCH codes are required in this LD.

Feature Group D maintenance and diagnostics

Contents

This section contains information on the following topics:

Introduction

The Succession 3.0 software provides maintenance and diagnostics for the Multi-frequency receiver (MFR). They are performed similarly to the Tone Detector (TDET) or Digitone Receiver (DTR).

Maintenance and diagnostics are provided by the Succession 3.0 software as Service Change programs that can be run either automatically upon 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).

The commands in Table 33 apply to MFRs.

Table 33
MFR commands

Command		Description
ENLR	LSC (U)	Enable the specified DTR/MFR card/unit (see Note 1)
DISR	LSC (U)	Disable the specified DTR/MFR card/unit (see Note 1)
SDTR	LSC (U)	Display the status of the specified DTR/MFR (see Note 1)
SDTR		List all the disabled DTR/MFR units (see Note 1)
STAT		List all the disabled DTR/MFR units (duplicate of SDTR with no parameters) (see Note 1)
MFR	LSC (U)	Test the specified MFR card/unit (see Note 2)
MFR	L	Test all the specified MFR units on loop L (see Note 2)
MFR	<CR>	Test all MFR units (see 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 Succession 3.0 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)

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

Index

Numerics

A

B

E

F

G

H

I

L

M

N

O

P

R

S

T

U

V

W

Meridian 1, Succession 1000,
Succession 1000M

Dialing Plans

Description

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