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Meridian Supernode

Meridian SL-100

Network Services System (NSS) Reference Manual

MSL07 Standard 08.02 October 1997

NORTEL

NORTHERN TELECOM

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About this document

When to use this document

The Network Services System (NSS) Reference Manual lists and defines the features and capabilities available through the Meridian SL-100 (MSL-100) NSS product. This manual also describes the datafill required by the various features and the impact and restrictions/limitations of the features.

How to check the version and issue of this document

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

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

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

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

This document is written for all DMS-100 Family offices. More than one version of this document may exist. To determine whether you have the latest version of this document and how documentation for your product is organized, check the release information in *Commercial Systems Master Index of Publications*

References in this document

The following documents are referred to in this document:

- 297-1001-360, *Table Editor Reference Manual*
- *Customer Data Schema*

- 297-2071-119, *DMS-100 IBN Customer Data*
- 555-4001-103, *Meridian SL-100 Cabinetized General Description*
- 555-4031-801, *Feature Description Manual*

What precautionary messages mean

The types of precautionary messages used in Northern Telecom (Nortel) documents include attention boxes and danger, warning, and caution messages.

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

Examples of the precautionary messages follow.

ATTENTION Information needed to perform a task

ATTENTION

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

DANGER Possibility of personal injury



DANGER

Risk of electrocution

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

WARNING Possibility of equipment damage



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

CAUTION Possibility of service interruption or degradation



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

How commands, parameters, and responses are represented

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

Input prompt (>)

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

```
>BSY
```

Commands and fixed parameters

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

```
>BSY CTRL
```

Variables

Variables are shown in lowercase letters:

```
>BSY  CTRL  ctrl_no
```

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

Responses

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

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

The following excerpt from a procedure shows the command syntax used in this document:

1 Manually busy the CTRL on the inactive plane by typing

>BSY CTRL ctrl_no
and pressing the Enter key.

where

ctrl_no is the number of the CTRL (0 or 1)

Example of a MAP response:

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

Overview

Network Services System (NSS) is a Nortel software package that provides a broad range of capabilities and functions to the NT40 and the MSL-100. These capabilities and functions allow MSL-100s to offer enhanced features and make more efficient use of their facilities and resources.

Table 1-1 lists MSL-100 NSS-specific features available in MSL07. The information in Table 1-1 is sorted by functional group and functionality.

Table 1-1
MSL-100 NSS features

Functional group	Functionality	Feature number	Feature name
MSL NSS	MSL 700/800/900 Services	AD1802	MSN N00 Dialing
	MSL NSS Billing Platform	AM0143	NSS Billing Platform II
		AM0144	NSS Billing Platform I
	MSL NSS Database Control Point	AD2472	NSS—DBCP Base
		AD3467	NSS—DBCP Sync
	MSL NSS N00 DBCP Process	AD3468	Replace Dialed Digits II
		AD8425	DBCP ANI Validation (MSL)
		AD8427	DBCP ANI Validation (CCM)
	MSL NSS Travel Card # Validation	AD2856	NSS—DBCP Travel Card Number Validation

—continued—

Table 1-1
MSL-100 NSS features (continued)

Functional group	Functionality	Feature number	Feature name
	MSL Travel Card Services	AD1946	MSN Travel Card Number Database
		AD2185	MSN Travel Card Call Processing
	MSL NSS Freecall Expansion	AD9343	NPA Freecall Expansion for NSS
		—end—	

In the restructured software architecture, some services provide one or more functions. The NSS service provides a single function, known as the functional group, to deliver MSL-100-specific NSS features.

Travel card number calling

Two features working in conjunction with each other perform travel card number (TCN) calling. These features are Travel Card Number Database and Travel Card Call Processing.

Travel card number (TCN) database

Table TCNDATA contains the TCN database. This table can hold 400,000 tuples. Each tuple consists of five attributes. The data store of Table TCNDATA is dynamically allocated so that each tuple in the table can be accessed or indexed by the table key attribute CARDNUM (travel card number).

Travel card digits

Travel card numbers are 14 digits long and have the following format:

NXXXXXXXXXXXXX

where:

N—digits 2 through 9

X—digits 0 through 9

Table TCNDATA

Table TCNDATA screens every travel card call. The database can accommodate at least 400,000 14-digit TCNs.

Table TCNDATA contains tuples consisting of five fields. Descriptions of these fields follow.

CARDNUM

The travel card number is a 14-digit number assigned to the subscriber.

CUSTSEL

The customer group selector provides the capability to replace a new customer group with the TCN. If Y is entered for CUSTSEL, the

CUSTGRP gives a prompt. The new customer group replaces the current customer group and defines translation of the TCN call.

NCOS

Network class of service is basically an IBN capability. Each customer group may have up to 256 different NCOSs. Each NCOS defines the dial plan or view of the network.

ACCT

Account code may be required for billing purposes based on either the attributes of the TCN entered by the caller or by the route taken by the call. account code (AC) length is fixed on each customer group.

ALLOW

Indicates whether or not a call is allowed to proceed.

Table 2-1 illustrates how the various fields must be datafilled.

Table 2-1
Required datafill for table TCNDATA

Field	Entry	Explanation
CARDNUM	14-digit number	Travel Card Number. Enter a 14-digit TCN. First digit ranges from 2 through 9; remaining digits range from 0 through 9.
CUSTSEL	N	No new customer group.
	Y	Indicates a new customer group is replacing the current customer group.
NCOS	3-digit number	Network Class Of Service, ranges from 0 through 255.
ACCT	N or Y	Account code. May or may not be required for billing purposes and is based on the NCOS of CARDNUM.
ALLOW	N or Y	Indicates whether a call is allowed to proceed.

Table 2-2 provides examples of possible datafill.

Table 2-2
Example datafill for table TCNDATA

CARDNUM	NCOS	CUSTSEL	ACCT	ALLOW	CUSTGRP
2987435619873	2	N	N	Y	CUST1
36513987561487	18	N	Y	Y	
90176453293242	111	N	N	Y	
29847562914375	199	N	N	Y	
35056431723451	116	Y	N	N	

Table editor commands for table TCNDATA

Storage requirements for the 400,000 tuples on the NSS node makes the usual approach for implementing database access impossible. Therefore, some of the table editor commands will execute differently from others existing on the DMS databases. The following is a list of these commands and their results, if executed.

LIST ALL

When accessing Table TCNDATA, all travel card number tuples present in the database display in the order they are stored. They are not in numerical order (See datafill sample in Table 2-1.)

DELETE

When accessing Table TCNDATA after a tuple has been deleted, the table control is positioned on the next travel card number tuple stored in the database. It is not stored on the next number (TCN) that follows.

BOTTOM

When using Table TCNDATA, the table control is positioned on the last TCN tuple as it is stored in the physical table and not on the last possible Travel Card Code (999999999999999), even if it is present in the table.

TOP

When using Table TCNDATA, the table control is positioned on the first TCN tuple as it is stored in the physical table and not on the first possible

Unless TCN (20000000000000) is the first physical number in the database, the TOP command is on the first TCN stored in the physical table.

Restrictions and limitations

Table TCNDATA holds up to 400,000 Travel Card Numbers. However, the design chosen to implement this feature is based on the assumption that TCNs entered into the database are randomly generated numbers. This limitation is due to the large storage requirement for the database.

Travel card call processing

The subscriber starts a travel card call by accessing the NSS node through any of the following trunks: FGA, FGB, FGD EAP and Interim cut-through, 800 universal access, and DAT cut-through. After the subscriber gains access to the switch, if the first digit is 0 and the MONA directory number has a TCNOPT option, then the call is treated as a TCN call. The dialing sequence is as follows: (Refer to the prompt tone section of Chapter 6, Offnet access dialing plan driver, for prompt tone details.)

ACCESS + <INITPT> + Address Digits + <PT> + TCN + (<PT> + AC) + <CT>

or

ACCESS + <PT> + 01 + International Address Digits + <PT> + TCN + (<DT> + AC) + <CT>

where:

ACCESS—access digits

INITPT—initial prompt tone

PT—prompt tone

TCN—travel card number

AC—account code

CT—confirmation tone

DT—dial tone

< >—required field

( )—optional field

Setting up a dial plan

The following calls must have their dial plans set up to require TCN:

- Feature Group D Interface
- NSS DAT Interface
- Feature Group A Interface
- Feature Group B Interface

Address digits

The address digits may be in one of the two formats that follow:

Domestic dialing: 0 + DEST DN + (#)

Destination dialed numbers (DN) are any dialing plans provided by meridian offset access (MONA). Since destination DNs are variable in length, the end of dialing for this stage is assumed when either an interdigit timeout occurs or when the switch receives a dual tone multifrequency (DTMF) end-of-dialing digit (#).

International dialing: 01 + CC + NN ... N + (#)
where:

CC—country code

NN—national number (0–9)

(#)—optional octothorpe indicating end of dialing

Since destination DNs are variable in length, the end of dialing for this stage is assumed when the switch receives either an interdigit timeout or a DTMF end-of-dialing digit #.

Travel card digits

The travel card number must be a 14-digit number with the following format: NXXXXXXXXXXXXX

where:

N—2 through 9

X—0 through 9

The end of dialing for a travel card number is assumed when the system receives either an interdigit timeout or 14 digits. The DTMF # sign does *not* signify the end of digits.

The travel card number is verified by performing a database lookup in table TCNDATA. The TCN must be a valid TCN before the call can continue to process. (For more information on table TCNDATA, refer to the Table TCNDATA section in this chapter.)

If an account code is required with the travel card number (defined in table TCNDATA), then the dial tone is given before the account code. The caller must wait for the dial tone before entering the account code. If the caller fails to wait for the dial tone, then treatment may be given.

After all travel card digits are collected (including account code if required) and the TCN is verified, the subscriber receives a confirmation tone indicating that the call is being processed. A new network class of service (NCOS) is obtained from the travel card database and translates the call.

If the caller enters an invalid travel card number, then the call routes to Calling Card Not Valid (CCNV) treatment. The caller's only option is to hang up and try again.

If the caller fails to enter a travel card number before timing out, then the caller routes to Calling Card Timeout (CCTO) treatment. Again the caller's only option is to hang up and retry the call.

If the caller reoriginates on a travel card call and fails to enter a zero before the destination digits, then the call is routed to First Digit Not Zero (FDNZ) treatment. The caller's only option is to hang up and try again. (For more information on treatments, refer to the treatments paragraphs that follow.)

Breaking prompt tone

The subscriber does not need to wait for the prompt tone before dialing the travel card number if the user enters the optional # at the end of the address digits. The first travel card digit stops the prompt tone. If the subscriber does not pause after the address digits, then a prompt tone does not occur.

Treatments

Travel card call processing uses several treatments. TCN calls route to treatments if the subscriber incorrectly enters the digits or times out. Table 2-3 describes the announcements given when a treatment is invoked.

Table 2-3
Travel card number treatments

Treatments	Cause and possible announcement
FDNZ	First Digit Not Zero. The subscriber receives this treatment on TCN call reorigination when the caller fails to dial zero (or 01 for international) before the address digits.
CCTO	Calling Card Time Out. The subscriber receives this treatment when the caller fails to enter a TCN digit within 10 seconds (Travel Card Timeout).
CCNV	Calling Card Not Valid. The subscriber receives this treatment when the travel card number is invalid.

When routed to any one of the treatments described in Table 2-3, the caller's only option is to hang up and redial the call.

Tones

There are two tones used for information purposes by TCN:

- travel card prompt tone
- travel card confirmation tone

The travel card prompt tone is a regular dial tone sent to the subscriber after dialing the address digits successfully (first stage). When the subscriber receives the travel card prompt tone, the subscriber must enter his/her personal travel card number. The prompt discontinues after receiving the first travel card digit.

The travel card confirmation tone is given after the travel card number or account code is validated. This tone is actually two regular dial tones separated by a period of silence.

Travel card SMDR billing

The SMDR extension record format (#DC) is for travel card number calls when the TCN option in Table CUSTSMDR contains datafill. Table 2-4 shows the fields contained in the SMDR extension record (#DC).

Table 2-4
SMDR fields

Field	Explanation
RECORD CODE	Value #DC. This is a 2-character code that identifies the TCN SMDR Extension Record.
TCN DIGITS	A 14-digit field that contains the subscriber's travel card number.
TCN VALIDATION	A 1-digit field that contains information concerning the travel card number. The values for this field are as follows: Valid TCN 3 Invalid TCN 4 TCN Timeout 5

Data schema

The TCN option in Table CUSTSMDR provides travel card billing.

Feature impact reset dialing

The reset digit (*) provides the subscriber the capability to restart the digit collection process. For the travel card call, the following rules apply to the reset digit feature:

- Pressing a reset digit in the first stage (address digits) of digit collection returns the subscriber to the initial tone where the subscriber may initiate a TCN or authcode call.
- Pressing a reset digit in the second stage (travel card digits) of the digit collection returns the subscriber to the prompt tone where the subscriber may enter the travel card number again.
- When the subscriber presses the reset digit after dialing the address digits of a reoriginating TCN call, the subscriber must reenter 0 plus the address digits. In other words, if a TCN call reoriginates and an error takes place during digit collection, then the subscriber may reset and continue with TCN calls only.

Call reorigination

The call reorigination feature provides the subscriber with the ability to chain several calls together without having to redial the NSS access number and travel card digits. Reorigination is allowed if the REORIG field is set to Y in Table TRKGRP.

The following format illustrates how a TCN call may reoriginate:

* or # + 0 + Address Digits + (<DT> + AC) + <CT>

This feature interacts with call reorigination as follows:

- If the subscriber reoriginates a TCN call, then the subscriber can only make TCN calls.
- Redialing travel card numbers is not required. The only digits that are expected are 0 and the address digits of the new call.
- The subscriber must enter the account code again on reorigination calls if the account code is required with TCN calls.
- After entering valid address digits (and account code if required), the subscriber hears the confirmation tone.
- Travel card numbers that are routed for treatment are not allowed to reoriginate because of the dialing error, for example, FDNZ.

Refer to the “Call Reorigination/Reset Dialing” chapter for more information on reorigination.

Restrictions and limitations

This feature has the following incompatibilities, limitations, and restrictions:

- Operator assisted travel card dialing is not supported.
- Travel card dialing is supported for FGA, FGB, FGD cut-through, 800 UA, DAT cut-through, and MONA.
- The DTMF # sign should not be used to signify the end of travel card digits.
- If an account code is required with the travel card number, then the subscriber must wait for the dial tone before entering the account code. If the subscriber fails to wait for the dial tone, then the call may route to treatment.
- The subscriber is restricted to TCN calls if the subscriber resets a reoriginated call.
- On reorigination, the subscriber must enter zero again.
- If the system requires billing, then the user must datafill the TCN option in Table CUSTSMDR.
- The travel card number must be in DTMF.
- For a domestic travel card call, the first digit of the destination cannot start with the digit 1.

Replace dialed digits

The Network Services System (NSS) Replace Dialed Digits (RDD) feature allows a call to route to a number other than the number dialed. This feature replaces the originating dialed digits and network class of service (NCOS) with new digits and a new NCOS. This new number then translates and routes the call. This feature changes originating dialed digits and NCOS through the use of the RDD database that Table REPLDATA implements.

The RDD database in the switch can be accessed through two methods: in-switch (local) or remote access through an NSS database control point (DBCP). An in-switch configuration is where the database is resident at the NSS SSP. This allows a direct table search without the use of Signaling System-7 (SS7) messaging. A remote access configuration is where the database is resident in a DBCP node and is queried by the service switching points (SSP) using SS7 messaging. The NSS DBCP node may also serve as a NSS SSP node, using the in-switch RDD database for calls originating at that node. Number services code (NSC) call translations initiate the access to in-switch or remote databases.

The RDD feature *replaces* the N00 Dialing feature. RDD provides the same functionality as N00 Dialing along with the following additional capabilities:

- RDD modifies the N00 dialing capabilities on NSS by allowing an N00 dialed number and the corresponding NCOS to be replaced for call translation using either the in-switch or remote database.
- 400 calls are recognized as INWATs calls.
- N00 dialing can be implemented on any integrated business network (IBN) line or trunk. However, only NSS per trunk signaling (PTS) feature group D (FGD) trunks support N00 dialing capabilities involving automatic number identification (ANI).
- It is no longer necessary to route on-net N00 calls to the local end office to be routed back to the MSL-100 by way of FGD for network routing.
- For 700 and 900 calls, ANI screening is not required as long as a ten digit ANI is transmitted with the call.

- Table N00PXLA is replaced by Table REPLDATA. Table REPLDATA is the RDD database and is accessed when NSC translations is invoked. Table REPLDATA does not contain a call type field. The call type is determined by the dialed digits.
- NCOS values can be updated by Table REPLDATA.

Structure of the RDD database

Capacity and location of database

Table REPLDATA is the RDD database. This database can contain several dialed numbering plan areas (NPA) depending on how many ten-digit numbers are datafilled with each NPA. The table is structured to hold all 10,000 possible directory numbers within each NPA-NXX that is datafilled.

Table REPLDATA supports tuples in up to 160 different NPAs. However, to avoid storage problems, the tuples in Table REPLDATA must be concentrated within as few NXXs as possible. The NXXs can be scattered across several NPAs as long as the number of NXXs actually datafilled is minimized.

The tuples in Table REPLDATA consist of a key and a refinement area. The key into Table REPLDATA is the ten digit number passed in the database query. Figure 3-1 illustrates an example tuple in Table REPLDATA.

Note: Table N00PXLA is replaced by Table REPLDATA and is removed by this feature.

The REPLACE selector specifies that the digits that follow replace the RDD application original dialed digits. The REPLACE refinement consists of two fields: REPLDIGS and REPLOPT.

Figure 3-1
Table REPLDATA

DIGITS	OPTION	REPLDIGS	REPLOPT	COSMIN	COSMOUT
8005556666	(REPLACE	9196577433	COSMAP	MAP0	MAP1

Field REPLOPT cont...	REPLOPT	NCOS
	NCOS	10

Field REPLOPT cont...	REPLOPT	OPTION
	$)	$

REPLDIGS field

The REPLDIGS field may contain a maximum of 18 digits. (See Figure 3-1). The digits in this field replace the original dialed digits. The replaced digits go in a Transaction Capabilities Application Part (TCAP) message to the NSS SSP. TCAP is the common protocol used to send non-call processing messages across an SS7 network.

REPLOPT field

Options specific to the REPLACE selector are entered in the REPLOPT field. The REPLOPT field has two options: COSMAP and NCOS. (See Figure 3-1).

COSMAP option

This option is available only on a node that receives database queries from a remote node using SS7 TCAP messaging.

The class of service mapping option has two fields:

- COSMIN
- COSMOUT

The COSMIN and COSMOUT fields refer to network class of service (NCOS) map names in Table COSDATA.

NCOS option

This option appears only when Table REPLDATA is resident at a node that performs in-switch table lookups. When an in-switch lookup is performed in Table REPLDATA, the value in the NCOS field is used as the NCOS for the call if the NCOS option is present. If the NCOS option is not present, the NCOS of the call is not changed. No class of service mapping in Table COSDATA is performed for in-switch table lookups.

RDD invoked through NSC call translations

The NSC invokes the RDD in-switch or remote database search to replace dialed digits. Number services provide inward call management features and require special numbers, NSCs, to be dialed. NSC call translation provides a base translation capability for handling all NSC calls and indicates calls that require special handling. NSC RDD calls require special treatment in the form of a database search to obtain destination digits for translation.

The system recognizes NSC calls during translation by checking Table HNPACONT/Subtable HNPACODE for the NSC selector. This selector specifies the type of call handling required by the NSC call. NSC RDD handling requires datafilling the CDRRTMT field with option REPLDIGS.

See Figure 3-2. The REPLDIGS parameter indexes the NSCDEFS table where RDD call handling requirements are defined.

Figure 3-2
Table HNPACONT, Subtable HNPACODE

FROMDIGS	TODIGS	CDRRTMT
800	800	NSC REPLDIGS

Table NSCDEFS

Table NSCDEFS defines RDD call handling requirements including RDD search method, class of service or class of service mapping, and database timeout parameters. An NSCODE value of REPLDIGS must be datafilled in Table NSCDEFS if NSC service is required. Two parameters, REPLACE and COSMAP, also apply to RDD call handling. The REPLACE parameter is required, and the COSMAP parameter is optional. These parameters directly correspond to the REPLDIGS NSCODE.

The REPLDIGS NSCODE with REPLACE parameter provides the option of searching the RDD database either in-switch, remotely, or both. If in-switch is chosen, the in-switch (local) database searches for the dialed digits. If remote is chosen, the RDD database at the DBCP searches for the dialed digits. If both is chosen, the in-switch database searches for the dialed digits first, then passes the search to the DBCP for a remote search if no digits are found in the local database. The method used for RDD database searches is defined in Table NSCDEFS.

> ***Note:*** RDD can be invoked only once for each call leg. If the replaced digits translate to another RDD call, then the system applies Negative acknowledgement (NACK) treatment.

Table NSCDEFS requires that calling and called addresses for the DBCP be datafilled if either the remote or both search method is chosen. All search methods require a failure route (datafilled in the FAILRTE field). The system uses this route for search failures. The route corresponds to a route already datafilled in either Table OFRT or Table IBNRTE.

The COSMAP parameter contains two fields: COSMIN and COSMOUT. COSMAP is used only when either the remote or both search method is chosen. These fields provide the new NCOS when a DBCP remote search is done. These fields, if present, contain class of service map names that are datafilled in Table COSMAP and Table COSDATA. If COSMOUT is datafilled, the NCOS sent in a database query is a network NCOS obtained by mapping the COSMOUT name into Table COSDATA with the NCOS of the call. If COSMIN is datafilled, the NCOS received in a database response

is considered a network NCOS and is mapped into Table COSDATA. The resulting NCOS is used to translate the call.

If the COSMAP option is not datafilled or the COSMOUT field is nil, then the system sends the NCOS on the call as the network NCOS for the database query. Likewise, if the COSMIN field is nil, the network NCOS received in the database response is the new internal NCOS for retranslation of the call.

Table REPLDATA has similar COSMOUT and COSMIN fields. At the DBCP, the COSMAP option in Table REPLDATA is used in the same way to map the NCOS received in the query using the COSMIN field and the COSMOUT to map the NCOS being sent in response.

Lastly, an assigned variable TIMEOUT parameter defines the timeout period for the database response. The default value is 3 seconds. The TIMEOUT field must be datafilled with a value less than 600 seconds.

Reference Figure 3-3 for sample datafill for Table NSCDEFS.

Figure 3-3
Table NSCDEFS sample datafill for both search method

NSCODE	TIMEOUT	OPTIONS	FAILRTE	REPLVAL	CLNGADDR	CLDADDR
REPLDIGS	3	(REPLACE	FRTE 100	BOTH	5188227324	6194772359

Field OPTIONS cont...	OPTIONS	COSMIN	COSMOUT
	COSMAP	MAP0	MAP1) $

Table REPLDATA database search

When a database search is required, Table REPLDATA is accessed and if dialed digits are datafilled, the replacing digits and a new NCOS are retrieved. These new dialed digits represent the number on which the call translates. The new NCOS is obtained either through the NCOS field (used with in-switch search method) or the COSMAP field (used with remote or both search methods). The new number is translated based on the new NCOS using regular IBN translations. If the dialed number is not datafilled in Table REPLDATA, the system routes the call to the failure route specified by Table NSCDEFS.

The NCOS field appears in Table REPLDATA only when the table resides on a node that performs an in-switch database search. The value in the NCOS field represents the NCOS used for the call. If the NCOS field is not present, the NCOS for the call does not change. NCOS mapping in Table COSDATA is not performed for in-switch table searches.

At the DBCP, the network NCOS sent in the query maps into Table COSDATA with the COSMIN name in Table REPLDATA to obtain an internal NCOS. This internal NCOS then maps into Table COSDATA at the DBCP with the COSMOUT name in Table REPLDATA. This mapping provides the network NCOS for the database response.

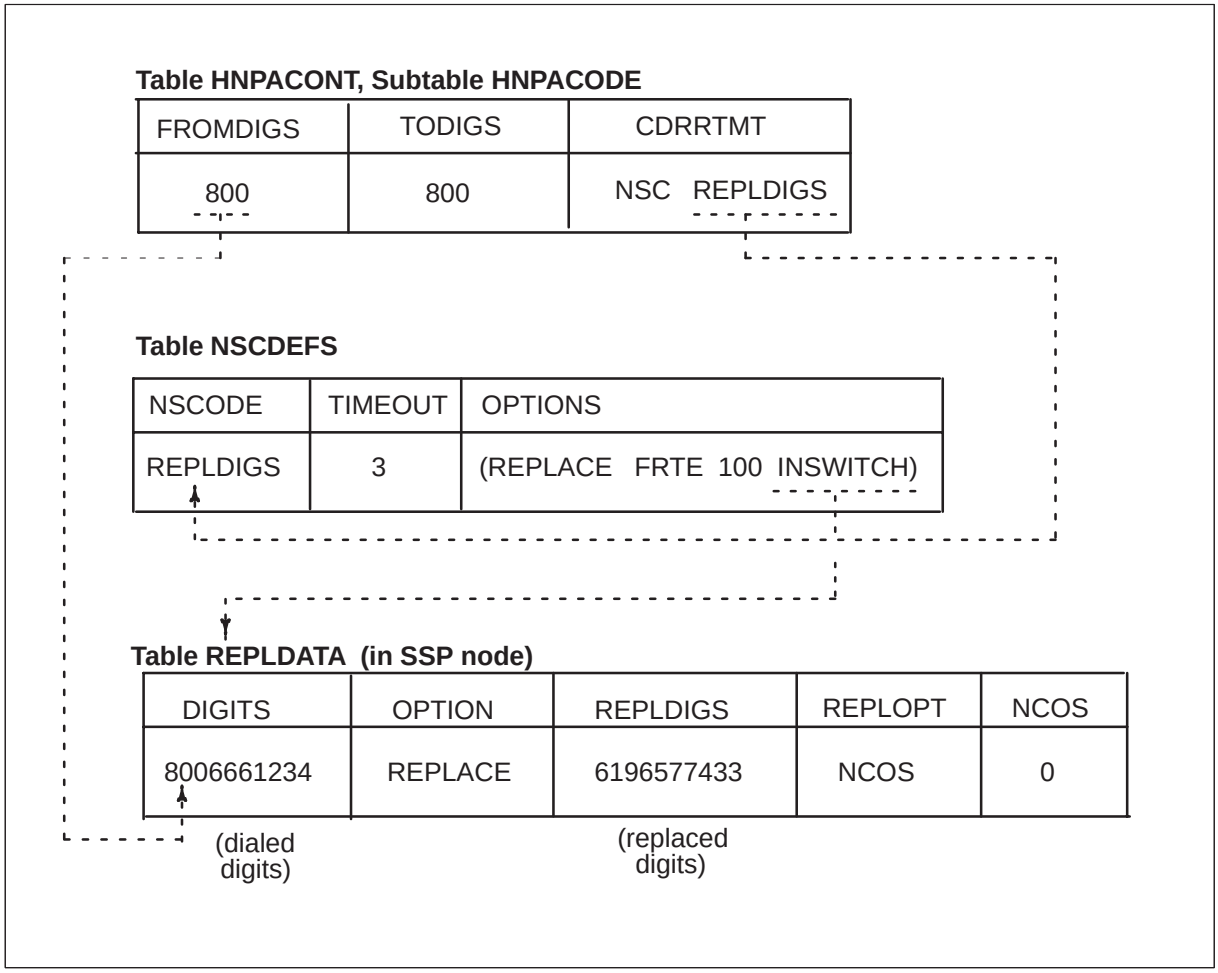
At the DBCP, if the COSMAP option is not present or if both COSMIN and COSMOUT fields are nil, the NCOS received in the database query also goes in the database response. If COSMIN contains datafill, but COSMOUT is nil, then the network NCOS received in the database query maps into Table COSDATA. The database response returns the resulting NCOS.

NSC translations for in-switch RDD database

Using the in-switch search method, the system searches locally for the dialed digits in Table REPLDATA. If the search does not locate the dialed digits, the system routes the call to the failure route. (The call does not necessarily need to route to treatment). The following example shows datafill using Tables HNPACONT/Subtable HNPACODE, NSCDEFS and REPLDATA for an in-switch database search. The caller dials 8006661234, which indexes into Table REPLDATA on the switch. The system replaces the dialed digits with the replaced digits 6196577433 and routes the call accordingly. If the original dialed digits (8006661234) are not datafilled in Table REPLDATA, the call routes to failure route FRTE 100.

Figure 3-4 illustrates sample datafill in Table HNPACONT/Subtables HNPACODE, NSCDEFS, and REPLDATA. In this example, Table NSCDEFS contains the specification for the in-switch search mode.

Figure 3-4
Sample datafill for in-switch RDD search method

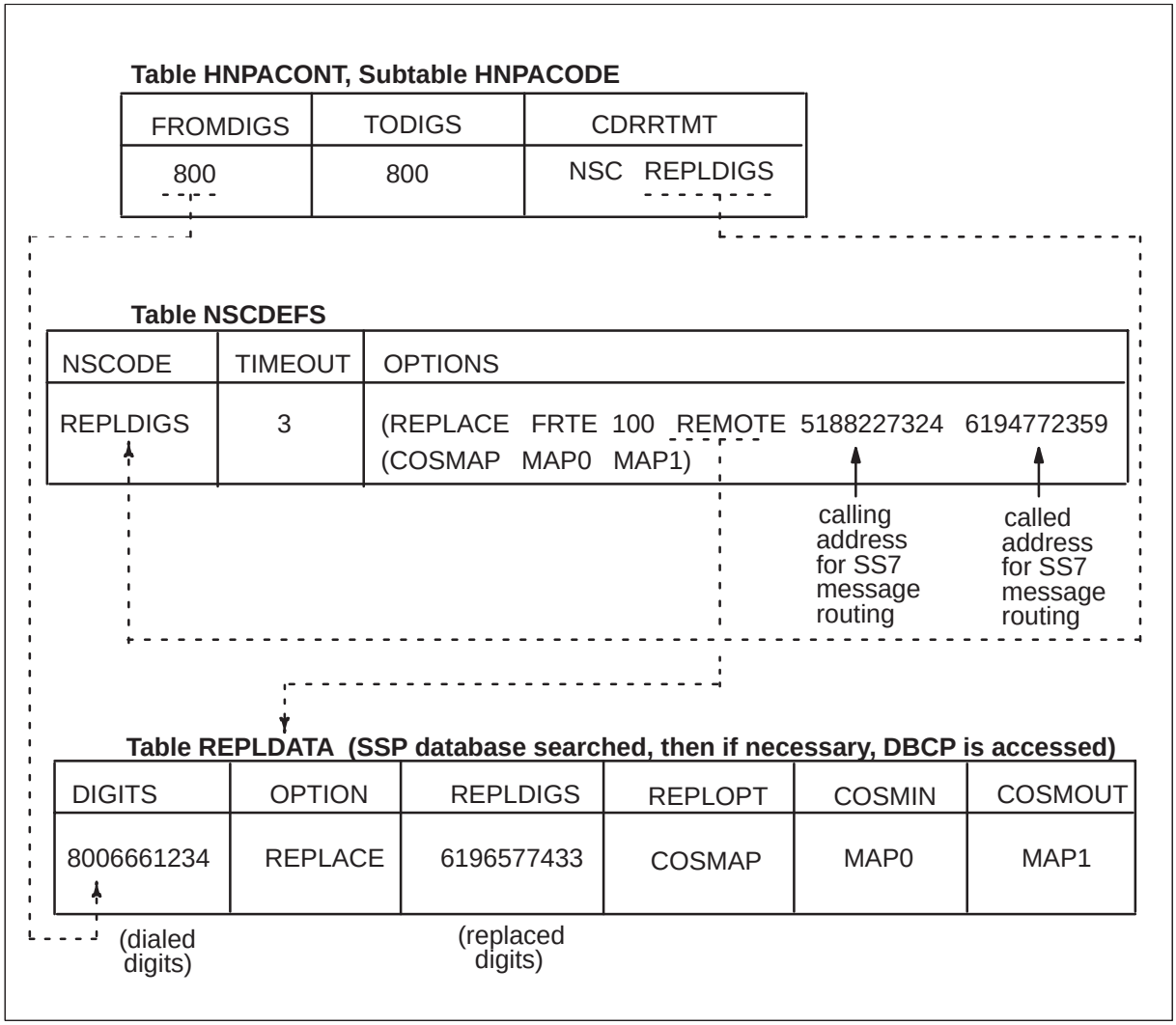


NSC translations for remote RDD database

If the remote search method is specified, the SSP sends a query message to the DBCP which performs a database search in Table REPLDATA on the dialed digits. If the search locates the dialed digits, then the DBCP returns the corresponding replaced digits. The SSP then translates the replaced digits using the returned NCOS. However, if the database search does not locate the dialed digits, the DBCP returns a response indicating the failure. The DBCP then routes the call to the failure route. The following example shows datafill samples for a remote database search using Table HNPACONT/Subtables HNPACODE, NSCDEFS, and REPLDATA.

Figure 3-5 illustrates sample datafill in Table HNPACONT/Subtables HNPACODE, NSCDEFS, and REPLDATA. In this example, the search mode, remote, is specified in Table NSCDEFS.

Figure 3-5
Sample data for remote RDD search method

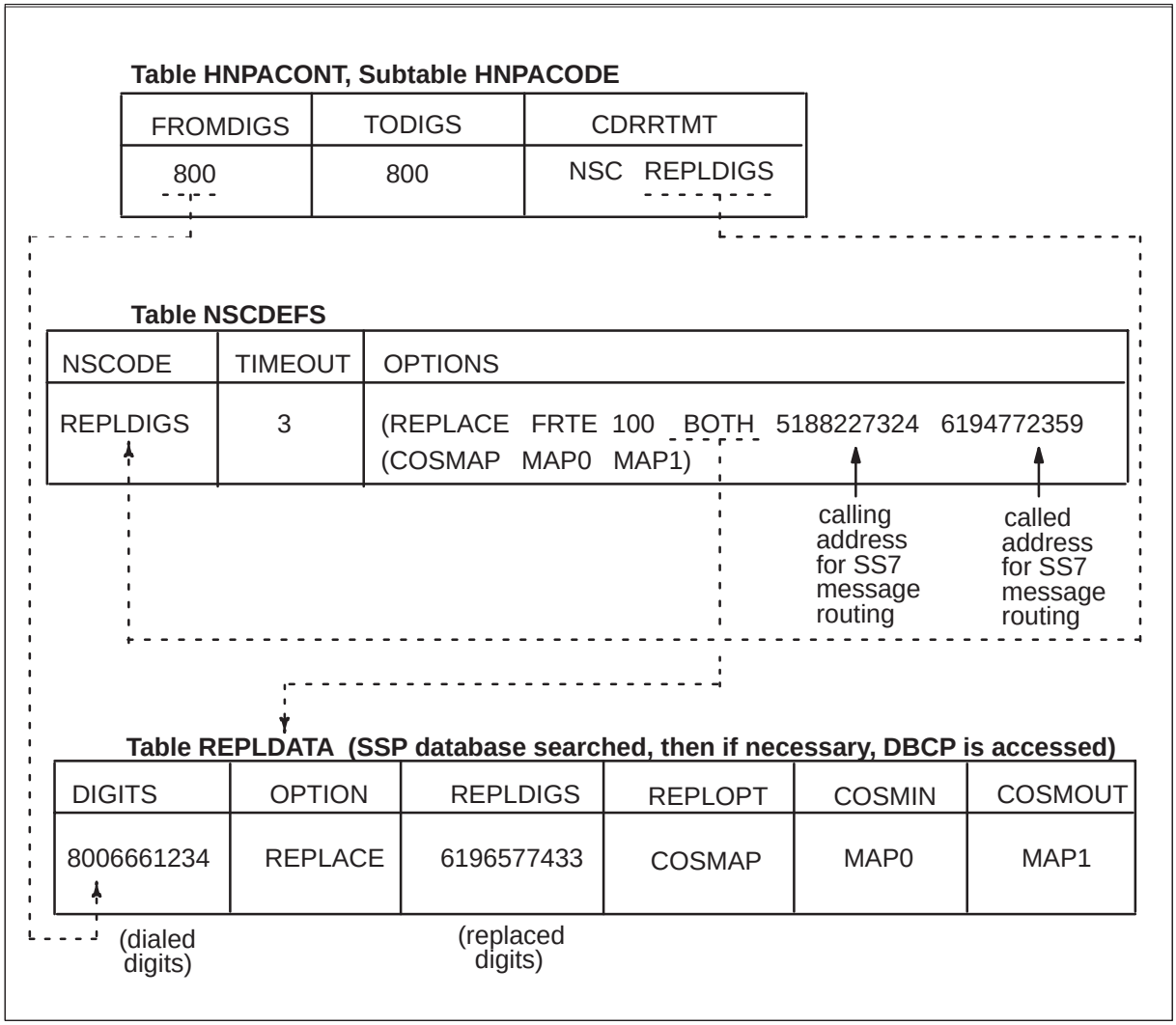


NSC translations for both search method

When the both database search method is used, the dialed digits in Table REPLDATA (local search) are checked first. If the digits are found, the system routes the call to the replaced digits. If the digits are not found, the system queries the DBCP, and the database searches for the dialed digits in Table REPLDATA residing at the DBCP. If the digits are found, the DBCP returns the corresponding replacing digits. If no digits are found, then the call routes to the failure route as specified in Table NSCDEFS.

Figure 3-6 illustrates sample datafill in Table HNPACONT/Subtables HNPACODE, NSCDEFS, and REPLDATA. In this example, the search mode both is specified in Table NSCDEFS.

Figure 3-6
Sample data for both RDD search method



NCOS mapping

When the NSS SSP receives the DBCP response, the call reenters translation with the replaced digits contained in the response message. The call may also have an associated NCOS when it reenters translation.

Table NSCDEFS at the NSS SSP contains the option COSMAP, with two fields COSMIN and COSMOUT. Table REPLDATA also has similar COSMIN and COSMOUT fields. If the COSMAP option is present in Table NSCDEFS, these fields contain class of service map names which contain datafill in Tables COSMAP and COSDATA at the SSP. Table COSMAP defines class of service mapping characteristics while Table COSDATA lists the mapping and screening data for each map name. Both of these tables are

also present at the NSS DBCP. Figure 3-7 describes Table COSMAP and Figure 3-8 describes example datafill for a full NCOS mapping.

NCOS mapping on database response

To obtain the network NCOS for the database response, this internal NCOS maps into Table COSDATA at the DBCP with the COSMOUT name from Table REPLDATA.

When the database response arrives at the SSP, the network NCOS in the response maps into Table COSDATA with the COSMIN name from Table NSCDEFS to obtain the internal NCOS. This internal NCOS overrides the original NCOS for the translation of the new destination digits obtained from the DBCP.

Since the tuple in NSCDEFS has the COSMAP option, the COSMOUT field (MAP2) is used as the index into Table COSDATA. If the original NCOS on the call is 10, then the network NCOS sent in the database query is 3.

At the DBCP, the map name in the COSMIN field (MAPA) in Table REPLDATA is used with received network NCOS of 3 to index into Table COSDATA. MAPA and NCOS value of 3 map to obtain an internal NCOS of 20. Mapping the value of the COSMOUT field (MAPB) in Table REPLDATA with the internal NCOS of 20 results in a network NCOS value of 4. This new NCOS is included in the response sent by the DBCP.

The SSP receives the response and maps the network NCOS value of 4 into Table COSDATA with the map name in the COSMIN field of Table NSCDEFS. This results in a new internal NCOS of 11. In effect, the NCOS for this call has been changed from 10 to 11.

Figure 3-7
Example datafill for Table COSMAP

NAME	MAX	SCREEN	VALTYPE
Map1	250	Allow	Anything
Map2	250	Allow	Anything
Map3	250	Allow	Anything

Legend:

Name = mapping name which indexes into COSDATA
Max = maximum value for a valid NCOS
Screen = type of screening to be done on the original NCOS
Valtype = restrictions user may place on mapping results

Figure 3-8
Example datafill for full NCOS mapping

NSS SSP NODE

Table NSCDEFS

NSCODE	OPTIONS
REPLDIGS . . .	(COSMAP COSMIN MAP1 COSMOUT MAP2)

Table COSDATA

COSMAP	COS	RESULT
MAP1	2	9
MAP1	4	11
MAP2	10	3
MAP2	12	5

NSS DBCP NODE

Table REPLDATA

CALLED	COSMIN	COSMOUT
8008888888 . . .	MAPA	MAPB

Table COSDATA

COSMAP	COS	RESULT
MAPA	2	10
MAPA	3	20
MAPB	20	4
MAPB	30	5

Partial NCOS mapping

If the COSMAP option is not present in Table NSCDEFS or the COSMOUT subfield is nil, then the original NCOS on the call routes as the network NCOS in the database query. Similarly, if the COSMAP option is not present in Table NSCDEFS or the COSMIN subfield is nil, then the network NCOS received in the database response is the internal NCOS for the retranslation of the call.

If, on the DBCP side, the COSMAP option is not present, or if both the COSMIN and COSMOUT subfields are nil in Table REPLDATA, then whatever NCOS is received in the database query goes in the database response. If COSMIN is not nil but COSMOUT is nil, then the network NCOS received in the database query maps into Table COSDATA and the resulting NCOS returns in the database response. The network NCOS in the query maps into Table COSDATA only once if COSMIN is nil and COSMOUT is not nil.

RDD SS7 messaging

The NSS service switching point communicates with the NSS DBCP database in the form of query and response messages using SS7. These messages transmit using the Transaction Capabilities Application Part (TCAP) and the connectionless service provided by the Signaling Connection Control Part (SCCP) of the SS7 protocol. A new SCCP subsystem called REPLDIGS is provided for the RDD application and resides at both the SSP and DBCP nodes. This SCCP subsystem is invoked when it is determined in translations that a query of the RDD database is necessary.

TCAP/SCCP interface

TCAP invokes the SCCP and Message Transfer Part (MTP) of SS7 to transport messages between the NSS SSP and the NSS DBCP.

Calling and called SCCP addresses

The calling and called addresses of a DBCP application are required for the SCCP portion of the database query sent by the SSP. These addresses are used as the SCCP addresses when sending TCAP messages across the network. The calling address defines the originating switch that requests the dialed digit replacement, and the called address identifies the terminating node that processes the request.

The calling and called addresses are datafilled in Table NSCDEFS when the REPLDIGS application is added. An example of this is shown in Figure 3-9. These addresses are required only for remote or both searches. They do not apply to in-switch replacement of dialed digits.

Note: The value in the TIMEOUT field in Table NSCDEFS must be a value less than 600 seconds.

Figure 3-9
Table NSCDEFS sample datafill for remote search method

NSCODE	TIMEOUT	OPTIONS	FAILRTE	REPLVAL	CLNGADDR	CLDADDR
REPLDIGS	3	(REPLACE	OFRT 100	REMOTE	5188227324	6194772359

Field OPTIONS cont...	OPTIONS	COSMIN	COSMOUT
	COSMAP	MAP0	MAP1) $

RDD query message

In the SSP, the RDD application is invoked when it is determined in translations that a query of the RDD database is necessary. A remote RDD query generates when one of the following occurs:

- the translation result indicates the search method is remote
- the translation result indicates the search method is both and the dialed digits are not found in the local database

For remote and both searches, the application examines the called address of the message (called address is datafilled in Table NSCDEFS), then accesses Table MSGRTE to determine which DBCP node the message must route to over an SS7 link.

The message is encoded as a TCAP Query with Permission package with an invoke component. The following two parameters are included in the service key of the invoke component:

- the digits dialed at the SSP
- the external NCOS

The protocol also includes a calling number, local access and transport area (LATA), and originating type parameters. However, these are not used by the NSS DBCP and default values are encoded in them.

After a query is sent, the call waits for a response message from the DBCP. The caller receives silent tone while the call is waiting for the response message. If no response message is received from the DBCP within the timeout period as datafilled in Table NSCDEFS, the call routes to the

specified failure route. If the RDD call is abandoned after sending a query message and before receiving an associated response message, the system ignores the response message and takes down the call.

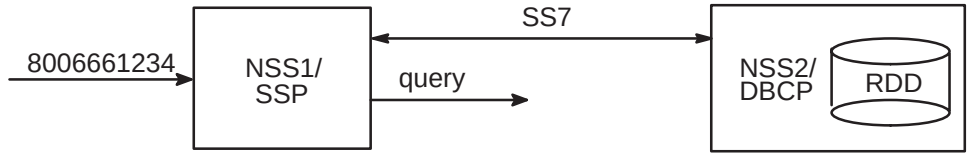
RDD response messages

When the NSS DBCP RDD database is queried, there are three possible responses sent to the SSP:

- return result—The DBCP sends the SSP a TCAP response package containing a return result component when the original called number is found in Table REPLDATA at the DBCP. The new called number in the REPLDIGS field returns to the SSP, along with the network NCOS. If the information contained in the response message is valid, the SSP invokes translations a second time on the returned digits and NCOS.
  - — If the SSP receives a return result response from the DBCP with invalid data (that is, invalid new called number or NCOS), the SSP constructs and sends a TCAP unidirectional message to the DBCP containing a report error operation code. If this occurs, a NSS106 log generates at the DBCP node after this unidirectional message is received.
  - — If the SSP receives a return result response from the DBCP with a protocol error or an invalid transaction ID, the SSP constructs and sends a TCAP unidirectional message to the DBCP containing a reject component. If this occurs, an NSS105 log generates at the DBCP node after this unidirectional message is received. A unidirectional message does not contain a transaction ID and a response is not required.
- reject—The DBCP sends the SSP a TCAP response package containing a Reject component when a protocol error or invalid transaction ID is found in the incoming database message. If this occurs, no database lookup can be performed. A NSS102 log generates at the SSP when a reject response is received.
- return error—The DBCP sends the SSP a TCAP response package containing a return error component if the original dialed number is not found in Table REPLDATA at the DBCP or the NCOS is invalid. A NSS107 log displays at the SSP when a return error response is received.

Figures 3-10 and 3-11 illustrate RDD query and response messaging between SSP and DBCP using Tables NSCDEFS, MSGRTE, and REPLDATA. In these examples, the query and response messages contain valid data.

Figure 3-10
Table flow for RDD query messages



a. An 800 called number is received. The HNPACODE subtable indicates this number is an RDD call. The SSP accesses table NSCDEFS to determine the RDD search method. In this example, the REMOTE search method is specified. Therefore, the called address is used to determine where to send the RDD message.

NSS1: NSCDEFS table (sample datafill)

NSCODE	TIMEOUT	OPTIONS
REPLDIGS	3	(REPLACE FRTE 100 REMOTE 5188227324 (calling address) 6194772359) (called address)

b. NSS1 accesses table MSGRTE which contains only called address numbers. The results indicate where the query message should be routed. In this example, the query message is routed by SS7 to point code NSS2.

NSS1: MSGRTE table (sample datafill)

MSGRTKEY	MSGRTSEL
PUBLIC 518 518	LOCAL 0 N $
PUBLIC 619 619	SS7 NSS2PC 0 N $

c. The query message arrives at NSS2 and table MSGRTE located in NSS2 is accessed for further processing. The results indicate that called address numbers within the 619 range terminate locally in this switch. Therefore, the RDD database search is performed here.

NSS2: MSGRTE table (sample datafill)

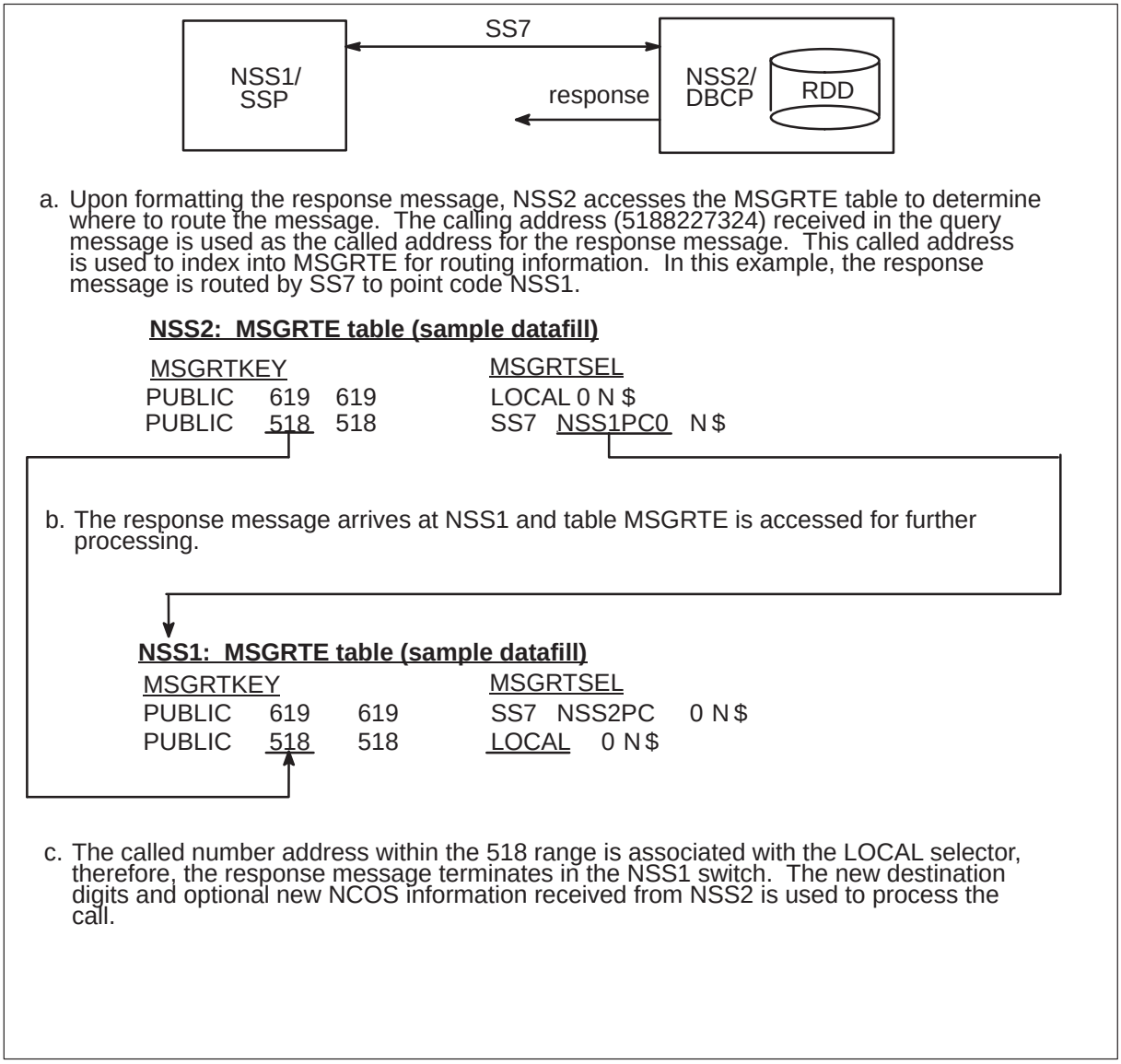
MSGRTKEY	MSGRTSEL
PUBLIC 518 518	SS7 NSS1PC 0 N $
PUBLIC 619 619	LOCAL 0 N $

d. Table REPLDATA is accessed based on the dialed digits (8006661234). The dialed digits are then replaced with new digits and optionally a new NCOS. This information is returned in a response message to the originating switch by the SS7 network.

DIGITS	OPTION	REPLDIGS	COSMIN	COSMOUT
8006661234	REPLACE	6196577433	MAP0	MAP1

The replacement data derived from table REPLDATA is sent by SS7 to NSS1 in a response message.

Figure 3-11
Table flow for RDD response messages



N00 capabilities

The RDD feature replaces the N00 Dialing feature. RDD provides the same functionality as N00 Dialing along with the following additional capabilities:

- RDD modifies the N00 dialing capabilities on NSS by allowing an N00 dialed number and the corresponding NCOS to be replaced for call translation using either the in-switch or remote RDD database.
- 400 calls are recognized as INWATs calls.

- N00 dialing can be implemented on any IBN line or trunk. However, only NSS PTS FGD trunks support N00 dialing capabilities involving ANI. (Refer to Figure 3-12.)
- It is no longer necessary to route on-net N00 calls to the local end office to be routed back to the MSL-100 over FGD for network routing.
- For 700 and 900 calls, ANI screening is not required as long as a ten-digit ANI transmits with the call.
- Table N00PXLA has been replaced by Table REPLDATA. Table REPLDATA is the RDD database and is accessed when the system software invokes NSC translations. Table REPLDATA does not contain a call type field. The call type is determined by the dialed digits.
- Table REPLDATA updates NCOS values.

N00 translation methods

Two N00 translation schemes route N00 calls. NSC call translations invoke RDD database look-up for replacement of dialed digits, while regular call translations do not. The two methods are described in the following sections.

N00 regular call translations

Regular call translations screen N00 calls at the 6-digit level (N00-NXX) to bypass RDD. These calls do not invoke NSC translations and do not perform a RDD database search. Table 3-1 is an example of Subtable SDTPRT datafill when regular translations is required. In this example, the terminating trunk group (TRKGRP1) is specified, therefore, the call routes directly from STDPRT subtable.

Table 3-1
Subtable STDPRT

Table STDPRTCT, Subtable	**STDPRT**								
FROMDIGS	TODIGS								
800444	800444	S	DD	0	TRKGRP1	2	12	NONE

Another scenario for regular N00 translations is to route the call from STDPRT through Table HNPACONT and Subtable HNPACODE where further digit analysis takes place to derive routing information.

In both scenarios, if a call originates over a NSS PTS FGD trunk, ANI collection may or may not be required. This is based on the ANIDIGS parameter datafill in Table TRKGRP. If the ANIDIGS field has been

datafilled as N (No), then ANI digits are not required. If the ANIDIGS datafill is Y (Yes), then ANI digits must be sent.

Incoming digit format of NSS FGD trunks

The NSS FGD trunk receives two streams of digits from the equal access end office (EAEO) or access tandem (AT) in the following format:

KP + (II + ANI) + ST

KP + N00 + NXX-XXXX + ST

where:

- KP = MF digit denoting the start of an equal access digit stream
- II = Information digits ranging from 0–9
- ANI = automatic number identification digits, 3 to 10 digits in length
- ST = MF digit denoting end of digit stream.
- N = 2 through 9
- X = 0–9
- ( ) = optional field

Whether ANI (II + ANI) goes to the NSS depends on the datafill in the ANIDIGS field in Table TRKGRP.

For 800 calls, there are two possible FGD digit streams that could come from the EAEO or AT. The N00 digit stream, as described previously, has the following format:

KP + (II + ANI) + ST

KP + N00 + NXX-XXXX + ST

The other digit stream is the 00Y format shown:

KP + (II + ANI) + ST

KP + 00Y + NXX-XXXX + ST

where:

- N = 2 through 9
- X = 0 through 9
- Y = 0 through 9

- ( ) = optional field

If the EAEO or AT that interfaces with the NSS serves only one numbering plan area (NPA), then the second stream of digits comes to the NSS in the 800-NXX-XXXX format. However, if the EAEO or AT serves more than one NPA, then the second stream of digits can come into the NSS in either 800 or 00Y format. If the originating NPA is the same as that of the office that interfaces with NSS, then this stream comes in the 800 format. Otherwise, the stream comes in the 00Y format.

Using the 00Y format, the EAEO or AT strips the 800 digits and replaces those digits with 00Y. The Y digit represents the NPA of the originator. The Bell Operating Company (BOC) notifies the NSS of the mapping of Y digits to NPAs. However, because ANI provides the originating NPA, the NSS does not need the 00Y digits. The NSS then strips the 00Y digits and replaces those digits with 800 so that proper translations and routing can occur.

400/800 INWATS service

INWATS is a service designed to meet the needs of customers that receive substantial volumes of long distance calls. This service allows a customer to receive telephone calls originating within specified service areas without a charge to the originating party. The terminating party (customer) receives any charges for all calls.

The originating NPA associated with the ANI provides banded billing capabilities for INWATS. Banded billing allows customers to charge INWATS subscribers different rates based on the distance from the call originator.

The system does not perform ANI screening on 800 or 400 INWATS calls. However, if the Table TRKGRP data specifies that ANI is required, then the system software checks the ANI to ensure that the NPA is received at a minimum. If the ANI stream contains 10 digits, system software checks the stream for a corresponding entry in Table ANIDATA. If the entry is found, a new customer group and NCOS route the call through translations. If the entry is not found, then the call routes through regular translations with the existing customer and NCOS.

If ANI is required, but not received, the system blocks the call and gives partial dial treatment to the calling party. (This treatment is datafilled in Table TMTCNTL.)

900 calls

For 900 calls, the calling party is charged a flat rate for each call rather than being charged according to the call duration.

ANI screening is not performed on 900 calls. However, if the Table TRKGRP data specifies that ANI is required, a ten digit ANI must be sent to the NSS and checked for an entry in Table ANIDATA. If the entry is found, a new customer group and NCOS route the call. If the entry is not found, then the call routes with the existing customer group and NCOS.

If the ANI for the calling party is not sent when required, the system blocks the call, and the caller is given partial dial treatment.

700 calls

An example of a 700 call is to give the caller an announcement stating that he/she is pre-subscribed to a particular carrier.

ANI screening can be performed on the originator of a 700 call. If the Table TRKGRP data specifies that ANI is required, then the 10-digit ANI stream must go to NSS. The ANI is checked for a corresponding entry in Table ANIDATA. If the entry is found, a new customer group and NCOS route the call. If the ANI entry is not found, the call routes to ADBF treatment.

If ANI is required but is not sent to NSS, the system blocks the call, and the calling party receives partial dial treatment.

Figure 3-12 illustrates regular N00 translations for 400/800 INWATS, 700, and 900 calls. If NSC translations specifies digit replacement, then these calls are processed as shown in Figure 3-12.

Figure 3-12
Process for 400/800 INWATS, 700, and 900 calls on a FGD trunk

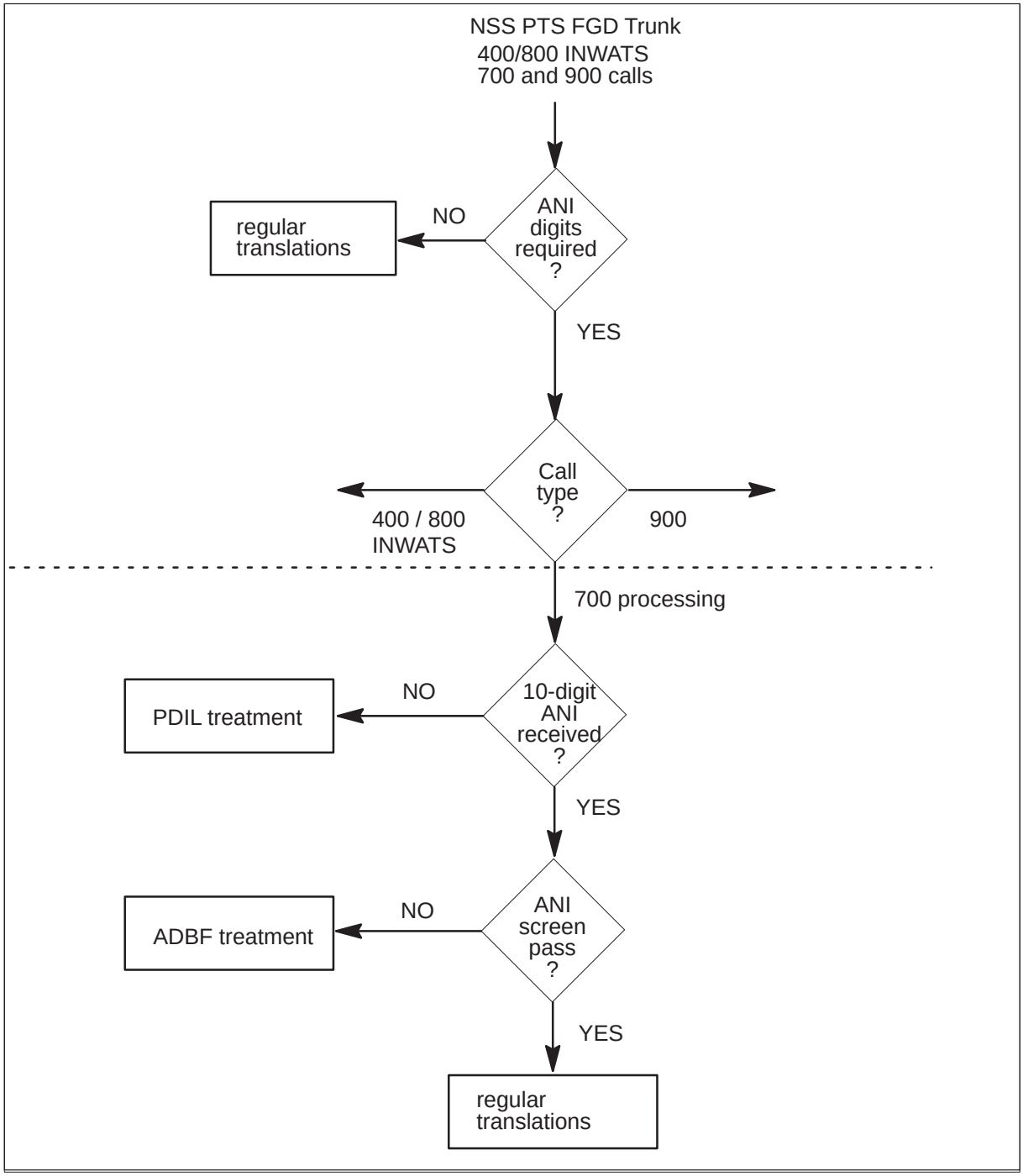
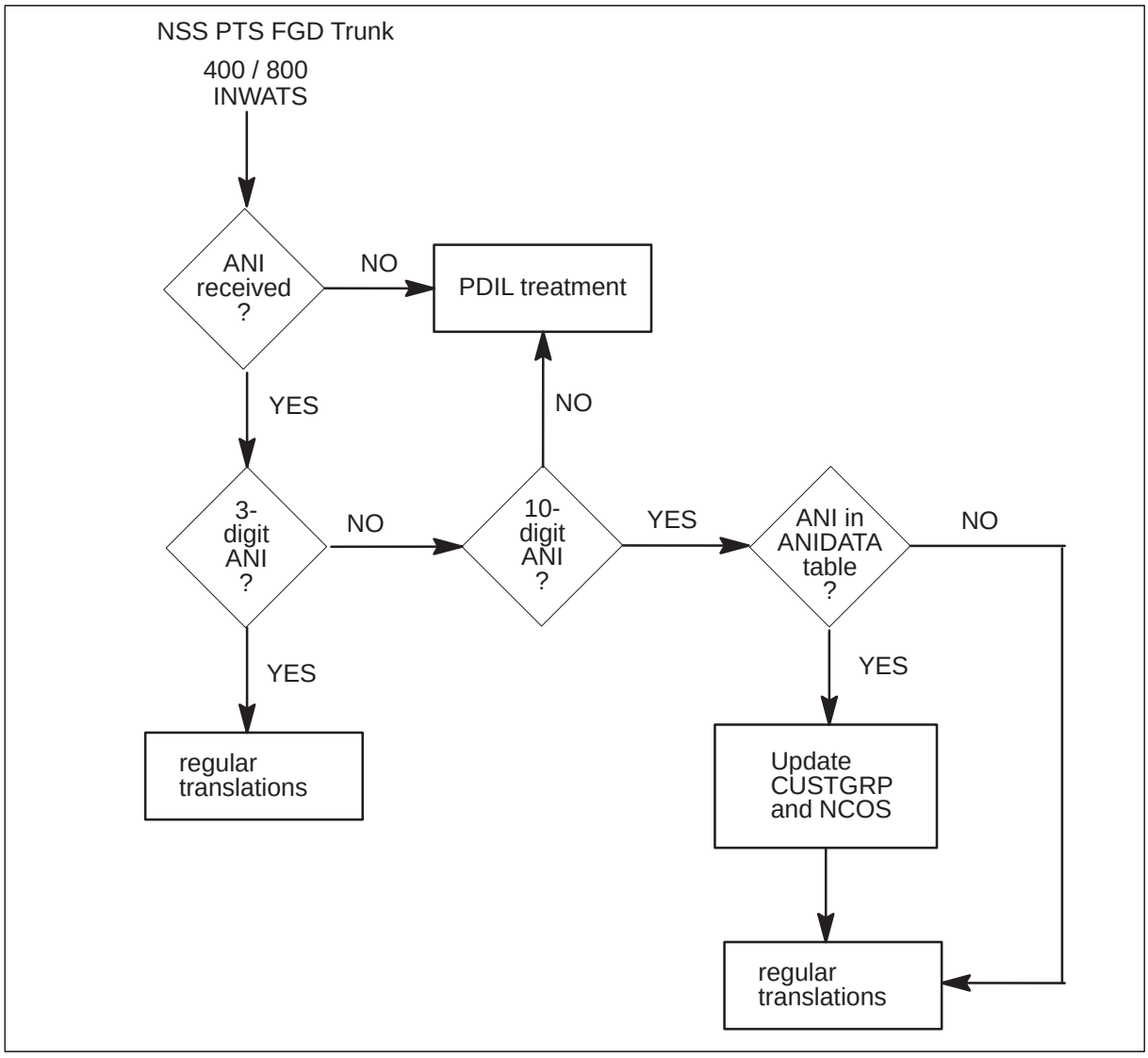
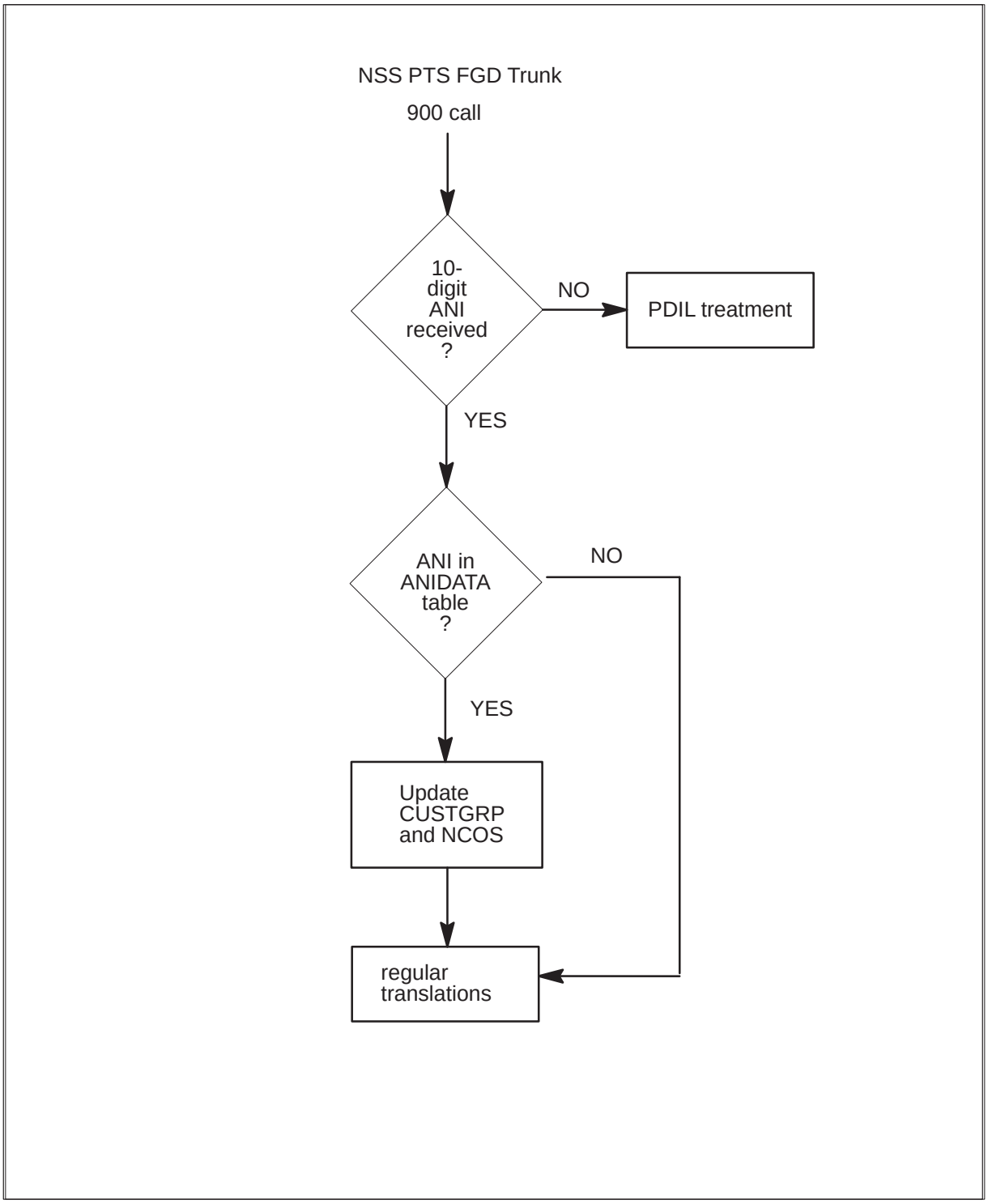


Figure 3-12
Process for 400/800 INWATS on a FGD trunk (continued)




NSS PTS FGD Trunk
900 call
10-digit ANI received ?
NO
PDIL treatment
YES
ANI in ANIDATA table ?
NO
YES
Update CUSTGRP and NCOS
regular translations

N00 NSC call translations

The NSC call translations invoke RDD database queries for N00 400/800 INWATS, 700, and 900 calls. NSC translation is defined in Subtable HNPACODE by assigning the NSC and REPLDIGS parameters to N00 digits requiring RDD processing. If NSC translation is not specified in Subtable HNPACODE, the N00 digits route using regular translations. For NSC calls, the NSS queries Table REPLDATA to obtain the new destination digits and optional NCOS for routing the call.

The REPLDATA table is the RDD database. It contains the REPLDIGS field which defines the new destination digits associated with the originally dialed N00 number. The datafill for the REPLDIGS field is determined by the dialing plan set up for the CUSTGRP field of the incoming trunk group and the NCOS obtained. The user may datafill any number in this field as long as that number is valid according to the dialing plan of the customer group and NCOS for that N00 number. If the number datafilled in the REPLDIGS field is not valid, the call routes to the appropriate treatment.

Figure 3-13 shows the NSC translation process. This illustration also shows the process for 800 universal access numbers which is described in the following sections.

800 universal access service

Universal access (UA) is a service that allows customers to gain access to their network from various locations by dialing an 800 access code. The customer enters an authorization code or a travel card number and an optional account code for screening and billing purposes. After gaining access to their network, customers can dial any number that is valid in their dialing plan.

The RDD database is not accessed for 800 UA calls. An 800 UA number must be datafilled in Table DNROUTE as a Meridian offnet access (MONA) directory number (DN). Translations must be defined such that 800 UA calls not terminating to MONA do not terminate to valid routes. If the 800 UA number is not datafilled as a MONA DN, the system blocks the call and the calling party receives vacant (VACT) treatment. 800 universal access calls translate using regular IBN translations to route to Table DNROUTE.

Note: Table DNROUTE existed prior to BCS34 as Table WRDN.

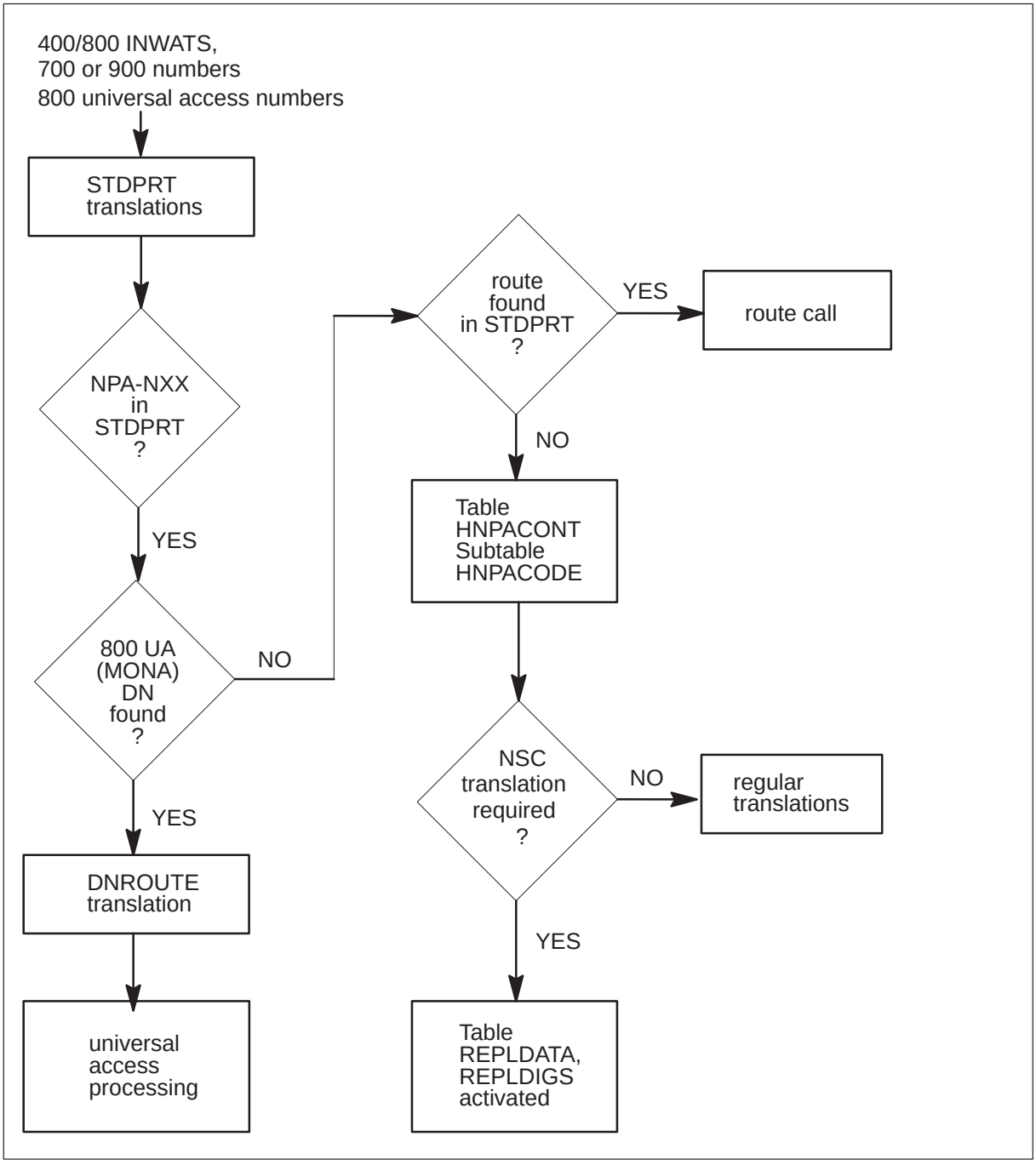
The MONA feature returns dial tone for 800 UA calls routed to Table DNROUTE. MONA also collects an authorization code or travel card number (TCN), destination digits, and an optional account code. For information on MONA, refer to the chapter entitled “Offnet Access Dialing Plan Driver” in this document.

ANI screening is not valid on NSS FGD 800 UA calls. However, if the Table TRKGRP data specifies that ANI is required for an NSS FGD trunk, then the system software checks the ANI to ensure that, at a minimum, the NPA is received. If the ANI stream contains 10 digits, it is checked for a corresponding entry in Table ANIDATA. If the entry is found, a new customer group and NCOS route the call to Table DNROUTE and the MONA feature. If the entry is not found, then the call is routed with the original customer group and NCOS of the originating trunk group over which 800 UA calls come into the NSS. This allows translation and routing to Table DNROUTE and MONA.

All IBN lines and trunks can function as originators of these calls.

Figure 3-13 illustrates the translation process for 800 universal access numbers.

Figure 3-13
NSC and 800 universal access translations process



TRAVER enhancements

When a number is entered in TRAVER which translates to the REPLDIGS NSC application, TRAVER indicates whether a remote database query is required.

When the Table REPLDATA lookup takes place in-switch, TRAVER displays on the MAP screen the new destination digits and, if applicable, the associated NCOS. If the tuple is not found in REPLDATA, TRAVER displays the failure route datafilled in Table NSCDEFS.

When TRAVER is used for a call which specifies BOTH in the REPLDIGS entry in Table NSCDEFS, system software searches Table REPLDATA first for tuple IN-SWITCH. If the tuple is not found, TRAVER indicates that a remote database query is required.

Log reports

Log reports are generated when an error occurs, or to notify the user of an event that has taken place. For more detailed information on log reports, refer to *Commercial System Log Reports Reference Manual*.

NSS102

An NSS102 log generates on the SSP node when the SSP receives a reject response from the DBCP notifying the SSP of a query protocol problem. The format of the log report and an example of the NSS102 log follow:

NSS102 format:

NSS102 mmmdd hh: mm ssdd INFO NSS QUERY PROTOCOL PROBLEM

APPLICATION=application

CALLED ADDRESS=nnnnnnnnnn

PROBLEM TYPE=problem type

PROBLEM CODE=unsignedint

where:

- APPLICATION—identifies the application that is sending the non-standard protocol query.
- CALLED ADDRESS—identifies the DBCP node that rejects the query.
- PROBLEM TYPE—indicates the protocol problem.
- PROBLEM CODE—indicates the protocol problem.

NSS102 example:

NSS102 JAN01 15:59:50 8123 INFO NSS QUERY PROTOCOL PROBLEM

APPLICATION=REPL_DIGS

CALLED ADDRESS=6137224500

PROBLEM TYPE=GENERAL_PROBLEM

PROBLEM CODE=1

NSS105

To send a message from the originating switch or to tandem a message, there must be an entry with PUBLIC netname and called address as the key datafill in Table MSGRTE with an SS7 or GTT selector. The LOCAL selector in Table MSGRTE indicates the message is processed at the local node. This log generates when a tuple with PUBLIC netname and called address does not contain datafill in Table MSGRTE, or when the tuple is not datafilled properly [SS7 or local selector is present when the message is to be sent out of the network]. The format of the log report and an example of the NSS104 log follow.

NSS104 format:

APPLICATION=application

CALLED ADDRESS=nnnnnnnnnn

REASON=reason

where:

- APPLICATION=application
- CALLED ADDRESS=identifies the entry that is not datafilled correctly in Table MSGRTE
- REASON=indicates whether the tuple is not datafilled or contains an invalid route

Note: When a tuple contains the datafill, PRI, and the PRI D channel is not available, the log reason indicates MSGRTE_NOT_DATAFILLED. When the PRI D channel is available, then the log reason indicates INVALID_MSGRTE.

If the NSS104 log is received, the user must confirm that there is an entry with PUBLIC netname and called address in Table MSGRTE. This entry must either be a local SS7 or GTT selector.

NSS 105 example:

NSS104 JAN01 15:43:45 1234 INFO NSS XLA PROBLEM

APPLICATION=REPL_DIGS

CALLED ADDRESS=6137224500

REASON=INVALID_MSGRTE

NSS105

An NSS105 log generates on the DBCP node when it receives a unidirectional message back from the SSP notifying the SSP of a response protocol problem. This occurs when the SSP can not decode the response it receives from the DBCP. The format of the log report and an example of the NSS105 log follow:

NSS105 format:

NSS105 mmmdd hh: mm ssdd INFO NSS DBCP RESP PROTOCOL PROBLEM

APPLICATION=application

CALLED ADDRESS=nnnnnnnnnn

PROBLEM TYPE=problem type

PROBLEM CODE=unsignedint

where:

- APPLICATION—identifies the application where the response protocol problem occurred.
- CALLED ADDRESS—identifies the SSP node that could not decode the response.
- PROBLEM TYPE—indicates the protocol problem
- PROBLEM CODE—indicates the protocol problem.

NSS105 example:

NSS105 JAN01 14:30:20 3456 INFO NSS RESP PROTOCOL PROBLEM

APPLICATION=REPL_DIGS

CALLED ADDRESS=6137224500

PROBLEM TYPE=GENERAL_PROBLEM

PROBLEM CODE=1

NSS106

An NSS106 log generates on the DBCP node when it receives a unidirectional invoke message back from the SSP notifying the DBCP that there is corruption in the response such as invalid NCOS. The format of the log report and an example of the NSS106 log follow:

NSS106 format:

NSS105 JAN01 14:30:20 3456 INFO NSS INVALID DATA RESPONSE

APPLICATION=REPL_DIGS

CALLED ADDRESS=6137224500

INVALID FIELD=NCOS

INVALID DATA=10

NSS107

An NSS107 log generates on the SSP when it receives a return error response from the DBCP specifying that the dialed digits are not found in Table REPLDATA. The format of the log report and an example of the NSS107 log follow:

NSS107 format:

NSS107 mmmdd hh: mm ssdd INFO NSS REPLDIGS INFO

CALLED ADDRESS=nnnnnnnnnn

DIGITS=nnnnnnnnnn

REASON=reason

where:

- CALLED ADDRESS—identifies the DBCP node where the replace dialed digits database, REPLDATA, resides.

- DIGITS—displays the dialed digits used to index into Table REPLDATA.
- REASON—indicates that the dialed digits are not found in Table REPLDATA.

If an NSS107 log generates, the user must confirm that the dialed digits are not valid for a REPLDIGS call.

NSS107 example:
NSS107 JAN01 15:50:49 8123 INFO NSS REPLDIGS INFO

CALLED ADDRESS=6137225000

DIGITS=8008881234

REASON=DIALED_DIGITS_NOT_FOUND

Operational measurements

Changes and additions to operational measurement groups

The three operational measurement (OM) group changes attributed to the REPLDIGS follow:

- The key, NSS_RDD_TCAP_EXT_BLK_FC, is part of the existing EXT OM group. This OM group measures the provisioning of extension blocks.
- An operational measurement group with seven OM registers is part of the OMs. The OM group, NSSTCAP (Network Service System TCAP messaging), measures events that occur in the NSS SSP when sending a query to the NSS DBCP, and when processing a response. This OM group also measures events that occur while processing queries at the NSS DBCP. Measurements from this OM group can indicate signaling trouble between the SSP and DBCP.
- The registers associated with the OM group, NSSTCN, (formerly used for the NSS travel card number application) consolidate with the registers in the REPLDIGS OM group (NSSTCAP). The mapping of NSSTCN OM registers to NSSTCAP OM registers is found in Table 3-2.

Table 3-2
OM register mapping for NSSTCN and NSSTSCAP OMs

NSSTCN Registers	NSSTCAP Registers
NSSTCNNP	NTWKPROB
NSSTCNQP	QRYPROCD
NSSTCNNR	NORESRCE
NSSTCNTE	TIMEREXP
NSSTCNQS	QERYSENT
NSSTCNIV	INVDIGIT
NSSTCNFC	TCNFREEC

Note: The registers in the OM group (NSSTCAP) are pegged for the NSS TCN application under the same condition as they were pegged in the obsoleted OM group (NSSTCN).

New operational measurement registers

Descriptions of all OM registers associated with the NSSTCAP OM group follow:

- NTWKPROB (network problem)—This OM register is pegged at both the DBCP and SSP nodes. At the DBCP, this register measures the number of times the REPLDIGS reports a problem sending the response message to the SSP due to network problems. At the SSP, this OM register measures the number of times the Replace Dialed Digits application has a problem sending the query and unidirectional messages to the DBCP due to network problems.
- QRYPROCD (queries processed)—This OM register is pegged only at the DBCP node. It pegs the number of queries processed at the DBCP.
- NORESRCE (no resources)—This OM register is pegged at both the DBCP and SSP nodes whenever a “no resource” problem occurs. This condition exists when there are no transaction IDs available and when no software resource blocks can be located.
- TIMEREXP (timer expired)—This OM register is pegged only at the SSP node. It increments when the REPLDIGS response timer (datafilled in Table NSCDEFS) expires before a response arrives from the DBCP. This information determines whether the response timeout value needs to be increased.

- QERYSENT (queries sent)—This OM register is pegged only at the SSP node. It measures the number of REPLDIGS query messages received by the DBCP.
- INVDIGIT (invalid digits)—This OM register is pegged only at the SSP when it receives a replace dialed digits return error message from the DBCP. This message indicates that the dialed digits sent in the database query were not found in Table REPLDATA on the DBCP. Additionally, the NSS107 log generates when this event occurs.
- TCNFREEC (NSS TCN free calls)—This OM register is not pegged for the replace dialed digits application. It is, however, a register within the NSSTCAP OM group and is pegged for the NSS travel card number application. It is pegged under the same conditions as the NSSTCNFC register in the obsoleted NSSTCN OM group.

Table changes

The following is a list of tables that have either been modified, added, or deleted as a result of the RDD feature. A description of these tables is found in either *DMS-100 Family Common Customer Data Schema, or DMS-100 Meridian Digital Centrex Customer Data Schema* as shown in Table 3-3. A summation of the changes are listed in that table.

Table 3-3
NTP table modification summary

Table name	Type of change	NT Preference
C7GTTYPE	Modified	297-1001-451
C7LOCSSN	Modified	297-1001-451
C7NETSSN	Modified	297-1001-451
C7RPLSSN	Modified	297-1001-451
C7RSSCRN	Modified	297-1001-451
HNPACONT/SUBTABLE HNPACODE	Modified	297-1001-451
STDPRTCT/SUBTABLE STDPRT	Modified	297-1001-451
NSCDEFS	Modified	297-1001-451
TCAPTRID	Modified	297-1001-451

—continued—

Table 3-3
NTP table modification summary (continued)

Table name	Type of change	NT Preference
N00PXLA	Deleted	Reference removed from 297-2001-451
REPLDATA	Modified	297-1001-451
—end—		

Summary of table changes

- The global title translation type, REPLDIGSGT, is part of the field GTTID in Table C7GTTYPE.
- The REPLDIGS subsystem name is part of the range of SCCP subsystems for use in Tables C7LOCSSN, C7NETSSN, C7RPLSSN, and C7RSSCRN.
- The CDRRTMT field in Subtable HNPACODE of Table HNPACONT includes REPLDIGS as an optional parameter of NSCCODE when the NSC selector is used.
- The PRETRTE field in Subtable STDPRT of Table STDPRTCT includes REPLDIGS as an optional parameter of NSCCODE with the NSC selector. However, REPLDIGS NSC translations is defined using Table HNPACONT/Subtable HNPACODE for the Replace Dialed Digits feature. Therefore, the REPLDIGS value in the standard pretranslation tables is not used.
- NSC REPLDIGS in Table NSCDEFS invokes the Replace Dialed Digits feature in translations. Two new options are REPLACE and COSMAP.
- Table N00PXLA, which is obsolete, requires a manual dump and restore to the Table, REPLDATA.
- Table REPLDATA is the database for the REPLDIGS application. Its key field contains the dialed digits. The remaining fields consist of the replaced digits and NCOS mapping values.
- TCAPAPPL type, REPLDIGS, is part of Table TCAPTRID. It indicates the number of transaction IDs and NSS_EXT_BLOCKs required by the Replace Dialed Digits application.

Office parameter changes

Two office parameters are part of Table OFCENG for the Replace Dialed Digits feature. They are

- NSS_RDD_REPLDIGS_LENGTH_A
- NSS_RDD_REPLDIGS_LENGTH_B

The range of these office parameters is 1 to 18. This value represents the number of digits in the REPLDIGS field in Table REPLDATA.

When the REPLDIGS subsystem is brought into service at the NSS DBCP, this builds two templates of the REPLDIGS TCAP return result response messages, each sized for a Digits parameter. Two different sized return result messages are built ahead of time to save real-time processing. If a return result message needs to be sent containing a number of digits other than those defined in Table OFCENG, that message builds during call processing. The default for A is 7 digits. For B, the default is 10 digits. These office parameters are activated by using the SCCPLOC MAP level to busy and return-to-service the REPLDIGS subsystem.

For detailed information on office parameters (OPARM), refer to the *Office Parameters Reference Manual*.

Billing

SMDR billing changes

For SMDR billing, the RDD feature uses the SMDR NSS DB extension record to display the dialed digits for both NSS and non-NSS calls. NSS calls include (but are not limited to) IBN NSS FGD and IBN NSS_FGB originations, while non-NSS calls include (but are not limited to) POTS originated calls. The ACCESS DIRECTORY NUMBER field of the DB extension record stores dialed digits. For non-NSS calls, the remaining fields in this extension record are not applicable for the RDD feature. The CALLED NUMBER field found in the SMDR D1 and D3 records the replaced digits. The D1 record can store from 1 to 12 digits in the called number field. The D3 record stores from 13 to 24 digits in this field. If the dialed digits are not replaced, the CALLED NUMBER field contains nil characters (#A's).

400/800 INWATS and 800 universal access SMDR billing

For 400/800 INWATS and 800 universal access calls, NSS records the information in the SMDR billing record as shown in Table 3-4.

Table 3-4
400/800 INWATS and 800 universal access SMDR billing

SMDR field	INWATS description	Universal access description
Called number	Replaced digits obtained from RDD database	Destination digits dialed
MSN N00 call type	INWATS	Universal
MSN access directory number	400/800 INWATS dialed number	800 UA dialed number
Information digits	ANI information digits	ANI information digits
ANI number	Originator's ANI	Originator's ANI
Authcode	Not applicable	Authorization code dialed
Account code	Not applicable	Account code dialed

700 and 900 SMDR billing

Table 3-5 illustrates the SMDR billing record for NSS 700 and 900 service calls

Table 3-5
700 and 900 SMDR billing

SMDR field	700 description	900 description
Called Number	Replaced digits obtained from RDD database	Replaced digits obtained from RDD database
MSN N00 Call Type	700	900
MSN Access Directory Number	700 dialed number	900 dialed number
MSN Access Directory Number	ANI information digits	ANI information digits
ANI Number	Originator's ANI	Originator's ANI

RDD provisioning rules

An entry for the REPLDIGS application in Table TCAPTRID indicates the number of transaction IDs and NSS software resource blocks allowed for RDD calls. Table TCAPTRID allocates the transaction IDs on an individual application basis. A maximum of 819 transaction IDs may exist for all applications on a DMS. Use the following provisioning rule to calculate the

number of transaction IDs and software resource blocks required for the REPLDIGS application: C * T = X

where:

- **C** is the number of REPLDIGS calls processed each second.
- **T** is the TIMEOUT value in Table NSCDEFS.
- **X** is the number of transaction IDs and software resource blocks required for the REPLDIGS application.

Note: A cold start is necessary to reallocate the number of transaction IDs. The system holds the transaction ID and software resource block for the duration of a REPLDIGS query.

RDD testing information

The TESTSS command supports the REPLDIGS subsystem. Performing TESTSS REPLDIGS from the SCCPLOC MAP level sends a query to the REPLDIGS database at the NSS DBCP without an actual call.

To access the SCCPLOC level of the MAP terminal, enter the following command:

```
MAPCI;MTC;CCS;CCS7;SCCPLOC
```

Note: Only one verification query can be active at any one time.

Feature interactions

RDD feature interactions with specific features follow:

MONA

An 800 UA number is datafilled as a MONA DN. For more detailed information on 800 UA interaction with RDD, refer to the section, 800 universal access service, in this chapter.

A user can dial RDD calls as the destination digits of a MONA call.

Call reorigination

A user can dial RDD calls as the destination digits of a reoriginated call.

DISA

A user can dial RDD calls as the destination digits of a DISA call.

Authorization and account codes

A user can dial RDD calls as destination digits after entering an authorization or account code feature access code. RDD calls can also route to authorization or account code feature access codes.

Other IBN features

RDD calls can route to various IBN features and others can interact by dialing a RDD call. In all cases the intragroup requirements imposed by each feature must be met. The system evaluates the intragroupness of a RDD call on the basis of the translation of the dialed number rather than the replaced digits.

RDD replaced digits can route to the following features:

- ACD
- UCD
- MADN
- Meetme Conference
- AUTH
- ACCT

RDD calls can be dialed from the following features:

- CNF
- CXR
- Three Way Calling/Call Transfer

The following features work with RDD calls:

- OHQ
- VFG
- LNR

Restrictions and limitations

The RDD feature has the following restrictions and limitations:

- There is a limitation of 819 transaction IDs allowed for all applications on a DMS.
- No N00 calls are blocked on non-FGD trunks.
- The OPTION field in Table REPLDATA must contain the datafill, REPLACE. A tuple may not be entered that only has $ for OPTION.
- PRI D channel is not supported by NSS DBCP.

- Selector GTT (global title translation) for Table MSGRTE only applies to NSS DBCP messages.
- To replace digits with the RDD feature, NSCODE REPLDIGS must contain datafill in Table NSCDEFS with at least the REPLDIGS option REPLACE.
- The REPLACE and COSMAP options apply only to the REPLDIGS NSCODE.
- All RDD numbers using the RDD database must contain datafill in Table REPLDATA or the call routes to the failure route assigned in Table NSCDEFS.
- An 800 UA number must contain datafill in Table DNROUTE as a MONA DN or the system blocks the call and the caller receives VACT treatment.
- The NPA must be present in the ANI for NSS FGD 400 and 800 INWATS calls which require ANI delivery or the system blocks the call and the caller receives PDIL treatment.
- The 10-digit ANI must be provided for NSS FGD 900 calls that require ANI delivery or the system blocks the call and the caller receives PDIL treatment.
- The system performs ANI screening only for NSS FGD 700 calls. 700 calls that require ANI delivery must pass ANI screening or the system blocks the call and the caller receives ADBF treatment.
- Discussion of ANI in this chapter applies only to N00 calls on an NSS FGD trunk with NSSFGD datafilled in Table TRKGRP.
- Discussion of ANI in this chapter excludes calls on an SS7 FGD trunk.
- On non-FGD trunks, the system does not block N00 calls for failing ANI requirements.
- The system gives silent tone during the RDD DBCP response wait period.
- The TIMEOUT field in Table NSCDEFS must contain datafill with a value less than 600 seconds.
- When a response timeout expires, the call goes to the failure route.
- Since the value in the TIMEOUT field in Table NSCDEFS determines the response timeout, the caller could receive silent tone for the length of the timeout value.
- The RDD feature supports only the field MSN_ACCESS_DN for non NSS calls in the SMDR #DB record.

- Each IBN feature imposes its own intragroup requirements. The system evaluates the intragroupness of a RDD call on the basis of the translation of the dialed number rather that the replaced digits.
- If less than 10 dialed digits route to the RDD feature, the call goes to treatment and an NSS107 log generates.

Database control point

A Network Services System (NSS) database control point (DBCP) node is one that stores special services database information such as authcode, travel card, automatic number identification, and 700, 800, 900 (N00) translations, and is queried by NSS signaling service point (SSP) nodes to perform database searches. Query and response messages are transmitted over signaling system-7 (SS7) links and are processed using Signaling Connection and Control Part (SCCP) subsystems resident in DBCP and SSP nodes. Each NSS application (such as authcode or travel card) is a separate SCCP subsystem capable of sending and receiving query messages. The NSS application subsystems use Transaction Capabilities Application Part (TCAP) which is a common protocol for sending messages across the SS7 network.

An SCCP subsystem called replacement of dialed digits (RDD) replaces the N00 Dialing feature. For information on RDD, please reference the chapter entitled “Replacement of Dialed Digits”.

SCCP subsystem

The SCCP feature does not implement a particular application. Its function, processing SS7 messages, applies to all of the subsystem applications. However, throughout this section, the automatic number identification (ANI) application is used as an *example* to describe how messages are routed through the network. These routing examples can be applied to other existing TCAP applications as well as future TCAP applications.

At the originating switch, when ANI validation from the DBCP node is required, the call processing assembles the ANI query message and invokes the ANI application. The ANI application examines the called address of the message, and using Table MSGRTE, determines if the message must be routed to the ANI DBCP application over a SS7 link or to a local ANI DBCP application.

The ANI SCCP subsystem is invoked when a message is received or sent over the SS7 link. The ANI SCCP subsystem calls the proper procedure to send the query message to the terminating switch.

Figure 4-1 depicts the ANI DBCP application. Since these application subsystems can interface with a service control point (SCP) or a signaling transfer point (STP), the standard address must be used to route the messages. Global title (GT) point code (PC) and subsystem number (SSN) are a means of addressing in an SS7 network.

Note 1: Global Title is an address, such as dialed digits, and does not explicitly contain information that allows routing in the signaling network. The translation function of the SCCP is required to derive the appropriate routing information. Refer to Bellcore document TR-NPL-000246 for more details.

Note 2: A destination point code (DPC) and SSN allow direct routing by the SCCP and message transfer part (MTP). Therefore, the translation function of the SCCP is not required. Refer to Bellcore document TR-NPL-000246 for more details.

Figure 4-1
ANI DBCP application

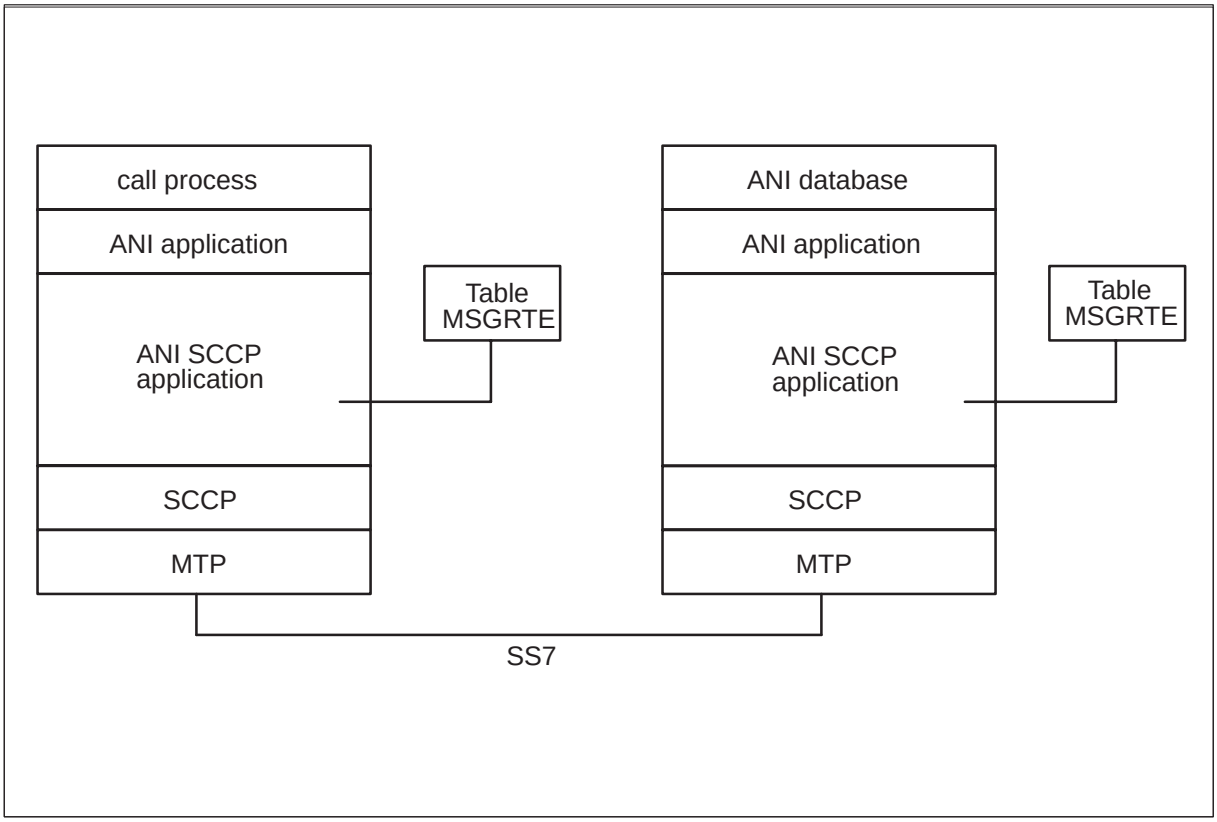


Table MSGRTE

Table MSGRTE routes messages through the network. Table MSGRTE is indexed by a three-field key consisting of:

- the network identifier (NETID)
- FROMDIGS
- TODIGS

Each entry has a corresponding selector which indicates how the message is routed. The selectors are local, SS7, or GTT. PRA is also an option but is not valid for the DBCP application.

Table 4-1 is an example of Table MSGRTE with all current selectors.

Table 4-1
Table MSGRTE example

MSGRTKEY	MSGRTSEL
PUBLIC 427 428	SS7 SWITCHBPC 0 N $
PUBLIC 429 430	LOCAL 0 N $
PUBLIC 450 460	GTT ANITRANS $

When the local selector is chosen, the message terminates on this switch. When the SS7 selector is chosen, the SCCP unit data message is constructed using the PC specified by the selector, and sent to the associated SCCP application subsystem at the next switch. The DELDIGS and PREDIGS fields are parts of all these selectors. DELDIGS specifies the number of digits to delete from the beginning of the destination information element before routing the message. PREDIGS is a string of digits before the message is routed to be prefixed to the destination information element. When the GTT selector is chosen, global title translation is required to obtain the address for routing the message to the next switch. A global title name is retrieved from table MSGRTE and stored in the SCCP address. The SCCP does global title translation to derive an SS7 address for message routing using table C7GTT. GTT is described further in this chapter under the heading “global title routing/subsystem number routing”.

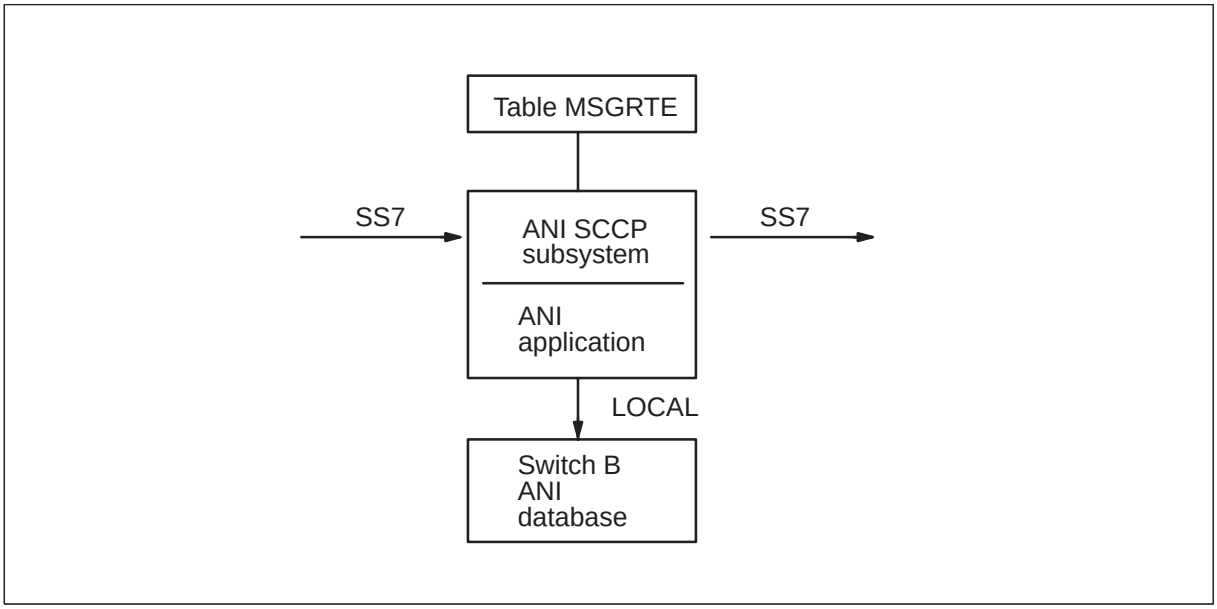
SS7 signaling link

When a message arrives over an SS7 signaling link, it comes into the SCCP. The SCCP transfers the message to the appropriate subsystem for processing. For example, if the ANI query message is sent, the SCCP invokes the ANI SCCP subsystem to process the message. The subsystem examines Table MSGRTE to determine if the message is to be processed

locally or routed to the next switch. When a message is to be sent over an SS7 signaling link, the ANI SCCP subsystem formats the SCCP address with the PC from the selector and sends the message using the SCCP.

Figure 4-2 depicts an ANI query message on a SS7 link.

Figure 4-2
ANI query message on SS7 link



SCCP addresses

The originating switch must provide the calling and called addresses with a database query message going through the SS7 network. An address could be a combination of global title (directory number digits), point code, and a subsystem number. The called address determines where the query message is to be routed. At the terminating switch, the calling address becomes the called address and is used to send the return messages back to the originating switch. These addresses are datafilled on an individual SCCP application subsystem basis.

Global title (GT) routing/subsystem number (SSN) routing

GT routing indicates that routing must be performed based on the GT digits. The GT digits are used to derive either a PC, SSN, or both for routing the message to the next switch. To obtain the necessary routing information, global title translation (GTT) is performed.

GTT can also be used for loadsharing and hot standby when there are multiple DBCP nodes in the network. These two modes of operation (if required) are datafilled in table C7GTT. Loadsharing distributes the

messages between two DBCP nodes. Hot standby is used when one of the DBCP mates is corrupted. If this occurs, the messages are delivered to the other DBCP mate for processing. These scenarios are usually supported by the STP. Since the STP is not always present in the network configuration, the NSS node must have the ability to provide these functions.

When GT T is required, the GTT selector in Table MSGRTE is specified. A global title name is retrieved from this tuple and stored in the SCCP address. The SCCP executes the following:

- performs GTT to get an SS7 address consisting of a PC, or a SSN, or both using Table C7GTT
- sets the routing indicator to either SSN or GT
- routes the message to the next node by SS7 links

SS7 addresses

The result of a global title translation can be one of the following:

- PC ONLY—Where PC ONLY is specified, it is assumed that the message must be sent to the next switch using only a point code in the address message. There can be one or two point code names assigned with a cost value associated with each. If one point code is assigned, loadsharing is not available. If two point codes are defined, this assumes loadsharing is required. Therefore, the costs of the point codes must be assigned identical values. For the PCONLY mode, loadsharing is allowed between two point codes, however, hot standby is not.
- SSN ONLY—Where SSN ONLY is specified, it is assumed the SSN is the local node and the message terminates here. Only one SSN name is assigned.
- PC and SSN—Where PCSSN is assigned, it is assumed that the message must be sent to the next switch using a point code and subsystem number in the address message. There can be one or two point code names and subsystem number names assigned. If two point codes are assigned, cost parameters are associated with the point code names to determine if loadsharing or hot standby is required. The point code with the least cost value is considered the primary subsystem and processes all of the messages. Should this subsystem fail, the secondary point code subsystem takes over processing. If the cost values are equal, loadsharing is required. For PCSSN, both hot standby and loadsharing are available if two point codes are specified.

- PC and new GT—Where PCNEWGT is assigned, it is assumed the message must be sent to the next switch using a point code and a new global title number.
  There can be one or two point code names assigned with a cost value associated with each. If one point code is assigned, loadsharing is not available. If two point codes are defined, this assumes loadsharing is required. Therefore, their costs must be assigned identical values. For the PCONLY mode, loadsharing is allowed between two point codes, however, hot standby is not.

Routing indicators

SN or GT routing indicators are specified for GTT translation results PCONLY and PCSSN. The use of these routing indicators follows:

- PCONLY without SSN—When the GTT result is PCONLY and the SSN is not in the called party address, the GT routing indicator is used. This indicates that the point code should be altered and that the message sent to the next node requires further translation.
- PCONLY with SSN—When GTT result is PCONLY and the SSN is already in the called party address, the SSN routing indicator is used. This indicates that with the new point code, the final destination of the message is known and can be routed.
- PCSSN with SSN but without PC—When GTT result is PCSSN and the final destination SSN has been determined but the point code has not, the GT routing indicator is used. This indicates that the final destination SSN should be placed in the called party address and further translation is required at the new node to determine the point code.
- PCSSN with SSN and PC—When GTT result is PCSSN and both the final destination SSN and point code have been determined, the SSN routing indicator is used. This indicates no further translation is required and the message can be routed to its destination.

Table 4-2 is sample datafill for Table MSGRTE using the ANI application and the GTT selector.

Table 4-2
Table MSGRTE with GTT selector example

MSGRTKEY	MSGRTSEL
PUBLIC 437 438	GTT NSSANIGT $

Table 4-3
Table C7GTT example

C7GTTKEY	C7GTTSEL
NSSANIGT 437 438	PCSSN SWITCHBPC ANISSN 0 GT $

Allowing or prohibiting a subsystem

When the NSS DBCP application subsystem is down, it must send a subsystem prohibited message to the SCCP to indicate that it is not able to process any more messages. A procedure provided by the SCCP is called by the application to notify the SCCP that the subsystem is down. The SCCP broadcasts the subsystem prohibited message to all the concerned destinations when a node or link goes down or an application system is busied. The SSP message informs the SCCP management at the message destinations of the failure of a subsystem. At this time, the SCCP routing tables are updated and the subsystem-status-test (SST) is initiated. SST is an audit procedure that detects if the subsystem has been recovered in case a subsystem allowed (SSA) message is lost.

When the NSS DBCP application subsystem is up, another procedure provided by the SCCP is called by the application subsystem to notify the SCCP that the subsystem is up and and able to process messages. The SSA message is sent to the concerned destinations when the subsystem is up or returned to service or the node or link recovers. The SSA message informs the SCCP at the destinations that the subsystem formerly prohibited is now allowed and the routing tables are to be updated.

SS7 datafill

Table C7LOCSSN

Table C7LOCSSN datafills the local subsystem resident at the node. It provides attributes such as subsystem name, SSN, number of instances of the subsystem, indication of replication at another PC, traffic mix information (TFMI) indicator, and a list of concerned PCs that require notification on subsystem status changes.

Table C7NETSSN

Table C7NETSSN datafills the remote PCs and remote subsystems that are of concern to the SCCP at the node. It provides attributes such as PC name (routeset CLLI) and a list of subsystems at the PC where each subsystem consists of the subsystem name and SSN.

Table C7RPLSSN

Table C7RPLSSN datafills a list of replicated subsystems that the node may use for message routing and for which subsystem status is kept. It provides

attributes such as the subsystem name and a list of PC pairs where the subsystem is replicated.

Table C7GTTYPE

Table C7GTTYPE datafills the types of GT translation supported by the node. It provides attributes such as the GT type name, GT type number, and GT internal name.

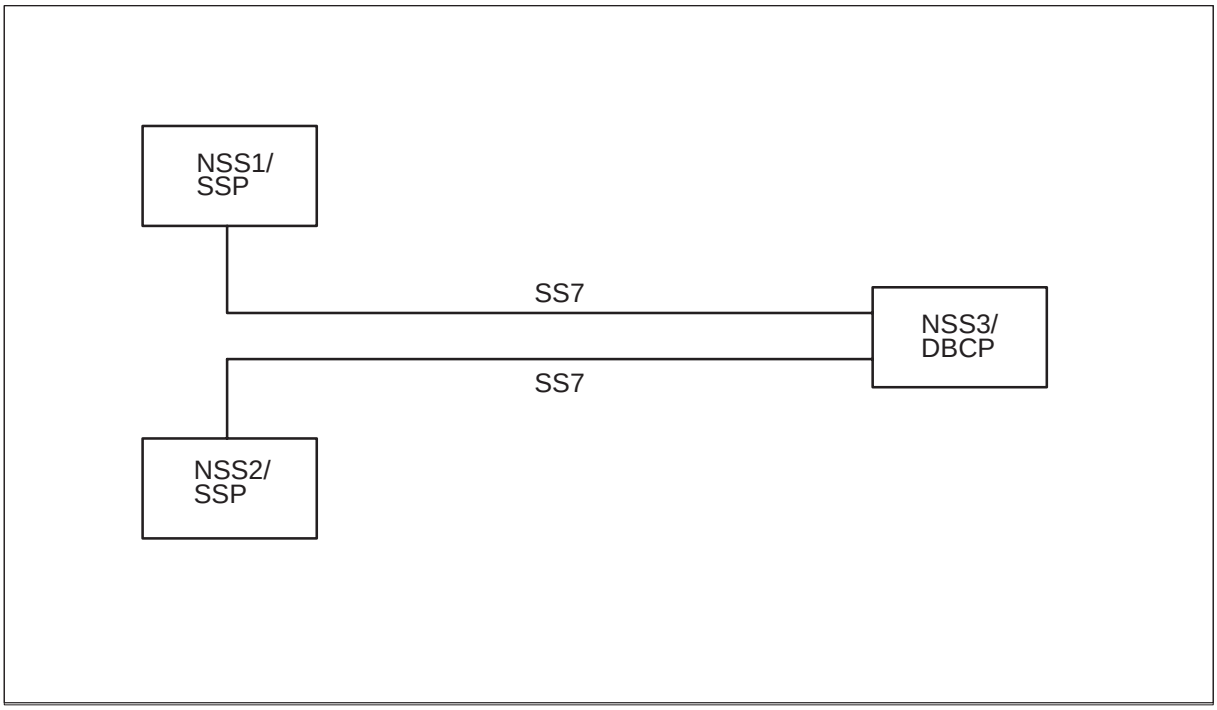
Table C7GTT

Table C7GTT datafills the GT translations performed by the node and the results of these translations. It provides attributes such as the GTT type name, FROM digits and TO digits specifying the range of a GT of that type, and the result of the translation. The result specifies the result type, the results of the type, and the cost. If two results are given, cost is used to pick the result. The lowest cost result is chosen unless both are equal. There are four result types; PCONLY, SSNONLY, PCSSN, and PCNEWGT.

NSS/DBCP configuration requirements

In the NSS/DBCP configuration examples depicted in Figures 4-3 through 4-8 and Tables 4-4 through 4-8, the ANI application is used. However, all NSS application subsystems support these configurations.

Figure 4-3
Direct links between NSS and NSS/DBCP—SS7 only



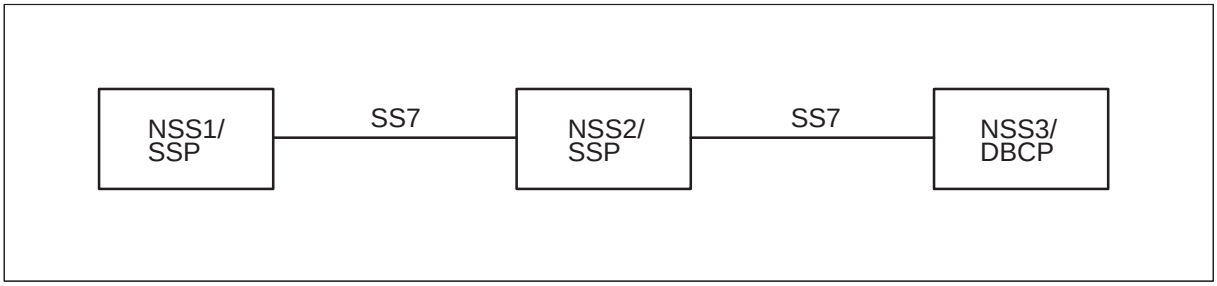
The ANI subsystems at the NSSs have the same SSNs. The NSS3 is the DBCP containing the ANI database. Both NSS1 and NSS2 are the concerned nodes of NSS3. The called address for ANI subsystem at NSS1 and NSS2 for NSS3 DBCP is 6137224570. The calling address for the ANI subsystem at NSS1 is 6137223000. The calling address for the ANI subsystem at NSS2 is 6137222000.

Table 4-4 shows the datafill for Figure 4-3.

Table 4-4
Datafill for NSS1, NSS2, and NSS3

Datafill for NSS1	
1	C7NETSSN • NSS3PC ANI 250 $
2	C7LOCSSN • ANI 250 1 N N $
3	MSGRTE • PUBLIC 61372230 61372235 LOCAL 0 N $ • PUBLIC 61372245 61372250 SS7 NSS3PC 0 N $
Datafill for NSS2	
1	C7NETSSN • NSS3PC ANI 250 $
2	C7LOCSSN • ANI 250 1 N N $
3	MSGRTE • PUBLIC 61372220 61372225 LOCAL 0 N $ • PUBLIC 61372240 61372250 SS7 NSS3PC 0 N $
Datafill for NSS3	
1	C7NETSSN •NSS1PC ANI 250 $ • NSS2PC ANI 250 $
2	C7LOCSSN • ANI 250 1 N N NSS1PC NSS2PC $
3	MSGRTE • PUBLIC 61372220 61372225 SS7 NSS2PC 0 N $ • PUBLIC 61372230 61372235 SS7 NSS1PC 0 N $ • PUBLIC 61372240 61372250 LOCAL 0 N $

Figure 4-4
TCAP pass along—SS7 only



The ANI subsystems in NSS1 and NSS3 have identical subsystem numbers. TCAP pass along is performed using NSS2. NSS3 is the DBCP node containing the ANI database. NSS1 is the concerned node of NSS2 and NSS2 is the concerned node of NSS3. The called address for ANI subsystem at NSS1 and NSS2 for NSS3 DBCP is 6137224570. The calling address for ANI subsystem at NSS1 is 6137223000.

Table 4-5 contains the datafill for Figure 4-4.

Table 4-5
Datafill for NSS1, NSS2, and NSS3

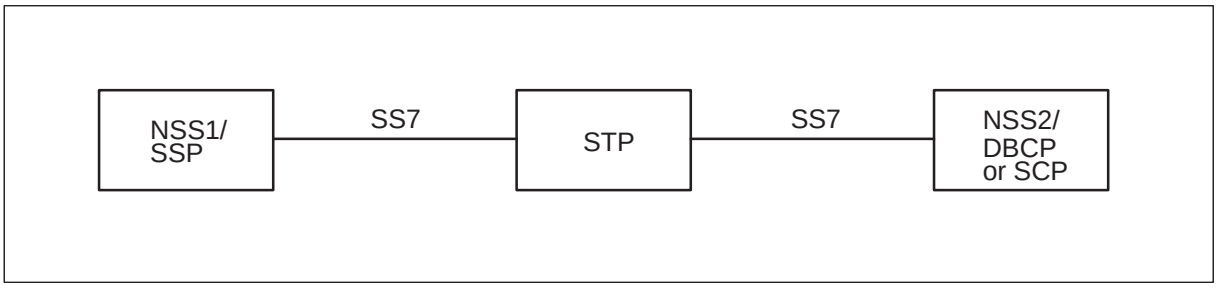
Datafill for NSS1	
1	C7NETSSN • NSS2PC ANI 250 $
2	C7LOCSSN • ANI 250 1 N N$
3	MSGRTE • PUBLIC 61372230 61372235 LOCAL 0 N $ • PUBLIC 61372245 61372250 SS7 NSS2PC 0 N $
Datafill for NSS2	
1	C7NETSSN • NSS1PC ANI 250 $ • NSS3PC ANI 250 $
2	C7LOCSSN • ANI 250 1 N N NSS1PC $
3	MSGRTE • PUBLIC 61372230 61372235 SS7 NSS1PC 0 N $ • PUBLIC 61372240 61372250 SS7 NSS3PC 0 N $
Datafill for NSS3	

—continued—

Table 4-5
Datafill for NSS1, NSS2, and NSS3

1	C7NETSSN • NSS2PC ANI 250 $
2	C7LOCSSN • ANI 250 1 N N NSS2PC $
3	MSGRTE • PUBLIC 61372230 61372235 SS7 NSS2PC 0 N $ • PUBLIC 61372240 61372250 LOCAL 0 N $
—end—	

Figure 4-5
STP involved with single NSS/DBCP or SCP—SS7 only



The ANI subsystems in NSSs have identical SSNs. STP tandems messages between NSS1 and NSS2. NSS2 is the DBCP node containing the ANI database. STP is the concerned node of NSS2. The called address for the ANI subsystem at NSS1 for NSS2 is 6137224570 and the calling address is 6137223000.

Table 4-6 shows the datafill for Figure 4-5.

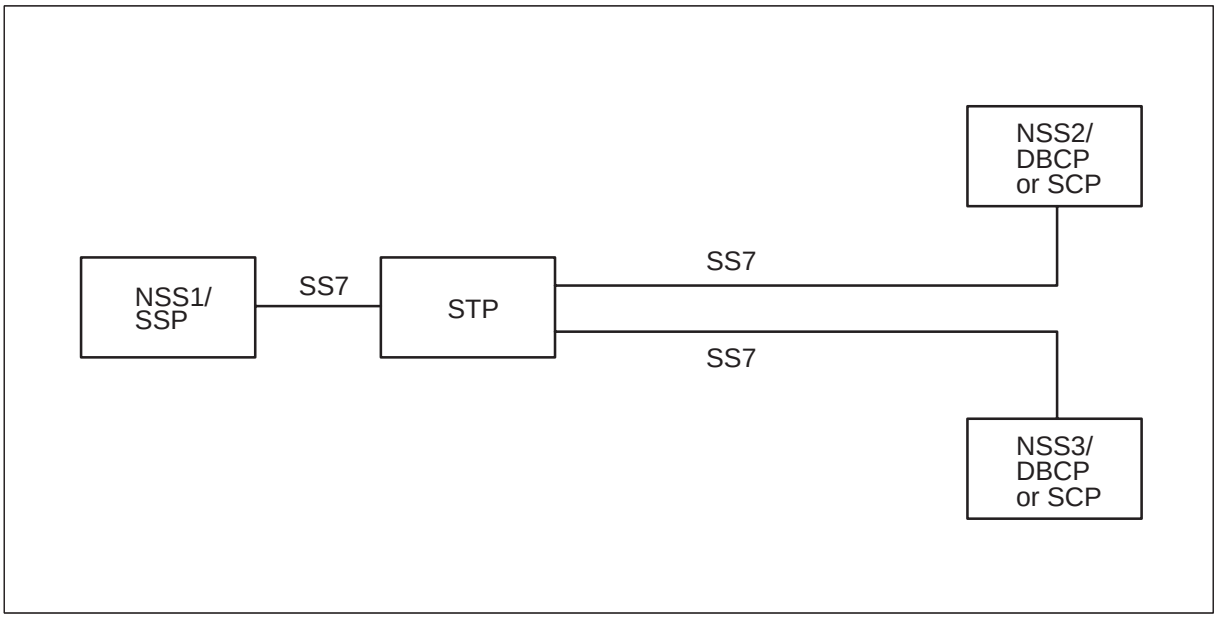
Table 4-6
Datafill for NSS1, STP, and NSS2

Datafill for NSS1	
1	C7NETSSN • STPPC $
2	C7LOCSSN • ANI 250 1 N N $
—end—	

Table 4-6
Datafill for NSS1, STP, and NSS2 (continued)

3	MSGRTE • PUBLIC 6137223 61372235 LOCAL 0 N $ • PUBLIC 61372245 61372250 SS7 NSS2PC 0 N $
Datafill for STP	
1	C7NETSSN • NSS1PC ANI 250 $ • NSS2PC ANI 250 $
Datafill for NSS2	
1	C7NETSSN • STPPC $
2	C7LOCSSN • ANI 250 1 N N STPPC $
3	MSGRTE • PUBLIC 61372230 61372235 SS7 NSS1PC 0 N $ • PUBLIC 61372240 61372250 LOCAL 0 N $
—end—	

Figure 4-6
STP involved with dual NSS/DBCP—SS7 only; loadsharing and hot standby



The ANI subsystems in NSSs have identical subsystem numbers. The ANI database at NSS2 and NSS3 is replicated. ANI messages from NSS1 is

loadshared by STP for NSS2 and NSS3. GTT for ANI is performed at the STP. The STP is the concerned node of NSS2 and NSS3. The called address for the ANI subsystem at NSS1 for the ANI database is 6137224570 and calling address is 6137223000.

Table 4-7 shows the datafill for Figure 4-6.

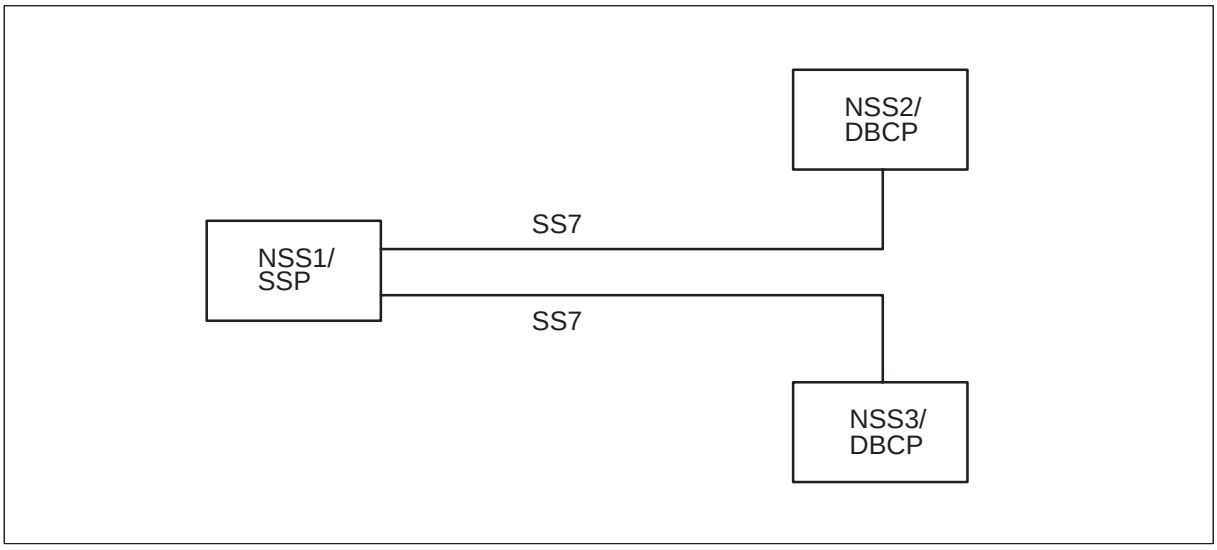
Table 4-7
Datafill for NSS1, STP, NSS2, and NSS3

Datafill for NSS1	
1	C7NETSSN • STPPC $
2	C7LOCSSN • ANI 250 1 N N $
3	MSGRTE • PUBLIC 61372230 61372235 LOCAL 0 N $ • PUBLIC 61372245 61372250 SS7 STPPC 0 N $
Datafill for STP	
1	C7NETSSN • NSS1PC ANI 250 $ • NSS2PC ANI 250 $ • NSS3PC ANI 250 $
2	C7RPLSSN • ANI NSS2PC NSS3PC Y $
3	C7GTTYPE • ANITRANS 1 NSSANIGT
4	C7GTT • ANITRANS 61372245 61372250 PCSSN NSS2PC ANI 0 NSS3PC ANI 1 GT $
Datafill for NSS2	
1	C7NETSSN • STPPC $
2	C7LOCSSN • ANI 250 1 N N STPPC $
3	MSGRTE • PUBLIC 61372230 61372235 SS7 NSS1PC 0 N $ • PUBLIC 61372240 61372250 LOCAL 0 N $
Datafill for NSS3	
—continued—	

Table 4-7
Datafill for NSS1, STP, NSS2, and NSS3 (continued)

1	C7NETSSN • STPPC $
2	C7LOCSSN • ANI 250 1 N N STPPC $
3	MSGRTE • PUBLIC 61372230 61372235 SS7 NSS1PC 0 N $ • PUBLIC 61372240 61372250 LOCAL 0 N $
—end—	

Figure 4-7
Dual NSS/DBCP—SS7 only; load sharing and hot standby



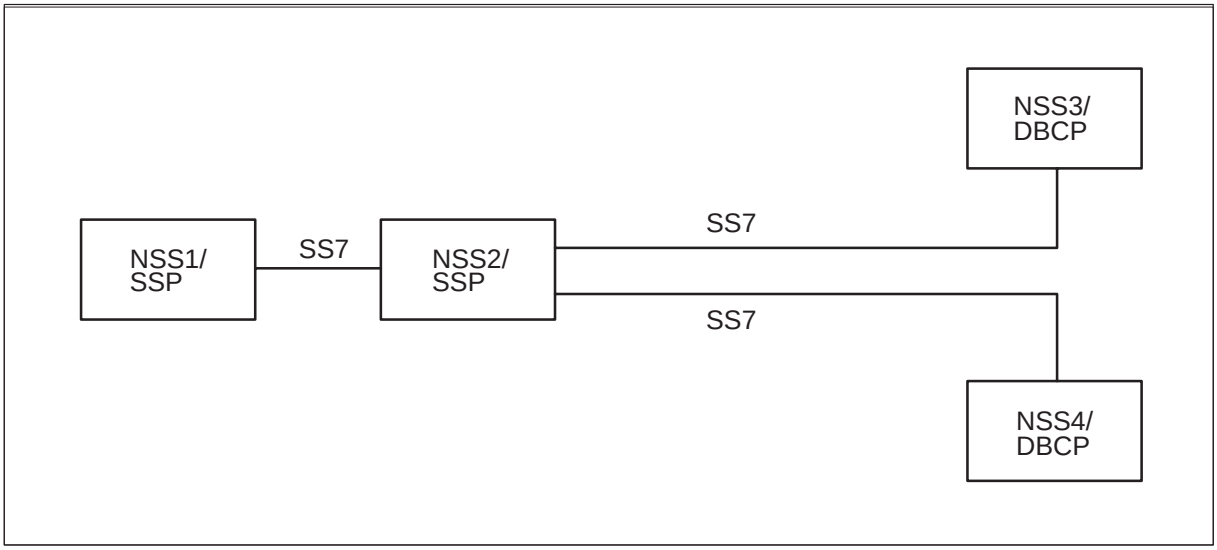
The ANI subsystems in NSSs have identical SSNs. The ANI database is replicated at NSS2 and NSS3. ANI messages are loadshared between NSS2 and NSS3. GTT for ANI is performed at NSS1. NSS1 is the concerned node of NSS2 and NSS3. The called address for ANI subsystem at NSS1 for NSS2 and NSS3 ANI database is 6137224570 and the calling address is 62137223000.

Table 4-8 contains the datafill for Figure 4-7.

Table 4-8
Datafill for NSS1, NSS2, and NSS3

Datafill for NSS1	
1	C7NETSSN •NSS2PC ANI 250 $ • NSS3PC ANI 250 $
2	C7LOCSSN • ANI 250 1 N N $
3	C7RPLSSN • ANI NSS2PC NSS3PC Y $
4	C7GTTYPE • ANITRANS 1 NSSANIGT
5	C7GTT • ANITRANS 61372245 61372250 NSS2PC ANI 0 NSS3PC ANI 1 GT $
6	MSGRTE • PUBLIC 61372230 61372235 LOCAL 0 N $ • PUBLIC 61372245 61372250 GTT ANITRANS $ $
Datafill for NSS2	
1	C7NETSSN • NSS1PC ANI 250 $
2	C7LOCSSN • ANI 250 1 N N NSS1PC $
3	MSGRTE • PUBLIC 61372230 61372235 SS7 NSS1PC 0 N $ • PUBLIC 61372240 61372250 SS7 LOCAL 0 N $
Datafill for NSS3	
1	C7NETSSN • NSS1PC ANI 250 $
2	C7LOCSSN • ANI 250 1 N N NSS1PC $
3	MSGRTE • PUBLIC 61372230 61372235 SS7 NSS1PC 0 N $ • PUBLIC 61372240 61372250 LOCAL 0 N $

Figure 4-8
Dual NSS/DBCP—SS7 only; load sharing and hot standby

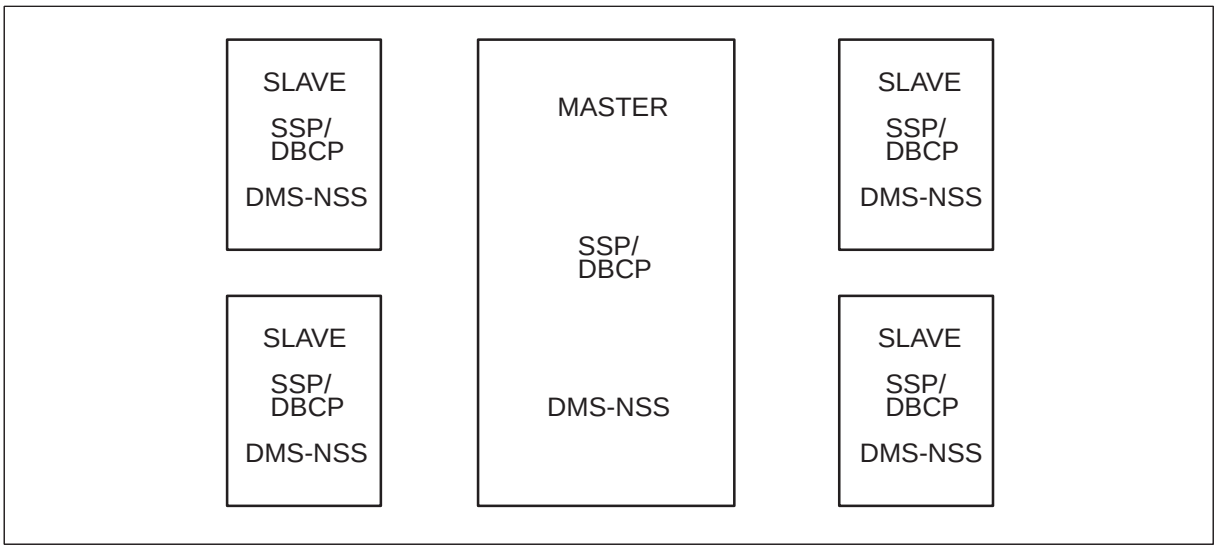


The datafill for Figure 4-8 is similar to the previous scenarios.

DBCP synchronization

Many networks are multi-nodal networks; that means that they are made up of more than one node (switch). Figure 4-9 illustrates a typical multi-nodal network with its one master switch and multiple slave switches.

Figure 4-9
Typical multi-nodal network containing multiple DBCPs



Currently, the various databases in a multi-nodal network are individually maintained by on-site personnel. This form of operation can cause confusion and possible datafill mismatch errors.

BCS34 makes available the database control point (DBCP) synchronization feature. By providing a process called synchronization, this feature centralizes the maintenance of the various DBCP databases, thus minimizing potential DBCP corruptions. Synchronization allows the database changes made on the master DBCP to be extended across the network to the other (slave) DBCPs.

Note: With this feature, only one master DBCP must be designated at a time. Also, the BCS of the master DBCP must be equal to or lower than the BCS of the slave DBCPs. The difference between the master and slave BCS releases cannot exceed three release cycles.

Synchronizing network databases

There are two time periods in which the multiple DBCP databases must be synchronized (or synced). These sync periods occur at DBCP initialization and during DBCP run-time maintenance.

Synchronizing databases during DBCP initialization

At initialization, the slave DBCPs must be synchronized with the master DBCP. Procedure 4-1 details the steps required to synchronize the slave and master DBCPs.

Procedure 4-1
Synchronizing the master and slave during DBCP initialization

Step	Action
1	On the master DBCP, perform the following table dumping process: • Datafill the master database. • Using a personal computer (PC), gain access to the master DBCP's MAP. • From the master DBCP's MAP, issue the CI command DUMPTAB. This command dumps the contents of a specific database into a data modification order (DMOPRO) file. The syntax for the DUMPTAB command is: DUMPTAB < head table name > [SUB <key1.field1i/keyi.fieldi>] [ALL <specific subtable field name>] <form of dump> <output device> <extent of dump> <table editor cmd prefix tuple> [<output file name>]
2	On the slave DBCPs, perform the following table restore process:

- Using PC, dial access a selected slave DBCP.
- Access the slave DBCP's MAP terminal.
- Download the DMOPRO file from the PC to the slave DBCP.
- If the master DBCP's BCS or PCL dump load equals the slave DBCP's BCS or PCL restore load, use either the CI command DMOPRO or RESTAB to restore the file. The CI commands' syntax are as follows:

DMOPRO <file name> or RESTAB <file name>
Example: DMOPRO TCNFILE or RESTAB TCNFILE

If the master DBCP's BCS or PCL dump load BCS or PCL release is less than the slave DBCP's BCS or PCL restore load, use the RESTAB command to restore the file. The RESTAB command syntax is as follows:

RESTAB <file name> [<dump BCS>]
Example: RESTAB TCNFILE BCS32

- End the MAP session.
- Repeat steps A through E for all applicable slave databases.

3 Conclude the initialization process by performing the following action:

- Access the master DBCP's MAP terminal.
- Start the journal files on the master DBCP.

Synchronizing databases during DBCP run-time maintenance

After DBCP initialization has completed, it is necessary to periodically extend database changes on the master DBCP to the slave DBCPs. This procedure is known as time-delay synchronization.

To time-delay sync the various slave DBCPs with the master DBCP, use the DIRP and journal file (JF) system to perform the steps in Procedure 4-2.

Procedure 4-2
Time-delay sync slave DBCP with master DBCP

Step Action

1 Access the master DBCP's MAP terminal.

2 From the DIRP level, close the JF files stored on disk or tape. This JF contains data modification orders (DMO) and service orders (SO) detailing all table control changes performed since:

- initialization or
- the closing of the last journal file (whichever is most recent).

3 Using the CI command JFDUMP, create a DMO process (DMOPRO). (A DMOPRO is a file of all database DMO and SO manipulations performed on the master.) The JFDUMP command syntax is:

- JFDUMP <JF name> <output file name> <output file device> <from Release number>
  <to Release number> [ONLY <table name>]

where:
< > required field
[ ] optional field

Note 1: JFDUMP is a non-resident utility which sequentially reads a closed journal file and dumps its contents in machine-readable format. This enhancement preserves the capability of dumping all tables contained within the closed journal file and provides the capability of searching and dumping only a specific table contained within the closed journal file.

Note 2: JFDUMP does not work on DMOPRO commands where a particular hardware status must exist before a tuple can be modified (for example, reading a device to Table TERMDEV). The hardware status is not captured in the journal file and the tuple cannot be changed without the appropriate hardware status. Therefore, when problems of this sort are encountered, JFDUMP fails to report this condition and fails to re-add the tuple.

4 Upload the DMOPRO file from the master to the PC.

5 Using the PC, dial access the slave DBCP.

6 Download the DMOPRO file from the PC to the slave.

7 Using the CI command DMOPRO, apply the file on the PC to the slave database.
The MAP syntax is:
DMOPRO <file name>

8 End the slave DBCP's MAP session.

Because slave DBCP database updates do not occur simultaneously with master DBCP database updates, conditions relating to mismatched datafill may occur. These conditions can be minimized by applying slave DBCP database updates frequently. Also, slave database changes must be applied during off-peak times.

Time involved to synchronize databases

The time involved to sync databases depends on:

- baud rate of the modem and dialup ports
- switch CPU occupancy rate
- size of tables being manipulated
- quantity of tables being manipulated

- efficiency of PC software and hardware

Error detection

By using the synchronization feature, error mismatches are greatly reduced. However, a mismatch still may occur. For instance, a user might forget to use the synchronization feature and instead apply slave database changes at the slave site. Because "in sync" databases access many tables for numerous functions (for example, translations, routing, or billing), slave DBCP datafill must be "in sync" with the master DBCP datafill. To ensure the DBCP databases are "in sync" (such as, no mismatches exist), compare either the content or the size of the master and slave databases.

To compare the content of the databases, perform the steps described in Procedure 4-3.

Procedure 4-3
Comparing the contents of the database

Step	Action
1	Upload a DMOPRO file from the master to the PC.
2	Upload a DMOPRO file from the slave to PC.
3	Compare the databases contained within the respective files by analyzing one or more of the following samplings: • Compare all the tuples within a table. • Compare last tuples (such as, the tuples at the bottom of the file). • Compare every nth tuple.

To compare the size of the databases, perform the steps described in Procedure 4-4.

Procedure 4-4
Comparing the size of the database

Step	Action
1	Using table editor (TE), access each database on the master DBCP that must be transferred to a slave DBCP and issue the command COUNT.
2	Repeat this process on all slave DBCP databases.
3	For each database involved, compare the master COUNT results with the slave COUNT results. Inconsistent counts means there is a datafill mismatch.

Error recovery/correction

Any detected datafill mismatches must be corrected as quickly as possible. To correct a minor mismatch, use the slave PC to perform removes, adds, and modifies on the datafill within the various out of sync databases. Replace the mismatched slave datafill with the correct master datafill. Then compare the datafill to ensure the slave and master datafill matches.

To correct a major mismatch, off-line the slave DBCP that has the out of sync database. From the slave, remove the out of sync datafill from the database. Then re-initialize the corrupted slave database by performing the steps outlined in the section entitled, Synchronizing databases during initialization.

Security

Slave database changes must be made only by the person who performs the master database changes. Security is accomplished through I/O user classes, passwords and command screening. Refer to 297-1001-129, *DMS-100 Family Input/Output System Reference Manual* for detailed information.

Interactions

All features such as PRI facility and Interwork Subsystem that use Table MSGRTE ignore the GTT selector.

Restrictions and limitations

The DBCP feature has the following restrictions and limitations:

- The GTT selector in Table MSGRTE applies only to NSS DBCP messages.
- DBCP does not support the PRI D channel.

The DBCP Synchronization feature has the following restrictions and limitations:

- Only one master DBCP node should be designated at at time.
- Changes to the databases on the slave DBCPs should not be allowed by anyone other than the master.
- The master DBCP release must be less than or equal to the slave BCS or PCL release. The difference between releases cannot exceed three releases.

DBCP ANI validation

MSL support of DBCP ANI validation

Database control point (DBCP) automatic number identification (ANI) validation provides network services software (NSS) the capability of remotely validating an ANI number by providing a Transaction Capabilities Application Part (TCAP) message interface to table ANIDATA. The ANIDATA table was developed in feature NSSFGD ANI Screening Database.

This feature provides the customer the flexibility of choosing an ANI validation method on a dialplan basis. The following validation methods are available:

- INSWITCH: ANI's are screened using a locally provided (that is, on the same switch as the call process requesting ANI screening) table of ANI information.
- REMOTE: ANI's are screened by querying a remote (on a different switch or SCP in an SS7 network) ANI information table. This is accomplished using the database control point functions provided by feature NSS DBCP in conjunction with TCAP messaging, which is a standardized part of the SS7 protocol.
- BOTH: ANI screening is performed locally, and if the ANI is not found within the locally available ANI information table, the screening procedure queries the remote table.

This feature also develops the ANI validation application on the DBCP to process ANI validation TCAP queries and send responses back to the originating node, as well as enhancing the TRAVER utility to handle remote ANI validation.

ANIDATA background

On NSS nodes, the table that contains all ANI screening information is table ANIDATA, provided by feature NSSFGD ANI Screening Database. This table and corresponding call processing enhancements provide users NSS software the ability to screen calls based on 3, 6, or 10 digit incoming ANIs.

The ANI digits are used by the operating company to identify the originator of a call. ANI digits can be used by the operating company as a method of determining whether a subscriber's call is allowed to route or is blocked.

The ANIDATA table can be datafilled at three levels by the customer, so the calls are allowed to proceed or blocked at NPA, NPA NXX, or NPA NXX–XXXX level (where NPA is a valid area code, NXX is a valid exchange, and XXXX is the extension digit). Any or all of the ANI levels may be datafilled by the customer, so that calls may proceed from the datafilled level(s).

The table ANIDATA provides the following capabilities for network services system software:

- Allow or block all calls for ANIs with specific NPA.
- Allow or block all calls for ANIs with specific NPA NXX.
- Allow or block all calls for a specific ten-digit ANI.

The following feature group D (FGD) dialing plans screen calls based on incoming ANIs:

- NSSFGD pure call (casual or presubscribed)
- 800 INWATS over NSSFGD interface
- 700 and 900 calls over NSSFGD interface

ANIDATA table information

Tuples in table ANIDATA are of three different types, and are referenced by the ANIDIGS field, which is 3, 6 or 10 digits of ANI as determined by the ANI level (NPA, NPA-NXX, or NPA-NXX-XXXX). The next field, ANITYPE, determines the level of screening, and therefore the type of the ANI (NPA for 3-digit entries, NXX for 6-digit entries, & SUB for 10-digit entries (SUBscriber level)).

The key into table ANIDATA are ANIDIGS. When a 3-digit ANI is entered as the key, then the ANITYPE must be NPA. When a 6-digit ANI is entered, then the ANITYPE must be NXX. When a 10-digit ANI is entered, then the ANITYPE must be SUB (SUBscriber).

Note: The same NPA may be datafilled at each of the NPA, NXX, and SUB levels. Similarly the same NXX may be datafilled at each of the NXX and SUB levels.

NPA ANI level (3-digit ANI)

The fields that can be datafilled within this level are as follows:

STATUS—This field that can be datafilled as either CASUAL or NOTALW. A call referencing a tuple of type NPA and a STATUS of CASUAL is allowed to proceed as long as the call is a domestic call or an International call within World Zone 1 and the NSSFGD trunk group over which the call is originated is setup to allow casual callers.

A call referencing a tuple of type NPA (3 digit ANI) and a STATUS of NOTALW is sent to treatment only if this call is not a N00 called party billed call.

NXX ANI level (6-digit ANI)

Within this level, the STATUS field can be datafilled as either CASUAL or NOTALW. A call referencing a tuple of type NXX follows the same rules as outlined above for the NPA ANI type.

SUB ANI level (10-digit ANI)

The fields that can be datafilled within this level are as follows.

STATUS—This field can be datafilled either as CASUAL, ALLOW, or NOTALW. When CASUAL or NOTALW is datafilled, then no other attributes are required to be prompted for the SUB ANI type (10 digit ANI). When a call references a tuple with an ANI type of SUB and a STATUS of CASUAL or NOTALW, it follows the same rules as outlined above for the NPA ANI type. If, however, the STATUS is datafilled as ALLOW, then the following fields prompt for datafill:

ACUSGRP—This field can be datafilled with any valid customer group that is datafilled in table CUSTHEAD. When a domestic call or an international call within World Zone 1, references a tuple with ANI type of SUB and with STATUS set to ALLOW, then this customer group along with the NANCOS field defines the translations of the destination digits.

NANCOS—This field can be datafilled with any NCOS valid for the customer group datafilled in the field NACUSGRP. When a domestic call or an international call within World Zone 1 references a tuple with ANI type of SUB and with STATUS set to ALLOW, then this NCOS along with the customer group datafilled defines the translations of the destination digits.

Please note that if the combination of customer group and NCOS does not exist as a valid key into the NCOS table, the tuple is invalid and will not be written into the ANIDATA table.

ACCTREQ—This field specifies whether or not an account code is required for all incoming NSSFGD calls using pure dialing that originate from the offnet address specified by this ANI. If an account code is required (when ACCTREQ is set to Y), then the customer group datafilled against the valid 10-digit ANI specifies the length of the account code required; that is, it overrides the customer group of the incoming trunk group.

SUPPRESS—This field controls whether or not offnet originated stations entering the network over an NSSFGD trunk using pure dialing wish to have their ANI information suppressed thereby preventing the display of their directory numbers. Individuals wishing to have their ANI made available to downstream agents may have their ANI information provided by entering an N.

For more information on the SUPPRESS field, please refer to DDOC Feature Group D ANI Delivery.

IDDALLOW—This field indicates whether or not a call referencing an ANI tuple with ANI type of SUB and with Status set to ALLOW is allowed to make international calls outside World Zone 1. When this field is set to N, then international calls outside World Zone 1 are not allowed to be made and the call is sent to treatment. When this field is set to N, no additional fields are prompted for datafill.

When international direct distance dialing is allowed (when IDDALLOW is set to Y), then an international customer group and international NCOS are prompted by table control for datafill. Datafilling an international customer group and NCOS against ten-digit ANIs allows a customer to setup partitioned international translations.

Please refer to IDDD Via ARS for details on partitioned international translations.

INTLCGRP—This field can be datafilled with any valid customer group that was datafilled in table CUSTHEAD. When an international call outside World Zone 1 references a tuple with ANI type of SUB and with IDDALLOW set to Y, then this customer group along with INTLNCOS (International NCOS described below) defines the translations of the international destination digits.

INTLNCOS—This field can be datafilled with any NCOS for the valid customer group that was datafilled in table CUSTHEAD. When an international call outside World Zone 1 references a tuple with ANI type of SUB and with IDDALLOW set to Y, this NCOS along with the customer group previously listed defines the translations of the international destination digits.

If the combination of customer group and NCOS does not exist as a valid key into the NCOS table, the tuple is invalid and can not be written into the ANIDATA table.

For more information on the ANIDATA table, as well as datafill examples, please refer to DDOC NSSFGD ANI Screening Database or the *Network Services System Reference Manual*.

Remote Validation feature operation

This feature extends the range of the ANI screening capability of NSS software by allowing the ANIDATA table to be accessed remotely using DBCP functions in conjunction with the SS7 TCAP protocol. This allows a customer to centralize an ANIDATA database on an SS7 accessible node for ease of moves, adds, and changes and provides the ability to have a single ANIDATA database for a network of switches providing ANI screening.

ANIDATA validation methods

As stated previously, this feature provides the customer the flexibility of choosing the ANI validation methods. When the INSWITCH method is chosen, the ANI received is searched for only at the in-switch table ANIDATA. When the remote method is chosen the ANI received is searched at the NSS-DBCP. When the both method is chosen, the ANI received is first searched for at the in-switch table ANIDATA, and if not found then searched at the NSS-DBCP.

The ANI validation method is prompted for in table DIALPLAN when the customer datafills the FGD dialing plan. Further information can be found in DDOC CCM Changes to Support DBCP ANI Validation.

DBCP calling and called addresses

As discussed in document NSS DBCP Base, the calling and called addresses of an DBCP application are required. These addresses are used as the SCCP addresses when sending TCAP messages across the network. The Calling Address defines the originating switch that requires the ANI validation and the called address identifies the terminating node that processes the ANI validation query. For more information refer to document NSS DBCP Base.

The calling and called addresses are datafilled when an ANI validation method is chosen. These addresses are only required for the remote and both validation methods.

ANIDATA DBCP query

The information provided in an ANIDATA database query is the received ANI and destination digits. The ANI DBCP query protocol can accommodate up to an 18-digit destination number and 16-digit ANI number.

A query message with invoke component is sent to the DBCP after collecting the ANI number when the validation method is remote or the ANI is not found in table ANIDATA when the validation method is both.

ANI response timeout

After the query is sent to the DBCP, the call is given silent tone while waiting for the response message from the DBCP. The customer can specify the wait time for response messages by way of the office parameter NSS_DBCP_ANI_RESP_TIMEOUT in table OFCVAR.

The parameter ranges from 1 second to 10 seconds and the default value is 3 seconds. If no response message is received from the DBCP within the wait time, the call is given RODR treatment or allowed to proceed normally depending on office parameter NSS_DBCP_ANI_BLOCK_CALL.

Override action for ANIDATA calls

Office parameter NSS_DBCP_ANI_BLOCK_CALL (Y/N) in table OFCVAR determines whether a call should be blocked or allowed to proceed when certain problems occur. Problems such as bad connection between the switches, the DBCP goes down, reject received from DBCP because of a protocol decoding problem, or the wait time for a response expires before a response is received all refer to this office parameter.

When one of these problems occurs and the call is allowed to proceed, then the current customer group and network class of service (NCOS) are used to translate the call. Account code is not collected and the caller receives confirmation tone when the call is allowed to proceed.

Abandoned ANI calls

If the ANI call is abandoned after sending a query message but before receiving an associated response message, the response message is discarded.

DBCP RESPONSE

When an ANI DBCP response is received, it is discarded when the FGD call associated to the response is abandoned or the wait time period as specified in office parameter NSS_DBCP_RESP_TIMEOUT has expired. If the timeout has not expired and the call is still waiting to be connected, then the response is analyzed:

Reject

A reject response from the NSS-DBCP means that a protocol error in the query is detected. A NSS log 102 is generated when a reject response is received to indicate the problem type and problem code of the protocol error. Office parameter NSS_DBCP_ANI_BLOCK_CALL determines whether the FGD call is assumed valid or not. If the office parameter

specifies that the call is blocked then the caller is sent to automatic number identification not valid (ANINV) treatment.

If the office parameter specifies that the ANI is treated as valid, then the call progresses with the current incoming customer group and network class of service. The account code is not collected based on ANI digits and the caller receives confirmation tone. However, if an account code is required based on the destination translation, then it is collected before the confirmation tone is given.

Return error

A return error response from the NSS-DBCP means that the ANI query is not valid. The reason could be that the ANI is not valid or not allowed. The caller is sent to ANINV treatment. A NSS log 108 is generated on both the originating node and the terminating node when a return error is received from the DBCP node. This log indicates whether the ANI digits are not allowed or not found.

Return result (ANI status casual)

If the query at the NSS-DBCP is valid, and the status of the ANI in the remote ANIDATA table is CASUAL, then a return result message based on the ANI_RESPONSE message is returned and the call continues. The data in the return result is the destination digits register (18 digits).

This register replaces the dialled digits register of the incoming NSSFGD call based on the status of office variable NSS_DBCP_ANI_REPLACE_DR.

Return result (ANI status allow, IDDALLOW is No in ANIDATA)

If the query at the NSS-DBCP is valid, and the status of the ANI in the remote ANIDATA table is ALLOW and field IDDALLOW is No, then a return result message based on the ANI_RESPONSE_ALLOW message is returned and the call continues. The data in the Return Result is as follows:

- Destination Digits Register (18 digits)
- Network Class of Service
- Network ID
- Network Customer Group ID
- Account Code Required? (Y or N)
- Suppress Further ANI Delivery? (Y or N)

When the status of the ANI in the remote database is ALLOW, a new NCOS and customer group are specified for the ANI. The datafilled customer group is converted to a Network ID and network customer group ID, which is sent

to the SSP and used to map using table CUSTNTWK into an internal customer group at the SSP. This internal customer group overrides the incoming current customer group and is used in conjunction with the Network Class of Service (NCOS) to determine the translations of the destination digits entered by the caller

The Network ID and Network Customer Group ID fields returned from the NSS-DBCP are used to map through table CUSTNTWK into an internal customer group at the SSP. The Network Class of Service received from the DBCP is mapped through table CUSTNTWK with COSMAP option into an internal NCOS. This internal customer group and internal NCOS override the current customer group and NCOS to determine the translations of the destination digits entered by the caller. Refer to document IBN ISUP NETINFO Translations for information on COSMAP option on table CUSTNTWK. An example follows:

Table COSMAP:

NAME	MAX	SCREEN	VALTYPE
MAP1	250	ALLOW	ANYTHING
MAP2	300	ALLOW	ANYTHING
MAP3	200	ALLOW	ANYTHING
MAP4	250	ALLOW	ANYTHING

Table CUSTNTWK:

CUSTNAME	NETNAME	NETCGID	OPTIONS	COSMIN	COSMOUT
CGRP1	NET1	1	COSMAP	MAP1	MAP2
CGRP2	NET2	2	|		
CGRP3	NET3	3	COSMAP	MAP3	MAP4

Table COSDATA:

COSMAP	COS	RESULT
MAP1	3	10

```
MAP2        10      3
```

If the Network ID of the DBCP response translates to netname NET1 and the Network Customer Group ID is 1, then these map into internal customer group CGRP1 through table CUSTNTWK. Since CGRP1 has the COSMAP option, the COSMIN field is used as the index to pick up the internal NCOS. If the Network Class Of Service from the DBCP response is 3, then the internal NCOS is 10 since mapping name MAP1 with NCOS 3 maps into the number 10 in table COSDATA. (If, however, the network NCOS from DBCP response does not exist in table COSDATA or if no COSMAP option is datafilled for the tuple in table CUSTNTWK, then the network NCOS is used as the internal network class of service.)

Note: The NCOS and customer group provided by this feature may be overridden if the dialplan for the incoming FGD call expects a travel card number to be entered and there is a new NCOS, or a new customer group, or both datafilled against that card number in table TCNDATA.

The Account Code Required field has a value of Y (yes) or N (no). If the value is N (no), then no account code is required based on the ANI digits. However, an account code still may be required based on the destination digits dialed by the caller. If the value is Y (yes), then an account code is required based on the ANI.

The length of the account code when required based on the ANI or on the destination digits dialed by the caller is specified by the current customer group if there is no customer group datafilled against the ANI (ANI status is casual). Otherwise, the customer group datafilled against the ANI specifies the length of the account code required.

If an account code is required, then an account code prompt tone is given. The caller must wait for the account code prompt tone before entering the account code. The prompt tone is disconnected when the first account code digit is entered. All account code digits are ignored if they are entered during the wait time for ANI response and before the account code prompt tone is given.

The Suppress field has a value of Y (yes) or N (no). If the value is Y then the ANI information is made available to downstream agents. Otherwise it is suppressed.

Return result (ANI status allow, IDDALLOW is Yes in ANIDATA)

If the query at the NSS-DBCP is valid, and the status of the ANI in the remote ANIDATA table is allow and field IDDALLOW is Yes, then a return result message based on the ANI_RESPONSE_IDDD message is returned and the call continues. The data in the Return Result is as follows:

- Destination Digits Register (18 digits)
- Network Class of Service
- Network ID
- Network Customer Group ID
- Account Code Required? (Y or N)
- Suppress Further ANI Delivery? (Y or N)
- International Network Class of Service
- International Network ID
- International Network Customer Group ID

The combination of new international NCOS and new international customer group datafilled in table ANIDATA when the IDDALLOW field is Yes is converted to an international network ID and international network customer group ID in exactly the same way as the regular NCOS and customer group described previously, using the same tables. The received international NCOS and customer group defines further translations for International direct distance dialling calls.

Problems in return result response from the DBCP

If the information in the response (such as the NCOS, Network ID, or Network Customer Group ID) is invalid, then the originating node constructs and sends a TCAP unidirectional message with invokes last component and report error operation to the DBCP. This message contains the error code such as invalid network ID, invalid network customer group ID, invalid network class of service, and the actual invalid value in the parameter.

When the originating node receives a return result response from the DBCP with protocol error or invalid transaction ID, the originating node constructs and sends a TCAP unidirectional message with reject component to the DBCP.

The unidirectional message does not contain a transaction ID and a response is not required. The call refers to office parameter NSS_DBCP_ANI_BLOCK_CALL to either allow or block the call.

ANI application on the DBCP

This feature also develops the ANI application on the DBCP to lookup table ANIDATA. When a ANI TCAP query is received at the DBCP end, it searches through table ANIDATA to find the specified ANI. If the ANI is not found or the ANI is not allowed, then the application assembles a return error response with associated error code and sends it back to the originating node. A reject response is sent back to the originating node when the application detects a protocol error in the invocation.

If the ANI is valid and its status is datafilled as CASUAL, then the customer group datafilled against the ANI is used to map into table CUSTNTWK to get the Network ID and the Network Customer Group ID.

If the customer group is not found in table CUSTNTWK then a reject response is sent back to the SSP with a problem type of ‘general problem’ and problem code of ‘nil general problem’. The internal NCOS is also mapped using the COSMAP option on table CUSTNTWK into a network NCOS. The COSMOUT field of option COSMAP is used as the index into table COSDATA to get the network NCOS.

If the internal NCOS is not found in table COSDATA or the COSMAP option is not datafilled for the internal customer group in table CUSTNTWK, then the internal NCOS is used as the network NCOS.

The same rules apply for the international NCOS and international customer group.

As previously described, the return result response can be one of three different formats:

- The regular return result response using the ANI_RESPONSE message format is used when the ANI status is causal. When an ANI is datafilled with a status of causal, there is no other information datafilled against it in the table. So there is no need to format a message containing blank parameters.
- The extended return result response using the ANI_RESPONSE_ALLOW message format is used when the ANI Status is allow and the IDallow field is N. When the IDallow field is N, there is no new international customer group or NCOS datafilled against the ANI. There is no need to format a message containing these blank parameters.
- The full return result response using the ANI_RESPONSE_IDDD message format encapsulates all the data that can be datafilled against an ANI in table ANIDATA.

The return result messages are divided in this manner to more efficiently utilize the SS7 signalling links.

Return error codes

The following error codes can be used by the ANI application on the DBCP to construct Return Error Responses:

ANI NOT VALID—This error code is returned when an ANI tuple is not found in table ANIDATA. An NSS108 log is generated when this occurs.

ANI NOT ALLOWED—This error code is returned when the ANI tuple on table ANIDATA is datafilled as not allowed. An NSS108 log is generated when this occurs.

Unidirectional message from the originating node

This message is sent from the originating node to the DBCP when it receives a response message which contains invalid data or a protocol error. A NSS105 log is generated when a unidirectional reject message is received for a response protocol problem. A NSS106 log is generated when a unidirectional invoke message is received for an invalid data response message.

The following example should help illustrate the operation of this feature. The scenario used is that of a three node network depicted in Figure 5-1.

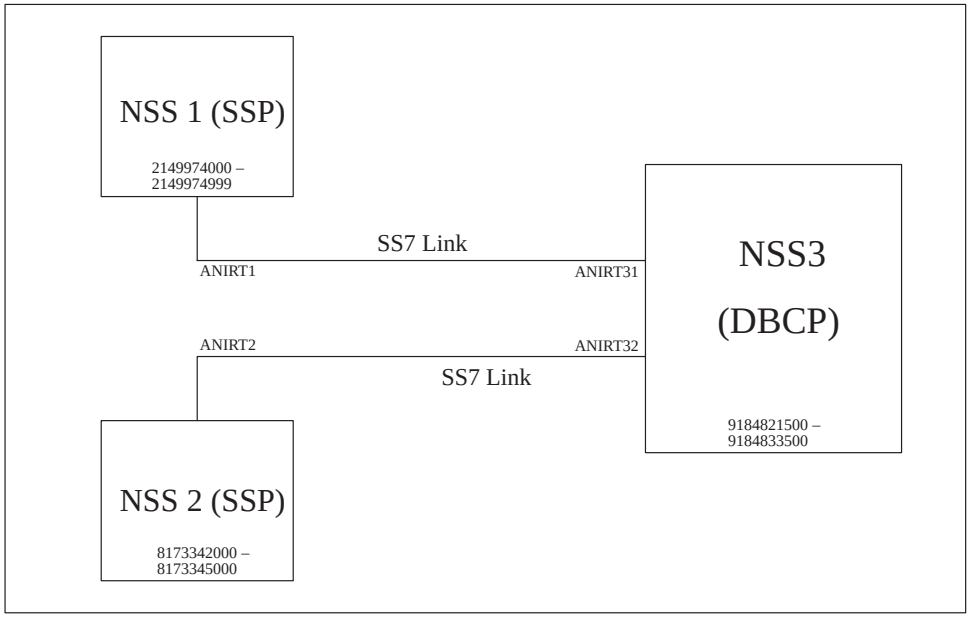


Figure 5-1 Direct link setup between SSPs and DBCP

The ANI subsystems at all the NSS nodes have the same subsystem numbers, which for this example are 100. The NSS3 is the DBCP containing

the ANI database. Both SSPs (NSS 1 and NSS 2) are the concerned nodes of NSS 3.

Calling addresses in the range of 2149974000 to 2149974999 are routed to NSS 1. Calling addresses in the range of 8173342000 to 8173345000 are routed to NSS 2. Calling addresses in the range of 9184821500 to 9184833500 are routed to NSS 3.

The point code of the SS7 link between NSS 1 and NSS 3 is called ANIRT1 at the NSS 1 node. This same link is called ANIRT31 at the NSS 3 node. The point code of the SS7 link between NSS 2 and NSS 3 is called ANIRT2 at the NSS 2 node and ANIRT32 at the NSS 3 node.

The following datafill implements this setup:

Datafill for NSS 1:

```
Table C7NETSSN

        ANIRT1 ( NSSANI 100 ) $

Table C7LOCSSN

        NSSANI 100 1 N N (ANIRT1) $

Table C7GTTYPE

        NSSANIGT ANSI7 4 ( NSSANIGT ) $

Table MSGRTE

        PUBLIC 2149974000 2149974999 ( LOCAL 0 $ ) $

        PUBLIC 9184821500 9184833500 ( SS7 ANIRT1 0 $ $ ) $
```

Datafill for NSS 2:

```
Table C7NETSSN

        ANIRT2 ( NSSANI 100 ) $

Table C7LOCSSN

        NSSANI 100 1 N N (ANIRT2) $

Table C7GTTYPE

        NSSANIGT ANSI7 4 ( NSSANIGT ) $

Table MSGRTE

        PUBLIC 8173342000 8173345000 ( LOCAL 0 $ ) $

        PUBLIC 9184821500 9184833500 ( SS7 ANIRT2 0 $ $ ) $
```

Datafill for NSS 3:

```
Table C7NETSSN

        ANIRT31 ( NSSANI 100 ) $

        ANIRT32 ( NSSANI 100 ) $

Table C7LOCSSN

        NSSANI 100 1 N N (ANIRT31) (ANIRT32) $

Table C7GTTYPE

        NSSANIGT ANSI7 4 ( NSSANIGT ) $

Table MSGRTE

        PUBLIC 2149974000 2149974999 ( SS7 ANIRT31 0 $ $ ) $

        PUBLIC 8173342000 8173345000 ( SS7 ANIRT32 0 $ $ ) $

        PUBLIC 9184821500 9184833500 ( LOCAL 0 $ ) $
```

The following call scenarios use the previous datafill as the basis on which to datafill a dialplan tuple for the incoming FGD trunk if ANI validation will be performed on the call:

Call scenario 1: Incoming FGD call at NSS 1

```
Table DIALPLAN

        ANIVER NONE REMOTE 2149974444 9184822222 $
```

Call scenario 2: Incoming FGD call at NSS 2

```
Table DIALPLAN

        ANIVER NONE REMOTE 8173343333 9184822222 $
```

Call scenario 3: Incoming FGD call at NSS 3

```
Table DIALPLAN

        ANIVER NONE INSWITCH $
```

More information can be obtained in the feature document NSS-DBCP Base. This document contains several examples like this one for several different DBCP scenarios. The information is also contained in the *Network Services System Reference Manual*.

Global title translation

This is a function of the DBCP software, and is used to retrieve the destination point code and subsystem number based on such things as dialed digits. For more information please refer to feature document NSS-DBCP Base.

Load sharing / hot standby

This also is a function of the DBCP software. Refer to feature document NSS-DBCP Base for information on this topic.

Supplementary information: engineering/hardware

Hardware dependencies

Access to database control point applications is through an SS7 network using TCAP signaling. As such, the following hardware is required:

- SuperNode Cabinet system or SuperNode SE (SNSE) system
- Link Peripheral Processor (LPP) or Single Shelf LPP on SNSE

CAP interface

Customers may wish to pursue original equipment manufacturer (OEM) interfacing with this feature to allow for off-loading database administration to third-party equipment. The following TCAP message interface provides the exact format of the messages described previously.

To allow additional capabilities on OEM equipment, a destination digits field is part of the query and response messages. Within the query message, this field is loaded with the dialed digits of the incoming FGD call, and is 18 digits in length. Upon return, the destination digits field of the response message replaces the original dialed digits; the call proceeds to translation on the newly replaced dialed digits. The office variable NSS_DBCP_ANI_REPLACE_DR, which is either Yes or No, controls this function. If it is datafilled as Yes then the dialed digits are replaced with the digits in the destination digits field of the TCAP response message. If it is datafilled as No then the destination digits field of the TCAP response message is ignored and the call translates on the original dialed digits.

This extra field allows extra OEM capabilities in conjunction with this feature. A specific example of this feature is ANI-based routing, wherein a person could dial one number and be routed to the destination office closest to his location. The standardized nature of TCAP signaling allows this sort of development to proceed outside of a DMS.

At this point, this feature handles the destination digits field at the DBCP by taking this field from the query message and immediately reinserting it in the response message. The result is that if the DBCP is a DMS controlled by this feature, sending out the dialed digits in this field within the query message results only in having these same digits sent back in the response message. This makes the status of office variable NSS_DBCP_ANI_REPLACE_DR irrelevant. It is only when an external (to this feature) SCP is handling the DBCP functions of ANIDATA that this office variable becomes relevant.

Any third party application wishing to provide ANIDATA services instead of the DMS product, must take care to duplicate the ANIDATA functionality exactly as presented here in this document or risk causing serious network breakdown.

Supplementary information

Logs

This feature uses logs already available within the NSS software, and introduces one new log, NSS 108, that handles specific ANI Validation database lookup failures for both originating and terminating (DBCP) nodes.

All logs contain the date and time in addition to the specific information that follows.

NSS 102 (Query Protocol Problem)

This log is generated on the originating node when it receives a reject response from the DBCP. This response notifies the originator that there is a problem in the query protocol.

Data Contained: APPLICATION (NSS_ANI in this case)

CALLED ADDRESS

PROBLEM TYPE

PROBLEM CODE

Data Description:

APPLICATION—Identifies the application that is sending the non-standard protocol query. Currently available applications are NSS_TCN, REPL_DIGS, and NSS_ANI.

CALLED ADDRESS—10-digit field that identifies the DBCP node that rejects the query.

PROBLEM CODE—Indicates the protocol problem. It is a generic SCCP / TCAP problem code.

NSS 104 (Routing Problem)

This log is generated on either the originating or terminating (DBCP) nodes when table MSGRTE is not datafilled properly, or no route is defined for the calling or called addresses of the DBCP message.

Data Contained: APPLICATION (NSS_ANI in this case)

CALLED_ADDRESS

REASON

Data Description:

APPLICATION—Identifies the application that is encountering the problem. Currently available applications are NSS_TCN, REPL_DIGS, and NSS_ANI.

CALLED ADDRESS—10-digit field that identifies the entry not correctly datafilled in table MSGRTE.

REASON—Problem code for the MSGRTE error. Can be one of two reasons:

- MSGRTE_NOT_DATAFILLED, which means that the CALLED_ADDRESS is not datafilled in table MSGRTE
- INVALID_MSGRTE, which means that the routing information provided in the MSGRTE tuple is not correct.

Note: When a tuple in MSGRTE is datafilled as PRA and the PRA D-channel is not in-service then the log reason will indicate MSGRTE_NOT_DATAFILLED. When the PRA D-channel is in-service the log reason will indicate INVALID_MSGRTE.

NSS 105 (DBCP Response Protocol Problem)

This log is generated on the DBCP node when it receives a unidirectional message (originating node protocol error) back from the originating node. This response notifies the terminating node that there is a problem in the response protocol. This occurs when the originating node cannot decode the response it receives from the DBCP.

Data Contained: APPLICATION (NSS_ANI in this case)

CALLED ADDRESS

PROBLEM TYPE

PROBLEM CODE

Data Description:

APPLICATION—Identifies the application where the response protocol error occurred. Currently available applications are NSS_TCN, REPL_DIGS, and NSS_ANI.

CALLED ADDRESS—10-digit field that identifies the SSP node that could not decode the response.

PROBLEM TYPE—Indicates the protocol problem. This can be one of the following: NIL_PROBLEM, GENERAL_PROBLEM, INVOKE_PROBLEM, RESULT_PROBLEM, ERROR_PROBLEM, TRANSACT_PROBLEM, MAX_PROBLEM_FAMILY, or UNKNOWN_PROBLEM.

PROBLEM CODE—Indicates the protocol problem. It is a generic SCCP / TCAP problem code.

NSS 106 (DBCP Invalid Data in Response Message)

This log is generated on the DBCP node when it receives a unidirectional message (Originating Node Invoke Component) back from the originating node. This response notifies the terminating node that there was a protocol error in the DBCP response.

Data Contained: APPLICATION (NSS_ANI in this case)

CALLED ADDRESS

INVALID FIELD

INVALID DATA

Data Description:

APPLICATION—Identifies the application that is sending the non-standard protocol query. Currently available applications are NSS_TCN, REPL_DIGS, and NSS_ANI.

CALLED ADDRESS—10-digit field that identifies the DBCP node that rejects the query.

INVALID FIELD—Indicates the protocol problem. This can be one of the following: ACR, NCOS, NETID, NETCGRPID, REPLDIGIT, SUPPRESS, INTLNCOS, INTLNTID, or INTLNCID.

Field definitions:

ACR—Account Code Required

NCOS—Network Class of Service

NETID—Network ID

NETCGRPID—Network Cust Group ID

REPLDIGIT—Replace Dialed Digit

SUPPRESS—ANI Suppression Field

INTLNCOS—Intl Network Class of Service

INTLNTID—Intl Network ID

INTLNCID—Intl Network Cust Group ID

INVALID DATA—contains the corrupted value.

NSS 108 (ANI Invalid)

This log is generated at the originating node when a return error (Response Message with Return Error) message is received from the DBCP node. The return error message is sent for reasons such as the ANI is not found in the ANIDATA DBCP database, or the ANI is datafilled as NOT_ALLOWED in the remote database.

It is generated at the terminating node when a query message from the originating node results in the ANI not being found or datafilled as NOT_ALLOWED in the ANIDATA DBCP database.

Data Contained: CALLED ADDRESS

ANI DIGITS

REASON

Data Description:

CALLED ADDRESS—For the originating node, this field identifies the SSP node where ANI lookup failure occurred. For the terminating node, this field identifies the SSP node requesting the failed ANI lookup.

ANI DIGITS—The received ANI digits used to query the remote database.

REASON—The specific reason that ANI lookup failure occurred. Can be one of two reasons:

- ANI_NOT_FOUND—The ANI was either invalid or not datafilled in the ANIDATA DBCP database
- ANI_NOT_ALLOWED—The ANI was found but it was datafilled as “NOT_ALLOWED”.

Data schema

Table control for table DIALPLAN is changed to accommodate DBCP ANI validation. Table 5-1 shows the first layer fields for table DIALPLAN.

Table 5-1
DIALPLAN first layer fields

Field Name	Range of Values	Status	Default Value
DIAL PLAN	16-char vector	Unchanged	n/a
PLANTYPE	NONE, HOTLINE, SENDERIZ, CUTTHRU	Unchanged	n/a
OPTIONS	CONDHL, TIMEOUT, $	Unchanged	$

The table control changes involve modifications to subfields of field PLANTYPE, for the specific plan types of NONE and CUTTHRU. Table 5-2 shows the subfield modifications for a PLANTYPE of NONE, and table 5-3 shows the subfield modifications for a PLANTYPE of CUTTHRU:

Table 5-2
PLANTYPE subfields (PLANTYPE = NONE)

Subfield Name	Range of Values	Status	Default Value
ANIVALID	INSWITCH, REMOTE, BOTH	New	INSWITCH

Table 5-3
PLANTYPE Subfields (PLANTYPE = CUTTHRU)

Field Name	Range of Values	Status	Default Value
CUTHRUTY	DESTONLY, AUTHONLY, TCNONLY, AUTHORTC	Unchanged	n/a
ANIVALID	INSWITCH, REMOTE, BOTH	New	INSWITCH

The ANIVALID subfield specifies whether ANI validation is done locally without the use of the DBCP application (INSWITCH), remotely using the DBCP application (remote), or first locally, and if that fails, then remotely (both).

In both cases (PLANTYPE = NONE and PLANTYPE = CUTTHRU), the ANIVALID subfield will have two subfields, CLG_ADDR and CLD_ADDR, which stand for calling address and called address, respectively. The expected values for these two fields are 10-digit numbers that identify the node requesting remote DBCP ANI validation and the node processing the remote validation request. Table 5-4 illustrates this arrangement.

Table 5-4
ANIVALID subfields (ANIVALID = remote or both

Field Name	Range of Values	Status	Default Value
CUTHRUTY	DESTONLY, AUTHONLY, TCNONLY, AUTHORTC	Unchanged	n/a
ANIVALID	INSWITCH, REMOTE, BOTH	New	INSWITCH

CI/MAP test command

This feature makes available a resident test tool that is executable from both the CI prompt and a MAP level. The command is NSSANIVR, and it sends out an ANI remote database query using the same protocol as a call processing remote database query to assist in debugging the remote ANI validation system. The command format is as follows:

```
> NSSANIVR <Calling Address> <Called Address> <ANI digits>
```

The format for this command when accessed from the SCCPLOC level of the map is:

```
> TESTSS NSSANI <Calling Address> <Called Address> <ANI
digits>
```

The calling and called address fields are the 10-digit SCCP addresses that would normally be datafilled in a tuple of table DIALPLAN. The actual SS7 point code is given by table MSGRTE, which uses the called address to map to a SS7 point code. The ANI digits are the 3-or-10 digit ANIs one might expect to see presented in NSSFGD call, and which the user would expect to see datafilled in table ANIDATA.

Office parameters

This feature defines the following three office parameters, all accessible within table OFCVAR:

NSS_DBCP_ANI_RESP_TIMEOUT—This parameter has a valid range of 1 to 10 seconds, with a default value of 3. It controls the wait time for response messages after queries have been sent out.

NSS_DBCP_ANI_BLOCK_CALL—This parameter has a valid range of Y or N, with a default value of Y. It controls whether a call is blocked or allowed to proceed when certain network problems occur.

NSS_DBCP_ANI_REPLACE_DR—This parameter has a valid range of Y or N, with a default value of N. It controls whether the destination digits register received from the response message replaces the dialed digits register used to translate the call.

Traver enhancements

The TRAVER CI command is enhanced to allow for checking translations on incoming NSSFGD calls that use ANI screening with a remote ANIDATA database.

Operational measurements

This feature uses the standard OM registers available through the OM group NSSTCAP. This feature is registered as a key application called NSSANI and shows up using the command OMSHOW NSSTCAP.

The registers are currently defined as:

- NTWKPROB—Network problem

- NORESRCE—No resource
- QRYPROCD—Query processed
- TIMEREXP—Timer expired
- QERYSENT—Query sent
- INVDIGIT—Invalid digits
- TCNFREEC—TCN free call (not applicable)

Billing information

This feature does not change any SMDR billing record information beyond what is consistent with local ANI screening information.

Feature impact

This feature is a direct extension of the functionality provided in feature NSSFGD ANI Screening Database. It is designed as a member of the NSS TCAP application suite, and therefore has a mild interaction with features NSS Travel Card Number and NSS Replace Dialed Digits. It does not, however, have any impact on these features, nor do they have any impact on this feature.

This feature requires the services provided by features NSSFGD ANI Screening Database, NSS Offnet Access Dialing Plan Driver, and NSS DBCP Base.

CCM support of DBCP ANI validation

The majority of changes for DBCP ANI Validation are implemented by MSL changes. The following paragraphs describe the changes necessary to support DBCP ANI Validation in the CCM layer.

This feature allows ANI's to be validated off-node by using a database control point (DBCP) application for remote database access. DBCP in turn uses TCAP signaling over an SS7 network as the nodal intercommunication method. By using off-node ANI validation, a customer can centralize an ANIDATA database on an SS7 accessible database for ease of table administration. This also provides the ability to provide a single ANIDATA database for a network of nodes (switches) providing ANI validation.

This feature provides the necessary CCM support for DBCP ANI Validation, which is broken down into two parts:

1 Changing table control for table DIALPLAN to implement the addition of a subfield to the PLANTYPE field (for PLANTYPES of NONE or CUTTHRU) that will allow for the specification of an ANI validation method. Also, additional validation subfields will be added for determining the addresses of the network node requesting DBCP ANI Validation and of the node where the DBCP application resides.

2 Adding new logs to the NSS Logs Utility module specific to DBCP ANI Validation.

Supplementary information

Logs

The NSS Logs Utility module contains the logs implementation for NSS. This module allows for any remote validation specific logs, as well as making sure that any current ANI validation logs work with the remote system.

NSS logs are generated to record problems at both the originating node and the DBCP. Problems such as protocol decoding error (Reject Response), failure to send TCAP queries, invalid ANI responses, ANI not allowed responses, are recorded at the originating node.

Problems such as invalid ANI queries, ANI not allowed, failure to send TCAP responses, INVOKE LAST with invalid data received from the originating node, are recorded at the DBCP node.

Information recorded includes the date, time, the called address of the message, ANI digits, and application name.

Data schema

Table control for table DIALPLAN accommodates DBCP ANI Validation. Table 5-1 shows the first layer fields for table DIALPLAN.

The table control changes involve modifications to subfields of field PLANTYPE, for the specific plan types of NONE and CUTTHRU. Table 5-5 shows the subfield modifications for a PLANTYPE of NONE, and Table 5-6 shows the subfield modifications for a PLANTYPE of CUTTHRU:

Table 5-5
PLANTYPE Subfields (PLANTYPE = NONE)s

Subfield Name	Range of Values	Status	Default Value
ANIVALID_METHOD	INSWITCH, REMOTE, BOTH	New	n/a

Table 5-6
PLANTYPE Subfields (PLANTYPE = CUTTHRU)s

Subfield Name	Range of Values	Status	Default Value
CUTHRUTY	DESTONLY, AUTHONLY, TCNONLY, AUTHORTC	Unchanged	n/a
ANIVALID_METHOD	INSWITCH, REMOTE, BOTH	New	n/a

The ANIVALID subfield specifies whether ANI validation is done locally without the use of the DBCP application (INSWITCH), remotely by the DBCP application (REMOTE), or first locally and if that fails, then remotely (BOTH).

In both cases (PLANTYPE = NONE and PLANTYPE = CUTTHRU), the ANIVALID subfield will have two subfields, CLG_ADDR and CLD_ADDR, which stand for calling address and called address, respectively. The expected values for these two fields are 10-digit numbers that identify the node requesting remote DBCP ANI validation and the node processing the remote validation request. Table 5-7 illustrates this arrangement:

Table 5-7
PLANTYPE Subfields (PLANTYPE = CUTTHRU)s

Subfield Name	Range of Values	Status	Default Value
CLD_ADDR	Vector 0 to 10 of digit	New	n/a
CLG_ADDR	Vector 0 to 10 of digit	New	n/a

Travel card number validation

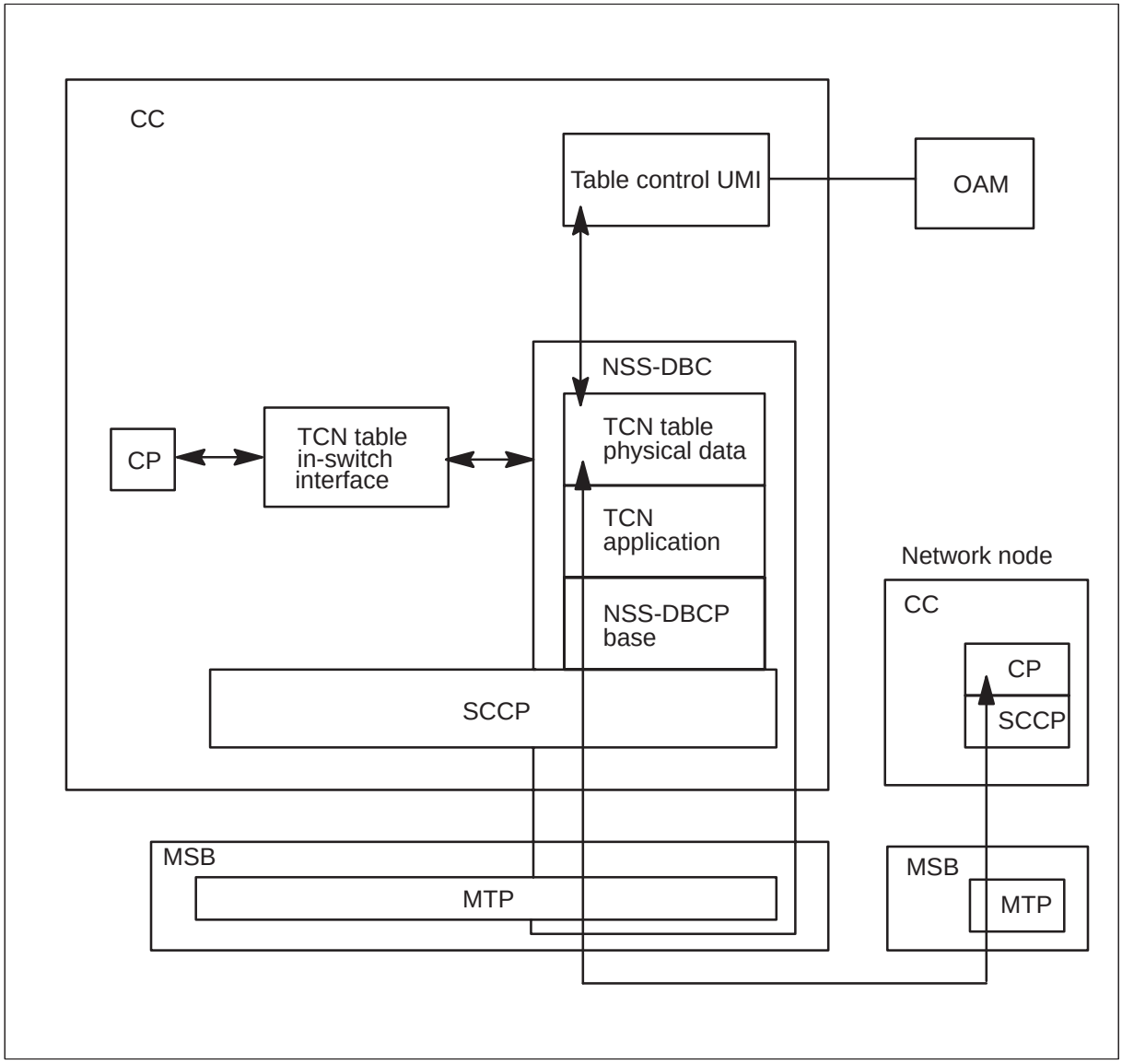
The Network Services System (NSS) Database Control Point (DBCP) Travel Card Number (TCN) validation feature provides NSS software the capability to remotely validate TCNs. It allows the customer the flexibility of choosing the TCN validation method used. The choices given to the customer include:

- validate the TCN digits remotely using an NSS DBCP
- validate the TCN digits in-switch through table TCNDATA
- validate in-switch first and if not found, validate remotely through the NSS DBCP

This feature also develops the TCN application on the DBCP to process TCN Transactions Capabilities Application Part (TCAP) queries and send responses back to the originating node.

Figure 6-1 shows a combined NSS DBCP network node.

Figure 6-1
Combined NSS-DBCP/network node



TCN validation methods

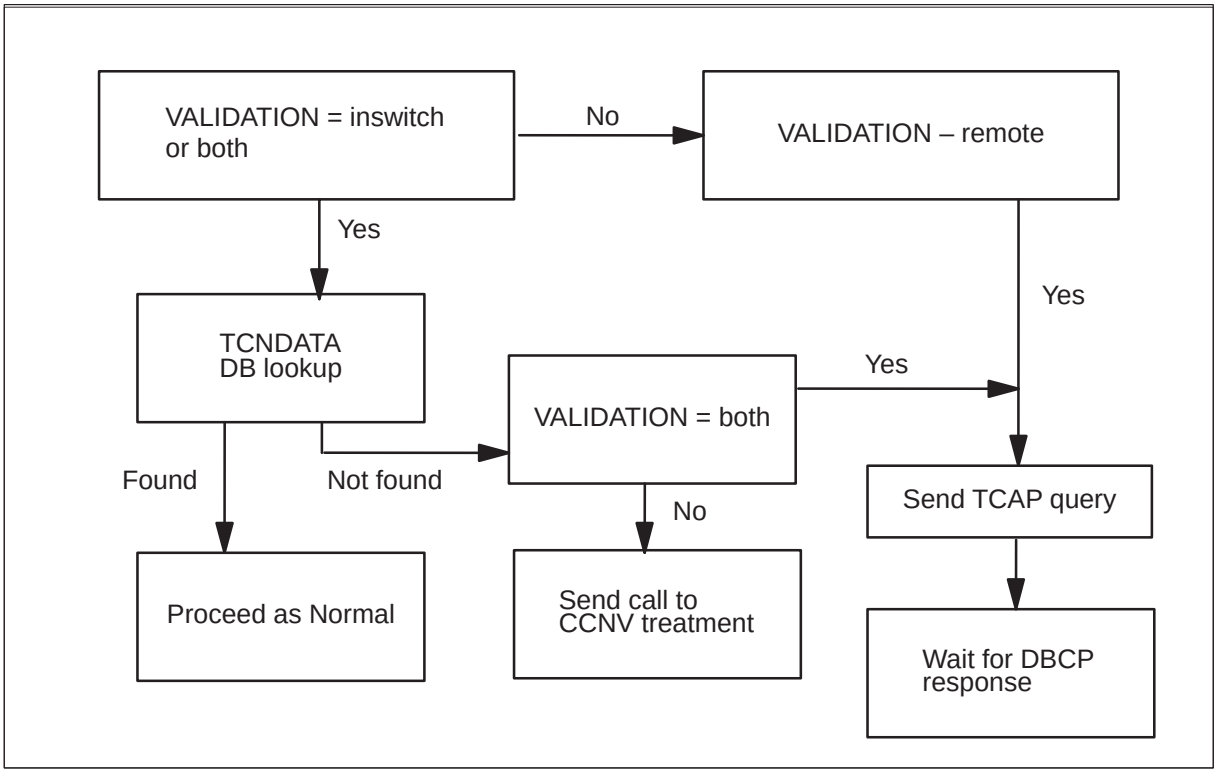
The NSS DBCP TCN validation feature allows the customer to choose the TCN validation methods. TCN can be validated in-switch using table TCNDATA or remote using NSS DBCP or both.

When the in-switch method is chosen, the TCN entered is searched for only at the in-switch table TCNDATA. When the remote method is chosen, the TCN entered searches at the NSS DBCP. When both methods are chosen,

the TCN entered is searched for at the in-switch table TCNDATA. If the TCN is not found, it is searched for at the NSS DBCP.

As shown in Figure 6-2 the TCN validation method is prompted for in table DIALPLAN when the customer datafills the TCN dialing plan.

Figure 6-2
TCN validation method



DBCP calling and called addresses

The calling and called addresses are used as the signaling connection control part (SCCP) addresses when sending TCAP messages across the network. The calling address defines the originating switch that requires the TCN validation and the called address identifies the terminating node that processes the TCN validation query.

The calling and called addresses are datafilled when a TCN validation method is chosen. These addresses are only required when the validation method is through an NSS DBCP or both. Table 6-1 shows a datafill example for calling and called addresses.

Table 6-1
Table dialplan

DIALPLAN	PLANTYPE	CTTYPE . . .	VALIDATE	CLG_ADDR	CLD_ADDR
TCN1	CUTTHRU	TCNONLY . .	INSWITCH	6137224555	2145557244
TCN2	CUTTHRU	TCNONLY . .	REMOTE	6137224555	2145557244
TCN3	CUTTHRU	TCNONLY . .	BOTH	6137224555	2145557244

TCN DBCP query

The only information required for TCN database query is the TCN. The TCN DBCP query protocol can accommodate up to a 14-digit TCN.

A query message with an invoke component is sent to the DBCP after collecting the TCN when the validation method is remote or the TCN is not found in table TCNDATA when the validation method is BOTH.

Table TCAPTRID

An entry for TCN application in table TCAPTRID indicates the number of transaction IDs and NSS_EXT_BLOCKS allowed for TCN calls. The transactions IDs are allocated by table TCAPTRID on a per application basis. Only 820 transaction IDs are allowed for all applications on a DMS. The customer should use the provisioning rule in Table 6-2 to calculate the number of transaction IDs / NSS_EXT_BLOCKS required for the TCN application.

Table 6-2
Provisioning rule, number of transaction IDs/NSS_EXT_BLOCKS required

C/T = X

where:

C is the number of TCN calls processed per second.

T is the NSS_DBCP_TCN_RESP_TIMEOUT.

X is the number of transaction IDs/NSS_EXT_BLOCKs required for TCN application.

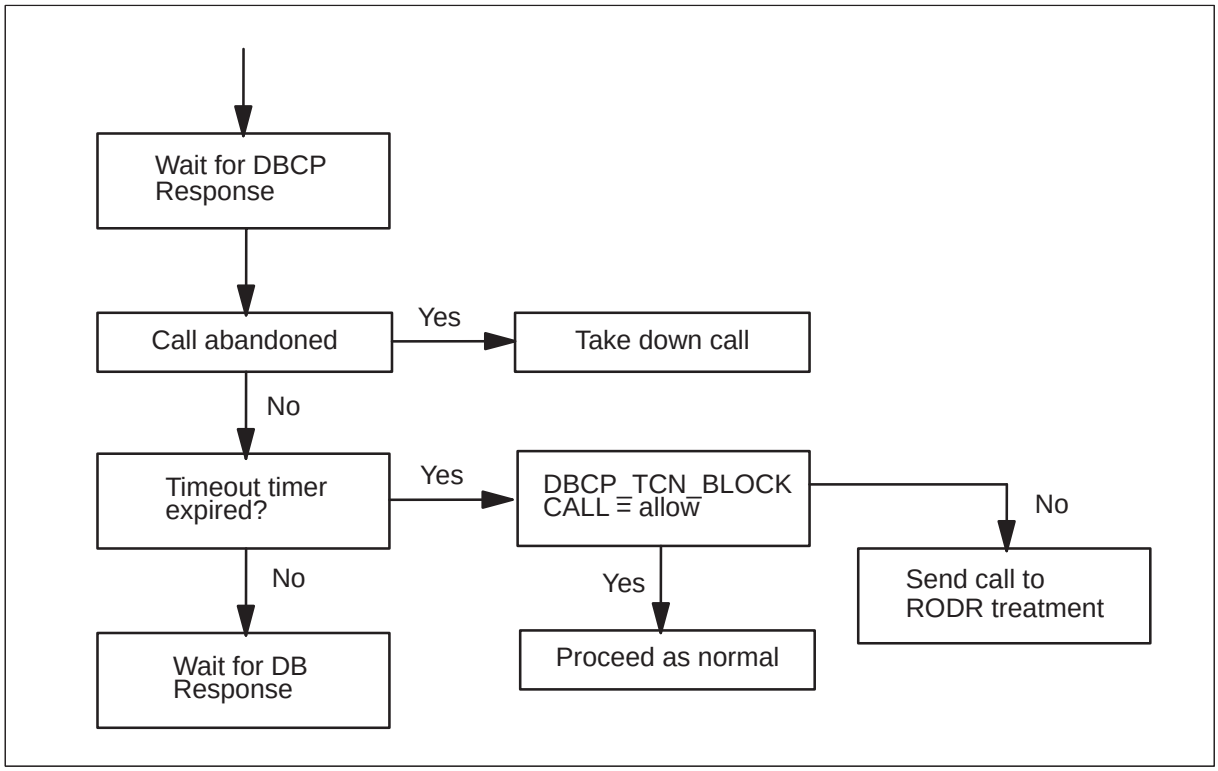
Note: A restart cold is required to reallocate the new number of transaction IDs and the transaction ID and NSS_EXT_BLOCK is held for the duration of a TCN query.

TCN response timeout

After the query is sent to the DBCP, the call is given silent tone while waiting for the response message from the DBCP. The customer can specify the wait time for the response message by way of office parameter NSS_DBCP_ RESP_TIMEOUT in table OFCVAR. The parameter ranges from 1 second to 10 seconds and the default value is three seconds. If no response message is received from the DBCP within the wait time, the call is given reorder (RODR) treatment or the call proceeds normally depending on office parameter NSS_DBCP_TCN_BLOCK_CALL.

Figure 6-3 is a flowchart of a timeout time expiration and abandoned TCN call.

Figure 6-3
Timeout timer expires / abandoned TCN call



Override action for TCN calls

Office parameter NSS_DBCP_TCN_BLOCK_CALL (Y/N) in table OFCVAR determines if a call should be blocked or allowed to proceed when certain problems occur. Problems such as bad connection between the switches, the DBCP goes down, reject received from DBCP because of a protocol decoding problem, or the expiration of wait time for a response are addressed by this office parameter.

When one of these problems occurs and the call is allowed to proceed, the current customer group and network class of service (NCOS) are used to translate the call. Account code is not collected and the caller receives confirmation tone when the call is allowed to proceed.

Abandoned TCN calls

If the TCN call is abandoned after sending a query message before it receives an associated response message, the response message is discarded.

DBCP response

When a TCN DBCP response is received, it is discarded when the TCN call associated with the response is abandoned or the wait time period as specified in office parameter NSS_DBCP_RESP_TIMEOUT is expired. If the timeout has not expired and the call is still waiting to be connected, the response is analyzed.

Reject

A reject response from the NSS DBCP means that a protocol error in the query is detected. NSS log 102 is generated when a reject response is received to indicate the problem type and problem code of the protocol error. Office parameter NSS_DBCP_TCN_BLOCK_CALL determines if the TCN call is assumed valid. If the office parameter specifies that the call is to be blocked, the caller is sent to Calling Card Not Valid (CCNV) treatment. If the office parameter specifies that the TCN is to be treated as valid, the call progresses with the current incoming customer group and NCOS. The account code is not collected based on TCN digits and the caller receives confirmation tone. However, if an account code is required based on the destination translation, it is collected before the confirmation tone is given.

Return error

A return error response from the NSS-DBCP means that the TCN query is not valid. The reason could be that the TCN is not valid or not allowed. The caller is sent to CCNV treatment. An NSS log 103 is generated on the originating node when a return error is received from the DBCP node. This log indicates whether or not the TCN digits are allowed.

Return result

If the queries at the NSS_DBCP are valid, a return result is returned and the call continues. The data in the return result is described in the paragraphs that follow..

Network ID and Network Customer Group ID

When there is an optional customer group specified for the TCN in the NSS DBCP database, the network ID and Network Customer Group ID returned from NSS DBCP are used to map through table CUSTNTWK into an internal customer group at the service switching point (SSP). This internal customer group overrides the incoming current customer group and is used in conjunction with the NCOS to determine the translations of the destination digits entered by the caller.

Network Class of Service

When the tuple in table TCNDATA is datafilled with only an NCOS, the NCOS from the TCNDATA tuple is used in conjunction with the current customer group to determine the translation of the destination digits entered by the caller.

When the tuple in table TCNDATA is datafilled with both a customer group and NCOS, the Network ID and Network Customer Group ID fields returned from the NSS DBCP are used to map through table CUSTNTWK into an internal customer group at the SSP. The NCOS received from the DBCP is mapped through table CUSTNTWK with the COSMAP option into an internal NCOS. This internal customer group and internal NCOS override the current customer group and NCOS to determine the translations of the destination digits entered by the caller.

Table 6-4 is an example of tables COSMAP, CUSTNTWK, and COSDATA.

Figure 6-4
Tables COSMAP, CUSTNTWK, and COSDATA

TABLE COSMAP

NAME	MAX	SCREEN	VALTYPE
MAP1	250	ALLOW	anything
MAP2	300	ALLOW	anything
MAP3	200	ALLOW	anything
MAP4	250	ALLOW	anything

TABLE CUSTNWK

CUSTNAME	NETNAME	NETCGRID	OPTIONS	COSMIN
CGRP1	NET1	1	COSMAP	MAP 1
CGRP2	NET1	2		
CGRP3	NET1	3	COSMAP	MAP 1

TABLE COSDATA

COSMAP	COS	RESULT
MAP1	3	10
MAP2	10	3

In the Figure 6-4 example, if the Network ID of the DBCP response translates to netname NET1 and the Network Customer Group ID is 1, these map into internal customer group CGRP1 through table CUSTNTWK. Since CGRP1 has the COSMAP option, the COSMIN field is used as the index to pick up the internal NCOS. If the NCOS from the DBCP response is 3, the internal NCOS is 10 because mapping name MAP1 with NCOS 3 maps into the number 10 in table COSDATA. If, however, the network NCOS from DBCP response does not exist in table COSDATA or no COSMAP option is datafilled for the tuple in table CUSTNTWK, the network NCOS is used as the internal NCOS.

Account code required

Account Code Required has a value of Y(yes) or N(no).

If the value is N, no account code is required based on the TCN digits. However, an account code still may be required based on the destination digits dialed by the caller. If the value is Y, account code is required based on the TCN.

The length of the account code, when required based on the TCN or on the destination digits dialed by the caller, is specified by the current customer group if there is no customer group datafilled against the TCN. Otherwise, the customer group datafilled against the TCN specifies the length of the account code required.

If account code is required, an account code prompt tone is given. The caller must wait for the account code prompt tone before entering the account code. The prompt tone is disconnected when the first account code digit is entered. All account code digits are ignored if they are entered during the wait time for TCN response and before the account code prompt tone is given.

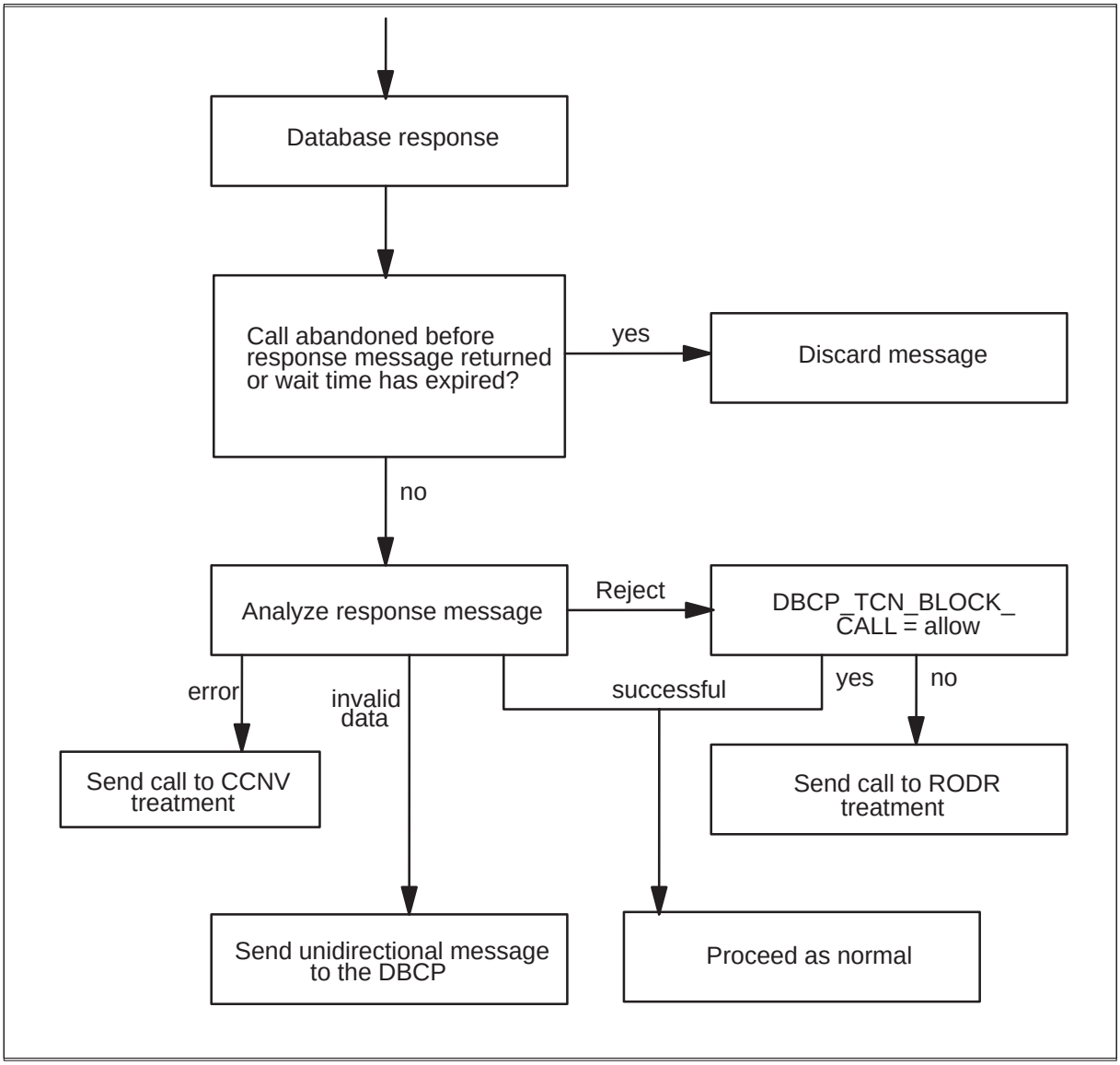
Problems in return result response from the DBCP

When the originating node receives a Return Result Response from the DBCP and the information in the response is invalid, the originating node constructs and sends a TCAP unidirectional message with Invoke Last component and report error operation to the DBCP. This message contains the error code and the actual invalid value in the parameter.

When the originating node receives a return result from the DBCP with protocol error or invalid transaction ID, the originating node constructs and sends a TCAP unidirectional message with a reject component to the DBCP.

Figure 6-5 depicts TCN DBCP response processing.

Figure 6-5
Processing TCN DBCP response



TCN application on the DBCP

When a TCN TCAP query is received at the DBCP end, it searches through table TCNDATA to find the specified TCN. If the TCN is not found or the TCN is not allowed, the application assembles a return error response with associated error code and sends it back to the originating node. A reject response is sent back to the originating node when the application detects a protocol error in the invocation.

If the TCN is valid and the customer group is datafilled against the TCN, that customer group is used to map into table CUSTNTWK to get the Network ID and the Network Customer Group ID. If the customer group is not found in table CUSTNTWK, a reject response is sent back to the SSP with a problem type of general problem and problem code of nil general problem. The internal NCOS is also mapped using the COSMAP option on table CUSTNTWK into a network NCOS. The COSMOUT field of option COSMAP is used as the index into table COSDATA to get the network NCOS. If the internal NCOS is not found in table COSDATA or the COSMAP option is not datafilled for the internal customer group in table CUSTNTWK, the internal NCOS is used as the network NCOS.

The return result response contains the following fields:

- Network ID
- Network Customer Group ID
- NCOS
- Account Code Required (Y or N)

The NCOS and the Account Code Required are datafilled on table TCNDATA.

Return error codes

The following error codes can be used by the TCN application on the DBCP to construct return error responses:

- TCN NOT VALID is returned when a TCN tuple is not found in table TCNDATA. A log is generated when this occurs.
- TCN NOT ALLOWED is returned when the TCN tuple on table TCNDATA is not allowed. A log is generated when this occurs.

Unidirectional message from the originating node

This message is sent from the originating node to the DBCP when it receives a response message that contains invalid data or a protocol error. An NSS105 log is generated when a unidirectional reject message is received for a response protocol problem. An NSS106 log is generated when a unidirectional invoke message is received for an invalid data response message.

TCN protocol specification

Communicating query and response messages with the DBCP is implemented through the TCAP and the connectionless service provided by the SCCP of the SS7 protocol.

A database query or response contains the following information used by the SCCP:

- routing label consisting of:
  - — destination point code, containing:
    - – the SS7 address of the node to which the query is directed
    - – either the service control point (SCP) that processes the query or a signal transfer point (STP) that forwards the query to an SCP
  - — originating point code (OPC), containing the SS7 address of the SSP sending the query
  - — signaling link selection, which indicates the signaling link on which the query is sent
- Message Type, which indicates a unidata message corresponding to a request for connectionless service
- Protocol Class, which indicates the transaction that should take place using basic connectionless service (class 0)
- SCCP Called Party Address, which:
  - — identifies specialized routing functions provided at the destination code of the message
  - — includes in the Global Title a Translation Type Number which corresponds to the TCN application.
- SCCP Calling Party Address, which contains the same information as the Called Party Address so the response message can be returned to the originating node

The following information is present in a TCN TCAP database query:

- Package Type Identifier, in which;
  - — the package type is query with permission
  - — the identifier form is a constructor
  - — the identifier class is defined within a national TCAP.
- Total TCAP Message Length, which specifies the entire TCAP message length in octets (not including the package type identifier and this length indicator itself)
- Transaction ID Identifier, in which:
  - — the information following is identified as a transaction ID
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP.
- Transaction ID Length, which indicates the transaction ID is four octets

- Originating Transaction ID, as assigned by the SSP
- Component Sequence Identifier, in which:
  - — the information following is identified as the component portion
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Component Sequence Length, which indicates the length of the Component Portion in octets
- Component Type Identifier, in which:
  - — the component is identified as an invoke component
  - — the component is indicated to be the last component in the component portion
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Component Length, which is the length of the component in octets
- Component ID Identifier, in which:
  - — it is indicated that the information following is a component ID
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP
- Component ID Length, which indicates the component ID is one octet
- Invoke ID, assigned by the SSP, starting at 0
- Operation Code Identifier, in which:
  - — it is indicated that the following information is pertaining to an operation
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP
  - — the operation code is defined within private TCAP
  - — operation code is defined within private TCAP
- Operation Code Length, which indicates operation code is two octets
- Operation Code, which indicates:
  - — the operation is TCN validation
  - — the operation hex value is 03
  - — the operation requires a reply

- Parameter Set Identifier, which indicates that the following information is a set of parameters.
- Parameter Set Length which is the second element in an unordered list using the *List:Un2* component
- Service Key Identifier, which indicates:
  - — the following information is a service key
  - — the identifier form is a constructor
- Service Key Length, which indicates the total length of all parameters in the service key, in octets
- Digits Identifier (private), in which:
  - — it is indicated that the following informations is digits
  - — the identifier form is a primitive
  - — the identifier class is defined within Private TCAP
- Digits Length, which is the length of digits field in octets
- Digits, in which:
  - — the TCN is contained
  - — the type of digits is billing number
  - — the telephony numbering plan is indicated
  - — representation is in binary coded decimal
  - — the number of digits is indicated

A TCN TCAP response message contains the valid TCN information when it is in the following format:

- Package Type Identifier, in which:
  - — the package type is response
  - — the package is a constructor
  - — the data is defined within national TCAP
- Total TCAP Message Length, which specifies the entire TCAP message length in octets not including the package type identifier and this length indicator itself
- Transaction ID Identifier, in which:
  - — the information following is identified as a transaction ID
  - — the identifier from is primitive
  - — the identifier class is defined within national TCAP

- Transaction ID Length, which indicates that the information to follow is the number of octets of the transaction ID
- Responding Transaction ID, which is the transaction ID contained in the original query
- Component Sequence Identifier, in which:
  - — the information following is indicated as the component portion
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Component Sequence Length, which indicates the length of the component portion in octets
- Component Type Length, in which:
  - — the component is identified as a return result component
  - — the component is indicated as the last component in the component portion
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Component Length, which indicates the length of the component in octets
- Component ID Identifier, in which:
  - — the information following is indicated as a component ID
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP
- Component ID Length, which indicates that the component ID is two octets
- Correlation ID, in which the invoke ID is contained in invoke component in original query
- Parameter Set Identifier, which indicates that the following information is a set of parameters.
- Parameter Set Length, which indicates the length of the parameter set in octets
- NCOS Identifier (private), in which:
  - — the following information is indicated as NCOS
  - — the identifier form is a primitive
  - — the identifier class is defined as private TCAP
- NCOS Length, which indicates the length of NCOS field in two octets

- NCOS, which contains NCOS value
- Account Code Ready (ACR) Identifier (private), in which:
  - account code presence is indicated
  - the identifier form is a primitive
  - the identifier class is defined as private TCAP
- ACR Length, which is the length of ACR field in one octets
- ACR, which:
  - contains a boolean
  - indicates if an account code is required
  - 0 specifies account code is not required
  - 1 specifies account code is required
- Network ID Identifier (private), in which:
  - it is indicated that the following information is Network ID
  - the identifier form is a primitive
  - the identifier class is defined as private TCAP
- Network ID Length, which indicates the length of network ID field in two octets
- Network ID, which contains the network ID value
- Network Customer Group Identifier (private), in which:
  - it is indicated that the following information is Network Customer Group
  - the identifier form is a primitive
  - the identifier class defined as private TCAP
- Digits Length, which is the length of the Network Customer Group field in two octets
- Network Customer Group, which contains the Network Customer Group value

A response message with a return error component is encoded in the following format:

- Package Type Identifier, in which:
  - the package type is response
  - the identifier form is a constructor
  - the identifier class is defined within national TCAP

- Total TCAP Message Length
  - — specifies entire TCAP message length in octets not including the package type identifier and this length indicator itself
- Transaction ID Identifier, in which:
  - — the information following is a transaction ID
  - — the identifier form is a primitive
  - — the identifier class is defined with national TCAP
- Transaction ID Length, which indicates that the transaction IDs is four octets
- Responding Transaction ID, which is the transaction ID contained in the original query
- Component Sequence Identifier, in which:
  - — it is indicated that the information following is the component portion
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Component Sequence Length, which is the length of the component portion in octets
- Component Type Identifier, in which:
  - — the component is identified as a return error component
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Component Length, which is the length of the component in octets
- Component ID Identifier, in which:
  - — it is indicated that the information following is a component ID
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP
- Component ID Length, which indicates that the component ID is one octet
- Correlation ID ; invoke ID contained in invoke component in original query
- Error Code Identifier, in which:
  - — it is indicated that the information following is an error code
  - — the identifier form is a primitive

  - — the error code that follows is identified as being either national, TCAP, or private TCAP
- Error Code Length, which indicates length of error code field as one octet
- Error Code, which indicates the type of error
- Parameter Set Identifier, which indicates that the following information is a set of parameters
- Parameter Set Length, in which:
  - — the length of the parameter set is indicated
  - — the length of the parameter set is zero octet (no parameters)

A response message with a reject component is encoded in the following format:

- Package Type Identifier, in which:
  - — the package type is response
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Total TCAP Message Length, which specifies the entire TCAP message length in octets not including the package type identifier and this length indicator itself
- Transaction ID Identifier, in which:
  - — the information following is indicated as a transaction ID
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP
- Transaction ID Length, which:
  - — indicates the length of transaction IDs is four octets
  - — indicates the length of transaction IDs is four octets
- Responding Transaction ID; transaction ID contained in original query
- Component Sequence Identifier, in which:
  - — it is indicated that the information following is the component portion
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Component Sequence Length, which is the length of the component portion in octets

- Component Type Identifier, in which:
  - — the component is identified as a reject component
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Component Length, which is the length of the component in octets
- Component ID Identifier, in which:
  - — the information following is indicated as a component ID
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP
- Component ID Length, which indicates component ID is one octet
- Correlation ID; invoke ID contained in invoke component in original query
- Problem Code Identifier, in which:
  - — the information following is indicated as a problem code
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP
- Problem Code Length, which indicates the length of the problem code field is two octets
- Problem Code, which indicates the problem that caused the reject to be generated
- Parameter Set Identifier, in which:
  - — the following information is identified as a set of parameters
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Parameter Set Length, which indicates length of parameter set is zero octets

The origination node has the ability to send an error message to the DBCP indicating there is invalid data in the response message. The invoke component is encoded in the following format:

- Package Type Identifier, in which:
  - — the package type is unidirectional
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP

- Total TCAP Message Length, which specifies the entire TCAP message length in octets not including the package type identifier and this length indicator itself
- Transaction ID Identifier, in which:
  - — the information following indicated as a transaction ID
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP
- Transaction ID Length, which indicates length of transaction ID field is zero octets
- Component Sequence Identifier, in which:
  - — the information following isindicated as the component portion
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Component Sequence Length, which is the length of the component portion in octets
- Component Type Identifier, in which:
  - — the component is identified as an invoke component
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Component Length, which is the length of the component in octets
- Component Identifier, in which:
  - — the information following is indicated as a component ID
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP
- Component ID Length, which indicates component ID is one octet
- Invoke ID, which is assigned by the SSP
- Operation Code Identifier, in which:
  - — the following information is indicated as pertaining to an operation
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP
  - — the operation code is defined within private TCAP
- Operation Code Length, which indicates the operation code is two octets
- Operation Code, in which:

— the operation family is procedural

— the operation specifier is report error

— it is indicated that the operation does not require a reply

- Parameter Set Identifier, in which:
  — the following information is indicated as a set of parameters
  — the identifier form is a constructor
  — the identifier class is defined within national TCAP
- Parameter Set Length, which indicates length of parameter set in octets
- Problem Data Identifier, in whic:h:
  — the information following is indicated as problem data
  — the identifier form is a primitive
  — the identifier class is coded contextual
- Problem Data Length, which is the length of problem data field variable
- Problem Data, which contains identifier, length, and contents of erroneous data element.

The originating node has the ability to send a component set to the DBCP indicating a protocol error in the database response. The reject component is in the following format:

- Package Type Identifier, in which:
  — the package type is unidirectional
  — the identifier form is a constructor
  — the identifier class is defined within national TCAP
- Total TCAP Message Length, which specifies the entire TCAP message length in octets not including the package type identifier and this length indicator itself
- Transaction ID Identifier, in which:
  — the information following is identified as a transaction ID
  — the identifier form is a primitive
  — the identifier class is defined within national TCAP
- Transaction ID Length, which indicates the length of the transaction IDs is zero octets
- Responding Transaction ID; transaction ID contained in original query
- Component Sequence Identifier, in which:
  — the information following is identified as the component portion

  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Component Sequence Length, which is the length of the component portion in octets
- Component Type Identifier, in which:
  - — the component is identified as a reject component
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Component Length, which is the length of the component in octets
- Component ID Identifier, in which:
  - — the information following is indicated as a component ID
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP
- Component ID Length, which indicates the component ID is one octet
- Correlation ID; invoke ID contained in invoke component in original query
- Problem Code Identifier, in which:
  - — the information following is indicated as a Problem Code
  - — the identifier form is a primitive
  - — the identifier class is defined within national TCAP
- Problem Code Length, which indicates the length of problem code field is two octets
- Problem Code, which indicates the problem that caused the reject to be generated
- Parameter Set Identifier, in which:
  - — the following information is indicated as a set of parameters
  - — the identifier form is a constructor
  - — the identifier class is defined within national TCAP
- Parameter Set Length, which indicates that the length of parameter set is zero octets

Restrictions and limitations

The TCN validation feature has the following restrictions and limitations:

- New selector GTT for table MSGRTE only applies to NSS DBCP messages. A swerr message is generated if a GTT selector is chosen by other subsystems.
- PRI D-channel is not supported by NSS DBCP.

Station message detail record billing

The Station Message Detail Record (SMDR) billing feature provides the capability to create billing records for the various network services system (NSS) features. This is accomplished by defining an SMDR extension record format for calls involving NSS.

The NSS SMDR extension record generates only for NSS calls provided that the MSN option is added to the associated customer group in table CUSTSMDR. If the MSN option is not assigned or if the incoming call is not NSS specific, the NSS SMDR extension record is not processed. NSS specific calls are those that originate over one of the following trunk group types:

- Feature Group B (FGB) Per Trunk Signaling (PTS) Integrated Business Network (IBN) trunk
- Feature Group D (FGD) PTS IBN trunk
- Feature Group A (FGA) PTS IBN trunk
- Dedicated Access Trunk (DAT)
- IBN trunk

SMDR extension report format

For a detailed description of the SMDR extension report format, refer to NTP 297-2071-119.

Data assignment

To control the generation of the NSS SMDR extension record, the MSN option of table CUSTSMDR must be datafilled.

Bearer capability

Bearer capability (BC) is supported by SMDR billing for NSS originations. BC defines the type of bearer service which may be accessed by a user.

A list of pre-defined bearer capability functions and associated SMDR codes follows:

BC Function	SMDR Code
Nil	0
Speech	1
64K Data	2
64K X.25	3
56K Data	4
Data Unit	5
64K Restricted	6
3.1K HZ Audio	7
7K HZ Audio	8
Voice Data	9

Bearer capability requires a new SMDR extension (#DD) to capture the information. All originators which currently support bearer capability and SMDR billing are supported by this new extension record.

The BC extension record (#DD) includes the following fields:

- Record Code—Value DD is the extension code identifying this record as a bearer capability extension record.
- Bearer Capability—This field consists of a two character field that identifies the BC type. This field has a range of 0–63. If the BC type falls within the range of 0–9, then the left most character is padded with hex A (#A).

Bearer capability can be enabled for SMDR by specifying the BC option in Table CUSTSMDR. This option can be added on a per customer group basis. If the BC option is defined for a particular customer group, then all calls which generate SMDR records will also contain the #DD, Bearer Capability extension record.

Feature dependencies

The bearer capability SMDR extension record needs the following feature functions to function properly:

- IBN Station Message Detail Recording

- Offnet Access Services

Restrictions and limitations

The SMDR feature has the following incompatibilities, limitations, and restrictions.

- The NSS SMDR extension record is generated only for NSS-type calls.
- The NSS SMDR extension record is generated only if the MSN option has been assigned to the associated customer group in table CUSTSMDR.
- The NSS SMDR extension record is not output as a separate field in the AMAB150 log.

The SMDR Bearer Capability feature has the following limitations and restrictions.

- All Bearer Capability values are in hex and not decimal format. To get the true value, it must be converted to its decimal equivalent.
- The BC extension record is not supported on SMDRLK which is a one-way ASCII data link through SLLNK (SL-100 link).
- The BC extension record (#DD) is not output as a separate field in the AMAB150 logs.

Freecall expansion for NSS

This feature is composed of two components:

- One component is support for an expanded range of numbering plan areas (NPA) within network services software call processing. Specifically, the restriction that the middle or P digit must be either a 0 or 1 is removed. This is implemented by removing the restriction (within tables ANIDATA and REPLDATA) that the middle or P digit of the NPA must be either a 0 or 1. Valid NPA's are now in the range 200–999.
- The other component is enhanced support for an expanded range of NPA's designated for called-party billing. Specifically, new NPAs for use in the same fashion as typical 800 number calls, such as 888, 887 and 886. This is implemented by providing a table that allows a user to specify an NPA and alter its behavior by specifying whether the NPA maps to a 700- 800-, or 900 -type call.

NPA expansion

The table control for tables ANIDATA and REPLDATA is modified to support a wider range of NPA's. By removing the restriction that the middle digit of an NPA be a 0 or 1, the maximum number of datafillable NPAs increases from 160 to 800.

Table ANIDATA allows users to enter either 3, 6, or 10 digit automatic number identifications (ANI). The outward appearance of the table control for this table is unchanged, other than to allow for a full range of digits in the middle position of the NPA. Table REPLDATA expects a 10-digit string as a key, indicating a called-party number to be replaced. As with ANIDATA, the outward appearance of table REPLDATA is unchanged, other than to allow a full range of digits in the middle position of the NPA.

FREECALL expansion

Table FREECALL is implemented on the DMS to allow users to specify a set of NPA's to be treated as called-party billed calls. In addition to allowing a specific NPA to be treated as an 800 number call, NPA's can be mapped to 700- or 900 -type calls as well.

Note: This table does not perform digit replacement. Users desiring this functionality are directed to the Replace Dialed Digits feature.

In addition to modifying the billing behavior of the datafilled NPAs, this feature carries over any call-processing specific treatments of these NPAs by the Network Service System (NSS), such as whether or not ANI validation is performed. In other words, within NSS, NPA's datafilled in table FREECALL take on every aspect of the N00-type NPA to which they are mapped.

Bellcore has designated 888 as a free call NPA, and plans are being made similarly for 886 and 887. Additionally, NSS treats the 400 NPA as an 800 NPA, and it might be useful to designate 777 as a 700 -type NPA, as well as designating 999 as 900 -type NPA. An example of datafill to implement this scenario follows.

Note: The 400 NPA will no longer be hard-coded as an 800 type NPA within NSS. Instead of mapping 400 to an 800 type NPA, it is implemented as a default tuple within table FREECALL.

The following is an example datafill:

```
>table FREECALL

TABLE: FREECALL
>lis all

TOP
NPA MAPTON00
_____________________________________________

400  800
888  800
886  800
887  800
777  700
999  900
BOTTOM
```

Supplementary information

Data schema

The 3-part keys in tables REPLDATA and ANIDATA (the keys are identical) accommodate a full range of digits in the middle position of the NPA part of the key.

Table FREECALL has been implemented to allow for mapping of non-N00 NPA's to N00-type behavior with regard to billing and ANI validation.

Billing information

Billing records will not change other than 800-type billing records are produced for any NPA's datafilled in table FREECALL as mapping to an 800 behavior. Likewise, 700- and 900-type billing records are produced for NPA's datafilled in table FREECALL as mapping to 700 or 900 behavior. For additional billing record information, refer to the chapters concerning Replace dialed digits and Station Message Detail Record billing in this manual.

Restrictions and limitations

There is a limit of 32 possible tuples within table FREECALL.

FGA interface

The Feature Group A (FGA) interface allows a subscriber to access a private network. It does this by connecting a Network Services System (NSS) node with the line side of a class 5 end office. The FGA interface:

- accepts incoming calls over FGA trunks
- collects authorization code, account code, PIN code, destination digits, and Travel Card Number (TCN)
- uses FGA trunks as originating and two-way trunks

FGA trunk attributes

FGA trunks are IBN FX outgoing (FXO) trunks that have the following attributes:

- contains a DS1FXO card code and ground start signaling for accessing the network
- IBNT incoming (IBNTI) trunks for originating access
- IBNT 2-way (IBNT2) trunks used for two-way access
- Incoming signaling IBNT protocol (IBNTP) is specified by the trunk subgroup field ISTARTSIG and must be datafilled as ground start.
- The incoming pulse, IPULSTYP, datafilled as nil pulse, NP
- The outgoing pulse, OPULSTYP, datafilled as nil pulse, DP, or DTMF.

Note: When an IBN FXO trunk is designated as an FGA trunk, the additional capability of NSS billing is allowed.

FGA dialing plan

To gain access to the network over FGA trunks, the following sequence is dialed:

(NPA)-NXX-XXXX or 800-NXX-XXXX

To place a call requiring an authorization code, dial the following sequence:

ACCESS + <SDT> + AUTH + (AC) + <DT> + DEST DN + (<SDT> + AC)

where:

- ACCESS = access digits
- DT = dial tone
- DEST DN = destination directory number
- TCN = travel card number
- AC = account code
- ( ) = optional fields
- < > = required fields

To place a call requiring a travel card number, dial the following sequence:

ACCESS + <DT> + 0 + DEST DN + <DT>+ TCN + (<DT> + AC)

where:

- ACCESS = access digits
- DT = dial tone
- DEST DN = destination directory number
- TCN = travel card number
- AC = account code
- ( ) = optional fields
- < > = required fields

Refer to the chapter entitled *Offnet Access Dialing Plan Driver* for a more in-depth explanation of the dialing plans.

Originating access

FGA originating access refers to a call coming into the network from an end office over a FGA ground start FXO trunk. The incoming FGA trunk must provide disconnect supervision to the network.

To place a call using FGA access, a caller dials either a 7- or 10-digit North American Numbering Plan (NANP) access number, or an 800 number that terminates to a line on a class 5 end office.

When seizure and ringing are detected on the FGA trunk to which the call routes, the NSS returns a special dial tone to the caller. This is the caller's

prompt to begin dialing. The caller dials the applicable authorization code, PIN, TCN, and account digits, followed by the destination digits.

The authorization code, PIN, TCN, account and destination digits are received in dual tone multi-frequency (DTMF) format. If the TCN or authorization digits allow access to the network, the call routes based on the destination digits.

Terminating access

FGA terminating access refers to a call going from the network to an end office over an FGA ground start FXO trunk.

Because FGA trunks connect to the line side of an end office and do not generate supervisory signals for hardware answer supervision, audio signals generated from the called end determine when the called party answers. An audio tone detector (ATD) is used to monitor the called end for outgoing FGA calls.

FGA table control

One possible datafill for the OFNTACCTYP field in table TRKGRP is FGA. This datafill designates that an IBN FXO trunk is an FGA trunk.

SMDR Billing

Table 9-4 illustrates how to datafill the tables for FGA trunks.

Table 9-1
NSS SMDR billing records for FGA calls

Name	Description
MSN_ORIG	NSS origination call type (FGA)
MSN_ACCESS_DN	NSS access directory number
MSN_BILLDIGS	NSS billing digits

Note: This number is from the BILLDN field in table TRKGRP.

Datafill example

Figure 9-1 illustrates how to datafill the tables for FGA trunks.

Figure 9-1
Datafilling tables for FGA trunks

Table TRKGRP

CLLI	GRPTYPE	BILLDN	OFFNET	OFFNTACC	. . .
FGATK	IBNT2	. . .	Y	FGA	

Field GRPTYPE must be IBNTI or IBNT2.

Table TRKSGRP

CLLI	SGRPKEY	CARDCODE	SIGDATA	ISTARTSG
FGATK	IBNT2	DS1FXO	STD	GS

Notes:

1. Field SGRPKEY must be IBNT1 or IBNT2.
2. For Field CARDCODE, DS1FXO is the card code used for FGA trunks.
3. For field SIGDATA, use standard protocol for call processing.
4. For field ISTARTSG, use ground start as start signaling.
5. For field IPULSTYP, use nil pulse as pulse type.
6. For field OSTARTSG, use ground start as start signaling.
7. For field OPULSTYPE, use DP or DTMF.

Hardware requirements

ATDs are needed for ground start FXO trunks to reflect the correct billing information in the SMDR record. The card code for audio tone detectors is 5X29AC.

Feature impact

The Meridian Offnet Access (MONA) feature is invoked after the network has been accessed to collect the following numbers or codes:

- authcode code (which is validated by the authorization code feature)
- account code (if required by the account code last feature)
- personal identification number (PIN) digits (which may be required by an authorization code to further identify a caller)
- a TCN (which is used to identify a caller when an authorization code does not apply)

Restrictions and limitations

The FGA interface has the following restrictions and limitations:

- A FGA trunk must be datafilled in table TRKGRP as FGA.
- FGA is only available on IBN FXO ground start incoming, IBNTI, and two-way trunks, IBNT2. The ISTARTSIG and OSTARTSIG must be datafilled as GD in table TRKSGRP.
- The card code in table TRKSGRP must be datafilled as DS1FXO.
- The IPULSTYP must be datafilled as NP for nil pulse and the OPULSTYP as DP or DTMF.
- FGA calls must traverse MONA unless datafilling an FGA hotline trunk. FGA hotline trunks do not traverse MONA.
- FGA trunks are available on LTCs or DTCs.
- UTRs may be used to collect digits over FGA trunks. If UTRs are not available, DTMF receivers will be used for digit collection.
- Call reorigination on FGA trunks is available only on DTCs.
- FGA trunks may use either FXODTC or DTCFX exec lineups.
- FGA trunk call reorigination is available only with exec lineup DTCFX.
- FGA trunks are only available on digital trunks since the card code must be DS1FXO.
- ATDs must be used if billing records are to reflect the correct billing information.

FGB interface

Like the FGA interface, the Feature Group B (FGB) interface also allows a subscriber to access a private network. However, it does so by connecting the Network Services System (NSS) and the trunk side of a class 5 end-office or a class 4 or 5 local tandem office. Subscribers access a FGB trunk by dialing a Uniform Access Code similar to the following:

950-WXXX

where:

- W = 0 or 1
- XXX = carrier access code

With this arrangement, the subscriber does not need to know a different access code for every city in the corporate network.

FGB trunk attributes

FGB trunks have the following attributes:

- They are IBN trunks with DS1SIG and FGB signaling.
- IBNTI trunks are used for originating access.
- Incoming side of IBNT2 trunks with DS1SIG or FGB signaling are used for originating access.
- IBNT2 trunks with DS1SIG signaling are used for two-way access while IBNT2 trunks with FGB signaling are not used for two-way access.
- IBN FGB trunk and dialplan name are specified by datafilling trunk group field OFFNET with Y and field OFFNTACC with FGB.

FGB dialing plan

FGB allows all callers to use one nationwide number to access a corporate network. The following is an example of a dialing plan for FGB calls.

950-WXXX + <SDT> + AUTH + (AC) + <DT> + DEST DN + (<SDT> + AC)

where:

- 950-WXXX—corporate network access number
- SDT—special dial tone
- AUTH—authorization code
- AC—account code
- DT—dial tone
- DEST DN—destination directory number
- ( )—optional fields
- < >—required fields

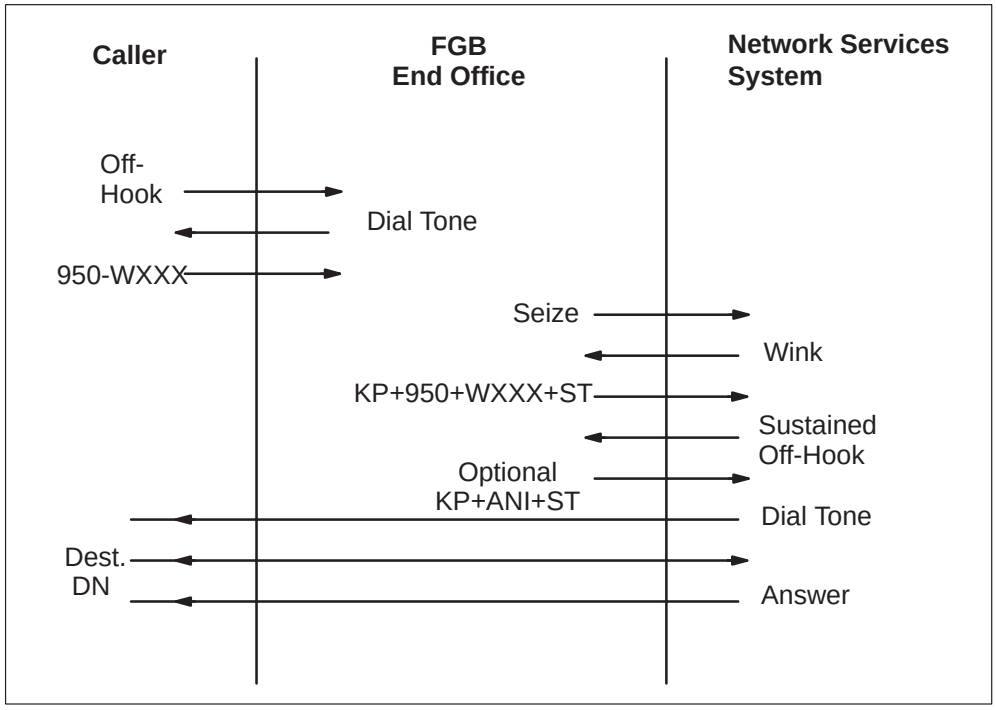
An account code entered after the authorization code or after the destination digits must be mutually exclusive; that is, the account code cannot be entered after both the authorization code and after the destination digits.

Refer to the appendixes at the end of this manual for a detailed list of dialing plans.

FGB signaling

Figure 10-1 illustrates the signaling between an FGB end office and the network, where subscriber dialed digits are as discussed previously.

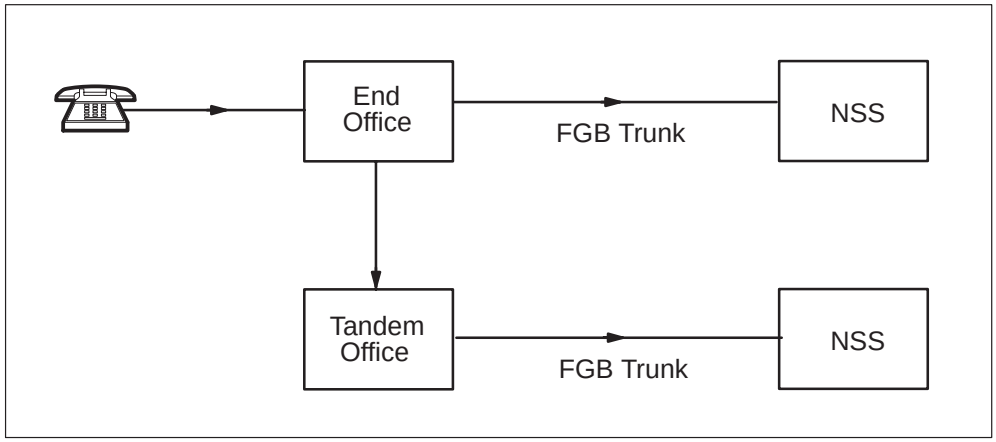
Figure 10-1
Feature Group B signaling



Incoming FGB access

FGB incoming access refers to a call coming into NSS from an end office or a local tandem office over an FGB trunk. See Figure 10-2.

Figure 10-2
Incoming FGB access



Incoming seizure

The incoming signaling protocol for IBN FGB trunks is specified by the trunk subgroup field ISTARTSIG, which can contain wink start or delay dial datafill.

NSS recognizes an off-hook signal of a specified period of time (determined by trunk group parameter ORIGFLTR) as an origination. The value of the ORIGFLTR parameter ranges from 5 to 255 ms in 10 ms granularity. If subgroup field ISTARTSIG contains datafill for delay dial, NSS sends a leading edge, off-hook delay dial signal to the originating far end. The minimum length of time for the delay dial signal is specified by the standard office parameter, SND_DD_TIME. This parameter ranges from 0 to 2550 ms in 10 ms granularity. The default is 150 ms.

After recognizing a valid origination, NSS requests an universal tone receiver (UTR) to serve the call and obtains a two-way path between the incoming trunk and the receiver. If a receiver is not available, the request is queued up to a maximum length of five seconds. If a queue slot is not available or a timeout occurs, NSS ignores the origination and locks the trunk out until an idle condition (on-hook) is received. If a two-way path cannot be obtained, a second receiver is requested and an attempt for a path to that receiver is made. When the second receiver is not available or a path to the second receiver cannot be obtained, the incoming trunk is placed in a lockout state until an idle signal is received from the trunk.

Start dial signal

After a receiver and the network are obtained, NSS sends the appropriate start dial signal to the originating far end to send the access code.

If wink start is datafilled, NSS sends an off-hook. The duration of the off-hook is specified by the standard office parameter SND_MF_WK_TIME as a start dial signal and returns to on-hook after the specified time.

If the delay dial signal is datafilled, NSS sends a trailing edge, off-hook delay dial as a start dial signal. The amount of time required for the off-hook is specified by the standard office parameter SND_DD_TIME.

Both office parameters range from 0 to 2550 ms in 10 ms granularity, and the default is 150 ms.

Access code

After sending a start dial signal, NSS expects to receive seven digits of the Uniform Access Code. The access code is in multifrequency (MF) format and enveloped by the key pulse (KP) and start (ST) digits. If the KP digit has not been dialed within the period of time specified in the trunk subgroup parameter PSPDSEIZ, the trunk is placed in a lockout state until an idle

indication is received. The trunk subgroup parameter PSPDSEIZ ranges from 2 to 30 seconds in 1-second granularity.

After the KP digit is received, partial dial timing is initiated for each subsequent digit. After each digit, if the next digit is not dialed within a period of time specified by the trunk subgroup parameter PARTDIAL, the trunk is placed in a lockout state until an idle condition is received. The parameter PARTDIAL ranges from 2 to 30 seconds in 1-second granularity.

The access code is used only for billing purposes and is not validated.

Optional Automatic Number Identification

The trunk group parameter ANIDIGS specifies whether or not an ANI on IBN FGB trunk group is to be expected.

If the ANI is not expected, NSS sends a sustained off-hook signal to the end office or the local tandem office.

If the ANI is expected, the UTR used to receive the 950 access code is instructed to prepare to collect more digits. At that time, the trunk sends a sustained off-hook as a start dial for the ANI to collect more digits. The ANI digits are received in the MF format. After sending a sustained off-hook, NSS expects to receive one of the following digit streams:

```
KP + I + NXX-XXXX + ST (Successful ANI spill)
or
KP + I + ST (ANI Failure)
```

where:

- KP = key pulse
- I = information digit where
  - — the information digit values are 0 or 3.
  - — indicates ANI was successfully collected; 1, 2, 4, or 5.
  - — indicate ANI was not received, the call is cut-through
  - — and receives a dial tone; any other value indicates ANI failure
- N = digits 2 through 9
- X = digits 0 through 9

  Note: The network does not block FGB calls based on the information digit.

Trunk subgroup parameters PSPDSEIZ and PARTDIAL also are applied for ANI. PSPDSEIZ specifies the time period within which the KP digit must

be received and PARTDIAL specifies the time period within which the next digit must be received.

Subscriber-dialed digits

Meridian Offnet Access

The Meridian Offnet Access (MONA) feature is invoked by FGB after NSS has been accessed to collect the authorization code, account code (if authcode/account code combined is set up as the dialing plan), or travel card number and destination digits according to table DIALPLAN.

The FGB dialing plan determines FGB characteristics, such as authorization code and account code collection.

Authorization codes

Authorization codes, also called authcodes, identify authorized users to NSS and are defined in table AUTHCDE. Because the ANI is optional for an FGB call, an authcode is required to screen unauthorized access to the network and to retrieve an associated network class of service (NCOS). (An NCOS is necessary because it determines the caller's dialing and routing plans.)

An authcode is received in the dial tone multifrequency (DTMF) format with a length from two to 14 digits and is composed of the following format:

- Authcode—The authcode is 2 to 10 digits and fixed on each MONA customer group basis. The leading digit cannot be a 0. However, subsequent digits can range from 0 to 9.
- Security code—The security code, optional for each authcode, is 0 to 4 digits.

Account code

An account code is required based on the attributes of the MONA customer group and the authcode. An account code is entered either immediately after the authcode (and security digits, if applied), or after the destination digits, but not both. An account code collected after the authcode is referred to as authcode/account code combined. An account code collected after the destination digits is called account code required (ACR). Only one type of account code collection can be performed for each call and each trunk.

Account codes can be two to 14 digits in length with the digits ranging from 0 to 9 digits inclusive. An account code's length is fixed on a customer group basis and the only check performed on the account code is for its length. The authcode/account code combined has a maximum length of 15 digits. The account code is received in DTMF format.

Destination digits

The destination digits can be any one of the dialing formats supported by the customer's dialing plan using the MONA customer group.

Call treatments

Table TMTCNTL defines tones and announcements given to the caller when a certain condition is not met. The following treatments are applied to FGB calls:

- No Service Circuit (NOSC)
- No Software Resource (NOSR)
- Partial Dial (PDIL)
- Permanent Signal Timeout (PSIG)
- Vacant Code (VACT)
- Network Blockage Heavy Traffic (NBLH)
- System Failure (SYFL)

No Service Circuit

A call is routed to NOSC treatment when UTRs are not available to collect access code, optional ANI, authorization code, optional account code, or the destination digits.

No Software Resource

A call is routed to NOSR treatment when software resources (such as feature data blocks, supplementary data blocks, and port perm extension blocks) are not available.

Partial Dial

A call is routed to PDIL treatment when: 1) an insufficient number of digits are received for a call or 2) an ST signal is not received after a KP signal is received.

Permanent Signal Timeout

PSIG treatment is given when digits are not received before timing out.

Vacant Code

A call is routed to VACT treatment when an unassigned NPA code, office code, or country code is dialed.

Network Blockage Heavy Traffic

A call is routed to NBLH treatment after a second unsuccessful attempt to reserve a network path from an incoming trunk to an outgoing trunk.

System Failure

A call is routed to SYFL treatment when a software failure or an error condition occurs.

SMDR billing

Table 10-1 exhibits the fields added to the Station Message Detail Recording (SMDR) billing records for FGB calls.

Table 10-1
FGB Station Message Detail Recording

Name	Description
MSN_ORIG	NSS Origination call type
MSN_CAC	NSS Carrier Access code. For FGB calls, the last four digits of the 950 access code are recorded.
MSN_ACCESS_DN	NSS Access Directory Number
MSN_INFO_DIGS	NSS Information Digits. If ANI is expected, only one information digit is recorded. If ANI is not expected, this field contains a blank.
MSN_ANI_NUMBER	NSS Automatic Number Identification Number. If ANI is expected, this field is recorded with the ANI received (from 0 to 7 digits). If ANI is not expected, this field contains a blank.

Datafill examples

Table 10-2 illustrates example datafill for an incoming FGB call with the following attributes:

- receives ANI
- provides a seven-digit authorization code
- has no security digits
- provides an authcode/account combined length of 5

Table 10-2
Example datafill for an incoming FGB call that receives ANI

Table CUSTHEAD

CUSTNAM -	CUSTXLA	OPTIONS
MYGRP	. . .	(ACCT %) (AUTH MYGGRP N Y)

The ACCT (account code) option must be added. The subfield of this option (5) specifies the length of the account.

The COMB (combined) subfield, third subfield of the AUTH option, must be set to “Y” for authcode/account combined.

If COMB is set to “N”, it can be account code last (ACR).

Table NCOS

CUSTGRP-	NCOS . . .	OPTIONS
MYGRP	31	. . .

Table DNROUTE

DN	DNSEL	FEAT	CUSTGRP	AUTH
6137225000	FEAT	DISA	MYGRP	Y

The DN should be a DISA DN.

Field CUSTGRP must be datafilled with the customer group used to translate and route the destination digits.

Field AUTHREQ must be datafilled with “Y” to specify an authorization code is required. If this field is datafilled “N”, no authcode will be promtped for and the FGB call will not be billed.

Table TRKGRP

CLLI	GRPTYPE	BILLDN	OFFNET	OFFNTACC-	ANIDIGS
FGBTK	IBNTI	6137225000	Y	FGB	Y

Field GRPTYPE must be datafilled IBNTI or IBNTO.

Field BILLDN must contain the DISA DN datafilled in table DNROUTE with the appropriate customer group.

Field OFFNET must be set to “Y” and FGB must be set for OFFNTACC to specify that FGB signaling is expected on this trunk.

Table AUTHPART

PARTNM	FORMAT . .	LENGTH	MAXSIZE
MYGRP	IBN	7	20

—continued—

Table 10-2
Example datafill for an incoming FGB call that receives ANI

Table AUTHPART
Field LENGTH determines the authcode length.

Table AUTHCODE

AUTHPRT	AUTHCODE	NCOS	ACCT	SECDIG
MYGRP	1234567	31	N	$

Field NCOS is the DISA customer group's class of service used to translate and route the destination digits.

Field ACCT (account code) is set to Y if the account code is needed for this authcode (either ACR or authcode/account code combined). If this field is set to N, the account code last will not be prompted for this authcode.

—end—

If ANI is not to be received, all tables shown in Table 10-2 (except for table TRKGRP) should be datafilled the same. The datafill for table TRKGRP is shown in Table 10-3.

Table 10-3
Example datafill for an incoming FGB call that does not receive ANI

Table TRKGRP

CLLI	GRPTYPE	BILLDN	OFFNET	OFFNTACC;	ANIDIGS
FGBTK	IBNTI	6137225000	Y	FGB	N

If account code last (ACR) is preferred, all tables shown in Table 10-2 should be datafilled the same, except for tables CUSTHEAD, NCOS, and AUTHCDE. The appropriate changes to these three tables are shown in Table 10-4.

Table 10-4
Example datafill for an incoming FGB call with account code last

Table CUSTHEAD

CUSTNAME	CUSTXLA	OPTIONS
MYGRP	CUSTXLA . .	(ACCT 5) (AUTH MYGRP N N) (ACR ACCT 0)

Table NCOS

CUSTGRP	NCOS . . .	OPTIONS
MYGRP	31	(ACR N)

The ACR option must be datafilled in this table for the NCOS specified in table AUTHCDE for the given AUTHPART and AUTHCODE.

Table AUTHCDE

AUTHPART	AUTHCODE	NCOS	ACCT	SECDIGS
MYGRP	1234567	31	Y	$

—end—

If account code last based on the routes is preferred, the following tables should be datafilled as shown in Table 10-5.

Table 10-5
Example datafill for an incoming FGB call with account code last based on route

Table CUSTHEAD

CUSTNAME	CUSTXLA . .	OPTIONS
MYGRP		(ACCT 5) (AUTH MYGRP N N) (ACR ACCT 0)

Table NCOS

CUSTGRP	NCOS . . .	OPTIONS
MYGRP	31	(ACR N)

Table 10-5
Example datafill for an incoming FGB call with account code last based on route

Table NCOS
The ACR option must be datafilled in this table for the NCOS specified in table AUTHCDE for the given AUTHPART and AUTHCODE.

Table AUTHCDE

AUTHPART	AUTHCODE	NCOS	ACCT	SECDIGS
MYGRP	1234567	31	Y	$

Table IBNXLA

XLANAME	DGLIDX	TRSEL	ACR . . .
CXDK	43	ROUTE	Y

Field ACR must be set to "Y" to specify an account code is needed to go over this route.

If no account code is needed, then all tables illustrated in Table 10-2 should be datafilled the same except for the tables illustrated in Table 10-6.

Table 10-6
Example datafill for an incoming FGB call with account code last based on route

Table CUSTHEAD

CUSTNAME	CUSTXLA . .	OPTIONS
MYGRP	CXDK	(AUTH MYGRP N N)

Table NCOS

CUSTGRP	NCOS . . .	OPTIONS
MYGRP	31	. . .

Table AUTHCDE

AUTHPART	AUTHCODE	NCOS	ACCT	SECDIGS
MYGRP	1234567	31	N	$

Data assignment

Fields OFFNET, OFFNTACC, and ANIDIGS in table TRKGRP (IBNTI and IBNT2 trunk group types) must contain datafill to provide incoming FGB trunk signaling and receive the optional automatic number identification (ANI) on a trunk group basis.

Restrictions and limitations

This feature has the following restriction:

- A combination authorization and account code must not exceed 15 digits.

FGD interface

Like the Feature Group A (FGA) and Feature Group B (FGB) interfaces, the Feature Group D (FGD) interface connects a subscriber to a private network. It does this by connecting the Network Services System (NSS) with the trunk side of an Equal Access End Office (EAEO) or a class 4 or 5 local tandem office.

The FGD interface also provides the capabilities for authorizing and screening calls on the network. Call authorization is performed through authorization codes, account codes, or travel card numbers. Call screening is performed through information digits (ID) and automatic number identification (ANI).

FGD trunk attributes

FGD trunks have the following attributes:

- They are integrated business network (IBN) trunks with DS1SIG and FGD signaling.
- IBNTI trunks are used to accept incoming FGD calls.
- Incoming sides of IBNT2 trunks are used to accept incoming FGD calls.

FGD dialing plan

The FGD interface provides two types of dialing: cut-through dialing and pure FGD dialing.

FGD cut-through dialing plan

The following is an example of the FGD cut-through dialing plan.

```
10XXX + # + <SDT> + AUTH + (AC) + <DT> + DEST DN + (<SDT>
+ AC)
```

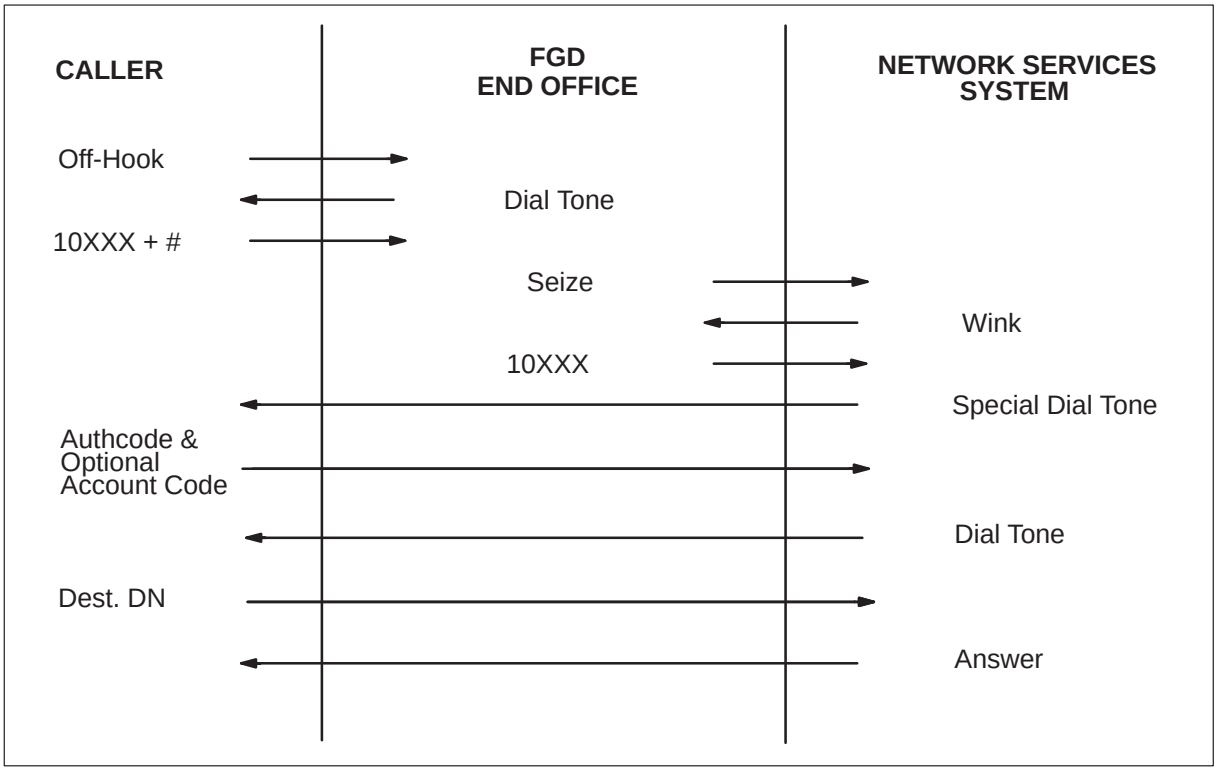
where:

- XXX—carrier access code
- #—octothorpe sign on the telephone
- SDT—special dial tone
- AUTH—authorization code

- AC—account code
- DT—dial tone
- ( )—optional fields
- < >—required fields

Figure 11-1 illustrates the signaling between an FGD end office and the network when a FGD cut-through call is placed.

Figure 11-1
Feature group D cut-through signaling



Pure FGD dialing plan

There are two types of pure FGD dialing: FGD pure casual dialing and FGD pure presubscribed dialing.

FGD pure casual dialing plan

The following is an example of the FGD pure casual dialing plan.

```
10XXX + DEST DN + (SDT + AC)
```

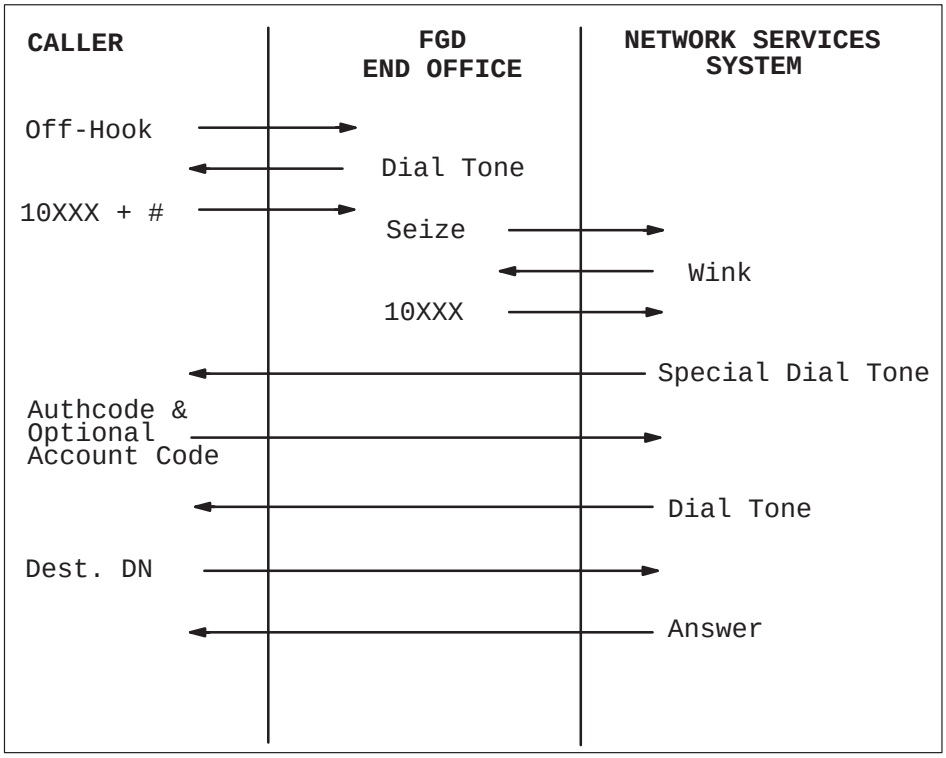
where:

- XXX—carrier access code

- DEST DN—destination directory number
- SDT—special dial tone
- AC—account code
- ( )—optional field

Figure 11-2 illustrates the signaling between an FGD end office and the network when a FGD pure casual call is placed.

Figure 11-2
Feature Group D pure casual signaling



FGD pure presubscribed dialing

This dialing plan allows a subscriber to presubscribe to FGD service. With FGD pure presubscribed dialing, the subscriber does not dial the carrier access code. The carrier access code is prefixed automatically to the outpulsed digit stream. Following is an example of the FGD pure presubscribed dialing plan.

```
1 + DEST DN
```

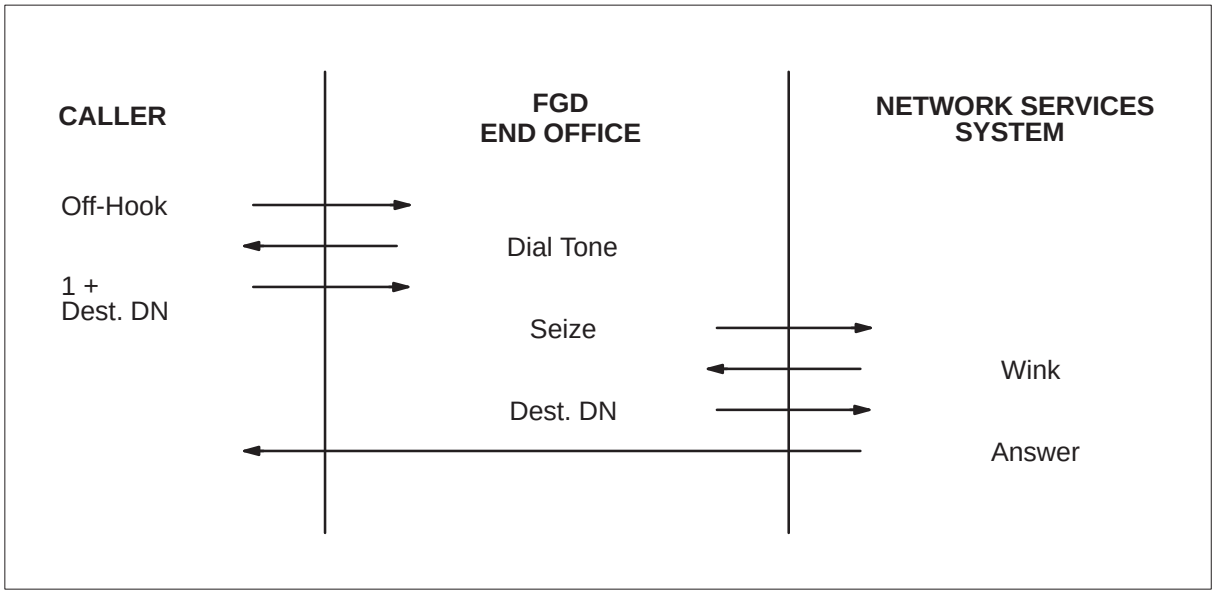
where:

```
DEST DN = destination directory  number
```

where:

Figure 11-3 illustrates the signaling between a FGD end office and the network when a FGD pure presubscribed call is placed.

Figure 11-3
Feature Group D pure presubscribed signaling



FGD call screening

The FGD interface provides enhanced call screening capabilities. It provides these capabilities through two features: the Information Digit and Casual Calling feature and the FGD Automatic Number Identification (ANI) Database feature.

These two features work in conjunction to perform the following functions on incoming FGD calls to an NSS node:

- screen the 1NX code of international calls
- screen a call's ANI information digits
- define alternative translation based on ANI information digits
- acknowledge test calls
- screen all FGD pure calls (including N00 calls) for ANI digits
- block international dialing by casual callers

Digit screening on 1NX (international) calls

In the first digit stream, all incoming NSS FGD calls are screened for the 1NX code. The presence of the 1NX code indicates the call is an

international call. The format of the first digit stream of an 1NX international call is as follows:

```
KP+1NX+XXX+CCC/01R+ST
```

where:

- KP—MF signal denoting the start of an Equal Access digit stream
- 1NX—code indicating the call is an international call, where
  - — N=1–9 and
  - — X=0–9
- XXX—carrier access code
- CCC—country code of countries outside World Zone 1
- 01R—region code of countries inside World Zone 1
- ST—MF digit denoting end of digit stream

If a call's initial digit stream contains a 1NX code, the translator name datafilled in field IDPRTRAN of table TRKGRP is used to translate the digits in table STDPRTCT, subtable STDPRT. Valid 1NX codes are datafilled in this table with a pretranslator selector of ID and a translation result of INTDD. The 1NX code assignment is arranged between the Bell Operating Company (BOC) and the carrier.

Table 11-1 is an example of 1NX screening, subtable STDPRT.

Table 11-1
1NX screening example

Subtable STDPRT

FROMDIGS	TODIGS	PRERTSEL	CALLCOND
129	129	ID	INTDD

If a call contains a 1NX in the initial digit stream but translation of the 1NX code fails, the call is routed to vacant code (VACT) treatment after the FGD signaling protocol has been completed.

When the INTDD translation result is returned, the last three digits of the 1NX digit stream (either CCC or 01R) then are screened internally to determine if the call is inside World Zone 1 (01R) or outside World Zone 1 (CCC).

If 1NX screening is successful, the call proceeds to information digit screening to process the second digit stream.

Information digit screening

All calls with ANI digits are preceded by information digits. Information digits are two-digit codes generated by the telco central office. These codes provide information about the originator of the call and indicate whether or not the call should be allowed or denied. For example, the information digit sequence of 95 usually indicates the call is a test call. Notice the word "usually" is used in the preceding statement. Information digits are flexible; however, Bellcore recommendations have been made for the use and format of information digits.

All FGD calls (cut-through and pure), including international calls that have successfully completed 1NX translation, are screened for information digits. Following is an example of a digit stream with information digits:

```
KP + (II + ANI) + ST
```

where:

- KP—MF signal denoting the start of an Equal Access digit stream
- II—information digits, where N=0–9 and X=0–9
- ANI—automatic number identification digits, 3 to 10 digits in length
- ST—MF digit denoting end of digit stream
- ( )—optional field

As previously stated, information digits are two digits long. Although digit sequences 00 through 99 can be used for information digits, it is suggested that sequences 11 through 19 are excluded from information digit use. Using digit sequences 11 through 19 would cause ambiguity when translating the information digits and the 1NX digits. Refer to Bell Communications Research Technical Reference TR-NPL-000275, *Notes on the Intra-LATA Networks*, 1986, for more information on the format and use of information digits.

An entry should be made in table STDPRT for each set of information digits expected over the FGD trunk for a particular translator. The information digit translator is datafilled in table TRKGRP for each NSS FGD trunk. This is the same translator used for the 1NX code in the first digit stream of an international call. If a call is received with information digits that do not have a translator entry, the call is sent to VACT treatment.

The following translation results are datafilled for the ID selector in subtable STDPRT of STDPRTCT.

- CONT—Call proceeds to ANI screening.

- STOP—Call is sent to ANI database failure unless this is a FGD pure call. If this is a pure call and it is not an N00 called party billed call, it is sent to treatment.
- TEST—Information digits specify in station message detail recording (SMDR) that this is a test call.
- ALTXLA—Specifies an alternate translation scheme for domestic and World Zone 1 calls. A customer group and NCOS are datafilled in this tuple that overrides the customer group and NCOS in TRKGRP.

Table 11-2 is an example of information digit screening in subtable STDPRT.

Table 11-2
Information digit screening example

Subtable STDPRT

FROMDIGS	TODIGS	PRERTSEL	CALLCOND	ALTCUST	ALTCOS
00	00	ID	CONT		
10	10	ID	TEST		
02	02	ID	STOP		
99	99	ID	ALTXLA	BNRRCH	20

If translation of the information digits is not successful, treatment is set to VACT. If a translation result of CONT or ALTXLA is returned, the last digit in the ANI stream is examined to determine if this is an FGD pure call or a cut-through call (ST as the last digit denotes a pure call; STP, ST2P, or ST3P denotes a cut-through call). Pure calls proceed to ANI screening if ANI is expected and cut-through calls proceed to address digit processing.

It is possible for the ANI digit stream to consist only of KP+ ST (that is, no II digits or ANI digits are sent). There are two possibilities in this situation.

- If the ANIDIGS field in table TRKGRP is Y, then II and ANI are expected for calls on this trunk. In this case, ANI Database Failure (ADBF) treatment is set for this call. The ANIDIGS field is prompted for when OFFNET=Y in table TRKGRP. This call then proceeds to address digit processing to check for N00 in the address digits.
- If the ANIDIGS field in table TRKGRP is N, II and ANI are not expected. If II and ANI are not received, the call proceeds to address digit processing. If II and ANI are received, the call is handled as if the ANIDIGS field is set to Y.

Test calls

If a translation result of TEST is returned, the digit stream received should be in one of the following formats:

- KP+10X+ST
- KP+95X+XXXX+ST

The first two digits following the KP are removed and the remaining digits are sent to address digit processing. These digits (X or XXXXX) should translate to a particular test circuit.

There are two protocols used with FGD test calls. One protocol tells the carrier to send an acknowledgement wink to the BOC after receiving the digit stream. The other protocol tells the carrier to send a sustained off-hook to the BOC after receiving the digit stream. The NSS FGD interface supports both of these protocols using table OFCVAR office parameter FGD_TEST_CALL_ACK_OFFHOOK. When this office parameter is set to Y, an off-hook is sent after receiving the test call digit stream. If this office parameter is set to N, an acknowledgment wink is sent after receiving the test call digit stream.

For more information on test calls in the FGD protocol, refer to Bellcore documents PUB51201, *Compatibility Information for FGD Switched Access Service*, June 1983, and TR-NPL-000258, *Compatibility Information for Feature Group D Switched Access Service*, October 1985.

The first two digits of the test call digit stream (that is, the information digits) are stored in the information digit field of the Station Message Detail Recording (SMDR). These two digits specify this is a test call.

ANI screening

After successful information digit screening, the ANI digits are screened for all incoming FGD pure calls. ANI screening is not performed on cut-through calls. Like the information digits, ANI digits are used to identify the originator of a call and determine whether or not the call is allowed or denied. Calls for which ANI is not received and is not expected, and calls for which a treatment has already been set, proceed to address digit processing to check for N00 in the address digits.

The ANI received is either a 10-digit directory number or, if the calling party cannot be identified, the 3-digit EAEO NPA. ADBF (ANI database failure) treatment is sent if

- the ANI received is not 10 or three digits, or
- no ANI is received when it is expected.

Once the ANI is received, it is screened. With a 3-digit ANI, all of the digits are screened. However, a 10-digit ANI can be screened in one of the following three ways:

- the first three digits are screened for a specific numbering plan area (NPA)
- the first six digits are screened for a specific NPA-NXX
- all digits are screened for a specific 10-digit ANI

ANI database stored in table ANIDATA

Table ANIDATA is the ANI screening database for calls originating over NSS Feature Group D trunk groups. Therefore, if a 3- or 10-digit ANI is received, it is screened in table ANIDATA. This table has three levels.

- NPA level for the 3-digit ANI
- NXX level for the 6-digit ANI
- SUB level for the 10-digit ANI

The attributes common to all three levels of the table are:

- ANIDIGS—3, 6, or 10 digits of the ANI as determined by the ANI level (NPA, NPA-NXX, or NPA-NXX-XXXX). ANIDIGS is the key into table ANIDATA. When a 3-digit ANI is entered as the key, the ANITYPE is NPA. When a 6-digit ANI is entered, the ANITYPE is NXX. When a 10-digit ANI is entered, the ANITYPE is SUB (SUBscriber).
- ANITYPE—NPA for 3-digit entries, NXX for 6-digit entries, SUB for 10-digit entries (SUB level).

  Note: The same NPA can be datafilled at each of the NPA, NXX, and SUB levels. The same NXX can be datafilled at each NXX and XXXX level.

NPA ANI level (3-digit ANI) fields

The NPA ANI level has one field, STATUS. The STATUS field can be datafilled either CASUAL or NOTALW (not allowed).

An NPA level call with a status of CASUAL is allowed to proceed when the following conditions are met:

- The call is a domestic or international call within World Zone 1.
- The NSS FGD trunk group over which the call is originated is set up to allow casual callers.

An NPA level call with a status of NOTALW is sent to treatment only if this call is not an N00 called party billed call.

NXX ANI level (6-digit ANI) fields

The NXX ANI level also has one field, STATUS. As with the NPA level, the STATUS field can be datafilled either CASUAL or NOTALW (not allowed).

An NXX level call with a status of CASUAL is allowed to proceed when the following conditions are met:

- Tthe call is a domestic or international call within World Zone 1.
- The NSS FGD trunk group over which the call is originated is set up to allow casual callers.

An NPA level call with a status of NOTALW is sent to treatment only if this call is not an N00 called party billed.

SUB ANI level (10-digit ANI) fields

The SUB ANI level also has a STATUS field. This STATUS field can be datafilled CASUAL, NOTALW, or ALLOW. When CASUAL or NOTALW is datafilled, no other fields are required for the SUB ANI level. However, when ALLOW is datafilled, other fields are required. Information on these fields follows momentarily.

A SUB level call with a status of CASUAL is allowed to proceed when the following conditions are met:

- The call is a domestic or international call within World Zone 1.
- The NSSFGD trunk group over which the call is originated is set up to allow casual callers.

When STATUS is datafilled ALLOW, the following fields are prompted for datafill.

- NACUSGRP (North American Numbering Plan Customer Group)—This field can be datafilled with any valid Customer Group found in table CUSTHEAD.

  Note: When a domestic call or an international call within World Zone 1 references a tuple with an ANI type of SUB and a STATUS of ALLOW, the Customer Group and NANCOS define the translations of the destination digits.

- NANCOS (North American Numbering Plan Network Class of Service—This field can be datafilled with any NCOS valid for the Customer Group datafilled in preceding field, NACUSGRP.

Note 1: When a domestic call or an international call within World Zone 1 references a tuple with an ANI type of SUB and a STATUS of ALLOW, the NCOS and the Customer Group define the translations of the destination digits.

Note 2: If the combination of Customer Group and NCOS does not exist as a valid key into the NCOS table, the tuple is invalid and is not written into the ANIDATA table.

- (Account Code Required) ACCTREQ—The ACCTREQ field specifies if an account code is required for all incoming NSS FGD calls using pure dialing and that originated from the offnet address specified by this ANI.

  Note: If ACCTREQ is set to Y, the customer group datafilled against the valid 10-digit ANI specifies the length of the account code required (that is, it overrides the customer group of the incoming trunk group).

- SUPPRESS—This field specifies if the offnet originated stations entering the network through NSS FGD trunks using pure dialing wish to have their ANI information suppressed. A Y indicates here would be no display of their directory numbers. To have the ANI made available to downstream agents, enter N.

- IDDALLOW (International Direct Distance Dialing Allowed)—The IDDALLOW field indicates if a call referencing an ANI tuple with ANI type of SUB and a STATUS of ALLOW is allowed to make international calls outside World Zone 1.

  — When this field is set to N, international calls outside World Zone 1 are not allowed and the call is sent to treatment. When this field is set to N, no additional fields are prompted for datafill.

  — When this field is set to Y, an International Customer Group and international NCOS are prompted by table control for datafill. Datafilling an international customer group and NCOS against 10-digit ANIs allows a customer to set up partitioned international translations. The following fields are prompted by table control for datafill:

    – International Customer Group (INTLCGRP)—The field INTLCGRP can be datafilled with any valid Customer Group that was datafilled in table CUSTHEAD. When an international call outside World Zone 1 references a tuple with ANI type of SUB and with IDDALLOW set to Y, the customer group and International NCOS (INTLNCOS) define the translations of the international destination digits.

– International Network Class of Service (INTLNCOS)—The field INTLNCOS can be datafilled with any NCOS for the valid customer group that was datafilled in table CUSTHEAD. When an international call outside World Zone 1 references a tuple with ANI type of SUB and with IDDALLOW set to Y, this NCOS and the customer group above define the translations of the international destination digits.

Note: If the combination of customer group and NCOS does not exist as a valid key into the NCOS table, the tuple is invalid and is not written into the ANIDATA table.

ANI screening results

If an ANI is not screened successfully, treatment is set to ADBF (ANI database failure) and the call proceeds to address digit processing to check for N00. Successful ANI screening returns CASUAL, NOTALW (not allowed), or ALLOW.

When CASUAL is returned, the CASUAL field in table TRKGRP is checked to ensure that casual calls are permitted on this trunk. If the field in TRKGRP is N, treatment is set to ANI Account Code Status Not Allowed (ANIA) and the call proceeds to address digit processing to check for N00 in the address digits.

If the Casual field in TRKGRP is Y, the call proceeds to address digit processing. However, if the call is outside World Zone 1, it is sent to IDDD Prohibited (IDPB) treatment because casual callers are not permitted to call outside World Zone 1.

When NOTALW is returned, treatment is set to ANI Account Code Status Not Allowed and the call proceeds to address digit processing to check if it is an N00 call.

When ALLOW is returned, table ANIDATA returns the following fields:

- NACUSGRP—Customer group to be used for domestic calls and international calls inside World Zone 1
- NANCOS—NCOS to be used for domestic calls and international calls inside World Zone 1
- ACCTREQ—Account Code Required if Y
- SUPPRESS—Suppress ANI Delivery if Y
- IDDALLOW—If this field is Y, IDDD calls outside World Zone 1 are allowed and the following two fields are returned as well
  - — INTLCGRP—Customer group to be used for international calls outside World Zone 1

— INTLNCOS—NCOS to be used for international calls outside World Zone 1

If this is a domestic call or an international call inside World Zone 1, it proceeds to address digit processing with a new customer group and NCOS from the NACUSGRP and NANCOS fields in table ANIDATA.

If it is an international call outside World Zone 1 and if the appropriate tuple in ANIDATA does not allow IDDD calls, the call is sent to IDDD prohibited treatment.

If it is an international call outside World Zone 1 and the appropriate tuple in ANIDATA allows IDDD calls, the call proceeds to address digit processing with a new IDDD customer group and NCOS obtained from the INTLCGRP and INTLNCOS fields in ANIDATA.

ANI datafill examples

When listing table ANIDATA at the MAP, fields 2 and 3 or 2 through 9 are listed under the heading REFAREA. This heading indicates that the area where these fields are stored is refineable (varies according to the key). Table 11-3 illustrates valid datafills for table ANIDATA and also the order in which the ANI tuples are displayed. When table control LIST ALL is executed, all ANI tuples present in the database are displayed in numerical order, based on the following assumptions:

- Table control internally treats an NPA type ANI (3-digit) as a 10-digit ANI by having seven zeros follow the 3-digit NPA. For example, 214 (NPA type ANI) is treated as 2140000000 by table control commands first key, last key, next key, previous key, and list.
- Table control internally treats an NXX type ANI (6-digit) as a 10-digit ANI by having four zeros follow the 6-digit NPA. For example, the 214424 (NXX type ANI) is treated as 2144240000 by table control commands first key, last key, next key, previous key, and list.

Table 11-3
Table ANIDATA datafill examples

ANIDIGS	REFAREA	
2015677493	SUB	NOTALLOW
214	NPA	CASUAL
219	NPA	NOTALLOW
315	SUB	ALLOW CUSTGRP2 1 Y Y Y CUSTGRP4 9
404	SUB	CASUAL

Table 11-3
Table ANIDATA datafill examples (continued)

416	SUB	ALLOW CUSTGRP5 1 N Y N
504	NPA	CASUAL
504	NXX	CASUAL
817	NXX	NOTALLOW
905	NPA	CASUAL
905	NXX	NOTALLOW
905	SUB	ALLOW CUSTGRP9 8 Y N Y CUSTGRP8 8

Accessing table ANIDATA

When an attempt is made to access a 10-digit ANI that has not been datafilled into the ANIDATA table, the STATUS field associated with the ANI at the NPA-NXX level is returned if the NPA-NXX has been datafilled.

If the 6-digit ANI has not been datafilled, the STATUS field at the NPA level is returned. If the NPA of the ANI has not datafilled (that is, when there is no data present at any ANI level), the NOT FOUND code is returned.

A 3-digit ANI (NPA) can be screened only at the NPA level. If the NPA of ANI has not been datafilled, the NOT FOUND return code is returned.

- EXAMPLE 1

  Assume that an attempt is made to screen ANI 2143012323 and this 10-digit ANI has not been datafilled in the ANIDATA table. Assume that the STATUS field has not been datafilled for ANI 214301, but that the STATUS field for ANI 214 is CASUAL. The CASUAL field is returned.

- EXAMPLE 2

  Assume that an attempt is made to screen ANI 2015677493 and this 10-digit ANI has not been datafilled in the ANIDATA table but neither 6-digit ANI 2015467 nor 3-digit 201 have had their STATUS fields datafilled. The call is sent to ANI Database Failure (ADBF) treatment.

To illustrate the ANI Screening process described previously, Table 11-4 contains examples based on the datafill shown in Table 11-3.

Table 11-4
Datafill examples

ANI to be Screened	Result
3158271323	Data associated with ANI is returned.
5047756565	CASUAL (STATUS) is returned from NXX level.
2143012323	CASUAL (STATUS) is returned from NPA level
219	NOTALW (STATUS) is returned from NPA level.
5184827428	NOT FOUND is returned.

Address digit screening on N00 calls

After the ANI stream has been processed, the address digits are examined. For N00 dialed digits, translations may indicate NSC Replacement of Dialed Digits is required. This indicator is found in Table HNPACONT/Subtable HNPACODE. If NSC processing is necessary, the system accesses the Replacement of Dialed Digits (RDD) database (either locally or remotely) to search for the N00 digits. If N00 digits are found in the database, the destination digits associated with the N00 number are retrieved and returned to call processing for retranslation and call routing. If N00 digits are not found in the RDD database, the system routes the call to the failure route specified in Table NSCDEFS.

Datafill examples

Tables 11-5 and 11-6 show datafill related to ANI screening and information digit screening with the datafill for an NSS FGD trunk (Figure 11-4 and Table 11-7).

Table 11-5
Table STDPRT, subtable STDPRCT datafill example

EXPRTNM IDTRN FROMDIGS	TODIGS	PRERTSEL	CALLCOND	ALTCUST	ALTCOS
00	00	ID	CONT		
10	10	ID	TEST		
129	129	ID	INTDD		
02	02	ID	STOP		
99	99	ID	ALTXLA	BNRRCH	20

Table 11-6
Table ANIDATA datafill example

ANIDIGS	REFAREA
214	NPA CASUAL
219	NPA NOTALW
817517	NXX NOTALW
504775	NXX CASUAL
219445	NXX CASUAL
4045495811	SUB CASUAL
2015677493	SUB NOTALW
3158271323	SUB ALLOW BNRRCH 1 Y Y Y BNRINTL 9
4165050228	SUB ALLOW BNRRCH 1 N Y N
2194455729	SUB ALLOW BNRRCH 1 N N N

Figure 11-4
Example 1, Table TRKGRP

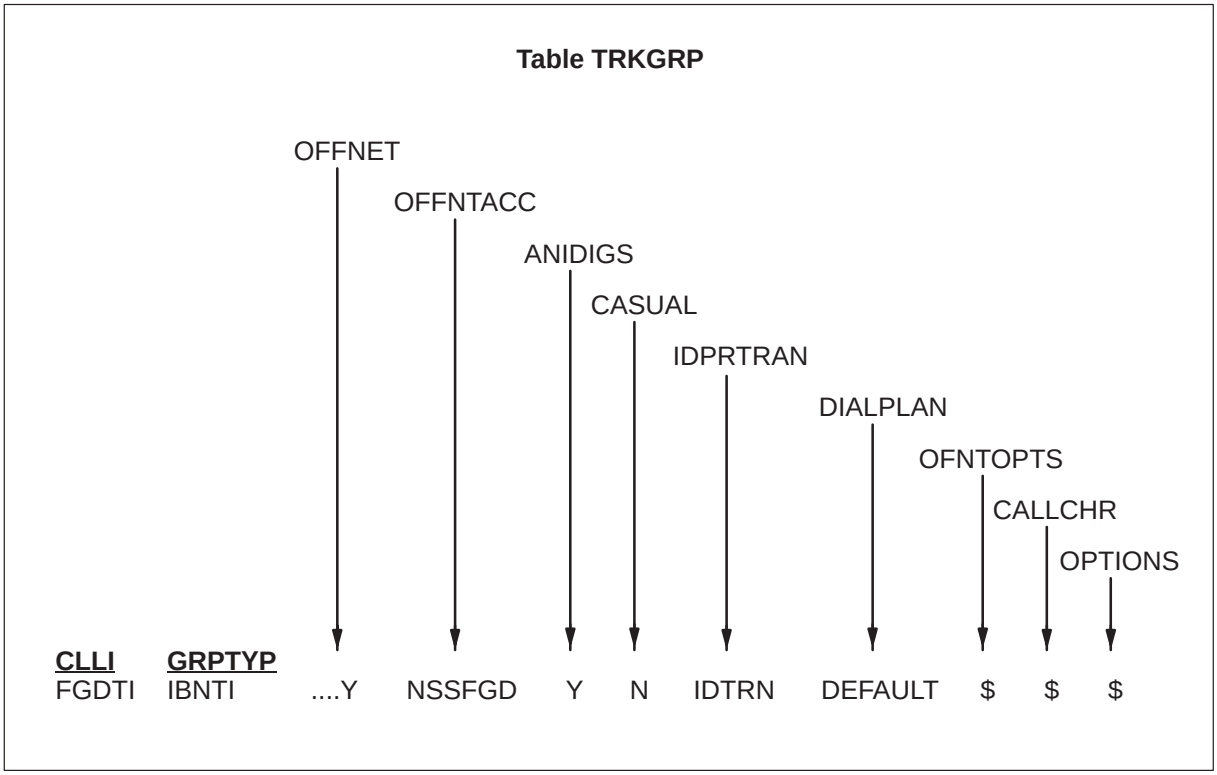


Table 11-7 is a sample of the ANI data that might be received on the trunk shown in Figure 11-4, along with the result of ID and ANI screening for each situation.

Table 11-7
Sample ANI data

ANI received	Result	Comments: Treatment
KP+00+2144293917+ST	blocked	trunk does not allow casual caller; ANIA
KP+00+2144293917+STP	routed	cut-through call; ANI not screened
KP+02+2144293917+STP	blocked	cut-through call; blocked by ID; ADBF
KP+00+4165050228+ST	routed	customer group and NCOS from TRKGRP overwritten by ANIDATA
KP+02+3158271232+ST	blocked	blocked by ID screening; ADBF

—continued—

Table 11-7
Sample ANI data (continued)

ANI received	Result	Comments: Treatment
KP+99+3158271232+ST	routed	customer group and NCOS from STDPRT overwritten by ANIDATA
KP+ST KP+129+444+555+ST	blocked	ANI is expected for this trunk; ADBF
KP+99+3158271323 KP+129+444+555+ST	routed	IDDD customer group and NCOS from ANIDATA
KP+00+4165050228	blocked	IDDD not allowed for this ANI; IDPB
KP+145+222+012+ST KP+00+4165050228+ST	blocked	1NX not datafilled; sent to VACT

—end—

Figure 11-5
Example 2, table TRKGRP

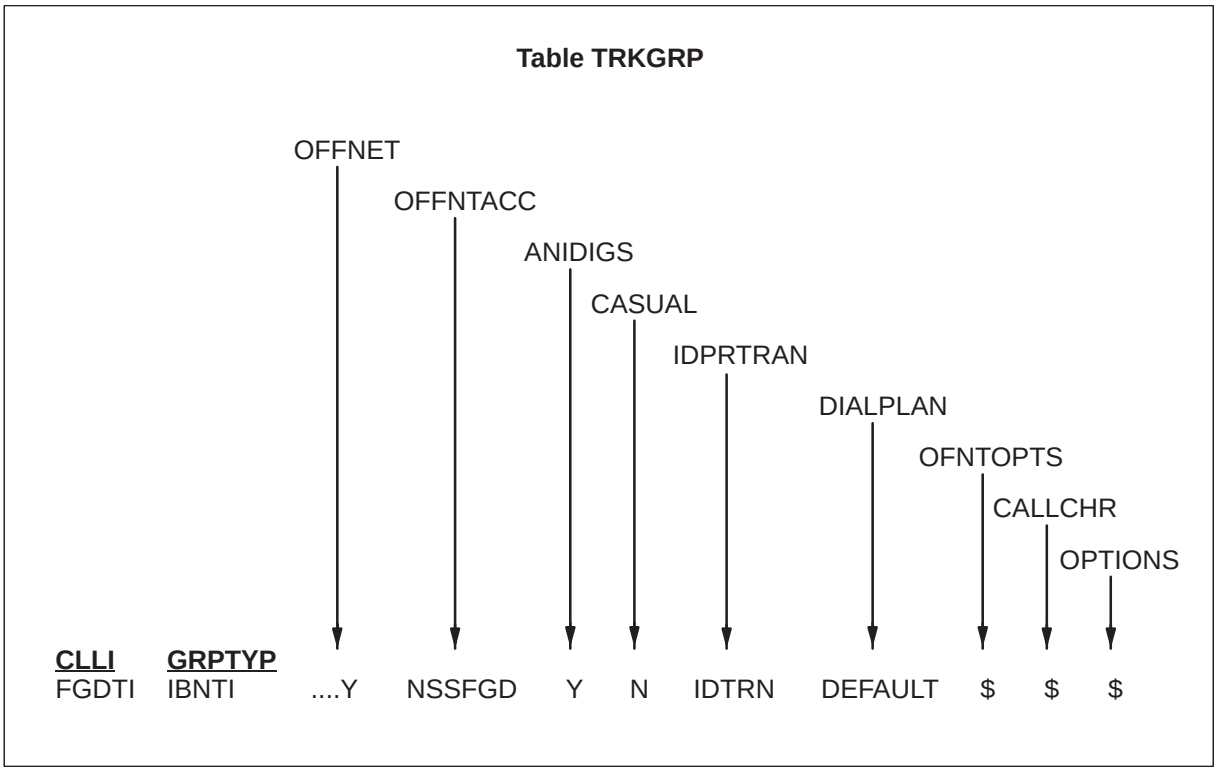


Table 11-8 shows a sample of the ANI that may be received on the trunk shown in Figure 11-5, along with the result of ID and ANI screening for each situation.

Table 11-8
Sample ANI data

ANI received	Result	Comments: Treatment
KP+00+2144293917+ST	Routed	Casual calls allowed on this trunk from this NPA
KP+00+2194453222+ST	Routed	Casual calls allowed on this trunk from this NXX
KP+00+2194467321+ST	Blocked	Casual calls not allowed from other NXXs in this NPA; ANIA
KP+00+2194455729+ST	Routed	Customer group and NCOS from TRKGRP overwritten by ANIDATA

Overriding customer group and NCOS

The previous examples show two ways that the current customer group and NCOS of an NSS FGD call can be overridden. The customer group and NCOS of the incoming trunk can be overridden by the ALTXLA result in table STDPRT, changing the current customer group and NCOS for this call. The customer group and NCOS, whether taken from the incoming trunk or ALTXLA, can be overridden again by a SUB tuple in table ANIDATA.

There are several later events that still update the current customer group and NCOS before the call is routed.

The following is a summary of the various methods that NSS translations can use to override the current customer group and NCOS of an incoming FGD call.

- The Authorization Code overrides the current NCOS, thus allowing greater flexibility and privileges to the subscriber. Therefore, the current customer group and the NCOS of the dialed Authorization Code are used to define the translations for the dialed destination digits.
- The Authorization Code can also include an optional customer group, datafilled in the options area in table AUTHCDE. This customer group, when datafilled, overrides the current customer group. This new customer group and new NCOS of the dialed Authorization Code are used to define the translations for the dialed destination digits. Table 11-9 is an example of datafill needed to achieve this.

Table 11-9
Table AUTHCODE example

AUTHPART	AUTHCODE	FORMAT	NCOS . .	OPTIONS	CUSTGRP
APART1	12345	IBN	12 . .	$	
APART2	23456	IBN	24 . .	CUSTGRP	CUSTGRP1
APART2	927502	IBN	0 . .	CUSTGRP	CUSTGRP2

Travel Card Number

The Travel Card Number (TCN) overrides the current NCOS of the call, thus allowing greater flexibility and privileges to the subscriber. The current customer group of the call and the NCOS of the dialed TCN are used to define the translations for the dialed destination digits.

The TCN also includes an optional customer group, datafilled in table TCNDATA, which overrides the current customer group for the call. This new customer group and new NCOS of the dialed TCN are used to define the translations for the dialed destination digits.

Refer to Table 11-10 for an example of datafill needed to access this method.

Table 11-10
Table TCNDATA example

CARDUM	CUSTSEL	CUSTGRP	NCOS	ACCT	ALLOW
29874356198473	N		2	Y	Y
36513987561487	N		18	Y	Y
90176453293242	Y	CUSTGRP1	111	N	Y
29847562914375	Y	CUSTGRP2	199	N	N

Replacement of Dialed Digits (RDD) Translations

The dialing of an N00 number (400/800 INWATS, 700, or 900) can override the current NCOS, thus allowing greater flexibility and privileges to the subscriber. The NCOS of the dialed N00 number is obtained from a different set of tables depending on the RDD search method used as described below:

— If RDD search method is “in-switch”, then a new NCOS is derived from Table REPLDATA.

— If RDD search method is both or remote, then a new NCOS is derived from Tables REPLDATA, COSMAP, COSDATA, and NSCDEFS.

The current customer group for the call and the new NCOS are used to define translations for the dialed destination digits. Figures 11-6 and 11-7 are examples of the datafill needed for Replacement of Dialed Digits (RDD) translations.

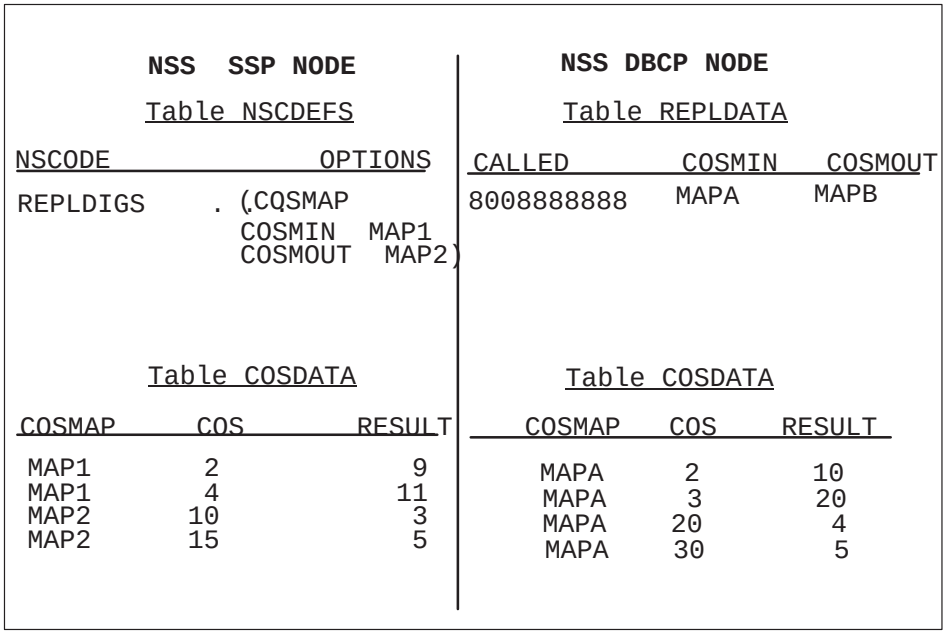
Figure 11-6
Example datafill for Table COSMAP

NAME	MAX	SCREEN	VALTYPE
Map1	250	Allow	Anything
Map2	250	Allow	Anything
Map3	250	Allow	Anything

Legend:

```
Name = mapping name which indexes into COSDATA
Max = maximum value for a valid NCOS
Screen = type of screening to be done on the original NCOS
Valtype = restrictions user may place on mapping results
```

Figure 11-7
Example datafill for full NCOS mapping



NSS SSP NODE

Table NSCDEFS

NSCODE	OPTIONS
REPLDIGS	. (CQSMAP COSMIN MAP1 COSMOUT MAP2)

Table COSDATA

COSMAP	COS	RESULT
MAP1	2	9
MAP1	4	11
MAP2	10	3
MAP2	15	5

NSS DBCP NODE

Table REPLDATA

CALLED	COSMIN	COSMOUT
8008888888	MAPA	MAPB

Table COSDATA

COSMAP	COS	RESULT
MAPA	2	10
MAPA	3	20
MAPA	20	4
MAPA	30	5

Logs

When a call is sent to treatment, a log is output corresponding to that treatment. Two logs, NSS100 and NSS101, have been added to the log system to report NSS specific failures. Following is an explanation of these reports.

- NSS100 log report—ANI_NOT_FOUND_IN_ANIDATA. Search for ANI in table ANIDATA was unsuccessful.
- INFO_DIGIT_TRANSLATION_ERROR. A selector other than ID was found in STDPRT, or the information digits were not found in STDPRT.
- TEST_CALL_TRANSLATION_ERROR. TEST translation result in STDPRT, but digits are not in proper format.
- INTDD_TRANSLATION_ERROR. Digits not in correct format for INTDD call.
- INVALID_ANI_LENGTH. ANI digits were received, but not in correct format.
- NSS101 log report—ANI_EXPECTED_NOT_RECEIVED. No ANI digits received, but ANIDIGS = Y in TRKGRP.

Restrictions and limitations

This feature has the following incompatibilities, limitations, and restrictions:

- No ambiguity can exist between information digits and 1NX. This means that information digits should not be 1N. Therefore, they are restricted to 00–10 and 20–99.
- The information digit translation result TEST should be datafilled in compliance with the standard information digit usage described in the following Bellcore references. That is, only information digits of 10 or 95 should have the test translation result datafilled
  - — Bell Communications Research TR-NPL-000275, Notes on the Inter-LATA Networks, 1986.
  - — Bell Communications Research TR-NPL-000258, Compatibility Information for Feature Group D Switched Access Service.
- For NSS FGD cut-through calls, the dial plan entered in table TRKGRP must be dial plan type cut-through.
- For NSS FGD pure calls, the DIALPLAN field in table TRKGRP must contain a valid dial plan name.
- If ANI is received when ANI is not expected (ANIDIGS = N in TRKGRP), the ANI is handled in the same manner as if it was expected.
- If field IDPRTRAN in table TRKGRP specifies {NPRT} and if information digit screening is performed for calls on this trunk, treatment is set to VACT.
- No new capabilities are added to the FGD stand-alone feature.
- Transitional dialing (950-XXXX) under the Interim Plan does not support international signaling inside World Zone 1.

NSS dedicated access trunk interface

A dedicated access trunk (DAT) provides a dedicated connection between a Network Services System (NSS) node and a private branch exchange (PBX), key system, or single telephone. Originating and two-way access is supported over.

- loop start foreign exchange station (FXS) arrangements
- ground start FXS arrangements
- ground start foreign exchange office (FXO) arrangements
- IBN per trunk signaling (PTS) and primary access rate (PRI) tie trunk arrangements

IBNTI trunks are used for originating only access and IBNT2 trunks are used for two-way access. Whether the IBN trunk used in a DAT interface is in a ground or loop start FXS, ground start FXO, or tie trunk arrangement depends on the interface requirements of the PBX, key system, or single telephone at the other end of the trunk.

DAT attributes

Dedicated access trunks, DATs, are of the following types:

- IBN per trunk signaling (PTS)
- IBN primary rate interface (PRI)
- IBN foreign exchange office (FXO)
- IBN foreign exchange station (FXS)

IBNTI and IBNT2 trunks

IBNTI trunks are used for originating access and the IBNT2 trunks are used for two-way access. For DAT cut-through trunks, the BILLDN field in table TRKGRP is used to access meridian office access (MONA). The MONA directory number (DN) must be datafilled according to the NSS translation scheme. (The trunk group's customer group and Network Class of Service (NCOS) are used to translate the MONA DN.)

IBN PTS cut-through trunks

IBN PTS cut-through trunks have the DS1SIG card code and use immediate start signaling protocol to access the NSS node. Incoming signaling protocol from IBN PTS trunks is specified by trunk subgroup field ISTARTSIG. This must be datafilled as immediate start. The in-pulse type is nil pulsing.

IBN PTS senderized trunks

IBN PTS senderized trunks have the DS1S1G card code and use wink or dial delay start signaling protocol to access the NSS node. The in-pulse type is MF, DP, or DTMF pulsing.

IBN PRI senderized trunks

IBN PRI senderized trunks have DS1S1G card codes and use ISDN signaling protocol to access the NSS node.

IBN FXO trunks

IBN FXO trunks have DS1FXO card codes and use GROUND start signaling protocol. Outgoing signaling protocol for IBN PTS trunks is specified by trunk subgroup field OSTARTSIG. This must be datafilled as ground start.

IBN FXS trunks

IBN FXS trunks have DS1FXSGS or DS1FXSLS card codes and use ground start or loop start signaling protocol to access the NSS node. Incoming signaling protocol for IBN PTS trunks is specified by trunk subgroup field ISTARTSIG. This must be datafilled as ground or loop start.

DAT dialing plan

For incoming calls, DATs are configured for either: 1) cut-through PBX, key system access, or single telephone access where the caller dials from NSS node dial tone, or 2) senderized access where the caller dials from PBX dial tone.

Cut-through access dialing plan

NSS node dial tone is returned when seizure and ringing are detected on a dedicated access trunk. The caller then dials from NSS node dial tone.

In cut-through access, optional authorization digits, personal identification number PIN digits, or account digits are expected before the destination digits. If travel card number (TCN) digits are dialed instead of authorization digits, they are dialed after the destination digits. An account code can optionally be required after the destination digits based on the authorization digits or travel card digits entered or the route taken by the call.

The following is an example of the NSS node cut-through PBX auth code dialing plan.

```
SDT + (AUTH) + (PIN) + (AC) + PT + DEST DN + (<PT> + AC)
```

where:

SDT—special dial tone

AUTH—authorization code

PIN—personal identification number

AC—account code

PT—prompt tone

DEST DN—destination directory number

( )—optional fields

< >—required fields

Refer to the appendixes at the end of this manual for a list of dial plans.

Senderized PBX access dialing plan

In senderized PBX access, the destination digits are collected by the PBX, an idle DAT to the NSS node is seized, and the digits are sent to the NSS node once a Proceed to Send signal is received.

The destination digits are the first digits expected after seizure and ringing are detected on the incoming DAT. An account code can optionally be required after the destination digits based on the DAT ACCT field in table DIALPLAN. The NSS collects the account code digits if required.

Originating access

DAT originating access refers to a call coming into the NSS node from a PBX, key system, or single telephone over a DAT. Loop start FXS, ground start FXS, ground start FXO, and tie trunk arrangements are supported for originating access.

As previously stated, for originating access from a PBX, integrated business network (IBN) PTS dedicated access trunks can be configured for either: 1) cut-through access where the caller dials from NSS node tone, or 2) senderized access where the caller dials from PBX dial tone. IBN PRI DATs are configured only for senderized access. FXS and FXO DATs are configured only for cut-through access.

For originating access from a key system or single telephone, the caller always dials from NSS node dial tone.

Cut-through PBX access

NSS node dial tone is returned when seizure and ringing are detected on a DAT. The caller then dials from NSS node dial tone. In cut-through access, optional authorization digits, account digits, or PIN digits are expected before the destination digits. If travel card number (TCN) digits are dialed instead of authorization digits, they are dialed after the destination digits. Optionally, an account code can be required after the destination digits based on the authorization digits or travel card digits entered or the route taken by the call. The authorization, PIN, TCN, account, and destination digits are received in DTMF format.

The DAT must provide disconnect supervision to the NSS node for cut-through PBX access.

To place a call through an NSS node using cut-through PBX access over a DAT, the following sequence occurs:

- Caller goes off-hook and receives dial tone from the PBX.
- Caller dials an access code to obtain a DAT to the NSS node.
- A DAT is seized to the NSS node and the NSS returns dial tone to the caller. Special dial tone is returned if an authorization code or a TCN is expected; otherwise, regular dial tone is returned.
- Caller dials from the NSS node dial tone. Caller enters the authorization, PIN, TCN, and account digits, as required, and the destination digits. If the authorization or TCN digits allow access to the NSS node, the call is routed based on the destination digits.

Senderized PBX access

In senderized PBX access, the destination digits are collected by the PBX, an idle DAT to the NSS node is seized, and the digits are sent to the NSS node once a Proceed to Send signal is received. The destination digits are the first digits expected after seizure and ringing are detected on the incoming DAT. An account code can be required after the destination digits based on the ACCT field in table DIALPLAN. The account code digits, if required, are collected by the NSS node.

To place a call through an NSS node using senderized PBX access over a DAT, the following sequence occurs:

- Caller goes off-hook and receives dial tone from the PBX.
- Caller enters the destination digits.
- PBX selects and seizes an idle DAT to the NSS node.

- NSS node returns ‘Proceed to Send’ signal to PBX and the PBX sends the digits. The destination digits are received in DTMF format.
- The PBX cuts the subscriber through to the NSS node as the call is routed.
- The NSS node returns special dial tone if an account code is required. Caller dials the account code from NSS node dial tone.

Key system and single telephone access

NSS node dial tone is required when seizure and ringing are detected on a DAT. The caller then dials from NSS node dial tone. The destination digits (and optionally the authorization digits, TCN, PIN, or account digits) are received in DTMF format. If allowed access to the NSS node, the call is routed based on the destination digits. An account code can be required after the destination digits based on the authorization or TCN digits entered or the route taken by the call.

The DAT must provide disconnect supervision to the NSS node for key system or single telephone access when authorization digits are part of the dialing plan.

To place a call through an NSS node from a key system or single telephone over a DAT, the following sequence occurs:

- Caller goes off-hook and receives a dial tone from the NSS node.
- Caller enters the optional authorization, TCN, PIN, or account digits, as required, and the destination digits.

Terminating access

DAT access refers to a call going from an NSS node to a PBX, key system, or single telephone over a DAT. Loop start FXS, ground start FXS, ground start FXO, or tie trunk arrangements are supported for terminating access.

Outgoing address signaling can be DP, MF, DTMF or nil pulse. The destinations that can be addressed are defined by the dialing plan of the PBX or key system for calls coming in over a DAT from an NSS node. For ground and loop start FXS arrangements, no digits are outpulsed. Ground start FXO arrangements use only DP or DTMF signaling.

FXO DATs connect to the line side of a PBX or key system, which do not generate supervisory signals for hardware answer supervision. Therefore, for billing purposes on a FXO DAT, audio signals generated from the called end determine when a called party has answered an outgoing call. In this case, an audio tone detector (ATD) is used to monitor the called end.

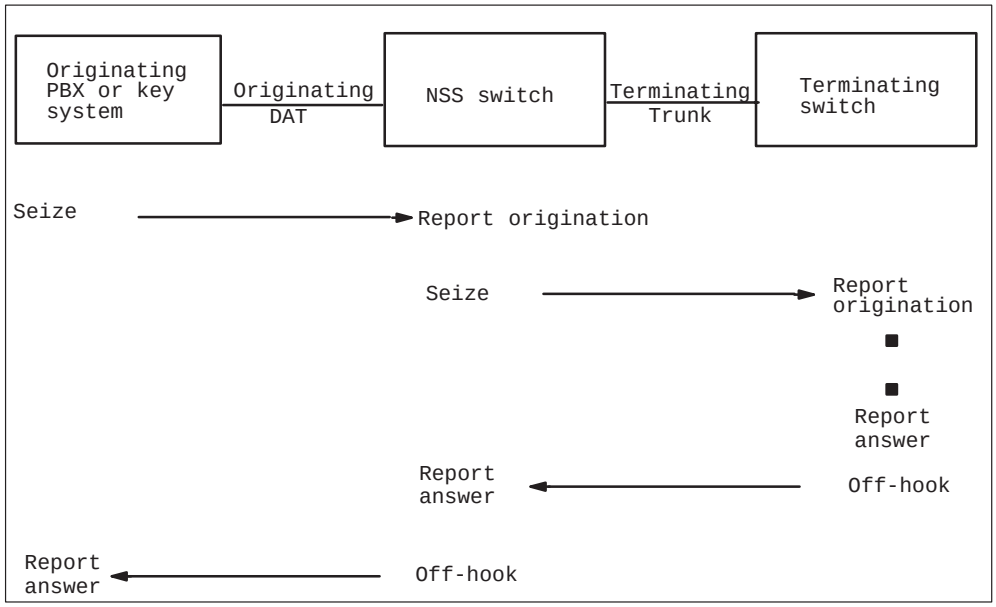
Return off-hook capability for DAT

A new offnet option, DATOFFHK, provides the capability to specify if and when an off-hook signal is given to an originating DAT's far end. IBN PTS DATs support the DATOFFHK option for both senderized and cut-through PBX access. PRI, FXO, and FXS DATs do *not* support the DATOFFHK option.

Return off-hook types for DAT

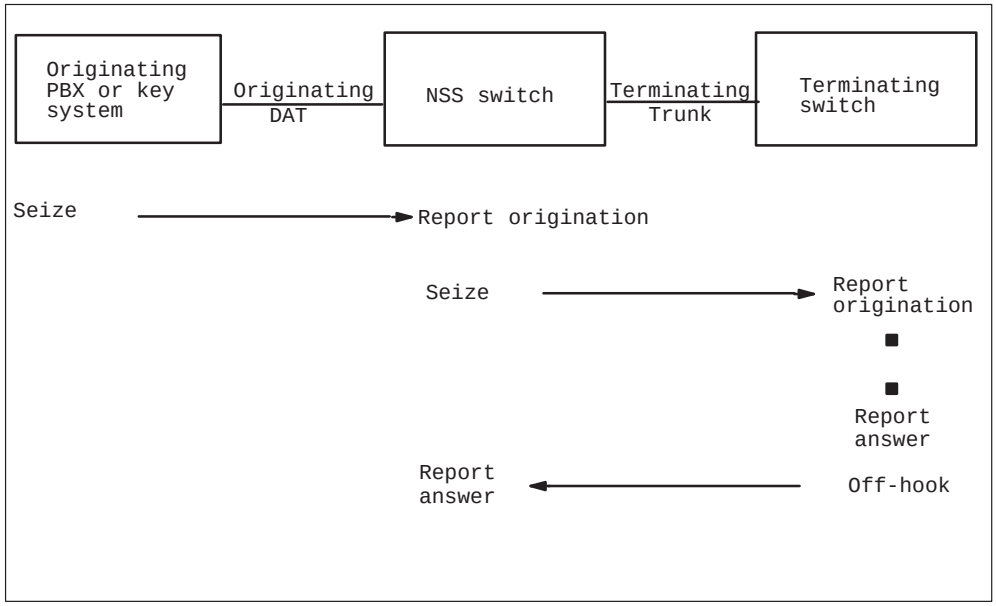
If the DATOFFHK option is not present, the DAT is supervised as a normal IBN trunk. During normal trunk-to-trunk supervision, when the tandem switch (the NSS node in this case) sees an off-hook on the terminating trunk, an answer message is reported. The off-hook is then propagated to the originating trunk (the DAT in this case). This is presented in Figure 12-1. In return off-hook terms, this is referred to as after answer detected (AAD).

Figure 12-1
Off-hook sent after answer detect



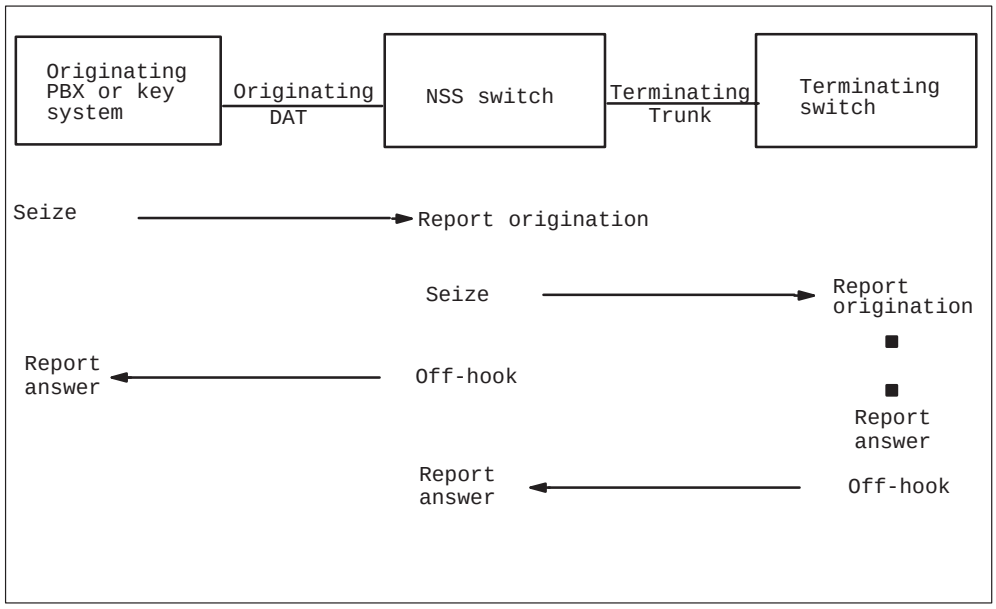
The DAT return off-hook option provides two alternatives to AAD. The first option is to have the DATOFFHK option present and specified as NIL (not sent). With this option, the off-hook signal is never given to the DAT's far end. Figure 12-2 illustrates the DAT return off-hook supervision in which the NSS never sends off-hook to the far end of the incoming DAT.

Figure 12-2
Off-hook sent after answer detect



The second option is to specify DATOFFHK as after outgoing seizure (AOS). With this option, off-hook is given to the far end of the DAT following the seizure of the trunk to which the DAT is terminating. This option is illustrated in Figure 12-3.

Figure 12-3
Off-hook sent after outgoing seizure



SMDR billing for DATs

Table 12-1 contains the fields that are used in the Station Message Detail Recording (SMDR) billing records for DAT calls.

Table 12-1
SMDR fields for DAT calls

Name	Description
MSN_ORIG	NSS Origination call type (DAT)
MSN_ACCESS_DN	NSS Access Directory Number
MSN_BILLDIGS	The filling number of DAT senderized trunks from field BILLDN in table TRKGRP.

DAT table control

A value, DAT, is added to field OFNTACCTYP in Table TRKGRP to indicate a dedicated access trunk. IBN PTS IBNTI and IBNT2 trunks and IBN PRI IBNT2 trunks can be datafilled as DAT trunks. For DAT FXS trunks, new card codes, DS1FXSGS and DS1FXSLS, are added.

An exec lineup, DTCFX, has been added. DAT FXS must use this exec lineup. All DAT, FGA, FGB and FGD trunks also can use this exec lineup. The DTCFX exec lineup must be datafilled in Table LTCINV against ABTRKS for the LTC or DTC to be used.

Datafill examples

Table 12-2 shows how to datafill tables for IBN PTS cut-through DATs.

Table 12-2
Example datafill for IBN PTS cut-through DATs

Table TRKGRP

CLLI	GRPTYPE	BILLDN	OFFNTACC	DIALPLAN
DATTK	IBNTI		DAT	

Field GRPTYPE must be datafilled IBNTI or IBNT2.

—continued—

Table 12-2
Example datafill for IBN PTS cut-through DATs (continued)

Table TRKGRP

Table TRKSGRP

CLLI	SGRPKEY	CARDCODE	ISTARTSG	IPULSTYP
DATTK	IBNTI	DS1SIG	IM	NP

Field SGRPKEY must be IBNTI or IBNT2.

For field CARDCODE, DS1SIG is the card code used for IBN PTS trunks. IBN tie trunks are used.

For field SIGDATA, use standard protocol for call processing.

For field ISTARTSG, use immediate start as start signaling.

For field IPULSTYP, use nil pulse as pulse type.

For field OSTARTSG, use immediate start as start signaling.

For field OPULSTYP, use DP, DTMF, or MF pulsing.

—end—

Table 12-3 is an example of how to datafill tables for IBN PTS senderized DATs.

Table 12-3
Example datafill for IBN PTS senderized DATs

Table TRKGRP

CLLI	GRPTYPE	BILLDN	OFFNTACC	OFFNTACC	DIALPLAN
DATTK	IBNTI		DAT	DAT	

Field GRPTYPE must be datafilled IBNTI or IBNT2.

Field BILLDN contains the billing number to store in the MSN_BILLDIGS field of the NSS SMDR.

Table TRKGRP

CLLI	SGRPKEY	CARDCODE	ISTARTSG	IPULSTYP
DATTK	IBNTI	DS1S1G	WK	MF

Field SGRPKEY must be IBNTI or IBNT2.

For field CARDCODE, DS1SIG is the card code used for IBN PTS trunks. IBN tie trunks are used.

For field SIGDATA, use standard protocol for call processing.

For field ISTARTSG, use wink start as start signaling.

For field IPULSTYP, use MF, DP, or DTMF as pulse type.

Table 12-4 is an example of how to datafill tables for IBN PRI senderized DATs.

Table 12-4
Example datafill for IBN PRO senderized DATs

Table TRKGRP

CLLI	GRPTYPE	SELSEQ	OFFNTACC	DIALPLAN
PRA	IBNT2	IASEQ	IDAT	

Field GRPTYPE must be datafilled IBNTI or IBNT2.

Field SELSEQ should be ASEQ or DSEQ, while the other end of the trunk uses the opposite value.

Field BILLDN contains the billing number to store in the MSN_BILLDIGS field of the NSS SMDR.

Table TRKGRP

CLLI	GRPTYPE	SELSEQ	OFFNTACC	DIALPLAN
DATPRA	IBNT2	IDS1S1G	ISDN	AC10024

Field SGRPKEY must be IBNT2.

For field CARDCODE, DS1SIG is the card code used for IBN PRI trunks. IBN tie trunks are used.

For field SIGDATA, use ISDN protocol for call processing.

For field DCHNL, the main D-channel is made up of the IACNO, IACCKTNO, and IACCKTTS.

Table 12-5 illustrates how to datafill tables for IBN FXS dedicated access trunks.

Table 12-5
Example datafill for IBN FXO DATs

Table TRKGRP

CLLI	GRPTYPE	BILLDN	OFFNET	OFFNTACC
FXO	IBNT2	I6137225000	I Y	DAT

Field GRPTYPE must be datafilled IBNTI or IBNT2.

Field BILLDN contains the billing number to store in the MSN_BILLDIGS field of the NSS SMDR.

Table TRKGRP

CLLI	SGRPKEY	CARDCODE	OSTARTSG	OPULSTYP
FXO	IBNT2	IDS1FXO	I GD	DP

Field SGRPKEY must be IBNT2.

—continued—

Table 12-5
Example datafill for IBN FXO DATs

Table TRKGRP
For field CARDCODE, DS1SIG is the card code used for IBN PRI trunks. IBN tie trunks are used.

For field SIGDATA, use ISDN protocol for call processing.

For field ISTARTSG, use ground start as start signaling.

For field IPULSTYP, use nil pulse.

For field OSTARTSG, use ground start signaling.

For field OPULSTYP, use DP or DTMF pulse.

—end—

Table 12-6 illustrates how to datafill tables for IBN FXS dedicated access trunks.

Table 12-6
Example datafill for IBN FXS DATs

Table TRKGRP

CLLI	GRPTYPE	BILLDN	OFFNTACC
FXS	IBNT2	I6137225000	DAT

Field GRPTYPE must be datafilled IBNTI or IBNT2.

Field BILLDN contains the billing number to store in the MSN_BILLDIGS field of the NSS SMDR.

Table TRKGRP

CLLI	SGRPKEY	CARDCODE	ISTARTSG	IPULSTYP
FXS	IBNTI	IDS1FXSGS	NP	NP

Field SGRPKEY must be IBNTI or IBNT2

For field CARDCODE, DS1FXSGS and DS1FXSLS are the card codes used for IBN FXS trunks.

For field SIGDATA, use standard protocol for call processing.

For field ISTARTSG, use ground start as start signaling.

For field IPULSTYP, use nil pulse.

Table 12-7 illustrates how to datafill table TRKGRP for return off-hook after outgoing seizure (AOS).

Table 12-7
Example datafill for return off-hook AOS

Table TRKGRP				
CLLI	GRPTYPE	OFFNTACC	OFNTOPT	OFFHKTYP
INDAT	IBNTI	DAT	DATAOFFHK	AOS

Table 12-8 illustrates how to datafill table TRKGRP for return off-hook not sent (NIL).

Table 12-8
Example datafill for return off-hook not sent

Table TRKGRP				
CLLI	GRPTYPE	OFFNTACC	OFNTOPT	OFFHKTYP
INDAT	IBNTI	DAT	DATAOFFHK	NIL

Signaling protocols

Tables 12-9 through 12-12 provide the characteristics of FXS ground start and FXS loop signaling protocols.

Table 12-9
Ground start incoming (FXS)

	Transmit to PBX		**Receive from PBX**		
	A	B	A	B	
Idle (tip open, no ring)	0	1	0	1	Idle (loop open no ring ground)
Outgoing seizure (ground on tip, ring)	0	0			Incoming seizure (loop open, ground on ring)
No ring (ground on tip, no ring)	0	1			
			1	1	Answer (trip) (loop closed, no ring ground)
Stable talking state (ground on tip, no ring)	0	1	1	1	Stable talking state (loop closed, no ring ground)

—continued—

Table 12-9
Ground start incoming (FXS) (continued)

	Transmit to PBX		Receive from PBX		
Clear forward (tip open, no ring)	1	1			
			0	1	Idle (loop open, no ring ground)
			0	1	Clear backward (loop open, no ring ground)

—end—

Table 12-10
Ground start outgoing (FXS)

	Transmit to PBX operator, trunk, telephone, or keyset		Receive from PBX		
	A	B	A	B	
Idle (tip open, no ring)	0	1	0	1	Idle (loop open no ring ground)
Outgoing seizure (ground on tip, ring)	0	0			Incoming seizure (loop open, ground on ring)
No ring (ground on tip, no ring)	0	1			
			1	1	Answer (trip) (loop closed, no ring ground)
Stable talking state (ground on tip, no ring)	0	1	1	1	Stable talking state (loop closed, no ring ground)
Clear forward (tip open, no ring)	1	1			

—continued—

Table 12-10
Ground start outgoing (FXS) (continued)

	Transmit to PBX operator, trunk, telephone, or keyset		Receive from PBX		
			0	1	Idle (loop open, no ring ground)
			0	1	Clear backward (loop open, no ring ground)

—end—

Table 12-11
Ground start incoming (FXS)

	Transmit to PBX		Receive from PBX		
	A	B	A	B	
Idle (tip open, no ring)	0	1	0	1	Idle (loop open no ring ground)
Outgoing seizure (ground on tip, ring)	0	0			Incoming seizure (loop open, ground on ring)
No ring (ground on tip, no ring)	0	1			
			1	1	Answer (trip) (loop closed, no ring ground)
Stable talking state (ground on tip, no ring)	0	1	1	1	Stable talking state (loop closed, no ring ground)
Clear forward (tip open, no ring)	1	1			
Idle (ground on tip open, no ring)	0	1	0		Idle (loop open)

—continued—

Table 12-11
Ground start incoming (FXS) (continued)

	Transmit to PBX		Receive from PBX		
Receiver attached (ground on tip, no ring and dialtone)	0	0			Incoming seizure (loop open, ground on ring)
Stable talking state (ground on tip, no ring)	0	1	1		Stable talking state (loop closed)
Idle (tip open, no ring)	0	1	0		Idle (loop open)

—end—

Table 12-12
Loop start outgoing (FXS)

	Transmit to PBX operator, trunk telephone or phone set		Receive from PBX		
	A	B	A	B	
Idle (tip open, no ring)	0	1	0	1	Idle (loop open no ring ground)
Outgoing seizure (ground on tip, ring)	0	0			Incoming seizure (loop open, ground on ring)
No ring (ground on tip, no ring)	0	1			
			1	1	Answer (trip) (loop closed, no ring ground)
Stable talking state (ground on tip, no ring)	0	1	1	1	Stable talking state (loop closed, no ring ground)
Clear Forward (tip open, no ring)	0	1			
	0	1	0		Idle (loop open no ring ground)

Interactions

The following interactions apply to dedicated access trrunk originating access.

Meridian offnet access (MONA)

The MONA feature is invoked once the NSS network has been accessed to collect authorization code, account code, PIN digits, travel card number, and the destination digits.

Authorization codes

The authorization codes (authcodes) feature is used to validate the collected auth code.

Account codes

The account code feature is used to collect an account code, if required by the attributes or the route taken by a call.

Personal identification numbers (PINs)

An auth code may have associated PIN digits that can be used to further identify the caller.

Travel card numbers

A travel card number is used to identify a caller when an authorization code does not apply.

Reset dialing

This feature is used to correct dialing mistakes made while dialing an authorization code, account code, PIN, travel card number, or the destination digits within MONA or the account code last feature. This feature is available only on DAT cut-through trunks that traverse MONA.

Call reorigination

This feature provides the ability to place another call from the NSS access digits, auth code or travel card number to access the NSS again. This feature is available only on DAT cut-through trunks that traverse MONA.

Hardware requirements

Audio tone detectors (ATD) are needed for ground start FXO trunks to reflect the correct billing information in the SMDR record. The card code for audio tone detectors is 5X29AC.

Restrictions and limitations

This feature has the following incompatibilities, limitations, and restrictions:

- UTRs are supported for digit collection on FXO and FXS DAT.
- DATs are only available as IBN incoming and two-way trunks, IBNTI and IBNT2 ground or loop start FXS, or tie trunk arrangements.
- All DAT cut-through calls must traverse MONA.
- DAT trunks are available on LTCs or DTCs.
- Reorganization is available only on DTCs.
- Reorigination is available only on DAT cut-through trunks.
- Reorigination is not available on DAT IBN PRI trunks.
- Reset dialing is not available on DAT IBN PRI trunks.
- Reset dialing is available only on DAT cut-through trunks.
- DAT FXS trunks are available only with exec lineup DTCFX.
- Reorigination on DAT FXO trunks is available only with exec lineup DTCFX.
- A warm SWACT is not supported on DAT FXS trunks.

DTMF and immediate start signaling on DATs

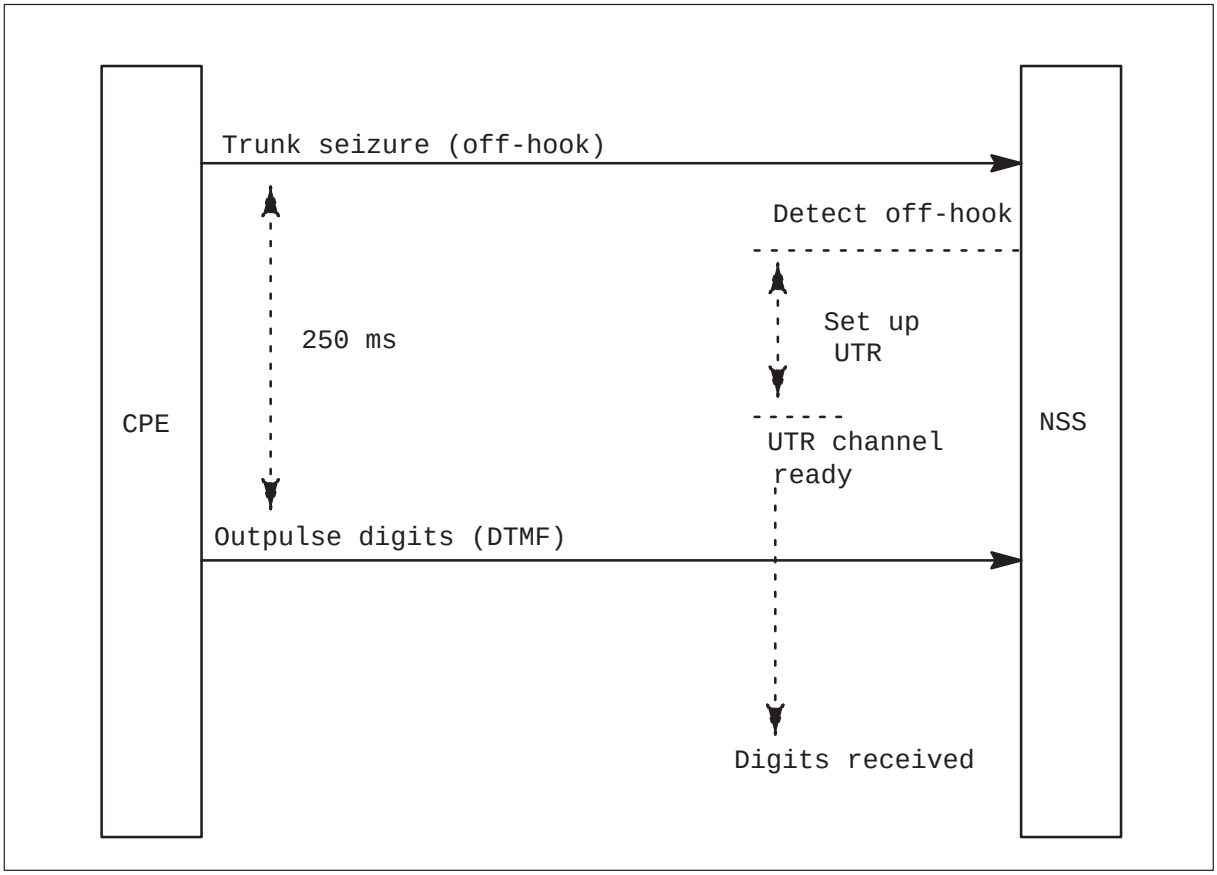
The DTMF and immediate start signaling feature allows NSS customers to interface with customer premise equipment (CPE) that supports this signaling scheme. This feature is supported on two-way IBNT2 trunks specified as Network services System (NSS) direct access trunk (DAT).

Signaling requirements

Certain customer premise equipment outpulses the address digits immediately after seizing the trunk rather than waiting for a start signal such as a wink. If the CPE is connected to an NSS switch, it should delay outpulsing of the address digits for a minimum of 250 ms rather than outpulsing them immediately after the trunk is seized when using DTMF and immediate start signaling. This delay should allow sufficient time for the NSS to set up a universal tone receiver (UTR) to collect the digits. Figure 13-1 illustrates DTMF and immediate start signaling where successful digit collection results.

If the CPE does not delay outpulsing for a sufficient period of time, the result will be digit outpulsing prior to establishing a UTR channel. This causes some digits to be lost and results in a partial dial error.

Figure 13-1
Successful digit collection using UTR

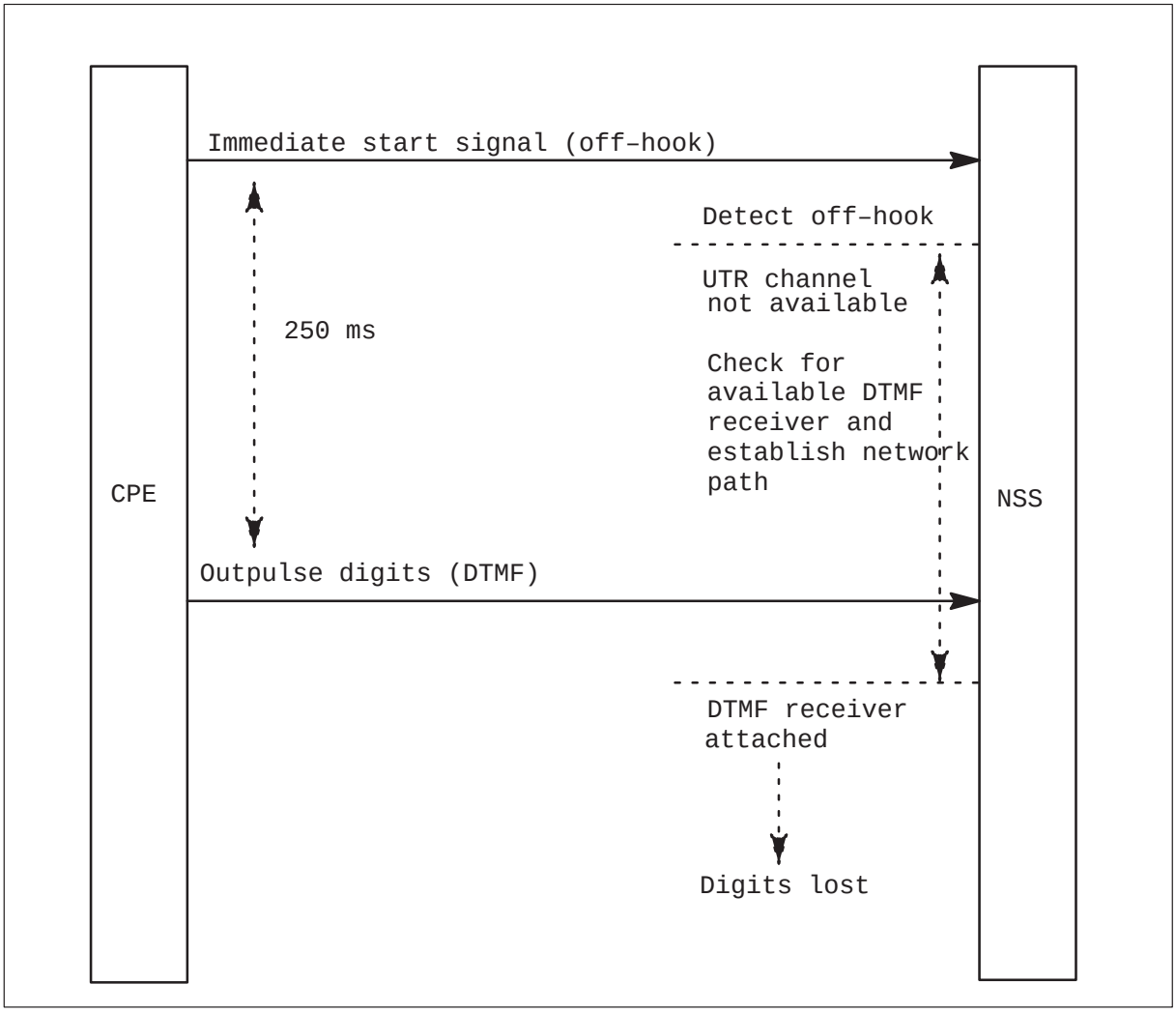


Universal tone receiver requirements

Universal tone receivers (UTR) are required to collect address digits for DTMF and immediate start signaling. UTRs must reside in a digital trunk Controller (DTC) and should be engineered for a grade of service such that a UTR is available at all times.

If a DTC is not configured properly, it is possible that a trunk member could be seized without an available UTR channel. If this occurs, the NSS attaches a DTMF receiver (if one is available) for address digit collection. However, a DTMF receiver requires a network path be established between the DTC (trunk) and maintenance trunk module (MTM) (dual tone multifrequency receiver). Should the time interval to perform this activity exceed the CPE's outpulsing delay, the dual tone multifrequency receiver is attached after digits are outpulsed. This results in lost digits. Figure 13-2 illustrates this potential DTMF receiver scenario using a DTMF and immediate start signaling trunk.

Figure 13-2
Example of DTMF and immediate start signaling using DTMF receiver



Trunk group and trunk subgroup datafill requirements

Because DTMF and immediate start signaling are only available for IBNT2 trunks specified as NSS DAT, the field OFFNET must be set to Y, and the field OFFNTACC in table TRKGRP must be set to DAT for this signaling combination to be operational

Datafill for table TRKSGRP involves setting the IPULSTYP field to DT and the ISTARTSG field to IM.

Figure 13-3 shows sample datafill for tables TRKGRP and TRKSGRP.

Figure 13-3
Examples of datafill for Tables TRKGRP and TRKSGRP

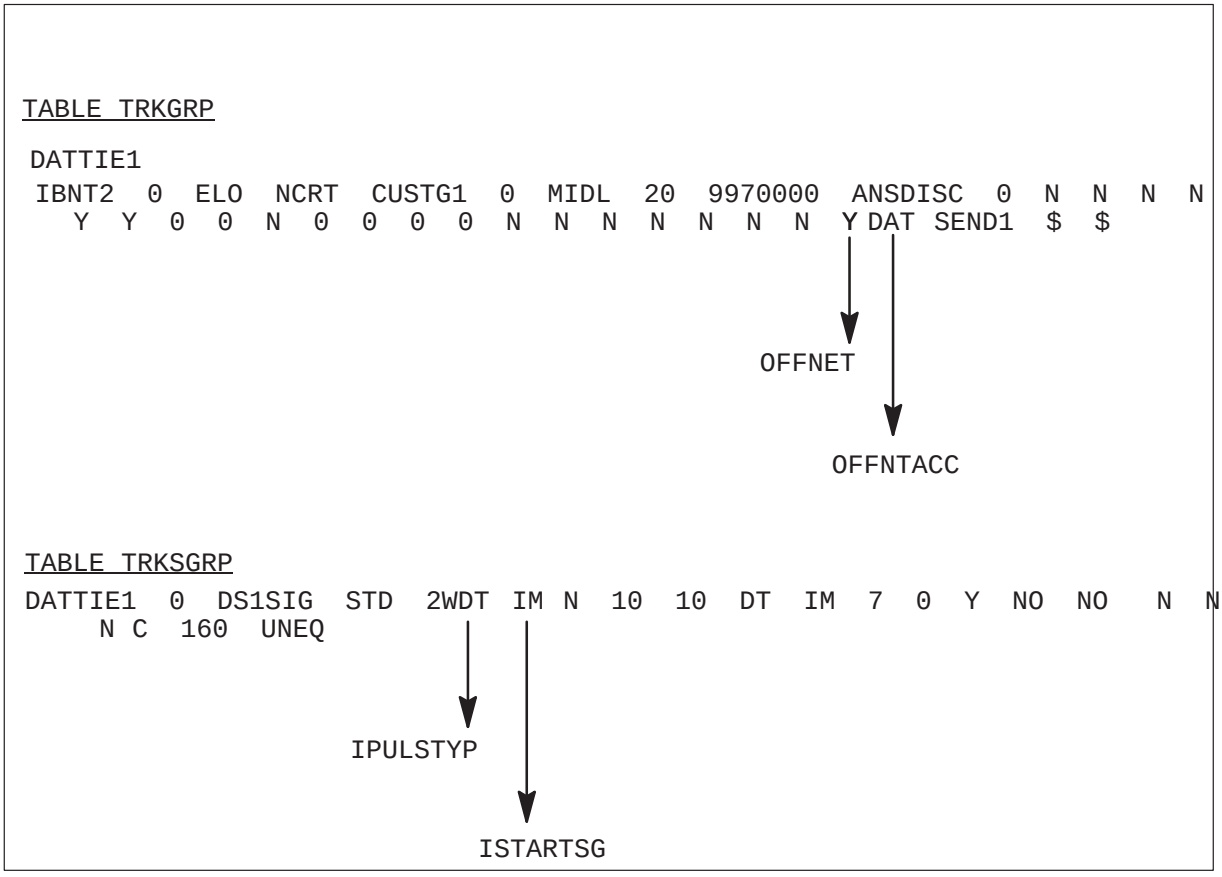


Table control

Updates for tables TRKGRP and TRKSGRP are accomplished using the Maintenance and Administration Position (MAP) along with human-machine interface (HMI) commands. During data modification sessions, Table Control is invoked to prevent invalid data from being entered. For the DTMF and immediate start signaling feature, Table Control checks table TRKGRP when an attempt is made to add a tuple to table TRKSGRP where IPULSTYP equals DT and ISTARTSG equals IM. It also performs this check when an existing tuple is changed to this configuration. Such entries cause Table Control to verify fields OFFNTACC and OFFNET in table TRKGRP to ensure they contain the appropriate information (that is, OFFNET equals Y and OFFNTACC equals DAT). If this is not the case, then a message is output on the MAP stating that this trunk signaling combination is not allowed.

Table DIALPLAN requirements

For Offnet DATs where DTMF and immediate start signaling is specified, the dialplan associated with the trunk group must be datafilled as ‘senderized’ in table DIALPLAN. This is because the DTMF and immediate start signaling scheme is not available for DAT cut-through dialing.

Feature dependencies

The DTMF and immediate start signaling feature requires the NSS dedicated access trunk (DAT) Interface software to function properly.

Hardware requirements

A DTC containing trunk members that use DTMF and immediate start signaling must have a UTR.

Restrictions and limitations

The following is a list of restrictions and limitations for the DTMF and immediate start feature.

- Only IBNT2 trunks with OFFNET equal to Y and OFFNTACC equal to DAT in table TRKGRP may have IPULSTYP equal to DT and ISTARTSG equal to IM in table TRKSGRP.
- A DTC containing trunk members that use DTMF and immediate start signaling must use either DTCEX or DTCFX as the exec lineup.
- This feature is supported only on a DTC peripheral (not a DTCI).
- The CPE should delay outpulsing address digits after seizing the trunk for at least 250 ms. However, even this delay may be insufficient to prevent lost digits under certain circumstances. Reference the section on UTR requirements for further detail.
- The trunk configuration within each DTC must maximize the probability that a UTR channel will be available for digit collection when requested.
- A trunk member using DTMF and immediate start signaling may be seized when a UTR channel is not available. In this case, address digits may be lost and a partial dial error will result.
- An offnet DAT using DTMF and immediate start signaling cannot support cut-through dialing. The dialplan datafilled for such a trunk must be the senderized dialplan.

Offnet access dialing plan driver

The offnet access dialing plan driver feature provides Network Servicing System (NSS) with the ability to

- directly access the Meridian Offnet Access (MONA) feature without datafilling the access number in the BILLDN field of table TRKGRP. (This function is for cut-through calls only.)

  Note: The BILLDN field is valid only to BCS30.

- optionally specify translations by both customer group and NCOS through tables AUTHCDE, TCNDATA, and REPLDATA.
- override a destination only dialing plan and allow a new billing number to be entered.
- access the MONA feature through IBNTI or IBNT2 trunks by dialing a DN that has been assigned the MONA feature in table DNROUTE.
- define specific unique dialing plans on an individual trunk group or directory number (DN) feature basis.
- provide prompt tone capabilities.

Directly accessing the NSS network

Access to the NSS network is defined as being any one of the following cut-through access methods:

- Feature Group A (FGA)
- Feature Group B (FGB)
- Feature Group D (FGD) equal access plan (EAP) cut-through
- FGD 800 universal access
- dedicated access trunk (DAT) cut-through
- integrated business network (IBN)

Calls access the NSS MONA network by routing translations. MONA access is based on the datafill found in either

- table TRKGRP's BILLDN field for cut-through calls, or

- the number datafilled in table DNROUTE for FGD 800 UA calls

The offnet access dialing plan driver feature changes this method of MONA access. Now, the MONA feature is invoked directly, thereby providing a real-time improvement for all FGD 800 universal access (UA) and cut-through calls.

To invoke MONA, table TRKGRP must have the OFFNET field for IBNTI and IBNT2 trunks datafilled Y and the DIALPLAN field datafilled with a dialing plan name. (Refer to Table 14-1.) The dialing plan name in the OFFNET selector maps into table DIALPLAN, which defines the specific dialing plan used for all incoming calls on this trunk.

Table 14-1
Dialplan name access example

TABLE DIALPLAN

DIALPLAN	PLANTYPE	CTTYPE	INIT	ACCT	ACCT
DEST1	CUTTHRU	DESTONLY	PRMT	Y	PRMT
			SDT		D

OPT	OPTTCN	OPTIONS
AUTH	N	$
N		

TABLE TRKGRP

CLLI	GRPTYP . .	OFFNET	OFFNTACC .	DIALPLAN
TGRP1	IBNTI . .	Y	FGB	DEST1

OFNTOPT
$

Default tuple for table DIALPLAN

TABLE DIALPLAN

DIALPLAN	PLANTYPE	OPTIONS
DEFAULT	NONE	$

However, if the default tuple in table DIALPLAN is datafilled as the dial plan name, the incoming calls route through translations to gain access to NSS. This allows support of the FGD stand-alone feature, FGD on MSL-100. (Refer to bottom portion of Table 14-1, Default tuple for table DIALPLAN.) If the default tuple is used for any agency other than FGD, the calls go to treatment.

Note: As previously stated, NSS uses numerous access features (for example, FGA, FGB, FGD, DAT, N00 dialing, call reorigination/reset dialing). These features are explained throughout this manual. For a summary of the various access methods available to NSS, refer to the appendixes at the end of this manual.

Specifying destination translations

The Offnet Access Dialing Plan driver feature standardizes the various translation schemes for NSS. It also restricts the initial destination translations to be controlled by the customer group and Network Class of Service (NCOS) of the incoming trunk for both pure and cut-through calls.

This feature has the flexibility to override the NCOS and the customer group for the following types of calls:

- authorization calls
- travel card calls
- n00-type calls
- FGD automatic number identification (ANI)

The following is a summary of how NSS translations use the incoming trunk's customer group and NCOS. It defines

- the translations for the digits of the DESTDIGS field used for Trunk Group Hotline. For more details, refer to the chapter entitled *Private speed calling and hotline dialing*.
- the translations for destination digits when no authorization code or TCN is entered on cut-through calls.
- the translations for destination digits when no authorization code or travel card number (TCN) is entered on cut-through calls.
- the translations for destination digits when no ANI digits are received for FGD pure calls.

Authorization code

Authorization codes (authcodes) can override the incoming trunk's NCOS, thus allowing greater flexibility and privileges to the subscriber. Therefore, the customer group of the incoming trunk and the NCOS of the dialed authorization code can define the translations for the dialed destination digits.

The authorization code also can include an optional customer group which is datafilled as a part of the OPTIONS in table AUTHCDE. This customer group, when datafilled, overrides the customer group specified in the trunk

group datafill. The new customer group and NCOS of the dialed authorization code define the translations for the dialed destination digits.

Table 14-2 presents the tables and datafill needed.

Table 14-2
AUTHCODE example

AUTHPART	AUTHCODE	FORMAT	NCOS	OPTIONS . .	CUSTGRP
APART1	12345	IBN	12	$	
APART2	13456	IBN	24	CUSTGRP. .	CUSTGRP1
APART2	927502	IBN	0	CUSTGRP. .	CUSTGRP2

Travel card number

Like the authorization code, TCNs also are used to override the incoming trunk's NCOS, thereby allowing greater flexibility and privileges to the subscriber. The customer group of the incoming trunk and the NCOS of the dialed TCN are used to define the translations for the dialed destination digits.

The TCN also includes an optional customer group, datafilled in Table TCNDATA which overrides the customer group specified in the trunk group datafill. This new customer group and NCOS of the dialed TCN are used to define the translations for the dialed destination digits. Refer to Table 14-3 for more detailed information.

Table 14-3
TCNDATA example

CARDNUM	CUSTSEL	CUSTGRP	NCOS	ACCT	ALLOW
29874356198473	N		2	Y	Y
36513987561487	N		8	Y	Y
90176453293242	Y	CUSTGRP1	111	N	N
29847562914375	Y	CUSTGRP2	199	N	N

N00 translations

The dialing of an N00 number (400/800 INWATS, 700, or 900) can override the current NCOS, thus allowing greater flexibility and privileges to the subscriber. The NCOS of the dialed N00 number is obtained from a different set of tables depending on the RDD search method used as described below:

- If RDD search method is inswitch, then a new NCOS is derived from Table REPLDATA
- If RDD search method is both or remote, then a new NCOS is derived from Tables REPLDATA, COSMAP, COSDATA, and NSCDEFS.

The current customer group for the call and the new NCOS define the translations for the dialed destination digits.

Figures 14-1 and 14-2 are examples of the datafill needed for N00 Replacement of Dialed Digits (RDD) translations.

Figure 14-1
Example datafill for Table COSMAP

NAME	MAX	SCREEN	VALTYPE
Map1	250	Allow	Anything
Map2	250	Allow	Anything
Map3	250	Allow	Anything

Legend:

Name = mapping name which indexes into COSDATA
Max = maximum value for a valid NCOS
Screen = type of screening to be done on the original NCOS
Valtype = restrictions user may place on mapping results

Figure 14-2
Example datafill for full NCOS mapping

NSS SSP NODE

Table NSCDEFS

NSCODE	OPTIONS
REPLDIGS	(COSMAP COSMIN MAP1 COSMOUT MAP2)

Table COSDATA

COSMAP	COS	RESULT
MAP1	2	9
MAP1	4	11
MAP2	10	3
MAP2	12	5

NSS DBCP NODE

Table REPLDATA

CALLED	COSMIN	COSMOUT
8008888888	MAPA	MAPB

Table COSDATA

COSMAP	COS	RESULT
MAPA	2	10
MAPA	3	20
MAPB	20	4
MAPB	30	5

ANI screening of FGD pure calls

Using ANI screening for FGD pure calls to override the incoming trunk's NCOS and customer group also allows greater flexibility and privileges to the subscriber. The customer group and the NCOS obtained from table ANIDATA are used to define the translations for the dialed destination digits. Refer to Table 14-4 for the datafill needed.

Table 14-4
Table ANIDATA

ANIDIGS	REFAREA
214	NPA CASUAL
219	NPA NOTALW
817517	NXX NOTALW
504775	NXX CASUAL

—continued—

Table 14-4
Table ANIDATA (continued)

219445	NXX	CASUAL	
4045495811	SUB	CASUAL	
20156774993	SUB	NOTALW	
3158271323	SUB	ALLOW	BNRRCH 1 Y Y Y BNRINTL 9
4165050228	SUB	ALLOW	BNRRCH 1 N Y N
219445729	SUB	ALLOW	BNRRCH 1 N N N

—end—

Overriding the destination only dialing plan and providing billing override

One of the dialing plans available to NSS is the destination only dialing plan. After gaining access to the switch, this dialing plan allows the subscriber to dial any valid destination followed by an optional account code. The destination only dialing plan format is:

```
ACCESS + <PT> + DEST DN + (<PT> + AC)

 where:

ACCESS—access digits

PT—prompt tone

DEST DN—destination directory number

AC—account code

( )—optional field

< >—required field
```

In this dialing plan, the number used for billing purposes comes from the BILLDN field in table TRKGRP. Access to the switch can be any one of the following NSS access methods:

- FGA
- FGB
- FGD

- DAT
- IBN

The Offnet Access Dialing Plan Driver feature provides a billing override function. The type of billing override used is determined by the first digit dialed. This function overrides the billing number and allows the subscriber to enter one of the following:

- an authorization code or TCN and optional code
- a TCN dialing plan
- just destination digits

The new dialing plan in the following example allows the subscriber to change the billing number, the NCOS and, depending on datafill, the customer group. The following example illustrates the datafill needed for all offnet access types datafilled in table TRKGRP.

```
ACCESS + <PT> + # + AUTH + <PT> + DEST DN + (<PT> + AC)

or

ACCESS + <PT> + 0 + DEST DN <PT> + TCN + (<PT> + AC)

where:

ACCESS—access digits

PT—prompt tone

#—the octothorpe button

AUTH—authorization code

DEST DN—destination directory number

AC—account code

TCN—travel card number

( )—optional field

< >—required field
```

For details on setting up different customer groups for translations and datafilling the dialing plan, refer to the sections entitled:

- Destination translations

- Dialing plan definitions

Accessing MONA through IBNTI and IBNT2 trunks

The offnet access dialing plan feature allows non-offnet IBNTI and IBNT2 trunks to access NSS. This is done in one of two ways.

- The first method datafills table TRKGRP's OFFNET field with Y and OFFNTACC field with IBN. This method allows ordinary IBN trunks to access the various NSS trunk features.
- The second method datafills table TRKGRP's OFFNET field with N. This method allows any call routed over IBNTI and IBNT2 trunks to translate to MONA. However, these trunks can not access the various trunk features developed for NSS (such as PIN digits with region code).

Table 14-5 illustrates the datafill allowing IBNTI and IBNT2 trunks to access NSS.

Table 14-5
IBNTI and IBNT2 datafill example

CLLI	GRPINFO	OFFNET	OFFNTACC
TRKA	IBNTI1	Y	IBN
TRKB	IBNT2	Y	IBN
TRKC	IBNT2	N	IBN

Note: All applicable restrictions that currently exist for FGA, FGB, FGD, and DAT access types with respect to feature interactions, also apply to IBN access types. Offnet access trunks are those IBNTI and IBNT2 trunks that have the OFFNET selector in table TRKGRP set to Y and the access type datafilled as either FGA, FGB, FGD, or DAT.

Defining dialing plans

The Offnet Access Dialing Plan Driver feature uses table DIALPLAN to datafill the various dialing plans and customize prompt tones. This feature supports the following dialing plans:

- hotline dialing
- senderized dialing
- cut-through dialing
  - — destination only
  - — billing override
  - — travel card number only

— authorization or travel card

Hotline dialing

Hotline dialing is also known as Trunk Group Hotline. After gaining access to the switch, Hotline allows a subscriber to route directly to a predefined destination. The user also can be prompted for an optional account code. The format for the dialing plan is as follows:

```
ACCESS + (<SDT> + AC)

where:

ACCESS—access digits

SDT—special dial tone

AC—account code

( )—optional field

< >—required field
```

The following is a list of destination examples and the necessary datafill.

```
Local—NXX-XXX

DDD—(1) + (NPA) - NXX-XXXX

IDDD—011 + CC + NN

Private SC—1NN

Network SC—NSC + XXX

EXTN—1 to 7 digits

FAC—1 to 7 digits
```

Note: The optional account code is based on the translations setup for the Hotline number.

The number used for billing purposes in this dialing plan is obtained from the BILLDN field in table TRKGRP. An example of the datafilled needed is in Table 14-6.

Table 14-6
Hotline dialing datafill example

TABLE DIALPLAN

DIALPLN	PLANTYPE	DESTDIGS
HOTLINE	HOTLINE	4596

TABLE TRKGRP

CLLI	GRPTYP	OFFNET	OFFNTACC .	DIALPLAN	OFNTOPTS
TGRP1	IBNTI	Y	FGA	HOTL1	$

All calls gaining access to NSS through trunk group TGRP1 are routed to the destination defined by digits 4596.

Senderized dialing

A second dialing plan available to NSS is SENDERIZED. In the SENDERIZED dialing plan, the destination digits are collected by the originating PBX and sent to NSS. The user also can be prompted for an optional account code. The dialing plan format is as follows:

```
DEST DN + (<SDT> + AC)

where:

DEST DN—destination directory number

SDT—special dial tone

AC—account code

( )—optional field

< >—required field
```

The following list describes destination examples and their datafill:

```
Local-NXX-XXX

DDD-(1) + (NPA) - NXX-XXXX

IDDD-011 + CC + NN

Private SC—1NN

Network SC-NSC + XXX

EXTN-1 to 7 digits

FAC-1 to 7 digits
```

Note: An account code can optionally be required after entering the destination digits based on the ACCT field of the dial plan.

A 14-digit TCN also can be collected. If a travel card name contains datafill, and the destination digits are preceded by a zero, and the OPTTCN is set to Y, the subscriber receives a prompt to enter a TCN.

For billing purposes, SENDERIZED uses the number obtained from the BILLDN field in table TRKGRP.

Table 14-7 presents the datafill necessary to set up the SENDERIZED dialing plan.

Table 14-7
SENDERIZED dialing datafill example

TABLE DIALPLAN

DIALPLAN	PLANTYPE	ACCT	OPTION	TCNNAME
SENDZ1	SENDERZ	Y	N	
SENDZ2	SENDERZ	Y	Y	TCN1

TABLE TRKGRP

CLLI	GRPTYP . .	OFFNET	OFFNTACC .	DIALPLAN
TGRP2	IBNTI . .	Y	.	SENDZ1
TGRP8	IBNTI . .	Y	DAT .	SENDZ2
			.	
			DAT .	
			.	

OFNTOPTS
$
$

All calls gaining access to NSS through trunk group TGP2 are prompted for an account code before routing to their destinations.

Cut-through dialing

A third dialing plan available to NSS is cut-through. The cut-through dialing plan has five dialing plan subtypes:

- destination only
- billing override
- authorization code only (AUTHFIRST and AUTHLAST)
- travel card number only

These cut-through dialing plans are discussed in the sections that follow.

Destination only

One type of cut-through available to NSS is destination only. This dialing plan only recognizes destination digits. The user receives a prompt for an optional account code. The format is as follows:

```
ACCESS + <PT> + DEST DN + (<PT> + AC)

where:

ACCESS—access digits

PT—prompt tone

DEST DN—destination directory number

AC—account code

< >—required field

( )-optional field
```

The following list describes destination examples and the datafill needed.

```
Local—NXX-XXX

DDD—(1) + (NPA) - NXX-XXXX

IDDD—011 + CC + NN

Private SC—1NN

Network SC—NSC + XXX

EXTN—1 to 7 digits

FAC—1 to 7 digits
```

Note: After entering the destination digits, an account code can be optionally required based on the ACCT field of the dial plan

In the destination only dialing plan, the number used for billing purposes comes from the BILLDN field in table TRKGRP. Table 14-8 shows an example of the datafill necessary to set up this dialing plan.

Table 14-8
Destination only datafill example

TABLE DIALPLAN

DIALPLAN	PLANTYPE	CTTYPE	INIT	ACCT	ACCT
DEST1	CUT THRU	DEST ONLY	PRMT SDT	Y	PRMT DT

OPT	OPTTCN	OPTIONS
AUTH N	N	$

TABLE TRKGRP

CLLI	GRPTYP . .	OFFNET	OFFNTACC	DIALPLAN
TGRP3	IBNTI . .	Y	FGB	DEST1

OFNTOPT
$

All calls gaining access to NSS through trunk group TGRP3 are only allowed to enter destination digits followed by an account code. The initial

prompt for the destination digits is special dial tone and the prompt for account code is dial tone. The dialing sequence is as follows:

```
ACCESS + <SDT> + DEST DN + <DT> + AC
```

where:

```
ACCESS—access digits

SDT—special dial tone

DEST DN—destination directory number

DT—dial tone

AC—account code

< >—required field
```

Billing override

Billing override allows the subscriber to override the billing number and enter an authorization code or travel card number and optional account code. This dialing plan format is as follows:

```
ACCESS + <PT> + # AUTH + <PT> DEST DN + (<PT> + AC)

or

ACCESS + <PT> + 0 + DEST DN + <PT> + TCN +(<PT> + AC)

where:

ACCESS—access digits

PT—prompt tone

#—octothorpe key

AUTH—authorization code

DEST DN—destination directory number

AC—account code

TCN—travel card number

< >—required field

( )—optional field
```

In the example that follows, the billing override allows the subscriber to change the billing number, the NCOS, and depending on datafill, the customer group.

Based on the billing override choice, the number used for billing purposes comes from one of two sources. If the billing override option is not used, the number comes from the BILLDN field in table TRKGRP. If it is used, the number comes from the dialed authorization code or TCN.

Table 14-9 presents the datafill necessary to set up this plan.

Table 14-9
Billing override datafill example

TABLE DIALPLAN

DIALPLAN	PLANTYPE	CTTYPE	INIT	ACCT	ACCT
BILL1	CUTTHRU	DESTONLY	PRMT SDT	Y	PRMT DT

OPT	AUTHNAME	OPTTCN	OPTIONS
AUTH Y	AUTH1	N	$

All calls that gain access to NSS through trunk group TGRP4 can only enter destination digits followed by an account code. However, the subscriber has the capability to override the billing number by entering an octothorpe (#) followed by an authorization code. The initial prompt for the destination digits or the authorization code is special dial tone. The prompt for the destination digits and account code (if applicable) is dial tone.

The dialing sequence is as follows:

```
ACCESS + <SDT> + DEST DN + <DT> + AC

or

ACCESS + <SDT> + # + AUTH + <DT> + DEST DN + <DT> + AC

where:

ACCESS—access digits

SDT—special dial tone

DEST DN—destination directory number

DT—dial tone

AC—account code

#—octothorpe key

AUTH—authorization code

< >—required field
```

Table 14-10 presents the datafill necessary to set up this plan.

Table 14-10
Billing override datafill example

TABLE DIALPLAN

DIALPLAN	PLANTYPE	CTTYPE	INIT	ACCT	ACCT
BILL1	CUT THRU	DEST	PRMT	Y	PRMT
		ONLY	SDT		DT

OPT	OPTTCN	TCN
AUTH	N	NAME
N		TCN1

TABLE TRKGRP

CLLI	GRPTYP . .	OFFNET	OFFNTACC	DIALPLAN
TGRP4	IBNTI . .	Y	FGB	BILL1

OFNTOPT
$

Authorization code only

The third type of cut-through dialing available to NSS is authorization only. Authorization only recognizes only an authorization code. There are two types of authorization code only dialing plans:

- AUTHFIRST
- AUTHLAST

The AUTHFIRST dialing plan format is as follows:

```
ACCESS + <PT> + AUTH + <PT> + DEST DN + (<PT> + AC)
```

where:

```
ACCESS—access digits

PT—prompt tone

AUTH—authorization code

DEST DN—destination directory number

AC—account code

< >—required field

( )—optional field
Local—NXX-XXX

DDD—(1) + (NPA) - NXX-XXXX

IDDD—011 + CC + NN

Private SC—1NN

Network SC—NSC + XXX

EXTN—1 to 7 digits

FAC—1 to 7 digits
```

Note: After the destination digits are entered, an optional authorization code can be required based on the ACCT field of the dialed authorization code.

The authorization code dialed is the number used for billing purposes.

The datafill necessary to set up the AUTHFIRST dialing plan is described in Table 14-11.

Table 14-11
Authorization only, datafill example

TABLE DIALPLAN

DIALPLAN	PLANTYPE	CTTYPE	ORDER	AUTHPRMT
AUTH1	CUT THRU	DEST ONLY	FIRST	SDT

DEST PRMT DT	ACCT PRMT DT	TCN NAME TCN1

TABLE TRKGRP

CLLI	GRPTYP . .	OFFNET	OFFNTACC	DIALPLAN
TGRP5	IBNTI . .	Y	FGB	AUTH1

OFNTOPT
$

All calls that gain access to NSS through trunk group TGRP5 are only allowed to enter an authorization code and destination digits followed by an account code. The following is a sample of prompts given:

- Authorization Code Special Dial Tone
- Destination Digits Dial Tone
- Account Code Dial Tone

The AUTHLAST dialing plan format is:

```
ACCESS + <PT> + DEST DN + (#) PT + AUTH + (PIN) + ((PT)
+ (AC) + (#))

where:

ACCESS—access digits

PT—prompt tone

DEST DN—destination directory number

#—octothorpe key

AUTH—authorization code

PIN—personal identification number

AC—account code

< >—required field

( )—optional field
```

Note 1: Whether or not the caller should dial the optional octothorpe following the destination digits depends upon translations datafill and the number of destination digits to be dialed. If the translations are correctly set up for the incoming trunk's customer group and NCOS, then the caller should not dial the octothorpe. However, if the translations for the incoming trunk's customer group and NCOS are not correctly set up, then the caller should dial the octothorpe or wait for timeout in order to get the prompt tone. Also, if the access digits and destination digits together are less than five digits and start with '1', then the caller should dial the octothorpe to indicate the end of the destination digits.

Note 2: If PIN digits, security code digits, or account code digits are collected with the authcode, then the authcode, PIN, security code, or account code digits must be dialed before a # can be dialed to signify the end of dialing.

The datafill necessary to set up the AUTHLAST dialing plan is described in Table 14-12.

Table 14-12
Authorization only, datafill example

TABLE DIALPLAN

DIALPLAN	PLANTYPE	ORDER	DEST	AUTH	ACCT
AUTHL	CUT THRU	LAST	PRMT DT	PRMT SDT	PRMT DT

TABLE TRKGRP

CLLI	GRPTYP . .	OFFNET	OFFNTACC	DIALPLAN
TGRP1	IBNTI	Y	FGB	AUTHL

OFNTOPT
$

Travel card number only

The fourth cut-through dialing plan available to NSS is TCN only. In this dialing plan, the only two numbers recognized are the TCN and destination digits. The dialing plan and destination formats are as follows:

```
ACCESS + <PT> + 0 + DEST DN (#) + <PT> + TCN + (<PT> +
AC)

or

ACCESS + <PT> + 01 + DEST DN (#) + <PT> + TCN + (<PT> +
AC)
```

Where:

```
ACCESS—access digits

PT—prompt tone

DEST DN—destination directory number

#—octothorpe key

TCN—travel card number

AC—account code

< >—required field

( )—optional field
```

Note: Whether or not the caller should dial the optional octothorpe following the destination digits depends upon translations datafill. If the translations are correctly set up for the incoming trunk's customer group and NCOS, then the caller should not dial the octothorpe. However, if the translations for the incoming trunk's customer group and NCOS are not correctly set up, then the caller should dial the octothorpe or wait for timeout in order to get the prompt tone. Also, if the access digits and destination digits together are less than five digits and start with '1', then the caller should dial the octothorpe to indicate the end of the destination digits.

The following list describes destination examples and their datafill:

```
Local—NXX-XXX

DDD—(1) + (NPA) - NXX-XXXX

IDDD—011 + CC + NN

Private SC—1NN

Network SC—NSC + XXX

EXTN—1 to 7 digits

FAC—1 to 7 digits
```

Note: After the TCN is entered, an account code can be required based on the ACCT field of the dialed TCN.

The TCN number dialed used for billing purposes.

Table 14-13 illustrates sample datafill for setting up the TCN only dialing plan.

Table 14-13
TCN only datafill example

TABLE DIALPLAN

DIALPLAN	PLANTYPE	CTTYPET —continued—	DEST	AUTH	ACCT
TCN1	CUT THRU	CNONLY	PRMTSDT	PRMTDT	PRMT DT

VALIDATE INSWITCH

—continued—

Table 14-13
TCN only datafill example (continued)

TABLE DIALPLAN

TABLE DIALPLAN **—end—**

DIALPLAN	PLANTYPECUT	CTTYPE	DEST	TCN	TCN
TCN1	THRU	TCNONLY	PRMTSDT	PRMTDT	PRMT DT

TABLE TRKGRP

CLLI	GRPTYP IBNTI	OFFNET	OFFNTAC	DIALPLAN
TGRP6		Y	C FGB	TCN1
CLLI	GRPTYP . .	OFFNET	OFFNTAC	DIALPLAN
TGRP1	IBNTI	Y	C FGB	AUTHL

OFNTOPT
$

—end—

All calls that gain access to NSS through trunk group TGRP5 are only allowed to enter a 0 plus destination digits followed by the TCN and an optional account code. Following is a list of the data items and their associated prompt tone.

- TCN Dial Tone
- Destination Digits Special Dial
- Account Code Dial Tone

Table 14-14 shows the dialing sequence for Authorization Only.

The dialing plan is as follows:

ACCESS + <SDT> + 0 + DEST DN (#) + <DT> + TCN + <DT> + AC

Table 14-14
Dialing sequence for authorization only

Equation element acronym	Full name
ACCESS	access digits
SDT	special dial tone
DEST DN	destination directory number
#	octothorpe key
DT	dial tone
TCN	travel card number
AC	account code
< >	required field
( )	optional field

Authorization or travel card

The fifth and final cut-through dialing plan available to NSS is Authorization or TCN. This dialing plan's format and destination digits are described in Table 14-15. This cut-through dialing plan, like the other cut-through dialing plans, can prompt the user for an optional account code.

ACCESS + <PT> + 0 + DEST DN + <PT> + TCN + (<PT> + AC)

or

ACCESS + <PT> + AUTH + <PT> + DEST DN + (<PT> + AC)

The elements of the authorization or travel card dialing plan are shown in Table 14-15.

Table 14-15
Dialing sequence for authorization or travel card

Equation element acronym	Full name
ACCESS	access digits
PT	prompt tone
DEST DN	destination directory number
TCN	travel card number
AC	account code
AUTH	authorization code
< >	required field
( )	optional field

The data shown in Table 14-16 are destination examples with the necessary datafill.

Table 14-16
Destination examples and needed datafill

Equation element acronym	Full name
Local	NXX-XXX
DDD	(1) + (NPA) - NXX-XXXX
IDDD	011 + CC + NN
Private SC	1NN
Network SC	NSC + XXX
EXTN	1 to 7 digits
FAC	1 to 7 digits

Note: After the user enters the TCN number, the system may optionally require an account code based on the ACCT field of the dialed TCN or the dialed authorization code. This is dependent upon the dialing plan dialed.

The TCN or authorization code dialed is used for billing purposes.

Table 14-17 gives an example of the datafill necessary to set up the authorization or TCN dialing plan.

Table 14-17
Dialing sequence for Authorization or travel card

Equation element acronym	Full name
ACCESS	access digits
PT	prompt tone
DEST DN	destination directory number
TCN	travel card number
AC	account code
AUTH	authorization code
< >	required field
( )	optional field

An example of the datafill necessary to set up the Authorization or TCN dialing plan is presented in Table 14-18.

Table 14-18
Authorization or TCN datafill example

TABLE
DIALPLAN

DIALPLAN	PLANTYPE	CTTYPE	AUTHNAME	TCNNAME
BOTH	CUTTHRU	AUTHORTC	AUTH1	TCN1

TABLE
TRKGRP

CLLI	GRPTYP . .	OFFNET	OFFNTACC . .	DIALPLAN
TGRP7	IBNTI . .	Y	FGD . .	BOTH

OFNTOPT
$

All calls that gain access to NSS through trunk group TGRP5 may enter either 0 plus destination digits followed by the TCN and an optional account code; or an authorization code, destination digits, and an optional account code. The format for the dialing sequences are illustrated in Table 14-19.

ACCESS + <SDT> + 0 + DEST DN + <DT> + TCN + <DT> + AC

or

ACCESS + <SDT> + AUTH + <DT> + DEST DN + <DT> + AC

The elements of this dialing plan are shown in Table 14-19.

Table 14-19
Dialing sequence formats to gain access to NSS

Equation element acronym	Full name
ACCESS	access digits
SDT	special dial tone
DEST DN	destination directory number
DT	dial tone
TCN	travel card number
AC	account code
AUTH	authorization code
< >	required field
( )	optional field

Note: Refer to the Authorization Only datafill examples after Authorization Code Only, AUTHFIRST and TCN Only for the dial plan names AUTH1 and TCN1 to obtain the necessary datafill.

Providing prompt tones

Following are several dialing plans. Within these dialing plans, are the prompt tones (PT) and their definitions.

TCN only

Access + <INITPT> + 0 + DEST DN + <PT> + TCN + <ACPT> + AC + <CT>

TCN senderized + <far end tone> + 0 + DEST DN + <PT> + TCN + <ACPT> + AC + <CT>

AUTHFIRST

<INITPT> + AUTH + <PT> + DEST DN + <ACPT> +AC

AUTHLAST

<INITPT> + DEST DN + <PT> + AUTH + <ACPT> + AC

DESTONLY

<INITPT> + DEST DN + <ACPT> + AC

Table 14-20
Dialing sequence formats to gain access to NSS

TCN ONLY	
Prompt Tones	**Definitions**
INITPT	initial prompt tone (first tone after accessing the network); special dial tone, dial tone, or carrier dial tone
DEST DN	destination directory number
PT	prompt tone; no dial tone, dial tone, or special dial tone
TCN	travel card number
ACPT	account code prompt tone; no dial tone, dial tone, or special dial tone
AC	account code
CT	confirmation tone
< >	required field
AUTHFIRST	
Prompt Tones	**Definitions**
INITPT	initial prompt tone (first tone after accessing the network); special dial tone, dial tone, or carrier dial tone

—continued—

Table 14-20
Dialing sequence formats to gain access to NSS

Prompt Tones	Definitions
AUTH	authorization code
PT	prompt tone; no dial tone, dial tone, or special dial tone
DEST DN	destination directory number
ACPT	account code prompt tone; no dial tone, dial tone, or special dial tone
AC	account code
< >	required field
AUTHLAST	
Prompt Tones	**Definitions**
INITPT	initial prompt tone (first tone after accessing the network); special dial tone, dial tone, or carrier dial tone
DEST DN	destination directory number
PT	prompt tone; no dial tone, dial tone, or special dial tone
AUTH	authorization code
ACPT	account code prompt tone; no dial tone, dial tone, or special dial tone
AC	account code

—continued—

Table 14-20
Dialing sequence formats to gain access to NSS

Prompt Tones	Definitions
< >	required field
DESTONLY	
INITPT	initial prompt tone (first tone after accessing the network); special dial tone, dial tone, or carrier dial tone
DEST DN	destination directory number
ACPT	account code prompt tone; no dial tone, dial tone, or special dial tone
AC	account code
< >	required field

—end—

Note: No dial tone is defined as a silent tone. Dial tone is defined as a normal dial tone; that is, 350 Hz + 440 Hz. Special dial tone is defined as three cycles of 100 ms on, 100 ms off, followed by continuous dial tone. Carrier dial tone is defined as continuous 400 Hz.

Feature impact

All interactions that currently exist for FGA, FGB, FGD, and DAT access types, with respect to feature interactions, also apply to IBN access types.

Restrictions and limitations

This feature has the following incompatibilities, limitations, and restrictions:

- The IBN access type does not provide cut-through capability.
- Translation of the destination digits dialed for the reoriginated leg of a call is controlled by the same customer group and NCOS used for the first leg of the call.
- IBN PRI calls to MONA are not supported and go to treatment.
- The CUSTGRP option datafilled in table AUTHCDE is only valid for IBN-specific tuples and only if the NSS package is in the load.

- If NO DIAL TONE is datafilled as the prompt tone for the collection of destination digits in an AUTHONLY dialing plan, there is no timeout value between the collection of the authorization code and the collection of destination digits. This is similar to what occurs when the SECRECY option is set to Yes in table CUSTHEAD.
- Tuples cannot be deleted from this table if referenced by another table.
- When datafilling the optional Customer Group field in tables AUTHCDE, and TCNDATA (MSNTCN), the combinations of the CUSTGRP and NCOS fields must equal a valid entry in table NCOS.
- All applicable restrictions that currently exist for FGA, FGB, FGD, and DAT access types, with respect to feature interactions, also apply to IBN access types.
- IBN PRI calls to MONA are NOT supported and go to treatment.
- The CUSTGRP option datafilled in table AUTHCDE is only valid for IBN-specific tuples and only if the NSS package is in the load.
- If ACCT is set to Yes for the DESTONLY dialing plans, then reoriginations do not require an account code unless specified by translations.
- After entering one of the various access methods, the subscriber must then wait until PROMPT TONE is given before dialing any other digits. However, all other prompt tones can be dialed through.
- After receiving the first prompt tone for NSS, all digits entered must be in DTMF format.
- Account code prompts are only valid for the Account Code Last feature. If a combined Authorization and Account code is required, there is no prompt before the account code.
- The INTRAGRP field in table TRKGRP determines if a call is to be considered an INTRA group call for all NSS calls.
- The SUBGRP field in table TRKGRP determines which subgroup is used when routing a call to an attendant console for all NSS calls.
- The field PLANTYPE (Dial Plan Type) cannot be changed. The tuple must be deleted then re-added if this field is to be changed.
- A maximum of 256 tuples can be added to this table.
- The default tuple can not be deleted even if there are no references to it.
- The timeout field is in the 4-to 30-second range. The default is 4-seconds if the option is not datafilled.
- The dialing plan name datafilled must be a unique name in this table.
- NONE

— NONE is valid for FGA, FGB, FGD, DAT, and IBN Offnet Access types (if dial plan is datafilled in table DNROUTE for IBN).

— The dial plan option, TIMEOUT, is not valid for this dial plan type.

— The dial plan option, CONDHL, is not valid for this dial plan type.

- HOTLINE

  — The field DESTDIGS must be datafilled.

  — The BILLDN field of IBNTI and IBNT2 trunks must be datafilled with the billing number that is to be used.

  — DESTDIGS is a vector of 1 to 18 digits.

  — HOTLINE is only valid for FGA and DAT Offnet Access types.

  — The dial plan option, TIMEOUT, is not valid for HOTLINE.

  — The dial plan option, CONDHL, is not valid for HOTLINE.

- SENDERIZ

  — SENDERIZ is only valid for DAT Offnet Access types.

  — The dial plan option, TIMEOUT, is valid for this dial plan type.

  — The dial plan option, CONDHL, is valid for this dial plan type.

- CUT-THROUGH DESTONLY

  — DESTONLY is only valid for FGA, FGB, FGD cut-through, DAT cut-through, and IBN Offnet Access Types (if dial plan is datafilled in table DNROUTE for IBN).

  — The BILLDN field of IBNTI and IBNT2 trunks must be datafilled with the billing number that is to be used.

  — An account code is collected if ACCT = Y or translations require an account code.

  — The dial plan option, TIMEOUT, is valid for this dial plan type.

  — The dial plan option, CONDHL, is valid for this dial plan type.

  — If an NSS FGD cut-through call uses an ALTXLA entry in table STDPRT for information digit translation, the NCOS and customer group in the ALTXLA entry is used for translation, not the NCOS and customer group of the incoming trunk.

  — International dialing is currently dependent upon either entering an octothorpe or waiting for timeout in order for the call to route.

  — AUTHONLY

  — AUTHONLY is only valid for FGA, FGB, FGD cut-through, DAT cut-through, and IBN Offnet Access Types (if dial plan is datafilled in table DNROUTE for IBN).

— The BILLDN field of IBNTI and IBNT2 trunks needs NOT be datafilled with the billing number that is used.

— An account code is collected if ACCT = Y in table AUTHCDE or translations requires an account code.

— If the ACCTPRMT field is set to N (no dial tone), the user must enter a # (octothorpe) immediately after dialing the destination digits.

— The dial plan option, TIMEOUT, is valid for this dial plan type.

— The dial plan option, CONDHL, is valid for this dial plan type.

— For an Authorization First (AUTHFIRST) dialing plan, the following situation exists. If an invalid authorization code is entered, then the correct number of destination digits is unknown. In this situation, the call routes to treatment after the destination digits and octothorpe have been entered or the caller has waited for timeout.

— For an Authorization Last (AUTHLAST) dialing plan, the customer group and NCOS of the incoming trunk must be set up correctly to get immediate prompt tone after dialing the destination digits (that is, without dialing an octothorpe). If the translations based upon the incoming trunk's customer group and NCOS are not correctly set up, the caller has to wait for timeout or dial octothorpe to get the prompt tone. The call does not go to treatment as the authorization number dialed may provide a different NCOS or customer group to give enhanced privileges to the call. If a new NCOS or customer group is given by the authorization number, then the destination digits are retranslated based upon the new NCOS and customer group. If translations fail here, then the call routes to treatment.

— Regarding Private Speed Call interaction with Authorization Last (AUTHLAST) dialing plans: for all private speed call access digits and destination digits less than five digits long and starting with '1', the caller must dial an octothorpe or wait for timeout to indicate the end of destination digits.

- TCN ONLY

  — TCN is only valid for FGA, FGB, FGD cut-through, DAT cut-through, and IBN Offnet Access Types (if dial plan is datafilled in table DNROUTE for IBN).

  — The BILLDN field of IBNTI and IBNT2 trunk need not be datafilled with the billing number is used.

  — An account code is collected if ACCT = Y in table TCNDATA or translations requires an account code.

  — The Dial Plan option, TIMEOUT, is valid for this dial plan type.

  — The dial plan option, CONDHL, is valid for this dial plan type.

— For a Travel Card dialing plan, the Customer Group and NCOS of the incoming trunk must be set up to correctly translate the destination digits. If the translations based upon the incoming trunk's Customer Group and NCOS are not correctly set up, the caller must wait for timeout or dial octothorpe to get the prompt tone. The call will not go to treatment as the TCN to be dialed may provide a different NCOS or customer group that will give enhanced privileges to the call. If the TCN gives a new NCOS or customer group, then the destination digits retranslate based upon the new NCOS and customer group. If translations fail here, then the call routes to treatment.

- AUTHORTC
  - — AUTHORTC is only valid for FGA, FGB, FGD cut-through, DAT cut-through, and IBN Offnet Access Types (if dial plan is datafilled in table DNROUTE for IBN).
  - — The BILLDN field of IBNTI and IBNT2 trunks is not datafilled with the billing number that is used.
  - — An account code is collected if ACCT = Y in table TCNDATA or table AUTHCDE or translations require an account code.
  - — The prompt tones are based on the dialplan datafilled, either AUTHNAME or TCNNAME based on the first digit dialed.
  - — The initial prompt is based on the INITPRMT field.
  - — Dialing plan invoked is based on the first digit dialed.
  - — The dial plan option, TIMEOUT, is valid for this dial plan type.
  - — The dial plan option, CONDHL, is valid for this dial plan type.

Reset dialing and call reorigination

Network Services System (NSS) provides two features that enable a caller to correct dialing mistakes and make multiple calls without losing access to the network. These features are reset dialing and call reorigination, respectively.

Reset dialing

Reset dialing allows a caller to correct a dialing error by pressing the asterisk (*) as the reset key. After pressing the reset key, dial tone is immediately returned from the switch and the caller can redial the appropriate dialing sequence. Therefore, if an error is made while dialing, a caller does not have to access the switch again.

Note: The caller does not have to dial an octothorpe or wait for timeout to get immediate dial tone.

Reset dialing is allowed while entering any of the following dialing sequences:

- authorization digits
- combined authorization/account digits
- MONA destination digits
- account code last digits
- destination digits of a reoriginated call
- TCN destination digits, TCN digits, and TCN account code

Special dial tone is returned after reset dialing has been performed on authorization or account code digits. Regular dial tone is returned after reset dialing has been performed on Meridian offnet access (MONA) destination digits. The length of the authorization/account codes is determined by the office parameter LN_SHORT_PARTIAL_DIAL_TIME in table OFCENG. The length of the timeout for the destination digits is 10 seconds.

Reset dialing on destination digits can not be performed after an invalid destination number has been dialed since the call will go to treatment after the first invalid digit has been translated. For example, if the second digit

dialed is not a valid destination digit, then the caller can not reset the dialing because the invalid digit will send the call to treatment.

Note: Destination digits are translated as they are collected. Therefore, reset dialing will not work after dialing the first invalid destination digit.

There is no limit to the times a caller can perform reset dialing.

Call reorigination

Call reorigination allows a caller to make several calls consecutively without losing access to the switch. After pressing an octothorpe (#) or asterisk (*), which acts as the reorigination key, the caller immediately receives standard dial tone and can dial a new address sequence and account code (if required). The reorigination key must be pressed for at least one second to give reorigination.

Because the switch retains the authorization code digits, it is not necessary for the caller to redial the authorization code. However, if an account code is required, the authorization code must be dialed again for each reoriginated call. This allows each call to be charged to a different code.

For TCN calls, the switch retains the TCN digits. Therefore, it is not necessary to redial TCN digits.

There is no limit on the times the reorigination key can be dialed to get the standard dial tone for reorigination.

Following are the types of situations in which a call can be reoriginated:

- before the call is answered by the called party
- during conversation with the called party
- during or after completion of a treatment
- after the called party disconnects and before the caller is disconnected

Before the call is answered by the called party

The caller can abandon a call before the called party answers by pressing the reorigination key. When dial tone is received, a new call can be initiated.

During conversation

A caller can terminate the current call and reoriginate a new call before the called party disconnects (talking state) by dialing the reorigination key to receive the standard dial tone.

During or after completion of a treatment

If a caller attempts a call but routes to a treatment (a tone or an announcement) on the network, the caller can receive standard dial tone by pressing the reorigination key during or after the completion of the treatment.

Note: Refer to the restrictions and limitations section of this chapter for the list of treatments given for calls that are not allowed to reoriginate.

After called party disconnects

After the called party disconnects, the caller can initiate a new call by pressing the reorigination key until either the call times out or until the caller goes on-hook.

SMDR billing records

A Station Message Detail Recording (SMDR) record generates for each call reorigination if SMDR billing is required. In a regular MONA call reorigination, only the authorization code is copied from the original call's SMDR. For FGB, FGD cut-through, and 800 universal access call types, an NSS record generates. The authorization code/TCN digits and the NSS SMDR information fields that are associated with the original or current NSS call are copied to the SMDR record of the new call with the exception of the reorigination field. The account code is not copied from the current SMDR record to the new SMDR record for NSS or non-NSS reoriginated calls. If a new account code is required and dialed in, the new account number is copied into the account code field of the reoriginated call.

Requirements

The call reorigination capability is available only for IBN trunks on a digital trunk controller (DTC) equipped with a STR card and only for the following call types:

- Feature Group A (FGA)
- Feature Group B (FGB)
- Feature Group D (FGD) cut-through
- 800 Universal Access (UA)
- Direct Access Trunk (DAT)
- calls accessing the network from PTS IBN trunks using standard central office (CO) signaling protocol

All the call types in the previous list originate through MONA over incoming IBN trunks (IBNTI) or two-way IBN trunks (IBNT2).

Note: Calls must access the network through MONA to have call reorigination.

The call reorigination capability is attained by using specialized tone Receivers (STR). An STR is a receiver which, in this application, constantly scans for certain tones. STRs exist as optional cards on switches that have DTCs. If the DTC is equipped with an STR, the STR scans for an asterisk or an octothorpe dialed by a caller to invoke call reorigination. The DTC has a total of 480 trunks, and the STR is capable of monitoring tones on all 480 trunks. Currently, however, a DTC is limited to five originations each second including reoriginations. Table LTCINV must be datafilled with STR options to return to service the DTC with a STR card.

The call reorigination capability is based on an optional trunk group. Field REORIG in table TRKGRP is for incoming and 2-way IBN trunks. IBNTI and IBNT2 specify this parameter.

The example in Table 15-1 illustrates the datafill for allowing a caller to reoriginate on trunk group REORIGTRK in table TRKGRP.

Table 15-1
Call origination datafill in table TRKGRP

CLLI	TRKTYP	REORIG
REORGTRK	IBNTI	Y

Data assignment

For IBN trunks, the REORIG field in table TRKGRP must be datafilled.

Hardware requirements

This feature requires a DTC equipped with an STR card NT6X62AA.

Feature impact

The MONA allows call reorigination on calls originating through MONA from IBN trunks. Call reoriginations are also allowed for calls originating as FGB, FGD cut-through, and 800 UA call types.

Restrictions and limitations

This feature has the following incompatibilities, limitations, and restrictions:

- The STR options must be datafilled in table LTCINV for the specified DTC.

- The call reorigination capability is available only for PTS IBN trunks on a DTC. IBNTI and IBNT2 trunks must be associated with a DTC in table TRKMEM.
- Field REORIG must be datafilled in table TRKGRP for each IBN trunk that is to have reorigination.
- A DTC is currently limited to five originations each second. This also includes reoriginations.
- This feature is only available on originating call types FGA, FGB, FGD cut-through, Interim, 800 UA, DAT, and other calls accessing NSS through MONA over IBN trunks. Callers that do not traverse through MONA do not have reorigination.
- The reorigination key must be pressed for a period of at least one second to give reorigination. Reorigination calls are only supported for telephones that generate a constant tone while the reorigination key is pressed.
- Only two-part calls are allowed for origination.
- Calls from MONA that translate to a feature access code are not allowed to reoriginate.
- There is no limit to the number of times that call reorigination or reset dialing can be invoked.
- Call reorigination is not allowed on the following calls:
  - invalid authcode
  - invalid TCN
  - invalid account code
  - timeout after called party disconnect
  - treatment timeout
  - no system resources
  - calls resulting in reorder treatment
- All restarts disable call reorigination.
- Calls that have other features running such as Call Park are not allowed to reoriginate.
- Reoriginated calls that are based on authcode to prompt for the account code must specify SMDR billing.
- International dialing is currently dependent upon either entering an octothorpe or waiting for a timeout in order for the call to route.
- Translations must be correctly set up to route the call.

- Reoriginated calls must transverse through either the DISA feature or the MONA feature from IBN trunks. For calls transversed through the DISA feature, the caller must dial an octothorpe or wait for timeout, after dialing the last DISA destination digit in order for the call to route. This is because the DISA feature collects all the digits entered before digit translation. However, for the calls reoriginated after first accessing the DISA feature, the caller need not dial the octothorpe or wait for timeout after dialing the last destination digit.
- For calls that have been reoriginated after first accessing the DISA feature, the caller need not dial an octothorpe or wait for a timeout altering the last digit of the destination digits.
- For reoriginated calls, if the following three conditions are met, then the caller must wait for timeout or dial an octothorpe in order for the call to route.
  - The first destination digit dialed is '1'.
  - The digits dialed are less than five.
  - The private speed call option is assigned for the authcode collected for the first leg of the call (MONA or DISA call).
- Account codes based on the TCN tuple will not be collected for TCN calls that have been reoriginated after first dialing a MONA directory number.
- For private speed call interaction, the caller must dial an octothorpe or wait for a timeout after dialing three- or four-digit private speed call numbers. This will ensure the system knows that the end of digit sequence has been reached and the digit sequence is ready for immediate routing.

Validated Account Codes and Authcode last dialing plan

The Validated Account Codes and Authcode Last Dialing Plan feature performs two primary functions. First, it screens or validates the content of two- and three-digit account codes. Second, it provides an authcode-last dialing plan within Meridian Offnet Access (MONA).

Validated account codes

Before this feature was implemented, account codes could be validated only by their length. Now, through this feature, account codes can be validated for *content*.

Account code validation can be used on calls originating over the following NSS agencies: feature group A (FGA), feature group B (FGB), and feature group D (FGD) interfaces; Integrated business network (IBN) trunks; and direct access trunks (DAT). The applicable DAT trunks are loop start foreign exchange station side (FXS), ground start FXS, foreign exchange office side (FXO), IBN per trunk signaling (PTS), cut-through tie trunks, IBN PTS senderized tie trunks, and primary rate access (PRI) senderized tie trunks.

Account code requirements

Account codes may be required by Automatic Number Identification (ANI) translations, Travel Card Number (TCN) translations, authcode translations, IBN translations, DAT destination only dial plans or DAT senderized dial plans.

Account code requirements for ANI/TCN translations and destination-only/senderized dial plans on a DAT

Translations can be set up so that account codes are required by ANI translations, TCN translations, destination-only dial plans or senderized dial plans on a DAT. These requirements are defined in three tables: ANIDATA, TCNDATA, and DIALPLAN. Table ANIDATA, field ACCTREQ, determines whether or not an account code is required for a particular automatic number identification (ANI). Table TCNDATA, field ACCT, determines whether or not an account code is required for a particular TCN.

Finally, Table DIALPLAN, field ACCT, determines whether or not an account code is required for a destination only or senderized dial plan on a DAT.

Account code requirements for authcodes

Whether or not an account code is required by an authcode is defined in one of two ways:

- In Table CUSTHEAD, authparts are assigned to customer groups. Authcodes then are assigned to the authparts in Table AUTHCDE. If, in Table CUSTHEAD, a customer group associated with a particular authpart meets the following requirements, then account codes are required for all authcodes datafilled against that authpart.
  - — contains the ACCT option and
  - — specifies through the COMB field (of the AUTH option) that authcodes are to be combined with account codes
- If, however, the COMB field of the ACCT option in Table CUSTHEAD specifies that authcodes and account codes are not to be combined, an account code still may or may not be required. Whether or not the account code is required depends on the datafill in Tables CUSTHEAD and AUTHCDE. For instance, if both of the following conditions are met, an account code is required.
  - — The customer group in Table CUSTHEAD contains the ACCT option and the ACR (account code required) option specifies that account codes must be collected last (that is, after the authcode).
  - — Table AUTHCDE's ACCT field is datafilled Y for the particular authcode.

Account code requirements for a call's route

Finally, if an account code is not required by one of the preceding methods, it is not collected and validation does not apply.

Datafill specifying account code validation

To correctly instruct the system that account code validation is desired, three fields in Table CUSTHEAD must be datafilled. These fields are ACCTVAL, ACSCRIDX, and DIGINACC. Field ACCTVAL for ACCT option in Table CUSTHEAD specifies, on a customer group basis, whether or not account codes should be validated. If codes should be validated, ACCTVAL is datafilled Y. If codes should not be validated, ACCTVAL is datafilled N.

The DIGINACC field of the ACCT option specifies the account code length for a customer group. Since two to twelve digit account codes can be validated, the DIGINACC field should contain a number within the range of

2–12. If the number of account code digits to collect is outside the range of 2–12, then ACCTVAL must be datafilled N.

Account code screening databases

There are two account code screening databases available. Table ACSCRN1 validates two and three digit account codes while Table ACSCRN2 validates two- to- twelve digit account codes. Only one of these Tables can be active at a time.

Account code screening database for two and three digit codes

As previously mentioned, the account code screening database for two- to three-digit account codes is located in Table ACSCRN1. The two-part key to Table ACSCRN1 consists of an account code screening index (ACSCRIDX) number and a valid account code (ACCTCODE). By adding several tuples with the same ACSCRIDX number and different account codes (ACCTCODE), the user forms a list of account codes valid for the customer group associated with that account code screening index.

The range of ACSCRIDX is from 1 to 2047. In Table ACSCRN1, a given ACSCRIDX can contain either two- or three-digit account codes but not both. If the ACSCRIDX contains two-digit account codes, a maximum of 100 account codes can be datafilled. If the ACSCRIDX contains three digit account codes, a maximum of 1000 account codes can be datafilled.

The first account code datafilled for a particular ACSCRIDX determines the length of all other account codes assigned to that ACSCRIDX. For example, if the first account code datafilled for ACSCRIDX 5 is 23, then all other account codes datafilled for ACSCRIDX 5 must be two digits. The data entry personnel must ensure the account codes datafilled in Table ACSCRN1 for a given customer group are the same length as the account codes specified in the ACCT option of Table CUSTHEAD. If they are different lengths, the calls route to treatment. For further details, see the following section, entitled Validation on two and three digit account codes.

Since each entry in ACSCRN1 contains the key, a CHANGE operation is not valid. Only additions and deletions can be performed. Therefore, to change a tuple, it must be deleted and then re-added.

Validation of two and three digit account codes

When an account code is dialed on a call originating over a Network Services System (NSS) agency, the ACCTVAL field of the ACCT option for the appropriate customer group in Table CUSTHEAD is checked.

If the option contains datafill, the customer group's account code length (specified in the ACCT option in Table CUSTHEAD) is checked against the ACSCRIDX's account code length datafilled in Table ACSCRN1. If the

lengths match, the dialed account code is checked against the particular ACSCRIDX's assigned account codes in Table ACSCRN1. If the account code is found, the call proceeds. If the account code is not found, an IBN110 log with an ACCT VALIDATION FAILURE message generates and the call goes to Invalid Account Code treatment.

If the code lengths are different, an IBN110 log with an INCONSISTENT ACCT LENGTHS message generates and the call routes to Invalid Account Code treatment. In all three cases, the account code is recorded in the station message detail recording (SMDR) billing record.

Sample validation scenarios

Following are three sample account code validation scenarios (that is, Example 1, Example 2 and Example 3). The datafill in Table 16-1 shows the rationale behind the processing of the three calls.

Table 16-1
Sample datafill for account code validation scenarios

TABLE CUSTHEAD

CUSTNAME	CUSTXLA	DGCOLNM	OPTIONS
CGRP1	. . .	. . .	(ACCT 2 Y 10) . . .
CGRP2	. . .	. . .	(ACCT 3 Y 113) . . .
CGRP3	. . .	. . .	(ACCT 3 Y 236) . . .

TABLE ACSCRN1

ACSCRIDX	ACCTCODE
10	00
10	27
10	99
113	000
113	014
113	342
113	787

—continued—

Table 16-1
Sample datafill for account code validation scenarios (continued)

TABLE ACSCRN1

ACSCRIDX	ACCTCODE
236	45
263	99

—end—

Example 1—A caller belonging to customer group CGRP1 dials the account code 27. Since CGRP1 has the ACCTVAL option with ACSCRIDX 10 and an account code length of 2, the account codes datafilled with ACSCRIDX 10 in Table ACSCRN1 are checked for an account code length of two. The check passes so the system searches for account code 27 associated with ACSCRIDX 10 in Table ACSCRN1. The account code is found and the call proceeds.

Example 2—A caller belonging to customer group CGRP2 dials the account code 777. Both the account code length specified in CUSTHEAD's ACCT option and ACSCRN1's ACSCRIDX 113 are the same, so the system searches for an account code 777 assigned to ACSCRIDX 113. The account code is not found. Therefore, an IBN110 log generates and the call routes to Invalid Account Code treatment.

Example 3—A caller belonging to customer group CGRP3 dials the account code 233. The account code length specified for this customer group through the ACCT option is 3. However, the account codes datafilled for the ACSCRIDX 236 are two-digits long. Therefore, an IBN110 log generates and the call routes to Invalid Account Code treatment.

Account code screening database for 2- to 12-digit codes

If account codes greater than three digits in length are to be validated, the ACSCRN2 table should be used. This table accommodates two- to twelve-digit account codes.

The ACSCRN2 table supports 0–2047 indices with up to 100 possible account code digits for each index. The initial account code number datafilled for a given index determines the length of the remaining account codes for that index. For example, if the first account code for index 1 is 12345, then all other account codes for index 1 must be 5 digits in length. The account codes datafilled in Table ACSCRN2 for a given customer group must be the same length as specified in the ACCT option of Table CUSTHEAD for that customer group.

Since each entry in ACSCRN2 contains the key, a CHANGE operation is not valid. Only additions and deletions can be performed. Therefore, to change a tuple, it must be deleted and then re-added. To change the length of account codes for a given index, all account codes associated with that index must be deleted and account codes of the new length added.

Validation of 2- to 12-digit account codes

When two-to-twelve digit account code validation is required, if the account code length received is greater than or equal to the account code length specified in Table CUSTHEAD, only the number of digits specified in Table CUSTHEAD are validated. The system validates the account code starting with the first digit of the digit stream.

Processing of non-validated 2- to 12-digit account codes

When account code validation is *not* required and if the length of the dialed account code is greater than or equal to the account code length specified in the ACCT option in Table CUSTHEAD for a particular customer group, the call routes. However, if the account code length is less than the length specified in Table CUSTHEAD, then a log outputs and the call routes to treatment regardless of whether account code validation is required.

Additionally, when an account code is collected with an authcode under the combined authcode/account code option specified in Table CUSTHEAD, the account code length must be the same as the length specified in the ACCT option in order for call routing to occur. Otherwise, a log outputs and the call routes to treatment regardless of whether account code validation is required.

Process to activate account code screening table

Only one of the account code screening tables, ACSCRN1 and ACSCRN2, can be active at a time. To activate a screening table the craftpersonnel must enter the command ACCTDB. This command produces the following options:

- QUERY—displays the account code screening database that is currently active (that is, the database call processing uses for validation)
- ACSCRN—enables call processing to validate the account code against Table ACSCRN1
- ACSCRN2—enables call processing to validate the account code against Table ACSCRN2

IBN ISDN PRI immediate routing following account code collection

The Immediate Routing Following Account Code Collection feature allows a call originating over an IBN ISDN PRI trunk group to route immediately following entry of the required number of account code digits rather than

wait for an octothorpe to be entered or inter-digital timeout to expire. However, if the account code entered is invalid, the call routes to a treatment.

This feature is enabled and disabled on a customer group basis by activating a new parameter, NOTIMOUT, which was added to the account code options vector in Table CUSTHEAD. When NOTIMOUT is set to Y, a call is routed immediately after an account code is entered. If this option is set to N, a call requiring an account code is not routed until a timeout occurs or an octothorpe is received.

Immediate routing feature interactions

The following account code related features interact with the Immediate Routing feature such that when the system collects account code digits, the call immediately routes without waiting for an octothorpe or timeout expiration.

- Feature Access Code
- Account Code Required (ACR)
- Direct Inward System Access (DISA)
- Meridian Offnet Access (MONA)
- Reorigination
- Reset Dialing
- Validated Account Codes

Authcode last dialing plan

Besides validating the content of account codes, the Validated Account Codes and Authcode Last Dialing Plan feature provides an authcode last dialing plan within meridian offnet access (MONA). This dialing plan is available to NSS FGA, FGB, NSS FGD, IBN trunks, and DATs. (Applicable DATs are loop start FXS, ground start FXS, ground start FXO, and IBN PTS cut-through tie trunks.)

The format of the Authcode Last Dialing Plan is as follows:

ACCESS + PT + DEST DN + (#) + PT + AUTH + (PIN) + ((PT) + AC) + (#)

where:

ACCESS—access digits

PT—prompt tone (dial tone or special dial tone)

DEST DN—destination directory number

#—octothorpe key

AUTH—authorization code

PIN—personal identification number

AC—account code

( )—optional field

Note: If PIN digits, security code digits, or account code digits are collected with the authcode, then the authcode, PIN, security code, or account code digits must be dialed before a # may be dialed to signify end of dialing.

Datafill

To specify the authcode last dialing plan, datafill two tables: TRKGRP and DIALPLAN. Table TRKGRP field DIALPLAN specifies the dial plan name. The dial plan name also is datafilled in Table DIALPLAN with PLAN TYPE = CUTTHRU and CTTYPE = AUTHONLY. When PLAN TYPE = CUTTHRU and CTTYPE = AUTHONLY, field ORDER is datafilled LAST. Datafilling the ORDER field with LAST causes the system to prompt for the destination, authcode, and account code prompt tones. Table 16-2 is a datafill example.

Table 16-2
Sample datafill for the authcode last dialing plan

TABLE DIALPLAN					
DIALPLAN AUTHL	PLANTYPE CUTTHRU	ORDER LAST	DESTPRMT DT	AUTH PRMT SDT	ACCT PRMT DT
TABLE TRKGRP					
CLLI TGRP1	GRPTYP . . IBNTI	OFFNET Y	OFFNTACC . . FGB .	DIALPLAN AUTHL	
OFNTOPT $					

In the the previous datafill, all callers who gain access to NSS through trunk group TGRP1 must dial destination digits followed by an authorization code and an optional account code. The prompt for the destination digits is dial

tone; for authcode, special dial tone, and for account code (if required) dial tone. The dialing sequence is as follows:

where:

ACCESS—access digits

DT—dial tone

DEST DN—destination directory number

SDT—special dial tone

AUTH—authorization code

AC—account code

< >—required field

Authcode or travel card dialing

When user dials a CTTYPE of AUTHORTC, the system prompts for AUTHNAME and TCNNAME. The AUTHNAME subfield must be datafilled with a dial plan name that uses the AUTHONLY dial plan. If the ORDER for this AUTHONLY dial plan is FIRST, AUTHORTC refers to authcode first or TCN dial plan. If the ORDER for this AUTHONLY dial plan is LAST, AUTHORTC refers to authcode last or TCN dial plan. Table 16-3 is a datafill example.

Table 16-3
Sample datafill for authcode or travel card dialing

TABLE DIALPLAN

DIALPLAN	PLANTYPE	CTTYPE . .	ORDER. . .	AUTHNAME	TCN
AUTHF	CUTTHRU	AUTHONLY	FIRST		NAME
AUTHL	CUTTHRU	AUTHONLY	LAST		
TCN1	CUTTHRU	TCNONLY			
DP1, DP2	CUTTHRU	AUTHORTC		AUTHF	
	CUTTHRU	AUTHORTC		AUTHL	TCN1
					TCN1

For the datafill shown in Table 16-3, a trunk group using dial plan DP1 supports either authcode first dialing or travel card dialing. On the other hand, a trunk group using dial plan DP2 supports either authcode last or travel card dialing.

When dial plan AUTHORTC is used, a restriction applies to the destination digits that may be dialed under the authcode last dial plan. The format for travel card dialing is:

0 + destination + TCN

The format for authcode last dialing is:

destination + AUTH

To differentiate between travel card and authcode calls, 0 can not be dialed as the first digit of the destination digits when using the authcode last dialing plan. Therefore, if the dial plan is AUTHORTC and the first digit dialed is 0, the call is treated as a travel card call. If the first digit dialed is not a 0, the call is treated as an authcode call.

Note: This restriction does not apply when the dial plan type is AUTHONLY.

Translations of destination digits

The destination digits dialed are translated using the NCOS and optional customer group associated with the dialed authcode.

Authcode last dialing plan and account code interaction

The collection of an account code is optional. An account code can be required based on the authcode or based on IBN translations. If an account code is required based on translations, the prompt tone specified for the account code in Table DIALPLAN prompts for the account code.

If an account code is required based on the authcode, the prompt tone may not apply. If the account code is collected with the authcode as a combined authcode/account code, the account code prompt tone is not given.

Additional functions

The Validated Account Codes and Authcode Last Dialing Plan provides the additional capabilities described in the following sections.

The Account Code Validation feature has the following incompatibilities, limitations, and restrictions:

- Account code validation is performed only on NSS FGA, FGB, and NSS FGD interfaces and IBN trunks and NSS DATs.
- Only two- and three-digit account codes can be validated.

- Zero (0) can not be dialed as the first digit of the destination digits under the authcode last dial plan. If a 0 is dialed, the dialed destination digits are ignored and the call is routed to the hotline number.
- If a hotline number is associated with the authcode dialed using the authcode last dial plan, the dialed destination digits are ignored and the call is routed to the hotline number.
- The ACR option in Table CUSTHEAD (specifying authcode required) has no effect on the authcode last dial plan. This does not prevent a destination only dial plan from using the ACR option to specify that an authcode should be collected.

The IBN ISDN PRI Immediate Routing Following Account Code Collection feature has the following incompatibilities, limitations, and restrictions:

- This feature does not affect Attendant Console operation concerning Account Code entry.
- Calls that use combined authorization and account codes are not affected by this feature.
- This feature does not affect the Account Code Required (ACR) feature when used with an announcement. ACR with announcement already collects the exact number of digits in the account code.
- This feature does not affect the collection of an account code following reorigination of a travel card number when MF receivers are used instead of universal tone receivers.

The Authcode Last Dialing Plan feature has the following incompatibilities, limitations, and restrictions:

- Under the authcode last dial plan, if: 1) a caller dials a private speed call number that is datafilled in Table PSCNUM under the private speed call index associated with the caller's dialed authcode, and 2) the account prompt is N for No Dial Tone, reset dialing cannot be performed during the collection of the account code. If the reset key is pressed during this stage, the call is routed to treatment.
- As with authcode first dialing, unless Table CUSTHEAD specifies combined authcode/account code, an account code is not collected for authcode hotline calls under the authcode last dial plan.

- Under the authcode last dial plan, if: 1) the account code prompt is N for No Dial Tone and 2) the reset key is pressed during the collection of the account code, the call will reset back to the authcode collection state. The destination digits are translated based on the customer group and NCOS associated with the last authcode dialed. If the destination digits do not translate, the appropriate logs are generated and the call is sent to treatment. However, even if the call completes, logs may still be generated.

If the destination digits do not translate using the customer group and NCOS associated with the first authcode dialed, logs generate but the call will not necessarily go to a treatment. If the destination digits cannot be translated, additional logs generate and the call goes to treatment.

Personal identification numbers

A personal identification number (PIN) is an optional one- to four-digit code that provides an additional level of screening beyond the authorization code. The PIN, always associated with an authorization code, identifies the individual caller placing the call. A single PIN or multiple PINs can be assigned to an authorization code. When multiple PINs are assigned to one authorization code, each PIN identifies a different person. For example, a sales department with 15 salespeople may be assigned only one authorization code. To enable the department manager to identify the calls made by each salesperson, 16 PINs are assigned to the authcode (for example, one PIN for the department manager and one PIN for each of the salespeople).

Dialing the PIN digits may or may not be required. If dialing the PIN digits is required, the digits must follow the authorization code or the security code, if a security code is required.

Each PIN digit ranges from 0 to 9. If an authorization code is assigned a single PIN, the PIN can be one- to four-digits long. If, however, an authorization code is assigned multiple PINs, the PINs must be two- or three-digits long.

Review of authorization code dialing

Following is the generic form of authorization code dialing for offnet callers who have received the node dial tone. Notice the placement of the PIN.

ACCESS + <SDT> + AUTH + (SEC) + (PIN) + (AC) + <DT> + DEST DN + (<SDT> + AC)

where:

ACCESS—access digits dialed by a caller to access an NSS node.

The access digits are as follows:

- FGA = (NPA) + NXX+XXXX or 800+NXX+XXXX
- FGB = 950+WXXX

- FGD EAP cut-through = 10XXX + #
- FGD Interim dialing cut-through = 950+WXXX
- DAT cut-through = depends on how DATTK is datafilled in table TRKGRP

SDT—special dial tone

AUTH—authorization code

SEC—security digits

PIN—personal identification number

AC—account code

DT—dial tone

DEST DN—destination directory number

( )—optional field

< >—required field

Capabilities and attributes provided

The PIN feature provides the following capabilities and attributes:

- NSS PIN collection
- region codes
- two types of PINs
- PIN database
- SMDR recording of PIN digits
- log reports

NSS PIN digit collection

As shown in the preceding authorization code dialing plan, the dialing of PIN digits is optional. When the PIN digits are dialed, the NSS collects them based on the parameters entered in table AUTHCDE. The system collects PIN digits from the following call types:

- Feature Group A (FGA) calls
- Feature Group B (FGB) calls
- Feature Group D (FGD) equal access plan (EAP) cut-through calls
- FGD interim dialing plan cut-through calls

- Universal Access 800 calls
- DAT cut-through calls
- Centrex calls

Once the switch collects the PIN digits, NSS validates them by comparing them against the PIN digits in the AUTHCDE or PINDATA database. If the collected PIN digits are valid, the call progresses normally. If the collected PIN digits are not valid, the call goes to reorder treatment after all the destination digits are collected. The Network Services System (NSS) continues to collect the destination digits as if the dialed PIN digits were valid so the caller does not know the PIN digits are invalid. This is done to ensure authcode security.

Table AUTHCDE further details on how and when the PIN digits are collected and validated. This table and its datafill are discussed in the PIN database section.

Region codes

With the PIN feature, the entire NSS node serving a physical area is divided into different regions. Each region, depending on its geographical location in the network, is assigned a region code number which ranges from 0 through 2047. All authorization codes assigned to the subscribers of a particular region have the same region code. Similarly, all incoming trunks from a particular region have the same region code.

Two types of PINs

According to table AUTHCDE's PINSTATS (PIN status) parameter, there are two types of PINs available. They are: 1) Required PIN and 2) Optional PIN based on region code.

Required PINs

When a PIN is required, it means the caller must always dial the PIN digits regardless of the caller's region. The required PIN is dialed after the authorization code or after the security code, if applicable.

The authorization code obtains this required PIN status when the PINSTATS (PIN status) field contains the datafilled REQUIRED. When REQUIRED is datafilled, either a single PIN or multiple PINs must be assigned to the authorization code to correctly enable this PIN type.

Because this type of PIN requires the NSS node to always collect and validate the PIN digits, the region code of the authorization code or incoming trunk group is not necessary.

Optional PINs based on region code

When a PIN is optional, it means the caller dials the PIN digits only when the call originates outside the home region. (A call originating outside the home region is a call in which the region code of the caller's authorization code is different from the region code assigned to the incoming trunk.)

When the region code of a caller's authorization code matches the originating trunk's region code, the caller is said to be placing a call within the home region. When placing a call within the home region, the caller should not dial the PIN digits. If the caller DOES dial the PIN digits, the call does not complete successfully. Instead, it goes to reorder treatment after all destination digits are collected.

This PIN type requires that: 1) region codes be assigned to the various authorization codes and incoming trunks.and 2) either a single PIN or multiple PINs be assigned to the authorization codes.

PIN database

The NSS PIN database is contained in three tables:

- Table AUTHCDE
- Table PINDATA
- Table TRKGRP

Table AUTHCDE

This table implements the authorization code feature. This feature identifies callers for billing purposes, assigns Network Class of Service (NCOS), and controls network access.

This table has three fields: AUTHCODE, SECDIGITS, and OPTIONS. The AUTHCODE field identifies the actual authorization code(s) assigned to an authpart. SECDIGITS identifies the optional security code digits. The OPTIONS field enables options (such as PINs) to be assigned to the authorization codes.

Only 16 authparts that can add options to their authcodes and options can have a first-come-first-served basis. That is, the first 16 authparts to add options are the only authparts allowed to add the options. Therefore, if the first 16 authparts (AP#1 through AP#16) added options to their authcodes, AP#17 (authpart number 17) is not be allowed to add options to its assigned authcodes. However, if only authparts AP#1, AP#3, AP#4, AP#5, and AP#10 added options, AP#17 could add options to its assigned authcodes. If data entry personnel try to add options to the authcodes of more than 16 authparts, an error message is printed and the options are not be added.

Table 17-1 illustrates datafill for an authcode with no PIN option associated with it. (No PIN associated with the authcode).

Table 17-1
Table AUTHCDE datafill example

TABLE AUTHCDE		
AUTHCODE	SECDIGITS	OPTIONS
945678	345	$

Table AUTHCDE PIN option

As previously stated, one of the options that can be added to an authorization code, is the option PIN. The PIN option has two subfields: 1) PINSTATS and 2) PINSEL. Following is a description of these subfields and explanations on how to use these subfields to achieve the PIN concepts already discussed.

PINSTATS (PIN status)

This field determines whether or not PINs are required by a particular authorization code. It also determines, for non-Centrex authcodes, whether or not the PIN digit dialing requirement is based on the region code of the origination trunk group or the authorization code.

This field can be datafilled as either REQUIRED or OPTBYREG (for non-Centrex authcodes only). When REQUIRED is datafilled, NSS always expects the PIN digits to be dialed and collected for validation.

When OPTBYREG is datafilled, NSS expects the PIN digits to be collected for validation ONLY if the region code of the caller's authorization code does not match the region code of the incoming trunk group over which the call originates. Since region codes are required to be screened in this situation, the authcode's region code field must be datafilled. The table control prompts for the authcode's region code.

Note: PINSTATS can not be datafilled OPTBYREG for authorization codes associated with a Centrex system.

PINSEL (PIN selector)

This field indicates whether a SINGLE PIN or multiple PINs are datafilled against a particular authorization code. This field can be datafilled as either:

- SINGLE (single PIN only)
- MULTIPLE (multiple PINs)

If SINGLE is entered, the table control prompts for the single PIN code (PINDIGS).

Table 17-2 illustrates datafill for REQUIRED PIN AUTHCODE option with single PIN associated with the authcode.

Table 17-2
Table AUTHCDE datafill example

Table AUTHCDE				
AUTHCODE	OPTIONS	PINSTATS	PINSEL	PINDIGS
987654	(PIN)	REQUIRED	SINGLE	9 $

Table 17-3 illustrates datafill for OPTIONAL PIN BY REGION AUTHCODE option with a single PIN associated with the authcode.

Table 17-3
Table AUTHCDE datafill example

Table AUTHCDE					
AUTHCODE	OPTIONS	PINSTATS	REGNCODE	PINSEL	PINDIGS
987654	(PIN)	OPTBYREG	34	SINGLE	1123 $

If MULTIPLE is entered, the table control prompts for a PININDEX number. The PININDEX number is used to access table PINDATA, where a list of the PINs is stored against the PININDEX number.

Table 17-4 illustrates datafill for REQUIRED PIN AUTHCODE option with multiple PINs associated with the authcode.

Table 17-4
Table AUTHCDE datafill example

Table AUTHCDE				
AUTHCODE	OPTIONS	PINSTATS	PINSEL	PINDIGS
987654	(PIN)	REQUIRED	MULTIPLE	123 $

Table 17-5 illustrates datafill for OPTIONAL PIN BY REGION AUTHCODE with multiple PINs associated with the authcode.

Table 17-5
Table AUTHCDE datafill example

Table AUTHCDE					
AUTHCODE	OPTIONS	PINSTATS	REGNCODE	PINSEL	PINDIGS
987654	(PIN)	OPTBYREG	99	MULTIPLE	0 $

Therefore, if a single PIN is assigned to an authorization code, the PIN is stored in table AUTHCDE. If multiple PINs are assigned to one authorization code, they are stored in table PINDATA. The index into table PINDATA is stored in the PININDEX field of table AUTHCDE.

Table PINDATA

On a per switch basis, the PINDATA table supports multiple two- to three-digit PINs per authcode. This database supports a maximum of 4096 index lists of two-digit PINs (maximum 1000 PINs per index list) and 4096 index lists of three-digit PINs (maximum 1000 PINs per index lists). (The range of two-digit PIN values is 00 to 99 while the range of three-digit PIN values is 000–999.)

The index into table PINDATA is the PININDEX number stored in table AUTHCDE. The value of this number ranges from 0 to 8191. PININDEXs 0 through 4095 list only two-digit PINs while PININDEXs 4096 through 8191 list only three-digit PINs.

The index number and valid PIN comprise the two-part key to table PINDATA. By adding several tuples with the same PININDEX number and different PINs, you form a list of PINs valid for one authorization code.

Because the PINDATA tuple consists only of a key, a change operation is not valid. Therefore, to effect a change, the tuple first must be deleted and then re-added.

Table 17-6 illustrates a datafill of two-digit PINs for PININDEX 371 and three-digit PINs for PININDEX 5555.

Table 17-6
Example datafill for multiple two-digit and three-digit PINs (table PINDATA)

PININDEX	PIN
371	23
371	57
371	99
5555	010
5555	123
5555	321
5555	998

This table is accessed by call processing and used to validate PIN digits collected in case of authorization dialed calls.

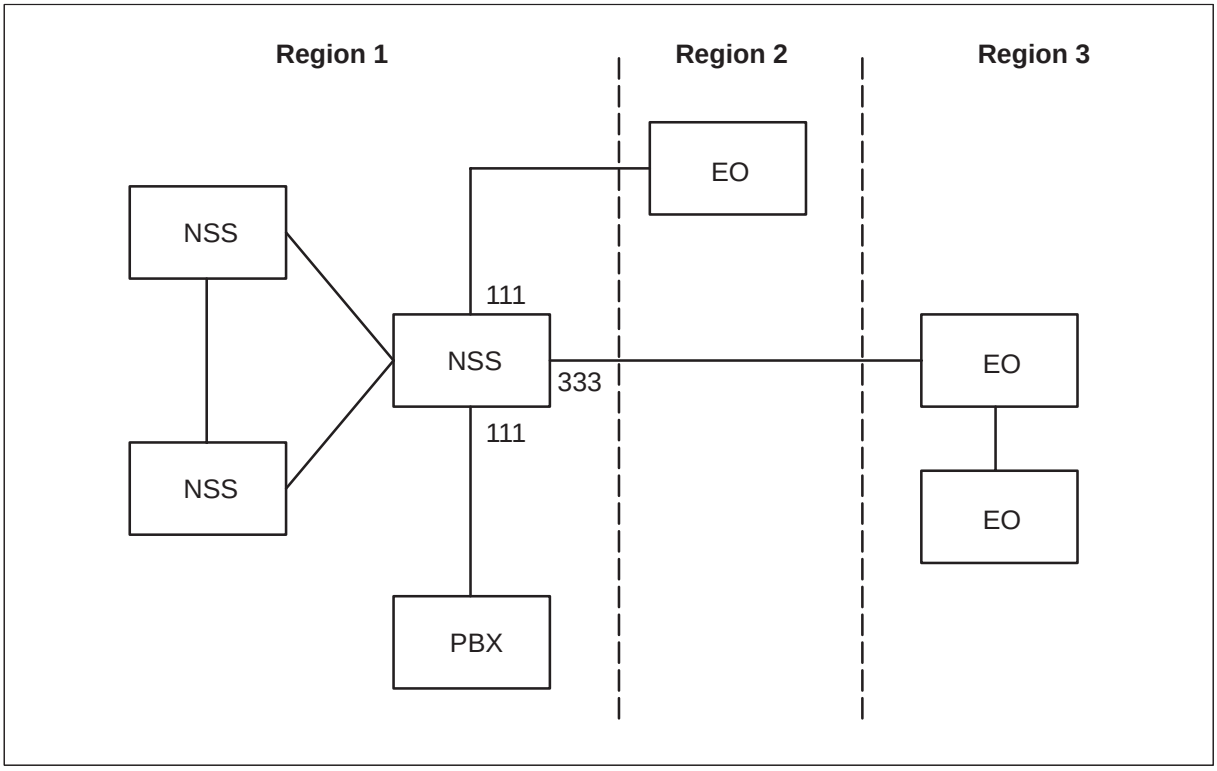
Table TRKGRP

The option, REGION, is included in the OFNTOPTS field of table TRKGRP for IBNTI and IBNT2. The Region option allows a region code field to be assigned to FGA, FGB, FGD, and DAT trunks. The range of trunk group region codes is 0 through 2047. This option is not datafilled for Centrex calls.

Datafill examples

Following are three examples of datafill for various region code and PIN combinations (that is., Optional PIN by Region Authorization Code, Examples 1 and 2 and Required PIN Authorization Code, Example 1). For all three of these examples, refer to Figure 17-1. In the examples, the region codes in table TRKGRP have been set to 333 for all trunks coming in from end offices (EO) that are located in Region 3. All other trunks coming in from EOs, NSSs, or PBXs that are located in either Region 1 or Region 2 have their region codes set to 111.

Figure 17-1
Region and PIN overview



Optional PIN by region authorization code, example 1

The caller wants the authorization code set so that PIN digits need only be dialed for long distance calls that travel through long distance carriers. Therefore, the caller receives an authorization code with PIN status and OPTBYREG (optional by region). The authcode entry in table AUTHCDE should be datafilled as shown in Table 17-7.

Table 17-7
Example 1 datafill for table AUTHCDE

TABLE AUTHCDE					
AUTHCODE	OPTIONS	PINSTATS	REGNCODE	PINSEL	PINDIGS
123456	(PIN)	OPTBYREG	111	SINGLE	345 $

Note: The caller belongs to region 1, so the Authcode region code should be set at 111.

If the caller places a call from the EO in region 2 (which terminates to the PBX in region 1), the caller is not required to dial the PIN digits following the authorization code (123456) even though the PIN digits are filled with an

Authcode. This is because the region code datafilled against the authorization code matches the region code datafilled against the incoming trunk. Also, in the example, that caller accesses an NSS network by dialing an FGB access code.

To implement the above type call, table TRKGRP should be datafilled as shown in Table 17-8.

Table 17-8
Example 1 datafill for table TRKGRP

TABLE TRKGRP					
CLLI	GRPTYPE	BILLDN	OFFNET	OFFNTACC	REGION
FGBTK	IBNTI	. . .	Y	FGB	111

A summary of the datafill requirements for table TRKGRP follows:

- The field GRPTYPE must be datafilled as IBNTI or IBNT2.
- OFFNET field must be set to Y and FGB must be set for OFFNTACC to specify that FGB signaling is expected on this trunk.
- The REGION code of trunk group is 111.

Optional PIN by region authorization code, example 2

Making a call from an EO in region 3 (which terminates to an NSS node in region 1), the caller must dial the PIN digits associated with his/her authorization code (345) following the authorization code 9123456 dialing. The region code datafilled against the authorization code does not match the region coded datafilled against the incoming trunk. Also, in the example, the caller accesses an NSS network by dialing an FGD access code. To implement this type of call, table TRKGRP should be datafilled as shown in Table 17-9.

Table 17-9
Example 2 datafill for table TRKGRP

TABLE TRKGRP					
CLLI	GRPTYPE	BILLDN	OFFNET	OFFNTACC	REGION
FGBTK	IBNTI	. . .	Y	NSS FGD	333

A summary of the datafill requirements for table TRKGRP follows:

- The GRPTYPE field must be datafilled as IBNTI or IBNT2.

- The OFFNET field must be datafilled as Y. The OFFNTACC field must be set to NSSFGD to specify that FGD signaling is expected on this trunk.
- The REGION code of this trunk group is 333.

Required PIN authorization code, example 1

In this example, the caller is always required to dial PIN digits following the authcode dialing, regardless of the call's origin. This includes dialing PIN digits for calls within their region.

The caller should be assigned an authorization code with a PINSTATS of REQUIRED. Since region code screening is not required, the region code of the trunk group is not validated. Table TRKGRP is not used.

Table 17-10 illustrates datafill for an Authcode entry in table AUTHCDE if multiple PINs are associated with the authcode.

Table 17-10
Example 3 datafill for table AUTHCDE

TABLE AUTHCDE				
AUTHCODE	OPTIONS	PINSTATS	PINSEL	PINDIGS
123456	(PIN)	REQUIRED	MULTIPLE	5678 $

Table 17-11 outlines different scenarios when a caller has to dial PIN digits.

Table 17-11
PIN digit dialing grid chart

TRKGRP	AUTHCDE				
REGNCODE	PIN STATUS			REGCODE	PINDIGS
DATAFILL	PINOPT	REQUIRED	OPTBYREG	MATCH	SINGLE/MULTIPLE
NO	NO	N/A	N/A	N/A	N/A
NO	YES	YES		N/A	Caller must dial PIN digits always.

—continued—

Table 17-11
PIN digit dialing grid chart

DATAFILL	PINOPT	REQUIRED	OPTBYREG	MATCH	SINGLE/MULTIPLE
YES	YES		YES	NO	Caller must dial PIN digits.
YES	YES		YES	YES	Caller should not dial PIN digits
			—end—		

SMDR recording of PIN digits

A call's PIN digits are recorded in a SMDR if the PIN digits are correctly dialed and the PIN option is datafilled in table CUSTSMDR. An SMDR Extension Record Format (#DC) is generated for PIN digit calls

Record code

Value #DC. This is a 2-character code that identifies the PIN SMDR Extension Record.

PIN digits

This field is a 14-digit field that contains the PIN dialed by the subscriber. This field is 14 digits long because it also is used to record the travel card number on travel card calls.

PIN validation

This is a 1-digit field that contains information dealing with the PIN digits. The possible values of this field are:

- Valid PIN (1)
- Invalid PIN (2)

Log reports

When invalid PIN digits are entered for a call, log report IBN110 with the message INVALID PIN DIGITS is generated. This log report also can generate two other messages. These messages are:

- INCORRECT PIN DIGITS
  - — given when the number of dialed PIN digits is less or more than that specified in table AUTHCDE
- PIN DIGITS MUST BE DIALED

— given when the caller failed to dial the PIN digits following the authcode.

Feature impact

Meridian offnet access (MONA)

All calls entering an NSS node through FGA, FGB, FGD cut-through, and 800 UA access invoke the Meridian Offnet Access (MONA) feature for collection of authorization, PIN digits, account digits, and destination digits.

Reset dialing

When a mistake is made while dialing PIN digits, the caller may enter * to receive dial tone from the NSS node and then redial the authcode, optional security digits, and PIN digits. The caller does not have to redial the corporate network access number.

Call reorigination

The following summarizes PIN digit impact on call reorigination.

- Anytime after a call involving PIN digits dialing has completed routing, the caller may enter a #. This action will disconnect the current call and prompt the NSS node for dial tone. Once dial tone is received, the caller can dial another destination. The caller does not have to redial the corporate network access number, authorization digits, and PIN digits again.
- When the call reorigination feature is invoked, the PIN digits stored in the NSS SMDR Extension Billing Record (format #DC) for the initial call are retrieved and used for subsequent calls.
- Reorigination is allowed based on the field REORIG datafilled as Y in table TRKGRP.
- Reorigination is only valid for trunk originated calls.

Restrictions and limitations

The PIN digits feature has the following restrictions and limitations:

- PIN digits are collected and validated only in calls that invoke MONA feature for collection of authcode and destination digits.
- The total number of authcode, Security digits, PIN digits, and Account Code (Auth_account combined) digits should not exceed 15.

Table 17-12
PIN digit dialing grid chart

TRKGRP	**AUTHCDE**				
REGNCODE	PIN STATUS			REGCODE	PINDIGS
DATAFILL	PINOPT	REQUIRED	OPTBYREG	MATCH	SINGLE/MULTIPLE
NO	NO	N/A	N/A	N/A	N/A
NO	YES	YES		N/A	Caller must dial PIN digits always.
YES	YES		YES	N0	Caller must dial PIN digits.
YES	YES		YES	YES	Caller should not dial PIN digits.

SMDR recording of PIN digits

A call's PIN digits are recorded in a SMDR if the PIN digits are correctly dialed and the PIN option is datafilled in table CUSTSMDR. A SMDR Extension Record Format (#DC) generates for PIN digit calls

Record code

Value #DC. This is a 2-character code that identifies the PIN SMDR Extension Record.

PIN digits

This field is a 14-digit field that contains the PIN dialed by the subscriber. This field is 14 digits long because it also is used to record the Travel Card Number on travel card calls.

PIN validation

This is a 1-digit field that contains information dealing with the PIN digits. The possible values of this field are:

- Valid PIN (1)
- Invalid PIN (2)

Log reports

When invalid PIN digits are entered for a call, log report IBN110 with the message INVALID PIN DIGITS is generated. This log report also can generate two other messages. These messages are:

- INCORRECT PIN DIGITS

— given when the number of dialed PIN digits is less or more than that specified in table AUTHCDE.

- PIN DIGITS MUST BE DIALED

  — given when the caller failed to dial the PIN digits following the authcode.

Feature impact

Meridian offnet access (MONA)

All calls entering an NSS node over FGA, FGB, FGD cut-through, and 800 UA access invoke the Meridian Offnet Access (MONA) feature for collection of authorization, PIN digits, account digits, and destination digits.

Reset dialing

When a mistake is made while dialing PIN digits, the caller may enter * to receive dial tone from the NSS node and then redial the authcode, optional security digits, and PIN digits. The caller does not have to redial the corporate network access number.

The following summarizes PIN digit impact on call reorigination.

- Anytime after a call involving PIN digits dialing has completed routing, the caller may enter a #. This action will disconnect the current call and prompt the NSS node for dial tone. Once dial tone is received, the caller can dial another destination. The caller does not have to redial the corporate network access number, authorization digits, and PIN digits again.
- When the call reorigination feature is invoked, the PIN digits stored in the NSS SMDR Extension Billing Record (format #DC) for the initial call are retrieved and used for subsequent calls.
- Reorigination is allowed based on the field REORIG datafilled as Y in table TRKGRP.
- Reorigination is only valid for trunk originated calls.

Restrictions and limitations

The PIN digits feature has the following restrictions and limitations:

- PIN digits are collected and validated only in calls that invoke the MONA feature for collection of authcode and destination digits.
- The total number of authcode, security digits, PIN digits, and Account Code (Auth_account combined) digits should not exceed 15.

- The valid range of PININDEX values is 0 to 8191. PININDEX 0 through 4095 are reserved for 2-digit PINs. PININDEX 4096 through 8191 are reserved for 3-digit PINs. Consequently, 2-digit and 3-digit PINs cannot be intermixed for the same PININDEX
- Only 2-digit and 3-digit PINs are allowed when validating PINs using the Table PINDATA.
- PINDIGS and PININDEX are mutually exclusive.
- In the case of OPTBYREG authcode, a call with an invalid PIN gets reorder treatment after collection of destination digits. NSS receives PIN digits provided that the authorization code region code matches the region code of the incoming trunk.
- If the PINSTATS field of an authcode is datafilled with the field OPTBYREG and the REGION field is not datafilled in the incoming trunk, the call gets reorder treatment after collecting destination digits.
- PIN digits are not collected at all in cases of authorization hotline call.
- No SMDR records are generated when invalid PIN digits are dialed.
- This feature is not applicable to the Account Code Ready (ACR) feature.

Private Speed Calling and Hotline Dialing

Private Speed Calling (PSC) and Hotline Dialing are two features that provide the caller with an abbreviated form of dialing. PSC allows the caller to associate a list of speed call numbers with a specific authorization code. The hotline dialing feature provides the caller with three ways to use hotline dialing: trunk group hotline dialing, authorization code hotline dialing and conditional hotline dialing.

As previously stated, PSC allows the caller to associate a list of speed call numbers with a specific authcode. Each speed call number represents a number to which a call routes when the associated speed call number is dialed. The number associated with the speed call number can be any number accessible by the caller through the caller's dialing plan. A maximum of 64 speed call numbers can be associated with each authcode.

Before dialing a PSC number, the caller must receive the Network Services System (NSS) dial tone. After receiving the NSS dialing tone prompt, the caller must enter the authcode. If the authcode entered is correct, the caller receives the regular dial tone and can dial the desired private speed call number.

The format for private speed calling dialing is as follows:

ACCESS + <PT> + AUTH + (PIN) + (AC) + <PT> + 1NN or 1xyy (which is determined by office parameter, SPEED CALL ACCESS DIGITS in Table OFCOPT) + (<PT> + AC)

where:

ACCESS—access digits

PT—prompt tone (NSS dial tone)

AUTH—authorization code

PIN—personal identification number

AC—account code

N—2 through 9

X, Y—0 through 9

< >—required field

( )—optional field

(Refer to the prompt tone section of the Offnet Access Dialing Plan for descriptions of the prompt tones.)

Note: Because the PIN digits and account codes are optional, discussion of their collection is described later in this chapter under Feature Impact.

Details

The OPTIONS field in table AUTHCDE allows options to be added to the authcodes in this table.

There is a maximum of 15 authparts that can add options to their authcodes. For each authpart that adds options, a maximum of 32K authcodes can specify options in the OPTIONS field. There may be more than 16 authparts that contain datafill for the authcodes in table AUTHCDE. There can only be a maximum of 16 authparts that datafill options against their authcodes. Likewise, there may be more than 32 K authcodes for each authpart. However, only 32K of these authcodes may contain options.

Only the first 16 authparts to add options are allowed to add options. For example, if authparts AP1 through AP16 contain authcodes with options and the data entry person tries to add options to an authcode for authpart AP17, then an error message prints and the options are not added to the authcode. However, if just one authpart removes all options from all its authcodes, then AP17 may add options.

To associate a private speed call list with an authcode, a private speed call index, PSCIDX (in table PSCNUM) must be datafilled against the corresponding authcode in table AUTHCDE. To datafill a PSCIDX for a particular authcode, the PSC option is added to that particular authcode. This option is under the OPTIONS field in table AUTHCDE.

After specifying the PSC option, the data entry person receives a prompt for the PSCDIX. The PSCDIX along with the dialed speed call number indexes table PSCNUM and obtains the appropriate destination digits.

Table PSCNUM contains all the private speed call numbers for a given network and has two indices. The first index is the private speed call index, PSCDIX, which is associated with an authcode in table AUTHCDE. The second index is the speed call number that the caller dials. Together these features obtain the destination digits associated with the private speed call number for a particular authcode. Figure 18-1 illustrates an example of private speed calling datafill.

Figure 18-1
Private speed calling example

TABLE AUTHCDE

AUTHPART	AUTHCODE	NCOS	OPTIONS	PSCIDX
CGRP1	45678	2	PSC	5

TABLE PSCNUM

PSC IDX	PSC NUM	DESTDIGS
1	22	9072341
1	25	64464814
3	22	4815
5	36	8066804350
5	48	01144486746

If a customer group uses authcodes, then an authpart must be assigned to that customer group in table CUSTHEAD. This datafilled authpart defines characteristics, such as formats and length, of the authcodes for that customer group. These characteristics are defined by the datafill in table AUTHPART.

When authparts are datafilled in table AUTHCDE, they are datafilled against the authpart of the customer group by which they are used. Therefore, each authcode is associated with a certain authpart.

A given set of speed call numbers is associated with a particular authcode. Further, because an authcode is associated with a certain authpart, that set of speed call numbers is actually associated with an authpart/authcode combination rather than being associated with an authcode exclusively.

Multiple use of speed call lists

A list of private speed call numbers may be used by several authcodes. This is accomplished by datafilling the same private speed call index for each authpart/authcode combination in table AUTHCDE that is to use the private speed call list associated with the datafilled private speed call index.

Ambiguous dial plans

The possibility exists for ambiguity between private speed call numbers and other numbers valid in a customer's dial plan. For example, a dial plan may be set up for three digit extension dialing. If the first digit of an extension is 1, then this extension may look like a private speed call number. This section explains how to handle this type of ambiguity.

If a caller dials 1NN and does not have PSC capability, then 1NN is sent to translations. Translations route the call accordingly.

If a caller dials 1NN and has PSC capability, then table PSCNUM is searched using the PSCINDX associated with the caller's authcode and the PSCNUM NN. If an entry is found in the table, then the call routes to the destination digits associated with this private speed number. On the other hand, if an entry is not found, then the call is treated as if the caller did not have PSC dialing capability.

Table PSCNUM indices

PSCINDX field

A maximum of 5000 private speed call indices may be datafilled in table PSCNUM. The value of this field may not exceed 4999 (0 to 4999).

Note: The PSCIDX subfield of the PSC option datafilled in table AUTHCDE must also contain a number in the same range (0 to 4999) because the same number is datafilled in both tables for a particular speed call list.

PSCNUM field

A speed call number is in the form NN where N is a number from 2 through 9. When the format is 1NN, NN may be 22 to 99. If the format is 1XYY, then YY may be 00 to 99.

A maximum of 64 private speed call numbers may be datafilled for each private speed call index. Therefore, each authcode may exceed 64 speed call numbers associated with a private speed call list.

DESTDIGS field

This field contains the destination digits that the caller normally dials if the private speed calling feature is not used. It can be any number within the translation scheme available to the caller, either within the customer's private network or in an associated private or public network.

The number can consist of the digits 0 through 9 and can not exceed 18 digits.

Note: Private speed call numbers are not programmable by the caller. They must be datafilled by a data entry personnel.

SMDR billing

The private speed call number, NN, is not recorded in the SMDR record. Instead, the destination digits associated with the private speed call number are recorded in the CALLED DR field of the SMDR record.

Hotline dialing

As previously stated, this feature provides the caller with three ways to use hotline dialing:

- trunk group hotline dialing
- authorization code hotline dialing
- conditional hotline dialing

Trunk group hotline

Trunk group hotline provides the capability for a caller to dial a local exchange number and reach a destination associated with the NSS incoming trunk group. This incoming trunk group is the trunk group over which the call routes from the Local Exchange Carrier (LEC) to the NSS.

The format for trunk group hotline dialing is defined as NXXXXXX

where:

N = 2 through 9

X = 0 through 9

Details

A trunk group hotline can be associated with a dedicated access trunk (DAT) or with a Feature Group A (FGA) trunk. To associate a hotline with a trunk group, the DIALPLAN field in TRKGRP must be datafilled NP, no (incoming) pulsing.

A billing number also is datafilled for the trunk in table TRKGRP. This billing number is a different billing number than the one dialed as an authcode. The billing number is entered in the BILLDN field.

To datafill a billing number, field OFFNET in table TRKGRP is datafilled as Y. When OFFNET is set to Y, the data entry person is prompted for OFFNTACC. This subfield is datafilled DAT or FGA.

Note 1: DAT is an offnet access type for the OFFNTACC field created by the NSS DAT interface. Refer to the NSS DAT interface chapter in this reference manual.

Note 2: FGA is an offnet access type for the OFFNTACC field created by the FGA interface. Refer to the FGA interface chapter in this reference manual for more information.

When OFFNET is datafilled Y, the data entry person is also prompted with the subfield DIALPLAN. Datafill with hotline dialplan name.

Figure 18-2 is an example of datafill for trunk group hotline.

Figure 18-2
Example datafill for trunk group hotline

TABLE TRKGRP

CLLI	GRPTYP . . .	BILLDN . . .	OFFNET	OFFNTACC	DIALPLAN
HOTLTGRP	IBNTI or IBNT2	2394732	Y	DAT or FGA	HOTL1

TABLE DIALPLAN

DIALPLAN	PLANTYPE	DESTDIGS
HOTL1	HOTLINE	2149964814

TABLE TRKSGRP

CLLI	...	IPULSTYP	...
HOTLTGRP		NP	

Using the datafill described in Figure 18-2, if a caller dials a local exchange number and routes to the NSS over trunk group HOTLTGRP, the call routes to 2149964814 because this is the number specified in the DESTDIGS field in table DIALPLAN for the incoming trunk group. The customer group and NCOS used to translate 2149964814 are the customer group and NCOS datafilled in table TRKGRP for trunk group HOTLTGRP. The call is billed to 2394732.

Hotline number

The hotline number datafilled in the DESTDIGS field can not exceed 10 digits and must be a valid number in the translation scheme defined by the customer group and NCOS of the incoming trunk group.

SMDR billing

The number datafilled in the BILLDN field in table TRKGRP is the number to which the trunk group hotline calls are charged. This number is recorded in the BILLDIGS field of the NSS SMDR extension record.

Authorization code hotline

Authorization code hotline or authcode hotline allows a hotline number to be associated with an authcode. Once a caller gains access to the NSS network, the caller then can dial the authcode. The call routes to the hotline number associated with the authcode dialed by the caller using the translation scheme defined by the Meridian Offnet Access (MONA) Directory Number (DN) customer group which gains access to the NSS network and the NCOS datafilled against the dialed authcode.

The format for authcode hotline dialing is as follows:

ACCESS + <SDT> + AUTH + (AC)

where:

- ACCESS—access digits
- SDT—special dial tone (NSS dial tone)
- AUTH—authorization code
- AC—account code
- < >—required field
- ( )—optional field

Details

A hotline number is associated with an authcode through the datafill in table AUTHCDE. To datafill a hotline number for a particular authcode, the HOTLINE option must be added to that authcode. This option is specified under the OPTIONS field in table AUTHCDE.

Note: The data entry person is prompted by the HOTLNUM subfield when the HOTLINE option is specified. The hotline number is datafilled in this subfield.

Refer to Figure 18-3 for detailed information.

Figure 18-3
Example of authcode hotline

TABLE AUTHCDE

AUTHPART	AUTHCODE . . .	OPTIONS . . .	HOTLNUM
CGRP1	8397423	HOTLINE	7511817

After gaining access and receiving NSS dial tone, the caller dials the authcode 8397423 and the call routes to 7511817.

The number datafilled in the HOTLNUM subfield can not exceed 10 digits. If the authcode Hotline feature is not used, the number contained in the HOTLNUM subfield is the same as the number that is valid in the dial plan used by the authcode associated with the hotline number.

SMDR billing

Normal SMDR billing is recorded for authcode Hotline calls. The hotline number is recorded in the CALLED_DR field of the SMDR record.

Conditional hotline

Conditional hotline provides the caller with the option of either dialing destination digits or allowing digit collection to timeout and let the call route to a predefined destination. The system invokes this capability after the user gains access to the NSS network. If the digits are received before the digit collection times out, the call is treated as a non hotline or a regular call. However, if digit collection times out and a hotline route is associated with the access digits that invoked the NSS dial tone, the call routes to the hotline route. The default hotline routes to an attendant console. The default can be overridden with any route that is set up in the NSS routing tables OFRT or IBNRTE.

An authcode may or may not be required after gaining access to the NSS network, depending on specifications in the dial plan. If an authcode is required, the caller must dial it after obtaining access. The caller receives the special dial tone. If digit collection times out before the required authcode is dialed, the call routes to the conditional hotline route. On the other hand, if the caller dials the authcode, the caller receives regular dial tone after dialing the authcode. The caller may either dial destination digits or let digit collection timeout and let the call route to the hotline route.

Details

To specify a hotline route other than the default route to an attendant console, the option CONDHL is part of the tuple in table DIALPLAN.

The CONDHL option contains the subfield DIGITS. If CONDHL is not part of the DIALPLAN tuple for a particular trunk and the call times out, the call routes to the attendant console.

Figure 18-4 illustrates a conditional hotline call.

Figure 18-4
Example datafill for conditional hotline call

TABLE TRKGRP

CLLI ...	OFFNET . . .	DIALPLAN . . .
HOTLGRP	Y	HOTLINE

TABLE DIALPLAN

DIALPLAN	PLANTYPE . . .	OPTIONS	DIGITS
DIALPL1	CUTTHRU	CONDITL	24112 $

Using the information illustrated in Figure 18-4, if a caller dials cut-through, receives regular dial tone, and lets the call timeout, the caller is routed to extension 24112.

Office parameter

Office parameter SPEED_CALL_ACCESS_DIGITS in table OFCOPT specifies if format for PSC calls is 1Xyy or 1NN.

SMDR billing

Normal SMDR billing is recorded for conditional hotline calls.

Feature impact

Account codes

Account codes may be required for private speed calls and hotline calls, depending on datafill. If an account code is required, it may be collected in one of two ways for private speed calls. The account code may be collected either with the authcode or after the destination digits. For hotline calls, an account code may be collected with an authcode.

Note: The system software verifies account codes for length, not content. Refer to specific network access type for information on authcode and account code setup.

Interactions

Refer to the Personal Identification Numbers and Reorigination/Reset Dialing chapters in this manual for more information.

PIN digits—private speed calling

PIN digits may or may not be required for private speed calling depending on the datafill. If PINs are required, they are collected as follows:

ACCESS + <SDT> + AUTH + PIN + <DT> + 1NN

where:

- ACCESS—access digits
- SDT—special dial tone (NSS dial tone)
- AUTH—authorization code
- DT—dial tone
- N—2 through 9
- < >—required field

PIN digits—hotline dialing

Trunk group hotline and authcode hotline PIN digits are not required and are not collected.

PIN digits—conditional hotline

PIN digits may or not be required for conditional hotline, depending on the datafill.

Reset dialing—private speed calling

System software can perform reset dialing on private speed calls during the collection of the authcode, account code, or the private speed call number.

Reset dialing—authcode hotline

System software can perform reset dialing on authcode hotline calls during the collection of the authcode.

Reset dialing—conditional hotline

If the system software requires an authcode for a conditional hotline call, reset dialing may be performed on the call during collection of the authcode.

Reorigination—private speed calling

A user may dial a private speed call number that may be dialed as the destination digits of a reoriginated call if the authcode previously dialed has

the PSC option. The only requirement for this function is that the network has SMDR billing.

In addition, a private speed call may reoriginate. In other words, after a private speed call terminates, the Reorigination feature may allow a user to dial another private speed call number or other destination digits.

Restrictions and limitations

The private speed calling and hotline dialing feature has the following restrictions and limitations:

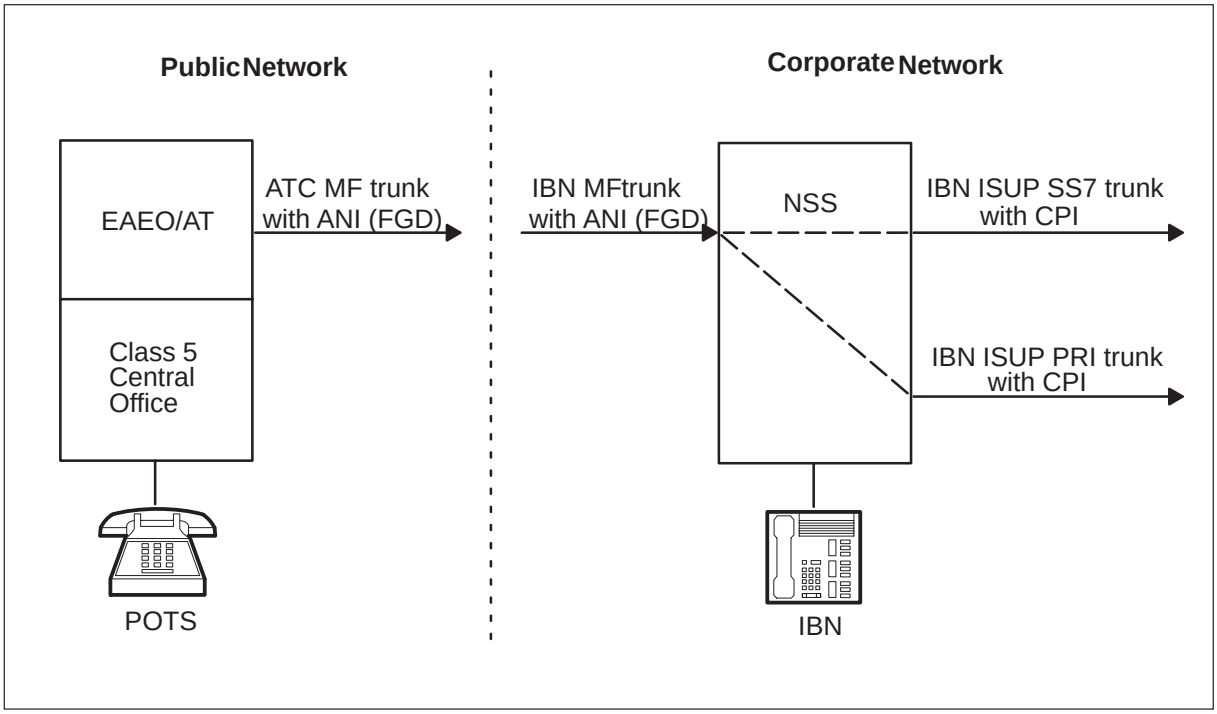
- Private speed call numbers are collected in DTMF format.
- Private speed calling/authcode hotline dialing are mutually exclusive. Therefore, if the PSC option is added to table AUTHCDE for a particular authcode, the HOTLINE option may not be added for that authcode. Likewise, if the HOTLINE option is added to table authcode for a particular authcode, the PSC option may not be added for that authcode.

Feature Group D automatic number identification delivery

This method of tandeming calls traversing the network through either integrated business network (IBN) integrated services digital network user part (ISUP) signaling system 7 (SS7) or IBN Integrated Servives Digital Network (ISDN) primary rate interface (PRI) terminating trunk facilities provides the capability of supplying incoming calling line identification (CLID) information to remote sets capable of displaying CLID information about the calling party that originated from an offnet location.

Figure 19-1 illustrates a typical scenario where this is applicable.

Figure 19-1
NSS configuration with ANI to CPI mapping



Background

Before continuing, the different Feature Group D (FGD) dialing plans available using FGD protocol should be reviewed.

FGD calling-party billable calls

The following FGD dialing plans are referred to as calling-party billable calls. This means that originating agents using these FGD dialing plans bill the calling party for the call.

FGD calling-party billable calls can be billed through the use of one of the following:

- ANI
- authcode/TCN
- both methods

Calling-party billable by ANI

The FGD calling-party billable call by ANI includes:

- FGD pure (national and international dialing)
- ANI screening can be provided with this dialing plan.

Calling-party billable by authcode/TCN

The FGD calling-party billable call by authcode/TCN includes:

- FGD pure dialing 800 universal access numbers
- FGD cut-through (EAP dialing) *
- FGD cut-through (Interim dialing) *

ANI screening is not possible with these dialing plans.

Calling-party billable by both calling methods

The FGD calling-party billable call by both methods includes FGD pure dialing of a Meridian Offnet Access (MONA) listed directory number (LDN).

ANI screening can be available with this dialing plan. Assuming that ANI screening is successful, the call can appear as a calling party billable by authcode/TCN call. Remember, when referring to calling-party billable by authcode/TCN or both, this FGD dialing plan also can be applicable depending upon the datafill.

FGD called-party billable calls

The following FGD dialing plan is referred to as a called-party billable call. Originating agents that use this FGD dialing plan bill the called party for the

call. The applicable FGD dialing plan includes FGD pure dialing 400/800 INWATS numbers.

FGD pure with 700 and 900 dialing

If ANI is received, ANI screening is required for 700 dialing. For 900 numbers, when ANI is received, an ANI look-up takes place in the ANIDATA table to ensure the 10-digit ANI is present.

Whether a call is calling-party billable by ANI, authcode/TCN, or by both calling methods; or called-party billable, it directly affects ANI or calling party information (CPI) mapping capabilities.

For more information, refer to the “Feature Group D Interface” chapter in this reference manual.

IBN MF (inband) signaling (FGD protocol)

IBN MF PTS agents using the FGD protocol typically outpulse two stages using inband signaling in the multi-frequency (MF) format. The first stage is referred to as the ANI spill. A typical ANI spill contains two subfields:

- information digits (2 digits)
- calling party’s number (10 digits)

The second stage is the called party’s number and usually contains the destination digits (also known as the terminating station number). Refer to the “Feature Group D Interface” chapter for more information.

Following is an MF format example of a typical outpulsing sequence for an IBN PTS trunk using the FGD protocol:

KP + (00 + 6137224556) + ST (First stage)

KP + 5186661234 + ST (Second stage)

where:

KP—MF signal denoting the start of an Equal Access digit stream

ST—start translation

IBN MF (FGD) signaling incoming, IBN ISUP SS7 outgoing

IBN ISUP SS7 agents handle various CPI information during the call establishment phase in their Initial Address Message (IAM). Specifically, there are mandatory and optional parameters of the IAM for this purpose.

The following parameters are mandatory:

- message type
- nature of connection indicator
- forward call indicator
- calling party's category
- user service information (formerly Bearer Capability)
- called party number

IBN ISUP SS7 mandatory IAM message parameters

Message type

Message Type is coded as IAM.

Nature of connection indicator

The nature of connection indicator is coded according to the datafill specified in the SAT field in table TRKSGRP for the SS7 trunking agent.

Specifically, the correlations are as follows:

- SAT—N (no satellite circuit in this connection)
- SAT—Y (one satellite circuit in this connection)

Continuity check indicator is coded according to the datafill specified by the COTREQ field in table TRKSGRP for the SS7 trunking agent.

Specifically, the choices are as follows:

- continuity check not required
- continuity check required on this circuit

Outgoing Echo Suppressor indicator is coded according to the datafill specified in the ESUPR field Table TRKSGRP for the SS7 trunking agent.

Specifically, the correlations are as follows:

- ESUPR—N (outgoing half echo suppressor not included)
- ESUPR—Y (outgoing half echo suppressor included)

Forward call indicator

Call indicator is coded as incoming national call unless analysis of the received digits indicate an incoming international call.

Protocol control indicator is coded as follows:

- no end-to-end method available

- interworking encountered
- no end-to-end information available
- ISDN user part not used all the way

Calling-party indicator is coded as Not Known To Be an ISDN Subscriber.

Calling-party's category

Calling-party's category indicator is coded as Calling-Party's Category Unknown.

User service information

Information transfer capability indicator is coded as SPEECH unless it is determined to the otherwise.

Coding standard is coded as CCITT unless it is determined to be otherwise.

Information transfer mode indicator is coded as CIRCUIT MODE.

Information transfer mode indicator is coded as 64 kbits/second.

User layer protocol identification is coded as Layer 1 U-Law.

Called-party number

Field length indicator is coded as 0 or 1.

Nature of address indicator is coded as follows:

- FGD pure calls (< = 7 digits) are Subscriber Number.
- FGD pure calls (> 7 digits) are National Significant Number.
- FGD EAP cut-through calls are No Address Present, cut-through Call to Carrier.
- FGD Interim cut-through calls are 950WXXX from Various.

Numbering plan indicator is coded as ISDN (telephony) numbering plan.

Address information is coded as the binary equivalent of the called-party's address.

IBN ISUP SS7 additional required IAM parameters

The Initial Address Message parameters that are normally optional but are considered mandatory for this call scenario include the following:

Originating line information

This parameter is considered mandatory (if ANI information is available).

The Originating line information of the CPI contains the two-digit binary equivalent ANI information digits.

Calling-party number

This parameter is considered mandatory for intraLATA calls not involving an inter exchange carrier (IEC). Otherwise, this parameter is considered optional. For our purposes, it is considered a mandatory parameter.

The calling-party number parameter of the CPI contains the following:

- field length indicator is coded as 0 or 1.
- Nature of Address indicator is coded as one of the following:
  - — FGD calls (<10 digits) are Subscriber Number.
  - — FGD calls (=10 digits) are National Significant Number.
  - — FGD calls (> 10 digits) are International Number.
- numbering plan indicator is coded as ISDN (Telephony) Numbering Plan.
- presentation restricted indicator is coded as either Presentation Restricted or Presentation Not Restricted.
- calling number is coded as the binary equivalent of the calling party's address (equivalent to the ANI calling party's number).

Charge number

For our purposes, this field is considered a mandatory parameter (if the ANI information is available).

- Field length indicator is coded as 0 or 1.
- Nature of Address indicator is coded as follows for FGD calling-party billable calls:
  - — no ANI provided—ANI Not Available or Not Provided
  - — FGD calls (<7 digits)—ANI of the Calling Party, Subscriber Number
  - — FGD calls (=> 7 digits)—ANI of the Calling Party, National Number
- Nature of Address indicator is coded as follows for FGD Called-party billable calls:
  - — no ANI provided—ANI of the Called Party Not Included.
  - — FGD calls (<7 digits)—ANI of the Called Party, Subscriber Number
  - — FGD calls (=> 7 digits)—ANI of the Called Party, National Number
- Numbering Plan indicator is coded as ISDN (telephony) numbering plan.

- Charge address is coded as the binary equivalent of the calling party's address (equivalent to the ANI calling party's number for calling-party billable calls and called party's number for called-party billable calls).

Note: Regarding ANI and number display, the charge number parameter of the IBN ISUP SS7 IAM message contains the same fields as the Calling Party Number parameter (less the Presentation Restricted indicator).

Calling-party billable calls

For calling-party billable calls, the charge number is the ANI provided to NSS (in a non-EAEO configuration). To illustrate, assume that the charge number is the number of the main line serving a PBX and the calling number is a number of a particular station set behind the PBX. Unfortunately, the incoming IBN MD PTS inband signaling trunk uses the FGD protocol and does not distinguish between the calling-party number and the charge number. These numbers may or may not be synonymous. For FGD calling-party billable calls, the address contained within the charge number parameter and the calling number parameter are treated as the same value. For example, both parameters contain the ANI. This means that in a few call scenarios, the number presented to a terminating agent as the calling number (known as number display or CLID may actually be the address of the PBX from which the calling number originated, not the address of the originating station.

Called-party billable calls

For called-party billable calls, the charge number is the called-party number and the calling-party number contains the ANI.

IBN MF (FGD) signaling incoming, IBN ISDN PRI outgoing

IBN ISDN PRI agents handle various CPI information during call establishment in their SETUP messages. Because many of the parameters are very dynamic (that is, they change many times during call processing), all field entries are not defined here.

However, the mandatory SETUP message parameters are as follows:

- Protocol Discriminator
- Call Reference
- Message Type
- Bearer Capability
- Channel Identification

IBN ISDN PRI additional required SETUP parameters

Some of the optional parameters of the SETUP message include the following:

- Called Party Number
- Calling Party Number

Note: Calling Party Number is a mandatory parameter if the originating agent is either an IBN ISUP SS7 trunk or an IBN ISDN PRI trunk. This is a tandem call.

Called party number

The Called Party Number parameter is an information parameter containing data about the terminating station number of the call.

The parameter includes the following:

- Type of number is coded as Unknown.
- Numbering Plan is coded as Public or Private determined by the destination of the terminating PRI trunk.
- Number digits are coded as IA5 character equivalent digits of the called party's address.

Called party number

The Called Party Number parameter is an information parameter containing data about the terminating station number of the call.

The parameter includes the following:

- Type of number is coded as Unknown.
- Numbering Plan is coded as Public or Private determined by the destination of the terminating PRI trunk.
- Number digits are coded as IA5 character equivalent digits of the called party's address.

Calling party number

The Calling Party Number parameter is an information parameter that contains data about the originating station number of the call.

The parameter includes the following:

- Type of number is coded as follows:
  - — FGD calls (<10 digits) are local number.
  - — FGD calls (=10 digits) are National Significant number.

— FGD calls (>10 digits) are International number.

- Numbering Plan is coded as ISDN Numbering Plan.
- Presentation Indicator is coded as one of the following:
  — Number Not Available Due to Interworking
  — Presentation Allowed
  — Presentation Restricted
- Screening Indicator is coded as network provided.
- Number digits are coded as IA5 character equivalent digits of the calling party's address (equivalent to the ANI calling party's number).

Control of calling party information (ANI) transmittal

Originating control group

The first step in specifying whether or not ANI information must be mapped to terminating agents processing CPI information is to specify that the ANIDIGS field in table TRKGRP must be set to Y for incoming IBN MF PTS trunks using FGD protocol. If the ANIDIGS field is set to N, then ANI to CPI mapping is not possible for any calls traversing the IBN MF PTS (FGD) trunking facility regardless of the dialing method used.

Originating station control

Calling-party billable by ANI

Because some offnet callers arrive through an IBN MF PTS trunk using FGD protocol, they may not want the ANI information used for display purposes by downstream agents processing CPI information, regardless of the datafill in the ANIDIGS field. The option as to whether or not ANI information displays to downstream agents possessing CPI information is specified on an individual station basis to those FGD agents using FGD calling-party billable by ANI dialing plans. To suppress downstream agents' ability to use ANI information for display purposes, the SUPPRESS field in table ANIDATA must be set to Y for incoming stations. They can be identified by their ANI in table ANIDATA.

Effect on IBN ISUP SS7 terminating trunk agents

If the originating IBN MF PTS (FGD) trunk specifies a Y in the ANIDIGS field in table TRKGRP and terminates to an IBN ISUP SS7 trunk, then the corresponding parameters that transmit during call establishment through the IBN ISUP SS7 IAM message include the following:

- Originating Line Information parameter
- Calling Number parameter

- Charge Number parameter

Entering an N in the ANIDIGS field omits these fields from the IBN ISUP SS7 IAM message during call establishment.

Assuming that the ANIDIGS field contains a Y, calling-party billable by ANI calls datafill the SUPPRESS field with Y and have the presentation restricted indicator in the Calling Party Number parameter of the IAM message set to PRESENTATION RESTRICTED for IBN ISUP SS7 terminating agents. Individuals that select this option are expressing their desire to not have ANI information used by IBN ISUP SS7 terminating agents for the purposes of displaying CLID information. Conversely, selecting an N in the SUPPRESS field causes the Presentation Restricted Indicator in the Calling Party Number parameter of the IAM message to be set to PRESENTATION NOT RESTRICTED for IBN ISUP SS7 terminating agents. Individuals that select this option may have their ANI information used by IBN ISUP SS7 terminating agents for the purposes of displaying CLID information.

Effect on IBN ISDN PRI terminating trunk agents

Assume that the IBN ISDN PRI terminating facility contains the Calling Party Number parameter (controllable through datafill and discussed shortly), and selects an N in the ANIDIGS field of table TRKGRP for the originating IBN MF PTS trunk using the FGD protocol. This causes the Presentation Indicator in the Calling Party Number parameter of the SETUP message to default to NUMBER NOT AVAILABLE DUE TO INTERWORKING.

Assuming the ANIDIGS field contains a Y, calling-party billable by ANI calls select a Y in the SUPPRESS field and have the Presentation Indicator in the Calling Party Number parameter of the SETUP message set to PRESENTATION RESTRICTED by IBN ISDN PRI terminating agents. Individuals that select this option are expressing their desire to not have ANI information used by IBN ISDN PRI terminating agents. Conversely, selecting an N in the SUPPRESS field causes the Presentation Indicator in the Calling Party Number parameter of the SETUP message to be set to PRESENTATION ALLOWED for IBN ISDN PRI terminating agents. Individuals that select this option may have their ANI information used by IBN ISDN PRI terminating agents for the purposes of displaying CLID information.

Calling-party billable by authcode/TCN

Because calling-party billable by authcode/TCN calls are not subject to ANI screening, suppression of calling-party billable by authcode/TCN calls on an individual basis is not supported.

Effect on IBN ISUP SS7 terminating trunk agents

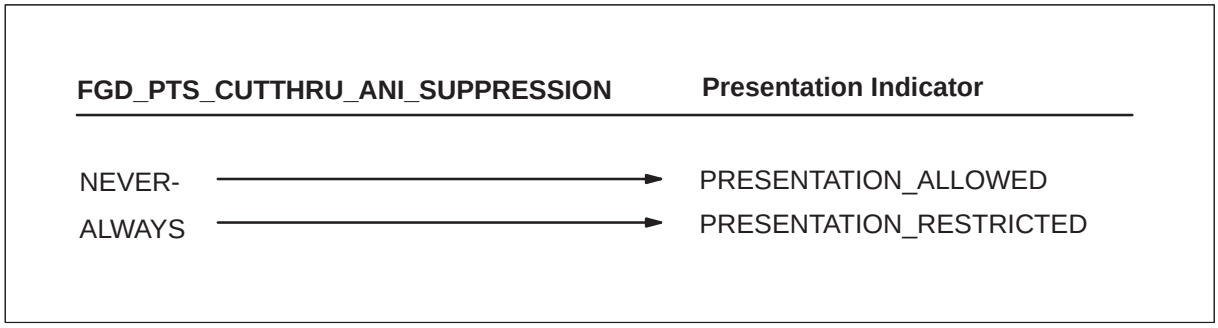
If the originating IBN MF PTS (FGD) trunk specifies a Y in the ANIDIGS field of table TRKGRP and terminates to an IBN ISUP SS7 trunk. Then the corresponding parameters that transmit during call establishment through the IBN ISUP SS7 IAM message include the following:

- Originating Line Information parameter
- Calling Number parameter
- Charge Number parameter

Selecting an N in the ANIDIGS field omits these fields from the IBN ISUP SS7 IAM message during call establishment.

Assuming that the ANIDIGS field contains a Y, calling-party billable by authcode/TCN calls that terminate on IBN ISUP SS7 terminating trunks have the Presentation Restricted Indicator of the Calling Party Number parameter of the IAM message coded according to the contents of the office parameter FGD_PTS_CUTTHRU_ANI_SUPPRESSION. Refer to Figure 19-2 for coding sequence.

Figure 19-2
FGD ANI



Called-party billable

Because the terminating station is billed for called-party billable calls, ANI station suppression on an individual station basis is not supported (the caller has no control). Instead, ANI information is provided, if it is available.

Effect on IBN ISUP SS7 terminating trunk agents

If the originating IBN MF PTS (FGD) trunk specifies a Y in the ANIDIGS field of table TRKGRP and terminates to an IBN ISUP SS7 trunk, then the corresponding parameters that transmit Originating Line Information during call establishment through the IBN ISUP SS7 IAM message include the following:

- Originating Line Information parameter

- Calling Number parameters
- Charge Number parameters

Selecting an N in the ANIDIGS field omits the fields from the IBN ISUP SS7 IAM message during call establishment.

Assume that the ANIDIGS field contains a Y and called-party billable calls terminate on IBN ISUP SS7 terminating trunk which have the Presentation Restricted Indicator of the Calling Party Number parameter for the IAM message set to PRESENTATION NOT RESTRICTED. Individuals using a called-party billable dialing plan may have their ANI information utilized by IBN ISUP SS7 terminating agents for the purposes of displaying CLID information.

Note: The Charge Number parameter contains the called-party number.

Effect on IBN ISDN PRI terminating trunk agents

If the IBN ISDN PRI terminating facility contains the Calling Party Number parameter (controllable by datafill and discussed shortly). Selecting an N for the ANIDIGS field in table TRKGRP for the originating IBN MF PTS trunk using the FGD protocol causes the Presentation Indicator in the Calling Party Number parameter of the SETUP message to default to NUMBER NOT AVAILABLE DUE TO INTERWORKING.

If the ANIDIGS field contains a Y. Called-party billable calls terminating on IBN ISDN PRI terminating trunks have the Presentation Indicator in the Calling Party Number parameter of the SETUP message set to PRESENTATION ALLOWED.

Terminating group control of ANI

IBN ISUP SS7 terminating trunk agents

There is no terminating control for IBN ISUP SS7 trunking agents to control whether or not certain fields are supplied in the IAM message during call establishment.

IBN ISDN PRI terminating trunk agents

For trunks connected to on-net configurations, IBN ISDN PRI trunking agents have no control over whether or not certain fields receive the IAM message during call or whether the IAM message is not supplied during call establishment for on-net paths.

For trunks connected to Offnet configurations, whether the Called Number parameter or Calling Number parameter, or both are omitted from the SETUP message during the call establishment phase, the call is controlled by table control for IBN MF PTS (FGD) calls that terminate on IBN ISDN

PRI trunks traversing offnet paths. Specifically, the Calling Number Delivery (CGNDELV) field and Called Number Delivery (CDNDELV) field in table LTDATA with the DATATYPE refinement specified as SERV for the terminating IBN ISDN PRI trunking agent provides the capability to control delivery if these fields in the SETUP message. The Calling-Party Number (CGN) and Called-Party Number (CDN) information elements in the SETUP message are optional for each subscription.

Three delivery options can be specified for the Calling Number Delivery option with the CGNDELV field in table LTDATA. They are as follows:

- ALWAYS
- NEVER
- SCREENED

The first two options are independent of the Calling-Party Number parameter's Presentation Indicator. They are terminating controlled. ALWAYS means that the Calling-Party Number parameter is always delivered (assuming the originating IBN PTS MF (FGD) trunk provides an ANI). Similarly, NEVER means that the Calling-Party Number parameter is never delivered. The third option, SCREENED, which is originator controlled, sends the calling-party number (assuming that the originating IBN PTS MF FGD trunk provides an ANI), but modifies the Calling-Party Number parameter based upon the Presentation Indicator which is set by the originating agent. If the Presentation Indicator is not Presentation Allowed, and the delivery option is SCREENED, then the Calling-Party Number parameter is delivered; but no ANI information is provided. Otherwise, the Calling-Party Number parameter is delivered as usual.

Two delivery options can be specified for the Called Number Delivery option with the CDNDELV field in table LTDATA. They are as follows:

- ALWAYS
- NEVER

ALWAYS means that the Called-Party Number parameter is always delivered. NEVER means that the Called-Party Number parameter is never delivered.

If table LTDATA does not contain an entry for the Logical Terminal Identification (LTID), then the Calling-Party Number and the Called-Party Number parameters are always included in the SETUP message. The default is to provide both the Calling Number Party parameter and Called Number parameter. This is the method normally used for on-net configurations.

Table 19-1 details whether or not the system receives ANI information and whether the terminating agents are able to display it. For example, the

presentation indicator in the Calling Number Party parameter gives permission to use the ANI. This is only applicable for IBN ISDN PRI offnet configurations.

Table 19-1
Received and displayed ANI information

IBN PTS MF (FGD) originating agent set presentation indicator	IBN ISDN PRI offnet terminating agent set CGNDELV option	Table LTDATA option CGNDELV delivered	ANI digits provided to offnet terminator	ANI digits provided and displayable to offnet terminators
Allowed			Yes	Yes
Restricted	Always	Yes	Yes	No
Not available			No	No
Allowed				
Restricted	Never	No CGNDELV delivered	No CGNDELV delivered	
Not available				
Allowed		Yes	Yes	Yes
Restricted	Screened	Yes	No	No
Not available		No	No CGNDELV delivered	No CGNDELV delivered

Note: The terminating IBM ISDN PRI trunk overwrites any ANI digits provided by the originating agent.

FGD calling party billable by ANI calls

Table ANIDATA contains the field SUPPRESS. This field controls whether or not offnet originated stations entering the network over an IBN MF PTS (FGD protocol) using pure dialing and ANI screening want to have their ANI information suppressed, thereby preventing their DNs from displaying based on each individual line specified by the ANI calling number. Individuals not wanting to have their ANI information made available to downstream agents may suppress their ANI information by entering a Y in the SUPPRESS field.

FGD calling-party billable by authcode/TCN calls

The FGD_PTS_CUT-THRU_ANI_SUPPRESSION office parameter in table OFCVAR has a range of values:

- ALWAYS
- NEVER

This office parameter controls whether or not offnet originated stations entering the network over an IBN MF PTS (FGD protocol) trunk using a cut-through dialing plan (like 800 Universal Access, FGB, or FGD cut-through dialing) want to prevent their DNs from displaying by suppressing their ANI information. Offices wanting to have their ANI information available to downstream agents may display their ANI information by entering NEVER in this office parameter. Conversely, offices who do not want to have their ANI information made available to downstream agents may suppress their ANI information by entering ALWAYS in this office parameter.

Feature impact

SMDR billing

The MSN_ANI_MAPPING field is in the NSS extension record of the SMDR billing record. This field identifies whether or not ANI information provided to the terminating IBN ISUP SS7 or IBN ISDN PRI trunking agents can display for the purposes of supplying CLID information to other downstream terminating agents.

Reorigination feature

The reorigination features allows the second leg of a call which traverses MONA disconnect without having to regain access to the NSS, the first leg. Refer to the “Reorigination/Reset Dialing” chapter for more information on reorigination.

Call forward/call transfer/three-way call

Calls that arrive from offnet sources over an IBN PTS MF (FGD) trunk and terminate (first leg) to an IBN set (including attendant consoles) and are subsequently extended by the IBN set to an additional destination using the Call Transfer/Call Forward/Three Way Call feature do not pass the original ANI to the terminator of the extended call. Instead, the terminator’s display for the extended call contains the originator’s ANI for the extended leg of the call. Also, if the originator of the extended leg leaves the call, the terminator’s display for the extended call does not update with the originator’s ANI for the original leg of the call.

Conference calls/preset conference

This feature does not interact with conferencing features.

Feature operations

To provide CPI information to terminating agents that traverse IBN ISUP SS7 or IBN ISDN PRI terminating trunks, the following commands must be entered in the order given:

IBN MF PTS (FGD) –>IBN ISUP SS7

or

IBN ISDN PRI

- The ANIDIGS field in table TRKGRP must be Y if incoming IBN MF PTS trunks using the FGD protocol expect ANI information to transmit over IBN ISUP SS7 trunking facilities to downstream terminating agents.
- The FGD_PTS_CUTTHRU_ANI_SUPPRESSION office parameter in table OFCVAR must be NEVER for incoming stations using FGD cut-through dialing to display ANI information to downstream IBN ISUP SS7 trunking facilities.
- NSS SMDR billing must be activated if it is needed.
- The SUPPRESS field in table ANIDATA must be N for incoming stations, which can be identified by their ANI, using FGD pure dialing to map ANI information to downstream IBN ISUP SS7 trunking facilities.

Restrictions and limitations

Feature Group D ANI Delivery has the following restrictions and limitations:

- The ANIDIGS field in table TRKGRP controls whether or not ANI information maps by the IBN MF PTS (FGD) trunk. To map ANI information into the CPI information for terminating IBN ISUP SS7 or IBN ISDN PRI trunking agents, the ANIDIGS field must contain the datafill Y for the originating IBN MF PTS (FGD) trunk. As stated earlier, ANI to CPI mapping is not possible if the ANIDIGS field in table TRKGRP is not Y.
- The Originating Line Information parameter, Calling Party Number parameter, and Charge Number parameter for the IBN ISUP SS7 IAM message are not provided if the ANIDIGS field in table TRKGRP is N for incoming and two-way IBN trunk group types using the FGD protocol.

- To suppress the ANI station, the SUPPRESS field in table ANIDATA must contain the datafill Y. ANI station suppression on an individual station basis is only available to originating callers that use FGD calling-party billable by ANI dialing plans and have the ANIDIGS field in table TRKGRP equal to Y. Otherwise, ANI information may display.
- Terminating agents can display calling party billable by authcode/TCN calls that have the office parameter FGD_PTS_CUTTHRU_ANI_SUPPRESSION set to NEVER, if the ANI is available. This includes offnet originators (such as subscribers in the public network) with unlisted numbers.
- Terminating agents can display called-party billable calls providing that the ANI is available. This includes offnet originators (such as subscribers in the public network) with unlisted numbers.
- Calls requiring service access codes (SAC) dialing or test call dialing are not supported by this feature.
- For FGD calling-party billable calls, the address contained within the Charge Number and the Calling Number parameters are treated as the same value (both parameters are contained in the ANI). This means that in a few call scenarios, the number that display to a terminating agent as the calling number (known as the number display or CLID may actually be the address of the PBX from which the calling number originated, not the address of the originating station.
- Name Display and Network Name Display only work for on-net calls that originate and terminate on the same network. Incoming IBN MF PTS FGD protocol calls are calls arriving from an offnet origination (like the public network), and terminating on-net. Therefore, Name Display and Network Name Display do not work with this feature.
- Because the calls of the party billable by Both Calling Methods may actually traverse two levels of screening (for example, screening by ANI and screening by authcode/TCN), there is a high potential for ambiguities to exist in defining the ANI suppression function. In this case, screening is similar to the calling-party billable by ANI method where the SUPPRESS field is set in table ANIDATA.

Automatic Number Identification delivery

The purpose of this feature is to provide Automatic Number Identification (ANI) mapping information to various NSS agencies for the purposes of delivering calling party information (CPI) to other Network Services System (NSS) agencies.

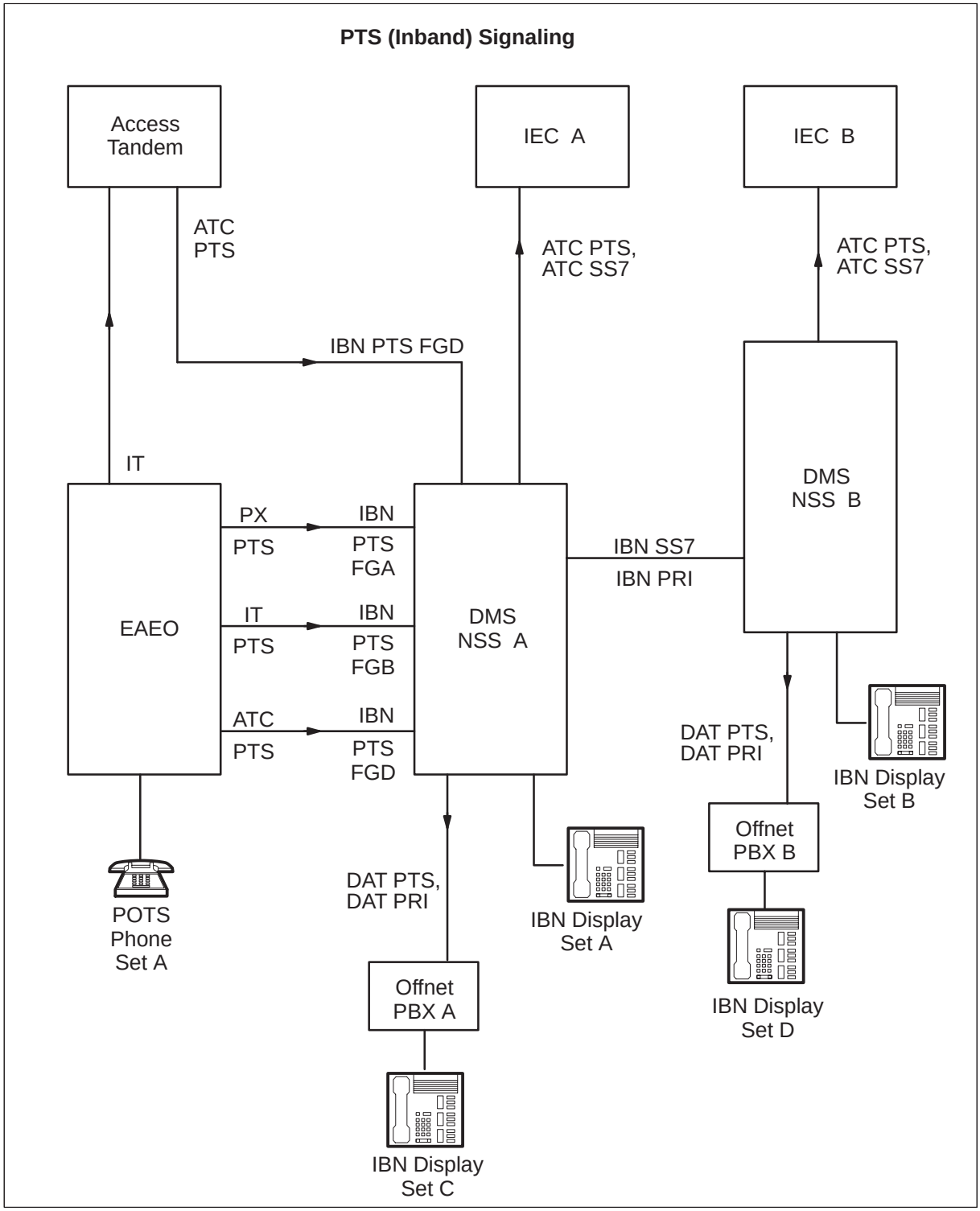
The following list shows the interworkings covered by this feature:

- IBN PTS (FGA) trks
  - — IBN Display set
  - — IBN ISUP SS7 trks
  - — IBN ISDN PRI trks
  - — ATC PTS MF (FGD) trks
  - — ATC ISUP SS7 trks
  - — DAT ISDN PRI trks
- IBN PTS MF (FGB) trks
  - — IBN Display set
  - — IBN ISUP SS7 trks
  - — IBN ISDN PRI trks
  - — ATC PTS MF (FGD) trks
  - — ATC ISUP SS7 trks
  - — DAT ISDN PRI trks
- IBN PTS MF (FGD) trks
  - — IBN Display set
  - — IBN ISUP SS7 trks
  - — IBN ISDN PRI trks
  - — ATC PTS MF (FGD) trks
  - — ATC ISUP SS7 trks

  - DAT ISDN PRI trks
- IBN ISUP SS7 trks
  - ATC PTS MF (FGD) trks
  - ATC ISUP SS7 trks
  - DAT ISDN PRI trks
- IBN ISDN PRI trks
  - ATC PTS MF (FGD) trks
  - ATC ISUP SS7 trks
  - DAT ISDN PRI trks
- DAT PTS trks
  - IBN Display set
  - IBN ISUP SS7 trks
  - IBN ISDN PRI trks
  - ATC PTS MF (FGD) trks
  - ATC ISUP SS7 trks
  - DAT ISDN PRI trks
- DAT ISDN PRI trks
  - IBN Display set
  - IBN ISUP SS7 trks
  - IBN ISDN PRI trks
  - ATC PTS MF (FGD) trks
  - ATC ISUP SS7 trks
  - DAT ISDN PRI trks

Figure 20-1 illustrates a typical scenario.

Figure 20-1
Delivery of calling party information—NSS network diagram



The following sections discuss how CPI information is transmitted over the various signaling facilities.

Normal inband signaling

Normal PTS signaling outpulses only the called party's number (also known as the terminating station number) and contains destination digits.

An example of a typical outpulsing sequence that an integrated business network (IBN) per trunk signaling (PTS) multifrequency (MF) trunk could receive from a plain old telephone service (POTS) trunk connected to an equal access end service (EAEO) follows.

KP + 5186661234 + ST (1st stage)

where:

KP represents key pulse

ST represents start translation

Note: CPI information is not transmitted.

FGB inband signaling

PTS agents using the FGB protocol typically outpulse two stages using inband signaling in the MF format.

The first stage is referred to as the FGB Carrier Identification Code dialing sequence:

(950-WXXX)

where:

W represents 0 or 1

X represents a number in the range of 0 to 9

The second stage is referred to as the ANI spill. A typical ANI spill contains the following two subfields:

- FGB Information digit consisting of 1 digit
- Calling party's number consisting of 7 digits

This is the vehicle used to deliver the calling party's information to various downstream agents using the FGB protocol.

The following example is a typical outpulsing sequence that an IBN PTS MF (FGB protocol) trunk receives from an IT trunk to an EAEO:

- KP + (9501333) + ST
- (KP + 0 + 7271234 + ST)
- where:
- KP represents key pulse
- ST represents start translation (including ST, STP, ST2P and ST3P)
- ( ) represents an optional field

FGD inband signaling

PTS agents using the FGD protocol typically outpulse two stages using inband signaling in the MF format. The first stage is referred to as the ANI spill.

- Information digits (two digits)
- calling party's number (usually 10 digits, but may be less than 10 digits)

This is the vehicle used to deliver the calling party's information to various downstream agents over the FGD protocol. The second stage is the called party's number and usually contains the destination digits (also known as the terminating station number).

The example illustrated below is a typical outpulsing sequence that an IBN PTS MF (FGD protocol) trunk could receive from an ATC trunk connected to an EAEO:

KP + (00 + 6137224556) + ST (1st stage)

KP + 5187271234 + ST (2nd stage)

where:

KP represents key pulse (including KP and KPP)

ST represents start translation (including ST, STP, ST2P and ST3P)

( ) represents parentheses that denote optional fields

ISUP SS7 signaling

During the call establishment phase integrated services digital network user part (ISUP) signaling system 7 (SS7) agents handle various CPI information in their Initial Address Message (IAM). There are mandatory and optional parameters of the IAM that are used for this purpose. The mandatory parameters are as follows:

- Message Type
- Nature of Connection Indicator
- Forward Call Indicator
- Calling Party's Category
- User Service Information (formerly Bearer Capability)
- Called Party Number

ISUP SS7 mandatory IAM message parameters

Details regarding the various IAM message parameters are described in the following sections:

Message type parameter

The parameter Message Type is coded as an Initial Address Message indicator (IAM).

Nature of connection indicator parameter

The parameter Nature of Connection is composed of three indicators:

- circuit indicator
- continuity check indicator
- outgoing echo suppressor indicator

Each is described in the paragraphs that follow.

The Nature of Circuit indicator is coded as follows according to datafill specified by the SAT field in table TRKSGRP for the SS7 trunking agent:

- SAT N (no Satellite Circuit)
- SAT Y (one Satellite Circuit)

The Continuity Check indicator is coded according to datafill specified by the COTREQ field in table TRKSGRP for the SS7 trunking agent as follows:

- Continuity Check Not Required
- Continuity Check Required

The Outgoing Echo Suppressor indicator is coded according to the datafill specified by the ESUPR field in table TRKSGRP for the SS7 trunking agent as follows:

- ESUPR N (outgoing Half Echo Suppressor Not Included)
- ESUPR Y (outgoing Half Echo Suppressor Included)

Forward call indicator parameter

The parameter Forward Call contains the following three indicators.

- Call Indicator
- Protocol Control indicator
- Calling Party indicator

The Call Indicator is coded as Incoming National Call unless analysis of the received digits indicates an incoming international call.

The Protocol Control indicator is coded as one of the following:

- No End-to-End Method Available
- Interworking Encountered
- No End-to-End Information Available
- ISDN User Part Not Used All the Way

The Calling Party indicator is coded Not Known as an ISDN Subscriber.

Calling party's category parameter

The Calling Party's Category indicator is coded as an ordinary calling subscriber (precedence level 1).

User service information parameter

The parameter User Service Information has the following five indicators.

- Information Transfer Capability indicator
- Coding Standard indicator
- Information Transfer Mode indicator
- Information Transfer Rate indicator
- User Layer Protocol Identification indicator

The Information Transfer Capability indicator is coded as Speech unless otherwise determined.

The Coding Standard indicator is coded as CCITT unless otherwise determined.

The Information Transfer Mode indicator is coded as Circuit Mode.

The Information Transfer Rate indicator is coded as 64 kbits/s.

The User Layer Protocol Identification is coded as Layer 1 u-law.

Called party number parameter

The Called Party Number parameter has four indicators. Each indicator is described in the following paragraphs.

- Field Length indicator
- Nature of Address indicator
- Number Plan indicator
- Address Information indicator

The Field Length indicator is coded as either 0 or 1.

The Nature of Address indicator is coded as one of the following:

For National Calls:

- calls (≤7 digits)—Subscriber Number
- calls (>7 digits)—National Significant Number
- FGD EAP cut-through calls—No Address Present, cut-through call to carrier
- FGB Interim cut-through calls from EAEO—No Address Present, cut-through Call to Carrier
- FGB Interim cut-through calls from non-EAEO—950WXXX from
- FGB Interim cut-through calls from non-EAEO—950WXXX from various

For International Calls:

- all calls—International Number

The Numbering Plan indicator is coded as ISDN (telephony) numbering plan.

The Address Information is coded as the binary equivalent of the called party's address.

ISUP SS7 additional required IAM parameters

There are two types of terminating trunks supported by ISUP SS7 signaling. They are integrated business network (IBN) trunks and Access to Carrier (ATC) trunks. Terminations to IBN SS7 trunks are considered onnet calls and terminations to ATC ISUP SS7 trunks using equal access translations are considered offnet calls. Consequently, the building of the optional parameters of the IAM is dependent upon the applicable terminating configurations. Table 20-1 describes the configurations.

Table 20-1
Terminating configurations

Calls (≥7 digits)	Subscriber Number
Calls (<7 digits)	National Significant Number
FGD EAP cut-through calls	No address Present, Cut (ATC) trunks
FGB interim cut-through calls from EAEO	No address
FGB interim cut-through calls from non-EAEO	950WXXX
All Calls	International Number
Originating Line Information	(IBN or ATC configurations)[1]
Calling Party Number	(IBN or ATC configurations)[2]
Charge Number	(IBN or ATC configurations)[3]
Transit Network Selector	(ATC configurations only)[4]
Carrier Selection	(ATC configurations only)[5]

Note 1: For IBN configurations, this parameter is considered mandatory (providing the ANI information is physically supplied by the originating NSS PTS agent). For ATC equal access configurations, the datafill for the ANI field in table OCCINFO determines whether or not this field is provided.

Note 2: For IBN configurations, this parameter is considered mandatory (providing the ANI information is physically supplied by the originating NSS PTS agent). For ATC equal access configurations, the datafill for the INCCPN field in table OCCINFO determines whether this field is provided.

Note 3: For IBN configurations, this field is only considered a mandatory parameter (providing the ANI information is physically available) if the call is a called party billable call. Otherwise, this parameter is omitted. The charge number is the same as the calling party number. For ATC equal access configurations, the datafill for the ANI field in table OCCINFO determines whether this field is provided. However, this parameter may still be omitted even though the ANI field in table OCCINFO has requested it. All of the following conditions must be met if it is to be omitted.

- The Originating Line Information parameter and the Charge Number parameter have been requested (the ANI field in table OCCINFO is Y).
- The Calling Party Number parameter is requested (the INCCPN field in table OCCINFO is Y).
- The Charge Number is the same as the Calling Party Number.
- If any of the three tests are failed, the Charge Number parameter is included upon request.

Note 4: With NSS tandem MF to SS7 configurations, this parameter is only applicable for international calls.

Note 5: For ATC equal access configurations, the datafill for the PICIND field in table OCCINFO determines whether this field is provided.

Originating line information parameter

The Originating Line Information parameter of the calling party information (CPI) contains the two-digit binary equivalent ANI information digits.

Calling party number parameter

The Calling Party Number parameter of the CPI contains five indicators. Each of these indicators is described in the paragraphs that follow.

- Field Length indicator
- Nature of Address indicator
- Numbering Plan indicator
- Presentation Restricted indicator
- Calling Number indicator

The Nature of Address indicator is coded as one of the following:

- Calls (<10 digits)—Subscriber Number
- Calls (=10 digits)—National Significant Number
- Calls (>10 digits)—International Number

The Numbering Plan indicator is coded as ISDN (telephony) numbering plan.

Calling Number is coded as the binary equivalent of the calling party's address, which is equivalent to the ANI calling party's number.

Charge number parameter

Following are the four indicators for the Charge Number parameter. Subsequent paragraphs describe each indicator.

- Field Length indicator
- Nature of Address indicator
- Numbering Plan indicator
- Charge Address indicator

The Field length indicator is coded as either 0 or 1.

The Nature of Address indicator is coded as one of the following:

For Calling Party Billable Calls:

- No ANI provided—ANI Not Available or Not Provided
- Calls (<7 digits)—ANI of the Calling Party; Subscriber
- Calls (≥7 digits)—ANI of the Calling Party; National Number

For Called Party Billable Calls:

- No ANI provided—ANI of the Called Party Not Included
- Calls (<7 digits)—ANI of the Called Party; Subscriber Number
- Calls (≥7 digits)—ANI of the Called Party; National Number

The Numbering Plan indicator is coded as ISDN (telephony) numbering plan.

The Charge address is coded as the binary equivalent of the calling party's address. This is the same as the ANI calling party's number for calling party billable calls and the called party's number for called party billable calls.

Transit network selector parameter

Within the Transit Network Selector parameter, there are five indicators, which follow. Each indicator for the parameter is discussed in subsequent paragraphs.

- Network Identification Type indicator
- Network Identification Plan indicator
- Carrier Identification Code indicator
- Circuit Code indicator

- Operator Request indicator

The Network Identification Type is coded as National Network.

The Network Identification Plan is coded as Carrier Identification Code.

The Carrier Identification Code is taken from table OCCINFO representing the unique XXX carrier identification code digit sequence.

The Circuit Code is coded for international calls only.

The Operator Request indicator specifies whether or not an operator is requested. If an Operator is not requested, the indicator yields a 1. If an Operator is requested, the indicator yields a 2.

Carrier selection parameter

The Carrier Selection parameter contains the Subscription field, that is coded according to the type of KP digit:

- KP received—presubscribed; no indication
- KPP received—not presubscribed; input by calling party

ISDN PRI signaling

During call establishment, ISDN PRI agents handle various CPI information in their SETUP messages.

ISDN PRI mandatory SETUP message parameters

The following list shows the mandatory SETUP message parameters.

- Protocol Discriminator
- Call Reference
- Message Type
- Bearer Capability
- Channel Identification

ISDN PRI additional required SETUP parameters

The following list shows some of the optional parameters of the SETUP message:

- Called Party Number
- Calling Party Number

Note: Calling Party Number is a mandatory parameter if the originating agent is either an ISUP SS7 trunk or an ISDN PRI trunk.

Called Party Number parameter

The Called Party Number parameter contains information about the terminating station number of the call. The information includes the following:

- yype of number
- numbering plan
- number digits

The Type of Number is coded as Unknown.

The Numbering Plan is determined by the destination of the terminating PRI trunk and is coded as public or private.

The Number Digits is coded as the IA5 character equivalent digits of the called party's address.

Calling party number parameter

While the Called Party Number parameter contains information about the terminating station number of the call, the Calling Party Number parameter contains information about the originating station number of the call. This information includes the following:

- yype of number
- numbering plan
- presentation indicator
- screening indicator
- number digits

The Type of Number is coded as one of the following:

- Call (<10 digits)—local number
- Call (=10 digits)—National significant number
- Call (>10 digits)—International number

The Numbering Plan is coded as ISDN numbering plan.

The Presentation indicator is coded as one of the following:

- Number Not Available Due to Interworking
- Presentation Allowed
- Presentation Restricted

The Screening indicator is coded as Network Provided.

The Number Digits is coded as IA5 character equivalent digits of the calling party's address, which is the same as the ANI calling party's number.

Note: The ISDN PRI SETUP message does not have a facility for saving ANI spill information digits.

Suppressing methods

Previous implementation

FGD ANI DELIVERY provides two methods for suppressing the originating party's ANI from being used by terminating agents for incoming IBN PTS MF (FGD protocol) trunks.

- ANI suppression—for FGD pure calls using ANI screening only
- OFCPARM suppression—for FGD cut-through calls which include the following:
  - — FGB Interim (950 +) dialing
  - — Equal Access Plan (10XXX #) dialing
  - — FGD 800 Universal Access dialing

Note: FGD calling-party by ANI calls that are not screened by table ANIDATA are not displayable. Also, FGD called-party billable calls are not capable of originating party control of ANI suppression by any method.

FGD calling-party by ANI calls that are not screened by table ANIDATA are not displayable. Also, FGD called-party billable calls are not capable of originating party control of ANI suppression by any method.

With this feature, the FGD_PTS_CUTTHRU_ANI_SUPPRESSION office parameter (that served as a switch group control for suppressing ANI delivery capabilities for originating IBN PTS MF (FGD protocol) trunks) is no longer available. This capability has been replaced by the ANIDELV trunk group control option, which can be specified by originating DAT, FGA, FGB, and FGD NSS agents. Incoming calls originating on these agents that want to allow display of their ANI information by terminating agents with the display capability simply datafill the OFNTOPT field with ANIDELV.

In a similar fashion, originating DAT, FGA, FGB, or FGD NSS agents that want to suppress the display of their ANI information by terminating agents with the display capability, simply omit datafilling the ANIDELV option against the incoming NSS PTS trunk.

Originating station control of suppression capabilities that are specifiable by ANI and implemented in the FGD ANI Delivery feature is preserved by this feature.

However, the originating station control of suppression capabilities feature is also applicable to originating IBN PTS MF (FGD) trunks that perform the following actions:

- physically receive ANI digits
- use pure dialing only
- are screened by Table ANIDATA

Otherwise, the trunk group control method is exercised.

The major advantage of trunk group control over switch group control of ANI Delivery is it provides the datafill coordinator with the enhanced capability to specify whether or not ANI spill information provided by the originating NSS agent can be used by the terminating agent for the purposes of display on a trunk group basis. In other words, the datafill coordinator has the capability of allowing delivery of ANI information on one particular trunk while denying delivery of ANI information on another particular trunk. A secondary advantage is that the capability is extended to DAT, FGA, and FGB trunks. With the old method, only FGD trunks were applicable.

IBN PTS (FGA) originations

IBN PTS (FGA) originations do not supply ANI spill information to terminating agents. This type of normal inband signaling outpulses called party (destination digits) only. The digits outpulsed vary depending on the dialing plan desired. IBN PTS (FGA) trunks have the capability of two dialing methods:

- cut-through
- hotline

In either of these dialing formats, the BILLDN field in table TRKGRP contains a seven- or 10-digit number that is used to represent the calling party information. This number is used as the ANI calling party's number. If required, ANI information digits are padded with 00.

IBN PTS (FGA) incoming, IBN display set

IBN display sets display the calling party information supplied by the originating IBN PTS (FGA) trunk. To be more specific, the contents of the BILLDN field in table TRKGRP for the originating IBN PTS (FGA) trunk are mapped to the IBN display set for the purposes of display.

IBN PTS (FGA) incoming, IBN ISUP SS7 outgoing

IBN ISUP SS7 trunks use the IAM message to deliver CPI information to terminating agents. The interworking for an originating IBN PTS (FGA)

terminating trunk to an IBN ISUP SS7 outgoing trunk signals the IBN PTS (FGA) trunk to pad the IAM Message parameter in the IBN ISUP SS7 trunk.

The IAM Message parameter contains two other parameters that are datafilled as follows:

- 00 (Originating Line Information parameter)
- Contents of the BILLDN field (Calling Party Number parameter)

IBN PTS (FGA) calls terminating on IBN ISUP SS7 trunks have the Presentation Restricted indicator of the Calling Party parameter coded with the default value of PRESENTATION_RESTRICTED. If the ANIDELV option is specified by datafill, the Presentation Restricted indicator contains PRESENTATION_NOT_RESTRICTED. An example of the coding is presented in Table 20-2.

Table 20-2
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_NOT_RESTRICTED
N	PRESENTATION_RESTRICTED

IBN PTS (FGA) incoming, IBN ISDN PRI outgoing

IBN ISDN PRI trunks use the SETUP message to deliver CPI information to terminating agents. An originating IBN PTS (FGA) trunk terminating to an IBN ISDN PRI outgoing trunk signals the IBN PTS (FGA) trunk to pad the IBN ISDN PRI Calling Party Number parameter with the ANI spill calling party number.

SETUP message parameters Contents of the BILLDN field (Calling Party Number)

Assume that the BILLDN field contains an ANI. IBN PTS FGA calls that terminate on IBN ISDN PRI trunks have the Presentation indicator of the Calling Party Number parameter in the SETUP message coded with the default value of PRESENTATION_RESTRICTED. If the ANIDELV option is specified by the datafill, the Presentation Restricted indicator contains PRESENTATION_ ALLOWED. An example of the coding is presented in Table 20-3.

Table 20-3
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_ALLOWED
N	PRESENTATION_RESTRICTED
Note: The IBN ISDN PRI SETUP message does not provide a facility to save ANI spill information digits.	

IBN PTS (FGA) incoming, ATC PTS MF (FGD) outgoing

ATC PTS MF (FGD) trunks use ANI spill information to deliver CPI information to terminating agents

The interworkings for an originating IBN PTS (FGA) trunk terminating to an ATC PTS MF (FGD) outgoing trunk signals the IBN PTS (FGA) trunk to pad the ATC PTS MF (FGD) ANI spill information as follows:

- 00 (ANI Information digits)
- contents of BILLDN field (ANI Calling Party Number)

IBN PTS (FGA) incoming, ATC ISUP SS7 outgoing

Like IBN ISUP SS7 trunks, ATC ISUP SS7 trunks use the IAM Message parameters to deliver CPI information to terminating agents. However, the interworkings for an originating IBN PTS (FGA) terminating to an ATC ISUP SS7 involve examining different datafill.

First, the ANI field in table OCCINFO controls whether or not the Originating Line Information parameter and the Charge Number parameter are to be provided. Second, the INCCPN field in table OCCINFO controls whether or not the Calling Party Number parameter is to be included. Third, the PICIND field in table OCCINFO controls whether or not the Carrier Selection parameter is to be included. And finally, the Transit Network Selector parameter is provided only for International calls.

IAM message parameters. The following list shows the IAM Message parameters and their respective datafill.

- Originating Line Information=00
- Calling Party Number=BILLDN field contents
- Calling Party Number=BILLDN field contents or destination digits
- Transit Network Selector=Transit Network Selector

- Carrier Selection=KP

IBN PTS (FGA) calls terminating on ATC ISUP SS7 terminating trunks code the Presentation Restricted indicator of the Calling Party Number parameter in the IAM Message with the default value PRESENTATION_RESTRICTED. If the ANIDELV option is specified by the datafill, the Presentation Restricted indicator contains PRESENTATION_NOT_RESTRICTED. The datafill for the indicator is present in Table 20-4.

Table 20-4
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_NOT_RESTRICTED
N	PRESENTATION_RESTRICTED

IBN PTS (FGA) incoming, DAT ISDN PRI outgoing

Like the IBN ISDN PRI trunks, the DAT ISDN PRI trunks use the SETUP Message to deliver CPI information to terminating agents. However, the interworking for an originating IBN PTS (FGA) trunk terminating to an DAT ISDN PRI outgoing trunk signals the IBN PTS (FGA) trunk to map the DAT ISDN PRI Calling Party Number parameter with the contents of the BILLDN field. The Setup Message parameter and its respective datafill are presented next.

SETUP message parameter. BILLDN field contents (Calling Party Number).

Assume that the BILLDN field contains an ANI. IBN PTS FGA calls terminating on DAT ISDN PRI terminating trunks have the Presentation indicator of the Calling Party Number parameter in the SETUP Message coded with the default value of PRESENTATION_RESTRICTED. If the ANIDELV option is specified by the datafill, the Presentation Restricted indicator contains PRESENTATION_ALLOWED. An example of the coding is presented in Table 20-5.

Table 20-5
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_ALLOWED
N	PRESENTATION_RESTRICTED
Note: The DAT ISDN PRI SETUP message does not provide a facility to save ANI spill information digits.	

IBN PTS MF (FGB) originations

The capability to provide calling party information by an incoming IBN PTS MF (FGB) originating trunk already exists. This feature provides the capability to supply selected terminating agents with this ANI calling party information for the purposes of display.

IBN PTS MF (FGB) control of ANI transmittal

There are two methods of supplying an ANI by FGB protocol. The first method uses the physical ANI received by the FGB trunk. For the second method, assume that the ANI digits are not physically received. The second method uses the ANI supplied in the BILLDN field in table TRKGRP for the originating FGB trunk as the ANI.

The transmitted ANI—conventional method

The first step in determining whether or not physically supplied ANI information is to be mapped to terminating agents possessing CPI information is to specify that the ANIDIGS field in table TRKGRP must be set to Y for incoming IBN MF PTS trunks using the FGB protocol.

Because the IBN PTS MF (FGB) trunk only transmits an ANI spill consisting of a one-digit information digit and a seven-digit calling party number, it may be necessary in some scenarios to extrapolate some information. PTS trunks using FGD protocols and ISUP SS7 trunks require a two-digit information digit and a 10-digit calling party number. Therefore, for IBN PTS MF (FGB) originators that terminate to PTS trunks using the FGD protocol or ISUP SS7 trunks, the ANI information digit mapping is as shown in Table 20-6.

Table 20-6
ANI information digit mapping

FGB I Digit	II Digits	Description
0, 3	00	Identification Line/No Special Trtmt
1, 4	01	ONI—Multiparty
2, 5	02	ANI Failure
6	06	Hotel (w/o room identification)
7	07	Coinless, Hospital, Inmate, and others
Others	02	Unrecognized (coded as ANI Fail)

Note: Some terminating agents may not need ANI information digits.

Furthermore, because the IBN PTS MF (FGB) trunk only supplies a seven-digit ANI calling party number (the calling party's NPA is omitted), an NPA is filed in the IBN PTS MF (FGB) trunk group data (table TRKGRP), which is inserted, as needed, to produce a 10-digit ANI calling party number. This NPA is supplied in the offnet CONNGNPA option for IBN PTS MF trunks that specify FGB as an offnet access type (OFNTACTYP).

The datafilled ANI—substitution method

Assume that it is not possible to physically receive ANI digits (which is controlled by the ANIDIGS field in table TRKGRP). It is possible to provide ANI information by datafilling the BILLDN field in table TRKGRP with an appropriate seven- or 10-digit number representing calling party information. This number is used as the ANI calling party number. If required, ANI information digits are padded with 00.

IBN PTS MF (FGB) incoming, IBN display set

IBN display sets display the calling party information supplied by the originating IBN PTS MF (FGB) trunk (subject to the screening restrictions previously discussed).

IBN PTS MF (FGB) incoming, IBN ISUP SS7 outgoing

If the ANI spill information is supplied by the originating IBN PTS MF (FGB protocol) trunk, it is mapped to the terminating IBN ISUP SS7 trunk.

IBN ISUP SS7 trunks use the IAM message to deliver CPI information to terminating agents. If the originating IBN MF PTS (FGB) trunk specifies a

Y or an N in the ANIDIGS field, supplies an ANI in the BILLDN field, and terminates to an IBN ISUP SS7 trunk.

The corresponding parameters that are transmitted during call establishment by the IBN ISUP SS7 IAM message include the following:

- Originating Line Information parameter
- Calling Party Number parameter.

Otherwise, these fields are omitted from the IBN ISUP SS7 IAM message during call establishment.

IAM message parameters. The IAM message parameters are:

Originating Line Information=00

Calling Party Number—BILLDN field contents or physical ANI received

IBN PTS MF (FGB) calls terminating on IBN ISUP SS7 terminating trunks have the Presentation Restricted indicator set to the Calling Party Number parameter in the IAM message. The IAM message is coded with the default value, PRESENTATION_RESTRICTED. Unless the ANIDELV option has been specified by datafill, the Presentation Restricted indicator contains PRESENTATION_NOT_RESTRICTED. The indicator is coded as shown in Table 20-7.

Table 20-7
IAM message coding

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_NOT_RESTRICTED
N	PRESENTATION_RESTRICTED

IBN PTS MF (FGB) incoming, IBN ISDN PRI outgoing

If the ANI spill information is supplied by the originating IBN PTS MF trunk (FGB protocol), it is mapped to the terminating IBN ISDN PRI trunk.

Assume that the IBN ISDN PRI terminating facility contains the Calling Party Number parameter (controllable by datafill). Selecting an N in the ANIDIGS field in table TRKGRP and neglecting to datafill the BILLDN field with an ANI for the originating IBN PTS MF trunk using FGB protocol causes the Presentation indicator for the Calling Party Number parameter of the SETUP message to default to NUMBER NOT AVAILABLE DUE TO INTERWORKING.

Assume that the ANIDIGS field contains a Y or the BILLDN field contains an ANI. IBN PTS MF FGB calls terminating on IBN ISDN PRI terminating trunks have the Presentation indicator of the Calling Party Number parameter in the SETUP message. The SETUP message is coded with the default value PRESENTATION_RESTRICTED. Unless the ANIDELV option has been specified by datafill, the Presentation Restricted indicator contains PRESENTATION_ALLOWED. The coding is as shown in Table 20-8.

Table 20-8
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_ALLOWED
N	PRESENTATION_RESTRICTED

IBN PTS MF (FGB) incoming, ATC PTS MF (FGD) outgoing

ATC PTS MF (FGD protocol) trunks can transfer ANI spill information to offnet locations. In this call scenario, the incoming IBN PTS MF (FGB) trunk merely passes the ANI spill information and the called party's number to the ATC trunk for offnet delivery and processing.

IBN PTS MF (FGB) incoming, ATC ISUP SS7 outgoing

Like the IBN ISUP SS7 trunks, the ATC ISUP SS7 trunks use the IAM message to deliver CPI information to terminating agents. However, the interworking for an originating IBN PTS MF (FGB) terminating to an ATC ISUP SS7 involves examining different datafill.

First, the ANI field in table OCCINFO controls whether or not the Originating Line Information parameter and the Charge Number parameter are to be provided. Second, the INCCPN field in table OCCINFO controls whether or not the Calling Party Number parameter is to be included. Third, the PICIND field in table OCCINFO controls whether or not the Carrier Selection parameter is to be included. And finally, the Transit Network Selector parameter is provided only for international calls.

IAM message parameters. The following is datafill for the IAM Message parameters.

Originating Line Information=00

Calling Party Number—BILLDN field contents or physical ANI received

Charge Number—BILLDN field contents or physical ANI received

Transit Network Selector—XXX representing CAC

Carrier Selection—KP

IBN PTS MF (FGB) calls terminating on ATC ISUP SS7 trunks have the Presentation Restricted indicator set to the Calling Party Number parameter in the IAM message. The IAM message is coded with the default value of PRESENTATION_RESTRICTED. If the ANIDELV option has been specified by datafill, the Presentation Restricted indicator contains PRESENTATION_NOT_RESTRICTED. The coding is as shown in Table 20-9.

Table 20-9
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_NOT_RESTRICTED
N	PRESENTATION_RESTRICTED

IBN PTS MF (FGB) incoming, DAT ISDN PRI outgoing

If the ANI spill information is supplied by the originating IBN PTS MF (FGB protocol) trunk, it is mapped to the terminating DAT ISDN PRI trunk.

Assume that the DAT ISDN PRI terminating facility contains the Calling Party Number parameter, which is controlled by datafill. Selecting an N for the ANIDIGS field in Table TRKGRP and neglecting to datafill the BILLDN field with an ANI for the originating IBN MF PTS trunk using the FGB protocol causes the Presentation indicator in the Calling Party Number parameter of the SETUP message to default to NUMBER NOT AVAILABLE DUE TO INTERWORKING.

Assume that the ANIDIGS field contains a Y or the BILLDN field contains an ANI. FGB calls terminating on IBN ISDN PRI terminating trunks have the Presentation indicator of the Calling Party Number parameter of the SETUP message. The SETUP message is coded with the default value, PRESENTATION_RESTRICTED. If the ANIDELV option has been specified by datafill, the Presentation Restricted indicator contains PRESENTATION_ALLOWED. Coding for the indicator is in Table 20-10.

Table 20-10
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_ALLOWED
N	PRESENTATION_RESTRICTED

IBN PTS MF (FGD) originations

The capability to provide calling party information by an incoming IBN PTS MF (FGD) originating trunk already exists. Two capabilities currently exist for delivering CPI information:

- Providing CPI by an incoming IBN PTS MF (FGD originating trunk)
- Delivering CPI information to IBN ISUP SS7 and IBN ISDN PRI terminating agents

IBN PTS MF (FGD) control of ANI transmittal

The first step in specifying whether or not ANI information is to be physically mapped to terminating agents possessing CPI information is to specify that the ANIDIGS field in table TRKGRP must be set to Y for incoming IBN MF PTS trunks using the FGD protocol. If the ANIDIGS field in table TRKGRP is set to N, ANI-to-CPI mapping is not possible because the ANI is not physically mapped. Any call traversing the IBN MF PTS (FGD) trunking facility that does not transmit the ANI cannot be mapped, regardless of the dialing method used.

IBN PTS MF (FGD) control of ANI transmittal

The first step in specifying whether or not ANI information is to be physically mapped to terminating agents possessing CPI information is to specify that the ANIDIGS field in table TRKGRP must be set to Y for incoming IBN MF PTS trunks using the FGD protocol. If the ANIDIGS field in table TRKGRP is set to N, ANI-to-CPI mapping is not possible because the ANI is not physically mapped. Any call traversing the IBN MF PTS (FGD) trunking facility that does not transmit the ANI cannot be mapped, regardless of the dialing method used.

ANI suppression for IBN PTS MF (FGD) originations

Note: For FGD pure calls that are SCREENED by table ANIDATA only.

FGD called-party billable calls are not capable of suppressing the ANI when the ANI is provided. The trunk group control function is implemented by datafilling the offnet ANIDELV option against the incoming NSS PTS trunk agency in table TRKGRP. NSS PTS agencies that allow display of their ANI information datafill the ANIDELV option. NSS PTS agencies that

suppress display of their ANI information omit datafilling the ANIDELV option. Also, FGD calling-party billable by ANI dialing plans that are screened by table ANIDATA have an additional option of determining whether or not their ANI is allowed to be displayed by agents further downstream. These types of calls can suppress delivery of ANI information even though the trunk group control ANIDELV may be specified for that given trunk. Table 20-11 contains the various dialing plans possible using FGD signaling and the applicable ANI suppression method. The display capability is determined by the last three fields on each row of Table 20-11.

Table 20-11
ANI suppression for IBN PTS MF (FGD) originations

FGD Dialing Plan	Group Control ANIDELV (TRKGRP)	Station Control SUPPRESS ANIDATA	Neither
FGD Pure	X	X	
FGD Pure dialing a MONA LDN	X	X	
FGD Pure with 700/900 calling billed	X	X	
FGD Pure dialing 800 UA	X		
FGD cut-through (EAP-10XXX dialing)	X		
FGD cut-through (interim-950WXXX dialing)	X		
FGB Pure dialing 400/800 INWATS			X
FGD Pure with 700/900 called billed			X

where:

SUPPRESS is the SUPPRESS field in table ANIDATA.

ANIDELV is the ANIDELV offnet option in table TRKGRP.

NEITHER means ANI is always allowed, if provided.

FGD pure dialed calls that provide ANI information by setting the SUPPRESS field in table ANIDATA (station suppression) to N must also ensure that the ANI offnet ANIDELV option (Trunk Group Control indicator) is datafilled against the FGD trunk in table TRKGRP. This

situation is only possible for FGD pure dialed calls. They are the only call type capable of both trunk group suppression and ANI station suppression. Table 20-12 illustrates the possible combinations and their respective outcomes.

Table 20-12
Possible combinations and their respective outcomes for FGD pure dialed calls

ANIDELV Datafill (Table TRKGRP)	SUPPRESS (Table ANIDATA)	ANI Delivered
N	N	N
N	Y	N
Y	N	Y
Y	Y	N

Note: Some terminating agents may not need ANI information digits.

When FGD pure calls are not screened, they obey the trunk group control method, which specifies whether or not ANI information is delivered.

IBN PTS MF (FGD) incoming, IBN display set

IBN Display Sets display the calling party information supplied by the originating IBN PTS MF (FGD) trunk (subject to the screening restrictions discussed above).

IBN PTS MF (FGD) incoming, IBN ISUP SS7 outgoing

If ANI spill information is supplied by the originating IBN PTS MF (FGD protocol) trunk, it maps to the terminating IBN ISUP SS7 trunk.

IBN ISUP SS7 trunks use the IAM message to deliver CPI information to terminating agents. If the originating IBN MF PTS (FGD) trunk specifies a Y in the ANIDIGS field, the corresponding parameters that are transmitted during call establishment over the IBN ISUP SS7 IAM message include the following:

- Originating Line Information parameter
- Calling Party Number parameter
- Charge Number parameter (only for called party billable calls)

Otherwise, these fields are omitted from the IBN ISUP SS7 IAM message during call establishment.

IAM message parameters. The datafill for the IAM Message parameter follows:

- Originating Line Information=00
- Calling Party Number = Physical ANI received
- Charge Number = Destination Number (for called party billable calls only)

IBN PTS MF (FGD) calls terminating on IBN ISUP SS7 terminating trunks have the Presentation Restricted indicator of the Calling Party Number parameter in the IAM message. The IAM message is coded with the default value, PRESENTATION_RESTRICTED. If the ANIDELV option has been specified by datafill, the Presentation Restricted indicator contains PRESENTATION_NOT_ RESTRICTED. Examine the datafill in Table 20-13 for coding the indicator.

Table 20-13
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_NOT_RESTRICTED
N	PRESENTATION_RESTRICTED

IBN PTS MF (FGD) incoming, IBN ISDN PRI outgoing

If the ANI spill information is supplied by the originating IBN PTS MF (FGD protocol) trunk, it is mapped to the terminating IBN ISDN PRI trunk.

Assume that the IBN ISDN PRI terminating facility contains the Calling Party Number parameter. (The parameter is controlled by datafill.) If an N is entered for the ANIDIGS field in table TRKGRP and the BILLDN field does not contain the ANI of the originating IBN PTS MF trunk using the FGD protocol, the Presentation indicator in the Calling Party Number parameter of the SETUP message defaults to NUMBER NOT AVAILABLE DUE TO INTERWORKING.

Assume that the ANIDIGS field contains a Y. IBN PTS MF FGD calls terminating on IBN ISDN PRI terminating trunks have the Presentation Indicator of the Calling Party Number parameter of the SETUP message. The SETUP message is coded with the default value, PRESENTATION_ RESTRICTED. If the ANIDELV option is specified by datafill, the Presentation Restricted indicator contains PRESENTATION_ALLOWED. The coding is as shown in Table 20-14.

Table 20-14
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_ALLOWED
N	PRESENTATION_RESTRICTED

IBN PTS MF (FGD) incoming, ATC PTS MF (FGD) outgoing

ATC PTS MF (FGD protocol) trunks provide the capability of transferring ANI spill information to offnet locations. This is an Equal Access (EA) tandem call. In the call scenario that follows, the incoming IBN PTS MF (FGD) trunk merely passes the ANI spill information and the called party's number to the ATC trunk for offnet delivery and processing.

IBN PTS MF (FGD) incoming, ATC ISUP SS7 outgoing

Like the IBN ISUP SS7 trunks, ATC ISUP SS7 trunks use the IAM message to deliver CPI information to terminating agents. However, the interworkings for an originating IBN PTS MF (FGD) terminating to an ATC ISUP SS7 involves examining different datafill. First, the ANI field table OCCINFO controls whether or not the Originating Line Information parameter and the Charge Number parameter are to be provided. Second, the INCCPN field in table OCCINFO controls whether or not the Calling Party Number parameter is to be included. Third, the PICIND field in table OCCINFO controls whether or not the Carrier Selection parameter is to be included. And finally, the Transit Network Selector parameter is provided only for international calls.

IAM message parameters. The following list contains the IAM message parameters with their respective coding requirements. The datafill for the IAM message coding for the indicator is presented in Table 20-15.

- Originating Line Information=00
- Calling Party Number=BILLDN

DAT PTS calls terminating on IBN ISUP SS7 terminating trunks have the Presentation Restricted indicator of the Calling Party Number parameter in the IAM message. The IAM message is coded with the default value, PRESENTATION_RESTRICTED. If the ANIDELV option is specified by datafill, the Presentation Restricted indicator contains PRESENTATION_ NOT_RESTRICTED. The coding for the indicator is shown in Table 20-15.

Table 20-15
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_NOT_RESTRICTED
N	PRESENTATION_RESTRICTED

IBN PTS MF (FGD) incoming, DAT ISDN PRI outgoing

If the ANI spill information is supplied by the originating IBN PTS MF (FGD protocol) trunk, it is mapped to the terminating DAT ISDN PRI trunk.

Assume that the DAT ISDN PRI terminating facility contains the Calling Party Number parameter. If an N is entered in the ANIDIGS field in Table TRKGRP using FGD protocol, the Presentation indicator in the Calling Party Number parameter in the SETUP message defaults to NUMBER NOT AVAILABLE DUE TO INTERWORKING.

Assume that the ANIDIGS field contains a Y. FGD calls terminating on IBN ISDN PRI terminating trunks have the Presentation indicator of the Calling Party Number parameter in the SETUP message. The SETUP message is coded with the default value, PRESENTATION_RESTRICTED. If the ANIDELV option is specified by datafill, the Presentation Restricted indicator contains PRESENTATION_ALLOWED. The ANIDELV option is coded as shown in Table 20-16.

Table 20-16
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_ALLOWED
N	PRESENTATION_RESTRICTED

IBN ISUP SS7 originations

IBN ISUP SS7 incoming, ATC PTS MF (FGD) outgoing

This call scenario passes the information supplied in the originating IBN ISUP SS7 trunk's IAM message to the terminating ATC PTS MF (FGD) outgoing trunk's ANI spill register. First, the information stored in the IBN ISUP SS7's Originating Line Information parameter is mapped to the ANI spill digit register. Thereafter, the Calling Party Number parameter calling number is mapped to the ANI spill register. Because the ATC PTS trunk has

no facility for transporting additional information, the balance of the information supplied by the originating IBN ISUP SS7 trunk is discarded.

IBN ISUP SS7 incoming, ATC ISUP SS7 outgoing

This call scenario passes the information supplied in the originating IBN ISUP SS7 trunk's IAM message to the terminating ATC ISUP SS7 outgoing trunk's IAM message in a one-to-one correspondence to the terminating agent and adds equal access parameters as required.

IBN ISUP SS7 incoming, DAT ISDN PRI outgoing

This call scenario passes the information supplied in the originating IBN ISUP SS7 trunk IAM message to the terminating DAT ISDN PRI SETUP parameters responsible for transporting this information. The Calling Party Number parameter of the originating IBN ISUP SS7 trunk's IAM message is mapped to the terminating DAT ISDN PRI SETUP Calling Party Number parameter. The rest of the information supplied in the originator's IAM message is discarded. This includes the ANI information digits stored in the Originating Line Information parameter.

IBN ISDN PRI originations

IBN ISDN PRI incoming, ATC PTS MF (FGD) outgoing

This call scenario passes the information supplied in the originating IBN ISDN PRI trunk's SETUP message to the terminating ATC PTS MF (FGD) outgoing trunk's ANI spill register. First, the Calling Party Number parameter is mapped to the ANI spill register. Because the ATC PTS trunk does not have a facility for transporting additional information, the balance of the information supplied by the originating IBN ISDN PRI trunk is discarded. The ANI information digits are padded with 00 for completeness.

IBN ISDN PRI incoming, ATC ISUP SS7 outgoing

This call scenario passes the information supplied in the originating IBN ISDN PRI trunk's SETUP message to the terminating ATC ISUP SS7 IAM parameters responsible for transporting this information. The Calling Party Number parameter of the originating IBN ISDN PRI trunk's SETUP message is mapped to the terminating ATC ISUP SS7's IAM Calling Party Number parameter. The rest of the information supplied in the originator's SETUP message is discarded. This presents a unique situation regarding what to put in the Origination Line Information parameter of the terminating ATC ISUP SS7 IAM message, since the originating agent does not supply this information. In this scenario, the Originating Line Information parameter is padded with 00 for CPI completeness.

IBN ISDN PRI incoming, DAT ISDN PRI outgoing

This call scenario passes the information supplied in the originating IBN ISDN PRI trunk's SETUP message to the terminating DAT ISDN PRI

outgoing trunk's SETUP message in a one-to-one correspondence to the terminating agent. There are no additions or deletions.

DAT PTS originations

DAT PTS Originations do not supply ANI spill information to terminating agents. This type of normal inband signaling outpulses called party (destination digits) only. The digits outpulsed vary depending on the dialing plan desired. Regardless of the dialing method used, the BILLDN field in table TRKGRP contains a seven- or 10-digit number that is used to represent the calling party information. This number is used as the ANI calling party's number. If required, ANI information digits are padded with 00.

DAT PTS incoming, IBN Display Set

IBN Display Sets display the calling party information supplied by the originating DAT PTS trunk. To be more specific, the contents of the BILLDN field in table TRKGRP for the originating DAT PTS trunk are mapped to the IBN Display Set for the purposes of display.

DAT PTS incoming, IBN ISUP SS7 outgoing

IBN ISUP SS7 trunks use the IAM message to deliver CPI information to terminating agents. The interworkings for an originating IBN PTS (DAT) terminating trunk to an IBN ISUP SS7 outgoing trunk signals the IBN PTS (DAT) trunk to pad the IBN ISUP SS7 Originating Line Information and Calling Party Number parameters.

IAM message parameters. The datafill for the IAM Message parameters follows:

- Originating Line Information=00
- Calling Party Number=BILLDN

DAT PTS calls terminating on IBN ISUP SS7 terminating trunks have the Presentation Restricted indicator of the Calling Party Number parameter in the IAM message. The IAM message is coded with the default value, PRESENTATION_RESTRICTED. If the ANIDELV option is specified by the data, the Presentation Restricted indicator contains PRESENTATION_NOT_RESTRICTED. The ANIDELV option coding is shown in Table 20-17.

Table 20-17
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_NOT_RESTRICTED
N	PRESENTATION_RESTRICTED

DAT PTS incoming, IBN ISDN PRI outgoing

IBN ISDN PRI trunks use the SETUP message to deliver CPI information to terminating agents. The interworking for an originating DAT PTS trunk terminating to an IBN ISDN PRI outgoing trunk signals the DAT PTS trunk to pad the IBN ISDN PRI Calling Party Number parameter with the ANI spill calling party number.

SETUP message parameter. The following is a SETUP message parameter:

BILLDN field contents=Calling Party Number

Assume that the BILLDN field contains an ANI. DAT PTS calls terminating on IBN ISDN PRI terminating trunks have the Presentation indicator of the Calling Party Number parameter in the SETUP message. The SETUP message is coded with the default value, PRESENTATION_RESTRICTED. If the ANIDELV option is specified by datafill, the Presentation Restricted indicator contains PRESENTATION_ALLOWED. The coding is illustrated in Table 20-18.

Table 20-18
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_NOT_RESTRICTED
N	PRESENTATION_RESTRICTED

DAT PTS incoming, ATC PTS MF (FGD) outgoing

ATC PTS MF (FGD) trunks use ANI spill information to deliver CPI information to terminating agents. The interworking for an originating DAT PTS trunk terminating to an ATC PTS MF (FGD) outgoing trunk signals the DAT PTS trunk to pad the ATC PTS MF (FGD) ANI spill information with the following parameters and datafill:

- 00=ANI Information digits

- BILLDN field contents=ANI Calling Party Number

DAT PTS incoming, ATC ISUP SS7 outgoing

Like the IBN ISUP SS7 trunks, ATC ISUP SS7 trunks use the IAM message to deliver CPI information to terminating agents. However, the interworkings for an originating DAT PTS terminating to an ATC ISUP SS7 involves examining different datafill. First, the ANI field in table OCCINFO controls whether or not the Originating Line Information and the Charge Number parameters are to be provided. Second, the INCCPN field in table OCCINFO controls whether or not the Calling Party Number parameter is to be included. Third, the PICIND field in table OCCINFO controls whether or not the Carrier Selection parameter is also to be included. And finally, the Transit Network Selector parameter is only provided for international calls.

IAM message parameters. The IAM Message parameters are coded as follows:

- Originating Line Information=00
- Calling Party Number=BILLDN field contents
- Charge Number=BILLDN field contents or destination digits
- Transit Network Selector=XXX representing CAC
- Carrier Selection=KP

DAT PTS calls terminating on ATC ISUP SS7 terminating trunks have the Presentation Restricted indicator of the Calling Party Number parameter of the IAM message. The IAM message is coded with the default value, PRESENTATION_RESTRICTED. If the ANIDELV option is specified by datafill, the Presentation Restricted indicator contains PRESENTATION_ NOT_RESTRICTED. The datafill is coded as shown in Table 20-19.

Table 20-19
Coding example

Offnet ANIDELV Option	Presentation Restricted Indicator
Y	PRESENTATION_NOT_RESTRICTED
N	PRESENTATION_RESTRICTED

DAT PTS incoming, DAT ISDN PRI outgoing

Like IBN ISDN PRI trunks, DAT ISDN PRI trunks use the SETUP message to deliver CPI information to terminating agents. However, the interworkings for an originating DAT PTS trunk terminating to a DAT ISDN

PRI outgoing trunk signal the DAT PTS trunk to map the DAT ISDN PRI Calling Party Number parameter with the contents of the BILLDN field.

SETUP message parameter. The SETUP message parameter is:

BILLDN field contents=Calling Party Number

Assume that the BILLDN field contains an ANI. DAT PTS calls terminating on DAT ISDN PRI terminating trunks have the Presentation indicator of the Calling Party Number parameter in the SETUP message. The SETUP message is coded with the default value, PRESENTATION_RESTRICTED. If the ANIDELV option is specified by datafill, the Presentation Restricted indicator contains PRESENTATION_ALLOWED. The datafill for the ANIDELV option is illustrated in Table 20-20.

Table 20-20
Coding example

Offnet ANIDELV option	Presentation Restricted Indicator
Y	PRESENTATION_ALLOWED
N	PRESENTATION_RESTRICTED

DAT ISDN PRI originations

DAT ISDN PRI incoming, IBN display set

IBN display sets display the calling party information supplied by the originating DAT ISDN PRI trunk.

DAT ISDN PRI incoming, IBN ISUP SS7 outgoing

This call scenario passes the information supplied in the originating DAT ISDN PRI trunk's SETUP message to the terminating IBN ISUP SS7 IAM parameters responsible for transporting this information. The Calling Party Number parameter of the originating DAT ISDN PRI trunk's SETUP message is mapped to the terminating IBN ISUP SS7's IAM Calling Party Number parameter. The rest of the information supplied in the originator's SETUP message is discarded. This presents a unique situation regarding what to put in the Origination Line Information parameter of the terminating IBN ISUP SS7 IAM message, since this information is not supplied by theoriginating agent. In this scenario, the Originating Line Information parameter is padded with 00 for CPI completeness.

DAT ISDN PRI incoming, IBN ISDN PRI outgoing

This call scenario passes the information supplied in the originating DAT ISDN PRI trunk's SETUP message to the terminating IBN ISDN PRI outgoing trunk's SETUP message in a one-to-one correspondence to the terminating agent. There are no additions or deletions.

DAT ISDN PRI incoming, ATC PTS MF (FGD) outgoing

This call scenario passes the information supplied in the originating DAT ISDN PRI trunk's SETUP message to the terminating ATC PTS MF (FGD) outgoing trunk's ANI spill register. The Calling Party Number parameter is mapped to the ANI spill register. Because the ATC PTS trunk does not have a facility for transporting additional information, the balance of the information supplied by the originating DAT ISDN PRI trunk is discarded. The ANI information digits are padded with 00 for completeness.

DAT ISDN PRI incoming, ATC ISUP SS7 outgoing

This call scenario passes the information supplied in the originating DAT ISDN PRI trunk's SETUP message to the terminating ATC ISUP SS7 IAM parameters responsible for transporting this information. The Calling Party Number parameter of the originating DAT ISDN PRI trunk's SETUP message is mapped to the terminating ATC ISUP SS7 IAM Calling Party Number parameter. The remaining information supplied in the originator's SETUP message is discarded. This presents a unique situation regarding what to put in the Origination Line Information parameter of the terminating ATC ISUP SS7 IAM message, since the information is not supplied by the originating agent. In this scenario, the Originating Line Information parameter is padded with 00 for CPI completeness.

DAT ISDN PRI incoming, DAT ISDN PRI outgoing

This call scenario passes the information supplied in the originating DAT ISDN PRI trunk's SETUP message to the terminating DAT ISDN PRI outgoing trunk's SETUP message. The information passed to the terminating agent is a one-to-one correspondence. There are no additions or deletions.

Data schema

If the OFNTOPT field in trunk group types IBNTI and IBNT2 for Table TRKGRP is datafilled as Y, two offnet options are possible. The OFNTACTYP field of the offnet access trunk type contains the two options, CONNGNPA and ANIDELV, for DAT, FGA, FGB, and FGD protocols.

Offnet option ANIDELV serves as an ANI suppression trunk group control. It determines whether or not calls incoming on DAT, FGA, FGB, and FGD trunks allow or deny terminating agents (except ATC PTS MF (FGD protocol) trunks) to display their ANI information. Omitting the offnet

ANIDELV option from the OFNTOPT field suppresses the terminator's capability of using ANI information for display purposes (except for ATC PTS MF (FGD protocol) trunks. Conversely, supplying this option allows the terminator to use ANI information for display purposes.

The offnet CONNGNPA option serves as a three-digit field that contains the Numbering Plan Area (NPA) of the connecting switch adjoining our NSS PTS agent. For FGB agents, the CONNGNPA field is used to pad the seven-digit ANI received by the FGB protocol with a three-digit NPA. This results in a complete ten-digit calling party number (ANI) and is ignored for other NSS PTS offnet access types.

Feature impact

NSS SMDR billing

Field NSS_ANI_MAPPING is contained within the NSS extension record of the SMDR billing record. This field identifies whether or not ANI information provided to the terminating ISUP SS7 or ISDN PRI trunking agents is displayable for the purposes of supplying CLID information to terminating agents further downstream.

Call forward /call transfer/three-way call

Calls arriving from NSS PTS agents (including originating DAT, FGA, FGB, and FGD trunks) that terminate on the first leg of a call to an IBN base station such as an Attendant Console, and then are extended by the IBN base station by using one of the Call Forward/Call Transfer/Three-way Call capabilities to another destination or the second leg of the call, do not pass the original ANI to the terminator of the extended call. Instead, the extended call on the terminator's display contains the ANI of the IBN base station, which is the second leg of the call. If the IBN base station leaves the established Three-way Call, the terminator's display for the extended leg of the call is not updated with the originator's ANI of the original leg of the call.

Conference calls/preset conference

This feature does not interact with conferencing.

Reorigination feature

When using cut-through dialing, the reorigination feature allows the second leg of a call that traverses MONA to be disconnected without regaining access to NSS (the first leg).

Note: Care has been exercised to ensure that successive reoriginations receive the proper ANI information digits and ANI suppression information (supplied in the first leg) in the originating address of each and every reoriginated call.

Translations verification (TRAVER)

Translations for these call scenarios can be verified by the TRAVER command.

Restrictions and limitations

It is the responsibility of the datafill coordinator to ensure that valid data is contained within the BILLDN field for table TRKGRP where originating agents provide a pseudo ANI for this field. Since the contents of the BILLDN field are used for ANI mapping, invalid entries are propagated across the network. The entries are not blocked and should typically contain the address of the PBX from which the calling number originated, in dedicated trunk scenarios, or the address of the originating station.

Incoming NSS PTS trunk originations that have calls with the offnet ANIDELV option datafilled are displayable by terminating agents if an ANI is supplied. This includes offnet originators, such as subscribers in the public network with unlisted numbers. It is the responsibility of the terminating network to determine whether or not the calling party's ANI is displayable by terminating agents possessing this capability.

Calls requiring service access codes (SAC) dialing or test call dialing are not supported by this feature. This includes the service code parameter of ISUP SS7 IAM messages.

This feature does not provide ANI information to operator service agents from PTS originators.

Name Display and Network Name Display only work for onnet calls that originate and terminate on the same network. Calls delivered to the network over NSS PTS trunks are delivering offnet originators to the network and do not have these feature capabilities.

Calls terminating to ATC PTS MF (FGD) do not interpret ANI suppression indicators. Applicable originating NSS PTS agents that request suppression of their ANI by any method are overridden if the call terminates to an ATC PTS MF (FGD) trunk. This is a tandem call scenario. Tandem calls terminating on trunks that use inband signaling do not accept suppression indicators.

Terminating billing option (TBO) is not available for SMDR billing records. Individuals requiring the TBO capability need AMA billing records instead.

Calls terminating to either ATC PTS MF (FGD) or ATC ISUP SS7 must use equal access translations. ATC ISUP SS7s that do not use equal access translations (bypassing Table OCCINFO, for example) result in various optional parameters not being assembled.

Originating restrictions

IBN PTS regular trunk originations (non NSS)

ANI delivery over a regular IBN PTS (non-NSS) trunk is not supported for IBN PTS (non-NSS) trunk originations. This also includes NSS PTS trunks with an OFNTACTYP in table TRKGRP of IBN.

IBN PTS (FGA) trunk originations

For calls that originate on IBN PTS (FGA) trunks, the number supplied as the calling party information is taken from the BILLDN field in table TRKGRP for the incoming IBN PTS (FGA) trunk. The CPI is not the usual ANI spill information supplied. There are no ANI information digits. In this scenario, the information digits are padded with 00 for terminating agents that require this information.

Name Display and Network Name Display work only for onnet calls. These are calls that originate and terminate on the same network. Calls delivered to the network over IBN PTS (FGA protocol) trunks do not have these feature capabilities.

IBN PTS MF (FGB) trunk originations

For calls that originate on incoming IBN PTS MF (FGB) trunks, the ANIDIGS field in table TRKGRP controls whether or not ANI information is to be mapped by the IBN MF PTS (FGB) trunk. To physically map ANI information into the CPI of terminating IBN ISUP SS7 or IBN ISDN PRI trunking agents, the ANIDIGS field must be set to Y and the BILLDN field set to N; or the ANIDIGS field must be set to N and the BILLDN field in table TRKGRP must be supplied with datafill to be used as an ANI.

For calls that originate on incoming IBN PTS MF (FGB) trunks, the digits contained within the CONNGNPA field can be attached only to physically received ANI digits. The CONNGNPA field does not interact with the ANI substitution method, which provides an ANI by datafilling the BILLDN field in table TRKGRP.

For incoming IBN PTS MF (FGB) trunk originations, the Charge Number parameter of the ISUP SS7 IAM message contains the same fields as the Calling Party Number parameter without the Presentation Restricted indicator. The two parameters do not need to be the same. For FGB calls, the Charge Number is the ANI number provided to NSS in a non-EAEO configuration. For example, the Charge Number could be the number of the main line serving a PBX and the calling number could be the number of a particular station set behind the PBX. Unfortunately, the incoming FGB IBN MF PTS inband signaling trunk does not distinguish between Calling Party Number and Charge Number. They are synonymous. The address contained within the Charge Number parameter and the Calling Party

Number parameter are treated as the same value for FGB. Both parameters contain the ANI. Therefore, the Charge Number parameter is not provided.

IBN PTS MF (FGD) trunk originations

For calls that originate on incoming IBN PTS MF (FGD) trunks, the ANIDIGS field in table TRKGRP controls whether or not ANI information is to be mapped by the IBN MF PTS (FGD) trunk. To map ANI information into the CPI of terminating ISUP SS7 or ISDN PRI trunking agents, the ANIDIGS field must be set to Y for the originating IBN PTS MF (FGD) trunk and the BILLDN field must be set to N. ANI-to-CPI mapping is not possible if the ANIDIGS field in table TRKGRP is set to N.

If the ANIDIGS field in table TRKGRP is set to N for incoming and two-way IBN PTS MF (FGD) trunk originations that terminate to ISUP SS7 trunks, the Originating Line Information, Calling Party Number and Charge Number parameters of the ISUP SS7 IAM message are not provided. Also, the contents of the BILLDN field are not usable as a filed ANI.

Datafilling the SUPPRESS field in table ANIDATA with a Y specifies ANI station suppression. ANI station suppression on an individual basis is available only to originating IBN PTS MF (FGD) callers that use FGD calling-party billable by ANI dialing plans. ANI dialing plans must have the ANIDIGS field in table TRKGRP set to Y. Otherwise, whether or not ANI information is displayable depends on the ANI Trunk Group Control Suppression indicator. FGD calling-party billable calls by ANI, which are screened by table ANIDATA and allow ANI delivery, can still be overridden by datafilling table ANIDATA's SUPPRESS field with an N and omitting the offnet ANIDELV option from table TRKGRP's datafill. To provide a better understanding, refer to Table 20-21.

Table 20-21
Overriding FGD calling-party billable calls by ANI which are screened by table ANIDATA and allow ANI delivery

ANIDELV Datafill (Table TRKGRP)	SUPPRESS (Table ANIDATA)	ANI Delivered
N	N	N
N	Y	N
Y	N	Y
Y	Y	N

If the ANI is supplied for incoming IBN PTS MF (FGD) trunk originations, called party billable calls are displayable by terminating agents. This

includes offnet originators, such as subscribers in the public network with unlisted numbers.

For incoming IBN PTS MF (FGD) trunk originations that involve FGD calling party billable calls, the Charge Number parameter of the ISUP SS7 IAM message contains the same fields as the Calling Party Number parameter except one. The difference between the Calling Party Number and the Charge Number parameters is that the Presentation Restricted indicator is not included in the Charge Number parameter.

Calling party billable calls

For calling party billable calls in a non-EAEO configuration, the Charge Number is the ANI number supplied to NSS. For example, the Charge Number could be the number of the main line serving a PBX and the Calling Party Number could be the number of a particular station set behind the PBX. Unfortunately, the incoming IBN PTS MF (FGD) inband signaling trunk does not distinguish between the Calling Party Number and the Charge Number. They are synonymous. The address contained within the Charge Number and Calling Party Number parameters is treated as the same value for FGD calling party billable calls. Therefore, the Charge Number parameter is not provided. Both parameters contain the ANI.

Called party billable calls

With called party billable calls, the Charge Number is the called party number and the Calling Party Number contains the ANI. Thus, the Charge Number parameter is supplied.

IBN ISDN PRI trunk originations

Terminating agents other than ISDN PRI trunks may require information digits as a part of their CPI for IBN ISDN PRI trunk originations. Since ISDN PRI trunks do not possess facilities for transporting this information, a 00 digit sequence is substituted if required. This includes both PTS and ISUP SS7 terminators.

ATC PTS MF (FGD) trunk originations

PTS signaling does not transmit ANI spill information for incoming ATC PTS MF (FGD) trunk originations. Therefore, originating ATC PTS MF (FGD) trunk calls do not supply CPI information to agents downstream. ATC trunks are used in terminating scenarios only.

DAT PTS trunk originations

The number supplied as the calling party information is taken from the BILLDN field in table TRKGRP for the incoming DAT PTS trunk and is not the usual ANI spill information supplied. There are no ANI information digits. This scenario pads 00 to the information digits of terminating agents that require this information.

Name Display and Network Name Display work only for calls that originate and terminate on the same network (onnet). Calls delivered to the network over DAT PTS trunks do not have these feature capabilities.

Terminating restrictions

IBN PTS MF (FGA) trunk terminations

PTS signaling does not transmit ANI spill information for IBN PTS (FGA) trunk terminations. Therefore, terminating IBN PTS MF (FGA) trunk calls are not supplied with CPI information from originating agents.

IBN PTS MF (FGB) trunk terminations

PTS signaling does not transmit ANI spill information for incoming IBN PTS (FGB) trunk terminations. Therefore, terminating IBN PTS (FGB) trunk calls are not supplied with CPI information from originating agents.

IBN PTS MF (FGD) trunk terminations

For incoming IBN PTS (FGD) trunk terminations, PTS signaling does not transmit ANI spill information. Therefore, terminating IBN PTS (FGD) trunk calls are not supplied with CPI information from originating agents. However, ATC trunks are used to deliver ANI spill information using FGD protocol.

ATC PTS MF (FGD) trunk terminations

If suppression is chosen for a tandem call arrangement, the originating screening indicators that screen by trunk group control or screen by ANI (FGD only) are ignored for outgoing ATC PTS MF (FGD) trunk terminations that originate from NSS PTS trunks. This includes offnet originators such as subscribers in the network with unlisted numbers.

IBN ISUP SS7 trunk terminations

If ANI information is not supplied by the originating NSS PTS trunks for outgoing IBN ISUP SS7 trunk terminations, the IBN ISUP SS7 trunks do not assemble the Originating Line Information or the Calling Party Number parameters in the IAM message. The Charge Number parameter is provided only for called party billable calls.

IBN ISDN PRI trunk terminations

IBN ISDN PRI trunk SETUP messages do not provide a facility for saving ANI spill information digits.

For NSS PTS originating calls that terminate on IBN ISDN PRI trunks traversing OFFNET paths, table control determines the inclusion of the Called Number or Calling Number parameters from the SETUP message during the call establishment phase of the call. The Calling Number Delivery (CGNDELV) and Called Number Delivery (CDNDELV) fields in

table LTDATA with DATATYPE refinement specified as SERV for the terminating IBN ISDN PRI trunking agent provide the capability to control delivery of these fields in the SETUP message. The Calling Party Number (CGN) and Called Party Number (CDN) information elements in the SETUP message are optional for each subscription.

The CGNDELV field in table LTDATA has three delivery options that can be specified by the CALLING Number Delivery option:

- ALWAYS
- NEVER
- SCREENED

The first two options are independent of the Calling Party Number parameter's Presentation indicator. (They are terminating controlled.) ALWAYS means that the Calling Party Number parameter is always delivered (assuming an ANI is provided by the originating NSS PTS trunk agency). NEVER means that the Calling Party Number parameter is never delivered. The third option, SCREENED, which is originator controlled, sends the Calling Party Number parameter (assuming that the originating NSS PTS trunk provides an ANI), but modifies the Calling Party Number parameter based upon the Presentation indicator set by the originating agent. If the Presentation indicator is anything other than PRESENTATION_ ALLOWED and the delivery option is SCREENED, the Calling Party Number parameter is delivered, but ANI information is not provided. Otherwise, the Calling Party Number parameter is delivered as usual.

The CDNDELV field in table LTDATA has two delivery options that can be specified by the Called Number Delivery option. ALWAYS means that the Called Party Number parameter is always delivered, while NEVER means that the Called Party Number parameter is never delivered.

If the table LTDATA does not contain an entry for the logical terminal ID (LTID), the Calling Party Number and the Called Party Number parameters are always included in the SETUP message. (The default is to provide both of these parameters.) This is the method normally used for onnet configurations.

Figure 20-2 details and summarizes whether ANI information is received and displayable by terminating agents. The Presentation indicator in the Calling Number Party parameter gives permission to use the ANI. This is only applicable for DAT ISDN PRI offnet configurations using SERV as DATATYPE.

Figure 20-2
ANI received and displayed from terminating agents

NSS PTS trunk originating agent set presentation indicator	IBN ISDN PRI offnet terminating agent set CGNDELV option	Table LTDATA, option CGNDELV delivered	ANI digits provided to offnet terminator	ANI digits provided and displayable by offnet terminators
Allowed	ALWAYS	Y	Y	Yes ←
Restricted			Y	No
Not Available			N	No
Allowed	NEVER	N	No CGNDELV Delivered	
Restricted				
Not Available				
Allowed	SCREENED	Y	Y	Yes ←
Restricted		Y	N*	No
Not Available		N	No CGNDELV Delivered	

***** Any ANI digits provided by the originating agent are overwritten by the terminating IBN ISDN PRI trunk.

ATC ISUP SS7 trunk terminations

Delivery of the Originating Line Information and the Calling Party Number parameters is controlled by the ANI field in table OCCINFO for outgoing ATC ISUP SS7 trunk terminations that originate from NSS PTS trunks.

For outgoing ATC ISUP SS7 trunk terminations that originate from NSS PTS trunks, delivery of the Calling Party Number parameter is controlled by the INCCPN field in table OCCINFO for the terminating ATC trunk.

If the datafill in table TRKGRP for outgoing ATC ISUP SS7 trunk terminations that originate from NSS PTS trunks indicates that the ANI and INCCPN fields are Y, an additional check is made to determine whether the number supplied in the Charge Number parameter is unique to the number supplied in the Calling Number parameter. If the numbers are the same, the Charge Number parameter is omitted from the ISUP IAM message.

Delivery of the Transit Network Selector parameter is provided only for International calls on outgoing ATC ISUP SS7 trunk terminations that originate from NSS PTS trunks.

Delivery of the Carrier Selection parameter is controlled by the PICIND field in table OCCINFO for outgoing ATC ISUP SS7 trunk terminations that originate from NSS PTS trunks.

Outgoing ATC ISUP SS7 trunk terminations that originate from NSS PTS trunks require a 10-digit ANI. Therefore, calls originating from DAT, FGA, or FGB originators that terminate to ATC ISUP SS7 trunks must provide a 10-digit ANI in the BILLDN field, if applicable or, in the special case of the physically received ANI, through the offnet CONNGNPA option (FGB).

DAT PTS trunk terminations

PTS signaling does not transmit ANI spill information for incoming DAT PTS trunk terminations. Therefore, terminating DAT PTS trunk calls are not supplied with CPI information from originating agents.

DAT ISDN PRI trunk terminations

DAT ISDN PRI trunk SETUP messages do not provide a facility for saving ANI spill information digits.

Table control for NSS PTS originating calls that terminate on DAT ISDN PRI trunks traversing OFFNET paths determines omission of the Called Number or Calling Number parameters from the SETUP message during the call establishment phase. The Calling Number Delivery (CGNDELV) and Called Number Delivery (CDNDELV) fields in table LTDATA with the DATATYPE refinement specified as SERV for terminating DAT ISDN PRI trunking agents provide the capability to control delivery of these fields in the SETUP message. The Calling Party Number (CGN) and Called Party Number (CDN) information elements in the SETUP message are optional for each subscription.

The CGNDELV field in table LTDATA has three delivery options available for the Calling Number Delivery option:

- ALWAYS
- NEVER
- SCREENED

The first two options are independent of the Calling Party Number parameter's Presentation indicator, which is terminator controlled. ALWAYS means that the Calling Party Number parameter is always delivered if an ANI is supplied by the originating NSS PTS trunk agency. NEVER means that the Calling Party Number parameter is never delivered. The third option, SCREENED, is originator controlled. If the originating NSS PTS trunk supplies an ANI, SCREENED sends the Calling Party Number parameter but modifies the Calling Party Number parameter based upon the Presentation indicator set by the originating agent. If the

Presentation indicator is not PRESENTATION_ALLOWED and the delivery is SCREENED, the Calling Party Number parameter is delivered, but no ANI information is provided. Otherwise, the Calling Party Number parameter is delivered as usual.

The CDNDELV field in table LTDATA has two delivery options available for the Called Number Delivery option:

- ALWAYS
- NEVER

ALWAYS means that the Called Party Number parameter is always delivered. NEVER means that the Called Party Number parameter is never delivered. If table LTDATA contains no entry for the Logical Terminal ID (LTID), the Calling Party Number and Called Party Number parameters are ALWAYS included in the SETUP message. This is the default and the method normally used for onnet configurations.

Figure 20-3 details whether or not ANI information is received and displayable by originating agents. The presentation indicator in the Calling Number Party parameter gives permission to use the ANI. This is only applicable for IBN ISDN PRI offnet configurations using SERV as a DATATYPE.

Figure 20-3
ANI received and displayed from originating agents

NSS PTS trunk originating agent set presentation indicator	IBN ISDN PRI offnet terminating agent set CGNDELV option	Table LTDATA, option CGNDELV delivered	ANI digits provided to offnet terminator	ANI digits provided and displayable by offnet terminators
Allowed	ALWAYS	Y	Y	Yes ←
Restricted			Y	No
Not Available			N	No
Allowed	NEVER	N	No CGNDELV Delivered	
Restricted				
Not Available				
Allowed	SCREENED	Y	Y	Yes ←
Restricted		Y	N*	No
Not Available		N	No CGNDELV Delivered	

***** Any ANI digits provided by the originating agent are overwritten by the terminating IBN ISDN PRI trunk.

IBN ISDN User Part network information translations

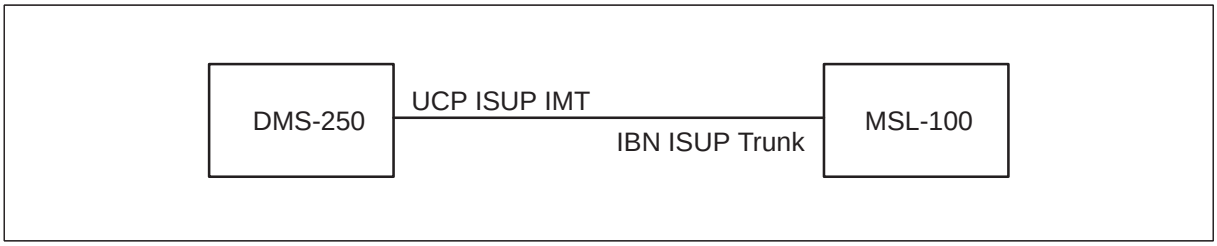
The Integrated Business Network (IBN) Integrated Services Digital Network User Part (ISUP) Network Information (NETINFO) translations feature provides enhancements to the IBN ISUP signaling between a DMS-250 and an MSL-100 and between two MSL-100s. Such enhancements include:

- the mapping of satellite information in and out of the Nature of Connection Indicators parameter of the Initial Address Message (IAM)
- the use of IAM's NETINFO parameter by translations
- Network Class of Service (NCOS) mapping
- the generation of the NETINFO parameter for calls originated over IBN offnet access trunks

Throughout this document, references made to trunks at the DMS-250 end of the trunk are references to UCP (Universal Carrier Protocol) ISUP Intermachine Trunks (IMT). Likewise, references made to trunks at the MSL-100 end of the trunk are references to IBN ISUP trunks.

Figure 21-1 is a description of these trunk types.

Figure 21-1
Trunk types



Satellite information

When a call travels through a network, it can use satellite links between network nodes. Each satellite link between nodes adds approximately a quarter of a second delay in speech transmission from point A to point B.

Hence, network designers typically restrict a call so that it uses only one satellite link in the call setup. If a call is marked as having used a satellite link, the routing of the call usually is restricted so that it does not route over a satellite trunk group. The SAT field in table TRKSGRP is used to specify if the trunks in a subgroup (and thus in a trunk group) are satellite links.

For a switch to acknowledge that a satellite link has previously been used for a call, satellite information must be transmitted from switch to switch. Using this information, the current switch is capable of restricting the route. This satellite information then may be transmitted to the next switch to which the call is routed so the routing again can be restricted.

Before this feature was implemented, satellite information was transmitted between MSL-100s through an Electronic Switched Network (ESN) call type as part of the IAM's called party address parameter. With this feature, the satellite information is transmitted between MSL-100s over IBN ISUP trunks using the IAM's Nature of Connection Indicators parameter.

Note: Satellite information still can be transmitted using the ESN call type over IBN ISUP trunks. But, if the information is transmitted in this manner, it is redundant.

In addition, satellite information transmitted by an ESN call type over IBN PTS trunks is mapped into the Nature of Connection Indicators parameter for calls that come into a switch over IBN PTS trunks and go out over IBN ISUP trunks.

This feature also provides for satellite information between a DMS-250 and an MSL-100 on an ISUP trunk to be transmitted by the IAM's Nature of Connection Indicators parameter.

Nature of Connection Indicators parameter

The Nature of Connection Indicators parameter is a mandatory parameter of the IAM message. This parameter contains three indicators:

- Satellite
- Continuity Check
- Echo Suppressor

The satellite indicator field is used to specify if a satellite link is in use.

NETINFO parameter information used for translations

NETINFO is another IAM parameter. The NETINFO parameter contains a Network ID (NETID), Network Customer Group ID (NETCGID), and Network Class of Service (NCOS). This feature uses this parameter to set up translations based on the information found in these fields.

Note: A NETID corresponds to network name (NETNAME) in table NETNAMES.

DMS-250 to MSL-100

Translations on a DMS-250 switch are based on a serving translation scheme (STS) while translations on an MSL-100 are based on a customer group and NCOS. This feature uses the IAM's NETINFO parameter to map between the DMS-250 translation scheme and the MSL-100 translation scheme. For example, on a call from a DMS-250 to an MSL-100, the DMS-250 maps the call's STS into the NETID, NETCGID, and NCOS fields of IAM's NETINFO parameter, which is transmitted for call setup on the UCP ISUP IMT. This mapping is performed by another table created by the DMS-250 STS/NETINFO Mapping feature.

At the receiving end, the MSL-100 maps the NETID and NETCGID into an internal customer group through table CUSTNTWK, and the NCOS into an internal NCOS through tables CUSTNTWK and COSDATA. The mapping from a NETID and NETCGID to a customer group is implemented by the calling number and NCOS display on the attendant console feature. The mapping from a network NCOS to an internal NCOS is a new capability added by this feature.

If the NETINFO, NETCGID, and NCOS fields are mapped into an internal customer group and NCOS, the internal customer group and NCOS are used to define the translation scheme for the switch.

MSL-100 to MSL-100

Prior to BCS30, translations for calls coming from one MSL-100 into another MSL-100 could be set up in one of two ways. The basic way to define the translation scheme was through the customer group and NCOS of the incoming trunk group. This customer group and NCOS were found in the datafill of table TRKGRP for the incoming trunk group.

If ESN signaling was used, translations were set up differently. The customer group still was retrieved from the trunk group datafill. But, an ESN NCOS was used to override the NCOS found in the trunk group datafill. This ESN NCOS was transmitted from the originating MSL-100 with the destination digits as part of the IAM's Called Party Address parameter for IBN ISUP trunks. The terminating MSL-100 mapped the ESN NCOS into an internal NCOS through table COSMAP. This customer group and new NCOS define the translation scheme used for destination digits.

The IBN ISUP Netinfo translations feature presents a third way to set up translations. The originating MSL-100 maps the internal customer group into the NETID and NETCGID fields of IAM's NETINFO parameter

through table CUSTNTWK and maps the internal NCOS into the NCOS field of the NETINFO parameter through tables COSDATA and CUSTNTWK.

After receiving the NETINFO parameter, the terminating MSL-100 may optionally map the NETID and NETCGD into an internal customer group using table CUSTNTWK and the NCOS field into an internal NCOS through tables CUSTNTWK and COSDATA. If the NETID, NETCGID, and NCOS are mapped into an internal customer group and NCOS, the internal customer group and NCOS are used to define the translation scheme for the terminating switch.

Specifying NETINFO translations

Using the NETINFO parameter information to set up translations at the MSL-100 terminating end is optional. Trunk group option NETXLA (NETINFO Translations) is used to specify whether or not translations are to be set up based on the information in NETINFO.

This option may be added to trunk groups through table TRKGRP. NETXLA may be added in the OPTIONS field of this table for IBNTI and IBNT2 type trunks. NETXLA is only applicable to ISUP trunks, but since ISUP signaling is specified in table TRKSGRP and not in table TRKGRP, NETXLA may be added to non-ISUP trunks. However, if the option is added to non-ISUP trunks, it has no effect on calls made over those trunks.

Table 21-1 is an example of table TRKGRP.

Table 21-1
Tables TRKGRP and TRKSGRP

TRKGRP CLLI	**TRKGRP** GRPTYP	**TRKGRP** OPTIONS	**TRKSGRP** CLLI	**TRKSGRP** SIGDATA
ISUPTRK1	IBNTI	NETXLA	ISUPTRK1	ISUP
ISUPTRK2	IBNT2	$	ISUPTRK2	ISUP
ISUPTRK3	IBNT2	NETXLA	ISUPTRK1	ISUP
PTSTRK1	IBNTI	NETXLA	PTSTRK2	STD
PTSTRK2	IBNTI	$	PTSTRK3	STD

For calls coming in over trunk groups ISUPTRK1 and ISUPTRK3, translations are based on the information in IAM's NETINFO parameter as specified in sections DMS-250 to MSL-100, and MSL-100 to MSL-100. For calls coming in over trunk groups ISUPTRK2, PTSTRK1, and PTSTRK2, translations are set up the same as they were before this feature.

Exceptions

If the NETXLA option is added to a trunk group (specifying that translations need to be set up using the information in the NETINFO parameter) but the NETINFO parameter is either not received or is not valid, the customer group and NCOS from the incoming trunk group are used to set up translations.

If the NETXLA option is added to a trunk group (specifying that translations are to be set up using the information in the NETINFO parameter) but the NETCGID and NETID in the NETINFO parameter do not map into an internal customer group through table CUSTNTWK, the call is sent to vacant code treatment.

Call scenario matrix

Table 21-2 explains where the customer group and NCOS used for translations are obtained for different call scenarios.

Table 21-2
Call scenario matrix

NETXLA OPTION	N	Y	Y	Y	Y	Y
RECEIVE NETINFO PARAMETER	–	Y	N	Y	Y	Y
NETID and NETCGID MAP INTO CUSTOMER GROUP	–	Y	–	N	Y	Y
COSMAP OPTION	–	Y	–	–	N	Y
NETNCOS MAPS INTO INTERNAL NCOS	–	Y	–	–	–	N
RESULT	A	B	A	C	D	D

where:

N signifies no

Y signifies yes

- signifies either NOT APPLICABLE or DOES NOT MATTER

A signifies the customer group and NCOS are taken from the incoming trunk

B signifies the NETID, NETCGID, and NCOS fields of the NETINFO parameter are mapped into an internal customer group and NCOS through tables CUSTNWK and COSDATA

C signifies the call routes to vacant code treatment

D signifies the NETID and NETCGID fields of the NETINFO parameter are mapped into an internal customer group by table CUSTNTWK and the NCOS of the NETINFO parameter is used as the internal NCOS.

Tables 21-3 through 21-6 show the NCOS mapping datafill.

Table 21-3
NCOS mapping datafill: table COSMAP

NAME	MAX	SCREEN	VALTYPE
MAP1	250	ALLOW	ANYTHING
MAP2	300	ALLOW	ANYTHING
MAP3	200	ALLOW	ANYTHING
MAP4	250	ALLOW	ANYTHING

Table 21-4
NCOS mapping datafill: table NETNAMES

NETNAME	EXTNETID
NET1	1
NET2	2
NET3	3

Table 21-5
NCOS mapping datafill: table CUSTNTWK

CUSTNAME	NETNAMES	NETCGID	COSMOUNT
CGRP1	NET1	1	MAP2
CGRP2	NET2	2	
CGRP2	NET3	3	MAP4

Table 21-6
NCOS mapping datafill: table COSDATA

COSMAP	COS	RESULT
MAP1	3	10
MAP2	10	3

NCOS mapping

One of the choices for the OPTIONS field in table CUSTNTWK is field COSMAP (class of service mapping). This option provides for NCOS mapping. COSMAP contains two fields:

- COSMIN (class of service mapping in)
- COSMOUT (class of service mapping out)

Each field may be datafilled with a mapping name from table COSMAP. The mapping name and either the network NCOS or the internal NCOS is used to index table COSDATA to retrieve either an internal NCOS or a network NCOS.

For incoming calls, NETID and NETCGID of the NETINFO parameter are mapped into an internal customer group by table CUSTNTWK. If the COSMAP option is datafilled against that customer group in table CUSTNTWK, the NCOS of the NETINFO parameter and the mapping name datafilled in the COSMIN field of the COSMAP option are used to pick up an internal NCOS from table COSDATA. If the COSMAP option is not datafilled for a particular customer group, NCOS mapping is not performed. If the COSMAP option is datafilled but the mapping name from the COSMIN field and the network NCOS are not datafilled in table COSMAP, NCOS mapping is not performed.

For outgoing calls, the internal customer group is mapped into an NETID and NETCGID for the NETINFO parameter by table CUSTNTWK. If the COSMAP option is datafilled against that customer group in table CUSTNTWK, the internal NCOS is mapped into a network NCOS for the NETINFO parameter. The mapping is done by table COSDATA using the mapping name datafilled against the COSMOUT field of the COSMAP option and the internal NCOS. If the COSMAP option is not datafilled for a particular customer group, NCOS mapping is not performed. Instead, the internal NCOS is placed in the NETINFO parameter as the network NCOS. If the option is datafilled in table CUSTNTWK but the mapping name and internal NCOS are not properly datafilled in table COSDATA, NCOS mapping is not performed.

Network NCOS to internal NCOS mapping

If the NETINFO parameter contains NETID 1 and NETCGID 1 for an incoming call, they are mapped into the internal customer group CGRP1 by table CUSTNTWK. Since CGRP1 has the COSMAP option, table COSDATA is indexed to pick up an internal NCOS. If the NETINFO parameter contains a network NCOS of 3, the internal NCOS is 10 since mapping name MAP1 with NCOS 3 maps into the number 10 in table COSDATA. If, however, for the same customer group, the network NCOS in the NETINFO parameter is 9, the internal NCOS is also 9 since no entry exists in table COSDATA for mapping name MAP1 and NCOS 9.

An incoming call with NETID 2 and NETCGID 2 in the NETINFO parameter maps into the internal customer group CGRP2 using table CUSTNTWK. Since CGRP2 does not contains the COSMAP option, NCOS mapping is not performed. The internal NCOS is the same as the network NCOS found in the NETINFO parameter.

An incoming call with NETID 3 and NETCGID 3 in the NETINFO parameter maps into the internal customer group CGRP3 using table CUSTNTWK. The mapping name is used to index into table COSDATA to pick up an internal NCOS. However, since MAP3 is not datafilled in table COSDATA, NCOS mapping is not performed. The network NCOS found in the NETINFO parameter is also used as the internal NCOS.

Internal NCOS to network NCOS mapping

For an outgoing call with the internal customer group CGRP1, the COSMAP option is datafilled. Therefore, MAP1 is used along with the internal NCOS to index table COSDATA and pic up a network NCOS that is to be placed in the NETINFO parameter. If the internal NCOS is 10, the network NCOS is also 14. NCOS mapping is not performed since no entry exists in table COSDATA for mapping name MAP1 and NCOS 14.

If an outgoing call has an internal customer group of CGRP2, NCOS mapping is not performed since CGRP2 does not have the COSMAP option in table COSDATA. The internal NCOS is used as the network NCOS in the NETINFO parameter.

Table COSDATA provides various ways in which to map from one number (COS) to another (RESULT). The examples above apply when the value for the SCREEN parameter in table COSMAP is ALLOW and the value for the VALTYPE parameter in table COSMAP is ANYTHING. For more information about tables COSMAP and COSDATA, refer to *Customer Data Schema*.

Generation of NETINFO parameter

This section is applicable to switches that contain the Network Services System package NTXE75AA, or the MSL-100 Feature Group D package, NTXA92AA.

Callers can be identified by their customer group and NCOS if the calls are originated over IBN offnet access trunks. Therefore, this feature generates a NETINFO parameter in the IAM message for calls that originate over an IBN Offnet Access trunk.

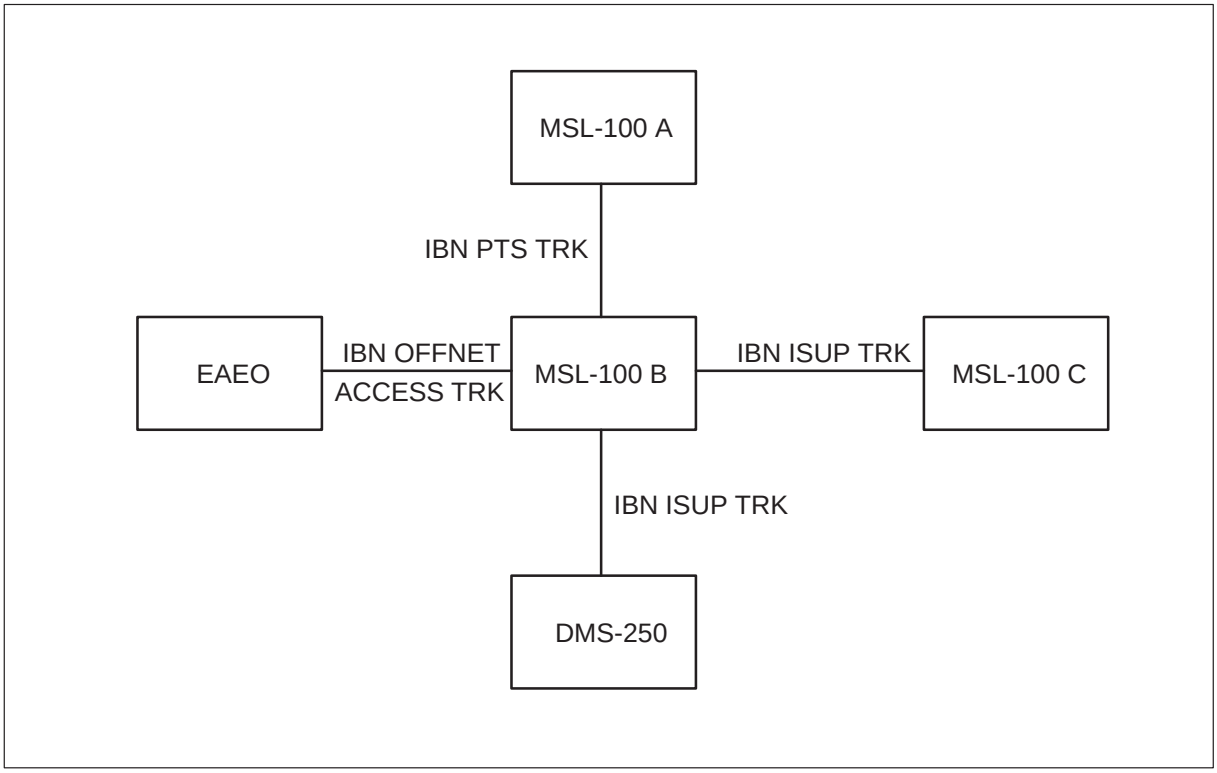
An IBN offnet access trunk is defined as one of the following trunks:

- Feature Group A (FGA)
- Feature Group B (FGB)
- Feature Group D (FGD)
- Dedicated Access Trunk (DAT)

Callers also can be identified by their customer group and NCOS if calls are originated over IBN PTS FGD trunks in a stand-alone configuration. Therefore, a NETINFO parameter in the IAM message is also generated.

Figure 21-2 illustrates when the NETINFO parameter of the IAM is generated for calls originating over an IBN Offnet Access trunk.

Figure 21-2
NETINFO parameter of IAM



For calls that originate on an equal access end office (EAEO) and terminate to an MSL-100 A, the NETINFO parameter is not generated since an ISUP IAM message is not generated. For calls that originate on an EAEO and terminate to an MSL-100 C or DMS-250, MSL-100 B generates the NETINFO parameter of the IAM. For calls that originate on an MSL-100 A and terminate to an MSL-100 C or DMS-250, MSL-100 B still does not generate the NETINFO parameter of the IAM.

Identifying the caller

Most calls originating over an IBN offnet access trunk require either an authorization code or a TCN to be dialed to identify the caller to the network. The NSS Offnet Access Dialing Plan Driver feature provides the capability to datafill a customer group and NCOS against a caller's authorization code through table AUTHCDE or against a caller's TCN through table TCNDATA. Thus, with the implementation of the NSS Offnet Access Dialing Plan Driver feature in BCS30, authorization code and travel card callers are identified by their customer group and NCOS.

The following call types originate over an IBN offnet access trunk and do not require that an authorization code or TCN be dialed:

- 400/800 INWATS
- 700/900
- FGD pure
- Destination Only
- Senderized DAT

For 400/800 INWATS, 700/900, and FGD pure calls, the caller can be identified by his customer group and NCOS as explained below. However, for Destination Only and DAT Senderized calls, a caller can not be identified by his customer group and NCOS as explained in the Exceptions section that follows.

For 400/800 INWATS and 700/900 numbers, the original customer group and NCOS are based on trunk group datafill. If replacement of dialed digits (RDD) processing is required, a new NCOS can be obtained for the call. The original customer group is used with the new NCOS to translate destination digits. However, if the call is an authcode, TCN, or FGD call where the trunk group's customer group and NCOS are overridden by an authcode, TCN or ANI process, the last customer group obtained is used with the new NCOS from RDD to translate the call.

A caller is uniquely identified by his automatic number identification (ANI) for FGD pure calls. If ANI screening is performed, a new customer group and NCOS are retrieved from table ANIDATA based on the caller's ANI. Therefore, for FGD pure calls, callers also may be identified by their customer group and NCOS. The ANI screening capability is provided by the Feature Group D on MSL-100 feature.

To identify the caller for authorization code, travel card, and FGD pure calls, the customer group and NCOS retrieved from table AUTHCDE, TCNDATA, or ANIDATA are mapped into the NETID, NETCGID, and NCOS fields for the NETINFO parameter in the IAM. The new NCOS derived from RDD processing for 400/800 INWATS, and 700/900 numbers is also mapped into the NETINFO parameter.

Exceptions

The NSS Offnet Access Dialing Plan Driver feature provides a Destination Only dialing plan. This dialing plan only collects destination digits. The NSS Dedicated Access Trunk feature implements DAT senderized access which also does not require that an authorization code or TCN be dialed.

Unlike the other types of calls that originate over IBN offnet access trunks, destination only and DAT senderized calls do not access tables AUTHCDE, TCNDATA, and ANIDATA to retrieve a customer group and NCOS. Instead, the customer group and NCOS for these call types are taken from the trunk group datafill in table TRKGRP for the incoming trunk group. This customer group and NCOS are then mapped into the NETID, NETCGID, and NCOS fields for the IAM's NETINFO parameter. Although the NETINFO parameter is generated, the caller is not identified by his customer group and NCOS in these cases. Therefore, other features that use the customer group and NCOS may not receive the true customer group and NCOS of the caller.

For example, the Calling Number and NCOS Display on Attendant Console feature in *MSl-100 Features and Description Manual* uses the information found in the NETINFO parameter to display information on the AC. The customer group of the originator is determined by the information in the NETINFO parameter. If the originating party belongs to the same customer group as the attendant, certain information is displayed. If the originating party and the attendant belong to different customer groups, other information is displayed.

Note: For destination only or DAT senderized calls, the customer group determined by the NETID and NETCGID fields of the NETINFO parameter are not the customer group of the originator, but the customer group of the incoming trunk group. Therefore, a caller may *appear* to be in the same customer group as the attendant when the call is originated from one location, but *actually* be in a different customer group when the call is originated from another location.

Failure to datafill customer group and NCOSs

Failure to datafill customer group and NCOSs for authorization codes, TCNs, and ANIs prevents callers from being identified by their customer groups and NCOSs. As with Destination Only and DAT senderized calls, this could affect other features.

Failure to obtain network information

When building the NETINFO parameter, the internal customer group is mapped into the NETID and NETCGID fields by table CUSTNTWK. If this mapping can not be performed because of improper datafill in table CUSTNTWK, the NETINFO parameter is not generated.

Data schema

The following two options have been added to the data schema for this feature:

- NETXLA has been added to the OPTIONS field in table TRKGRP for IBNTI and IBNT2 trunk types
- the OPTIONS field in table CUSTNTWK has added COSMAP

Interactions

Satellite information

When a call terminates to a business set or attendant console, the call is referred to as the first leg. This call can be extended to another party which is referred to as the second leg. The first and second legs of a call are independent of each other until a possible transfer of the first leg to the second leg occurs. When this transfer occurs, a Reconfigure Progress Message (RPM) is sent to both the originator and the terminator if they are trunks so that each end is updated with the NETINFO of the other. If the first leg uses a satellite link, the indication of this link does not apply to the second leg until the call is transferred. Since the second leg may be routed over a trunk, it, too, may use a satellite link. Therefore, at the time of transfer, two satellite links may be involved in the call.

NETINFO translations

If the incoming trunk group specifies the NETXLA option, the fields in the NETINFO parameter are mapped into a customer group and NCOS and used to set up translations for that switch. However, if an ESN NCOS also is sent as part of the called party address parameter, the ESN NCOS should not be sent as part of the Called Party Address field for the IAM when translations are specified based on the information in the NETINFO parameter.

Restrictions and limitations

Generation of NETINFO parameter

The NETINFO parameter is only generated for IBN offnet access trunks when the NSS package is part of the customer load.

Identifying the caller for the NETINFO parameter

This feature generates the NETINFO parameter for calls that originate over IBN offnet access trunks. For these calls, the caller is identified by his customer group and NCOS so that the customer group and NCOS may be mapped into the fields of the NETINFO parameter. However, as stated in the Failure to Datafill Customer Group and NCOS section, unless a customer group and NCOS are datafilled for authorization codes, TCNs, N00 numbers, and ANIs in tables AUTHCDE, TCNDATA, REPLDATA, and ANIDATA, respectively, callers cannot be identified by their customer groups and NCOSs. In addition, as mentioned in the Exceptions section,

destination only and DAT senderized calls do not allow for a caller to be identified by his customer group and NCOS.

Customer Group Transport on PRI

The Customer Group Transport on PRI feature provides the capability to transmit customer group information between Network Services System (NSS) nodes and DMS-250 nodes over a PRI trunk. Prior to BCS34, this information could only be transmitted on integrated services digital network user part (ISUP) trunk groups.

To implement this feature, PRI trunk groups and a unique dialing plan involving the Called Party Number parameter are used. The Called Party Number parameter is an existing element in the Q.931 SETUP message.

Customer group information

Customer group information consists of the elements NETID, NETCGID, and NCOS as shown in Table 22-1. Together, this information creates an 8-digit customer group identifier.

Table 22-1
Customer group identifier

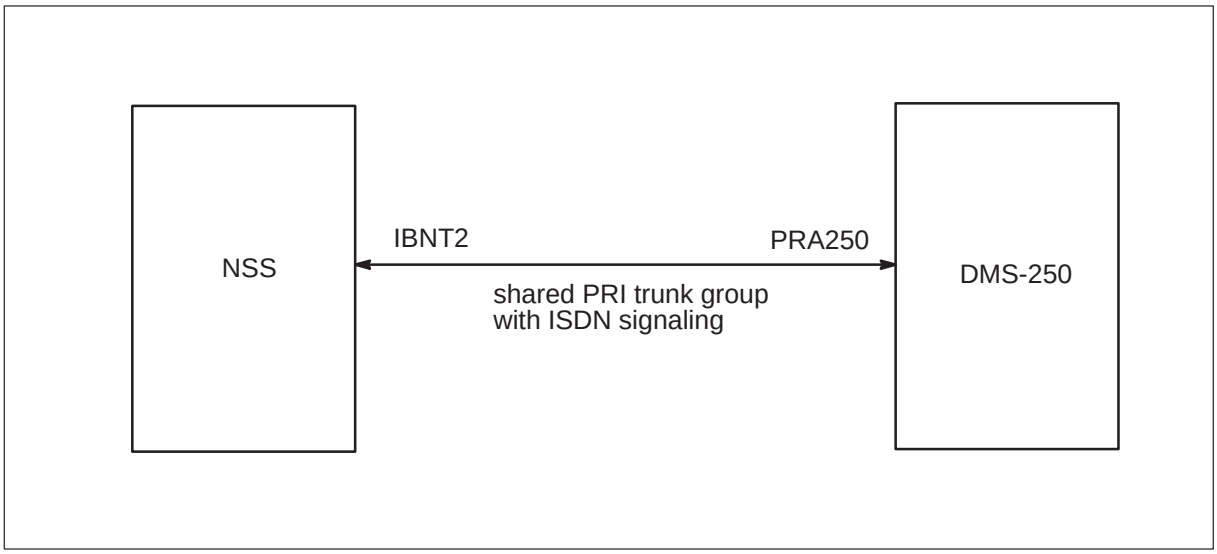
Parameter ID	Name	Number of Digits	Digit Range
NETID	Network Identifier	1-digit	0–9
NETCGID	Network Customer Group Identifier	4-digits	1–4096
NCOS	Network Class of Service	3-digits	0–255

When customer group information is to be transported across the network over a PRI trunk, the 8-digit customer group identifier is prefixed to the called number and forwarded in the Called Party Number parameter of the SETUP message. A maximum of 24 digits can be passed in this parameter, therefore, when customer group information is forwarded, a total of 16 digits are available for the called number.

PRI trunk group requirements

With this feature, the customer group information is forwarded between an NSS and DMS-250 switch over a PRI trunk group. The NSS end of the PRI trunk is an IBNT2 trunk group with ISDN signaling, and the DMS-250 connection is a PRA250 trunk with ISDN signaling. Figure 22-1 illustrates this shared trunking configuration.

Figure 22-1
PRI trunk group configuration between NSS and DMS-250



NSS customer group processing using the NETXLA parameter

The NSS switch uses the existing NETXLA value in the OPTIONS field of table TRKGRP to identify when an incoming call contains the customer group identifier in its Called Party Number parameter. NETXLA is also used to determine whether or not a terminating PRI trunk should include the customer group information in the Called Party Number parameter.

Table 22-2 illustrates how NETXLA datafill in table TRKGRP is used to process customer group information when received or sent over PRI trunk groups.

Table 22-2
Table TRKGRP customer group indicator settings

PRI Trunk Group Direction	Field OPTIONS equal to NETXLA	Result
Incoming	Y	The first 8 digits of the Called Party Number parameter are viewed as the customer group identifier and the remaining digits are considered the called number.
	N	All digits in the Called Party Number parameter are viewed as the called number.
Outgoing	Y	The called number is prefixed with the customer group identifier in the Called Party Number parameter.
	N	Only the called number is placed in the Called Party Number parameter.
Two-way		See incoming and outgoing scenarios.

The NETXLA option can be added to any trunk group, however, it will not activate the customer group transport feature unless the SIGDATA field in TRKSGRP is set to ISDN for PRI trunks or ISUP for ISUP trunks.

DMS-250 customer group processing using NETXLA parameter

For this feature to function, a new field called OPTIONS, which contains the NETXLA parameter, is added to the PRA250 trunk in table TRKGRP. NETXLA is used to indicate when an incoming PRI call contains customer group information in the Called Party Number parameter. The NETXLA parameter is also used to determine whether or not customer group information needs to be forwarded in the Called Party Number parameter over terminating PRA250 trunk groups.

NSS and DMS-250 trunk group datafill requirements

Both the NSS and DMS-250 TRKGRP tables must have NETXLA datafilled in the OPTIONS field in order to successfully transfer customer group information over a shared PRI trunk group.

If the customer group information indicators are not set correctly when the customer group identifier is prefixed to the called number, the customer group information shall be interpreted as part of the called number. The result is the called number digits will not be translated successfully.

New tables for DMS-250

The customer group transport on PRI feature requires two new tables in the DMS-250; tables STSTONET and NETTOSTS. Following is a description of each table.

Table STSTONET

The Serving Translation Scheme to NETwork (STSTONET) table provides mapping between an STS and NETwork Information fields NETwork Name (NETNAME), NETwork Customer Group ID (NETCGID), and Network Class of Service (NCOS). The data obtained from this mapping is used to derive a customer group identifier, which is then forwarded from a DMS-250 to a Network Services System (NSS) over a PRI trunk.

Table 22-3 provides a list of STSTONET field names and associated descriptions.

Table 22-3
Table STSTONET field names and descriptions

Field	Value	Explanation and action
STS	0 to 999	SERVING TRANSLATION SCHEME. This field contains the Serving Translation Scheme (STS). It must be datafilled in table HNPACONT.
NETNAME	Up to 32 characters	NETWORK NAME. A network name datafilled in table NETNAMES to identify an external network ID.
NETCGID	1 to 4096	NETWORK CUSTOMER GROUP IDENTIFICATION. A predefined number identifying an external customer group on an NSS.
NCOS	0 to 255	NETWORK CLASS OF SERVICE. This field specifies a line privilege which denotes a network class of service.

Example of NETTOSTS datafill

Table 22-4 is an example of datafill for Table NETTOSTS.

Table 22-4
NETTOSTS datafill example

NETNAME	NETCGID	NCOS	STS
NETWK7	100	10	814
NETWK7	150	3	815
NETWK8	150	10	814

Customer group transport on PRI translations

For both the NSS and DMS-250, once an incoming PRI call has been identified as containing customer group information in the Called Party Number parameter, the 8-digit customer group identifier is stripped and used in call translations.

NSS to DMS-250 call translations

Remembering that the values needed to create a customer group identifier are NETID, NETCGID, and NCOS, the following describes how these values are derived during NSS call translations.

On a call from NSS to DMS-250, the NSS uses table CUSTNTWK to map the local customer group ID into a Network Name (NETNAME) and Network Customer Group ID (NETCGID). The NETNAME is then used to access table NETNAMES to derive a Network ID (NETID).

Table CUSTNTWK also contains an OPTIONS field which can be used for NCOS mapping. If this field is datafilled as COSMAP (Class of Service Mapping), the internal class of service (COS) is mapped into a Network Class of Service (NCOS). The COSMAP field contains two parameters; COSMIN (Class of Service Mapping In) and COSMOUT (Class of Service Mapping Out). If the NSS call is outgoing as it is in this scenario, the COSMOUT value is used to access the COSMAP table. The COSMOUT value is then mapped against the internal COS to derive a final NCOS. This NCOS is used as part of the customer group identifier.

If the OPTIONS field in table CUSTNTWK is not datafilled with COSMAP, this means COS mapping is not required. The NSS then uses the internal COS as part of the customer group identifier.

Once the NETID, NETCGID, and NCOS are determined, the information is prefixed to the called number in the Called Party Number parameter in the outgoing SETUP message.

Figure 22-2 provides an example of NSS datafill for tables CUSTNTWK, NETNAMES, and COSDATA.

Figure 22-2
Example of NETTOSTS datafill

NETNAME	NCOS	STS
NETWK7	100	814
NETWK7	150	815
NETWK8	150	714

Customer group transport on PRI translations

For both the NSS and DMS-250, once an incoming PRI call has been identified as containing customer group information in the Called Party Number parameter, the 8-digit customer group identifier is stripped and used in call translations.

NSS to DMS-250 call translations

The values needed to create a customer group identifier are NETID, NETCGID, and NCOS. The following describes how these values are derived during NSS call translations.

On a call from NSS to DMS-250, the NSS uses table CUSTNTWK to map the local customer group ID into a Network Name (NETNAME) and Network Customer Group ID (NETCGID). The NETNAME is then used to access table NETNAMES to derive a Network ID (NETID).

Table CUSTNTWK also contains an OPTIONS field which can be used for NCOS mapping. If this field is datafilled as COSMAP (Class of Service Mapping), the internal Class of Service (COS) is mapped into a Network Class of Service (NCOS). The COSMAP field contains two parameters; COSMIN (Class of Service Mapping In) and COSMOUT (Class of Service Mapping Out). If the NSS call is outgoing as it is in this scenario, the COSMOUT value is used to access the COSMAP table. The COSMOUT value is then mapped against the internal COS to derive a final NCOS. This NCOS is used as part of the customer group identifier.

If the OPTIONS field in table CUSTNTWK is not datafilled with COSMAP, this means COS mapping is not required. The NSS then uses the internal COS as part of the customer group identifier.

Once the NETID, NETCGID, and NCOS are determined, the information is prefixed to the called number in the Called Party Number parameter in the outgoing SETUP message.

Figure 22-3 provides an example of NSS datafill for tables CUSTNTWK, NETNAMES, and COSDATA.

Figure 22-3
Sample DMS-250 datafill for deriving an STS from NETID, NETCGID, and NCOS

Table NETNAMES

NETNAME	NETID
NETWK7	1
NETWK8	2
NETWK9	3

Table NETTOSTS

NETNAME	NETCGID	NCOS	STS
NETWK7	100	10	814
NETWK7	150	3	815
NETWK8	150	10	714

Table STSTONET

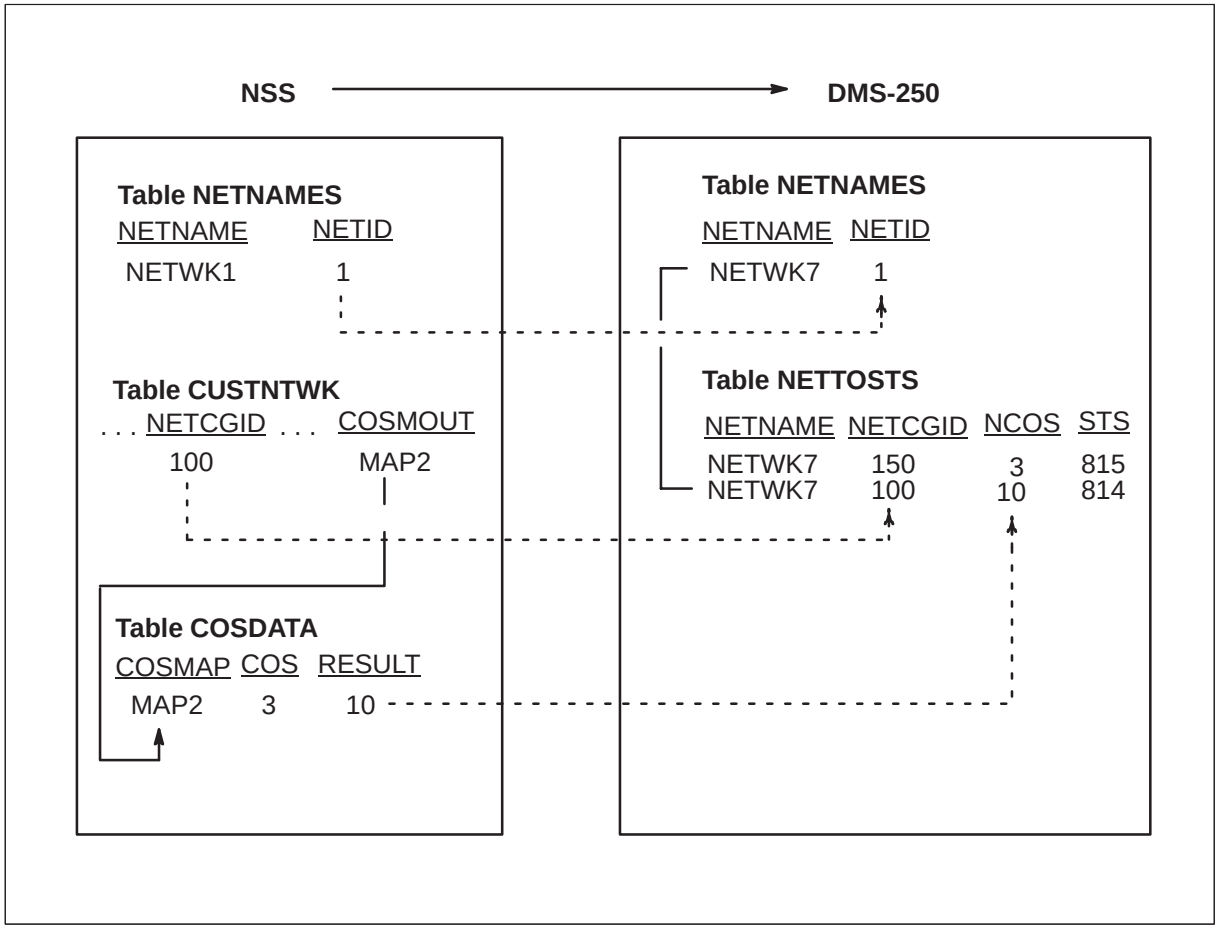
STS	NETNAME	NETCGID	NCOS
714	NETWK8	150	10
814	NETWK7	100	10
815	NETWK7	150	3

Figure 22-4 illustrates the interaction between the NSS and DMS-250 with regard to customer group call translations. In this scenario, the customer group information sent from the NSS to the DMS-250 is as follows:

- NETID=1
- NETCGID=100
- NCOS=10

The DMS-250 receives this information in the Called Party Number parameter and uses it to obtain an STS for routing the call.

Figure 22-4
Example of customer group call translations from NSS to DMS-250



NSS and DMS-250 treatments

In the event the NSS is unable to map the internal customer group ID and internal NCOS into the customer group information needed for the Called Party Number parameter, the NSS will provide VACANT CODE treatment. Additionally, an ISDN cause value of ‘Unassigned Number’ is generated prior to releasing the call.

In the event the DMS-250 is unable to map the customer group information into a serving translation scheme (STS), it will provide VACANT CODE treatment and issue an ISDN cause value of ‘Unassigned Number’ before releasing the call.

DMS-250 to NSS call translations

On a call from the DMS-250 to the NSS, the DMS-250 screens the call to determine whether or not customer group information should be sent in the Called Party Number parameter. If it is required, the DMS-250 maps the

STS of the call into a NETID, NETCGID, and NCOS using tables STSTONET and NETNAMES.

The STS is used to access table STSTONET to obtain the NETNAME, NETCGID, and NCOS information. The NETNAME is then used to access table NETNAMES to derive the NETID.

Once the NETID, NETCGID, and NCOS values are obtained, the DMS-250 prefixes them to the called number in the Called Party Number parameter. This parameter is then sent to the NSS in the outgoing SETUP message.

Once the information is received by the NSS, it strips the 8-digit customer group information from the Called Party Number parameter and uses it to derive the local customer group name and internal NCOS for call translations. The NETID information is the key into table NETNAMES where the Network Name (NETNAME) information is derived. The NETCGID parameter in conjunction with the NETNAME is used to access table CUSTNTWK where the local customer group name (CUSTNAME) is found.

The NCOS received in the message may or may not need to be mapped into an internal COS. The optionality for this mapping is defined in the OPTIONS field of table CUSTNTWK. If the OPTIONS field is datafilled with COSMAP, then the NCOS received with the call is mapped into an internal COS. COSMAP has two parameters: COSMIN and COSMOUT. For incoming calls, the COSMIN value is used in conjunction with the NCOS received to access the COSDATA table for class of service mapping. The end result is an internal COS which is used with the local customer name to route the call.

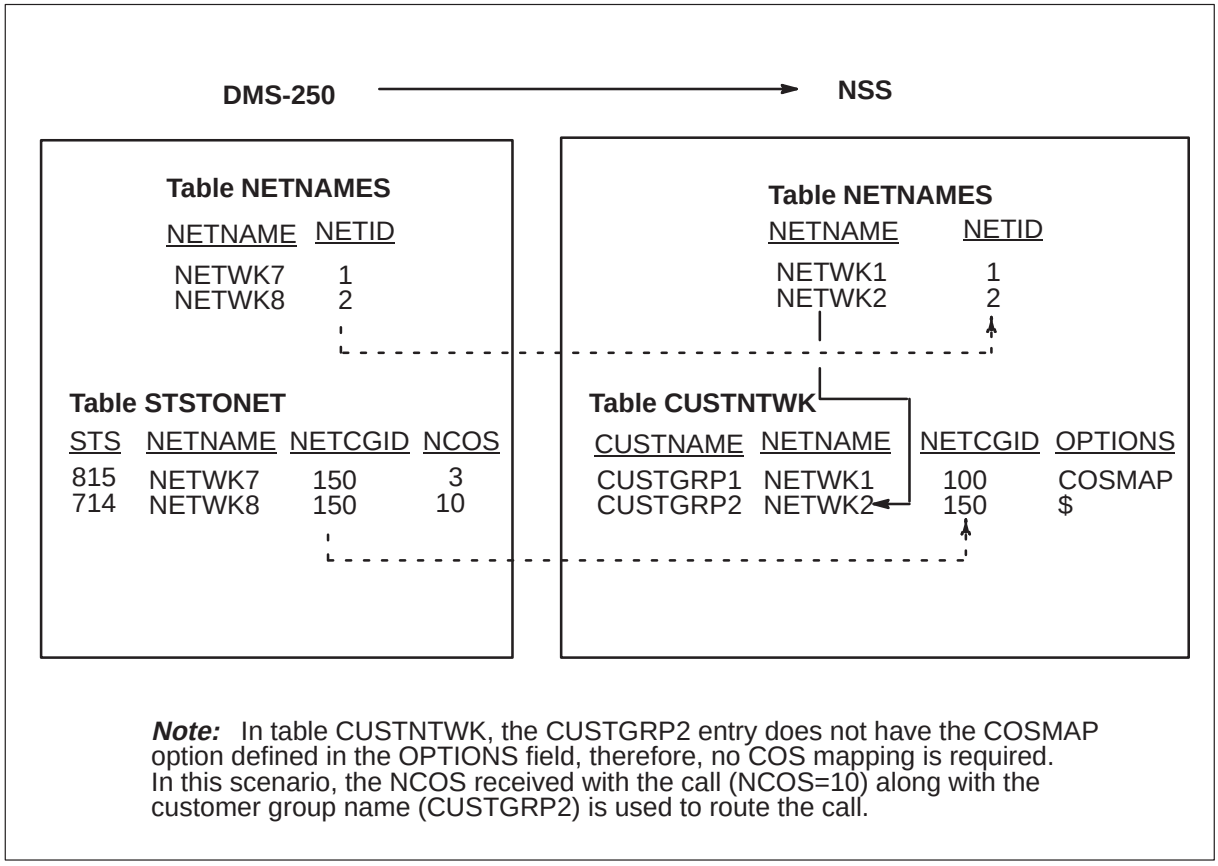
If the OPTIONS field is not datafilled with COSMAP, this means class of service mapping is not required. The NSS then uses the NCOS as received along with the local customer name for routing the call.

Figure 22-5 illustrates the interaction between the DMS-250 and NSS call translations. In this scenario, the customer group information sent from the DMS-250 to the NSS contains the following datafill:

- NETID=2
- NETCGID=150
- NCOS=10

The DMS-250 receives this information in the Called Party Number parameter and uses it to obtain an STS for routing the call.

Figure 22-5
Example of customer group call translations from DMS-250 to NSS



DMS-250 and NSS treatments

In the event the DMS-250 is unable to map the STS into the customer group information required for the Called Party Number parameter, the DMS-250 provides REORDER treatment. Additionally, an integrated service digital network (ISDN) cause value of Incomplete Number is generated prior to releasing the call.

In the event the NSS is unable to map the customer group information into an internal customer group name and internal COS, it will provide VACANT CODE treatment and generate an ISDN cause value of Unallocated Number prior to releasing the call.

Billing considerations

When the customer group transport feature is active, the called number field in the CDR will contain just the actual called number. The 8-digit customer group information prefixed to the called number in the SETUP message will not be included in the called number field of the CDR.

Logs

Several new logs were created on the NSS and DMS-250 as a result of the Customer Group Transport on PRI feature. Table 22-5 shows those logs and definitions.

Table 22-5
Comparison of sample log datafill

NSS logs	DMS-250 logs
NETX100	NETX250
NETX101	NETX251
NETX102	NETX252
NETX103	OCC222
NETX104	
NETX105	

NSS logs

Following is a description of NSS logs relative to the customer group transport on PRI feature.

NETX100

The NETX100 log is generated when tables NETNAMES, CUSTNTWK, and NCOS are not datafilled completely or consistently with the datafill at the other end of the PRI trunk.

Example of log format

report_id mmmdd hh:mm:ss ssdd event_type type_of_log

CKT
<text information>
TREATMENT=
CUSTGRP=
AGENT=
CALLED_NO=

Example of log report

NETX100 JAN02 16:04:32 9538 INFO NETXLA MAPPING FAILURE

LEN HOST 00 0 01 02 DN 7220102

The NETXLA option is not turned on for the other end of the trunk.

Mapping from network information to an internal custgrp and ncos failed.

TREATMENT=6
CUSTGRP=COMCGRP1
AGENT=LEN HOST 00 0 01 02 DN 7220102
CALLED_NO=96137220104

NETX101

The NETX101 log is generated when the NETXLA option is activated for the NSS side of the trunk but not active for the DMS-250 side of the trunk. The Customer Group Transport on PRI feature is supported only when the NETXLA option is activated for both ends of the transporting trunk.

Example of log report format

CKT <text information>
CUSTGRP=
TREATMENT=
AGENT=
CALLED_NO=

Example of log report

NETX101 JAN02 16:04:32 9538 INFO INCONSISTENT DATAFILL

LEN HOST 00 0 01 02 DN 7220102

NETX102

The NETX102 log is generated when there are no system software resources available to process the call.

Example of log report format

report_id mmmdd hh:mm:ss ssdd event_type type_of_log

CKT
<text information>
TREATMENT=
CUSTGRP=
AGENT=
CALLED_NO=

Example of log report format

NETX102 JAN02 16:04:32 9538 INFO SYS. RESOURCES EXCEEDED

LEN HOST 00 0 01 02 DN 7220102
There are no system resources available.

TREATMENT=58
CUSTGRP=COMCGRP1
AGENT=LEN HOST 00 0 01 02 DN 7220102
CALLED_NO=96137220104

NETX103

The NETX103 log is generated when the customer name datafilled in table KSETLINE for the originating line is not datafilled in table CUSTNTWK.

Example of log report format

report_id mmmdd hh:mm:ss ssdd event_type type_of_log

CKT
<text information>
TREATMENT=
CUSTGRP=
AGENT=
CALLED_NO=

Example of log report format

NETX103 JAN02 16:04:32 9538 INFO NETXLA MAPPING FAILURE

LEN HOST 00 0 01 02 DN 7220102
Mapping from internal CUSTGRP and NCOS
to network information failed.

TREATMENT 6
CUSTGRP=COMCGRP1
AGENT=LEN HOST 00 0 01 02 DN 7220102
CALLED_NO=96137220104

NETX104

The NETX104 log is generated when the EXTNETID field in table NETNAMES is datafilled out of the range 0–9.

Example of log report format

report_id mmmdd hh:mm:ss ssdd event_type type_of_log

CKT
<text information>
TREATMENT=
CUSTGRP =
AGENT=
CALLED_NO=
NETID=

Example of log report

NETX104 JAN02 16:04:32 9538 INVALID NETID

LEN HOST 00 0 01 02 DN 7220102
Datafill Error: EXTNETID field in table NETNAMES has a value greater than 9.

TREATMENT=68
CUSTGRP=COMCGRP1
AGENT=LEN HOST 00 0 01 02 DN 7220102
CALLED_NO=96137220104
NETID=11

NETX105

The NETX105 log is generated when the number of digits dialed exceeds 16. The Customer Group Transport on PRI feature is supported only for calls with less than or equal to 16 digits.

Example of log report format

report_id mmmdd hh:mm:ss ssdd event_type type_of_log

CKT
<text information>
TREATMENT=
CUSTGRP =
AGENT=
CALLED_NO=

Example of log report format

NETX105 JAN02 16:04:32 9538 EXCESS DIGITS

LEN HOST 00 0 01 02 DN 7220102
The Dialed Number of digits exceeds 16

TREATMENT=68
CUSTGRP=COMCGRP1
AGENT=LEN HOST 00 0 01 02 DN 7220102
CALLED_NO=96137220104

DMS-250 logs

NETX250

The NETX250 log is generated when the NETOTSTS table is not datafilled properly causing a mapping failure to occur between the incoming NETINFO digits and STS.

Example of log report format

report_id mmmdd hh:mm:ss ssdd event_type type_of_log

CKT
<text information>
TREATMENT=
AGENT=
CALLED_NO=

Example of log report

NETX250 JAN02 16:04:32 9538 STS—NETINFO MAPPING FAILURE

CKT L2DPR64CL1
Mapping from network information to an STS failed.

TREATMENT=6
AGENT =L2DPR54CL1
CALLED_NO=2999911234

NETX251

The NETX251 log is generated when the NETXLA option is activated for the DMS-250 side of the trunk but not active for the NSS side of the trunk. The Customer Group Transport on PRI feature is supported only when the NETXLA option is activated for both ends of the transporting trunk.

Example of log report format

report_id mmmdd hh:mm:ss ssdd event_type type_of_log

CKT
<text information>
TREATMENT=
AGENT=
CALLED_NO=

Example of log report

NEXT251 JAN02 16:04:32 9538 INFO INCONSISTENT DATAFILL

CKT L2DPR64CL1
The NETXLA option is not turned on for the other end of the trunk.

TREATMENT=68
AGENT=L2DPR54CL1
CALLED_NO=2999911234

NETX252

The NETX252 log is generated when a mapping failure occurs within table STSTONET between the STS and customer group information (that is NETINFO digits).

Example of log report format

report_id mmmdd hh:mm:ss ssdd event_type type_of_log

CKT
<text information>
TREATMENT=
AGENT=
CALLED_NO=

Example of log report

NEXT252 JAN02 16:04:32 9538 INFO STS—NETINFO MAPPING FAILURE

CKT L2DPR64CL1
Mapping from an STS to NETINFO digits failed.

TREATMENT=6
AGENT=L2DPR54CL1
CALLED_NO=2999911234

OCC222

The OCC222 log is generated when the entry in field EXTNETID of table NETNAMES is greater than 9. For the Customer Group Transport on PRI feature, the valid range for this field is 0–9.

Example of log report format

report_id mmmdd hh:mm:ss ssdd event_type type_of_log

TRBCODE=
TABLE=
KEY=

Example of log report

OCC222 JAN02 16:04:32 9538 INFO STS—NETINFO MAPPING FAILURE

TRBCODE=NETID SHOULD NOT BE GREATER THAN 9
TABLE=NETNAMES
KEY=11

Feature interactions

The following is a list of interactions between the Customer Group Transport feature and existing or new features.

- This feature uses existing tables NETNAMES, CUSTNTWK, and COSDATA on the NSS to generate customer group information for outgoing PRI calls, as well as translate incoming PRI calls from the DMS-250.
- This feature uses existing tables NETNAMES, CUSTNTWK, and COSDATA on the NSS to generate customer group information for outgoing PRI calls, as well as translate incoming PRI calls from the DMS-250.
- This feature requires the IBN ISUP NETINFO Translations feature to function.

Restrictions and limitations

The Customer Group Transport feature has the following restrictions and limitations:

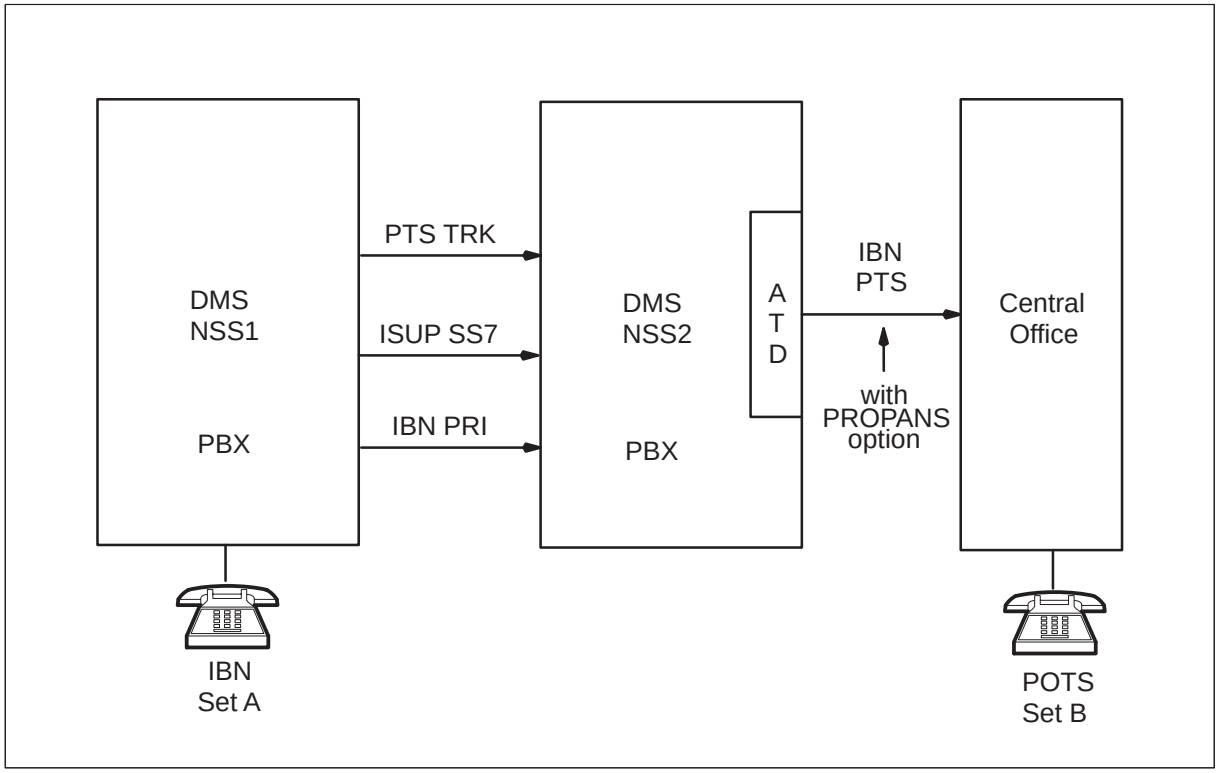
- The Called Party Number parameter accommodates a maximum of 24 digits, therefore, when the customer group information is required, only 16 digits are available for the actual called number.
- This feature does not provide any changes to TRAVER (Translations and Verification) on the DMS-250 or NSS. This means the two new tables on the DMS-250 (STSTONET and NETTOSTS) will not appear in TRAVER.
- A range restriction on the NETID field in table NETNAMES will be enforced on both the NSS and DMS-250 switches at call processing time. The datafillable range of values is 0–32767, but when the feature is active, the range of values is 0–9. A range check on field NETID will be performed during call processing. If the range check fails, the call is blocked and VACANT CODE treatment provided.

NSS Propagate Answer Back

The Network Services System (NSS) Propagate Answer Back feature allows software answer to be detected and propagated through the network to the far end originating switch. This feature is used when hardware answer is not available on a terminating IBN PTS per trunk signaling) trunk group. Hardware answer is the electrical pulse (off-hook signal) sent from a central office (CO) or a private branch exchange (PBX) to the adjoining switch. However, some trunk groups are not capable of sending this signal (that is, Foreign Exchange (FX) and private exchange (PX)). For these trunk groups an ATD is attached to listen for software answer. Software answer consists of voice detection, dial tone detection, and default answer detection. These are the only software answer types supported by this feature and which are propagated to the far end originating switch. Once software answer is detected by the ATD, it is propagated through the network in the form of hardware answer (off-hook signal).

Figure 23-1 illustrates a network view of audio tone detector (ATD) answer propagation.

Figure 23-1
Network view of ATD Answer Propagation



Referencing Figure 23-1, the call processing indicates that a call originates at NSS1, tandems through NSS2, and terminates to a plain old telephone service (POTS) telephone at a central office using an integrated business network (IBN) per trunk signaling (PTS) trunk. In this example, the central office does not provide hardware answer over the IBN PTS trunk. Therefore, an ATD is attached at NSS2 to detect software answer. Once detected, the software answer is propagated through the network to NSS1 as normal hardware answer (off-hook signal). Once the signal is received, the NSS1 switch processes the call as answered.

ATD feature implementation

To implement the Propagate Answer Back feature, several tables require datafill to establish ATD requirements and trunk group parameters for answer propagation. For the terminating IBN PTS trunk group the following tables require datafill; TRKGRP (Trunk Group), TRKSGRP (Trunk Subgroup), DIGMAN (Digit Manipulation), and optionally IBNATD (IBN Audio Tone Detector). For incoming trunk groups to support answer propagation, table TRKSGRP must be properly datafilled.

IBN PTS trunk group and trunk subgroup datafill requirements

Table trunk group

The Propagate Answer Back feature is available only on terminating IBN PTS trunk groups. This feature is activated on a per trunk group basis by datafilling the field OPTIONS in table TRKGRP with a new parameter called PROPANS (Propagate Answer). This field applies only to outgoing and 2-way (outgoing portion) IBN PTS trunk groups. The PROPANS parameter determines whether or not software answer should be propagated through the network once it is received. If software answer is to be propagated, call processing will use routing translations (that is, Table IBNRTE data) to access table DIGMAN for ATD processing requirements.

Note: If a terminating IBN PTS trunk is connected to an ISDN PRI trunk, software answer is always returned to the ISDN PRI trunk group regardless of the presence or absence of the PROPANS option defined for the IBN PTS trunk group.

Table trunk subgroup

The terminating IBN PTS trunks must have one of the following outgoing trunk pulse types defined for software answer propagation.

- DP (dial pulse)
- MF (multi-frequency)
- DT (digitone)

These values are datafilled in field OPULSTYP in table TRKSGRP.DP (dial pulse field).

DIGMAN and IBNATD datafill options

Digit Manipulation (DIGMAN) translation is used to determine the type of answer expected over an IBN PTS trunk group. Existing fields in table DIGMAN shall be used to set up datafill for the Propagate Answer Back feature.

The DIGCOM (Digit Command) field within table DIGMAN defines the answer type desired. The following four options can be datafilled in field DIGCOM:

- ANS
- ATD
- FLD
- all three

One or a combination of these options may be specified depending on the characteristics required.

An more detailed explanation of each of these options follows:

- The ANS parameter is required when the Audio Tone Detector (ATD) is used to detect answer on a terminating IBN PTS trunk for the purpose of answer supervision. If ANS is datafilled in the DIGCOM (Digit Command) field, one of the following options must be specified in field ANSTYPE (Answer Type):
  - — VOX—This option is entered if dial tone or voice is to be reported as "answer". The answer type received is reflected in the SMDR billing record in the switch where the ATD resides. This option is used when the trunk group cannot return hardware answer.
  - — ALL—This option is entered if either software answer (dial tone or voice) or hardware answer (off-hook signal) can be returned from the trunk. The first answer type received is recorded in the SMDR record. This option is usually the method specified.

Note: An additional option, ELEC, is available but is not applicable to the ATD feature. This option is valid if electrical hardware answer (off-hook signal) is to be returned from the trunk.

- The ATD parameter is required when the ATD is used to detect tones returned from the trunk. These tones signify the type of tone that should be interpreted by the ATD as software answer. If ATD is datafilled in the DIGCOM field, one of the following options must be specified in field ATDTONE (Audio Tone Detection tone):
  - — AR—The AR option is entered to detect ringing from the far end as software answer.
  - — DT—This option is entered to detect dial tone on the trunk as software answer. If DT is selected and field EQVXTON in table IBNATD is set to YES, the ATD interprets "dial tone" as an ATD voice detected software answer.
  - — GLARE—This option is entered to detect dial tone to resolve glare on the trunk immediately after the trunk is seized. The dial tone detected is considered software answer.
- FLD—The FLD option (defined in field DIGCOM) is used in conjunction with the IBNATD option (defined in field FIELD) to index into table IBNATD. The IBNATD table is used to define audio tone detector parameters but is accessed only when a special problem involving tone detection applies. The table is configured with defaults such that there is a 99.99% probability that this table will not need to be accessed during call processing.

- If the FLD option is specified, it must be datafilled prior to the ANS or ATD options in table DIGMAN. This is so the parameters defined for ANS, ATD, or both are associated with the parameters defined for FLD in table IBNATD. If option FLD is entered but neither the ANS or ATD options are datafilled, default parameters are assigned for these options. When FLD option is specified, an index into table IBNATD is defined. Each index in the IBNATD table is assigned default parameters which follow:

  — RNGCYCLE (Ring Cycle)—This parameter specifies the number of ring cycles to detect before a timeout or no answer condition exists. The default value is 10 rings. This parameter affects the holding time of the ATD.

  — DEAFTIME (ATD Deaf Time)—This parameter is used to mask outpulsing noise returned from far end switches. The tone detector treats these noises as a “pseudo conversation” and thus gets fooled into thinking that the call has been answered. This parameter specifies how long the ATD will wait before looking for tone. The default value for this parameter is 0 seconds.

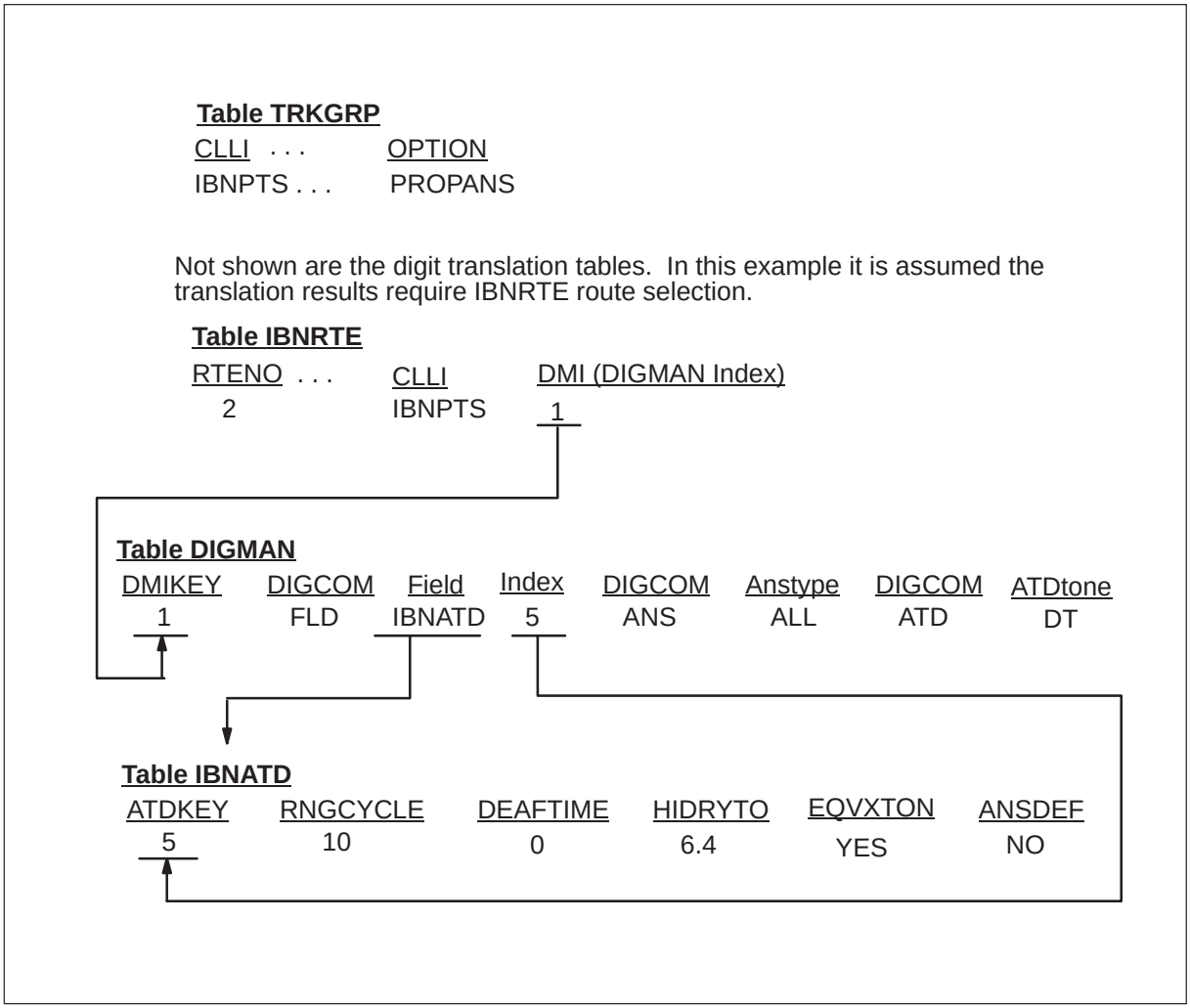
  — HIDRYTO (High and Dry Timeout)—This parameter is used to determine how long the ATD will listen to silence or no tone before reporting “high and dry timeout”. The default value is 6.4 seconds.

  — EQVXTON (Equate Voice to Tone)—The audio tone detector tries to differentiate between voice and dial tone based on frequency and cadence parameters. If a distinction between voice and dial tone for specific applications is desired, then this parameter should be set to NO. If voice and dial tone should be treated the same way, the parameter should be set to YES. The default value is YES.

  — ANSDEF (Default Answer Desired)—This parameter is used when default answer is detected by the tone detector. If default answer is set to YES, then this can be recorded in the SMDR record as valid software answer. If default answer is set to NO, then the tone detector will look once more for a valid tone. If default answer is found again, then it will be used this time to continue the progress of the call. This allows the customer to reduce the number of detected default answer conditions. The default value for this parameter is NO.

Figure 23-2 illustrates call progression through the tables previously defined.

Figure 23-2
Call progression through ATD related tables



Trunk subgroup requirements for answer propagation

To propagate software answer from the terminating switch to the far end originating switch over an incoming PTS trunk group, one of the following incoming trunk pulse types must be defined. These Per Trunk Signaling (PTS) types are datafilled in field IPULSTYP in table TRKSGRP.

- DP (dial pulse)
- MF (multi-frequency)
- DT (digitone)

Incoming PTS trunks must have a cardcode of DS1 signaling (DS1SIG) specified in table TRKSGRP in field CARDCODE.

Incoming PTS trunks must have an incoming start signal of WK (wink), DD (delay dial), or IM (immediate). This is specified in field ISTARTSIG in table TRKSGRP.

Table changes

To implement the Propagate Answer Back feature, a new parameter called PROPANS (Propagate Answer) has been added to field OPTIONS in table TRKGRP. This new parameter is valid for IBN PTS outgoing and two way trunk groups only.

Billing changes

ATD software answer detection is recorded in the SMDR billing records. The type of software answer received is recorded only in switches where an ATD resides. Since the software answer is propagated through the network as hardware answer, the far end originating switches can only record hardware answer in their SMDR billing records.

Feature interactions

Table TRKGRP, field SUPV (Supervision Type) consists of four parameters that define trunk supervision requirements. Of the four parameters, only two of them interact with the Propagate Answer Back feature.

- DISCONLY (Disconnect Only)—This parameter indicates a trunk group does not provide hardware answer but does provide a disconnect signal. For trunk groups that do not have cardcode types containing 5X25 or FX, the Propagate Answer Back feature is used to detect answer. For trunk types with cardcodes 5X25 or FX, the switch provides an internal ATD capability which detects software answer. Therefore, the Propagate Answer Back feature described in this document is not used for trunk types with these cardcodes.
- NODISC (No Disconnect)—This parameter indicates a trunk group provides neither hardware answer nor disconnect signal. For trunk types with SUPV datafilled with NODISC, the Propagate Answer Back feature is used to detect software answer and propagate it through the network.

Restrictions and limitations

A restriction of the Propagate Answer Back feature follows.

For this feature to function properly, it requires at a minimum that the DIGCOM (Digit Command) field in table DIGMAN be datafilled with the ANS option with an ANSTYPE of VOX or ALL.

Translation verification enhancements

TRAVER is a feature designed to help the the switch operator debug the datafill. TRAVER translates digits to a destination similar to those performed during actual digit translation of a telephone call on the DMS.

Currently, the person setting up the Network Services System (NSS) translations must step through the translation and routing tables one at a time to verify the datafill. This is a cumbersome and time-consuming process because new dialing plans have been added to NSS. To help verify the datafill in various translation and routing tables needed in the different NSS dialing plans, the existing TRAVER capabilities have been enhanced. Now, the following NSS call types can be TRAVERed:

- Calls with or without an authorization code (authcode)
  - — Feature Group A (FGA)
  - — Feature Group B (FGB)
  - — Feature Group D (FGD)
  - — Dedicated Access Trunk (DAT) cut-through
- DAT senderized calls
- FGD pure call with or without automatic number identification (ANI) screening
- Calls with or without a travel card number (TCN)
  - — FGA
  - — FGB
  - — FGD cut-through
  - — DAT cut-through
- 700 and 900 dialing call over a FGD interface
- authcode hotline call over
  - — FGA
  - — FGB
  - — FGD

— DAT

- trunk group hotline call over
  - — FGA
  - — DAT
- Private Speed Call on
  - — FGA
  - — FGB
  - — FGD
  - — DAT

Note: The TRAVER enhancements only are available for a particular NSS dialing plan. The corresponding package that contains the call processing for the dialing plan must be implemented as a part of the customer load.

NSS FGD pure dialing plan

Dialing plan access

The FGD pure dialing plan can be accessed from an FGD trunk when package NTXE75AA, Offnet Access Services, is part of the customer load.

Dialing plan specification

Information digits and ANI digits may or may not be required from the local exchange carrier (LEC) when an FGD pure call is originated to NSS. This is specified in the FGD trunk group datafill. Trunk group datafill specifies if information digit screening and ANI screening are required on the ANI digits.

TRAVER input required

To TRAVER an FGD pure call, the TRAVER user enters the destination digits in the DIGITS field of the TRAVER input line.

A prompt is given to the user for ANI digits when ANI screening is required. The TRAVER user must enter the information digits, followed by the ANI of the caller. If ANI screening is not required, no additional input is required.

If table ANIDATA's ANI tuple allows international direct distance dialing (IDDD), the prompt, **"**Please enter the call as Intl or not", is given. The user must enter Y if the call is an international call outside World Zone 1 and N if the call is not an international call outside World Zone 1.

When TRAVERing an FGD pure TEST call, the user is not required to enter the ANI digits. But, the user must enter the information digits in response to the prompt since.

Effect on translations

If the translation of information digits in subtable STDPRT (of table STDPRTCT) results in tuple selector ALTXLA (alternate translations), the datafilled customer group and NCOS override the customer group and NCOS in the FGD trunk. ALTXLA specifies the alternate translations scheme for the destination digits using the customer group and NCOS datafilled against the information digits in subtable STDPRT.

If ANI screening is required, the ANI entered by the TRAVER user specifies the translations to be used for the destination digits by the customer group and NCOS datafilled against the ANI in table ANIDATA.

If ANI specifies that IDDD is allowed and the user specifies the call is an international call outside World Zone 1, the translations for the destination digits are defined through the international customer group and NCOS datafilled against the ANI in table ANIDATA.

If ANI screening is not required, the translations to be used for the destination digits are defined by the customer group and NCOS datafilled against the incoming FGD trunk group.

Effect on TRAVER output

Following are the effects FGD ANI screening has on TRAVER output:

- Table STDPRTCT and subtable STDPRT are displayed when information digit screening is required.
- ANI's tuple in table ANIDATA is displayed when ANI screening is required.
- No additional output is generated for an FGD pure call that does not require ANI screening.

Information digit screening

Information digits are checked to ensure they appear in subtable STDPRT. If the information digit screening fails, the error message KEY NOT FOUND is generated.

If the translation of information digits in subtable STDPRT results in STOP, the TRAVER output is terminated and then the error message, CALL TRACE TERMINATED DUE TO DATA TROUBLE, is generated.

If the information digits translate to CONT, TRAVER checks for ANI screening.

ANI screening

The ANI is checked to ensure that it appears in the ANI screening database (table ANIDATA). If ANI digits screening in table ANIDATA fails, the error message TUPLE NOT FOUND is generated.

FGD pure call with ANI screening TRAVER example

Figure 24-1 illustrates the TRAVER output generated when a FGD trunk originated pure call terminates on an outgoing PTS trunk. (TRAVER prints the names of all tables and displays the tuple accessed within the tables.)

This TRAVER example shows the B option. When the TRAVER user specifies option T or NT, the user is prompted for parameters (such as authcode, information digits, ANI, TCN, and destination digits). When the TRAVER user opts for option B, the TRAVER executes the T and NT options. In this case, the user is prompted for parameters only once even though the TRAVER executes the T and NT options for the B command.

Now refer to Figure 24-1. Since the originator of the call is a FGD trunk, tracing the translations begins with table TRKGRP. The TRAVER user accesses table TRKGRP through the CLLI output on the TRAVER command line.

The trunk group tuple specifies that ANI digit screening is to be performed. The TRAVER user is prompted to enter the information digits and ANI digits of the calling station. The information digits and ANI digits access table ANIDATA. Table ANIDATA retrieves information about the originator, such as customer group and Network Class of Service (NCOS), used to translate and route the call to the destination. The customer group and NCOS illustrated in table ANIDATA are BNRRCH and 1, respectively.

Note: The entire ANI tuple is displayed.

The customer group and NCOS are used to access table NCOS. Next, the customer group accesses table CUSTHEAD. TRAVER prints the index needed to access table DIGCOL.

Figure 24-1
FGD pure call with ANI screening TRAVER example

```
TRAVER TR NSSFGD1 9196577433 B
Please enter Info digits followed by ANI
> > 775187837042
TABLE TRKGRP
NSSFGD1 IBNT2 0 ELO NCRT RCHRTP 1 MIDL 4 N ANSDISC 0 N N
    N N N N N Y 0 0 N 0 0 0 0 N N N N N Y NSSFGD Y Y TVS DEFAULT $
TABLE STDPRTCT
TVS (1) (0)
    SUBTABLE STDPRT
    77 77 ID CONT
TABLE ANIDATA
5187837042 SUB ALLOW BNRRCH 5 Y Y N
TABLE NCOS
BNRRCH 5 0 0 NRCH1 (XLAS NRCH1 NXLA NDGT) (FLSHXLA) $
TABLE CUSTHEAD: CUSSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
 BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCHDIG 9 POTS Y
TABLE IBNXLA: XLANAME NRCH1
NRCH1 9 NET N Y 0 N POTS N N ESN N 653
TABLE DIGCOL
POTS specified: POTS digit collection
TABLE LINEATTR
653 IBN NONE NT NSCR 0 103 NPRT NLCA NONE N 0 NIL NILSFC NILLATA 0 NIL NIL 00 N
TABLE HNPACONT
103 20 1 ( 1) ( 1) ( 0)
    SUBTABLE HNPACODE
    919 919 FRTE 1
    SUBTABLE RTEREF
        1 S D RCHTORTPPTS1
    EXIT TABLE RTEREF
EXIT TABLE HNPACONT
+++ TRAVER: SUCCESSFUL CALL TRACE +++

DIGIT TRANSLATION ROUTES
1 RCHTORTPPTS1              9196577433                  ST

TREATMENT ROUTES. TREATMENT IS: GNCT
1 NODIAL1
2 FRA0
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Authcode only dialing plan

Dialing plan access

The authcode dialing plan can be accessed from any of the following protocols when Offnet Access Services, NTXE75AA, is part of the customer load.

- FGA trunk
- FGB trunk
- FGD trunk with EAP or Interim cut-through dialing
- DAT

800 Universal Access can also access the authcode dialing plan.

Dialing plan specification

The authcode dialing plan is specified by datafilling AUTHONLY as the CUTTHRU dialing plan in table DIALPLAN against the incoming NSS trunk group.

TRAVER input required

Cut-through authcode calls are flagged to TRAVER by specifying an N in the DIGITS field of the TRAVER input line. When an N is detected and the incoming NSS trunk is an AUTHONLY cut-through dialing plan, a prompt is given to the TRAVER user to enter an authcode and destination digits.

For 800 UA authcode calls, the TRAVER will appear as a MONA directory number TRAVER. Reason is that all 800 UA calls are MONA DN calls regardless of the dialing plan accessed (such as authcode and TCN). Reference Figure 24-3 for an 800 UA (MONA) TRAVER example.

Effect on translations

If the TRAVER user enters an authcode that has a customer group associated with it, the authcode customer group overrides the customer group of the trunk group. The NCOS associated with the authcode is used in conjunction with either the authcode customer group or the trunk group customer group to define the translations for the destination digits.

If the TRAVER user enters an authcode that has a customer group associated with it, the authcode customer group overrides the customer group of the trunk group. The NCOS associated with the authcode is used in conjunction with either the authcode customer group or the trunk group customer group to define the translations for the destination digits.

Effect on TRAVER output

The dialing plan named in table TRKGRP accesses the DIALPLAN tuple in table DIALPLAN. The DIALPLAN tuple defines the call's dial plan. Table 24-1 lists the tables and tuples that are displayed.

Table 24-1
Effected tuples and their tables

TUPLES	TABLE
AUTHPART	AUTHPART
AUTHCODE	AUTHCDE

Authcode validation

The DIALPLAN name obtained from the originating trunk group accesses the DIALPLAN tuple in table DIALPLAN. The DIALPLAN tuple defines the dial plan characteristics used to drive the specific AUTHONLY dialing plan.

The authcode is verified for its existence in the authcode database. If the authcode digits fail the screening in table AUTHCDE, the error message TUPLE NOT FOUND is generated.

Cut-through validation

If an N is specified in the DIGITS field on the TRAVER input line, the dialing plan must be either HOTLINE or CUTTHRU for the NSS trunk. Otherwise, the DIALPLAN tuple is displayed and the error message DIALPLAN MUST BE HOTLINE OR CUTTHRU is generated.

If the DIGITS field on the TRAVER input line for FGA, FGB, or DAT cut-through calls does not contain an N, the error message INVALID DIGITS IN CALLED DR is generated.

FGD cut-through with authcode TRAVER example

Figure 24-2 contains the TRAVER output generated when an NSS FGD trunk originated cut-through call with authcode dialing terminates on a line.

The example call described is recognized as an FGD cut-through call because an N has been entered on the TRAVER input line. The customer group of the trunk group and the NCOS filed against the authcode define the translations.

Note: Based on the trunk group datafill in this example, ANI screening is not required.

Figure 24-2
FGD cut-through with authcode TRAVER

```
TRAVER TR RCHTOSWBFGD1 N B
Please enter authcode
>> 1234567
Please enter destination digits
>> 9196577433
TABLE TRKGRP
RCHTOSWBFGD1 IBNT2 0 ELO NCRT BNRRCH 0 MIDL 4 N ANSDISC 0 N N N N N N Y
      Y 0 0 N 0 0 0 0 N N N N Y FGD Y N AUTH1 $
TABLE DIALPLAN
AUTH1 CUTTHRU AUTHONLY FIRST SDT DT DT $
TABLE AUTHPART
 BNRRCH IBN 7 100
TABLE AUTHCDE
BNRRCH 1234567 IBN 1 N $ SW PIN REQUIRED SINGLE 999 $
TABLE NCOS
BNRRCH 1 0 0 NRCH1 (XLAS, NRCH1 NXLA NDGT) (FLSHXLA) $
TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
 BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCHDIG 9 POTS Y
TABLE IBNXLA: XLANAME NRCH1
NRCH1 9 NET N Y 0 N POTS N N ESN N 653
TABLE DIGCOL
POTS specified: POTS digit collection
TABLE LINEATTR
653 IBN NONE NT NSCR 0 103 NPRT NLCA NONE N 0 NIL NILSFC NILLATA 0 NIL NIL 00 N
TABLE HNPACONT
103 20 1 (1) (1) (0)
      SUBTABLE HNPACODE
      919 919 DN 919 657
TABLE THOUGRP
919657 7 Y C
TABLE DN
919 657 4567 L HOST 02 0 04 16
+++ TRAVER: SUCCESSFUL CALL TRACE +++

DIGIT TRANSLATION ROUTES
1 RCHTORTPPTS1                          9196577433                      ST

TREATMENT ROUTES. TREATMENT IS: GNCT
1 NODIAL1
2 FRAO
+++ TRAVER: SUCCESSFUL CALL TRACE +++


TRAVER TR RCHTOSWBFGD1 N NT
Please enter authcode
>> 1234567
Please enter destination digits
>> 9196577433


DIGIT TRANSLATION ROUTES
1 RCHTORTOOTS1                          9196577433                      ST

TREATMENT ROUTES. TREATMENT IS: GNCT
1 NODIAL
2 FRAO
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

800 UA call TRAVER example

Figure 24-3 illustrates an 800 Universal Access call TRAVER example.

Figure 24-3
NSS FGD 800 UA call TRAVER example

```
TRAVER TR RCHTOSWBFGD1 8004445555 B
Please enter INFO digits followed by ANI:
>> 005187837042
TABLE TRKGRP
RCHTOSWBFGD1 IBNT2 0 ELO NCRT BNRRCH 0 MIDL 0 N ANSDISC 0 N N N N N Y Y 0 0
        N 0 0 0 N N N N N N N Y Y NSSFGD Y Y IRCH DEST1 (ANIDELV ) $ $
TABLE DIALPLAN
DEST1 CUTTHRU DESTONLY SDT Y DT Y AUTH1 Y TCN1 $
TABLE STDPRTCT
IRCH ( 1) ( 0)
        SUBTABLE STDPRT
        00 00 ID CONT
TABLE ANIDATA
5187837042 SUB ALLOW BNRRCH 1 N N N
TABLE NCOS
BNRRCH 1 0 0 NRCH1 (XLAS, NRCH1 NXLA NDGT) $
TABLE CUSTSHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
 BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCHDIG 8 RPT
TABLE IBNXLA: XLANAME NRCH1
NRCH1 8 NET N Y N 0 N POTS N N ESN N 653
TABLE DIGCOL
POTS specified: POTS digit collection
TABLE LINEATTR
653 IBN NONE NT NSCR 0 103 RCHI NLCA N NONE N 0 NIL NILSFC NILLATA 0 NIL NIL
LCABILL OFF – BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
RCHI ( 1) ( 0)
        SUBTABLE STDPRT
        800444 800444 R DD 0 NA 5189974666 NONE
        SUBTABLE AMAPRT
        KEY NOT FOUND
        DEFAULT VALUE IS: NONE OVRNONE N
TABLE HNPACONT
103 20 1 (2) (1) (0) (0)
            SUBTABLE HNPACODE
            518 518 HNPA 0
            997 997 DN 518 997
TABLE TOFCNAME
518 997
TABLE DNINV
518 997 4666 FEAT MONA DEST1
+++ TRAVER: SUCCESSFUL CALL TRACE +++

DIGIT TRANSLATION ROUTES
1 FEATURE                5189974666              ST

TREATMENT ROUTES. TREATMENT IS: GNCT
1 NODIAL1
2 FRAO
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

DAT senderized dialing plan

Dialing plan access

Before the DAT senderized dialing plan can be accessed from a DAT, Offnet Access Services, NTXE75AA, must be implemented as a part of the customer load. For more detailed information, refer to the feature chapter on NSS Dedicated Access Trunk Interface.

Dialing plan specification

To specify the DAT senderized dialing plan, datafill the dialing plan as SENDERIZE in table DIALPLAN using the DAT trunk group.

TRAVER input required

No additional TRAVER input is required for a DAT senderized call. The call is recognized as a DAT senderized call based on the trunk group datafill and the datafill in table DIALPLAN. The destination digits are specified in the DIGITS field of the TRAVER input line.

Effect on translations

Translations for the destination digits on a DAT senderized call are specified by the customer group and NCOS datafilled against the DAT trunk group.

Effect on TRAVER output

The only TRAVER output generated for a DAT senderized call is the DIALPLAN tuple in table DIALPLAN tuple.

DAT senderized call TRAVER example

Figure 24-4 illustrates a DAT senderized call that can be recognized by the trunk group datafill. The trunk group specifies DAT and the dialing plan specifies SENDERIZE. The destination digits are entered on the initial TRAVER input line. The customer group and NCOS of the trunk group define the translations for the destination digits.

Note: With senderized calls, the BILLDN field in the trunk group must contain a billing number. In this example, the billing number is 5189974797.

Figure 24-4
DAT senderized call TRAVER example

```
TRAVER TR RCHTOPALTIEDAT 9196577433 B
TABLE TRKGRP
RCHTOPALTIEDAT IBNT2 0 ELO NDRC RCHRCH 0 MDL 1 5189974797 N ANDISC 0 N N N
        N N N Y Y 0 N 0 0 0 0 N N N N N Y DAT SEND1 $
TABLE DIALPLAN
SEND1 SENDERZ N $
TABLE NCOS
BNRRCH 1 0 0 NRCH1 (XLAS, NRCH1 NXLA NDGT) (FLSHXLA) $
TABLE CUSTSHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
 BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCH 9 POTS Y
TABLE IBNXLA: XLANAME NRCH1
NRCH1 9 NET N Y 0 N POTS N N ESN N 653
TABLE DIGCOL
POTS specified: POTS digit collection
TABLE LINEATTR
653 IBN NONE NT NSCR 0 103 NPRT NLCA NONE N 0 NIL NILSFC NILLATA 0 NIL NIL 00 N
TABLE HNPACONT
103 20 1 (1) (1) (0)
            SUBTABLE HNPACODE
            919 919 FRTE 1
            SUBTABLE RTEREF
                    1 S D RCHTORTPPTS1
             EXIT TABLE RTEREF
EXIT TABLE HNPACONT
+++ TRAVER: SUCCESSFUL CALL TRACE +++

DIGIT TRANSLATION ROUTES
1 RCHTORTPPTS1                          9196577433                  ST

TREATMENT ROUTES. TREATMENT IS: GNCT
1 NODIAL1
2 FRAO
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Feature impact

Destination digits only dialing plan

Dialing plan access

Before the following protocols can gain access to the Destination Digits Only dialing plan, Offnet Access Services, NTXE75AA, must be implemented as a part of the customer load.

- FGA
- FGB
- FGD (Equal Access Plan) EAP or Interim cut-through
- DAT cut-through

800 UA calls can also access the Destination Digits Only dialing plan.

Dialing plan specification

To specify the Destination Digits Only dialing plan, datafill DESTONLY as CUTTHRU in table DIALPLAN against the trunk group.

TRAVER input required

Cut-through Destination Digits Only calls are flagged to TRAVER by specifying an N in the DIGITS field on the TRAVER input line. When TRAVER detects an N in the DIGITS field and the incoming NSS trunk specifies CUTTHRU in DESTONLY, the TRAVER user is given a prompt to enter the destination digits.

For 800 UA “destination digit only” calls, the TRAVER will appear as a MONA directory number TRAVER. Reason is that all 800 UA calls are MONA DN calls regardless of the dialing plan accessed (such as destination digits only, authcode, TCN). Reference Figure 24-3 for an 800 UA (MONA) TRAVER example.

Effect on translations

Translations for the Destination Digits Only call are specified by the customer group and NCOS datafilled against the trunk group.

Effect on TRAVER output

The only TRAVER output generated for the Destination Digits Only dialing plan is a display of the DIALPLAN tuple in table DIALPLAN.

DAT cut-through TRAVER example

Figure 24-5 can be recognized as a DAT cut-through call because of the trunk datafill. The trunk specifies DAT and the dialing plan specifies CUTTHRU with DESTONLY. The destination digits are also entered as CUTTHRU with DESTONLY. When the prompt appears, the destination

digits are entered. The customer group and NCOS of the trunk group define the translations for the destination digits.

Note: For a cut-through Destination Digits Only call, the BILLDN field in the trunk group must contain a billing number. The billing number in this example is 5189974747.

Figure 24-5
DAT cut-through TRAVER example

```
TRAVER TR RCHTOPALTIEDAT N B
Please enter destination digits
>> 9196574433
TABLE TRKGRP
RCHTOPALTIEDAT IBNT2 0 ELO NCRT RCHRCH 0 MDL 1 5189974797 N ANDISC 0 N N N
        N N N Y Y 0 0 N 0 0 0 0 N N N N N Y DAT DEST1 $
TABLE DIALPLAN
DEST1 CUTTHRU DESTONLY N DT N $
TABLE NCOS
BNRRCH 1 0 0 NRCH1 (XLAS, NRCH1 NXLA NDGT) (FLSHXLA) $
TABLE CUSTSHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
 BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCH DIG 9 POTS Y
TABLE IBNXLA: XLANAME NRCH1
NRCH1 9 NET N Y 0 N POTS N N ESN N 653
TABLE DIGCOL
POTS specified: POTS digit collection
TABLE LINEATTR
653 IBN NONE NT NSCR 0 103 NPRT NLCA NONE N 0 NIL NILSFC NILLATA 0 NIL NIL 00 N
TABLE HNPACONT
103 20 1 (1) (1) (0)
            SUBTABLE HNPACODE
            919 919 FRTE 1
            SUBTABLE RTEREF
                    1 S D RCHTORTPPTS1
             EXIT TABLE RTEREF
EXIT TABLE HNPACONT
+++ TRAVER: SUCCESSFUL CALL TRACE +++

DIGIT TRANSLATION ROUTES
1 RCHTORTPPTS1                          9196577433                  ST

TREATMENT ROUTES. TREATMENT IS: GNCT
1 NODIAL1
2 FRAO
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Travel card only dialing plan

Dialing plan access

For the following protocols to access the Travel Card dialing plan, software packages Offnet Access Services (NTXE75AA) and Travel Card Services (NTXE76AA) must be implemented as a part of the customer load.

- FGA trunk
- FGB trunk
- FGD trunk with EAP or Interim Cut-Through dialing
- DAT

800 UA calls can also access the Travel Card dialing plan.

Dialing plan specification

The Travel Card Only dialing plan is specified by datafilling TCNONLY as the CUTTHRU dialing plan in table DIALPLAN against the incoming NSS trunk group.

TRAVER input required

Cut-through travel cards are flagged to TRAVER by specifying an N in the DIGITS field on the TRAVER input line. When TRAVER detects an N in the DIGITS field and the incoming NSS trunk specifies the CUTTHRU dialing plan as TCNONLY, the TRAVER user is given a prompt to enter the TCN and destination digits.

For 800 UA Travel Card calls, the TRAVER will appear as a MONA Directory Number TRAVER. Reason is that all 800 UA calls are MONA DN calls regardless of the dialing plan accessed (that is, authcode, TCN). Reference Figure 24-3 for an 800 UA (MONA) TRAVER example.

Note: For cut-through and 800 UA calls, the destination digits must begin with a 0.

Effect on translations

If the TCN entered has a customer group associated with it, the travel card customer group overrides the customer group of the trunk group. The NCOS associated with the TCN is used with either the travel card customer group or trunk group customer group to define the translations for the destination digits.

Effect on TRAVER output

Table 24-2 lists the tuples and their respective table names.

Table 24-2
Effected tuples and their tables

TUPLES	TABLE
DIALPLAN	DIALPLAN
TCN	TCNDATA (MSNTCN)

Travel card validation

The TCN is checked for its length and its existence in table TCNDATA, the travel card database.

Note: Name changed from MSNTCN to TCNDATA.

If the TCN digits fail the length test, the error message TCN CONTAINS INCORRECT NUMBER OF DIGITS is generated.

If the TCN digits do not exist in the travel card database and fail the screening test in table TCNDATA, the error message TUPLE NOT FOUND is generated.

Cut-through validation

If an N is specified as the destination digits on the TRAVER input line, the dialing plan must be either HOTLINE or CUTTHRU for the NSS trunk. If an N is not entered for the destination digits, the following error message and tuple are displayed, respectively.

- DIALPLAN MUST BE HOTLINE OR CUTTHRU
- DIALPLAN tuple

If the DIGITS field on the TRAVER input line does not contain an N for FGA, FGB, FGD cut-through or DAT cut-through calls, the error message INVALID DIGITS IN CALLED DR is generated.

Destination digits format

The destination digits must begin with a 0. If they do not begin with a 0, the error message FIRST DEST DIGIT MUST BE 0 is generated.

FGB travel card only TRAVER example

Figure 24-6 illustrates two datafills that indicate that the call is FGB: the trunk datafill and the N in DIGITS field on the TRAVER input line. The TRAVER user is required to enter the TCN of the caller because the TCNONLY dialing plan is datafilled for the FGB trunk. The customer group and NCOS filed against the TCN define the translations for the destination digits.

Figure 24-6
FGB travel card only TRAVER example

```
TRAVER TR RCHTOSWBFGB1 N B
Please enter destination digits
>> 09196577433
Please enter travel card number
>> 23456789012345
TABLE TRKGRP
RCHTOSWBFGB1 IBNT2 0 ELO NCRT BNR 0 MIDL 4 N ANSDISC 0 N N N N N N
        Y Y 0 0 N 0 0 0 0 N N N N N Y FGB Y TCN1 $ $
TABLE DIALPLAN
TCN1 CUTTHRU TCNONLY SDT DT DT BOTH 2015174545 2145175656 $
TABLE TCNDATA
23456789012345 Y BNRRCH 1 N Y
TABLE NCOS
BNRRCH 1 0 0 NRCH1 (XLAS, NRCH1 NXLA NDGT) (FLSHXLA) $
TABLE CUSTSHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
 BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCHDIG 9 POTS Y
TABLE IBNXLA: XLANAME NRCH1
NRCH1 9 NET N Y 0 N POTS N N ESN N 653
TABLE DIGCOL
POTS specified: POTS digit collection
TABLE LINEATTR
653 IBN NONE NT NSCR 0 103 NPRT NLCA NONE N 0 NIL NILSFC NILLATA 0 NIL NIL 00 N
TABLE HNPACONT
103 20 1 (1) (1) (0)
            SUBTABLE HNPACODE
            919 919 FRTE 1
            SUBTABLE RTEREF
                    1 S D RCHTORTPPTS1
             EXIT TABLE RTEREF
EXIT TABLE HNPACONT
+++ TRAVER: SUCCESSFUL CALL TRACE +++

DIGIT TRANSLATION ROUTES
1 RCHTORTPPTS1                          9196577433                  ST

TREATMENT ROUTES. TREATMENT IS: GNCT
1 NODIAL1
2 FRAO
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

FGD travel card only TRAVER example

Figure 24-7 is an example of a FGD travel card only TRAVER. In this TCN call, the trunk group dialing plan specifies that TCN NSS DBCP validation is chosen so the TRAVER generates the error message TRAVER CAN NOT VALIDATE A TCN AT NSS-DBCP. (TRAVER is not able to validate a TCN through NSS DBCP.)

Figure 24-7
FGD travel card only TRAVER example

```
TRAVER TR RCHTOSWBNSSFGD1 N B
Please enter destination digits
>> 09196577433
Please enter travel card number
>> 92345678901234
TABLE TRKGRP
RCHTOSWBNSSFGD1 IBNT2 0 ELO NCRT BNR 0 MIDL 4 N ANSDISC 0 N N N N N N
        Y Y 0 0 N 0 0 0 0 N N N N N Y NSSFGD Y TCN1 $
TABLE DIALPLAN
TCN1 CUTTHRU TCNONLY SDT DT DT REMOTE 2015175656 2145175656 $

TRAVER CANNOT VALIDATE A TCN AT NSS–DBCP
+++ TRAVER TERMINATED DUE TO DATA TROUBLE +++

DIGIT TRANSLATION ROUTES

+++ TRAVER TERMINATED DUE TO DATA TROUBLE +++
```

Travel card or authcode choice dialing plan

Dialing plan access

The protocols listed below can access the travel card or authcode choice dialing plan if software packages Offnet Access Services (NTXE75AA) and Travel Card Services (NTXE76AA) are implemented as a part of the customer load.

- FGA trunk
- FGB trunk
- FGD trunk with EAP or Interim Cut-through
- DAT Cut-through

Note: For more information, refer to the Travel Card Processing and NSS Offnet Access Dialing Plan Driver feature chapters.

800 UA over FGD trunks also can access the Travel Card or authcode choice dialing plan.

Dialing plan specification

To specify the Travel Card or authcode choice dialing plan, datafill the AUTHORTC field as the CUTTHRU dialing plan in table DIALPLAN against the incoming NSS trunk group.

TRAVER input required

Cut-through travel card calls are flagged to TRAVER by specifying an N in the DIGITS field on the TRAVER input line. When TRAVER detects the N,

and the incoming NSS trunk specifies the CUTTHRU dialing plan with AUTHORTC, the TRAVER user is given a prompt for either a TCN or an authcode. The TRAVER user must enter either TCN or AUTH and the correct TCN or authcode, respectively. The TRAVER user must follow that entry by destination digits.

For 800 UA "Travel Card or authcode choice" calls, the TRAVER will appear as a MONA Directory Number TRAVER. Reason is that all 800 UA calls are MONA DN calls regardless of the dialing plan accessed (such as authcode, TCN). Reference Figure 24-3 for an 800 UA (MONA) TRAVER example.

Note: In both cases if the travel card option is taken, the destination digits must begin with a 0.

Effect on translations and TRAVER output

The effect on translations and TRAVER output is the same as described in the previous sections on Authcode Only and Travel Card Only dialing plans.

Validations

The validations performed are the same as those described in the previous sections on Authcode Only and Travel Card only dialing plans.

FGB call with authcode or TCN TRAVER example

The call in Figure 24-8 can be recognized as FGB by examining the trunk group datafill and the N in the DIGITS field on the TRAVER input line. The TRAVER user is required to enter either the TCN or the authcode of the caller because the AUTHORTC dialing plan is datafilled for the FGB trunk. The TRAVER user specified a TCN and entered a TCN. The customer group of the trunk group and the NCOS filed against the TCN define the translations for the destination digits in this example.

Figure 24-8
FGB call with authcode or TCN TRAVER example

```
TRAVER TR RCHTOSWBFGB1 N T
Please enter authcode or travel card number
>> TCN
Please enter destination digits
>> 09974596
Please enter travel card digits
>> 34567890123456
TABLE TRKGRP
RCHTOSWBFGB1 IBNT2 0 ELO NCRT BNRRCH 0 MIDL 1 N ANSDISC 0 N N N N N N
        Y Y 0 0 N 0 0 0 0 N N N N N Y FGB Y BOTH $ $
TABLE DIALPLAN
BOTH CUTTHRU AUTHORTC SDT AUTH1 TCN1 $
TABLE TCNDATA
34567890123456 N 5 Y Y
TABLE NCOS
BNRRCH 5 0 0 NRCH5 (XLAS, NRCH5 NXLA NDGT) $
TABLE CUSTSHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
 BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCHDIG 0 RPT
TABLE IBNXLA: XLANAME NRCH5
NRCH5 0 NET Y Y 1 N NDGT N GEN (LATTR 650) $
TABLE DIGCOL
NDGT specified: digits collected individually
TABLE LINEATTR
650 1NR NONE NT NSCR 0 100 SRCH LRCH N NONE N 0 NIL NILSFC LATA3 0 NIL NIL 00 N
LCABILL OFF – BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
SRCH ( 1) ( 0)
            SUBTABLE STDPRT
            9 9 N NP 0 NA
            SUBTABLE AMAPRT
            KEY NOT FOUND
            DEFAULT VALUE IS :   NONE OVRNONE N
TABLE HNPACONT
100 20 1 (1) (1) (0)  (0)
             SUBTABLE HNPACODE
             997 997 DN 518 997
TABLE THOUGRP
518 997 4 Y C
TABLE DN
518 997 4596 L HOST 02 0 04 16
TABLE LCASCRCN
100 LRCH (2) OPTL N
                SUBTABLE LCASCR
                997 997
TABLE PFXTREAT
OPTL NP Y NP UNDT
TABLE EASAC
TUPLE NOT FOUND
TABLE LATAXLA
TUPLE NOT FOUND
ASSUMED TO BE DEFAULT INTRALATA, INTRASTATE, STD

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

N00 dialing With FGD pure dialing plan

Dialing plan access

N00 dialing can be accessed only from an NSS FGD trunk with NSS FGD datafilled in Table TRKGRP. N00 dialing capabilities include: 400/800 INWATS, 700 and 900 dialing. This feature does not enable NSS to TRAVER 800 UA calls since the 800 UA dialing plan is considered to be FGD cutthrough dialing. An example of an NSS FGD 800 UA TRAVER is shown in Figure 24-3.

TRAVER input required

When travering a N00 call with FGD pure dialing, the TRAVER user inputs the N00 number in the DIGITS field of the TRAVER input line.

When ANI screening is required, the TRAVER user must input the information digits, followed by the caller's ANI. A prompt is given to the user for information digits and ANI digits. When no ANI screening is required, no additional input is required.

Effect on translations

If the information digits translation in subtable STDPRT results in ALTXLA, the alternate translations scheme (the customer group and NCOS datafilled against the information digits in subtable STDPRT) is used for the destination digits. The customer group and NCOS datafilled in subtable STDPRT override the customer group and NCOS of the FGD trunk.

If ANI screening is required, the ANI entered by the TRAVER user specifies the translations to be used for the destination digits, using the customer group and NCOS datafilled against the ANI in table ANIDATA.

The REPLDATA table replaces the N00 number received with an actual address that can be translated (N00 number is found in REPLDIGS field in table REPLDATA). The NCOS specified for the N00 number is used with one of the customer groups listed below to translate the actual address digits.

- customer group of the incoming FGD trunk group
- customer group datafilled in the STDPRT subtable
- customer group datafilled in the ANIDATA

First, the customer group and NCOS are assigned to an incoming FGD call from the customer group and NCOS of the incoming trunk. The customer group and NCOS of the incoming trunk can be overridden by the ALTXLA result in subtable STDPRT, changing the current customer group and NCOS for this call. The current customer group and NCOS, whether taken from the incoming trunk or ALTXLA, can be overridden yet again by an ANI tuple in table ANIDATA. The current NCOS, whether taken from the

incoming trunk or ALTXLA or ANI tuple, can be overridden yet again by datafill in RDD related tables where NCOS mapping is performed; REPLDATA, COSMAP, COSDATA, and NSCDEFS. The last customer group and NCOS obtained is used to translate the call.

Effect on TRAVER output

The effects on TRAVER output include:

- the dialplan tuple in table DIALPLAN is displayed
- the table STDPRTCT tuple and subtable STDPRT are displayed when information digit screening is required
- the ANI tuple in table ANIDATA is displayed when ANI screening is required
- the NCOS information in tables NSCDEFS and REPLDATA is displayed

Information digit screening

The information digits are checked for an appearance in subtable STDPRT. If the information digit check fails, an error message KEY NOT FOUND is generated.

If the translation of information digits in subtable STDPRT results in STOP, then the TRAVER output is terminated. If the information digits translate to CONT, the TRAVER proceeds to ANI screening. If the information digits translate to TEST, the TRAVER terminates.

ANI screening

The ANI is checked for an appearance in the ANI database table ANIDATA. If the ANI digit check fails, an error message TUPLE NOT FOUND is generated.

N00 number validation

If the N00 number entered on the TRAVER input line does not exist in table REPLDATA, TRAVER displays the failure route datafilled in Table NSCDEFS.

N00 call TRAVER examples

Figures 24-9 through 24-11 illustrate an 800 INWATS call TRAVER relative to the following RDD search methods: inswitch, remote, or both.

These examples apply to N00 dialing patterns 400/800 INWATS and 700/900 numbers.

Figure 24-9
TRAVER example for an 800 INWATS call using RDD "inswitch" search method

```
TRAVER TR RCHTOSWBFGD1 8005176444 B
Please enter INFO digits followed by ANI:
>> 005187837042
TABLE TRKGRP
RCHTOSWBFGD1 IBNT2 0 ELO NCRT BNRRCH 0 MIDL 0 N ANSDISC 0 N N N N N Y Y 0 0
        N 0 0 0 N N N N N N N Y Y NSSFGD Y Y IRCH DEST1 (ANIDELV ) $ $
TABLE DIALPLAN
DEST1 CUTTHRU DESTONLY SDT Y DT Y AUTH1 Y TCN1 $
TABLE STDPRTCT
IRCH ( 1) ( 0)
       SUBTABLE STDPRT
       00 00 ID CONT
TABLE ANIDATA
5187837042 SUB ALLOW BNRRCH 1 N N N
TABLE NCOS
BNRRCH 1 0 0 NRCH1 (XLAS, NRCH1 NXLA NDGT) $
TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCHDIG 8 RPT
TABLE IBNXLA: XLANAME NRCH1
NRCH1 8 NET N Y N 0 N POTS N N ESN N 653
TABLE DIGCOL
POTS specified: POTS digit collection
TABLE LINEATTR
653 IBN NONE NT NSCR 0 103 RCHI NLCA N NONE N 0 NIL NILSFC NILLATA 0 NIL NIL
LCABILL OFF – BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
RCHI ( 1) ( 0)
       SUBTABLE STDPRT
       KEY NOT FOUND
       DEFAULT VALUE IS: N NP 0 NA
       SUBTABLE AMAPRT
       KEY NOT FOUND
       DEFAULT VALUE IS: NONE OVRNONE N
TABLE HNPACONT
103 20 1 (2) (1) (0) (0)
          SUBTABLE HNPACODE
          800 800 NSC REPLDIGS
TABLE NSCSCRN
REPLDIGS TUPLE NOT FOUND
TABLE NSCDEFS
REPLDIGS 5 (REPLACE OFRT 1002 INSWITCH 9197224500 9197225000) $
TABLE REPLDATA
8005176444
        (REPLACE 9974797 ( NCOS 1 ) $ ) $
        —> NEW DIGITS TO TRANSLATE: 9974797 NCOS: 1

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

Figure 24-10
TRAVER example for an 800 INWATS call using RDD "remote" search method

```
TRAVER TR RCHTOSWBFGD1 8005176555 B
Please enter INFO digits followed by ANI:
>> 005187837042
TABLE TRKGRP
RCHTOSWBFGD1 IBNT2 0 ELO NCRT BNRRCH 0 MIDL 0 N ANSDISC 0 N N N N N Y Y 0 0
        N 0 0 0 N N N N N N N Y Y NSSFGD Y Y IRCH DEST1 (ANIDELV ) $ $
TABLE DIALPLAN
DEST1 CUTTHRU DESTONLY SDT Y DT Y AUTH1 Y TCN1 $
TABLE STDPRTCT
IRCH ( 1) ( 0)
       SUBTABLE STDPRT
       00 00 ID CONT
TABLE ANIDATA
5187837042 SUB ALLOW BNRRCH 1 N N N
TABLE NCOS
BNRRCH 1 0 0 NRCH1 (XLAS, NRCH1 NXLA NDGT) $
TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCHDIG 8 RPT
TABLE IBNXLA: XLANAME NRCH1
NRCH1 8 NET N Y N 0 N POTS N N ESN N 653
TABLE DIGCOL
POTS specified: POTS digit collection
TABLE LINEATTR
653 IBN NONE NT NSCR 0 103 RCHI NLCA N NONE N 0 NIL NILSFC NILLATA 0 NIL NIL
LCABILL OFF – BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
RCHI ( 1) ( 0)
       SUBTABLE STDPRT
       KEY NOT FOUND
       DEFAULT VALUE IS: N NP 0 NA
       SUBTABLE AMAPRT
       KEY NOT FOUND
       DEFAULT VALUE IS: NONE OVRNONE N
TABLE HNPACONT
103 20 1 (2) (1) (0) (0)
          SUBTABLE HNPACODE
          800 800 NSC REPLDIGS
TABLE NSCSCRN
REPLDIGS TUPLE NOT FOUND
TABLE NSCDEFS
REPLDIGS 5 (REPLACE OFRT 1002 REMOTE 9197224500 9197225000) $
+++ REPLDIGS CALL WILL QUERY SCP DATABASE FOR TRANSLATION INFORMATION
    TRAVER NOT AVAILABLE


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

Figure 24-11
TRAVER example for an 800 INWATS call using RDD "both" search method where remote database access is required

```
TRAVER TR RCHTOSWBFGD1 8005176555 B
Please enter INFO digits followed by ANI:
>> 005187837042
TABLE TRKGRP
RCHTOSWBFGD1 IBNT2 0 ELO NCRT BNRRCH 0 MIDL 0 N ANSDISC 0 N N N N N Y Y 0 0
        N 0 0 0 N N N N N N N Y Y NSSFGD Y Y IRCH DEST1 (ANIDELV ) $ $
TABLE DIALPLAN
DEST1 CUTTHRU DESTONLY SDT Y DT Y AUTH1 Y TCN1 $
TABLE STDPRTCT
IRCH ( 1) ( 0)
       SUBTABLE STDPRT
       00 00 ID CONT
TABLE ANIDATA
5187837042 SUB ALLOW BNRRCH 1 N N N
TABLE NCOS
BNRRCH 1 0 0 NRCH1 (XLAS, NRCH1 NXLA NDGT) $
TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCHDIG 8 RPT
TABLE IBNXLA: XLANAME NRCH1
NRCH1 8 NET N Y N 0 N POTS N N ESN N 653
TABLE DIGCOL
POTS specified: POTS digit collection
TABLE LINEATTR
653 IBN NONE NT NSCR 0 103 RCHI NLCA N NONE N 0 NIL NILSFC NILLATA 0 NIL NIL
LCABILL OFF – BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
RCHI ( 1) ( 0)
       SUBTABLE STDPRT
       KEY NOT FOUND
       DEFAULT VALUE IS: N NP 0 NA
       SUBTABLE AMAPRT
       KEY NOT FOUND
       DEFAULT VALUE IS: NONE OVRNONE N
TABLE HNPACONT
103 20 1 (2) (1) (0) (0)
          SUBTABLE HNPACODE
          800 800 NSC REPLDIGS
TABLE NSCSCRN
REPLDIGS TUPLE NOT FOUND
TABLE NSCDEFS
REPLDIGS 5 (REPLACE OFRT 1002 BOTH 9197224500 9197225000) $
TABLE REPLDATA
TUPLE NOT FOUND
+++ REPLDIGS CALL WILL QUERY SCP DATABASE FOR TRANSLATION INFORMATION
    TRAVER NOT AVAILABLE

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

When TRAVER is used for a call which specifies both in the REPLDIGS entry in Table NSCDEFS, the inswitch Table REPLDATA is searched first

for the N00 number. If the tuple is not found, TRAVER indicates that a remote database query is required.

Authcode Hotline dialing

Dialing plan access

An FGA trunk, FGB trunk, FGD trunk with EAP or Interim cut-through dialing, and DAT can access the Authcode Hotline dialing plan after implementing the following software as part of the customer load: Offnet Access Services and Enhanced Tandem Services.

800 UA calls can also access the authcode hotline dialing plan.

Dialing plan specification

The authcode hotline dialing plan is specified by datafilling either AUTHONLY or AUTHORTC as the CUTTHRU dialing plan in table DIALPLAN against the incoming NSS trunk group.

TRAVER input required

Cut-through authcode hotline calls are flagged to TRAVER by specifying an N in the DIGITS field on the TRAVER input line. When TRAVER detects an N in the DIGITS field, and the incoming NSS trunk specifies the cut-through dialing plan as either AUTHONLY or AUTHORTC is given a prompt for an authcode. With AUTHORTC, the TRAVER user must enter AUTH followed by authcode. After the authcode is entered, TRAVER detects that a hotline number is stored against the authcode and therefore, does not prompt the TRAVER user for the destination digits.

For 800 UA Authcode Hotline calls, the TRAVER will appear as a MONA Directory Number TRAVER. Reason is that all 800 UA calls are MONA DN calls regardless of the dialing plan accessed (such as Authcode Hotline, TCN). Reference Figure 24-3 for an 800 UA (MONA) TRAVER example.

Effect on translations

If the authcode entered has a customer group associated with it, the authcode customer group overrides the trunk group's customer group. The NCOS associated with the authcode is used in conjunction with either the authcode customer group or the trunk group's customer group to define the translations for the authcode hotline destination digits.

Effect on TRAVER output

Table 24-3 lists the tuples and their related tables.

Table 24-3
Tuples and related tables

TUPLES	TABLE
DIALPLAN	DIALPLAN
AUTHPART	AUTHPART
AUTHCODE	AUTHCODE

Authcode validation

The authcode is verified for its existence in the authcode database. If it fails the validation test, the error message TUPLE NOT FOUND is generated.

Cut-through validation

If an N is specified in the DIGITS field on the TRAVER input line, the dialing plan must be either HOTLINE or CUTTHRU for the NSS trunk. If an N is not specified, the error message DIALPLAN MUST BE HOTLINE OR CUTTHRU is generated.

If anything other than an N is entered in the DIGITS field on the TRAVER input line for an FGA, FGB, or DAT CUTTHRU call, the error message INVALID DIGITS IN CALLED DR is generated.

Authcode hotline call TRAVER example

Figure 24-12 is an example of the authcode hotline call TRAVER. The TRAVER user must enter the authcode of the caller because the AUTHONLY dialing plan is datafilled for the trunk. The trunk group's customer group and NCOS filed against the authcode define the translations for the hotline digits filed against the authcode.

Figure 24-12
Authcode Hotline call TRAVER example

```
TRAVER TR RCHTOSWBFGD1 N B
Please enter authcode
>> 1234567
TABLE TRKGRP
RCHTOSWBFGD1 IBNT2 0 ELO NCRT BNRRCH 0 MIDL 0 N ANSDIC 0 N N N N N N Y
      Y 0 0 N 0 0 0 0 N N N N Y Y NSSFGD Y N AUTH1 $ $
TABLE DIALPLAN
AUTH1 CUTTHRU AUTHONLY FIRST SDT DT DT $
TABLE AUTHPART
BNRRCH IBN 7 20
TABLE AUTHCDE
BNRRCH 1234567 IBN 1 N $ SW (HOTLINE 9196577433) $
TABLE NCOS
BNRRCH 1 0 0 NRCH1 (XLAS, NRCH1 NXLA NDGT) $
TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
 BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCHDIG 9 POTS Y
TABLE IBNXLA: XLANAME NRCH1
NRCH1 9 NET N Y 0 N POTS N N ESN N 653
TABLE DIGCOL
POTS specified: POTS digit collection
TABLE LINEATTR
653 IBN NONE NT NSCR 0 103 RCH1 NLCA N NONE N 0 NIL NILSFC NILLATA 0 NIL NIL 00 N
LCABILL OFF – BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
RCH (1) (0)
        SUBTABLE STDPRT
        919 919 N DD 0 NA
        SUBTABLE AMAPRT
        KEY NOT FOUND
        DEFAULT VALUE IS: NONE OVRNONE N
TABLE HNPACONT
103 20 1 (2) (1) (0) (0)
       SUBTABLE HNPACODE
       919 919 FRTE 1
       SUBTABLE RTEREF
              1 S D RCHTORTPPTS1
                S D RCHTORTPSS71
                S D RCHTORTPSS72
       EXIT TABLE RTEREF
EXIT TABLE HNPACONT
+++ TRAVER: SUCCESSFUL CALL TRACE +++


DIGIT TRANSLATION ROUTES
1 RCHTORTPPTS1                    9196577433                    ST
2 RCHTORTPSS71                    9196577433                    ST
3 RCHTORTPSS72                    9196577433                    ST

TREATMENT ROUTES. TREATMENT IS: GNCT
1 NODIAL1
2 FRAO
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Trunk Group Hotline dialing

Dialing plan access

To access the Trunk Group Hotline dialing plan from an FGA trunk and a DAT, the following software routines must be implemented as a part of the customer load:

- Offnet Access Services
- Enhanced Tandem Services

Dialing plan specification

To specify the trunk group hotline dialing plan, datafill the HOTLINE field in table DIALPLAN as the dialing plan against the incoming NSS trunk group.

TRAVER input required

Not additional input is required by the TRAVER user.

Effect on translations

The customer group and NCOS of the NSS trunk group define the translations for the hotline destination digits.

Effect on TRAVER output

The only tuple displayed is DIALPLAN in table DIALPLAN.

Trunk group hotline TRAVER example

Figure 24-13 is an example of trunk group hotline TRAVER. This figure is recognized as an FGA trunk group hotline because of the trunk datafill and the N in the DIGITS field on the TRAVER input line. The DESTDIGS field in table DIALPLAN datafilled with the Hotline dialing plan, transmits the digits to be translated. The customer group and NCOS of the trunk group define the translations for the destination digits.

Note: For Trunk Group Hotline, the BILLDN field in the trunk group must contain a billing number. The billing number for this example is 5189974797.

Figure 24-13
Trunk group hotline TRAVER example

```
TRAVER TR RCHTOSWBFGA1 N B
TABLE TRKGRP
RCHTOSWBFGA1 IBN2 0 ELO NCRT BNRRCH 0 MIDL 5189974797 N ANSDISC 0 N N N N
      N N Y Y 0 0 N 0 0 0 0 N N N N N Y FGA HOTLN1 $
TABLE DIALPLAN
HOTLN1 HOTLINE 9196577433 $
TABLE NCOS
BNRRCH 1 0 0 NRCH1 (XLAS, NRCH1 NXLA NDGT) (FLSHXLA) $
TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
 BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCHDIG 9 POTS Y
TABLE IBNXLA: XLANAME NRCH1
NRCH1 9 NET N Y 0 N POTS N N ESN N 653
TABLE DIGCOL
POTS specified: POTS digit collection
TABLE LINEATTR
 653 IBN NONE NT NSCR 0 103 NPRT NLCA NONE N 0 NIL NILSFC NILLATA 0 NIL NIL 00 N
TABLE HNPACONT
103 20 1 (1) (1) (0)
        SUBTABLE HNPACODE
        919 919 DN 919 657
        SUBTABLE RTEREF
                1 S D RCHTORTPPTS1
         EXIT TABLE RTEREF
 EXIT TABLE HNPACONT
+++ TRAVER: SUCCESSFUL CALL TRACE +++


 DIGIT TRANSLATION ROUTES
 1 RCHTORTPPTS1                          9196577433                    ST



 TREATMENT ROUTES. TREATMENT IS: GNCT
 1 NODIAL1
 2 FRAO
 +++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Private Speed Call dialing plan

Dialing plan access

An FGA trunk, FGB trunk, FGD trunk with EAP or Interim Cut-Through dialing and DAT can access the Private Speed Call (PSC) dialing plan after implementing Offnet Access Services and the Enhanced Tandem Services software routines as a part of the customer load.

800 UA calls over an FGD trunk can also access the PSC dialing plan.

Dialing plan specification

The PSC dialing plan is available to an authcode caller when the PSC option is datafilled against the authcode that the caller dials. Valid speed call cell numbers are datafilled in table PSCNUM against the PSC index associated with authcode.

The PSC dialing plan is only accessible from within the authcode dialing plan.

TRAVER input required

Cut-through authcode PSCs are flagged to TRAVER by specifying an N in the DIGITS field on the TRAVER input line. When TRAVER detects an N in the DIGITS field and the incoming NSS trunk specifies the cut-through dialing plan as either AUTHORTC or AUTHONLY, the TRAVER user must enter an authcode. Next, the TRAVER user must enter the destination digits in the 1NN format where NN identifies the speed call cell number.

For 800 UA PSC calls, the TRAVER will appear as a MONA Directory Number TRAVER. Reason is that all 800 UA calls are MONA DN calls regardless of the dialing plan accessed (such as PSC, authcode, TCN, and others). Reference Figure 24-3 for an 800 UA (MONA) TRAVER example.

Effect on translations

If the authcode entered has a customer group associated with it, the authcode customer group overrides the trunk group's customer group. The NCOS associated with the authcode is used in conjunction with either the authcode customer group or the trunk group's customer group to define the translations for the destination digits stored against the speed call cell number specified in the NN entered on the TRAVER user.

Effect on TRAVER output

Table 24-4 lists the effected tuples and their associated tables.

Authcode validation

The authcode is verified for its existence in the authcode database. If the authcode fails the validation, the error message TUPLE NOT FOUND is generated.

Table 24-4
Effected tuples and tables

TUPLES	TABLE
DIALPLAN	DIALPLAN
AUTHPART	AUTHPART
AUTHCODE	AUTHCODE
PRIVATE SPEED CALL	PSCNUM

Cut-through validation

If an N is specified in the DIGITS field on the TRAVER input line, the dialing plan must be either HOTLINE or CUTTHRU for the NSS trunk. Otherwise, the error message DIALPLAN MUST BE HOTLINE OR CUTTHRU is generated.

If anything other than an N is entered in the DIGITS field on the TRAVER input line for an FGA, FGB, or DAT CUTTHRU call, the error message INVALID DIGITS IN CALLED DR is generated.

Private speed calling TRAVER example

Figure 24-14 is a PSC TRAVER example. The destination digits are retrieved from table PSCNUM. The customer group and NCOS filed against the authcode define the translations.

Figure 24-14
Private speed calling TRAVER example

```
TRAVER TR RCHTOSWBFGD1 N B
Please enter authcode
>> 1234567
Please enter destination digits
>> 122
TABLE TRKGRP
RCHTOSWBFGD1 IBNT2 0 ELO NCRT RCHRCH 0 MDL 8 N ANSDIC 0 N N N N N N
        Y Y 0 0 N 0 0 0 0 N N N N N Y FGD Y N AUTH5 $
TABLE DIALPLAN
AUTH5 CUTTHRU AUTHONLY FIRST SDT DT DT $
TABLE AUTHPART
BNRRCH IBN 7 100
TABLE AUTHCDE
BNRRCH 1234567 IBN 1 N $ SW CUSSTGRP BNRRCH PSC 5 $
TABLE PSCNUM
5 22 9196577433
TABLE NCOS
BNRRCH 1 0 0 NRCH1 (XLAS, NRCH1 NXLA NDGT) (FLSHXLA) $
TABLE CUSTSHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
 BNRRCH NXLA CRCH NXLA 0 RCHDIG
TABLE DIGCOL
RCHDIG 9 POTS Y
TABLE IBNXLA: XLANAME NRCH1
NRCH1 9 NET N Y 0 N POTS N N ESN N 653
POTS specified: POTS digit collection
TABLE LINEATTR
653 IBN NONE NT NSCR 0 103 NPRT NLCA NONE N 0 NIL NILSFC NILLATA 0 NIL NIL 00 N
TABLE HNPACONT
103 20 1 (1) (1) (0)
             SUBTABLE HNPACODE
             919 919 DN 919 657
             SUBTABLE RTEREF
                     1 S D RCHTORTPPTS1
              EXIT TABLE RTEREF
EXIT TABLE HNPACONT
+++ TRAVER: SUCCESSFUL CALL TRACE +++
DIGIT TRANSLATION ROUTES
1 RCHTORTPPTS1                          9196577433                  ST
TREATMENT ROUTES. TREATMENT IS: GNCT
1 NODIAL1
2 FRAO
+++ TRAVER: SUCCESSFUL CALL TRACE +++
TRAVER TR RCHTOSWBFGD1 N NT
Please enter authcode
>> 1234567
Please enter destination digits
>> 122
DIGIT TRANSLATION ROUTES
1 RCHTORTPPTS1                          9196577433                  ST
TREATMENT ROUTES. TREATMENT IS: GNCT
1 NODIAL1
2 FRAO
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Feature impact

This feature interacts with existing TRAVER software.

Restrictions and limitations

The TRAVER enhancement feature has the following restrictions and limitations:

- The TRAVER enhancements are only available for a particular NSS dialing plan when the corresponding package that contains the call processing for the dialing plan is a part of the customer load.
- For the TCN dialing plan, destination digits must be preceded by a zero (0).
- The first digit entered by the TRAVER user for TCN digits must not be a zero (0) or one (1). It must be between 2 and 9, inclusive.
- For CUTTHRU and HOTLINE dialing plans, the TRAVER user enters the letter N in the DIGITS field on the TRAVER input command line.
- This feature supports TRAVER Trace, Non Trace, and Both command.
- This feature provides NSS the capability to TRAVER the following calls based on the sections within this chapter:
  - NSS FGD Pure Dialing
  - Authcode Only Dialing
  - DAT Senderized Dialing
  - Destination Digits Only Dialing Plan
  - Travel Card Only Dialing Plan
  - Travel Card or Authcode Dialing Plan
  - Replacement of Digits Dialed (RDD) feature for N00 Numbers
  - Authcode Hotline
  - Trunk Group Hotline
  - Private Speed Call Dialing

PRI D-Channel Backup

The PRI D-Channel Backup feature provides a backup D-channel (other than the primary D-channel) to increase the reliability and guarantee continued PRI service between switching nodes or networks that use Integrated Services Digital Network (ISDN) primary rate interface (PRI).

This feature also enhances the existing PRIDCH level of the Maintenance and Administration Position (MAP) display, which handles the backup D-channel maintenance functions in the ISDN Central Controller (CC) and ISDN XMS Peripheral Module (XPM). The PRIDCH-level commands control bringing into service or removing from service the various physical and logical D-channel resources.

Background

A typical PRI interface supports a configuration of 23 B-channels and one D-channel in a common DS-1 facility. This is called the associated signaling of PRI interface, where the D-channel resides in the same DS-1 facility as the B-channels. In the case where one D-channel controls the PRI interface with more than one DS-1 facility, this is called nonassociated signaling of the PRI interface. When the nonassociated PRI interface is used, the D-channel integrity and reliability are critical concerns for the PRI services, since the failure of the D-channel would result in the loss of the entire PRI interface. D-channel backup ensures the integrity of the interface by providing a second D-channel and a warm swact capability.

In the DMS product series, ISDN Digital Trunk Controller (DTCI) and ISDN Line Trunk Controller (LTCI) XPMs are supported by D-channel backup. The ISDN access controller (IAC) type of XPM is not supported with D-channel backup.

Configuration for D-channel backup

When two or more DS-1 facilities are used for the PRI interface, a primary D-channel is always present on one DS-1 facility and is labeled as D1. On a different DS-1 facility, a secondary D-channel identified as D2 is present. Both primary and secondary D-channels can send signaling information in LAPD format, but only one D-channel (either primary or secondary) can be

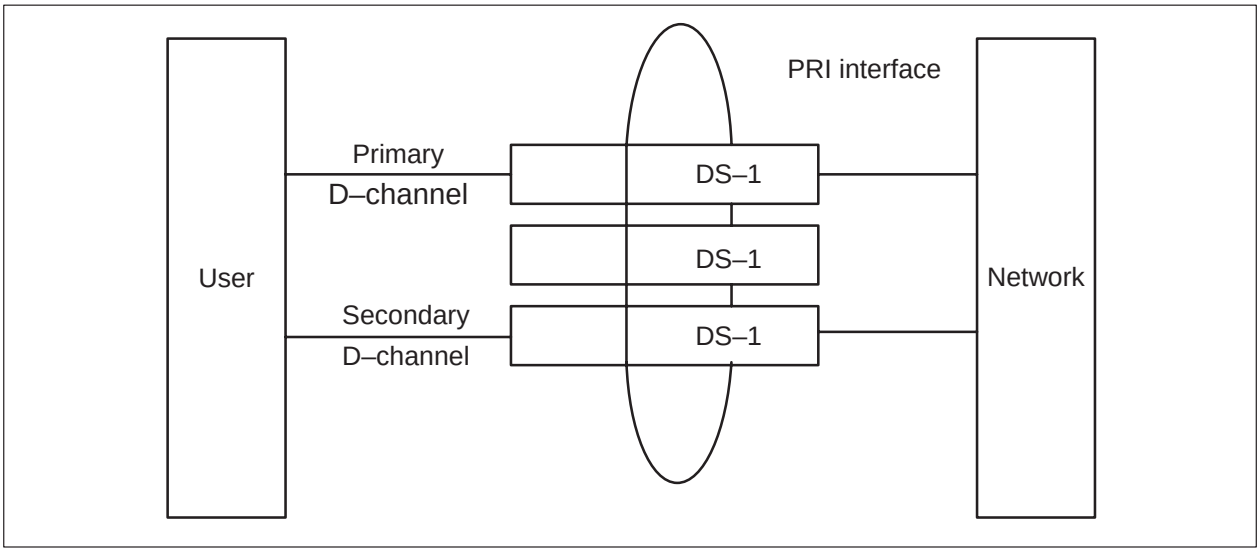
active in Layer 3 at a particular time. The other D-channel is active at Layer 2.

The term Backup D-channel can refer either to the D1 or D2 channel, depending on the state of D1 and D2. For example, if D1 is in the active state, D2 is called the backup D-channel, regardless of what state D2 is in. On the other hand, if D2 is in the active state, D1 is the backup D-channel. Both D1 and D2 cannot be in the active state at the same time.

"Backup D-channel" is a logical term, but the "Primary D-channel" and "Secondary D-channel" are physical terms assigned to physical hardware circuits as datafilled in the trunk subgroup table.

Figure 25-1 shows the basic nonassociated signaling of PRI with the backup D-channel. The figure shows the PRI with three DS-1 facilities, one primary D-channel, and one secondary D-channel.

Figure 25-1
Nonassociated PRI interface with D-channel backup



Although there is no restriction on a D-channel's physical hardware location in an XPM, it is always good practice to assign the backup D-channel to a DS1 other than the DS1 where the primary D-channel resides. This reduces the risk of a DS1 failure to affect the operation of both D-channels. Additionally, both primary and secondary D-channels need to be assigned to the same XPM as the associated B-channels.

D-channel states

Both the CC and the ISDN XPM maintain a unique and distinct state for the primary and secondary D-channels. These entities change the state of both

the primary D-channels and secondary D-channels based on events that occur within the system. The following sections list and describe the valid CC and XPM states.

CC states

The following states are valid for the central controller (CC).

- INB (Installation busy)—This state is the initial state of the D-channel when the D-channel (PRI interface) is defined in datafill.
- PMB (Peripheral MANB)—When the peripheral is taken out of service by a MANB operation, the state of the D-channel will be PMB.
- CFL (Carrier Fail)—The CFL state indicates that the carrier is down (out of service) or SYSB.
- MANB (Maintenance Busy)—When there is manual intervention from the MAP workstation, the channel may be set to MANB (Maintenance Busy) to take the channel out of service.
- LO (Lockout)—A D-channel in the LO state indicates a failure at the logical link level or at the Hardware level (not the carrier).
- RNR (Remote Not Responding)—A D-channel in the RNR state indicates that the Layer 3 at the remote side is not responding although layer 2 is established and ready.
- INSV (In Service)—This indicates that the D-channel is in service and available for use.

The following states are being introduced for the PRI D-channel backup feature.

- STB (Standby)—A D-channel is considered to be in the Standby state when it is in the multiple-frame-established state at Layer 2, but is not carrying any Layer 3 call control messages on the logical data link.
- WAI (Wait)—A D-channel is considered to be in the Wait state when the D-channel in the Standby state attempts to establish the Layer 3 communication with the other node as part of the process of going to the INS state.

XPM states

The following states are valid for the XPM (XMS Peripheral Module):

- MANB (Maintenance Busy)—When there is manual intervention from the MAP workstation, the channel may be set to MANB (Maintenance Busy) to take the channel out of service. When the peripheral is brought into service, the D-channel is initialized in this state.

- MBP (MB Pending)—When there is manual intervention from the MAP workstation, if there are active calls, these calls are taken down before the D-channel is taken out of service. During call clearing, the D-channel is put in MBP state.
- LO (Lockout)—A D-channel in the LO state indicates a failure at the logical link level or lower.
- RST (Restart Transmitted)—A D-channel in the RST state indicates that a Q.931 RESTART has been transmitted to the remote side and a RESTART ACK is waiting to be received.
- INSV (In Service)—This indicates that the D-channel is in service and available for use.
- CFL (Carrier Fail) —The CFL state indicates that the carrier where the D-channel resides has failed and the D-channel is unavailable for use.
- ALE (Await link establish)—This state indicates an RTS template has been received on the D-channel and a request has been sent to the LLM to establish Layers 1 and 2. The normal response in this state is an ll_establish indication from the LLM.
- SVT (Service transmit)—This state indicates that the in-service D-channel is down and the XPM maintenance is trying to bring the standby D-channel into service. A Service message has been sent across the PRI interface to the remote site and a Service ACK message is expected.
- STBY (Standby)—This state indicates that the D-channel is in the Standby mode. The Layer 2 of this D-channel is up. If anything goes wrong on the in-service D-channel, a warm switchover action puts this D-channel in service.

D-channel backup maintenance

The PRI D-channel feature includes MAP enhancements under the PRIDCH level to handle both primary and secondary D-channel maintenance. Changes include modifications to existing commands as well as an additional command, SWACT, which supports the manual switch of activity of D-channels.

Modified PRIDCH level commands

Following are existing PRIDCH level commands that have been modified to support PRI D-channel maintenance.

- POST GD—When the GD option is used to post the D-channel with backup, both primary and secondary D-channels are displayed on the MAP workstation simultaneously and designated as D1 and D2.

- POST D—When the D option is used to post the D-channel with backup, either the primary or secondary D-channel is displayed on the MAP workstation and is designated as D1 or D2 depending on the actual D-channel posted.
- POST AD—When the AD option is used to post the D-channels within a specific XPM (DTCI, LTC, or PDTC), all the D-channels datafilled in that XPM are set in the post set. Only one D-channel, either primary (D1) or secondary (D2), is displayed on the MAP workstation at a given time.
- BSY—The BSY (busy) command allows the craftsperson to busy out the circuit that is posted in the control position of the MAP display. It is enhanced to handle either D1, D2 or both, with the default set to “both”. Assuming both D1 and D2 are posted in the post position, some BSY command options are shown in the following list:
  - BSY INB: busy both D1 and D2 to the INB (Installation Busy) state
  - BSY MB: busy both D1 and D2 to the MB (Manual Busy) state
  - BSY INB D1: busy INB only the designated D1 channel
  - BSY INB D2: busy INB only the designated D2 channel
  - BSY (MB) D1: busy MB only the designated D1 channel
  - BSY (MB) D2: busy MB only the designated D2 channel
- RTS—The RTS command returns the posted circuit to service, and is enhanced to handle either D1, D2, or both. The default is to return both D1 and D2 to service. Assuming both D1 and D2 are posted in the post position, some examples of RTS command options are:
  - RTS D1: return D1 to service
  - RTS D2: return D2 to service
  - RTS: return both D1 and D2 to service
- HOLD—The HOLD command is enhanced to display both D1 and D2 channels of a given CLLI in a hold position. If no backup D-channel is used, only one D-channel is displayed.
- NEXT—If the circuit in a hold position is a D-channel with backup, the NEXT command will bring the primary and secondary D-channels from the hold position back to the post position.

- CONT—The CONT command performs continuity tests on the posted D-channel and is enhanced to handle either D1, D2, or both. The default is to run tests on both D1 and D2. There are two types of continuity tests; local loopback (internal to the near end of the PRI circuit) and external loopback (external to the other end of the PRI circuit). Before performing the external loopback test, the external loopback point at the other end of the PRI circuit must be established. Assuming both D1 and D2 are posted in the post position, some examples of CONT command options are as follows:

  — CONT INT D1: perform D1 internal continuity test

  — CONT EXT D1: perform D1 external continuity test

  — CONT INT D2: perform D2 internal continuity test

  — CONT EXT D2: perform D2 external continuity test

  — CONT EXT D1: perform D1 external continuity test

  — CONT INT: perform D1 and D2 internal continuity test

- LOOPBK—The LOOPBK command is used to set loopback test points on D1, D2, or both, with the default set to "both". It provides the capability to set up a continuity test point external to the other end of the PRI circuit so that any incoming data will be sent back to its source. Assuming both D1 and D2 are posted in the post position, some examples of LOOPBK options are:

  — LOOPBK SET D1: set the loopback point of D1

  — LOOPBK REMOVE D1: remove the loopback point of D1

  — LOOPBK QUERY D1: query the loopback point of D1

  — LOOPBK SET D2: set the loopback point of D2

  — LOOPBK REMOVE D2: remove the loopback point of D2

  — LOOPBK QUERY D2: query the loopback point of D2

  — LOOPBK SET: set the loopback point of D1 and D2

  — LOOPBK REMOVE: remove the loopback point of D1 and D2

  — LOOPBK QUERY: query the loopback point of D1 and D2

New PRIDCH level command

A new PRIDCH level command, SWACT, is being introduced with the PRI D-channel backup feature and is used to manually switch the activity of the D-channel. When the SWACT command is issued, all the active calls on the B-channels maintain their active state. These calls are not affected by the SWACT activity. This is known as a warm SWACT. Calls in a "non-active" call state (for example, initiated calls) are not guaranteed to survive the warm SWACT.

Logs

Five new logs are created as a result of the PRI D-channel feature. These logs are described below.

ISDN 110

This log is used to keep track of the status of D-channels in a backup configuration. When the D-channel states change from OOS (Out-of-Service) to INS (Inservice) and STB (Standby), this log is generated to indicate the current D1 and D2 channel states. No alarm indication is provided.

```
ISDN110  Oct27  15:10:43  1563  PRA D-CHANNEL STATUS
PRACLLI  D1=DTCI  10  0  19 : INS, D2=DTCI  10  1  20 :
STB
```

Example of log format:

```
ISDN110  Oct27  15:10:43  1563  PRA D-CHANNEL STATUS
PRACLLI  D1=DTCI  10  0  19 : INS, D2=DTCI  10  1  20 : STB
```

ISDN 111

This log is generated when one of the D-channels in a backup configuration is in the INS (Inservice) state and the other D-channel is in the OOS (Out-of-Service) state. A major alarm indicator is provided.

```
ISDN111  Oct27  15:11:43  1564  PRA D-CHANNEL MAJOR ALARM
PRACLLI  D1=DTCI  10  0  19 : OOS, D2=DTCI  10  1  20 :
ACT
```

```
  ISDN111  Oct27  15:11:43  1564  PRA D-CHANNEL MAJOR ALARM
  PRACLLI  D1=DTCI  10  0  19 : OOS, D2=DTCI  10  1  20 :
  ACT
```

ISDN 112

This log is generated when both of the D-channels in a backup configuration are in the OOS (Out-of-Service) state. A critical alarm indicator is provided.

```
ISDN112  Oct27  15:10:43  1563  PRA D-CHANNEL CRITICAL ALARM
PRACLLI  D1=DTCI  10  0  19 : OOS, D2=DTCI  10  1  20 : OOS
```

ISDN 113

This log is generated when D-channel switchover occurs manually in a D-channel backup configuration. It shows the state of the D-channels states after switchover (for example, Active and Out-of-Service).

```
ISDN113  Oct27  15:10:43  1563  PRA D-CHANNEL MANUAL SWACT
PRACLLI  D1=DTCI  10  0  19 : OOS, D2=DTCI  10  1  20 :
ACT
```

ISDN 114

This log is generated when D-channel switchover occurs autonomously in a D-channel backup configuration. It shows the D-channel states after switchover (that is, Active and Out-of-Service).

```
ISDN114  Oct27  15:10:43  1563  PRA D-CHANNEL AUTONOMOUS
SWACT
PRACLLI  D1=DTCI  10  0  19 : OOS, D2=DTCI  10  1  20 : ACT
```

PRI D-channel feature activation

The PRI D-channel feature is optional through feature packaging (NTXG33AA). If the backup D-channel feature is not in the user's software, any datafill for a secondary D-channel in the trunk subgroup table (TRKSGRP) will be rejected. In this instance, the error message `BACKUP D-CHANNEL IS NOT SUPPORTED` is displayed. If the D-channel feature is in the software load, the secondary D-Channel must be datafilled in Table TRKSGRP to activate this feature.

PRI D-channel feature interactions

The following features interact with PRI D-channel backup:

- ANI/ABB (Automatic Number Identification/All B-channels Busy) — After the Temporary Signaling Connection (TSC) transaction has completed, those transactions are not affected by D-channel switchover. If the D-channel switchover occurs during the time of TSC establishment, the transaction is not guaranteed to survive.
- NACD (Network Automatic Call Distribution)—All active calls survive a D-channel switchover.
- NRAG (Network Ring AGain)—If the switchover of D-channels occurs during the exchange of the FACILITY message between nodes, the feature is aborted.
- UTR (Universal Tone Receiver on PRI)—During D-channel switchover, the calls in the digit receiving state are lost.

- Basic PRI calls—Only active calls survive a D-channel switchover.
- OHQ (Offhook Queuing)—There is no interaction with trunk offhook queuing.
- DTCI Robustness—The backup D-channel can have different carrier rates (64k or 56k) than the Primary D-channel. Coding format (HDLC or INVHDLC) on the D-channels also can be different on the backup D-channel and the primary D-channel. However, both ends must set the carrier rate and coding format the same for a given D-channel.

Restrictions and limitations

The D-channel backup feature has the following restrictions and limitations:

- It is not supported on an IAC type of XPM
- The backup channel does not do load-sharing with the active D-channel.
- When the D-channel backup configuration is used, the maximum number of B-channels per PRI is 478.
- Both primary and secondary D-channels must reside on the same XPM.
- The backup D-channel has to be in the same XPM as the associated B-channels.
- A backup D-channel is dedicated to a specific trunk group and cannot be shared with other trunk groups.
- Both sides of the primary rate interface must be configured with the same D-channel configuration (single or backup D-channel configuration). If one side is single and the other side is configured as backup, the D-channel will not function properly. This could be diagnosed from the generated logs and by using the continuity test.
- Only the active calls survive after a D-channel switchover. Non-active calls are not guaranteed to survive.
- Only the active temporary signaling connections survive the D-channel switchover.
- Only the active temporary signaling connections will survive the D-channel switchover. Temporary signaling is used when all B-channels are busy and the call is queued on the D-channel.

ISDN PRI: network name display

The Network Name Display (NND) feature transports NAME information of the calling party, originally called party (if redirection occurs), and connected party across an ISDN primary rate interface (PRI) network. It is also capable of transporting the name information across PRI and Common Channel Signaling–7 (CCS7) network boundaries within a hybrid network.

The Network Name Display feature supports the following attendant console (AC) and station equipment:

- Digital M2317 sets
- Digital M2216A sets
- Digital M2216B sets
- Digital M3000 sets
- Digital M2616 sets with Display Module Option (M0200)
- Digital M2008 sets with Display Module Option (M0200)
- electronic business sets (EBS)

The call types supported for name delivery are:

- Basic calls over PRI network
- IBN feature calls using PRI network
  - — Call Forwarding
    - – Call Forward Universal (CFU)
    - – Call Forward Busy (CFB)
    - – Call Forward Do Not Answer (CFD)
  - — Call Transfer (CXR)
  - — Call Waiting (CWT)
  - — Call Pickup (CPU)
- Attendant Console (AC) basic call

Interworking between PRI and CCS7 integrated services digital network user part (ISUP) for the above call types is supported.

Types of name displays

The types of NAME displays that appear on a station are the calling party name, connected party name, and originally called party name. These terms are described in the following list:

- Calling Party Name—The calling party is the person originating the call. The calling party's name is displayed at the connected party's station.
- Connected Party Name—The connected party is the person receiving a call. The connected party's name is displayed on the calling party's station.
- Originally Called Party Name—The originally called party is the person whom the calling party is trying to reach. If the originally called party has activated a call forwarding or call transfer feature, then all calls shall be redirected to a third party. The third party receiving the redirected call is considered the 'connected party'. For remote and Intra-nodal network configurations, the original called party's name is displayed at the connected and calling parties' stations. These network configurations are defined later in this chapter.

Station display area

The station equipment display area ranges from a 2x16 to 2x40 area (that is, 2 lines with up to 16 characters per line and 2 lines with up to 40 characters per line). The information to be displayed includes the name, directory number, and call reason messages. Depending on the length of these elements combined, the line peripherals determine on a per call basis how this information will be displayed at the station. For example, the line peripheral may determine for one call that based on the length of all information received, the name should be displayed on the bottom line whereas for another call the lengths may warrant the name be displayed on the top line.

Call reason displays

If a call is redirected from the originally called party station to another station, call reason messages are displayed at the calling and connected parties' stations to identify why the call was rerouted.

Default call reason messages are provided in software but can be modified by the customer using Table REASONS. Call reason messages cannot exceed 15 characters in length and are not subject to system truncation (that is, the message as defined in datafill will always be displayed regardless of the lengths of the other elements; name and DN). Default call reason messages are defined in the table 26-1.

Table 26-1
Default call reason messages

Default Call Reason Messages	Explanation
NO CALL INFO	This message is displayed if NAME information is restricted or unavailable. It is applicable for incoming and outgoing calls
OUTSIDE CALL	This message appears when a call is originated or received on a line or trunk outside the customer group.
CONFERENCE	This message applies to multi-party calls (such as 3WC, STN Controlled, Meetme, Preset and Attendant Conferences).
FORWARD	This message is displayed only at the calling party station when any type of call forward is encountered.
CALL FWD	This message is displayed only at the connected party station when a CFU (Call Forward Universal) call type is received.
BUSY FWD	This message is displayed only at the connected party station when a CFD (Call Forward Do Not Answer) call type is received.
NO ANS FWD	This message appears on the connected party station when call pickup is initiated by that party.
PICKUP	This message appears on the connected party station when call pickup is initiated by that party.
PICKED UP	This message appears on the originally called party station when call pickup has occurred at the terminating end.
CALL TRANSFER	This message appears on the connected party station when receiving a CXR call type.

Criteria for name, directory number, and call reason message

The maximum number of characters for the name display is 15, the directory number (DN) is a maximum of 10 digits, and the call reason message is a maximum of 15 characters. Valid characters are upper-case A–Z, digits 0–9, spaces (datafilled in Table REASONS as underscores), and special symbols such as asterisk (*), pound sign (#), period (.), colon (:), and dash (–).

Name information may be datafilled in lower case letters at an MSL-100 as it is converted to upper case letters prior to display. However, if an MSL-100 switch receives lower case letters over the PRI network from another switch and the call is to be terminated to an Attendant console, the

name display information is not properly displayed. Therefore, information must be sent to an MSL-100 in upper case letters.

Rules for displaying name, directory number, and reason

Sometimes the name, DN, and call reason exceed the maximum length of the display area, in which case the system displays only certain elements as described in the following list:

- use the first and last names if less than or equal to 15 characters
- use last name plus all initials (first and middle) if less than or equal to 15 characters
- use last name plus one initial (first or middle) if less than or equal to 15 characters
- use last name without vowels plus all initials (first and middle)
- use last name without vowels plus one initial (first or middle)
- use only the last name without vowels

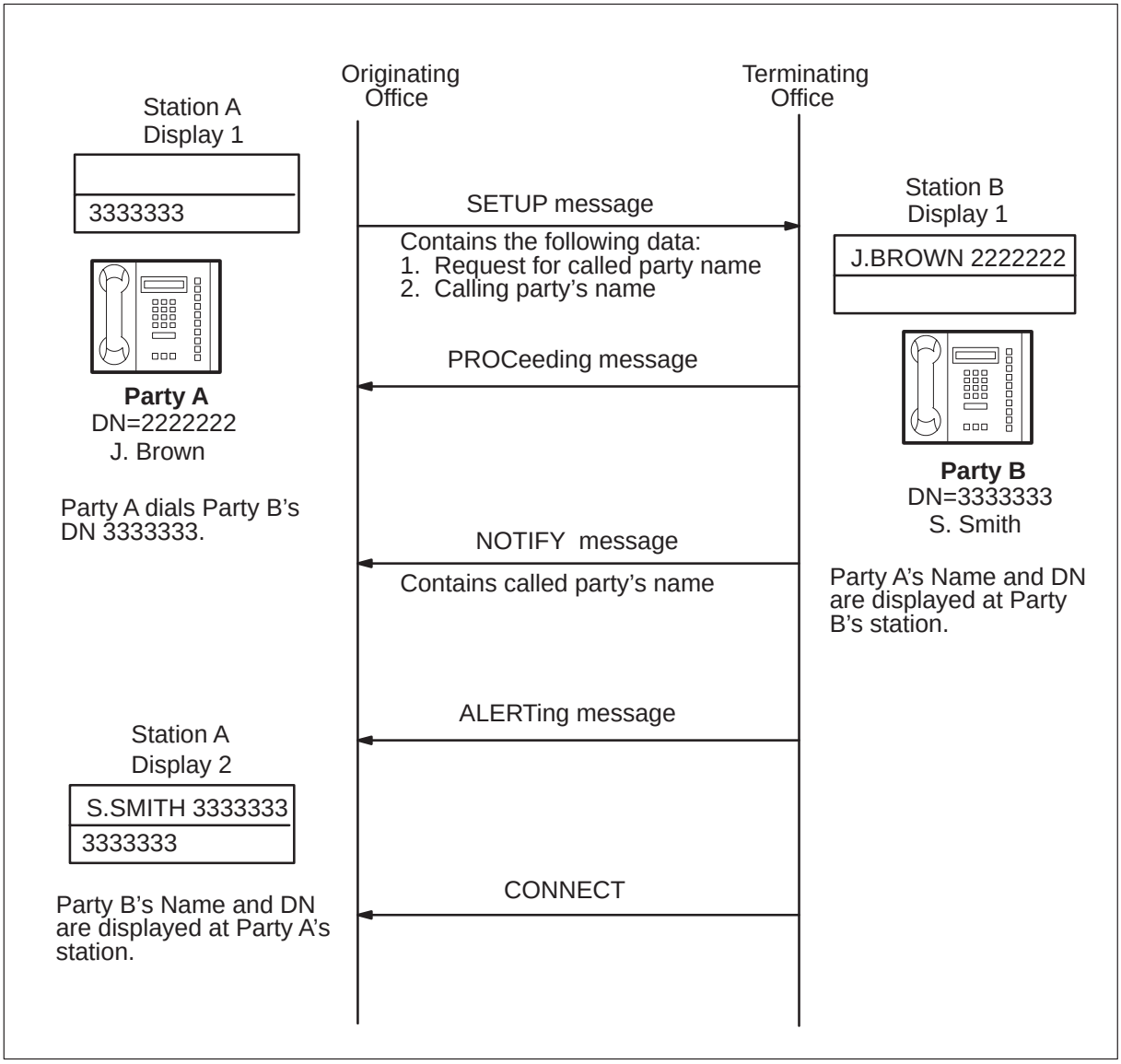
Name transport

For basic call processing, the originating office sends a PRI SETUP message to the terminating office requesting ‘connected party name’ information. This SETUP message also contains the name of the calling party to be displayed at the called party’s station.

In response to the SETUP message, the terminating office performs database lookups through tables NETNAMES, CUSTNTWK, and CUSTSTN to determine if the name display feature is available to the customer group and called party station. If so, the terminating office sends a NOTIFY message to the originating office with the called party’s name.

Figure 26-1 illustrates the PRI messaging scenario for name transport for a basic call type.

Figure 26-1
Example of name transport using SETUP signaling for basic call type



Network configurations

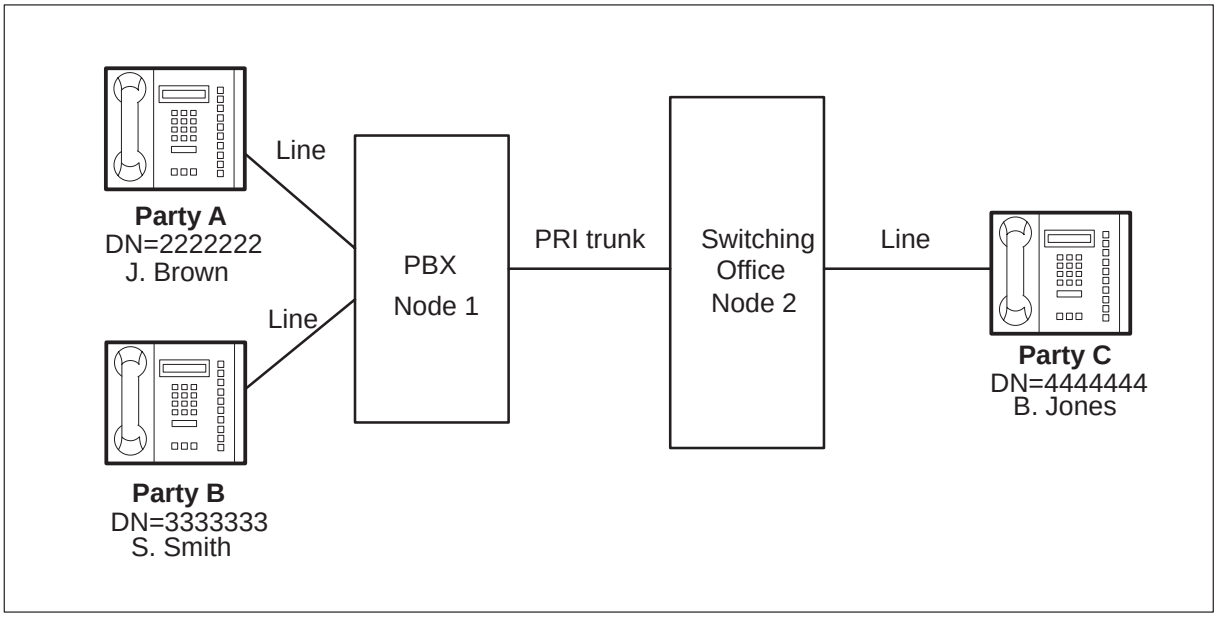
A network capable of transporting name information can be configured three different ways; Intra-nodal, Inter-nodal, and Remote. These configurations are defined below and illustrations are provided in Figures 26-2 through 26-4.

Intra-nodal network configuration

In an Intra-nodal configuration, the first two parties of a call, parties A and B, are located at the originating node and the third party, party C, is located

at the remote terminating node. Basic call processing and name delivery between parties A and B occur within the same node. If either party A or party B has call forwarding or call transfer activated to party C, then remote processing is required. Figure 26-2 illustrates the Intra-nodal network configuration.

Figure 26-2
Intra-nodal network configuration



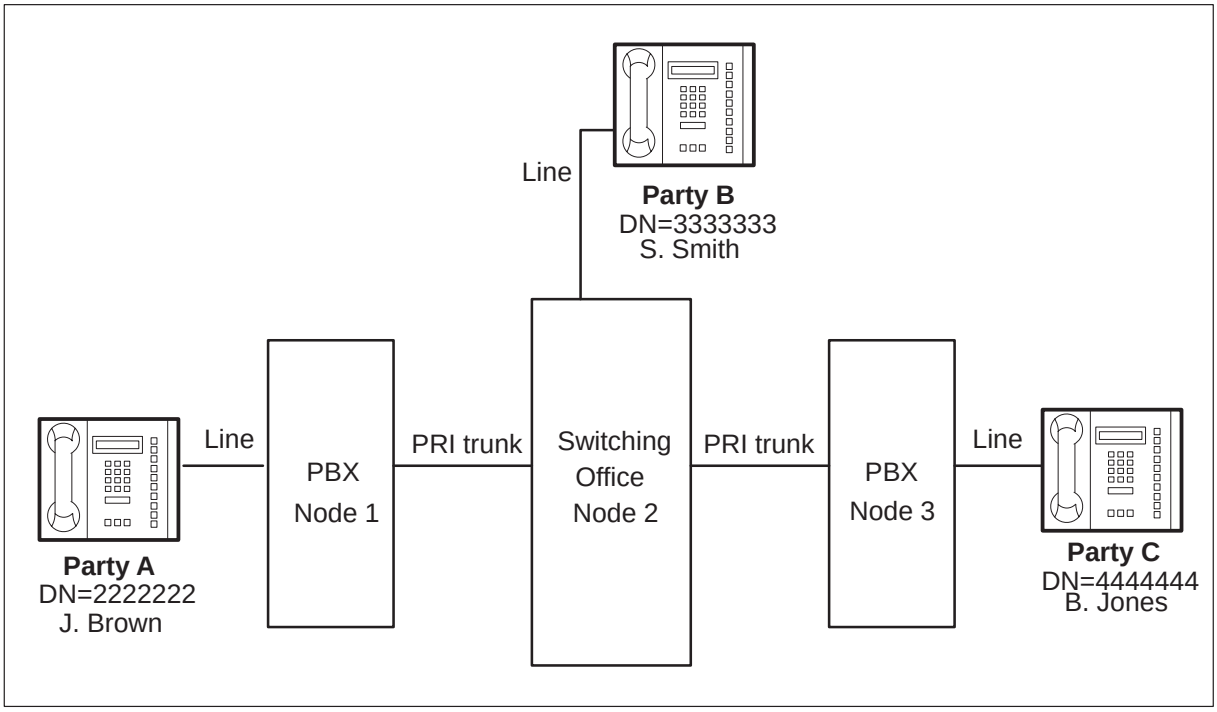
Inter-nodal network configuration

In an Inter-nodal configuration, party A is located at the originating node, party B is located on an intermediate node, and party C is located at the remote terminating node. Basic call processing between parties A and B transports the name between nodes. If either party A or party B has call forwarding or call transfer activated to party C, then remote processing to a third node is required.

Note: If the originally called party station is located in an *intermediate* switching office, the Network Name display feature does not transport the originally called party name for call forwarding call types (CFU, CFB, and CFD). If this situation occurs, the display information appearing at the calling party's station shows only the connected party information and the call reason message. The originally called party name is not displayed. The display at the connecting party's station shows the calling party name, the call reason message, and the redirecting number. The originally called party name is not displayed.

Figure 26-3 illustrates the Inter-nodal network configuration.

Figure 26-3
Remote network configuration

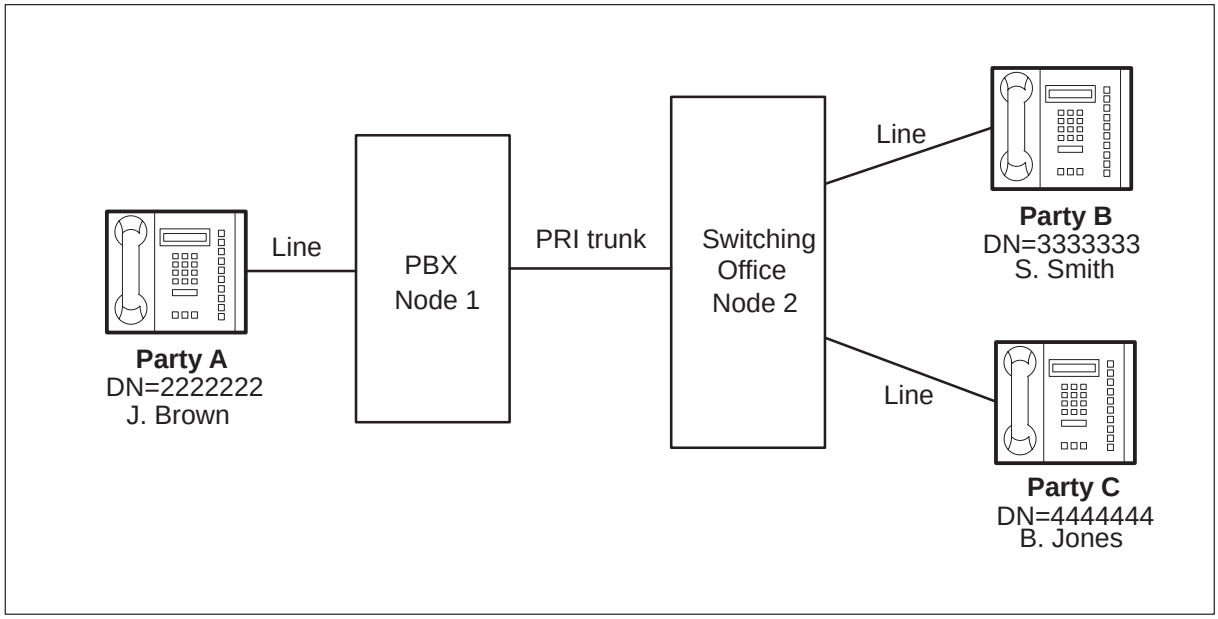


Remote network configuration

In a Remote configuration, party A is located at the originating node, and parties B and C are located at the terminating node. Basic call processing between parties A and B or A and C requires transporting the name information to the remote node. If party A has call forwarding or call transfer activated to party B or C, remote processing is required.

Figure 26-4 illustrates the Remote network configuration.

Figure 26-4
Remote network configuration



Station displays associated with IBN call types

In subsequent pages, examples of station displays for IBN features CFU, CFB, CFD, CPU, CXR, and CWT are provided based on the network configurations previously illustrated.

Call Forwarding Universal (CFU) and Call Forwarding Busy (CFB)

Call Forwarding Universal (CFU) and Call Forwarding Busy (CFB) features allow a person to redirect their calls to another station if they are away from their desk or their station is busy.

The following illustrations show the station display elements for the CFU and CFB call types based upon the Intra-nodal and Inter-nodal network configurations. In each of these network scenarios, the three parties involved are:

- Party A, the calling party (person originating the call)
- Party B, the redirecting party (person with call forward activated)
- Party C, the connecting party (person answering the call)

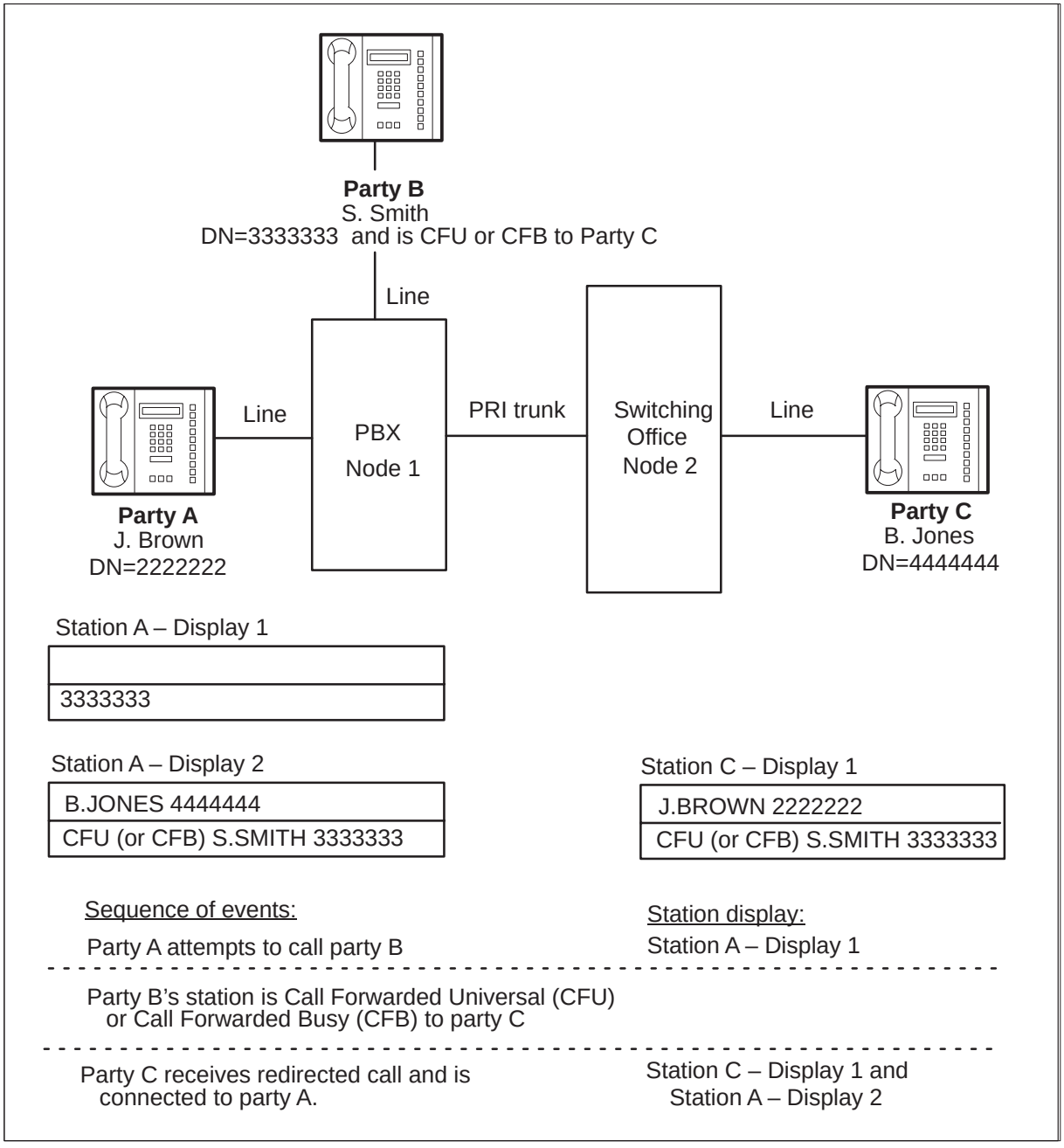
Intra-nodal scenario for CFU and CFB call types

In the Call Forward Universal (CFU) Intra-nodal scenario, Party A attempts to call party B within the same node, however, party B has activated the CFU feature such that all calls forward to party C.

In the Call Forward Busy (CFB) scenario, Party A attempts to call party B, however, party B's station is busy. Party B has the CFB feature activated, therefore, the call is forwarded to party C.

Figure 26-5 illustrates the Intra-nodal network name display elements for CFU and CFB call types.

Figure 26-5
Intra-nodal network station display elements for CFU and CFB call types



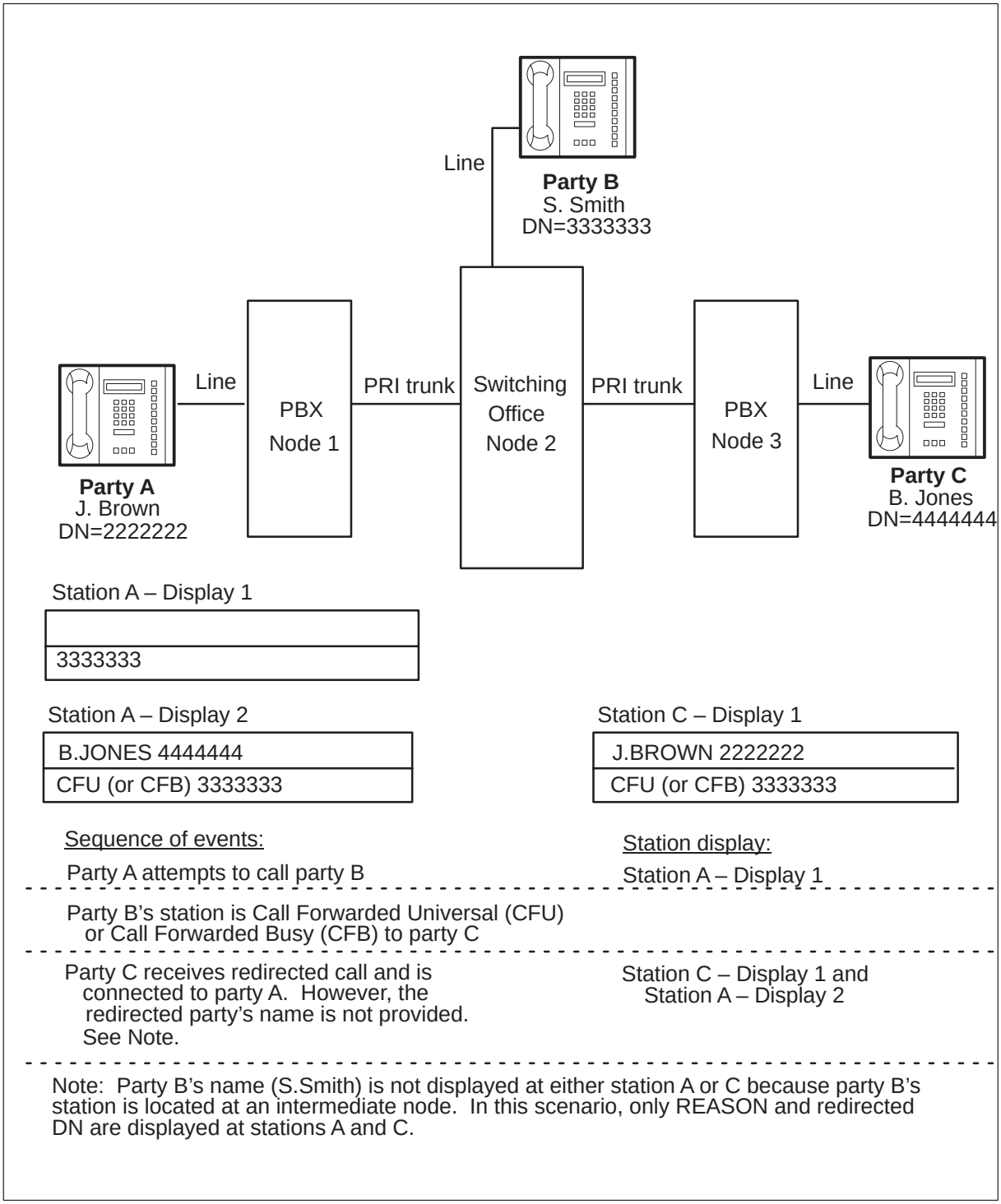
Inter-nodal scenario for CFU and CFB call types

In the Call Forward Universal (CFU) scenario, Party A attempts to call party B where B is located at an intermediate switch. Party B's station, however, has activated the CFU feature such that all calls forward to party C.

In the Call Forward Busy (CFB) scenario, Party A attempts to call party B, however, party B's station is busy. Party B has the CFB feature activated, therefore, the call is forwarded to party C.

Figure 26-6 illustrates the Inter-nodal network configuration for CFU and CFB call types.

Figure 26-6
Inter-nodal network station display elements for CFU and CFB call types



Call Forwarding Do not Answer (CFD)

Call Forwarding Do Not Answer (CFD) redirects calls to another station if the originally called party does not answer within a predefined time period.

The following illustration shows the station display elements for the CFD call type based upon an Intra-nodal network configuration. In this example, the three parties involved are:

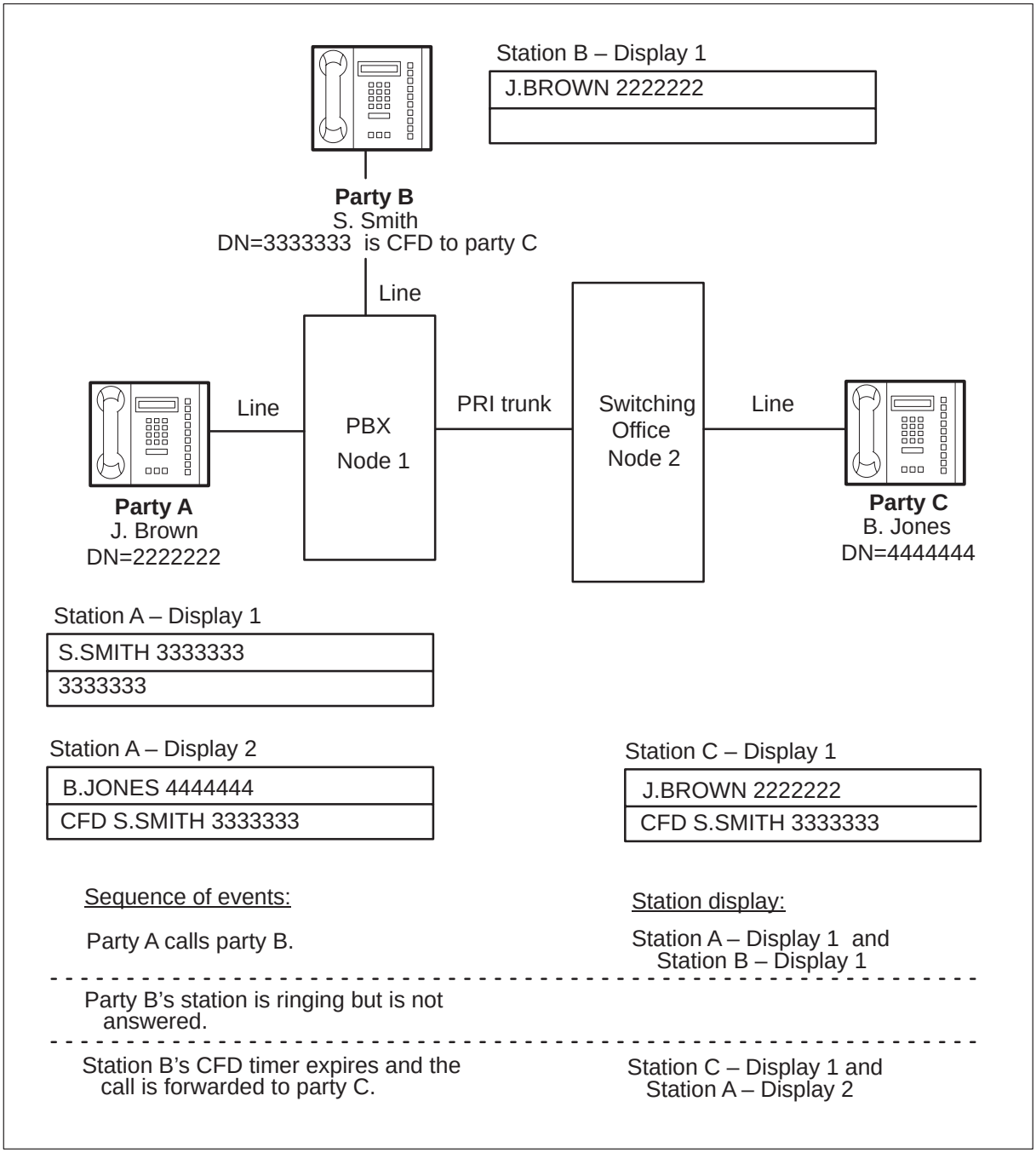
- Party A, the calling party (person originating the call)
- Party B, the redirecting party (person with call forward activated)
- Party C, the connecting party (person answering the call)

Intra-nodal scenario for CFD call type

In the Call Forward Do not Answer (CFD) Intra-nodal scenario, Party A attempts to call party B within the same node, however, party B has activated the CFD feature such that all calls forward to party C.

Figure 26-7 illustrates the Intra-nodal network name display elements for the CFD call type.

Figure 26-7
Intra-nodal network station display elements for CFD call type



Call Pickup (CPU)

Call Pickup (CPU) allows a user to answer a ringing station from another station within the call pickup group.

The following illustration shows the station display elements for the call pickup (CPU) call type based upon a Remote network configuration. In this example, the three parties involved are:

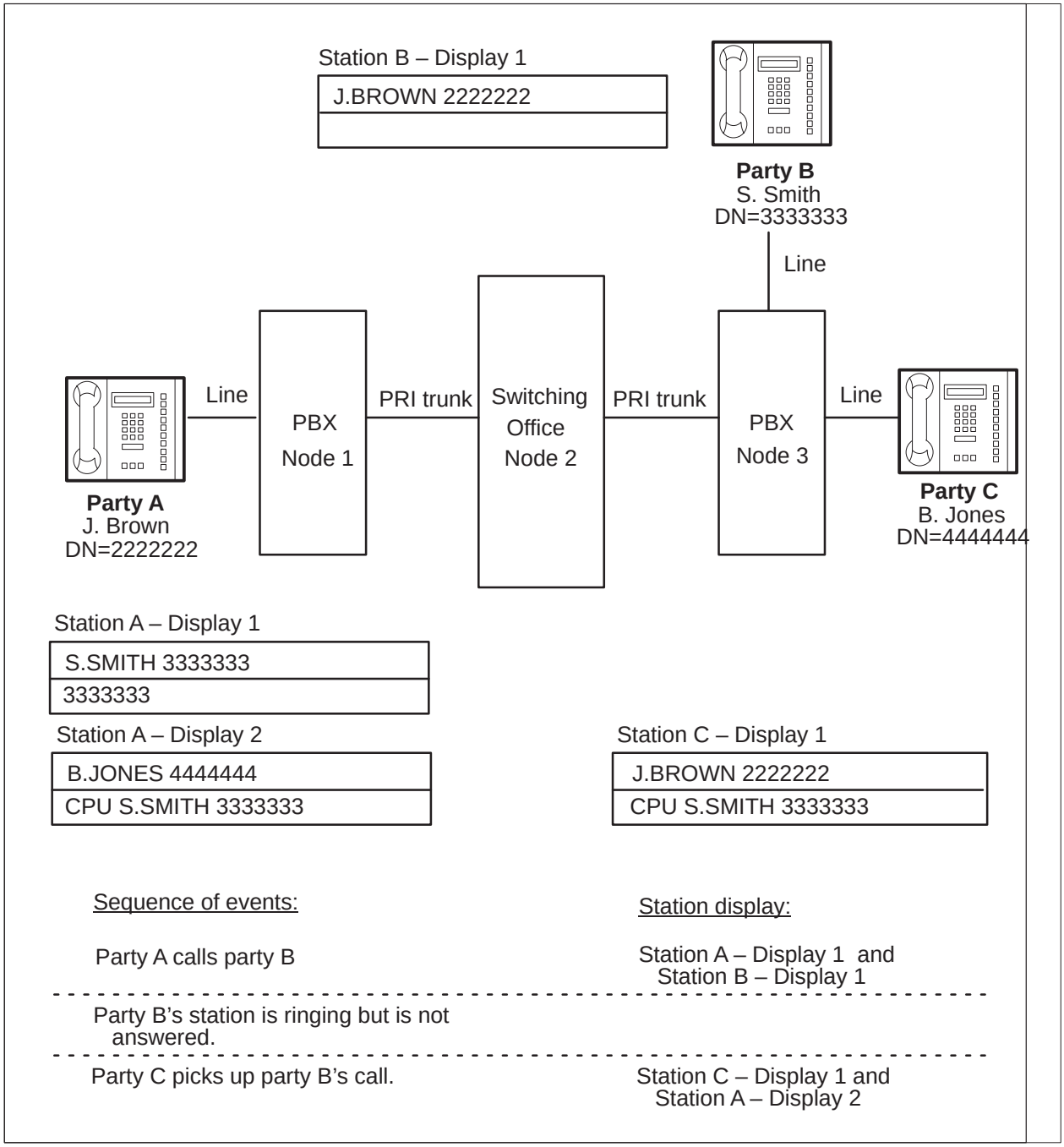
- Party A, the calling party (person originating the call)
- Party B, the redirecting party (person with call forward activated)
- Party C, the connecting party (person answering the call)

Remote scenario for CPU call type

In this CPU scenario, Party A calls party B through a PRI network, and party B's station is picked up by party C. The display of party A is updated to show the name of party C. Similarly, party C's display shows the calling party's name and the name of the originally called party, party B.

Figure 26-8 illustrates the Remote network name display elements for the CPU call type.

Figure 26-8
Remote network station display elements for CPU call type



Call Transfer (CXR)

Call Transfer (CXR) allows a user to transfer a call to another station on the network.

The following illustration shows the station display elements for the CXR call type based upon an Intra-nodal network configuration. For this example, the three parties involved are:

- Party A, the calling party (person originating the call)
- Party B, the redirecting party (person with call forward activated)
- Party C, the connecting party (person answering the call)

Intra-nodal scenario for CXR call type

In the Call Transfer (CXR) Intra-nodal scenario, Party A calls party B within the same node, and party B transfers the call to party C through PRI network.

Figure 26-9 illustrates the Intra-nodal network name display elements for the CXR call type.

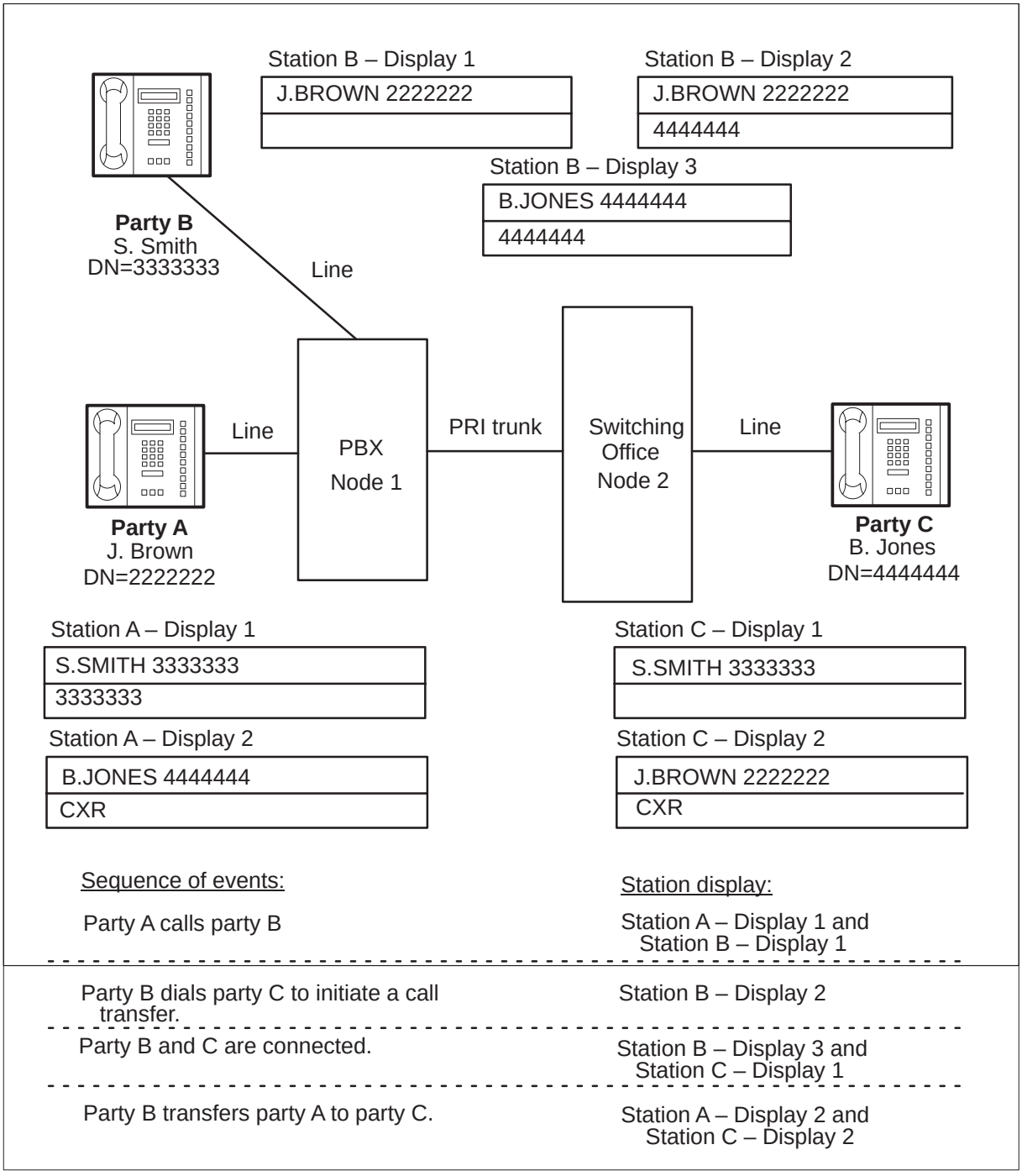
Call Waiting (CWT)

Call waiting is activated when the called party is engaged in a telephone conversation and a call arrives at the called party station and is waiting to be answered.

The following illustration shows the station display elements for the CWT call type based upon a Remote network configuration. In this example, the three parties involved are:

- Party A, the calling party (person originating the call)
- Party B, the redirecting party (person with call forward activated)
- Party C, the connecting party (person answering the call)

Figure 26-9
Intra-nodal network station display elements for CXR call type



Remote scenario for CWT call type

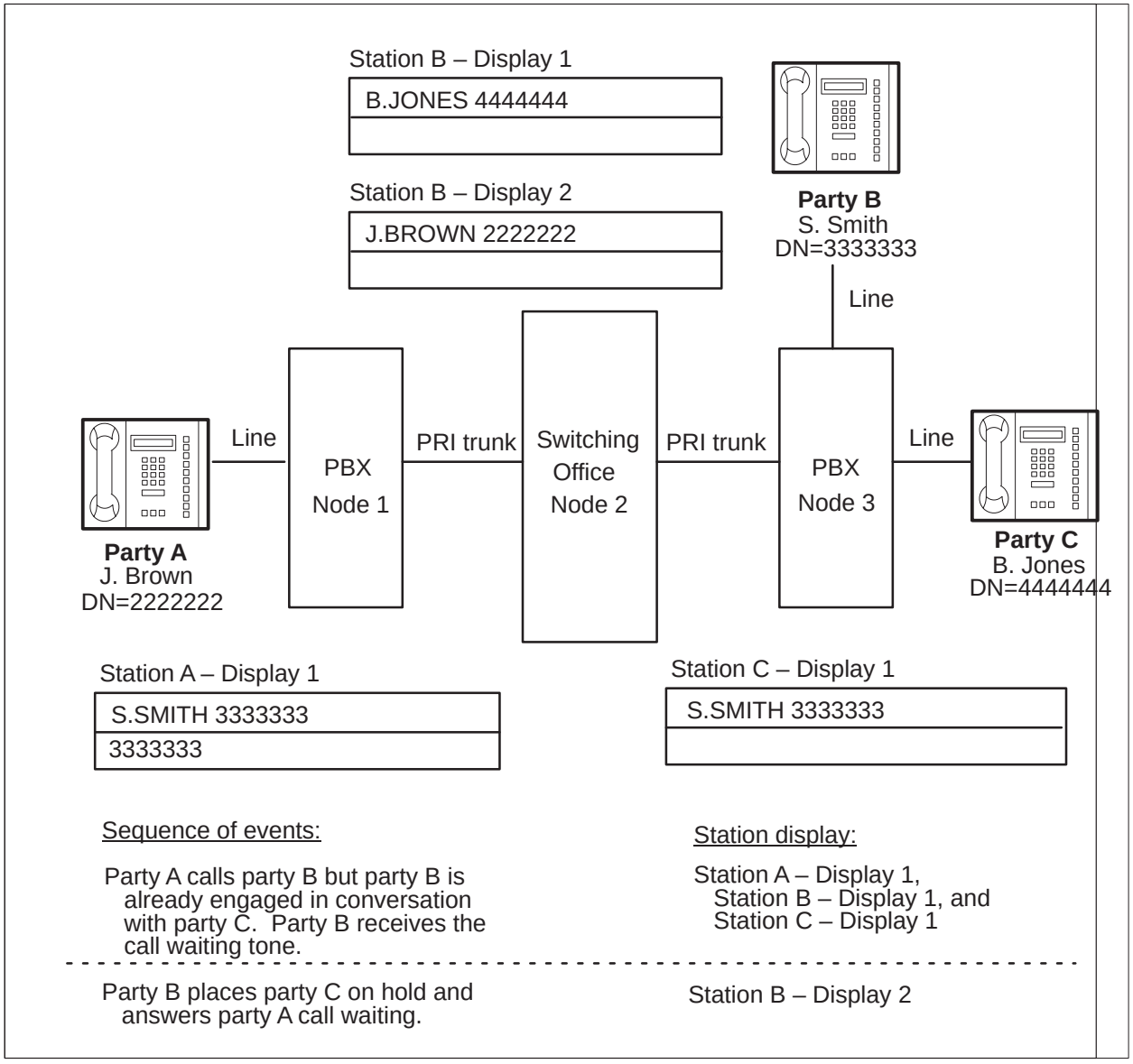
In the Call Waiting (CWT) Remote scenario, parties B and C are engaged in a conversation, and party A calls party B through PRI network. Party B is given the call waiting tone to indicate a call is waiting to be answered. Party B can answer the waiting call after holding party C or releasing party C. In either case, the display at party A's station is the same as with base call processing. No indication of call waiting is displayed.

The display at party B's station does not show party A name information until the waiting call is answered. Once the call is answered, the display format is the same as a basic line to line call. No additional information is provided to party B to indicate a waiting call.

Party B can alternate between parties A and C. In this case, the display on station B is always updated to indicate the connected party. There is no change in the display at station A or C.

Figure 26-10 illustrates the Remote network name display elements for the CWT call type.

Figure 26-10
Remote network station display elements for CWT call type



Attendant console name display

The attendant console (AC) name display area consists of one line which can accommodate up to 13 characters.

The PRI call types supported by the AC for name display are in the following list:

- incoming PRI calls to an AC
- outgoing calls from an AC to a PRI trunk

- incoming PRI calls to an AC where Attendant extends the call to a PRI trunk

Incoming call to AC

When a call terminates on an AC from an incoming PRI trunk, the calling party name is provided if the caller's DN has a name associated with it in Table DNATTR. The switching office where the AC is located checks to see if the AC has a NAME key defined and if so the calling party name is placed in the NAME key buffer. This illuminates the NAME lamp at the AC. By pressing the NAME key, the calling party NAME is displayed at the AC and the NAME lamp is turned off.

Outgoing call from AC

When a call originates from an AC over a PRI trunk, a request is sent to the terminating switch for connected party name if the AC has a NAME key defined. The terminating switch checks the connected party DN to see if it has an associated NAME in table DNATTRS. If so, the NAME information is sent to the originating switch where the AC is located. The connected party name is placed in the AC buffer which illuminates the NAME lamp at the AC. Once the NAME key is pressed, the connected party name is displayed and the NAME lamp is turned off.

Extension of calls by AC

The call extension scenario is a combination of the incoming call and outgoing call scenarios described in the above paragraphs.

Table control

No new tables or table control parameters are required for the Network Name Display feature. Existing optional parameters are used to activate this feature for lines and ACs.

Network name display table information for lines

To activate Network Name Display for lines, the following tables should be datafilled in the following order:

Table NETNAMES

Use Table 26-2 to select the Network Name Display option and select a signaling method. The signaling method selected should be SETUP signaling to maximize compatibility between other switches. Descriptions of field names for Table NETNAMES are listed in Table 26-2.

Table 26-2
Table NETNAMES field definitions

FIELD NAME	DEFINITION
NETNAME	Logical network name. Enter a value from 1–32 characters.
EXTNETID	External network ID. Enter a value from 1–32767.
NETDIGS	Number of digits used in logical network. Enter a value from 0–10.
NETOPTS	Network options. Enter NMDSP.
NMXCHG	Name exchange method. Enter SETUP to indicate signaling method.

Table NETNAME sample tuple:

PUBLIC 0 0 NMDSP SETUP

CUSTNTWK

Table CUSTNTWK assigns a network to a customer group and then assigns the name display option to that group. Descriptions of field names found in Table CUSTNTWK are listed in Table 26-3.

Table 26-3
Table CUSTNTWK field definitions

FIELD NAME	DEFINITION
CUSTNAME	Customer group name. Enter a value from 1–32 characters.
NETNAME	Enter the NETNAME assigned in Table NETNAMES.
NETCGID	External customer group ID.
OPTIONS	Enter CLID to indicate whether a customer group supports the Network Name Display for ONNET or OFFNET calls.

Table CUSTNTWK sample tuple:

CUSTGRP1 PUBLIC 1 CLID OFFNET

CUSTSTN

Table CUSTSTN assigns the network name option to a customer group. Descriptions of field names in Table CUSTNTWK are listed in Table 26-4.

Table 26-4
Table CUSTSTN field definitions

FIELD NAME	DEFINITION
OPTION NAME	Enter NAMEDISP.
OPTION	Enter NAMEDISP.

Table CUSTSTN sample tuple:

CUSTGRP1 NAMEDISP NAMEDISP

Table DNATTRS assigns a name to a specific DN. You cannot assign a name to an Attendant Console. Descriptions of field names in Table DNATTRS are listed in Table 26-5.

Table 26-5
Table DNATTRS field descriptions

FIELD NAME	DEFINITION
KEY	Enter the DN to be assigned the Network Name Display feature.
DATA	This field has two subfields; NETNAME and NETOPTS. Use the same NETNAME assigned in Table NETNAMES. Enter NAME in the NETOPTS field.

Table DNATTRS sample tuple:

613 722 7020 PUBLIC NAME S.SMITH

Network name display table information for AC

To activate Network Name Display for Attendant Consoles (AC), the FNMAP table must be datafilled.

FNMAP

Table FNMAP assigns features to each of the Attendant Console keys, 2–43. To activate Network Name Display, the NAME key must be assigned to one of these keys.

Table FNMAP sample tuple:

ATTCONS 42 SPECL NAME

where 42 is the number assignment for the NAME key

Restrictions and limitations

The following restrictions and limitations apply to the Network Name Display feature:

- In cases where the PRI network name information is not available to the switching office, display on the agent's station proceeds as if the network name option is not assigned to the line. For example, if the name information is not available, the display on the agent's station will show the DN only if the line has the CLID option specified. Otherwise, the display will default to ******** as in the case of nodal trunk display.
- The network CLID option in Table CUSTNTWK must be assigned to the customer group of the party equipped with a display station in order to have the network name displayed for ONNET or OFFNET calls. In addition, the nodal name display option, NAMEDISP in Table CUSTSTN must also be assigned to the customer group in order to display the network name information.
- The name display cannot exceed 15 characters. If more than 15 characters are received, only the first 15 are displayed.
- Name information may be datafilled in lower case letters at an MSL-100 as it is converted to upper case letters prior to display. However, switches interacting with an MSL-100 must always transport upper case letters, otherwise, name display information destined for an Attendant Console will not be properly displayed.
- In some cases when the call configuration is modified after the call setup phase, the protocol control parameters are not exchanged. Thus, the name information may not be transmitted across the network.
- In multiple call forwarding situations, only the first originally called party name is displayed.
- For call forwarding scenarios (CFU, CFB, and CFD) where the originally called station is neither located in the originating nor terminating offices, the originally called party's name is not displayed at the calling and connected parties' stations.

FGD carrier identification code expansion

The divestiture of AT&T brought forth Equal Access (EA) and the use of 3-digit carrier identification codes (CIC). These codes are assigned to long distance carriers and used by equal access end office (EAEO) and access tandem (AT) switches to direct subscriber calls to their carrier of choice.

Currently, CICs are 3 digits in length and range from 000–999 which provides 1,000 possible carrier ID assignments. However, in reality only 970 CICs can be assigned because the CICs in the 10X, 15X, and 16X ranges remain temporarily unassigned. To allow for future growth, the FGD Carrier Identification Code Expansion feature increases the number of assignable CICs from 970 to 10,000. This is accomplished by expanding the CIC range from 3 digits (000–999) to 4 digits (0000–9999).

To place a long distance call, subscribers may either presubscribe to a primary interLATA carrier (PIC) which allows them to access their carrier of choice without having to dial an access code, or they can dial a FGD carrier access code (CAC) on a per call basis. Currently, the CAC is 5-digits in length of the format 10XXX where XXX represents the 3-digit CIC. To accomodate 4-digit CICs, a new 7-digit CAC dialing plan, 101XXXX, is provided. Ultimately, this dialing plan will replace the 5-digit CAC in use today. A three phased approach shall be used to introduce 4-digit CICs and 7-digit CACs into the network.

As a result of increasing the number of CIC digits, modifications to MF and SS7 signaling have been implemented for certain trunk group types within the EAEO and AT switches. Since the EAEO and AT switches interact with interLATA carrier (IC) and international carrier (INC) switches, these signaling changes affect those switches as well. However, this feature *only* addresses the EAEO and AT switches. The IC and INC switches are briefly discussed in order to provide a comprehensive view of this feature. It should be noted that the examples and illustrations contained within this chapter reflect a single IC/INC switch. This is because an IC switch may also serve as an INC.

Phased approach to CIC expansion and CAC dialing plan conversion

The expansion of FGD CICs and the addition of a 7-digit CAC dialing plan will be implemented in three phases; Transitional I, Transitional II, and Final Conversion. This phased approach allows subscribers to gradually transition from a 5-digit CAC to a 7-digit CAC dialing plan as well as aides customers in transitioning their networks from 3- to 4-digit CICs.

Transitional I phase

In the Transitional I phase, 4-digit CICs are assignable for both 5- and 7-digit CAC dialing plans. In this initial phase, the 4-digit CIC is created by adding a zero in front of the existing 3-digit CIC. This change is transparent to users dialing a 5-digit CAC since the current format, 10XXX, already has a zero prefix on the 3-digit CIC. Initially, the 7-digit CAC dialing plan will be in the format 1010XXX where the last 4 digits contain the CIC digits. In this phase, the first digit of the CIC must contain a zero. In a later phase, this restriction is removed.

The following restrictions apply in the Transitional I phase:

- For both 5- and 7-digit CAC dialing plans, the first digit of the CIC *must* begin with 0 (zero), for example, 1**0XXX** and 101**0XXX.**
- For the 7-digit CAC dialing plan, *only* the 0XXX CIC series is supported.
- For the 5-digit CAC dialing plan, the CIC series 010X, 015X, and 016X are *not* supported. This is so the switch can distinguish between 5- and 7-digit CACs. An example of how this applies can be seen when a user dials a CAC number where digit 10 appears in digit locations 3 and 4 of the CAC received (such as 10**10**XXX). If this occurs, the switch assumes a 7-digit CAC was dialed since the CIC series 010X is not valid for 5-digit CACs.

Should a subscriber dial an unsupported CAC, the call will be routed to vacant code treatment. See Table 27-1 for a summary of the Transitional I phase.

Table 27-1
Transitional I phase

Phase No.	Phase Name	Valid CACs	Total CICs available
1	Transitional I	1**0XXX** 101**0XXX**	970

Transitional II phase

In the Transitional II phase, the 5-digit CAC dialing plan is supported as described in the Transitional I phase, and the 7-digit CAC dialing plan is expanded to include the 5XXX and 6XXX CIC series. This expansion will occur when carriers are assigned to this series of CICs. The net result is the number of assignable CICs increases to 2,970.

In the Transitional II phase, the following restriction applies:

- For 5-digit CACs, the 010X, 015X, and 016X series CICs are *not* supported. The reason for maintaining this restriction is so the switch can distinguish between 5- and 7-digit CACs for the 5XXX and 6XXX CIC series. An example of how this applies can be seen when a user dials a CAC number where digits 15 or 16 appear in digit locations 3 and 4 of the CAC received (such as 10**15**XXX or 10**16**XXX). If this occurs, the switch assumes a 7-digit CAC was dialed since the CIC series 015X and 016X are not valid for 5-digit CACs.

Should a subscriber dial an unsupported CAC, the call will be routed to vacant code treatment. See Table 27-2 for a summary of the Transitional II phase.

Table 27-2
Transitional II phase

Phase No.	Phase Name	Valid CACs	Total CICs available
2	Transitional II	1**0XXX** 101**0XXX** 101**5XXX** 101**6XXX**	2,970

Final conversion phase

The final phase will be a total conversion from 5- to 7-digit CACs which means the full 10,000 CICs are assignable. In this phase, the 5-digit CACs are no longer supported, therefore, if a 5-digit CAC is dialed, the call will be routed to treatment. See Table 27-3 for a summary of the Final Conversion phase.

Table 27-3
Final conversion phase

Phase No.	Phase Name	Valid CACs	Total CICs available
3	**Final conversion phase**	101**XXXX**	10,000

This three-phased approach to introduce 4-digit CICs is controlled by office parameters EAEO_FOUR_DIGIT_CIC_STATUS (applicable only to the EAEO switch), and office parameter EA_TAB_CICSIZE4_OBSOLETE (applicable to both the EAEO and AT switches). These parameters are described in detail in the Office Parameter section of this chapter. Additionally, a new data schema table and modifications to existing tables are required to support this feature. These changes are described in the Table Requirements section of this chapter.

Lines and trunk groups supported by FGD CIC expansion feature

The lines, trunk groups, and signaling protocols supported by the FGD CIC Expansion feature are listed in Table 27-4. Figure 27-1 illustrates the MF and SS7 trunk group interworking supported between the EAEO, AT, and IC/INC switches.

Table 27-4
Lines and trunk groups and signaling protocols supported by FGD CIC expansion

Line and Trunk Group Type	Signaling Type	Line/Trunk Direction and Switch Type
POTS lines	MF	Incoming EAEO
TIE lines	MF	Incoming EAEO
FX lines	MF	Incoming EAEO
IBN lines	MF	Incoming EAEO
RES lines	MF	Incoming EAEO
ISDN lines	BRI/PRI	Incoming EAEO
P2/PX trunks	MF	Incoming EAEO
MDC/Datapath trunks	MF	Incoming EAEO

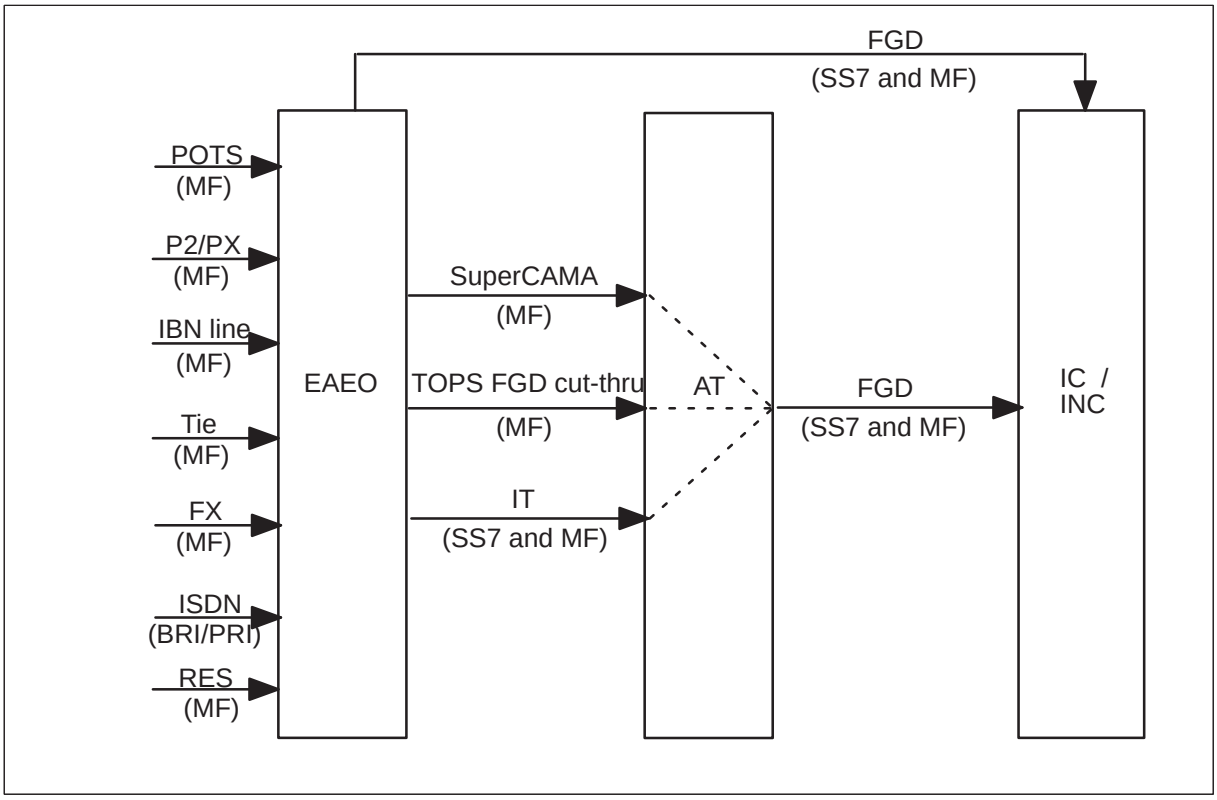
—continued—

Table 27-4
Lines and trunk groups and signaling protocols supported by FGD CIC expansion (continued)

Line and Trunk Group Type	Signaling Type	Line/Trunk Direction and Switch Type
SuperCAMA (SC) trunks	MF	Outgoing EAEO and incoming AT
TOPS FGD cut-through trunks	MF	Outgoing EAEO and incoming AT
Intertoll (IT) trunks	SS7 and MF	Outgoing EAEO and incoming AT
Feature Group D (FGD) trunks	SS7 and MF	Outgoing AT and incoming IC/INC, Outgoing EAEO and incoming IC/INC

—end—

Figure 27-1
FGD equal access switching configuration



Signaling changes required to support FGD CIC expansion

This section focuses on the changes made to multifrequency (MF) and signaling system-7 (SS7) signaling for trunk groups supported by the FGD CIC Expansion feature. For a clear understanding of these changes, it is necessary to understand the current MF Equal Access Plan (EAP) signaling between the EAEO, AT, and IC/INC switching units. Table 27-5 illustrates MF EAP signaling for domestic, international inside World Zone 1, and international oustide World Zone 1 call types. Terminology referenced in the illustration is defined in the following list.

- EAEO—Equal Access End Office
- AT—Access Tandem
- IC—InterLATA Carrier (an IC can also serve as an International Carrier (INC))
- PIC—Primary InterLATA Carrier
- SC—SuperCama
- XXX—signifies 3-digit Carrier Identification Code (CIC)
- 0ZZ—these digits are chosen from spare toll center codes in the LATA and signify to the AT that translation of the XXX digits are necessary in order to derive the carrier identity. These digits also signify the type of call to the AT so that the AT may route calls over more than one trunk group to an IC or INC.
- 1NX/1N'X—these digits are used in the same fashion as the 0ZZ by an INC. Additionally, N signifies non-operator assisted call and N' signifies operator assisted calls. A carrier is allowed up to four of these 3-digit codes.
- II—these digits are information digits signifying ONI, ANI failure, hotel without room identification, coinless, hospital, interLATA restricted, test call, and others.
- CCC—represents a country code padded to 3 digits with leading zeros.
- NN—signifies the national number
- 01R—is a 3-digit sequence consisting of the "1" country code padded with a leading zero, and the R which distinguishes between the various regions based upon NPA. The NPA, in this case, is outside the continental U.S. but inside World Zone 1.
- ST2P—identifies EAEO coin calls and calls coming from non-conforming Equal Access End Offices.
- ST3P—identifies calls coming from conforming Equal Access End Offices.

Table 27-5
Domestic and international call types and associated MF EAP signaling

Subscriber dialed digits/ DMS call type	EAEO outpulsing	AT incoming	IC/INC incoming
MF EAP SIGNALING FOR DOMESTIC CALLS			
10XXX + 0– Cut-through to IC Operator Service	KP + 0ZZ + XXX + ST KP + (II + ANI) + ST KP + 0 + ST	KP + 0ZZ + XXX + ST —	— KP + (II + ANI) + ST KP + 0 + ST
10XXX + # Cut-through to IC	KP + 0ZZ + XXX + ST KP + (II + ANI) + STP	KP + 0ZZ + XXX + ST —	— KP + (II + ANI) + STP
10XXX + N(N) InterLATA/ IntraLATA Interstate/ Intrastate SC1 or SC2	KP + 0ZZ + XXX + ST KP + (II + ANI) + ST KP +7/10D + ST	KP + 0ZZ + XXX + ST —	— KP + (II + ANI) + ST KP +7/10D + ST
10XXX + (1/0) + 7/10D or 10XXX + N(N) InterLATA/ IntraLATA Interstate/ Intrastate DD/OA call SC1 or SC2	KP + 0ZZ + XXX + ST KP + (II + ANI) + ST KP + (0) + 7/10D +ST	KP + 0ZZ + XXX + ST —	— KP + (II + ANI) + ST KP + (0) + 7/10D +ST
1+7/10D or N(N) InterLATA/ Interstate/ Intrastate Uses PIC or Default Carrier SC1 or SC2	KP + 0ZZ + XXX + ST KP + (II + ANI) + ST KP +7/10D + ST		— KP + (II + ANI) + ST KP +7/10D + ST

—continued—

Table 27-5
Domestic and international call types and associated MF EAP signaling (continued)

MF EAP SIGNALING FOR DOMESTIC CALLS			
950–WXXX Transitional Plan	KP + 0ZZ + XXX + ST ——————— KP+ (II + ANI) + ST3P or (ST2P)	KP + 0ZZ + XXX + ST ——————— — KP + 0ZZ + XXX + ST ——————— —	——————— — KP+ (II + ANI) + ST3P or (ST2P)
MF EAP SIGNALING FOR INTERNATIONAL CALLS INSIDE WZ1			
10XXX + 0– Cut-through to INC Operator Service	KP + 1N'X + XXX + 000 + ST ——————— KP + (II + ANI) + ST KP + 0 + ST	KP + 1N'X + XXX + 000 + ST ——————— —	
10XXX + # Cut-through to INC	KP + 1NX + XXX + 000 + ST ——————— KP + (II + ANI) + STP	KP + 1NX + XXX + 000 + ST ——————— —	
10XXX + N(N) International DD call to SC1 or SC2	KP + 1NX + XXX + 01R + ST ——————— KP + (II + ANI) + ST KP + 10D + ST	KP + 1NX + XXX + 01R + ST ——————— —	
10XXX + 0 + 10D International Operator Assisted call	KP + 1N'X + XXX + 01R + ST ——————— KP + (II + ANI) + ST KP + 0 + 10D + ST	KP + 1N'X + XXX + 01R + ST ——————— —	

—continued—

Table 27-5
Domestic and international call types and associated MF EAP signaling (continued)

MF EAP SIGNALING FOR INTERNATIONAL CALLS INSIDE WZ1			
10XXX + 1 + 10D International DD call	KP + 1NX + XXX + 01R + ST KP + (II + ANI) + ST KP + 0 + 10D + ST	KP + 1NX + XXX + 01R + ST —	
1 + 10D or N(N) International Uses PIC or Default Carrier SC1 or SC2	KP + 1NX + XXX + 01R + ST KP + (II + ANI) + ST KP + 10D + ST		
MF EAP SIGNALING FOR INTERNATIONAL CALLS OUTSIDE WZ1			
10XXX + 01 + CC + NN International Operator Assisted call	KP + 1N'X + XXX + CCC + ST KP + (II + ANI) + ST KP + CC + NN + ST	KP + 1N'X + XXX + CCC + ST —	KP + 1N'X + XXX + CCC + ST — KP + (II + ANI) + ST KP + CC + NN + ST
10XXX + 011 + CC + NN International DD call	KP + 1NX + XXX + CCC + ST KP + (II + ANI) + ST KP + CC + NN + ST	KP + 1NX + XXX + CCC + ST —	KP + 1NX + XXX + CCC + ST — KP + (II + ANI) + ST KP + CC + NN + ST
01 + CC + NN International Uses PIC or Default Carrier	KP + 1N'X + XXX + CCC + ST KP + (II + ANI) + ST KP + 10D + ST	KP + 1N'X + XXX + CCC + ST —	KP + 1N'X + XXX + CCC + ST — KP + (II + ANI) + ST KP + 10D + ST
—end—			

MF signaling changes

Changes to MF EAP signaling allow 4-digit CICs (XXXX) to be transmitted over MF trunk groups; Intertoll (IT), SuperCAMA (SC), TOPS FGD cut-through, and FGD.

The decision to send a 3- or 4-digit CIC is driven by the new office parameter EA_TAB_CICSIZE4_OBSOLETE which is described in detail in the Office Parameter section of this chapter. Basically, this office parameter when set to N, forces the switch to perform a lookup in Table CICSIZE4 to determine if a 3- or 4-digit CIC should be received over a specific incoming trunk or outpulsed over a given terminating trunk. (Table CICSIZE4 is described in the Table Requirements section of this chapter.) When the parameter EA_TAB_CICSIZE4_OBSOLETE is set to Y, a 4-digit CIC is *always* received or outpulsed over MF trunks regardless of the datafill in Table CICSIZE4.

SS7 signaling changes

Changes to SS7 signaling allow 4-digit CICs (XXXX) to be transmitted over SS7 FGD trunks and SS7 Intertoll (IT) trunks. To implement 4-digit CICs over these trunk groups, a change is required to the optional Transit Network Selection (TNS) parameter which is transported in the Initial Address Message (IAM). The IAM contains call setup information as shown in Table 27-6.

Table 27-6
Equal access initial address message content

Parameter	Type
Message Type	Mandatory
Nature of Connection Indicator	Mandatory
Forward Call Indicator	Mandatory
Calling Party Category	Mandatory
User Service Information	Mandatory
Called Party Number	Variable
Calling Party Number	Optional
Charge Number	Optional
Originating Line Information	Optional

—continued—

Table 27-6
Equal access initial address message content

Parameter	Type
Transit Network Selection	Optional
Carrier Selection	Optional
—end—	

Table 27-7
Equal access initial address message content

Parameter	Type
Message Type	Mandatory
Nature of Connection Indicator	Mandatory
Forward Call Indicator	Mandatory
Calling Party Category	Mandatory
User Service Information	Mandatory
Called Party Number	Variable
Calling Party Number	Optional
Charge Number	Optional
Originating Line Information	Optional
Transit Network Selection	Optional
Carrier Selection	Optional

The TNS parameter contains a circuit code and carrier identification code (CIC). The circuit code is equivalent to the 0ZZ/1NX/1N'X digits outpulsed with MF EAP signaling. The Carrier Identification Code (CIC) contains the XXX code dialed for CAC calls (such as 10XXX) or the XXX code of the subscriber's primary interLATA carrier (PIC) for presubscribed calls. With the implementation of 4-digit CICs, the TNS parameter can now support both 3- and 4-digit CICs.

For EAEO switches, the TNS parameter is included in the IAM for domestic and international calls routed to the AT, and is *only* included in the IAM for international calls routed directly to the IC/INC. For domestic calls routed directly to the IC/INC, the TNS is *not* included because it is assumed the carrier identified by the CIC is routing the call, therefore, it does not need to receive its own CIC digits. For international calls, the TNS is sent because it

is possible for a carrier to subcontract the routing of its international calls to another carrier, therefore, the carrier ID is transported in the TNS parameter for international calls.

For calls being routed from AT switches to an IC/INC, the TNS parameter is *only* included in the IAM for international calls. For domestic calls, the TNS is not included in the IAM for reasons described in the previous paragraph.

The decision to send a 3- or 4-digit CIC over an SS7 trunk group is driven by the new office parameter EA_TAB_ CICSIZE4_OBSOLETE and Table CICSIZE4 as described in the MF signaling section.

EAEO and AT CIC digit manipulation

During the phases where both 3-and 4-digit CICs are supported (Transitional I and II), it is possible for the CIC digits received to differ from the number of CIC digits expected over a given trunk group or outpulsed over a given trunk group. The following describes these scenarios from EAEO and AT switch perspectives.

EAEO CIC digit processing

If a 3-digit CIC is received at the EAEO and is to terminate to an MF trunk group that is datafilled in Table CICSIZE4 (meaning a 4-digit CIC is to be outpulsed over this trunk group), the switch prefixes a leading zero to the dialed digits to form a 4-digit CIC. These digits are then verified against the CIC entries in Table OCCINFO which contains all valid CICs. After digit verification is completed, the 4-digit CIC is outpulsed to the AT or IC/INC for further processing.

If a 4-digit CIC is received at the EAEO and is to terminate to an MF trunk group that is *not* datafilled in Table CICSIZE4 (meaning a 3-digit CIC is to be outpulsed over this trunk group), the leading CIC digit is deleted to form a 3-digit CIC. However, prior to digit deletion, the 4-digit CIC dialed by the subscriber is verified in Table OCCINFO as this table contains only 4-digit entries. After CIC verification is completed, the switch deletes the leading digit and outpulses the 3-digit CIC to the AT or IC/INC. In this scenario, if the leading CIC digit deleted is *non-zero*, DFIL log 147 is generated and the call is blocked. The reason for blocking the call is to prevent outpulsing of a CIC that represents a different carrier ID than the one originally dialed.

AT CIC digit processing

If a 3-digit CIC is received at the AT over a trunk group that is datafilled in Table CICSIZE4 (meaning a 4-digit CIC is expected over this trunk group), the switch generates log DFIL145 and the call is allowed to complete.

If a 4-digit CIC is received at the AT over a trunk group that is *not* datafilled in Table CICSIZE4 (meaning a 3-digit CIC is expected over this trunk group), the switch generates log DFIL146 and the call is allowed to complete.

In either of the two scenarios above, if the call received is to terminate to a trunk group that does not support the number of CIC digits received, the AT prefixes and deletes the leading CIC digit as described in the EAEO section. As with the EAEO scenario, if the leading digit deleted is non-zero, log DFIL147 is generated and the call is blocked.

Trunk group conversion from 3- to 4-digit CICs

Trunk groups may only be converted from 3- to 4-digit CICs on a per trunk group basis. There should never be a scenario where both 3- and 4-digit CICS are received over the same trunk group. Trunk groups that carry 4-digit CICs must be datafilled in Table CICSIZE4, and the office parameter EA_TAB_CICSIZE4_OBSOLETE must be set to N. Trunk groups still carrying 3-digit CICs should not be datafilled in table CICSIZE4. Once an office is totally converted to 4-digit CICs, the office parameter EA_TAB_CICSIZE4_OBSOLETE can optionally be set to Y to eliminate datafill requirements for table CICSIZE4. Please reference the Office Parameter and Table Requirements sections of this chapter for further information on the aforementioned parameter and table.

E800 and private virtual network (PVN) changes required as a result of FGD

CIC digits are used in processing NSC (Number Service Code) type calls, E800 and PVN. With the implementation of 4-digit CICs, modifications were made to allow these call types to continue functioning properly. Changes to E800 and PVN include the following:

- Allow E800 and PVN calls containing 4-digit CICs to be transmitted over FGD CIC supported trunk groups to an AT that has access to a Service Control Point (SCP) database.
- Modify Subtable STDPRT to translate 4-digit CICs received at the AT for NSC type calls, E800 and PVN.

Note: The FGD CIC expansion feature does *not* support transmittal of 4-digit CICs to/from an SCP for E800 or PVN database queries and responses.

E800 and PVN calls are translated in the EAEO using the EA selector and can be carried over MF or SS7 facilities to the AT. A special CIC (usually 0110) is datafilled in Table OCCINFO to identify E800 and PVN calls.

The EAEO transmits the E800 and PVN call information in the format 0ZZXXX or 0ZZXXXX depending on whether a 3- or 4-digit CIC is required on the trunk group terminating to the AT. Once the digits arrive at the AT, the digits are translated using the NSC selector in Subtable STDPRT. The selector identifies the call as either E800 or PVN. Previously, only 6 digits could be datafilled in Subtable STDPRT using the NSC selector. With the FGD CIC Expansion feature, both 6 and 7 digit numbers are supported (such as 0ZZXXX and 0ZZXXXX).

The Office Engineering parameter SSP_NSC_CARRIER_ID stores the NSC CIC digits datafilled in Table OCCINFO, however, the value is stored as a 3-digit CIC (usually 110). During processing, the CIC received with the NSC call is compared with the office parameter's CIC digit. When a 4-digit CIC is received at the AT (0ZZXXXX), the leading CIC digit is deleted before comparing the CIC with office parameter SSP_NSC_ CARRIER_ID.

Sample datafill for Subtable STDPRT and Office Engineering parameter SSP_NSC_CARRIER_ID is shown in Table 27-8.

Table 27-8
Sample datafill for Subtable STDPRT and office parameter SSP_NSC_CARRIER_ID

Table STDPRTCT, Subtable STDPRT sample datafill		
Fromdigs	Todigs	PRERTSEL
092110	092110	NSC DD 6 6 PVN NA
0920110	0920110	NSC DD 7 7 PVN NA
Office parameter SSP_NSC_CARRIER_ID sample datafill		
SSP_NSC_CARRIER_ID 110		

Figure 27-2 is an example of E800 and PVN processing using a 4-digit CIC.

Figure 27-2
E800 and PVN processing using a 4-digit CIC

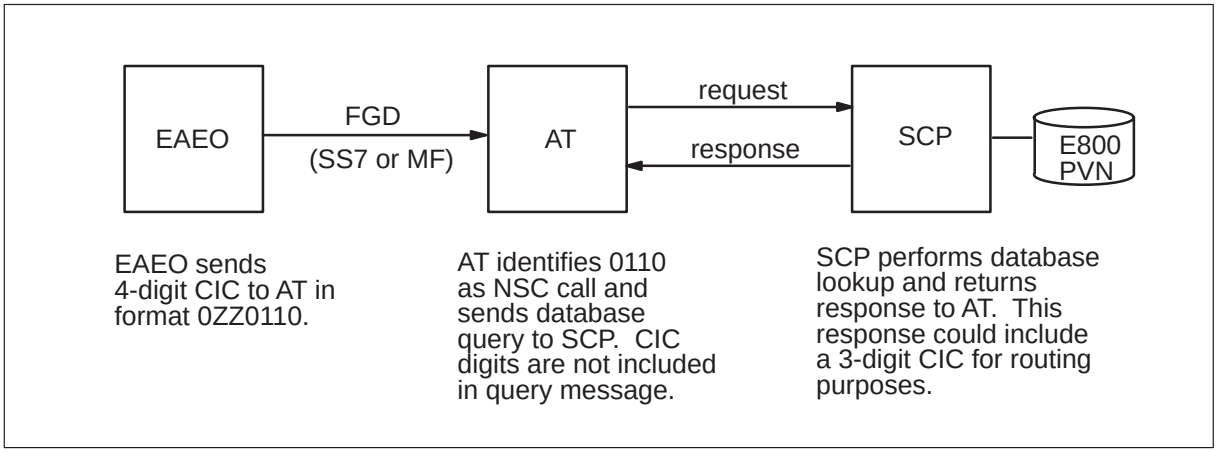


Table requirements for FGD CIC Expansion

To support the FGD CIC Expansion feature, a new table called CICSIZE4 was created and existing tables, OCCINFO, STDPRT, and IBNXLA, were modified. Descriptions of these tables are found in the following sections.

Table CICSIZE4

Table CICSIZE4 was created so customers could specify the trunk groups that will transmit 4-digit CICs. The key field, TRUNKGRP, is the only field in the table and is datafilled with the trunk group CLLI name. Trunk groups not appearing in table CICSIZE4 are assumed to use 3-digit CICs. Prior to specifying a trunk group in this table, it is necessary to ensure the terminating office is capable of receiving 4-digit CICs over this trunk group.

Note: Table CICSIZE4 only exists if the FGD CIC Expansion feature is present.

Table OCCINFO modifications

Table OCCINFO has been modified to include one new parameter, ORIGCARR, as well as change an existing parameter, CARRNUM. These modifications are described in subsequent paragraphs.

Note: The OCCINFO table modifications are in affect regardless of whether or not the FGD CIC Expansion feature is present.

Table OCCINFO stores the CIC digits used to process a FGD Equal Access call. Prior to this feature, the CIC digits stored in field CARRNUM were 3 digits in length. With the implementation of FGD CIC expansion, the CARRNUM field is increased to 4 digits. To accomodate this new requirement, all 3-digit CICs must be prefixed with a leading digit of zero.

Note: Although the range of values includes N, this value is no longer a valid entry for CARRNUM.

Addition of new parameter, ORIGCARR

A new parameter, ORIGCARR (Original Carrier), was added to Table OCCINFO and appears after field ACCESS. Although this field does not have direct bearing on FGD CIC expansion, it addresses a long standing problem with the OCCINFO table relative to reverse mapping features such as Number Services Calls (NSC).

ORIGCARR is used to explicitly specify whether a carrier is to be regarded as the original or prime carrier when more than one carrier is entered with the same carrier number. Prior to BCS35, this information was *implied* using the scheme that the last carrier name entered with the same carrier number was understood to be the original carrier. Features such as NSC used the *implied* method to map CICs obtained from a database query against original carrier data located in Table OCCINFO. By adding the ORIGCARR field, a more straightforward method is provided to identify the original carrier for CIC mapping.

The rules that apply to original carrier identification are listed below.

- If there are *no* duplicate carriers (such as multiple carriers sharing the same carrier number), then all carriers are considered original and field ORIGCARR is set to Y for each tuple.
- If there are duplicate carriers, then only one carrier can be designated as an original carrier (ORIGCARR = Y).

It is possible to have carrier numbers for which no original carrier assignment is specified. As a reminder that this situation exists, a warning is issued each time a tuple is added with a carrier number that does not have an original carrier specified.

A warning is also issued each time an original carrier's status changes from original to duplicate (ORIGCARR = N) or the original carrier tuple is deleted while other carriers exist with the same carrier number.

Table STDPRT modifications

Table STDPRT is the subtable of Table STDPRTCT. No new fields are added to this subtable, however, the range of values for the NSC PRESEL field, FROMDIGS and TODIGS**,** have been expanded to accomodate both 6 and 7 digits. This allows the switch to process NSC type calls such as E800 and PVN with 4-digit CICs (such as 0ZZXXXX). If the number of digits is other than 6 or 7, an error message "NEED 6 OR 7 DIGITS FOR NSC REROUTE SELECTOR" will be generated.

Table IBNXLA modifications

No new fields are added to this table. The only new element is a warning message that is generated when attempting to datafill the EA selector when using more than 2 IBN prefix digits. The reason for this is that the digit register has a 24-digit limitation and any calls exceeding the register will result in call failure. A situation where this could occur is with direct dial international calling where more than 2 IBN digits and a 4-digit CIC are encountered (such as YYY–101XXXX–011–44–1234567890 where YYY are the IBN digits). The new warning message generated for this condition indicates “12 DIGIT INTERNATIONAL CALLS MAY NOT COMPLETE WITH MORE THAN 2 IBN PREFIX DIGITS.”

Office parameter requirements for the EAEO

Office parameter EAEO_FOUR_DIGIT_CIC_STATUS only applies to line and P2/PX trunk dialing, therefore, this parameter only appears in the EAEO switch. It controls Line Module (LM) digit collection using the settings described below to determine if a valid CIC is received.

- THREEDIG—This setting defines the dialing plan that exists today where 3-digit CICs and 5-digit CAC dialing are valid (that is, 10XXX). THREEDIG is the default setting for this office parameter.
- PERMISSIVE—This setting applies to the Transitional I and II phases where 4-digit CICs and 5- and 7-digit CAC dialing plans are valid (such as 10XXX, 1010XXX, 1015XXX, and 1016XXX).
- FOURDIG—This state is set when only 7-digit CACs are accepted. The final format for the 7-digit CAC is 101XXXX.

A summary of office parameter settings and associated CAC dialing plan phases for parameter EAEO_FOUR_DIGIT_CIC_ STATUS is found in Table 27-9.

Table 27-9
EAEO_FOUR_DIGIT_CIC_STATUS parameter summary

Parameter Setting	Phase	Valid CACs	Total No. of CICs
THREEDIG	Current	10**XXX**	970
PERMISSIVE	Transitional I	1**0XXX** 101**0XXX**	970

—continued—

Table 27-9
EAEO_FOUR_DIGIT_CIC_STATUS parameter summary (continued)

Parameter Setting	Phase	Valid CACs	Total No. of CICs
PERMISSIVE	Transitional II	1**0XXX** 101**0XXX** 101**5XXX** 101**6XXX**	2,970
FOURDIG	Final Conversion	101**XXXX**	10,000
—end—			

Determining which digit sequences are valid will be made using the status of the above office parameter setting along with digit sequence analysis.

Changes to parameter EAEO_FOUR_DIGIT_CIC_STATUS are immediate, no restart is required. However, after changing the office parameter, the peripheral static data must be reloaded in order for digit collection to change.

Office parameter EA_TAB_CICSIZE4_OBSOLETE

Office parameter EA_TAB_CICSIZE4_OBSOLETE is used to determine whether or not Table CICSIZE4 is obsolete. This parameter appears in both EAEO and AT switches.

When full 4-digit CIC conversion has been achieved, Table CICSIZE4 is no longer needed for processing FGD CIC calls. Therefore, this office parameter should be set to Y to prevent the switch from accessing this table. When this parameter is set to N, the EAEO and AT shall continue accessing Table CICSIZE4 to process FGD CIC calls. The default value is set to N.

Note: This office parameter should only be set to Y when there are no more trunks carrying 3-digit CIC traffic. To emphasize this, a warning message is generated when this parameter is activated.

Changes to parameter EA_TAB_CICSIZE4_OBSOLETE are immediate, no restart is required. Once changed to Y, Table CICSIZE4 is no longer referenced.

Log requirements for FGD CIC expansion

The logs listed below have either been added or modified as a result of the FGD CIC Expansion feature. An explanation of each log is found in subsequent paragraphs.

- DFIL145—added
- DFIL146—added
- DFIL147—added
- DFIL122—modified

Log DFIL145

The DFIL145 log report is generated by the AT switch when the CIC received from the EAEO consists of 4 digits, but Table CICSIZE4 datafill indicates the trunk group over which the CIC was received supports 3-digit CICs. When this condition exists, this log is generated and the call is allowed to complete.

An example of the DFIL145 log report format is as follows:

```
DFIL145  JAN01  22:22:20  3245 INFO  Datafill  Error
CLLI
4 digit CIC was received over a trunk group that supports 3 digit CICs only.
Refer to table CICSIZE4.
Digits Received = YYYYYYY (such as 0ZZXXXX)
```

If this log is received, corrective action to be taken is to verify if the trunk group should be carrying 4-digit CICs, and if so, add the trunk group CLLI to Table CICSIZE4, or set office parameter TAB_CICSIZE4_OBSOLETE to Y. TAB_CICSIZE4_OBSOLETE must only be set to Y when the Access Tandem switch supports 4-digit CICs on ALL trunk groups. If 3-digit CICs rather than 4-digit CICs are to be supported over the trunk group, datafill corrections are required at the originating switch to send 3-digit CICs.

Log DFIL146

The DFIL146 log report is generated by the AT switch when the CIC received from the EAEO consists of 3 digits, but Table CICSIZE4 datafill indicates the trunk group over which the CIC was received supports 4-digit CICs. When this condition exists, this log is generated and the call is allowed to complete.

An example of the DFIL146 log report format is as follows:

DFIL146 JAN01 22:22:20 3245 INFO Datafill Error
CLLI

3 digit CIC was received over a trunk group that supports 4 digit CICs only. Refer to table CICSIZE4.

Digits Received = YYYYYY (such as 0ZZXXX)

If this log is received, corrective action to be taken is to verify if the trunk group should be carrying 3-digit CICs, and if so, remove the trunk group CLLI from Table CICSIZE4 and ensure office parameter TAB_CICSIZE4_OBSOLETE is set to N. If 4-digit CICs rather than 3-digit CICs are to be supported over the trunk group, datafill corrections are required at the originating switch to send 4-digit CICs.

Log DFIL147

The DFIL147 log report is generated by the AT or EAEO when attempting to convert a 4-digit CIC to a 3-digit CIC and the leading CIC digit deleted is non-zero. Should this occur, log DFIL147 is generated and the call is blocked.

An example of the DFIL147 log report format is as follows:

DFIL147 JAN01 22:22:20 3245 INFO Datafill Error
CLLI

Attempting to outpulse a 4 digit CIC over a trunk group that supports 3 digit CICs only. Refer to table CICSIZE4

Digits Received = YYYYYYYYYY (such as 1NX XXXX CCC)

If this log is received, corrective action to be taken is to verify if the trunk group should be carrying 4-digit CICs, and if so, add the trunk group CLLI to Table CICSIZE4, or set office parameter TAB_CICSIZE4_OBSOLETE to Y. TAB_CICSIZE4_OBSOLETE must only be set to Y when the switch supports 4-digit CICs on ALL trunk groups. If 3-digit CICs rather than 4-digit CICs are to be supported over the trunk group, check translations to determine why a 4-digit CIC with a non-zero leading digit is being routed to a 3-digit CIC trunk group.

If this log is received, corrective action to be taken is to verify if the trunk group should be carrying 4-digit CICs, and if so, add the trunk group CLLI to Table CICSIZE4, or set office parameter TAB_CICSIZE4_OBSOLETE to Y. TAB_CICSIZE4_OBSOLETE must only be set to Y when the switch supports 4-digit CICs on ALL trunk groups. If 3-digit CICs rather than

4-digit CICs are to be supported over the trunk group, check translations to determine why a 4-digit CIC with a non-zero leading digit is being routed to a 3-digit CIC trunk group.

Log DFIL122

The DFIL122 log report is generated by the AT switch when the IAM received from the EAEO over an SS7 IT trunk group contains a TNS parameter which has no corresponding entry in Table CKTDIGIT. Table CKTDIGIT is used to derive the OZZ/1NX digits based on the Circuit Code received in the TNS parameter. The DFIL122 log report is modified by this feature to output a 4-digit CIC rather than a 3-digit CIC in the log text. If a 3-digit CIC is received in the TNS parameter, a zero is prefixed to the 3-digit CIC and the resulting 4-digit CIC is included in the log text.

An example of the DFIL122 log report format is as follows:

```
DFIL122  JAN01  22:22:20  3245  INFO  Missing Datafill
CLLI

Missing tuple in Table CKTDIGIT

Carrier Name=XXX

Carrier Digits=YYYY

Circuit Code=N
```

If this log is received, corrective action to be taken is to add the appropriate tuple to Table CKTDIGIT.

Automatic message accounting requirements for FGD CIC expansion

The IC/INC Carrier Prefix field of the automatic message accounting (AMA) billing record supports 4-digit CICs. This change involves using the first BCD character of the IC/INC Identification code to store the first digit of a 4-digit CIC. This BCD character was previously padded with zero, therefore, the change does not affect the length of the IC/INC PREFIX field which remains 6 characters. The contents of the IC/INC PREFIX field is shown in Table 27-10.

Table 27-10
Contents of the IC/INC PREFIX field in the AMA billling record

BCD character	Description
1 – 4	IC/INC Identification
5	0 = Operator Involved: CIC + 0+ CIC + 0– CIC + 01+ where CIC is either 10XXX or 101XXXX 1 =Direct Dialed: CIC + 1+ CIC + 011+ where CIC is either 10XXX or 101XXXX 2 =Cannot determine if IC/INC Operator involved
6	SIGN (hex C)

The IC/INC PREFIX is generated for Call Codes listed in Table 27-10 for FGD originating and terminating billing records.

Network conversion strategy

It is recommended that transitioning the network from 3- to 4-digit CICs be accomplished in stages as outlined below. However, this FGD CIC Expansion feature focuses *only* on points 2 and 3. The remaining items are listed to provide a more comprehensive view of the overall network transition requirements.

- When 4-digit CIC messaging between the AT and Service Control Point (SCP) database systems is available, users should populate their databases with valid 4-digit CICs based upon CIC specifications as defined in the 3 phased approach (such as Transitional I, II, and Final Conversion). The system should be designed to support both 3- and 4-digit CIC queries and responses. As explained in the E800 and PVN section, messaging between the AT and SCP is *not* provided by this FGD CIC Expansion feature.
- Convert the ATs to accept 4-digit CICs on a per trunk group basis for traffic received from upgraded EAEOs. Additionally, the AT must continue to support 3-digit CICs on a per trunk group basis from those EAEOs that have not yet been upgraded to support 4-digit CICs.

- Convert EAEO to accept both 5- and 7-digit CACs for the Permissive dialing phase, then reject 5-digit CACs at the end of this phase. The EAEO must be able to transmit 3- and 4-digit CICs on a per trunk group basis (that is, send 3-digit CICs to non-upgraded ATs and 4-digit CICs to upgraded ATs).
- Convert InterLATA carrier switches (IC/INCs) to accept 4-digit CICs on a per trunk group basis for international calls only.

Datafill strategy for phased cutover to 4-digit CICs

This section outlines the strategy for activating the FGD CIC expansion feature using table and office parameters. The information is presented for Permissive and Final Conversion phases on a per switch basis (that is, EAEO and AT).

Permissive phase—equal access end office

Following are the steps required to activate 4-digit CICs at the EAEO for the Permissive dialing phase (Transitional I and II).

- Add tuples to Subtable STDPRTCT for those 7-digit CACs to be translated.
- Set office parameter EAEO_FOUR_DIGIT_CIC_STATUS to PERMISSIVE.
- Reload CC DATA in all the XPMs serving line control devices (such as LCM, LM, and others). This will change digit collection in the peripherals.
- Add the trunk CLLI values to table CICSIZE4 for those trunk groups which will carry 4-digit CIC traffic.

Permissive phase—access tandem

Following are the steps required to activate 4-digit CICs at the AT for the Permissive dialing phase.

- If there is a 3-digit CIC entry in subtable STDPRT using the NSC selector, add a corresponding 4-digit CIC entry (such as 0ZZXXXX).
- Add the trunk CLLI values to table CICSIZE4 for those trunk groups which will carry 4-digit CIC traffic.

Permissive phase—access tandem

Following are the steps required to activate 4-digit CICs at the EAEO for the Final Conversion phase.

- Datafill all 4-digit CICs in Table OCCINFO.
- Change the Subtable STDPRTCT for those 7-digit CACs to be translated.

- Change the value in the EAEO_FOUR_DIGIT_CIC_STATUS office parameter to FOURDIG.
- Reload CC DATA in all the XPMs serving line control devices (such as LCM, LM, and others). This will change digit collection in the peripherals.
- Revise CICSIZE4 by adding those additional trunk groups which will carry 4-digit CIC traffic. If all applicable trunks have been converted to carry 4-digit CICs, office parameter EA_TAB_CICSIZE4_OBSOLETE can be set to Y, and table CICSIZE4 will not need to be datafilled.

Final conversion phase—access tandem

Following are the steps required to activate 4-digit CICs at the AT for the Final Conversion phase.

- If there is a 3-digit CIC entry in subtable STDPRT using the NSC selector, add a corresponding 4-digit CIC entry (such as 0ZZXXXX).
- Revise CICSIZE4 by adding those additional trunk gro9ups whgich will carry 4-digit CIC traaffic. If all applicable trunks have been converted to carry 4-digit CICs, office parameter EA_TAB_CICSIZE4_OBSOLETE can be set to Y, and table CICSIZE4 will not need to be datafilled.

Feature interactions

The FGD CIC Expansion feature supports the following Equal Access End Office (EAEO) features:

- *POTS*—This feature is supported on POTS lines.
- *IBN*—This feature is supported on IBN lines.
- *EAEO P2 (PX) Trunks*—Call routing and setup for EA calls from a P2/PX trunk is similiar to that for EA calls for a POTS line. Digit translations will be changed for P2/PX trunks in addition to changes for lines.

Note: Overlap carrier selection (OCS) is *not* supported for P2 or PX trunks.

- *MDC/Datapath*—For a DMS equipped with EA and MDC/Datapath, this feature allows MDC stations and incoming trunks to function in the EA environment. The following MDC stations will be supported by this feature and can reside in a dedicated MSL-100 PBX or can be part of a DMS MDC subscriber group (that is, a CENTREX configuration):
  - — Attendant Console
  - — Data Unit (DU)
  - — Business Set
  - — Standard MDC 500/2500 set

- *Virtual Facility Groups (VFG)*—VFGs, software simulated trunk groups, are supported by this feature in addition to the following real MDC incoming trunks:
  - — PBX central office (CO) trunks (P2/PX trunks)
  - — Tie lines
  - — Foreign Exchange (FX) lines
- *Residence Enhanced Services (RES)*—RES lines are supported by this feature.
- *ISDN*—This feature supports ISDN calls that follow standard Equal Access translations.
- *PVN and E800*—Changes made to FGD CIC Expansion affect PVN and E800 features at both the EAEO and AT.

The FGD CIC Expansion feature interacts with the following AT features:

- *TOPS*—Traffic Operator Position System (TOPS) has its own EA features but also interacts with package NTX386AA (Access Tandem Switch) which is modifed by the FGD CIC Expansion feature. (***Note:*** The CIC expansion feature changes this package number to NTX386AB). No modifications to TOPS software were made by this feature directly, however, supporting 4-digit CICs on TOPS FGD cut-through trunks was added.
- *PVN and E800*—Changes made to FGD CIC Expansion affect PVN and E800 features at both the EAEO and AT.

Restrictions and limitations

The following are restrictions and limitations for the FGD CIC Expansion feature:

- This feature only applies to the software packages listed below. Other packages and features which use EA signaling remain unchanged.
  - — NTX186AB—Equal Access End Office
  - — NTX386AB—Access Tandem Switch
  - — NTXE13AC—CCS7 ISUP InterLATA Connection EAEO
  - — NTXE14AC—CCS7 ISUP InterLATA Connection AT
- Trunk groups used for other features cannot be converted to carry 4-digit CICs until those features have been modified for FGD CIC expansion.
- Although the FGD CIC Expansion feature provides 10,000 CICs, it is estimated that only 1,000 will be used by any one EAEO, thus, Table OCCINFO is limited to 1,000 entries.

- With the modifications to Table OCCINFO, it will no longer be possible to use the letter N as a valid carrier digit in field CARRNUM.
- The size of the digit register is 24 digits. Expanding the number of CAC digits from 5 to 7 means that this feature reduces the number of IBN prefix digits from 3 to 2 for EA call types supported by this feature (see Feature Interaction section for a list of EA call types supported).
- MF TOPS trunks support several different signaling types, however, this feature only supports one type; EAP FGD cut-through, where the call routes directly to the IC/INC based on the 0ZZ/1NX/1N'X + XXX(X) received.
- Of the two TOPS call scenarios listed below, this FGD CIC Expansion feature supports *only* the second scenario:
  - — TOPS calls that route to TOPS positions are *not* supported by FGD CIC expansion.
  - — TOPS calls that tandem directly to an IC/INC without interacting with a TOPS position are supported by FGD CIC expansion.
- To accomodate the 3 phases of CAC dialing (Transitional I, II, and Final Conversion), the digit collection algorithm has been modified. The digit collection algorithm and Table LMOVCODE share a 256 byte area of data store, and this change required 8 bytes of storage. Therefore, the amount of storage for Table LMOVCODE was reduced by 8 bytes. (Table LMOVCODE contains NXX codes which do not require Overlap Carrier Selection (OCS).) Should this storage area be exceeded, users will have to delete entries from Table LMOVCODE. They will know to do so if they attempt to LOAD CC DATA and a failure message is returned.

Appendix A: NSS access methods

The following is a summary of the various access methods available to Network Services Systems (NSS) and the valid destinations available to each access method.

Feature Group A access

The Feature Group A (FGA) interface allows connection between a DMS-100 or MSL-100 and the line side of a class 5 end office. FGA supports originating and two-way access to and from an end office over a ground start foreign exchange office (FXO) arrangement. Table 28-1 shows sample FGA datafill.

Table 28- 1
Datafill for FGA configurations

Type of access	Destination type	Digits
DDD		(1) + (NPA) - NXX - XXXX
800 UA		(1) + 800 - NXX - XXXX
	Local	NXX - XXXX
	DDD	(1) + (NPA) - NXX - XXXX
	IDDD	011 + CC + NN
	Onnet	NXX + XXXX
	Private SC	1NN
	Network SC	NSC + XXX
	EXTN	1 to 7 digits
	FAC	1 to 7 digits

Feature Group B access

Feature Group B (FGB) allows connection between a DMS-100 or MSL-100 and the trunk side of a class 5 end office or a class 4/5 local tandem office. Subscribers can access the FGB trunk by dialing a Uniform Access Code. With this arrangement, subscribers are not required to know the access number of each city in which they originate a call to a corporate network. Table 28-2 shows an example of a FGB arrangement.

Table 28- 2
Datafill for FGB configurations

Type of access	Destination type	Digits
EAP cut-through		10XXX + #
Interim		950 - WXXX (cut-through)
FGD 800 UA		800 - NXX - XXXX
	Local	NXX - XXXX
	DDD	(1) + (NPA) - NXX - XXXX
	IDDD	011 + CC + NN
	Onnet	NXX + XXXX
	Private SC	1NN
	Network SC	NSC + XXX
	EXTN	1 to 7 digits
	FAC	1 to 7 digits

Feature Group D access

Feature Group D (FGD) defines a set of interconnection rules between local exchange carrier (LEC) access facilities and Long Distance (LD) carriers such as AT&T or MCI. This is the equal access scheme under which all LD carriers are treated the same. Table 28-3 shows an example of a FGD arrangement.

Table 28- 3
Datafill for FGD configurations

Type of access	Destination type	Digits
EAP cut-through		10XXX + #
Interim		950 - WXXX (cut-through)
FGD 800 UA		800 - NXX - XXXX
	Local	NXX - XXXX
	DDD	(1) + (NPA) - NXX - XXXX
	IDDD	011 + CC + NN
	Onnet	NXX + XXXX
	Private SC	1NN
	Network SC	NSC + XXX
	EXTN	1 to 7 digits
	FAC	1 to 7 digits

—end—

Dedicated access trunk access

A Dedicated Access Trunk (DAT) allows a dedicated connection between an MSL-100 or a DMS-100 and a PBX key system, or single telephone. Originating and two-way access over loop start FXS, ground start FXS, and IBN PTS and PRI tie trunk arrangements are supported. Table 28-4 shows an example of datafill for dedicated access trunk configuration.

Table 28- 4
Datafill for dedicated access configurations

Type of access	Destination type	Digits
Unique to PBX or Key System	Local	NXX - XXXX
	DDD	(1) + (NPA) - NXX - XXXX

—continued—

Table 28- 4
Datafill for dedicated access configurations

Type of access	Destination type	Digits
	IDDD	011 + CC + NN
	Onnet	NXX + XXXX
	Private SC	1NN
	Network SC	NSC + XXX
	EXTN	1 to 7 digits
	FAC	1 to 7 digits
	—end—	

Integrated Business Network access

An Integrated Business Network (IBN) trunk allows the connection between an MSL-100 or DMS-100 and a PBX, class 5 end office, or a class 4/5 local tandem office. Table 28-5 shows an example of an integrated business Network datafill.

Table 28- 5
Datafill for an integrated business network

Type of access	Destination type	Digits
Local DDD		NXX - XXXX (1) + (NPA) - NXX - XXX
	Local	NXX - XXXX
	DDD	(1) + (NPA) - NXX - XXXX
	IDDD	011 + CC + NN
	Onnet	NXX + XXXX
	Private SC	1NN
	Network SC	NSC + XXX
	EXTN	1 to 7 digits
	FAC	1 to 7 digits

Appendix B: dialing plan

Dialing plan summary

Table 29-1 provides a summary of the various dialing plans available to NSS. Table 29-1 shows the access digits for each dialing plan.

Table 29-1
NSS dialing plans

Call type	Access digits
FGA	(NPA) - NXX - XXXX or 800 - NXX - XXXX
FGB	950 - WXXX
FGD cut-through	10XXX + #
FGD interim	950 - WXXX
FGD 800 UA	ACCESS = 800 - NXX - XXXX
IBN	Any valid destination dialing

Dialing sequence formats

The formats in Table 29-2 describe the various dialing sequences allowed for each type of call.

Table 29-2
Dialing sequence formats

Sequence type	Access digits
NANP destination	ACCESS + (<IPT> + AUTH + (PIN) + (AC)) + <PT> +(1) + NPA - NXX - XXXX + (<PT> + AC) or

—continued—

Table 29-2
Dialing sequence formats (continued)

Sequence type	Access digits
	ACCESS + (<IPT> + AUTH + (PIN) + (AC)) + <PT> + NAC + (DT) + (1) NPA - NXX - XXXX + (<PT> + AC)
International destination	ACCESS + (<IPT> + AUTH + (PIN) + (AC)) + <PT> + 011 + CC + NN + (<PT> + AC) or ACCESS + (<IPT> + AUTH + (PIN) + (AC)) + <PT> + NAC + (DT) + 011 + CC + NN + (<PT> + AC)
Omnet destination (VPN/ESN)	ACCESS + (<IPT> + AUTH + (PIN) + (AC)) + <PT> + NXX - XXXX + (<PT> + AC) or ACCESS + (<IPT> + AUTH + (PIN) + (AC)) + <PT> + NAC + (DT) + LOC + XXXX + (<PT> + AC)
Zero-minus dialing	Not Available
Zero-plus dialing	Not Available
Private speed call	ACCESS + (<IPT> + AUTH + (PIN) + (AC)) + <PT> + 1NN + (<PT> + AC)
Public speed call	ACCESS + (<IPT> + AUTH + (PIN) + (AC)) + <PT> + ZNXX + (<PT> + AC)
NANP travel card dialing	ACCESS + <IPT> + 0 + NPA - NXX - XXXX + <PT> + TCN + <PT> + AC) + <CT>
International travel card dialing	ACCESS + <IPT> + 01 + CC + NN + (#) + <PT> + TCN + (<PT> + AC) + <CT>
DAL dialing plan	Same as the authorization code dialing plan outlined above except the ACCESS digits are not dialed.
ETN dialing plan (EDAL)	Not Available

—continued—

Table 29-2
Dialing sequence formats (continued)

Sequence type	Access digits
Destination dialing plan	Not Available
Authcode hotline dialing	ACCESS + <IPT> + AUTH + (AC)
Trunk group hotline dialing	NXX - XXXX + (<PT> + AC)
Conditional hotline dialing	ACCESS + (<IPT> + AUTH + (PIN) + (AC)) + <PT> + ... timeout or destination digits.
	account code
—end—	

Format acronym definitions

ACCESS
: access digits

AC
: account code

AUTH
: authorization code

CC
: country code

CT
: confirmation tone

DT
: dial tone

IPT
: initial prompt tone—consists of carrier dial tone, special dial tone or dial tone

LOC
: location code used for onnet location identification

NAC
: location code used for onnet location identification

NN
: national number

NPA
: numbering plan area (area code)

NXX
: local exchange code, N = digits 2–9, X = digits 0–9

PIN
: personal identification number

PT
: prompt tone—special dial tone, dial tone or no tone

SDT
: special dial tone

TCN
: travel card number

XXXX
: last four digits of a phone number, X = digits 0–9

ZNXX
: public speed call code, Z = digits 0–9, N = digits 2–9, X = digits 0–9

1NN
: private speed call code, N = digits 2–9

< >
: required fields

( )
: optional fields

Appendix C: NSS log reports

The following information provides descriptions and corrective action, if needed, for log reports specific to Network Services Software (NSS) applications. These log reports are also documented in *Commercial Systems Log Reports Reference Manual* and *Defense Switched Network Log Reports Reference Manual*.

NSS100

Explanation

Network Services Software generates log report NSS100 to provide additional information when an incoming Feature Group D (FGD) call fails information digit or automatic number identification (ANI) screening.

Format

The format for log report NSS100 follows:

```
NSS100 mmmdd hh:mm:ss ssdd INFO DATA BASE TRBL
    CKT    CKTID
    PROBLEM CODE   =   reason
    DIGITS RECEIVED = hnnnnnnnnnnh
    CALLID         =   callid
```

Example

An example of log report NSS100 follows:

```
NSS100 JAN01 15:49:59 8234 INFO DATA BASE TRBL
   CKT    FGDIC   2
   PROBLEM CODE    =    ANI_NOT_FOUND_IN_ANIDATA
   DIGITS RECEIVED = D5198204880F
   CALLID          =    426196
```

Field descriptions

The following table explains each of the fields in the log report:

Field	Value	Description
INFO DATA BASE TRBL	Constant	Indicates a problem in an NSS FGD call
CKT	Representative text	Identifies the calling party's trunk circuit
PROBLEM CODE	ANI_NOT_FOUND_IN ANIDATA	Received the three- or 10-digit ANI that has no associated datafill in Table ANIDATA. Verify that ANI should be received on this trunk. Ensure that datafill in Table ANIDATA is correct

—continued—

NSS100 (continued)

Field	Value	Description
	INFO_DIGIT_TRANSLATION_ ERROR	Received the two ANI information digits that are either not datafilled for the pretranslator name in field IDPRTRAN for Table TRKGRP, or are datafilled with a selector other than “ID” in field PRERTSEL for Table STDPRTCT. Verify datafill in Table STDPRTCT for pretranslator name datafilled in field IDPRTRAN in Table TRKGRP for this trunk
	INTDD_TRANSLATION_ ERROR	Pretranslation of an INTDD result was found, but the digit stream does not fit the 1NX format for international dialing. Verify datafill in Table STDPRTCT for pretranslator name datafilled in field IDPRTAN in Table TRKGRP for this trunk
	INVALID_ANI_LENGTH	Received ANI digits are not three or ten digits in length (excluding KP, ST, and information digits). Check the ANI digit stream being received on this trunk
	TEST_CALL_TRANSLATION_ ERROR	Pretranslation of a “TEST” result was found, but the digit stream received does not fit either the 10X format or 95XXXXX format. Verify datafill in Table STDPRTCT for pretranslator name datafilled in field IDPRTRAN in Table TRKGRP for this trunk

—continued—

NSS100 (end)

Field	Value	Description
DIGITS RECEIVED	0–9, B, C, D, E, F	Received digits are for screening and include KP and ST digits
CALLID	Integer	Identifies the call by a unique call identification number
	—end—	

Action

Action to be taken for each problem code is indicated in the description section of the above table.

Associated OM registers

None

NSS100 (continued)

NSS101

Explanation

Network services software generates log report NSS101 when an incoming feature group D (FGD) call does not receive automatic number identification (ANI) digits, but field ANIDIGS in Table TRKGRP is set to "Y."

Format

The format for log report NSS101 follows:

```
NSS101 mmmdd hh:mm:ss ssdd INFO DATA BASE TRBL
    CKT     cktid
    PROBLEM CODE    =    reason
    DIGITS RECEIVED = hnnnnnnnnnnh
    CALLID          =    callid
```

Example

An example of log report NSS101 follows:

```
NSS101 JAN01 15:49:59 8234 INFO DATA BASE TRBL
   CKT    FGDIC   2
   PROBLEM CODE    =    ANI_EXPECTED_NOT_RECEIVED
   DIGITS RECEIVED = D5198204880F
   CALLID          =    426196
```

Field descriptions

The following table explains each of the fields in the log report:

Field	Value	Description
INFO DATA BASE TRBL	Constant	Indicates a problem in an NSS FGD call
CKT	Symbolic text	Identifies the calling party's trunk circuit
PROBLEM CODE	ANI_EXPECTED_NOT_ RECEIVED	Received no ANI digits, but field ANIDIGS in Table TRKGRP is set to "Y" for this trunk
DIGITS RECEIVED	0–9, B, C, D, E, F	Received digits are for screening and include KP and ST digits.
CALLID	Integers	Identifies the call by a unique call identification number

NSS101 (end)

Action

Verify that ANI should be sent on this trunk. If ANIDIGS are not to be sent, set to N. If ANIDIGS are to be sent, then take appropriate action to have transmission of ANI digits resumed.

Associated OM registers

None

NSS102

Explanation

Network services software generates log report NSS102 on the service switching point (SSP) node when the SSP receives a reject response from the database control point (DBCP) node because of a query protocol problem.

Format

The format for log report NSS102 follows:

```
NSS102 mmmdd hh:mm:ss ssdd INFO NSS QUERY PROTOCOL
PROBLEM
    APPLICATION         =   application
    CALLED ADDRESS      =   nnnnnnnnnn
    PROBLEM TYPE        =   problem_type
    PROBLEM CODE        =   unsigned_int
```

Example

An example of log report NSS102 follows:

```
NSS102 JAN01 15:49:59 8234 INFO NSS QUERY PROTOCOL
PROBLEM
   APPLICATION      =   REPL_DIGS
   CALLED ADDRESS   =   6137224500
   PROBLEM TYPE     =   GENERAL_PROBLEM
   PROBLEM CODE     =   1
```

Field descriptions

The following table explains each of the fields in the log report:

Field	Value	Description
APPLICATION	application	Identifies the application that is sending the non-standard query protocol
CALLED ADDRESS	nnnnnnnnnn	Identifies the DBCP node that rejects the query

—continued—

NSS102 (end)

Field	Value	Description
PROBLEM TYPE	problem_type	Identifies the type of query protocol problem
PROBLEM CODE	unsigned_int	Identifies the protocol problem
—end—		

Action

None

Associated OM registers

None

NSS103

Explanation

Network services software generates log report NSS103 on the service switching point (SSP) node when the SSP receives a return error response from the database control point (DBCP) node indicating that the travel card number (TCN) digits are not allowed or invalid.

Format

The format for log report NSS103 follows:

```
NSS103 mmmdd hh:mm:ss ssdd INFO NSS TCN INVALID
PROBLEM
   CALLED ADDRESS    =   nnnnnnnnnn
   TCN DIGITS        =   nnnnnnnnnnnnnn
   REASON            =   reason
```

Example

An example of log report NSS103 follows:

```
NSS103 JAN01 15:49:59 8234 INFO NSS TCN INVALID
PROBLEM
   CALLED ADDRESS    =   6137224500
   TCN DIGITS        =   71935564511011
   REASON            =   TCN_NOT_FOUND
```

Field descriptions

The following table explains each of the fields in the log report:

Field	Value	Description
CALLED ADDRESS	nnnnnnnnnn	Identifies the DBCP node that contains the DBCP database
TCN DIGITS	nnnnnnnnnnnnnn	Identifies the invalid TCN digits
REASON	reason	Indicates whether the TCN is not found in the database or is not allowed

Action

None

NSS103 (end)

Associated OM registers

None

NSS104

Explanation

The network services software subsystem generates log report NSS104 on either the service switching point (SSP) or database control point (DBCP) nodes when Table MSGRTE is not datafilled properly.

To send a message from the originating switch or to tandem a message, there must be an entry with PUBLIC netname and called address as the key datafilled in Table MSGRTE with Signaling System #7 (SS#7) or global title translation (GTT) selector. The LOCAL selector in Table MSGRTE indicates the message is to be processed at the local node. This log is generated when a tuple with PUBLIC netname and the called address is not datafilled in Table MSGRTE, or when it is not properly datafilled (SS#7 selector or LOCAL when the message is to be sent out of the network).

Format

The format for log report NSS104 follows:

```
NSS104 mmmdd hh:mm:ss ssdd INFO NSS XLA PROBLEM
    APPLICATION     = application
    CALLED ADDRESS  = nnnnnnnnnn
    REASON          = reason
```

Example

An example of log report NSS104 follows:

```
NSS104 JAN01 15:43:45 1234 INFO NSS XLA PROBLEM
   APPLICATION     =  NSS_TCN
   CALLED ADDRESS  =  6137224500
   REASON          =  INVALID_MSGRTE
```

Field descriptions

The following table explains each of the fields in the log report:

Field	Value	Description
INFO NSS XLA PROBLEM	Constant	Indicates improper datafill of Table MSGRTE
APPLICATION	Character string	Identifies the application where the problem occurred

—continued—

NSS104 (end)

Field	Value	Description
CALLED ADDRESS	Integers	Identifies the entry that was incorrectly datafilled in Table MSGRTE
REASON	Text	Indicates whether the tuple is not datafilled or contains an invalid route
	—end—	

Action

Check datafill for Table MSGRTE.

Associated OM registers

None

NSS105

Explanation

Network services software generates log report NSS105 on the database control point (DBCP) node when it receives a unidirectional message back from the service switching point (SSP) notifying the DBCP of a response protocol problem. This occurs when the SSP cannot decode the response received from the DBCP.

Format

The format for log report NSS105 follows:

```
NSS105 mmmdd hh:mm:ss ssdd INFO NSS RESP PROTOCOL
PROBLEM
    APPLICATION         =   application
    CALLED ADDRESS      =   nnnnnnnnnn
    PROBLEM TYPE        =   problem_type
    PROBLEM CODE        =   unsigned_int
```

Example

An example of log report NSS105 follows:

```
NSS105 JAN01 15:49:59 8234 INFO NSS RESP PROTOCOL
PROBLEM
   APPLICATION      =   REPL_DIGS
   CALLED ADDRESS   =   6137224500
   PROBLEM TYPE     =   GENERAL_PROBLEM
   PROBLEM CODE     =   1
```

Field descriptions

The following table explains each of the fields in the log report:

Field	Value	Description
APPLICATION	application	Identifies the application that is sending the non-standard query protocol
CALLED ADDRESS	nnnnnnnnnn	Identifies the SSP node that cannot decode the response

—continued—

NSS105 (end)

Field	Value	Description
PROBLEM TYPE	problem_type	Identifies the type of response protocol problem
PROBLEM CODE	unsigned_int	Identifies the protocol problem
—end—		

Action

None

Associated OM registers

None

NSS106

Explanation

Network services software generates log report NSS106 on the database control point (DBCP) node when it receives a unidirectional invoke message back from the service switching point (SSP) notifying the DBCP that the response is corrupted. One example of corrupted response data is an invalid network class of service (NCOS).

Format

The format for log report NSS106 follows:

```
NSS106 mmmdd hh:mm:ss ssdd INFO NSS DBCP INVALID DATA
PROBLEM
    APPLICATION         =   application
    CALLED ADDRESS      =   nnnnnnnnnn
    INVALID FIELD       =   field
    INVALID DATA        =   unsigned_int
```

Example

An example of log report NSS106 follows:

```
NSS106 JAN01 15:49:59 8234 INFO NSS DBCP INVALID DATA
PROBLEM
   APPLICATION      =   REPL_DIGS
   CALLED ADDRESS   =   6137224500
   INVALID FIELD    =   NCOS
   INVALID DATA     =   10
```

Field descriptions

The following table explains each of the fields in the log report:

Field	Value	Description
APPLICATION	application	Identifies the application that is sending the non-standard query protocol
CALLED ADDRESS	nnnnnnnnnn	Identifies the SSP node that cannot translate the response

—continued—

NSS106 (end)

Field	Value	Description
INVALID FIELD	field	Indicates the corrupted response field
INVALID DATA	unsigned_int	Contains the corrupted value
	—end—	

Action

None

Associated OM registers

None

NSS107

Explanation

The network services software subsystem generates log report NSS107 at the NSS service switching point (SSP) when the SSP receives a return error response from the NSS database control point (DBCP). The return error response indicates that the dialed digits could not be found in Table REPLDATA.

The NSS Replace-Dialed Digits (RDD) feature allows a call to be routed to a number other than the number dialed. This feature replaces the originating call dialed digits and network class of service (NCOS) with new digits and a new NCOS. This feature uses the RDD database stored in Table REPLDATA to replace the dialed digits.

Format

The format for log report NSS107 follows:

```
NSS107 mmmdd hh:mm:ss ssdd INFO NSS REPLDIGS INFO
    CALLED ADDRESS = nnnnnnnnnn
    DIGITS         = nnnnnnnnnn
    REASON         = DIALED_DIGITS_NOT_FOUND
```

Example

An example of log report NSS107 follows:

```
NSS107 JAN01 15:50:49 8123 INFO NSS REPLDIGS INFO
   CALLED ADDRESS = 6137225000
   DIGITS         = 8008881234
   REASON         = DIALED_DIGITS_NOT_FOUND
```

Field descriptions

The following table explains each of the fields in the log report:

Field	Value	Description
INFO NSS REPLDIGS INFO	Constant	Indicates that this log contains NSS replacing digits information
CALLED ADDRESS	Integers	Specifies the DBCP node where the RDD database (in table REPLDATA) resides. This TCAP destination address is datafilled in table MSGRTE.

—continued—

NSS107 (end)

Field	Value	Description
DIGITS	Integers	Displays the dialed digits used to index into table REPLDATA
REASON=DIALED_DIGITS _NOT_FOUND	Constant	Indicates that the dialed digits could not be found in table REPLDATA
	—end—	

Action

Confirm that the dialed digits are not valid for a replace-dialed digits call.

Associated OM registers

None

NSS108

Explanation

Network services software generates log report NSS108 at the originating node when a return error message is received from the NSS database control point (DBCP). A return error message is sent when ANI is not found in the ANIDATA DBCP database or when ANI is datafilled as NOT_ALLOWED in the remote database.

NSS generates log report NSS108 at the terminating node when a query message from the originating node does not return ANI or when ANI is datafilled as NOT_ALLOWED in the ANIDATA DBCP database.

Format

The format for log report NSS108 follows:

```
NSS108 mmmdd hh:mm:ss ssdd INFO NSS ANI INVALID
   CALLED ADDRESS    =   nnnnnnnnnn
   ANI DIGITS        =   nnnnnnnnnn
   REASON            =   reason
```

Example

An example of log report NSS108 follows:

```
NSS108 JAN01 15:49:59 8234 INFO NSS ANI INVALID
   CALLED ADDRESS    =   6137225000
   ANI DIGITS        =   8008881234
   REASON            =   ANI_NOT_FOUND
```

Field descriptions

The following table explains each of the fields in the log report:

Field	Value	Description
INFO ANI INVALID	Constant	Indicates that ANI digits are not found or cannot be returned
CALLED ADDRESS	nnnnnnnnnn	Originating node: This field identifies the service switching point (SSP) node where ANI lookup failure occurred. Terminating node: This field identifies the SSP node requesting the failed ANI lookup.

NSS108 (end)

Field	Value	Description
ANI DIGITS	nnnnnnnnnn	Displays the received ANI digits used to query the remote database
REASON	reason	Indicates the reason the ANI lookup failed. This field displays one of the following reasons: ANI_NOT_FOUND: ANI is either invalid or not datafilled in the ANIDATA DBCP ANI_NOT_ALLOWED: ANI is found, but is datafilled as NOT_ALLOWED
—end—		

Action

None

Associated OM registers

None

Appendix D: operational measurements

The following information provides descriptions for operational measurement (OM) groups and registers specific to Network Services Software (NSS) applications. These descriptions are also documented in *Commercial Systems Operational Measurements Reference Manual* and *Defense Switched Network Operational Measurements Reference Manual*..

OM group NSSTCAP

OM description

Network Services System Transaction Capabilities Application Part (TCAP) messaging

NSSTCAP measures events that occur in the network services software (NSS) database control point (DBCP), and when processing a response. The group also measures events that occur while processing queries at the NSS DBCP.

The measurements can be used to indicate signaling trouble between the service switching point (SSP) and the DBCP.

Release history

OM group NSSTCAP was introduced in BCS33.

Register

OM group NSSTCAP registers display on the MAP terminal as follows:

```
NTWKPROB    NORESRCE    QRYPROCD    TIMEREXP
QERYSENT    INVDIGIT    TCNFREEC
```

Group structure

OM group NSSTCAP provides two tuples per office.

Key field: NSS_TC_AP_NAME {REPLDIGS, NSSTCN}

Info field: None

Associated OM groups

None

Associated functional groups

Network services system database control point is the only functional group is associated with OM group NSSTCAP:

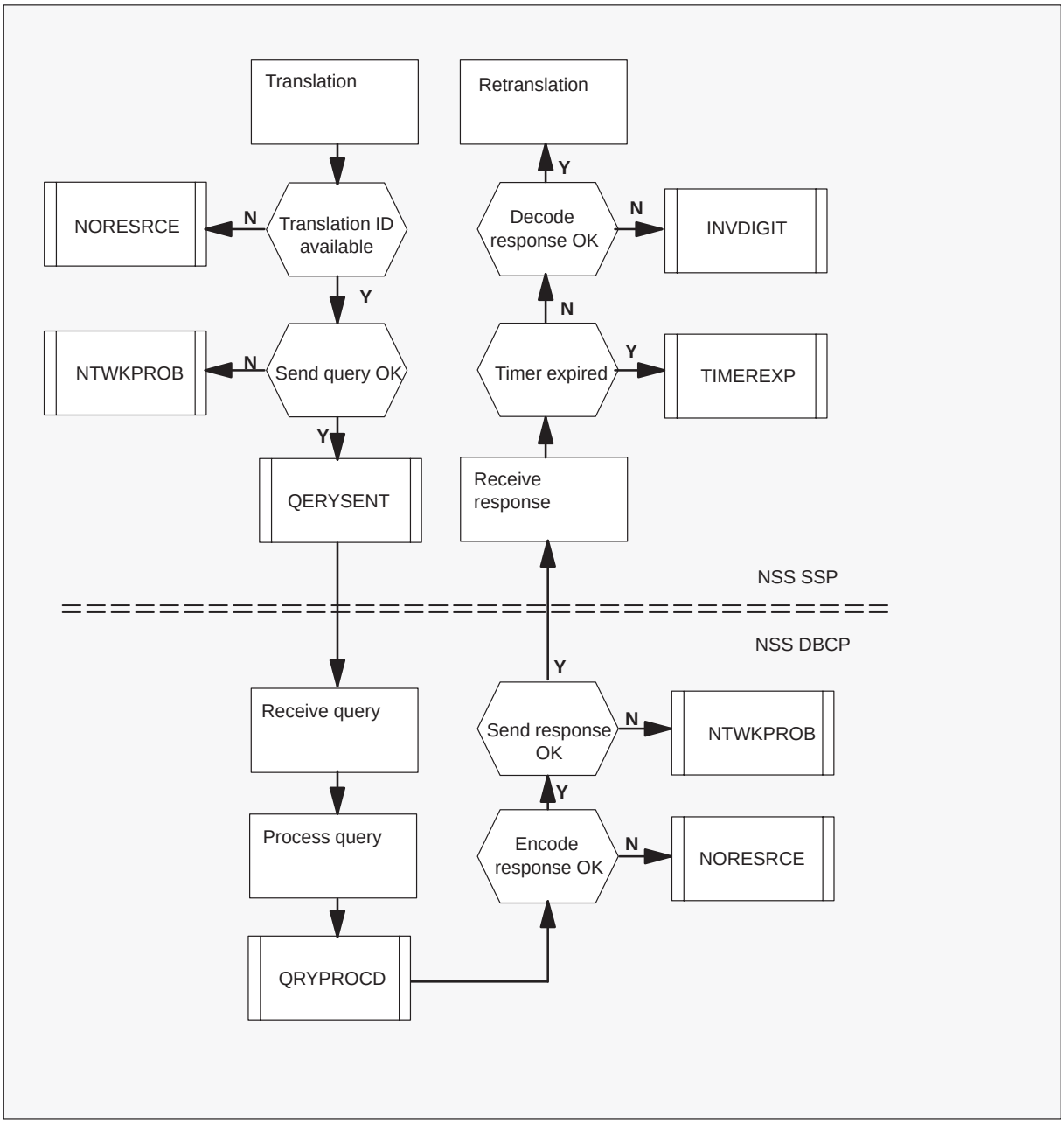
Associated functionality codes

The functionality codes associated with OM group NSSTCAP are shown in the following table.

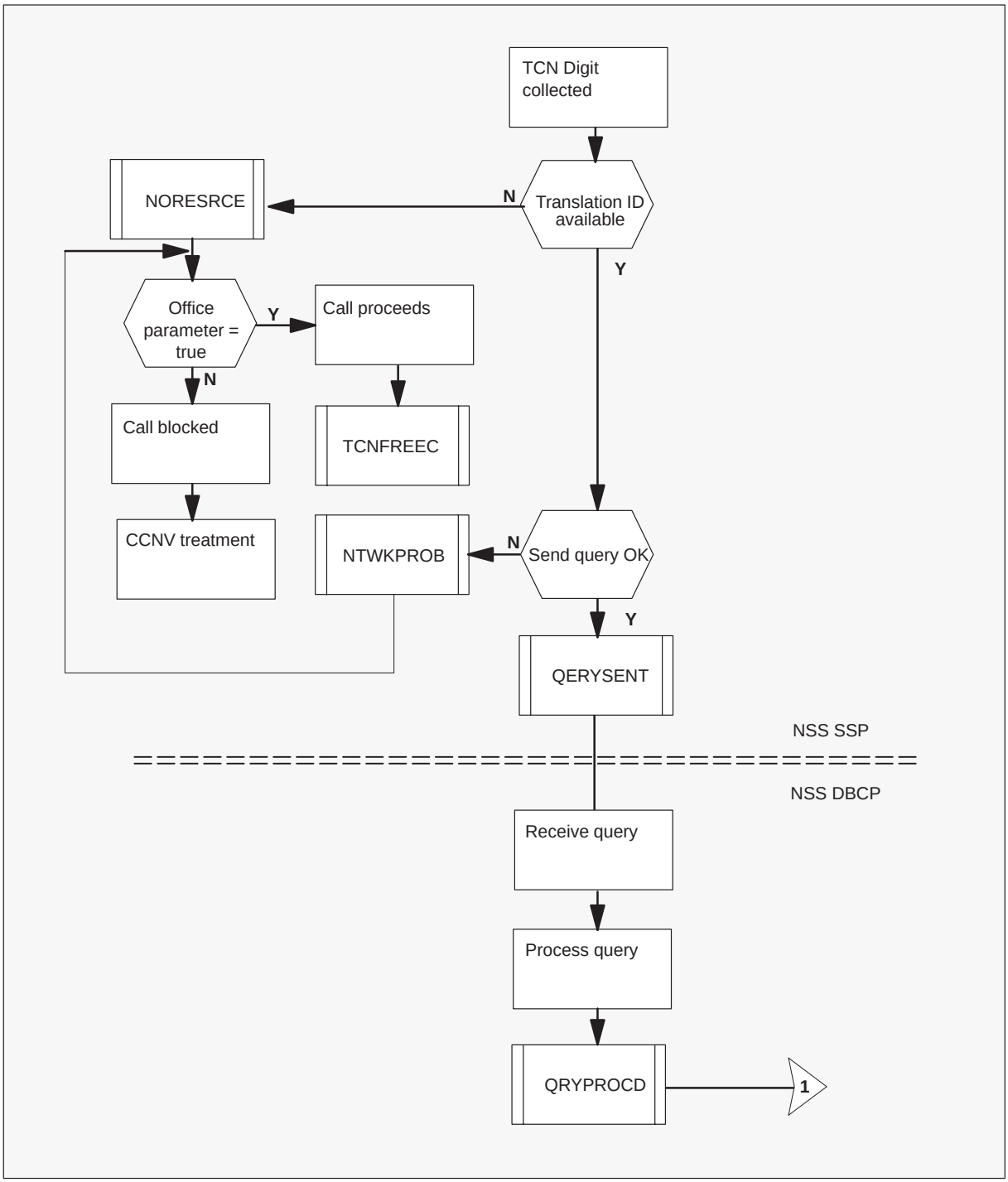
Functionality	Code
700/800/900 Service	NTXE77AA
NSS NOO DECP Call Processing	NTXQ77AA
NSS NOO DECP Database	NTXQ78AA

OM group NSSTCAP (continued)

OM group NSSTCAP : replaced dialed digits register

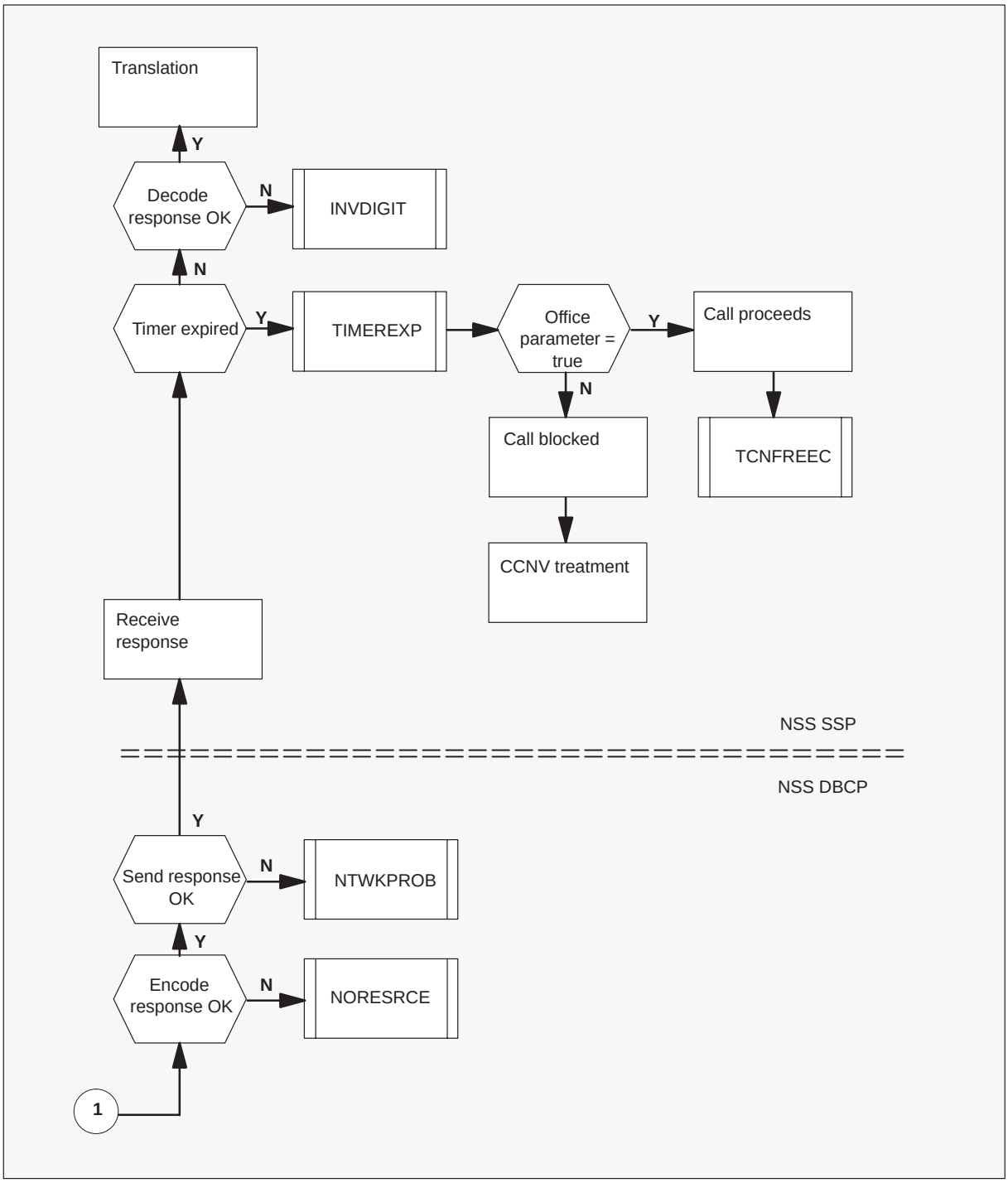


OM group NSSTCAP : TCN register



OM group NSSTCAP (continued)

OM group NSSTCAP : TCN register



Register INVDIGIT

Invalid digits

INVDIGIT is incremented on the service switching point (SSP) when it receives a replace dialed digits return error message from the DBCP. This message indicates that the dialed digits sent in the database query were not found in table REPLDATA on the Network Services System (NSS) database control point (DBCP).

Register INVDIGIT release history

INVDIGIT was introduced in BCS33.

Associated register

None

Associated logs

NSS107 is generated each time the SSP receives a return error response from the NSS DBCP, specifying that the dialed digits were not found in table REPLDATA.

NSS103 is generated when the originating node receives a return error response from the DBCP indicating that the TCN digits are not allowed or invalid.

Register NORESRCE

No resources

NORESRCE is incremented whenever a no-resource problem occurs on the DBCP. Conditions include when no transaction IDs are available and when no software resource blocks can be located.

This register is also incremented whenever a no-resource problem occurs on the SSP.

Register NORESRCE release history

NORESRCE was introduced in BCS33

Associated register

None

Associated logs

None

OM group NSSTCAP (continued)

Register NTWKPROB

Network problems

NTWKPROB counts the number of times the NSS replace dialed digits application (on the DBCP) has difficulty sending the REPLDIGS response message because of network problems.

This register also counts the number of times the NSS replace dialed digits application on the SSP has difficulty sending the query message and the unidirectional message because of network problems.

Register NTWKPROB release history

NTWKPROB was introduced in BCS33.

Associated register

None

Associated logs

None

Register QERYSENT

Queries sent

QERYSENT counts the number of REPLDIGS query messages sent to the DBCP on the SSP.

Register QERYSENT release history

QERYSENT was introduced in BCS33.

Associated register

None

Associated logs

None

Register QRYPROCD

Queries processed

QRYPROCD counts the number of REPLDIGS queries processed on the DBCP.

QRYPROCD release history

QRYPROCD was introduced in BCS33.

Register QRYPROCD release history

TCNFREEC was introduced in BCS33.

Associated register

None

Associated logs

None

Register TCNFREEC

NSS TCN free calls

TCNFREEC counts the number of NSS travel card number (TCN) application calls that are allowed to proceed even though the TCN digits are not validated.

Register TCNFREEC release history

TCNFREEC was introduced in BCS33.

Associated register

None

Associated logs

None

Register TIMEREXP

Timer expired

TIMEREXP is incremented whenever the REPLDIGS response timer has expired before a response is received from the DBCP. This information is used to determine whether the timer’s expiration time should be increased.

Register TIMEREXP release history

TIMEREXP was introduced in BCS33.

Associated register

None

OM group NSSTCAP (end)

Associated logs

None

OM group NSSTCAP (continued)

OM group NSSTCN

OM description

Network services software travel card number

NSSTCN monitors the use of the network services software (NSS) database to validate travel card numbers (TCN).

NSSTCN contains seven registers. At the originating node, six registers count:

- failures to send the TCN query message or unidirectional message because of network problems
- failures to validate a TCN because there are no software resources available
- TCN response timeouts
- TCN calls that are allowed to proceed, although the TCN digits are not validated
- TCN query messages that are sent to the database control point (DBCP)
- TCN error messages received from the DBCP that indicate the TCN digits are invalid

At the database control point, three registers count:

- failures to send the TCN response message because of network problems
- TCN queries that are processed
- failures to validate a TCN because there are no software resources available

Release history

OM group NSSTCN was introduced in BCS31.

BCS33

All registers in this group are deactivated.

Registers

OM group NSSTCN registers display on the MAP terminal as follows:

```
NSSTCNNP        NSSTCNQP        NSSTCNNR        NSSRCNTE
NSSTCNFC        NSSTCNQS        NSSTCNIV
```

OM group NSSTCN (continued)

Group structure

OM group NSSTCN provides one tuple for each office.

Key field: None

Info field: None

Associated OM groups

None

Associated functional groups

None

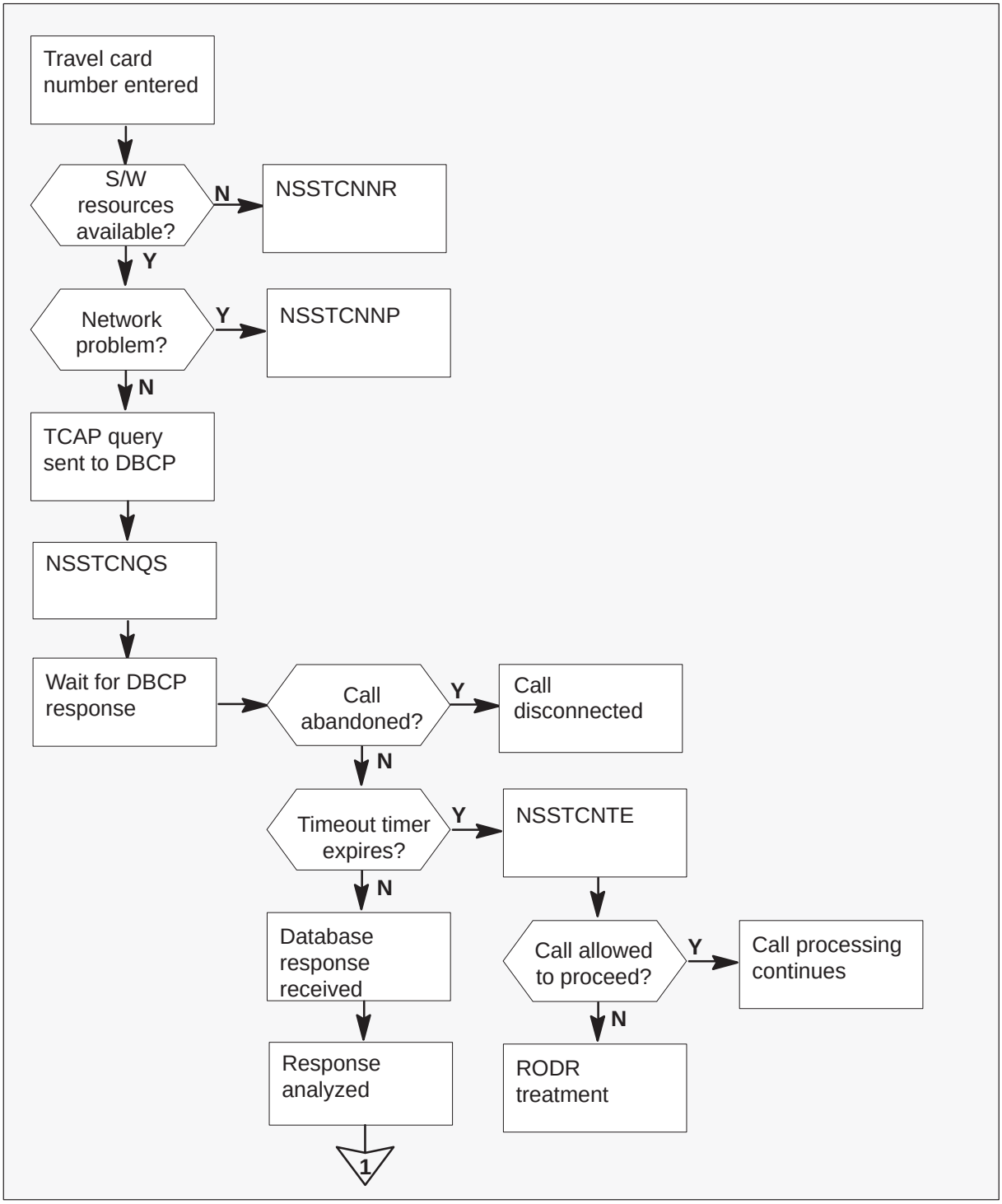
Associated functionality codes

The functionality codes associated with OM group NSSTCN are shown in the following table.

Functionality	Code
NSS Travel Card Number Validation	NTXN33AA

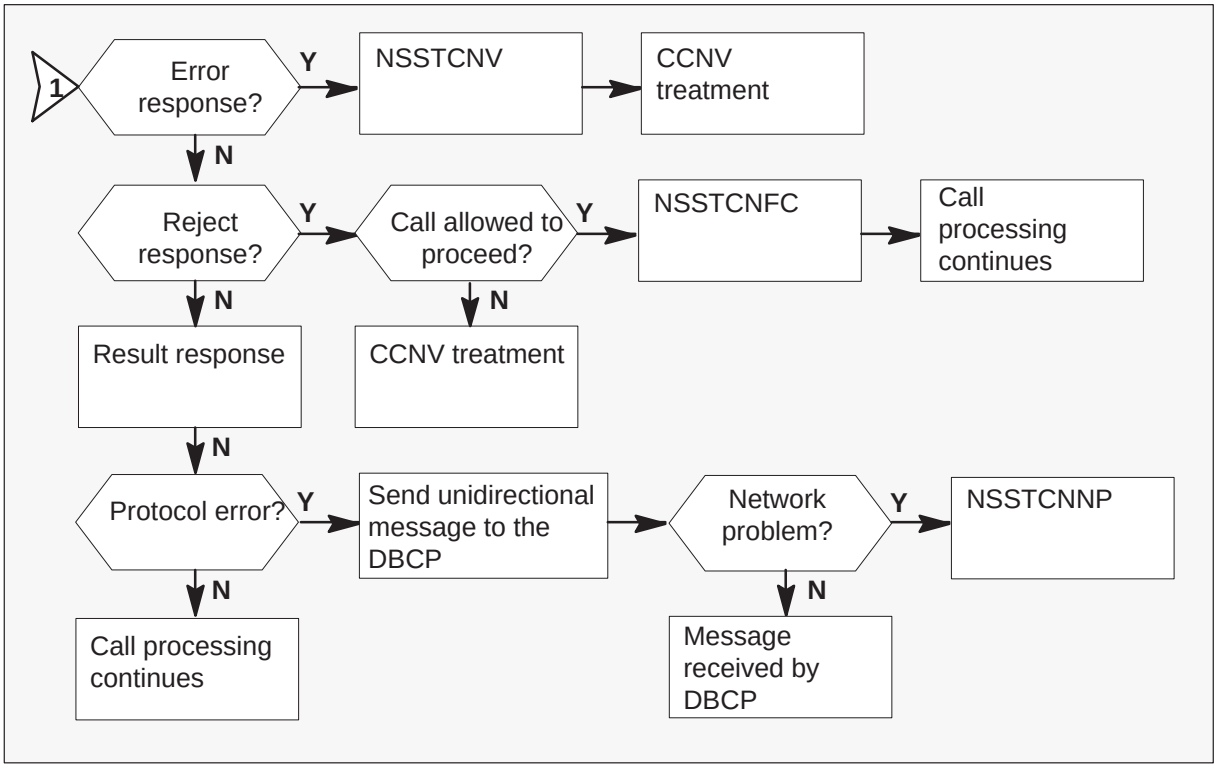
OM group NSSTCN (continued)

OM group NSSTCN registers: originating node



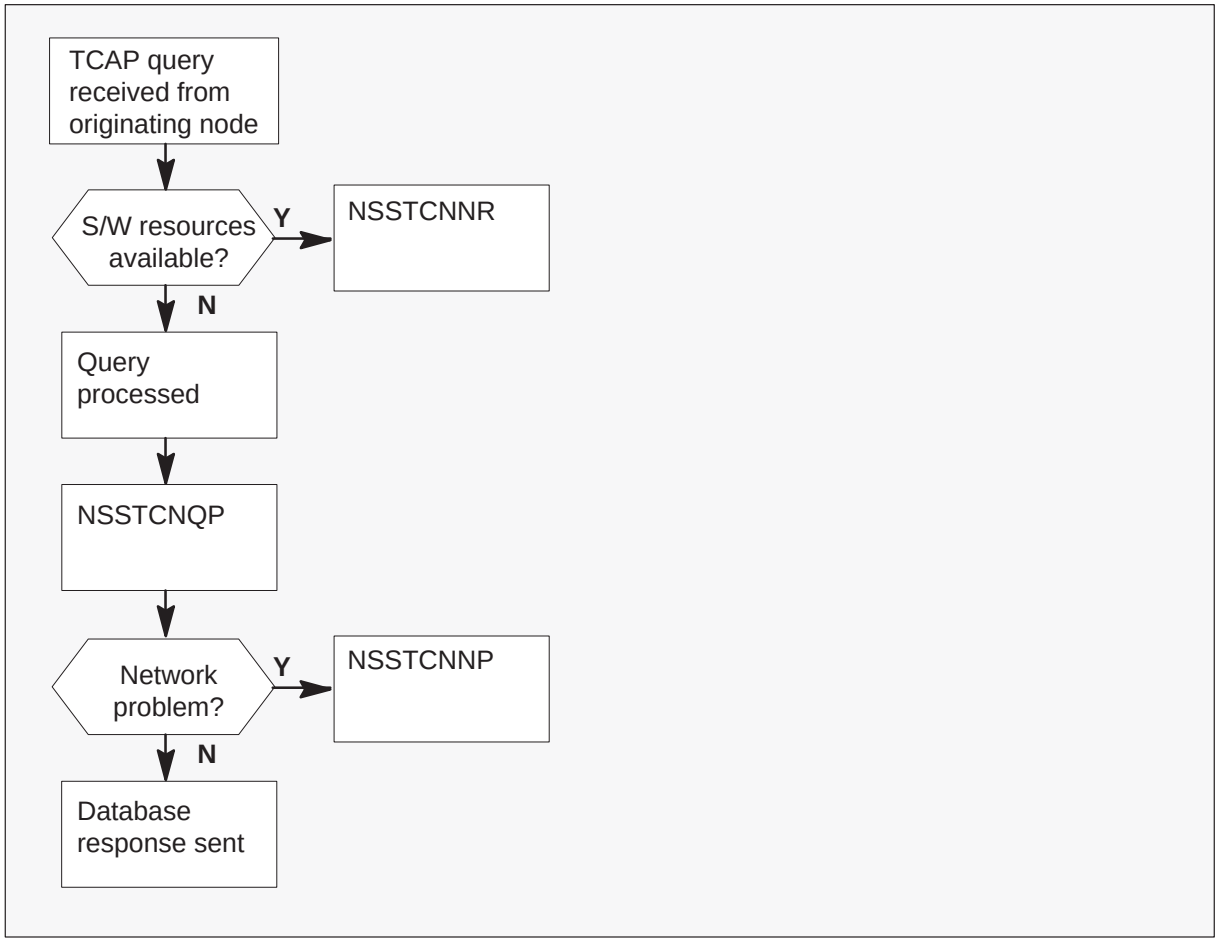
OM group NSSTCN (continued)

OM group NSSTCN registers: originating node



OM group NSSTCN (continued)

OM group NSSTCN registers: database control point



Register NSSTCNFC

NSS TCN free calls

At the originating node, NSSTCNFC counts travel card number (TCN) calls that are allowed to proceed, although the TCN digits are not validated.

If office parameter NSS_DBCP_TCN_BLOCK_CALL in table OFCVAR is set to N (no), the TCN call is allowed to proceed, although the TCN digits are not validated for one of the following reasons.

- network problem
- no software resources available
- response time out period has expired

If the call is not allowed to proceed, it is routed to Calling Card Not Valid (CCNV) treatment.

Register NSSTCNFC release history

NSSTCNFC was introduced in BCS31.

BCS33

Register is zeroed.

Associated registers

None

Associated logs

None

Extension registers

None

Register NSSTCNIV

NSS TCN invalid

At the originating node, NSSTCNIV counts return error responses received from the database control point (DBPC) that indicate the travel card number (TCN) is invalid.

Register NSSTCNIV release history

NSSTCNIV was introduced in BCS31.

BCS33

Register is zeroed.

Associated registers

None

Associated logs

NSS103 is generated when the originating node receives a return error response from the DBCP indicating that the TCN digits are not allowed or invalid.

Extension registers

None

OM group NSSTCN (continued)

Register NSSTCNNP

NSS TCN network problems

At the originating node, NSSTCNNP counts failures to send the travel card number (TCN) query message or the unidirectional message to the database control point (DBCP) because of network problems.

At the DBCP, NSSTCNNP counts failures to send the TCN response message to the originating node because of network problems.

Register NSSTCNNP release history

NSSTCNNP was introduced in BCS31.

BCS33

Register is zeroed.

Associated registers

None

Associated logs

None

Extension registers

None

Register NSSTCNNR

NSS TCN no resource

At the originating node and the database control point (DBCP), NSSTCNNR counts failures to validate a travel card number (TCN) because there are no software resources available, such as extension blocks or transaction identifiers.

The number of extension blocks and transaction identifiers that are allocated for TCN validation is datafilled in field NUMTRIDS in table TCAPTRID.

Register NSSTCNNR release history

NSSTCNNR was introduced in BCS31.

BCS33

Register is zeroed.

Associated registers

None

Associated logs

None

Extension registers

None

Register NSSTCNQP

NSS TCN queries processed

At the DBCP, NSSTCNQP counts TCN queries that are processed.

Register NSSTCNQP release history

NSSTCNQP was introduced in BCS31.

BCS33

Register is zeroed.

Associated registers

None

Associated logs

None

Extension registers

None

Register NSSTCNQS

NSS TCN queries sent

At the originating node, NSSTCNQS counts query messages that are sent to the DBCP.

Register NSSTCNQS release history

NSSTCNQS was introduced in BCS31.

BCS33

Register is zeroed.

OM group NSSTCN (end)

Associated registers

None

Associated logs

None

Extension registers

None

Register NSSTCNTE

NSS TCN timer expired

At the originating node, NSSTCNTE counts travel card number (TCN) response timeouts.

Office parameter NSS_DBCP_TCN_RESP_TIMEOUT in table OFCVAR specifies the wait time for a response message from the DBCP.

Register NSSTCNTE release history

NSSTCNTE was introduced inBCS31.

BCS33

Register is zeroed.

Associated registers

None

Associated logs

None

Extension registers

None

Appendix E: Acronyms

AAD
after answer detected

ABDF
automatic number identification database failure

AC
account code

ACCTREQ
account code required

ACPT
account code prompt tone

ACL
account code last

ACR
account code ready or account code required

ALTXLA
alternate translations

AMA
automatic message accounting

ANI
automatic number identification

ANIA
account code status not allowed

AOS
after outgoing seizure

AT
access tandem

ATD
audio tone detector

AUTH
authorization code

AUTHFIRST
authorization code first

AUTHLAST
authorization code last

BCS
Batch Change Supplement

BOC
Bell Operating Company

CC
country code

CCITT
International Telegraph and Telephone Consultative Committee

CCNV
calling card not valid

CCTO
calling card timeout

CDR
call detail record

CI
command interpreter

CLID
calling line identification

CLLI
common language location identifier

CO
central office

CPI
calling party information

DAT
direct access trunk

DBCP
database control point

DDD
direct distance dialing

DEST DN
destination directory number

DIRP
device independent recording package

DN
directory number

DP
dial pulse

DPC
destination point code

DR
digit register

DT
dial tone

DTC
digital trunk controller

DTMF
dual tone multifrequency

EAEO
equal access end office

EAP
equal access plan

ESN
electronic switching network

EXTN
extension

FDNZ
First Digit Not Zero

FGA
Feature Group A

FGB
Feature Group B

FGD
Feature Group D

FXO
foreign exchange office

FXS
foreign exchange station

GT
global title

GTT
global title translations

Hz
Hertz

IAM
initial address message

IBN
integrated business network

IBNTI
integrated business network trunk incoming

IBNT2
integrated business network trunk two-way

ID
information digits

IDDALLOW
international direct distance dialing allowed

IDDD
international direct distance dialing

IMT
intermachine trunk

INTLNCOS
international network class of service

INWATS
Incoming Wide Area Telephone System

ISDN
Integrated Services Digital Network

ISUP
integrated services digital network user part

kbits
kilobits

KP
key pulse

LEC
local exchange carrier

LOC
location code

LTC
line trunk controller

MAP
maintenance and administration position

MCDN
meridian customer defined networking

MF
multifrequency

MONA
meridian offnet access

Ms
milliseconds

MSN
Meridian SuperNode

MTM
maintenance trunk module

NAC
network access code

NACUSGRO
north american numbering plan customer group

NANCOS
north american numbering plan network class of service

NANP
north american numbering plan

NBLH
network blockage heavy traffic

NCOS
network class of service

NETCGID
network customer group identification

NETID
network identifier

NETINFO
network information

NN
national number

NP
nil pulse

NOSC
no service circuit

NOSR
no software resource

NPA
numbering plan area

NSS
Network Services System

NSSFGD
Network Services System Feature Group D

Nortel
Northern Telecom

NXX
local exchange code

OPC
originating point code

PBX
private branch exchange

PC
point code

PDIL
partial dial

PEC
product engineering code

PIN
personal identification number

POTS
plain old telephone service

PRA250
PRI trunks for DMS-250

PRI
primary rate interface

PSC
private speed call

PSIG
permanent signal timeout

PT
prompt tone

PTS
per trunk signaling

RDT

regular dial tone

RODR

reorder

SCCP

signaling connection control point

SCP

service control point

SDT

special dial tone

SMDR

station message detail recording

SSA

subsystem allowed

SSN

subsystem number

SSP

service switching point or subsystem prohibited

SST

subsystem status test

SS7

Signaling System Number 7

ST

start

STP

signaling transfer point

STR

special tone receiver

STS
serving translation scheme

SYFL
system failure

TCAP
Transaction Capabilities Application Part

TCN
travel card number

TFMI
traffic mix information

TRAVER
translations verification

UA
universal access

UTR
universal tone receiver

VACT
vacant code

Meridian Supernode

Meridian SL-100

Network Services System (NSS)

Reference Manual

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Allowing this equipment to be operated in such a manner as to not provide for proper answer supervision is a violation of Part 68 of FCC Rules, Docket No. 89-114, 55FR46066
The SL-100 system is certified by the Canadian Standards Association (CSA) with the Nationally Recognized Testing Laboratory (NRTL).
This equipment is capable of providing users with access to interstate providers of operator services through the use of equal access codes. Modifications by aggregators to alter these capabilities is a violation of the Telephone Operator Consumer Service Improvement Act of 1990 and Part 68 of the FCC Rules
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