Critical Release Notice

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The content of this customer NTP supports the SN06 (DMS) software release.

Bookmarks used in this NTP highlight the changes between the baseline NTP and the current release. The bookmarks provided are color-coded to identify release-specific content changes. NTP volumes that do not contain bookmarks indicate that the baseline NTP remains unchanged and is valid for the current release.

Bookmark Color Legend

Black: Applies to new or modified content for the baseline NTP that is valid through the current release.

Red: Applies to new or modified content for NA017 that is valid through the current release.

Blue: Applies to new or modified content for NA018 (SN05 DMS) that is valid through the current release.

Green: Applies to new or modified content for SN06 (DMS) that is valid through the current release.

Attention!
Adobe® Acrobat® Reader™ 5.0 is required to view bookmarks in color.

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Digital Switching Systems

DMS-500

TCAP Application Guide

LLT0B007 and up Standard 01.02 December 1997

NORTEL
NORTHERN TELECOM

Digital Switching Systems

DMS-500

TCAP Application Guide

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Preliminary version 01.01 for software release LLT0B007.

Contents

About this document

When to use this document

This document is to be used by maintenance and engineering personnel as a guide to Transaction Capabilities Application Part (TCAP) applications on the DMS-500 switch.

How this document is organized

The chapters in this document provide the following:

Chapter 1, Overview of TCAP
Chapter 2, N00 number translation
Chapter 3, Travel card validation
Chapter 4, Authcode validation
Chapter 5, Account code validation
Chapter 6, Private speed number translation
Chapter 7, Global title translation
Chapter 8, Version 2 N00 number translation
Chapter 9, List of abbreviations

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 *DMS-500 Master Index*, 297-2663-001.

This document is written for all DMS-500 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 *DMS-500 Master Index*, 297-2663-001.

References in this document

The following documents are referred to in this document:

- *DMS-500 Master Index*, 297-2663-001
- *DMS-500 Software Optionality Control (SOC) User's Manual*, 297-2663-301
- *DMS-500 Feature Group D (FGD) Application Guide*, 297-2663-385
- *DMS-500 Data Schema Reference Manual*, 297-2663-851
- *DMS-500 Office Parameters Reference Manual*, 297-2663-855
- *UCS DMS-250 FlexDial Framework Application Guide*, 297-2621-390

Information about related documents can be found in either the *DMS-500 Master Index*, 297-2663-001, or the *Product Documentation Directory*, 297-8991-001.

What precautionary messages mean

The types of precautionary messages used in 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.

Document conventions

This document conforms 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.
```

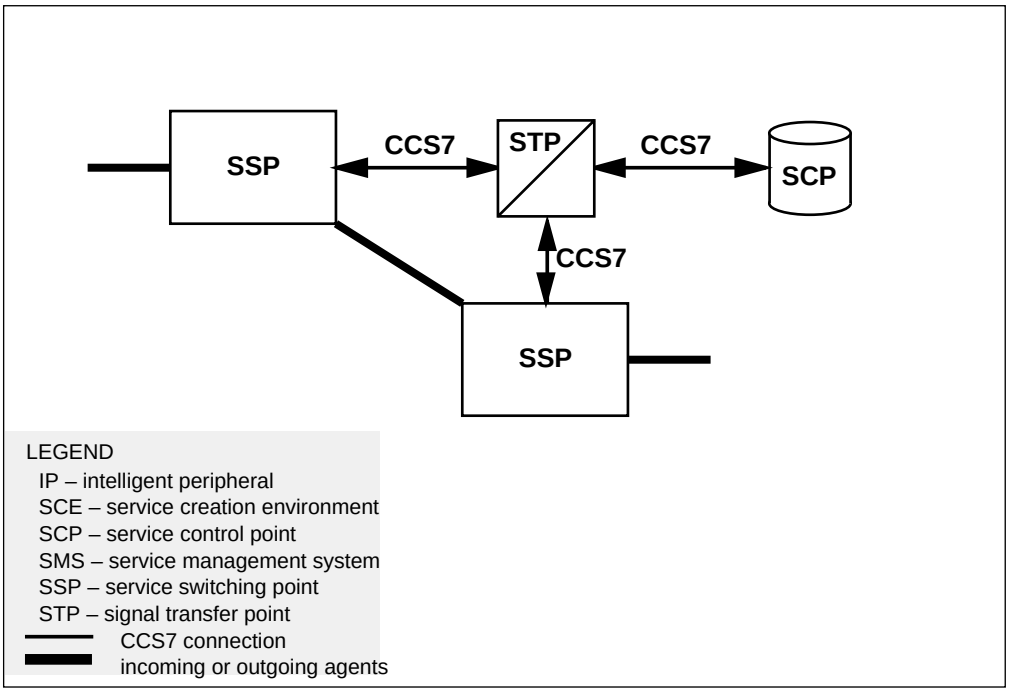
Overview of TCAP

Transaction Capabilities Application Part (TCAP) provides a common protocol for remote operations across a Common Channel Signaling #7 (CCS7) network. TCAP allows an application process at one node to access the same application process at another node. The following figure illustrates the TCAP network and provides key definitions necessary to understanding the TCAP protocol.

TCAP network

Figure 1-1 illustrates the communication between the Service Switching point (SSP) and the Service Control Point (SCP). TCAP is the basis for communication between the SSP and the SCP. This communication is assisted by the Service Transfer Point (STP) and occurs over CCS7 links.

Figure 1-1
The TCAP network



Understanding the functions of the SSP, STP, and SCP is integral to understanding TCAP. A brief definition of each follows.

Service Switching Point. The SSP initiates a dialogue with the SCP through the use of CCS7 links. SSPs can also be linked directly to each other.

Service Transfer Point. The STP routes messages between the SSP and the SCP. It is also involved in link management and network recovery.

Service Control Point. The SCP (sometimes called a DCP) responds to requests that are sent from the SSP. CCS7 links are used to carry the message to and from the SCP.

Note: DCP is a term that is associated with IN/1 technology. Over time, the terms DCP and SCP have become synonymous. The term DCP can be found in older documentation and software releases. In this guide, the term SCP is used as it reflects the most current technology. Use of these synonymous terms does not affect the network architecture.

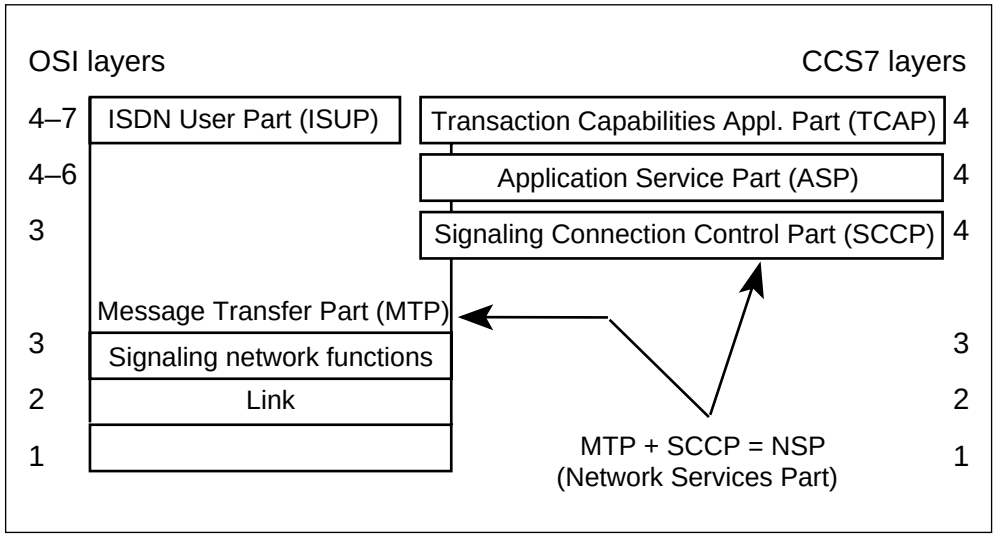
Since TCAP is a component of CCS7, a brief overview of CCS7 is provided before discussing the details of TCAP.

CCS7

CCS7 is patterned after the seven-layered Open Systems Interconnection (OSI) protocol reference model for an end-user interface. CCS7 uses the modular structure and naming conventions of the OSI model. The functions of CCS7 layers also mirror the functions of the OSI layer.

The software-based functions of CCS7 are arranged into the layers shown in Figure 1-2. Each layer performs a specific common channel signaling function and interfaces with only its adjacent (upper and lower) layers.

Figure 1-2
OSI and CCS7 comparison



There are four main CCS7 components, which are spread among the OSI layers:

- Message Transfer Part (MTP)
- Signaling Connection Control Part (SCCP)
- Integrated Services Digital Network (ISDN) User Part (ISUP)
- Transaction Capabilities Application Part (TCAP)

Layer usage

The lower three CCS7 layers (1, 2, and 3) comply with the OSI protocol model. These layers form the MTP, which provides a message transport service.

The MTP only uses a portion of OSI layer 3; the remainder of layer 3 is used by the SCCP. The SCCP is situated above the MTP; it supplies connectionless and connection-oriented services. The MTP and the SCCP combine to form the Network Services Part (NSP).

The Application Service Part (ASP) occupies OSI layers 4, 5, and 6 (CCS7 layer 4), and is not currently used.

ISUP occupies OSI layer 7 and uses the NSP to provide interexchange signaling.

The TCAP occupies part of OSI layer 7 (CCS7 layer 4) and provides services for noncircuit-related transaction-oriented applications. The applications supported for the DMS-500 switch are discussed in detail in the following chapters. They are as follows:

- N00 number translation
- Travel card validation
- Authcode validation
- Account code validation
- Private speed number translation

TCAP

Transaction capabilities are functions that control noncircuit-related information transfer between nodes in a CCS7 network. The implementation is based on ANSI/ECSA T1X1.1 Recommendations Q.771–Q.774 for SS7 Transaction Capabilities Application Part. The message set and protocol specification conform to Intelligent Network (IN/1) Transaction Capabilities Application Part (TCAP) for the DMS-500 switch and is based on the American National Standard Institute (ANSI) for Telecommunication.

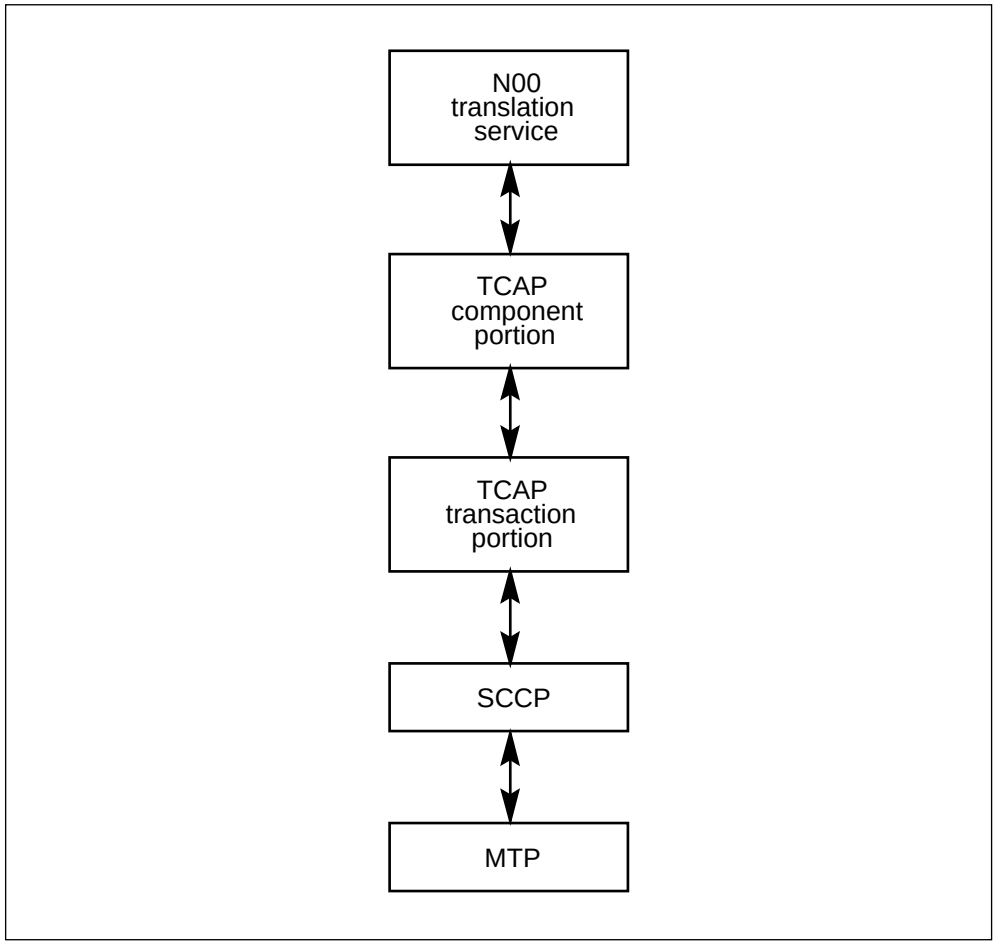
Note: UCS IN/1 TCAP applications are based on ANSI Issue 1 TCAP as standardized in 1988 (T1.114-1988). As a result, these features do not support the Abort package type, and all transaction-portion errors are handled with Reject components in a Response or Unidirectional package.

The TCAP protocol is used as the medium for communication of messages between the SSP and the SCP.

In the CCS7 layered architecture, TCAP lies between the application processes using the CCS7 signaling network and the SCCP that provides the message transfer capabilities. A typical transaction is shown in Figure 1-3.

In this typical transaction, the TCAP protocol interworks with the SCCP and MTP to provide N00 translation services for 700, 800, or 900 calls.

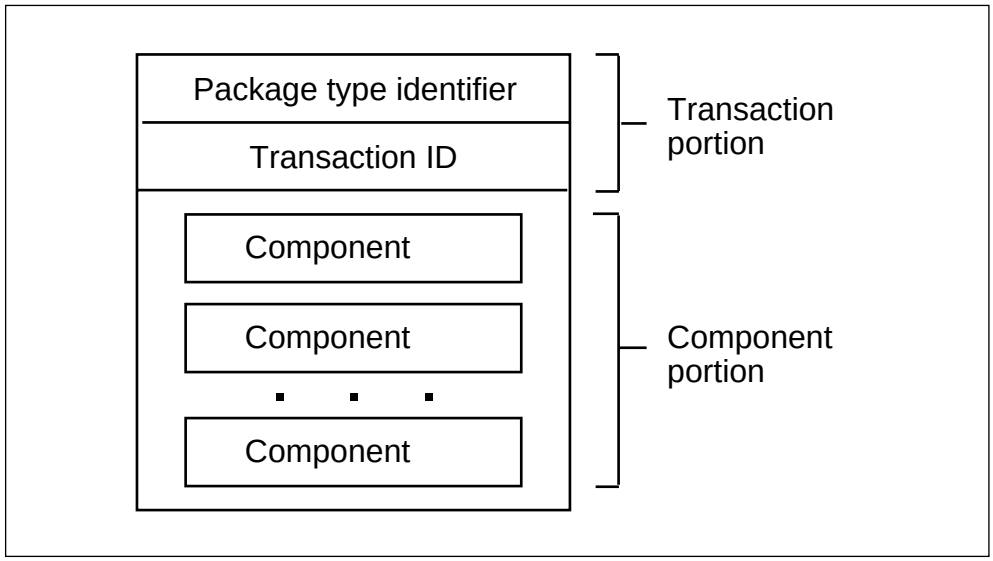
Figure 1-3
Transaction capabilities architecture



TCAP messages

The format of TCAP messages is shown in Figure 1-4. TCAP messages contain two portions: a transaction portion and a component portion.

Figure 1-4
TCAP message format



Transaction portion

The transaction portion of the TCAP message consists of a package type identifier and transaction ID information.

Package types

TCAP message package types include:

- Unidirectional — This package type is for information that travels in one direction only and does not set up the transaction.
- Query with permission — This package type initiates a transaction and informs the destination node that it may terminate the transaction normally.
- Query without permission — This package type initiates a transaction and informs the destination node that it may not terminate the transaction normally.
- Conversation with permission — This package type continues a transaction and informs the destination node that it may terminate the transaction normally.

- Conversation without permission — This package type continues a transaction and informs the destination node that it may not terminate the transaction normally.
- Response — This package type ends the transaction normally.

Transaction ID

When a transaction is established on a particular node, it must be provided with an ID that uniquely identifies it on its own node. The assignment of the transaction ID is performed by the application process using TCAP. A TCAP message can contain an originating ID, a responding ID, both, or neither, depending on the package type. Table 1-1 indicates the relationship between package type and transaction ID.

Table 1-1
Package type to transaction ID relationship

Package type	Transaction ID	Code HGFE DCBA
Unidirectional	Neither	1110 0001
Query with permission	Originating only	1110 0010
Query without permission (Note)	Originating only	1110 0011
Conversation with permission (Note)	Responding and originating	1110 0101
Conversation without permission (Note)	Responding and originating	1110 0110
Response	Responding only	1110 0100

Note: Query without permission, and conversation with or without permission package types are not used in IN/1.

—end—

The originating ID represents the transaction ID on the message's originating network node. The responding ID represents the transaction ID on the destination node. A transaction ID is significant only on the node on that it was assigned.

Component portion

The component portion of the TCAP message consists of one or more components. A component is used to start or report the results of a remote operation. TCAP message component types include:

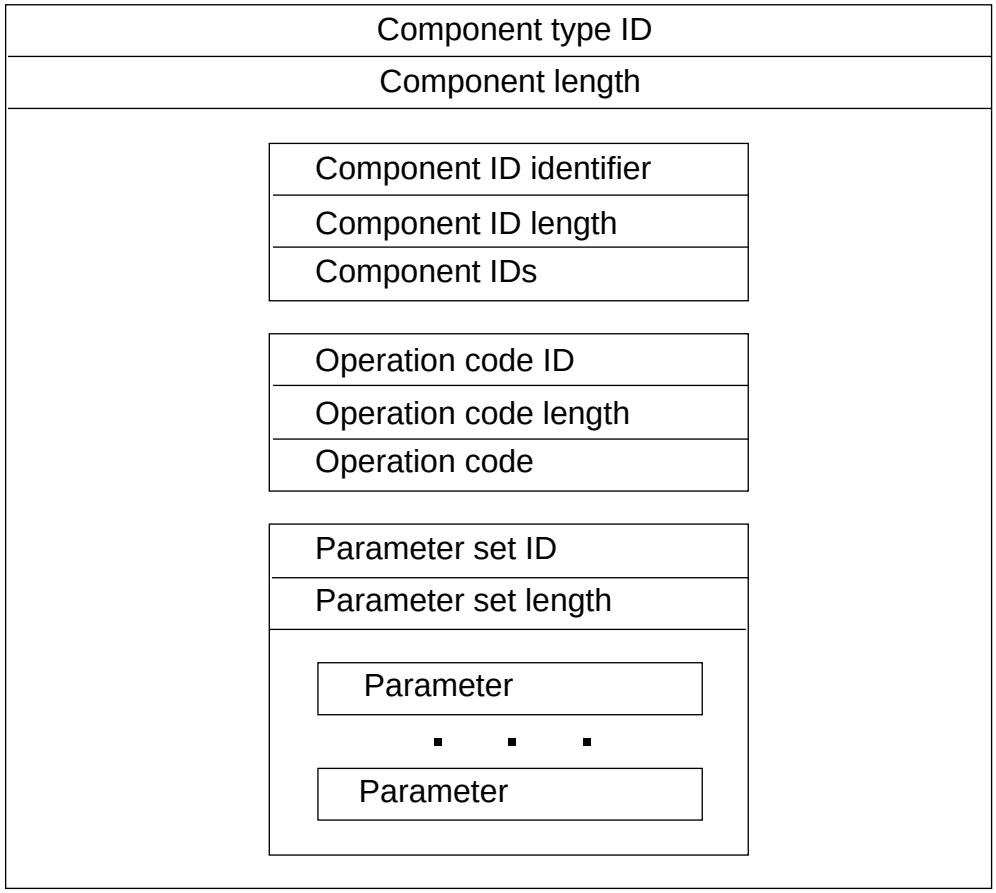
- Invoke — This component is used to initiate an operation on a remote node.
- Return Result — One or more Return Result components can be sent in response to an invoke component whose operation has been successfully completed.
- Return Error — This component is sent if the operation fails.
- Reject — This component is sent in response to a message or any portion of a message that cannot be understood.

Invoke component

The format of an Invoke component is shown in Figure 1-5. An Invoke component contains three data elements as follows:

- component ID — This data element allows the correlation of the Invoke operation with any response (Return Result component).
- operation code — This data element identifies the operation to be invoked.
- parameter set — This data element is a constructor whose contents are zero or more parameters. Each parameter is a data element specific to the invoked operation.

Figure 1-5
TCAP Invoke component



The Invoke component is used to initiate an operation. The node that originated the Invoke component must set up the Invoke ID. The Invoke/correlation ID is used to correlate a response to an invocation. If a message is both responding to an Invoke and invoking a new operation, the Invoke component contains both an Invoke ID and a correlation ID. The correlation ID is not used in IN/1 and is always zero.

A call that terminates to a customized announcement is an example of a call that would contain both an Invoke and a correlation ID. For example, if the SSP (DMS-500 switch) requested routing information for a certain customer and the operation fails, the SCP may respond with an Invoke component indicating that the SSP is to play a customized announcement. The Invoke component for customized announcements contains both an Invoke ID and a correlation ID. The Invoke ID corresponds to the SCP request to play the announcement. The correlation ID informs the SSP that this Invoke is responding to the original routing request. The SSP terminates the routing request transaction and plays the announcement.

Table 1-2 provides a definition of the component type identifiers that are included in the Invoke component. The terms "last" and "not last" in reference to Invoke indicate whether this is the last responding component to an Invoke.

Table 1-2
Definition of Invoke component type ID codes

Component type ID code HGFE DCBA	Meaning
1110 1001	Invoke (last)
1110 1101	Invoke (not last)
—end—	

Table 1-3 provides a definition of the four identifiers that may be included in the Invoke component.

Table 1-3
Definition of Invoke identifier codes

Identifier code HGFE DCBA	Meaning
1100 1111	Component ID identifier
1101 0000	Operation code ID (national)
1101 0001	Operation code ID (private)
1111 0010	Parameter set identifier
—end—	

The operation code parameter indicates the operation to be invoked. The operation code contained in an Invoke component contains three parts:

- reply required — indicates whether a reply is required
- operation family name — indicates the type of operation to be performed
- operation family specifier — provides more information about the operation to be performed

Table 1-4 provides a definition of each reply required code and family name code that may be included in the Invoke component.

Table 1-4
Definition of Invoke reply required and family name codes

Reply required and family name code HGFE DCBA	Meaning
0	Reply not required
1	Reply required
000 0000	Not used
000 0001	Parameter
000 0010	Charging (Note)
000 0011	Provide instruction
000 0100	Connection control
000 0101	Caller interaction
000 0110	Send notification (see Note)
000 0111	Network management
000 1000	Procedural (see Note)
000 1001 to 111 1100	Spare values
111 1110	Miscellaneous
111 1111	Reserved

Note: Not used in IN/1.

—end—

Table 1-5 provides a definition of each family specifier code as it relates to the family name (type of operation) identified in Table 1-4 that may be included in the Invoke component.

Table 1-5
Definition of Invoke family specifier codes

Operation family type	Family specifier code HGFE DCBA	Meaning
All families	1111 1111	Reserved
	0000 0000	Not Used
Parameter	0000 0001	Provide value
	0000 0010	Set value (Note)
Charging	0000 0001	Bill call (Note)
Provide instruction	0000 0001	Start
	0000 0010	Assist (Note)
	0000 0011	Additional (Note)
Connection control	0000 0001	Connect
	0000 0010	Temporary connect (Note)
	0000 0011	Disconnect
	0000 0100	Forward connect (Note)
Caller interaction	0000 0001	Play announcement
	0000 0010	Play announcement and collect digits (Note)
Send notification	0000 0001	Termination (Note)
Network management	0000 0001	Automatic code gap
Procedural	0000 0001	Temporary handover (Note)
	0000 0011	Report error (Note)

Note: Not used in IN/1.

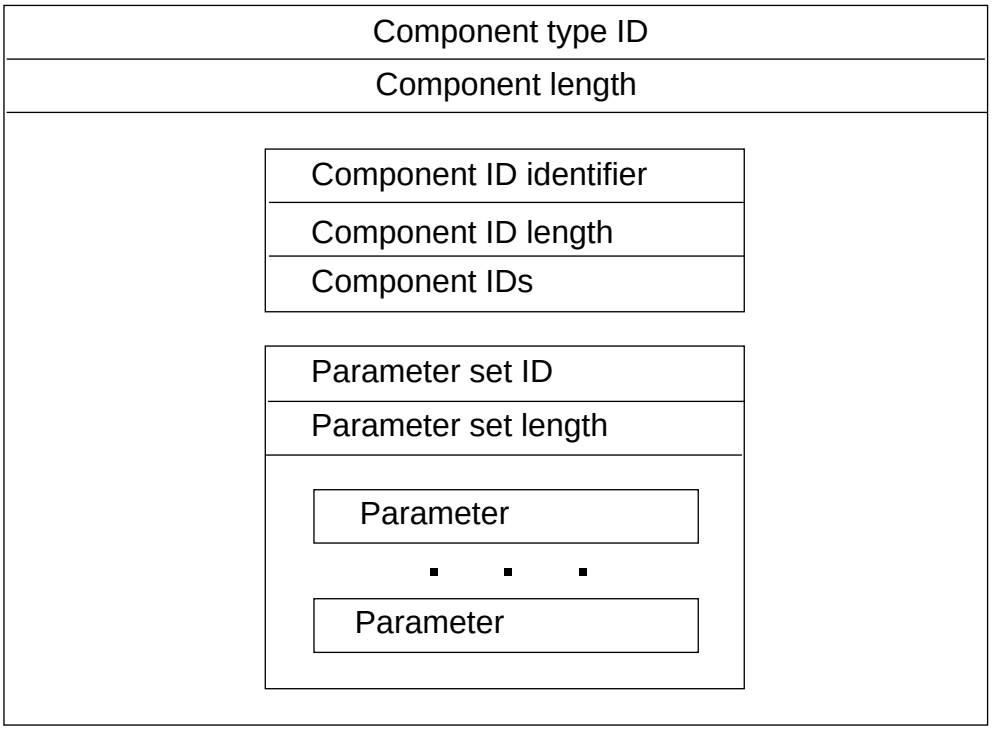
—end—

Return Result component

The format of a Return Result component is shown in Figure 1-6. A Return Result component contains two data elements as follows:

- component ID — This data element allows the correlation of the results with its Invoke component.
- parameter set — This data element is a constructor whose contents are zero or more parameters. Each parameter is a data element specific to the invoked operation.

Figure 1-6
TCAP Return Result component



The Return Result is used to respond to an operation normally. When this component type is used, the response does not indicate any action to be taken. Since this component can not contain an operation, it contains only a correlation ID. The correlation ID is optional in certain circumstances. For example, the request for termination information response does not contain a correlation ID.

Table 1-6 provides a definition of the component type identifiers that are returned in the Return Result component. The terms "last" and "not last" in reference to Return Result indicate whether this is the last responding component to an Invoke.

Table 1-6
Definition of Return Result component type ID codes

Component type ID code HGFE DCBA	Meaning
1110 1010	Return result (last)
1110 1110	Return result (not last) (Note)
Note: Return result (not last) is not used in IN/1.	
—end—	

Table 1-7 provides a definition of the two identifiers that are returned in the Return Result component.

Table 1-7
Definition of Return Result identifier codes

Identifier code HGFE DCBA	Meaning
1100 1111	Component ID identifier
1111 0010	Parameter set identifier
—end—	

Table 1-8 provides a definition of the component ID length codes that are returned in the Return Result component.

Table 1-8
Definition of Return Result component ID length codes

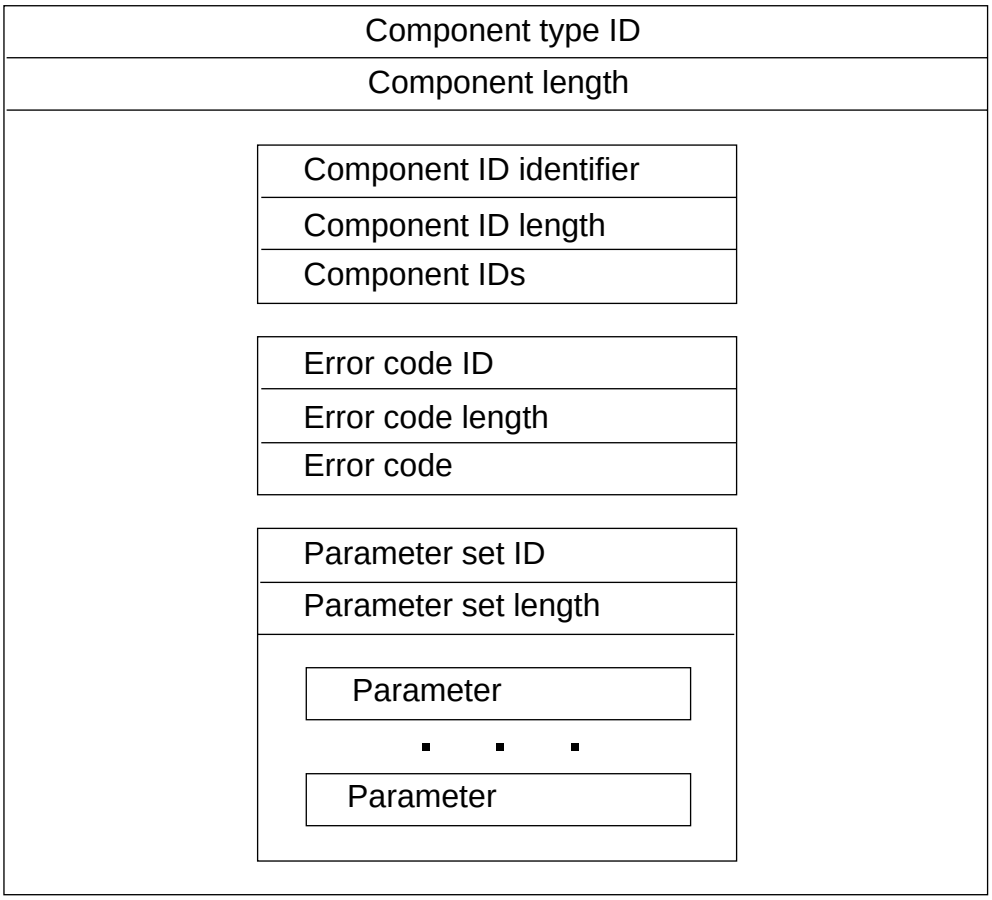
Component ID length code HGFE DCBA	Meaning
0000 0000	Zero bytes (no component ID)
0000 0001	One byte (correlation ID)
—end—	

Return Error component

The format of a Return Error component is shown in Figure 1-7. A Return Error component contains three data elements as follows:

- component ID — This data element allows the correlation of the error with its Invoke operation.
- error code — This data element identifies the reason the operation failed.
- parameter set — This data element is a constructor whose contents are zero or more parameters. Each parameter is a data element specific to the invoked operation, providing more details on the failure reason.

Figure 1-7
TCAP Return Error component



The Return Error component is returned in response to an operation that fails. This happens when the actual operation cannot be carried out. If a Return Error component is returned to the DMS-500 switch, a service communication failure (SCFL) treatment is applied.

Table 1-9 provides a definition of the three identifiers that are returned in the Return Error component.

Table 1-9
Definition of Return Error identifier codes

Identifier code HGFE DCBA	Meaning
1100 1111	Component ID identifier
1101 0011	Error code identifier
1111 0010	Parameter set identifier

—end—

Table 1-10 provides a definition of each error code that may be returned in the Return Error component.

Table 1-10
Definition of Return Error codes

Error code HGFE DCBA	Meaning
0000 0000	Not Used
0000 0001	Unexpected component sequence
0000 0010	Unexpected data value (for example, erroneous contents)
0000 0011	Unavailable network resource
0000 0100	Missing customer record
0000 0101	Reply overdue
0000 0110	Data unavailable
0000 0111 to 1111 1111	Spare values

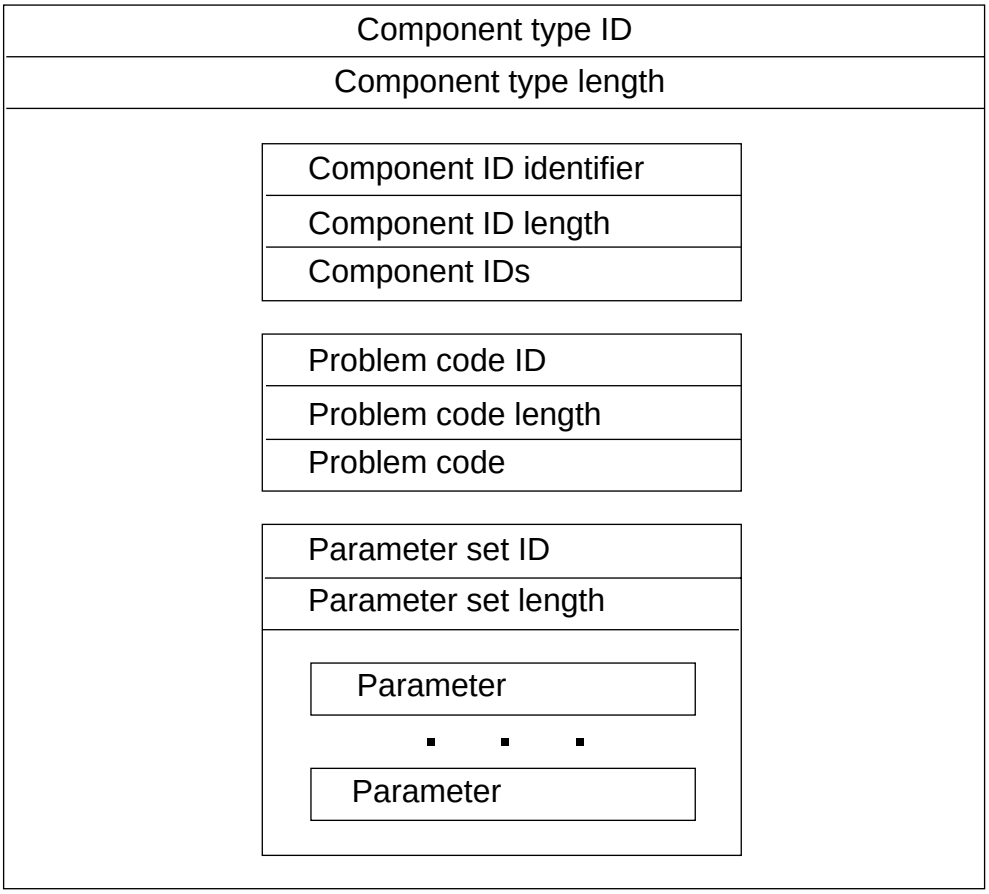
—end—

Reject component

The format of a Reject component is shown in Figure 1-8. A Reject component contains three data elements as follows:

- component ID — This data element allows the correlation of the rejection with another component.
- problem code — This data element identifies the reason a component or transaction was rejected.
- parameter set — This data element is a constructor whose contents are zero or more parameters. Each parameter is a data element specific to the invoked operation, providing more details on the rejection reason.

Figure 1-8
TCAP Reject component



The Reject component is returned in response to any component with a protocol error. A Reject component with a protocol error is not responded to by another reject. A Reject component may or may not contain a component ID. If the component ID in the message was not present or not readable, the Reject component will contain a correlation ID. If a Reject component is returned to the DMS-500 switch, a service communication failure (SCFL) treatment is applied.

Table 1-11 provides a definition of the three identifiers that are returned in the Reject component.

Table 1-11
Definition of Reject component identifier codes

Identifier code HGFE DCBA	Meaning
1100 1111	Component ID identifier
1101 0101	Problem code identifier
1111 0010	Parameter set identifier

—end—

The problem code data element contains two parts as follows:

- problem type code — indicates the type of problem that caused the reject.
- problem specifier code — provides more specific information on the problem type that caused the reject.

Table 1-12 provides a definition of each problem type code that may be returned in the Reject component.

Table 1-12
Definition of Reject component problem type codes

Problem type code HGFE DCBA	Meaning
0000 0000	Not Used
0000 0001	General problem
0000 0010	Invoke problem
0000 0011	Return result problem
0000 0100	Return error problem
0000 0101	Transaction portion problem
0000 0110 to 1111 1111	Spare values
—end—	

Table 1-13 provides a definition of each problem specifier code as it relates to the problem type identified in Table 1-12 that may be returned in the Reject component.

Table 1-13
Definition of Reject component problem specifier codes

Problem type	Problem specifier code HGFE DCBA	Meaning
All problems	1111 1111	Reserved
	0000 0000	Not Used
General problem	0000 0001	Unrecognized component
	0000 0010	Incorrect component portion
	0000 0011	Badly structured component
Invoke problem	0000 0001	Duplicate Invoke ID
	0000 0010	Unrecognized operation code
	0000 0011	Incorrect parameter
	0000 0100	Unrecognized correlation ID
Return result problem	0000 0001	Unrecognized correlation ID
	0000 0010	Unexpected Return Result
	0000 0011	Incorrect parameter
Return error problem	0000 0001	Unrecognized correlation ID
	0000 0010	Unexpected Return Result
	0000 0011	Unrecognized error
	0000 0100	Unexpected error
	0000 0101	Incorrect parameter
Transaction portion problem	0000 0001	Unrecognized package type
	0000 0010	Incorrect transaction portion
	0000 0011	Badly structured transaction portion
	0000 0100	Unrecognized transaction ID

—end—

TCAP implementation scope and compliance

The UCS IN/1 TCAP applications are based on ANSI Issue 1 TCAP (ANSI T1.114-1988) (ANSI/ECSA T1X1.1 Recommendations Q.771–Q.774). The following information applies for the TCAP translation portion:

- Only procedures relying on connectionless network service are supported. (Q.771 Section 2.3)
- The ability to override permission and terminate a transaction by sending a response package is supported. (Q.774 Section 3.2.1.5)
- The ability to terminate a transaction without sending or receiving an explicit response package is supported. (Q.774 Section 3.2.1.5)
- The ability to perform point-to-multipoint communications as one application process transaction with a single transaction ID is not supported. Point-to-multipoint communication requires the assignment of separate transaction IDs for each receiving point. (Q.774 Section 3.2.1.6)

The following information applies for the TCAP component portion:

- An Invoke operation reporting success or failure, success only, failure only, or neither, are all supported. (Q.771 Section 4.5)
- The ability to respond to an Invoke component with another Invoke component is supported only for N00 number translation. (Q.774 Section 3.3)
- The ability to send multiple responses to single Invoke is not supported. (Q.774 Section 3.3)
- The last/not last responding component concept is not supported. (Q.773 Section 4.1)
- Component ID management is not provided. (Q.774 Section 3.3)
- Special TCAP Procedures, Temporary and Permanent Handover, are not supported. (Q.774 Section 4)

TCAP operation examples

This section provides three examples that describe the exchange of TCAP packages within a transaction and the associated operations.

Lower case letters represent operations or the Invoke or correlation IDs of the package. The first ID in an Invoke package is its Invoke ID, the second is its correlation ID. Return Result, Error, and Reject packages have only a correlation ID.

Example 1

The first TCAP example provides an explanation of the simplest type of operation, an Invoke followed by a Return Result. Figure 1-9 shows the type of messages and timing used between the SSP (DMS-500) and the SCP. Account code validation is a typical TCAP operation that uses this sequence of operation.

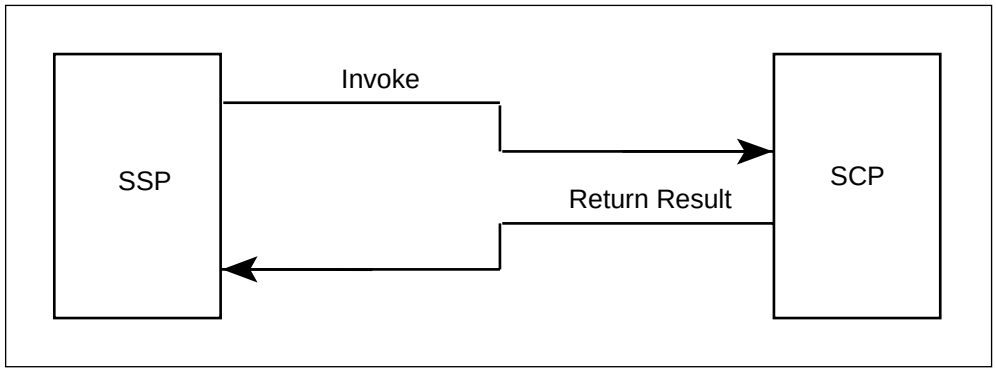
Sequence of operation for Example 1 in Figure 1-9 is as follows:

1 The SSP initiates an operation called x by issuing an Invoke that requires a reply.

2 The SCP receives the Invoke (with an ID of x) that requires a reply and responds with a Return Result (last) from the application (with a correlation ID of x).

3 The SSP receives the Return Result from the SCP.

Figure 1-9
TCAP operation, Example 1



Example 2

The second TCAP example provides an explanation of an Invoke that is used to respond to another Invoke. The first Invoke does not contain a correlation ID whereas the second Invoke does. Figure 1-10 shows the type of messages and timing used between the SSP (DMS-500) and the SCP. N00 number translation is a typical TCAP operation that uses this sequence of operation.

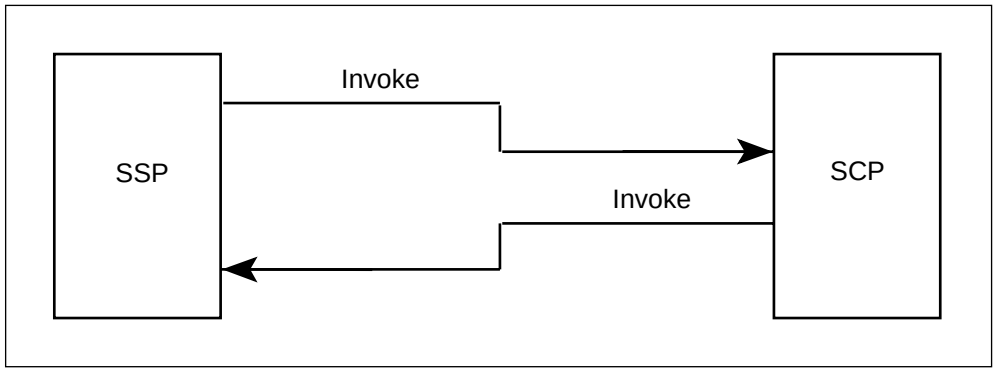
Sequence of operation for Example 2 in Figure 1-10 is as follows:

1 The SSP initiates an operation called x by issuing an Invoke that does not require a reply. (It may get a reply, but it is not necessary.)

2 The SCP receives the Invoke (with an ID of x) that does not require a reply. The SCP has the option of sending reply. The SCP application responds with an Invoke (with an ID of y and a correlation ID of x) requiring a reply. Operation y requires a reply and operation x is a "not last," which means that operation x has more replies to come.

3 The SSP receives the Invoke from the SCP.

Figure 1-10
TCAP operation, Example 2



Example 3

The third TCAP example provides an explanation of an operation in which an Invoke is rejected for a protocol error. Figure 1-11 shows the type of messages and timing used between the SSP (DMS-500) and the SCP.

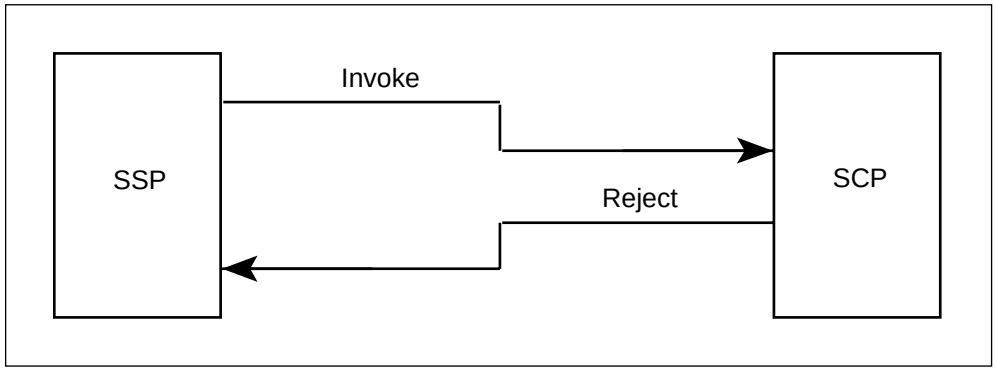
Sequence of operation for Example 3 in Figure 1-11 is as follows:

1 The SSP initiates an operation called x by issuing an Invoke that requires a reply.

2 The SCP receives the Invoke (with an ID of x) from the SSP that contains a protocol error and responds with a Reject containing an indicator that defines the nature of the problem.

3 The SSP receives the Reject correlated to operation x from the SCP.

Figure 1-11
TCAP operation, Example 3



Additional CCS7 information

For additional information on CCS7 operation, refer to the *DMS-500 Feature Group D (FGD) Application Guide.*

N00 number translation

Description

N00 number translation at the Service Control Point (SCP) using Transaction Capabilities Application Part (TCAP) allows DMS-500 switches to send N00 numbers (received as part of the subscriber's dialed digits) for translation to remote databases over the Common Channel Signaling #7 (CCS7) network.

Note: VER_2_N00_TCAP office parameter must be set to N for this Version of the N00 number translation as discussed in this chapter to be used. If the VER_2_N00_TCAP office parameter is set to **Y**, Version 2 of the N00 number translation as discussed in Chapter 8 is used. For additional information, see Chapter 8, "Version 2 N00 number translation."

Call scenario

The call scenario for a N00 number translation is provided in Figure 2-1.

Call originates

N00 service calls (700, 800, or 900) can originate from various trunk types as follows:

- 700 calls can come from feature group A (FGA), feature group B (FGB), feature group D (FGD), and dedicated access line (DAL) type of trunks.
- 800 calls can come from feature group C (FGC) and FGD type of trunks.
- 900 calls can come from FGD type of trunks.

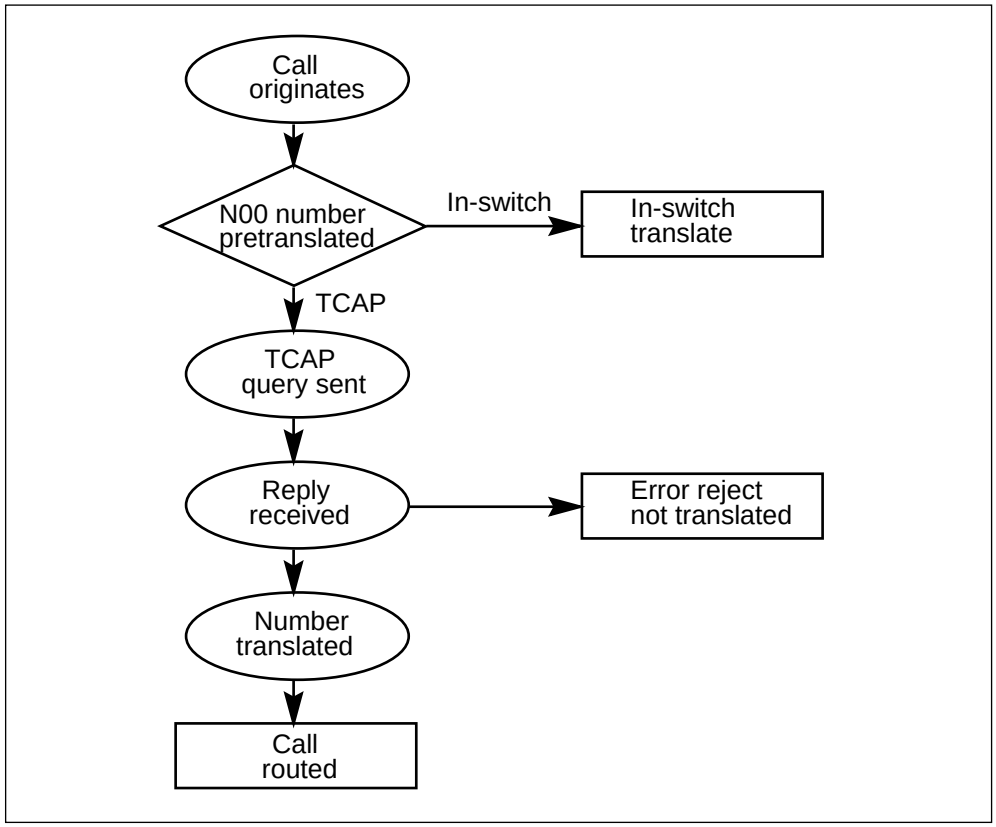
Note: 800 supporting agencies support NXX translation where N = 2 through 9 and X = 0 through 9. This allows support of numbers such as 888, 500, etc.

N00 pretranslated

If the dialed N00 number is marked in the pretranslator as a call to be translated remotely, the DMS-500 switch communicates to the SCP by sending a query over the CCS7 links.

Remote N00 translation is activated by the presence of the dialed N00 number within the range of digits identified as valid for SACREMOT in the SVCFEAT field of STDPRT (Standard Pretranslator) subtable within the STDPRTCT (Standard Pretranslator Control) table.

Figure 2-1
N00 number translation call scenario



TCAP query sent

An Invoke query is sent from the DMS-500 switch to the SCP over the CCS7 links. This query contains the dialed number and, if available, the 3-, 6-, or 10-digit automatic number identification (ANI) number.

The ANI transmitted in the Invoke query is the ANI or calling line identifier (CLID) received on the originating trunk, with a length of 3, 6, or 10 digits (10 digits only if office parameter ENHANCED_N00_TCAP is set to **Y**). If an ANI is not available, a pseudo automatic number identification (PANI) can be constructed and used instead. If neither an ANI or a PANI is available, the trunk group serving numbering plan area (SNPA) is sent as a 3-digit ANI value.

Reply received

After the N00 number is either translated or not translated at the SCP, results of the translation are sent back over the CCS7 links to the DMS-500 switch.

N00 number translated

If the N00 number is translated, an Invoke response is returned from the SCP containing the following:

- routing number
- billing indicator (calling party or called party)
- calling party's identity (CPI)
- satellite restriction
- nature of number (off-net or on-net)
- originating partition
- terminating partition
- translation billing type (only if parameter ENHANCED_N00_TCAP is set to **Y**)

N00 number not translated

If the N00 number is not translated, an Invoke response is returned from the SCP containing the following:

- diagnostic
  - — translation not found
  - — translation blocked

Automatic Code Gapping

Automatic Code Gapping (ACG) allows the DMS-500 switch to reduce the number of queries sent to the SCP at the request of the SCP. The request from the SCP comes in the form of an ACG parameter that is part of the standard TCAP Invoke response.

The ACG parameter is returned in an Invoke response in response to a query sent by the Service Switching Point (SSP) when the SCP is in one of the following conditions:

- calls are being received for an unassigned code (vacant code)
- calls are being received for a band that a customer has not subscribed to (out-of-band)
- database is overloaded (database overload)
- an excessive number of calls are being received for a destination (destination mass calling)

- ACG control has been externally initiated by an operation support system (service management system initiated)

An Automatic Code Gapping Invoke response that is returned from the SCP contains an ACG parameter that contains the following:

- Cause control indicator
  - — Vacant code
  - — Out-of-band
  - — Database overload
  - — Destination mass calling
  - — Service management system initiated
- Duration index
  - — Duration time in seconds
- Gap control interval
  - — Interval time in seconds
  - — Control to remove gap
  - — Control to stop all calls

Note: ACG for the N00 TCAP application follows ANSI T1.114-1988 with respect to the encoding of the ACG message and its parameters.

ACG operation

If ACG is applied to an N00 number, the N00 call that generated the query is treated, and the N00 number in the ACG message is entered for active control on an ACG control list.

The treatment to be applied to calls blocked by ACG is specified in office parameter N00_ACG_TRMT. Log ACG101 is generated each time an ACG response message is received by the DMS-500 switch.

The switch then applies the control to all other calls made to the N00 number being controlled by checking for the presence of an active control prior to sending each N00 query. If the N00 number of the call matches an active control, the query is disallowed if a query has previously been sent within a time interval specified in the control. As a result, the rate of query generation from the switch is controlled to a limit provided by the SCP in the ACG message.

ACG control list

The DMS-500 switch maintains a control list with the N00 numbers to be controlled, and the duration, gap interval, and time of application for each control. When the switch receives an ACG message, the N00 number is added to the list, and time recorded to note the start of the control's duration. Each time a query is made against that N00 number, another timestamp is recorded to allow gap interval calculations to be made.

The control list accommodates a maximum of 1024 N00 numbers for the N00 TCAP application. The controls are maintained over a warm restart, but all controls are cleared when a cold or reload restart is performed. When the maximum allowable controls (1024) are in use, subsequent ACG messages from the SCP are discarded and no control is applied. An ACG301 log is generated in this case. When one or more controls have expired and their places in the list reclaimed, the switch will again accept and apply ACG controls from the SCP.

An audit of the control list is invoked to remove control codes with an expired duration. The audit is invoked at the time interval in minutes specified by the office parameter N00_ACG_AUDIT_TIME. For example, if the parameter is set to 30, then the audit process is invoked every 30 minutes. After the audit of the control list is completed, log ACG201 is generated. The audit is also invoked when 1024 N00 numbers are under control.

ACG duration and gap relationship

The ACG message from the SCP specifies a gap interval for the controlled N00 number, which represents a minimum length of time between SCP queries. The gap interval begins at the time the ACG control is applied. Subsequent calls to the N00 number are blocked until the gap interval has expired. The start time of the gap interval is reset on the next call which is allowed to launch a query to the SCP (after expiry of the previous gap interval). By implication, the actual time between queries may be more than the gap interval, but not less. The actual gap interval is recalculated from the nominal gap according to a uniform random distribution between 90 and 110 percent of the nominal gap interval. The gap interval continues to be reset until the control's duration expires. At that point the control is removed.

If an additional ACG message is received for a controlled N00 number before the existing control has expired, the existing control is overwritten by the control specified in the new message. If the new message indicates a gap index of level 0 (remove gap) or level 1 (zero gap interval), the control is removed. Subsequent calls to the N00 number are allowed to query the SCP. The call whose query caused the SCP to return an ACG message is still blocked, even though the control was removed by the action of that message.

ACG error conditions

The following actions are taken in the event of an ACG error condition:

- If an invalid duration or gap index is returned by the SCP in the ACG message, the call is blocked, but the ACG control is not applied. A TCAP Reject message is sent, indicating that an incorrect parameter was received.
- If the CCS7 links are down to the SCP, no code gapping message (or any other message) can be returned, and the call will receive service communication failure (SCFL) treatment when the query times out. Controls already on the control list will be maintained.
- If an unsolicited ACG message is sent by the SCP, the control is not added to the control code list. A TCAP Reject message is sent indicating a transaction portion problem.
- If the SCP returns an ACG control and the maximum number of controls (1024) are already in use, the ACG control is discarded and the call is blocked with a treatment specified by parameter N00_ACG_TRMT.

Return Error reply

If an error (unsuccessful completion) is detected by the SCP, a Return Error reply is sent back over the CCS7 links to the DMS-500 switch. For a list of error code reasons that can be returned in the Return Error reply, refer to Table 1-10.

Reject reply

If a protocol error is detected by either the SCP or the DMS-500 switch, a Reject reply is sent to the node at the other end of the CCS7 links. For a list of the type of problems that can be identified in the Reject reply, refer to Tables 1-12 and 1-13.

Number translated

Normal 10-digit off-net or 7-digit on-net number translation is performed.

Call routed

The call is then routed to its destination.

Messaging

N00 translation is performed at the SCP for the off-switch translation. The invoke query is sent from the SSP requesting the translation to be performed at the SCP. Depending on the results, the SCP responds with one of following messages:

- Invoke response (N00 number translated)
- Invoke response (N00 number not translated)

- Automatic Code Gapping Invoke response
- Return Error
- Reject

If an erroneous message is returned from the SCP for N00 translation, a Reject message is sent from the SSP to the SCP.

Invoke query sent to SCP

The format of an Invoke query message sent to the SCP for N00 translation is shown in Table 2-1.

Table 2-1
N00 translation Invoke TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0010	Query with permission
2	Package length	1	0010 1011	43 bytes (variable)
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Originating transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0010 0011	35 bytes (variable)
8	Component type ident.	1	1110 1001	Invoke (last)
9	Component length	1	0010 0001	33 bytes (variable)
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Invoke ID assigned
13	Operation code identifier	1	1101 0000	National TCAP
14	Operation code length	1	0000 0010	2 bytes
15	Operation code family	1	1000 0011	Provide instruction (reply required)
16	Operation code specifier	1	0000 0001	Start

—continued—

Table 2-1
N00 translation Invoke TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
17	Parameter set identifier	1	1111 0010	
18	Parameter set length	1	0001 1000	24 bytes (variable)
19	Parameter ident.	1	1010 1010	Service key
20	Parameter length	1	0000 1100	12 bytes
21	Parameter ident.	2	1101 1111 0100 1001	Private digits (N00)
22	Parameter length	1	0000 1001	9 bytes
23	Parameter	9	0000 0001 0000 0000 0010 1110 0000 1010	Dialed number Nature of number (not applicable) Telephony numbering/TBCD Number of digits = 10 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9)
24	Parameter ident.	2	1101 1111 0100 1001	Private digits (ANI)
25	Parameter length	1		(variable)
26	Parameter	7 or 9	0000 0010 0000 0000 0010 1110	Calling number Nature of number (not applicable) Telephony numbering/TBCD Number of digits = 3, 6, or 10 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9)

—end—

Invoke response from SCP (number translated)

The format of an Invoke response message (N00 number translated) returned from the SCP is shown in Table 2-2.

Table 2-2
Invoke response (N00 number translated) TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0010 0110	38 bytes (variable)
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0001 1110	30 bytes (variable)
8	Component type ident.	1	1110 1001	Invoke (last)
9	Component length	1	0001 1100	28 bytes (variable)
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0010	2 bytes
12	Component ID	2		Invoke ID/correlation ID
13	Operation code identifier	1	1101 0000	National TCAP
14	Operation code length	1	0000 0010	2 bytes
15	Operation code family	1	0000 0100	Connection control (no reply required)
16	Operation code specifier	1	0000 0001	Connect
17	Parameter set identifier	1	1111 0010	
18	Parameter set length	1	0000 0010	2 bytes
19	Parameter ident.	2	1101 1111 0100 1001	Private digits (routing number)
20	Parameter length	1	0000 1001	9 bytes

—continued—

Table 2-2
Invoke response (N00 number translated) TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
21	Parameter	9	0000 0100 0000 0000 0010 1110	Routing number Nature of number (not applicable) Telephony numbering/TBCD Number of digits = 7 or 10 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9)
22	Parameter ident.	2	1101 1111 0100 0100	Private billing indicator
23	Parameter length	1		(variable)
24	Parameter	3 or 5		Refer to response data parameter format in Table 2-3 or Table 2-4.
			—end—	

N00 response data parameter format

If office parameter ENHANCED_N00_TCAP is set to **N**, the format shown in Table 2-3 is used for the response data parameter.

Table 2-3
N00 response data parameter format with ENHANCED_N00_TCAP=N

Code	Meaning
First parameter word (byte):	
Bit A	Billing indicator 0 = Calling party 1 = Called party
Bit B	Calling party's identity (CPI) 0 = CPI not transmitted to the terminator in the call. 1 = CPI transmitted to the terminator in the call.
	—continued—

Table 2-3
N00 response data parameter format with ENHANCED_N00_TCAP=N

Code	Meaning
Bit C	Satellite restriction 0 = Off 1 = On
Bit D	Spare
Bit E	Nature of number 0 = Off-net 1 = On-net
Bit F–H	Spare
Second parameter word (byte):	
Bits A–H	Originating partition (LSB)
Third parameter word (byte):	
Bits A–B	Originating partition (MSB)
Bits C–G	Terminating partition
Bit H	Spare
—end—	

If office parameter ENHANCED_N00_TCAP is **Y**, the format in Table 2-4 is used.

Table 2-4
N00 response data parameter format with ENHANCED_N00_TCAP=Y

Code	Meaning
First parameter word (byte):	
Bit A	Billed party 0 = Calling party 1 = Called party
—continued—	

Table 2-4
N00 response data parameter format with ENHANCED_N00_TCAP=Y
(continued)

Code	Meaning
Bit B	Calling party's identity (CPI) 0 = CPI not transmitted to the terminator in the call. 1 = CPI transmitted to the terminator in the call.
Bit C	Satellite restriction 0 = Off 1 = On
Bit D	Spare
Bit E	Nature of number 0 = Off-net 1 = On-net
Bits F–H	Spare
Second parameter word (byte):	
Bits A–H	Spare
Third parameter word (byte):	
Bits A–E	Terminating partition
Bits F–H	Spare
Fourth parameter word (byte):	
Bits A–H	Originating partition (LSB)
Fifth parameter word (byte):	
Bits A–B	Originating partition (MSB)
Bits C–H	Translation billing type
—end—	

Invoke response from SCP (number not translated)

The format of an Invoke response message (N00 number not translated) returned from the SCP is shown in Table 2-5.

Table 2-5
Invoke response (N00 number not translated) TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 1000	24 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0001 0000	16 bytes
8	Component type ident.	1	1110 1001	Invoke (last)
9	Component length	1	0000 1110	14 bytes
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0010	2 bytes
12	Component ID	2		Invoke ID/correlation ID
13	Operation code identifier	1	1101 0000	National TCAP
14	Operation code length	1	0000 0010	2 bytes
15	Operation code family	1	0000 0100	Connection control (no reply required)
16	Operation code specifier	1	0000 0011	Disconnect
17	Parameter set identifier	1	1111 0010	
18	Parameter set length	1	0000 0100	4 bytes
19	Parameter ident.	2	1101 1111 0100 0101	Private TCAP (Diagnostic parameter)

—continued—

Table 2-5
Invoke response (N00 number not translated) TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
20	Parameter length	1	0000 0001	1 byte
21	Parameter	1	0000 00XX	Parameter word (byte): Bit B A Significance 0 0 Not used 0 1 Translation not found 1 0 Translation blocked 1 1 Not used
			—end—	

Automatic Code Gapping Invoke response from SCP

The format of a Automatic Code Gapping Invoke response message returned from the SCP is shown in Table 2-6.

Table 2-6
Automatic Code Gapping Invoke response TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0010 0100	36 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0001 1011	27 bytes
8	Component type ident.	1	1110 1001	Invoke (last)
9	Component length	1	0001 1001	25 bytes
10	Component ID identifier	1	0000 0000	
11	Component ID length	1	0000 0001	1 byte
			—continued—	

Table 2-6
Automatic Code Gapping Invoke response TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
11	Component ID	1	0000 0000	Invoke ID
12	Operation code identifier	1	1101 0010	National operation
13	Operation code length	1	0000 0010	2 bytes
14	Operation code family	1	0000 0111	Network management
15	Operation code specifier	1	0000 0001	Automatic code gap
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0001 0000	16 bytes
18	Parameter ident.	2	1000 0100	ANSI digits parameter
19	Parameter length	1	0000 1001	9 bytes
20	Parameter	9	0000 0001 0000 0000 0010 0001 0000 1010	Dialed number Nature of number (not applicable) Telephony numbering/BCD Number of digits = 10 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9)
21	Parameter ident.	2	1000 0001	ANSI ACG parameter
22	Parameter length	1	0000 0011	3 bytes
23	Parameter	3	0000 0XXX	Control cause indicator: Bit C B A — Significance 0 0 0 — Not used 0 0 1 — Vacant code 0 1 0 — Out-of-band 0 1 1 — Database overload 1 0 0 — Destination mass calling 1 0 1 — Service management system initiated

—continued—

Table 2-6
Automatic Code Gapping Invoke response TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
			0000 XXXX	Duration: Bit D C B A — Significance 0 0 0 0 — Not used 0 0 0 1 — 1 second 0 0 1 0 — 2 seconds 0 0 1 1 — 4 seconds 0 1 0 0 — 8 seconds 0 1 0 1 — 16 seconds 0 1 1 0 — 32 seconds 0 1 1 1 — 64 seconds 1 0 0 0 — 128 seconds 1 0 0 1 — 256 seconds 1 0 1 0 — 512 seconds 1 0 1 1 — 1024 seconds 1 1 0 0 — 2048 seconds
			0000 XXXX	Gap control interval: Bit D C B A — Significance 0 0 0 0 — Remove gap control 0 0 0 1 — 0.00 seconds 0 0 1 0 — 0.10 seconds 0 0 1 1 — 0.25 seconds 0 1 0 0 — 0.50 seconds 0 1 0 1 — 1.00 seconds 0 1 1 0 — 2.00 seconds 0 1 1 1 — 5.00 seconds 1 0 0 0 — 10.00 seconds 1 0 0 1 — 15.00 seconds 1 0 1 0 — 30.00 seconds 1 0 1 1 — 60.00 seconds 1 1 0 0 — 120.00 seconds 1 1 0 1 — 300.00 seconds 1 1 1 0 — 600.00 seconds 1 1 1 1 — Stop all calls
			—end—	

Return Error from SCP

The format of a Return Error message returned from the SCP for N00 translation is shown in Table 2-7.

Table 2-7
N00 translation Return Error TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0010	18 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1010	10 bytes
8	Component type ident.	1	1110 1011	Return Error
9	Component length	1	0000 1000	8 bytes
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Correlation ID
13	Error code identifier	1	1101 0011	
14	Error code length	1	0000 0001	1 byte
15	Error code	1		Refer to error code definitions in Table 1-10.
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0000	No parameters
			—end—	

Reject from SCP

The format of a Reject message returned from the SCP for N00 translation is shown in Table 2-8.

Table 2-8
N00 translation Reject from the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0011	19 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1011	11 bytes
8	Component type ident.	1	1110 1100	Reject
9	Component length	1	0000 1001	9 bytes
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Correlation ID
13	Problem code identifier	1	1101 0101	
14	Problem code length	1	0000 0010	2 bytes
15	Problem type	1		Refer to problem type definitions in Table 1-12.
16	Problem specifier	1		Refer to problem specifier definitions in Table 1-13.
17	Parameter set identifier	1	1111 0010	
18	Parameter set length	1	0000 0000	No parameters
			—end—	

Reject to SCP

If an erroneous message is returned from the SCP for N00 translation, a Reject message is sent from the SSP to the SCP. The format of a Reject message sent to the SCP for N00 translation is shown in Table 2-9.

Table 2-9
N00 translation Reject to the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0001	Unidirectional
2	Package length	1	0000 1110	14 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0000	
5	Component seq. ident.	1	1110 1000	
6	Component seq. length	1	0000 1011	11 bytes
7	Component type ident.	1	1110 1100	Reject
8	Component length	1	0000 1001	9 bytes
9	Component ID identifier	1	1100 1111	
10	Component ID length	1	0000 0001	1 byte
11	Component ID	1		Correlation ID
12	Problem code identifier	1	1101 0101	
13	Problem code length	1	0000 0010	2 bytes
14	Problem type	1		Refer to problem type definitions in Table 1-12.
15	Problem specifier	1		Refer to problem specifier definitions in Table 1-13.
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0000	No parameters
			—end—	

Billing information

The OPART returned in the N00 response data is written to the ORIGOPRT field of the call detail record (CDR).

The translation billing type returned in the N00 response data is written to the BILLTYPE field of the CDR if parameter ENHANCED_N00_TCAP is set to **Y**. Otherwise, it is 0.

The dialed N00 number is written to the BILLNUM field if the number is called-party billed.

N00 number translation implementation

This section discusses the following N00 number translation implementation:

- datafilling tables
- setting up office parameters

Datafilling tables

Two database tables are used for N00 translation:

- STDPRTCT
- TMTCNTL

In table STDPRTCT, subtable STDPRT, there are two fields used for N00 translation.

The PRERTSEL field is set to ES.

The SVCFEAT field has a range of two subfields as follows:

- INWATS — This subfield indicates the type of N00 service feature available.
- SACREMOT — This subfield contains the range of numbers that are used during pretranslation to determine whether remote N00 translation is to be performed on the dialed number.

In table TMTCNTL (Treatment Control), subtable OFFTREAT, field TREATM is used to indicate two values. These values (treatments) are as follows:

- SCFL — DBS communication failure treatment
- N00B — N00 call blocked treatment

For more information, refer to the *DMS-500 Data Schema Reference Manual*.

Setting up office parameters

In table OFCVAR, nine parameters are used for N00 translation:

- TESTSS250_MAX_USERS — This parameter specifies the maximum number of simultaneous users that can execute the DMS-500 TESTSS MAP command for each of the applications.
- N00_DCP_RESPONSE_TIMEOUT — This parameter specifies the time interval within which the DMS-500 switch expects to receive a response message from the SCP.
- IE_LAS_ON_900_CGB — This parameter specifies whether Incoming Exclusion and/or InterLATA/State screening is performed for a 900 calling-party-billed call.
- IE_LAS_ON_900_CDB — This parameter specifies whether Incoming Exclusion and/or InterLATA/State screening is performed for a 900 called-party-billed call.
- IE_LAS_ON_700_CGB — This parameter specifies whether Incoming Exclusion and/or InterLATA/State screening is performed for a 700 calling-party-billed call.
- IE_LAS_ON_700_CDB — This parameter specifies whether Incoming Exclusion and/or InterLATA/State screening is performed for a 700 called-party-billed call.
- ENHANCED_N00_TCAP — This parameter specifies whether to use existing (3–6 digit ANI) or enhanced (10-digit ANI) format for the N00 invoke response from the SCP.
- N00_ACG_TRMT — This parameter specifies the treatment to be applied on a N00 call that is blocked because of Automatic Code Gapping.
- VER_2_N00_TCAP — This parameter identifies if the new TCAP development for the N00 application (Version 2) is to be used. If the parameter is set to **Y**, the new encoding and decoding schemes are used as discussed in Chapter 8. If the parameter is set to **N**, this version of DMS-500 switch capability is used for the N00 application as discussed in this Chapter.

In table OFCENG, three parameters are used for TCAP operation:

- NUM_RDB_EXTS — This parameter specifies the number of Extension Blocks to allocate for remote database (RDB) facility.
- NUM_TCAP_TRANSACTIONS — This parameter specifies the maximum number of concurrent TCAP transactions which may be used at one time among all DMS-500 switch IN/1 TCAP applications.

- N00_ACG_AUDIT_TIME — This parameter specifies the time interval at which the audit runs that deletes Automatic Code Gapping control codes from the control list.

In table OFCOPT, one parameter is used for TCAP operation:

- N00_ENHANCED_GLOBAL_TITLE — This parameter determines whether a fixed global title address string of a single 0 digit or a 10-digit N00 number for the SCCP called party address in the outgoing TCAP message. For more information, refer to "Global title address," in Chapter 7, "Global Title Translation."

For more information, refer to the *DMS-500 Office Parameters Reference Manual*.

Travel card validation

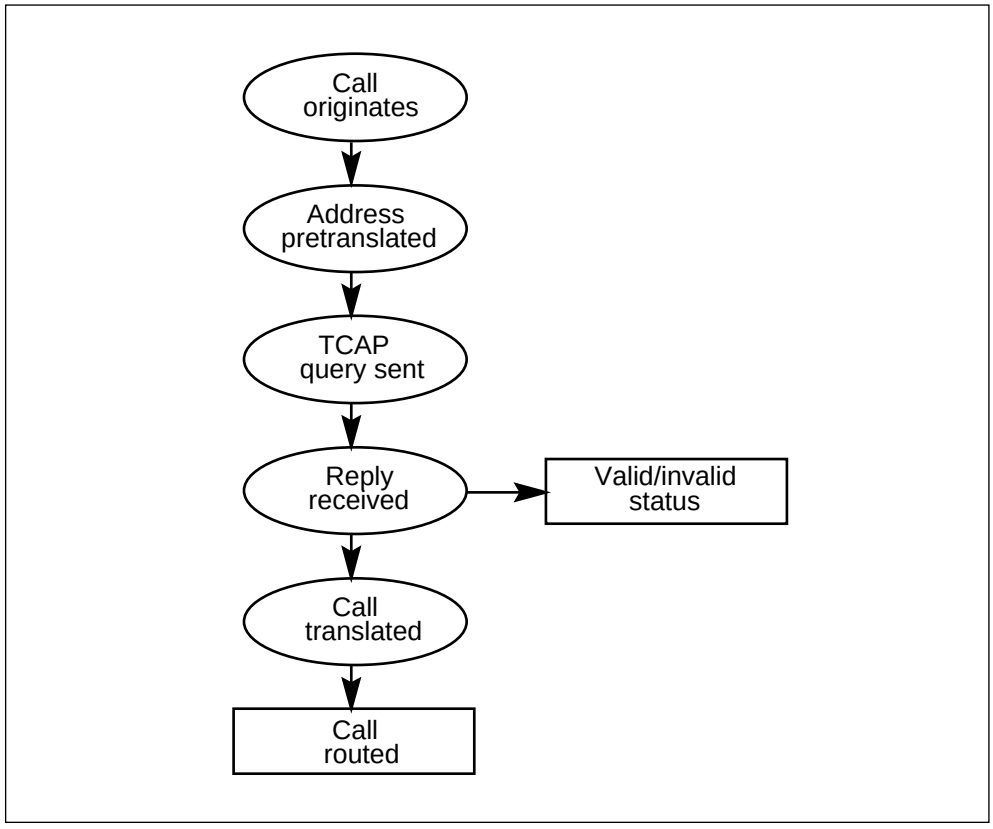
Description

Travel card validation at the Service Control Point (SCP) using Transaction Capabilities Application Part (TCAP) allows DMS-500 switches to send travel card numbers (received as part of the subscriber's dialed digits) for validation to remote databases over the Common Channel Signaling #7 (CCS7) network.

Call scenario

The call scenario for a travel card validation is provided in Figure 3-1.

Figure 3-1
Travel card validation call scenario



Call originates

The value in office parameter MCCS_VERIFY_TYPE determines whether the travel card is to be validated in-switch or via TCAP to the SCP. If the value of this parameter is **INSWITCH**, travel card validation is performed in-switch. If the value of this parameter is **DCP**, travel card validation is performed at the SCP using TCAP.

There are two types of mechanized calling card services (MCCS):

- with tone
- with voice prompt

With tone MCCS service, travel card numbers (TCN) may originate from any of the following trunk types that have the MCCS field in table TRKGRP (Trunk Group) enabled:

- feature group A (FGA)
- feature group B (FGB)
- feature group C (FGC)
- feature group D (FGD)
- dedicated access line (DAL)
- Integrated Services Digital Network (ISDN) User Part (ISUP) intermachine trunk (IMT) (inter-IMT only)

With voice prompt MCCS service, travel card numbers can originate from any of the following trunk types that have the MCCS field in table TRKGRP enabled:

- universal access (UA) per-trunk signaling (PTS) FGD
- UA IMT (inter-IMT only)
- UA ISUP FGD
- UA FGC
- pure FGD (0+) on PTS FGD
- pure FGD (0+) on ISUP FGD

Address pretranslated

Whenever a call contains a travel card number (TCN), the DMS-500 switch communicates to the SCP by sending a query over the CCS7 links.

TCAP query sent

An Invoke query is sent from the DMS-500 switch to the SCP over the CCS7 links. This query contains the travel card billing number (14 digits) that needs to be validated by the SCP.

Software Optionality Control (SOC) CRDS0004 is a state SOC only used by table control for ENHANCED_TCN_TCAP. In this case, the option must be in the **ON** state for the customer to change ENHANCED_TCN_TCAP to **Y**. An error message displays when ENHANCED_TCN_TCAP is changed without SOC CRDS0004 set to **ON**. SOC CRDS0004 does not affect CALLP or change the functionality of ENHANCED_TCN_TCAP.

If office parameter ENHANCED_TCN_TCAP is set to **Y**, the query is extended by two additional mandatory parameters. The additional parameters are as follows:

- called number parameter
- calling number parameter

The called number parameter is typed as international if it is identified as international or international-partitioned, as national if the call is typed as an off-net call, or network-specific if it is typed as an on-net call. The prefix digits of the called number (for example, 0, 01) are always removed.

Population of the calling number parameter is as follows:

- The nature-of-number is always national, as no agencies are supported on which calls with international calling party numbers are available.
- The parameter always contains two II digits, even if defaulted to 00, and can contain a calling party address. The II digits are obtained as follows:
  - — For DAL, FGA, FGB, and FGC calls, if the PANIVAL field of table TRKGRP is not set to NONE, then the digits in the PANIINFO field are used as the II digits.
  - — For FGD and IMT calls, the II digits are received by means of PTS or CCS7.
  - — PRI calls never have II digits.
  - — If II digits are not available, 00 is sent in their place.
- The calling number is obtained as follows:
  - — For DAL and FGA calls, a PANI is used if available, otherwise no calling number is sent after the II digits.
  - — For FGB and FGC calls, a PANI is used if available, otherwise the SNPA from table TRKGRP is sent (if the SNPA is datafilled as NIL, the digits 000 are sent as the SNPA).
  - — For FGD and IMT calls, the ANI or calling party ID can be received by means of PTS or SS7 signaling. If not received, no calling number is sent after the II digits.

— For PRI calls, the CLID or the DEFCLID field in table CALLATTR is used. If neither is available, no calling number is sent after the II digits.

Reply received

After the travel card billing number is either validated or not validated at the SCP, results of the validation are sent back over the CCS7 links to the DMS-500 switch.

Travel card number validation response

A result response is returned from the SCP containing the following:

- TCN status (valid or not valid)
- trap class
- originating partition
- terminating partition
- satellite restriction
- account code length (1–5)
- account code validation requirement
- class of service (COS) index
- TCN trap flag

Return Error reply

If an error (unsuccessful completion) is detected by the SCP, a Return Error reply is sent back over the CCS7 links to the DMS-500 switch. For a list of error code reasons that can be returned in the Return Error reply, refer to Table 1-10.

Reject reply

If a protocol error is detected by either the SCP or the DMS-500 switch, a Reject reply is sent to the node at the other end of the CCS7 links. For a list of the type of problems that can be identified in the Reject reply, refer to Tables 1-12 and 1-13.

Call translated

The call is translated.

Call routed

The call is then routed to its destination.

Messaging

Travel card validation is performed at the SCP for the off-switch database lookup. The Invoke query is sent from the Service Switching Point (SSP) requesting the validation to be performed at the SCP. Depending on the results, the SCP responds with one of following messages:

- Return Result
- Return Error
- Reject

If an error message is returned from the SCP for travel card validation, a reject message is sent from the SSP to the SCP.

Invoke query sent to SCP

The format of an Invoke query message sent to SCP for travel card validation is shown in Table 3-1.

Table 3-1
Travel card validation Invoke TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0010	Query with permission
2	Package length	1	0010 0001	33 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Originating transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0001 1001	25 bytes
8	Component type ident.	1	1110 1001	Invoke (last)
9	Component length	1	0001 0111	23 bytes

Note 1: Called number parameter and calling number parameter are only available if office parameter ENHANCED_TCN_TCAP is set to yes (**Y**) and then the two parameters are mandatory.

Note 2: Called number is typed as international if it is identified as international or international-partitioned.

Note 3: Called number is typed as national if the call is typed as an off-net call

Note 4: Called number is typed as network-specific if the call is typed as an on-net call

—continued—

Table 3-1
Travel card validation Invoke TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
10	Component ID ident.	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Invoke ID
13	Operation code ident.	1	1101 0000	National TCAP
14	Operation code length	1	0000 0010	2 bytes
15	Operation code family	1	1000 0001	Parameter (reply required)
16	Operation code specifier	1	0000 0001	Provide value
17	Parameter set identifier	1	1111 0010	
18	Parameter set length	1	0000 1110	14 bytes
19	Parameter ident.	2	1101 1111 0100 0011	Private digits (TCN)
20	Parameter length	1	0000 1011	11 bytes
21	Parameter	11	0000 0101 0000 0000 1101 1110 0000 1110	Billing number Nature of number (not applicable) Travel card number/TBCD Number of digits = 14 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9) Digits (D12, D11) Digits (D14, D13)
22	Parameter ident.	2	1101 1111 0100 1001	Private digits (Called number)
23	Parameter length	1		(variable)

Note 1: Called number parameter and calling number parameter are only available if office parameter ENHANCED_TCN_TCAP is set to yes (**Y**) and then the two parameters are mandatory.

Note 2: Called number is typed as international if it is identified as international or international-partitioned.

Note 3: Called number is typed as national if the call is typed as an off-net call

Note 4: Called number is typed as network-specific if the call is typed as an on-net call

—continued—

Table 3-1
Travel card validation Invoke TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
24	Parameter (Note 1)	5 to 12	0000 0001 0000 00XX	Called number Nature of number: Bit B A Significance 0 1 International (Note 2) 1 0 National (Note 3) 1 1 Network-specific (Note 4)
			0010 1110 0000 1111	Telephony numbering/TBCD Number of digits = 15 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9) Digits (D12, D11) Digits (D14, D13) Digits (filler, D15)
25	Parameter ident.	2	1101 1111 0100 1001	Private digits (II + ANI)

Note 1: Called number parameter and calling number parameter are only available if office parameter ENHANCED_TCN_TCAP is set to yes (**Y**) and then the two parameters are mandatory.

Note 2: Called number is typed as international if it is identified as international or international-partitioned.

Note 3: Called number is typed as national if the call is typed as an off-net call

Note 4: Called number is typed as network-specific if the call is typed as an on-net call

—continued—

Table 3-1
Travel card validation Invoke TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
26	Parameter length	1		(variable)
27	Parameter (Note1)	5 to 10	0000 0010 0000 0010 0010 1110 0000 1100	Calling number Nature of number (National) Telephony numbering/TBCD Number of digits = 12 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9) Digits (D12, D11)

Note 1: Called number parameter and calling number parameter are only available if office parameter ENHANCED_TCN_TCAP is set to yes (**Y**) and then the two parameters are mandatory.

Note 2: Called number is typed as international if it is identified as international or international-partitioned.

Note 3: Called number is typed as national if the call is typed as an off-net call

Note 4: Called number is typed as network-specific if the call is typed as an on-net call

—end—

Return Result response from SCP

The format of a Return Result response message returned from the SCP for travel card validation is shown in Table 3-2.

Table 3-2
Travel card validation Return Result TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0111	23 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1111	15 bytes
8	Component type ident.	1	1110 1010	Return Result (last)
9	Component length	1	0000 1101	13 bytes
10	Component ID ident.	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Correlation ID
13	Parameter set identifier	1	1111 0010	
14	Parameter set length	1	0000 1000	8 bytes
15	Parameter ident.	2	1101 1111 0100 1001	Private digits
16	Parameter length	1	0000 0101	5 bytes
17	Parameter	5		Refer to travel card validation response parameter format in Table 3-3.

—end—

Travel card validation response parameter format

The format of the travel card validation response parameter is shown in Table 3-3.

Table 3-3
Travel card validation response parameter format

Code	Meaning
First parameter word (byte):	
Bit A	TCN status 1 = Valid 0 = Not valid
Bits B–E	Spare
Bits F–H	Trap class 000 = Normal TCN call 001 = Trap class 1 (Note 1) 010 = Trap class 2 (Note 1) 011 = Trap class 3 (Note 1) 100 = Trap class 4 (Note 1) 101 = Trap class 5 (Note 1) 110 = Trap class 6 (Note 1) 111 = Trap class 7 (Note 1)
Second parameter word (byte):	
Bits A–H	Originating partition (LSB)
Third parameter word (byte):	
Bits A–B	Originating partition (MSB)
Bits C–G	Terminating partition
Bit H	Satellite restriction 0 = No 1 = Yes
Fourth parameter word (byte):	
Bits A–C	Account code length 1 – 5
Note 5: If trap class is set to a value other than zero, the call is terminated and the trap class number is used to index table TCNTCH for a 7/10 digit hotline number. If table TCNTCH is not datafilled, CCNV treatment is applied. ***Note 6:*** If TCN trap is set to1, a TRK411 log (TCN_TROUBLE_DATA) is generated.	
—continued—	

Table 3-3
Travel card validation response parameter format (continued)

Code	Meaning
Bit D	Account code validation 0 = No 1 = Yes
Bits E–H	Class of service (LSB)
Fifth parameter word (byte):	
Bits A–F	Class of service (MSB)
Bit G	TCN trap 0 = Log not generated 1 = Log generated (Note 2)
Bit H	Spare
Note 5: If trap class is set to a value other than zero, the call is terminated and the trap class number is used to index table TCNTCH for a 7/10 digit hotline number. If table TCNTCH is not datafilled, CCNV treatment is applied. ***Note 6:*** If TCN trap is set to1, a TRK411 log (TCN_TROUBLE_DATA) is generated.	
—end—	

Default travel card validation response parameter

If the response from the SCP times out or the response is not a Return Result message, a default travel card validation response is returned. The contents of the default response is shown Table 3-4.

Note: If the call is an on-net call (for example, 6/7 digit dialing), the default travel card validation response is not used and the call is routed with service communication failure (SCFL) treatment.

Table 3-4
Default travel card validation response

Item	Value
TCN status	Valid
Trap class	Normal TCN call
Originating partition	Not needed; MCCS_STS in table OFCVAR is used for translation.
Terminating partition	Not needed; MCCS_STS in table OFCVAR is used for translation.
Satellite restriction	No
Account code length	0
Account code validation	No
Class of service index	DEFAULT_TCN_COS_INDEX in table OFCVAR
TCN trap	Log not generated
—end—	

Return Error from SCP

The format of an error message returned from the SCP for travel card validation is shown in Table 3-5.

Table 3-5
Travel card validation Return Error TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0010	18 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1010	10 bytes
8	Component type ident.	1	1110 1011	Return Error
9	Component length	1	0000 1000	8 bytes
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Correlation ID
13	Error code identifier	1	1101 0011	
14	Error code length	1	0000 0001	1 byte
15	Error code	1		Refer to error code definitions in Table 1-10.
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0000	No parameters

—end—

Reject from SCP

The format of a Reject message returned from the SCP for travel card validation is shown in Table 3-6.

Table 3-6
Travel card validation Reject from the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0011	19 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1011	11 bytes
8	Component type ident.	1	1110 1100	Reject
9	Component length	1	0000 1001	9 bytes
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Correlation ID
13	Problem code identifier	1	1101 0101	
14	Problem code length	1	0000 0010	2 bytes
15	Problem type	1		Refer to problem type definitions in Table 1-12.
16	Problem specifier	1		Refer to problem specifier definitions in Table 1-13.
17	Parameter set identifier	1	1111 0010	
18	Parameter set length	1	0000 0000	No parameters
			—end—	

Reject to SCP

If an erroneous message is returned from the SCP for travel card validation, a Reject message is sent from the SSP to the SCP. The format of a Reject message sent to the SCP for travel card validation is shown in Table 3-7.

Table 3-7
Travel card validation Reject to the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0001	Unidirectional
2	Package length	1	0000 1110	14 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0000	
5	Component seq. ident.	1	1110 1000	
6	Component seq. length	1	0000 1011	11 bytes
7	Component type ident.	1	1110 1100	Reject
8	Component length	1	0000 1001	9 bytes
9	Component ID identifier	1	1100 1111	
10	Component ID length	1	0000 0001	1 byte
11	Component ID	1		Correlation ID
12	Problem code identifier	1	1101 0101	
13	Problem code length	1	0000 0010	2 bytes
14	Problem type	1		Refer to problem type definitions in Table 1-12.
15	Problem specifier	1		Refer to problem specifier definitions in Table 1-13.
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0000	No parameters
			—end—	

Billing information

The OPART returned in the TCN response data is written to the ORIGOPRT field of the call detail record (CDR).

The Trap flag bit is written to the TRAP field of the CDR. The Trap class is not recorded for UCS.

The TCN is written to the BILLNUM field of the CDR.

Travel card validation implementation

This section discusses the following topics:

- Datafilling tables
- Setting up office parameters

Datafilling tables

Table TCNTCH (Travel Card Number Trap Class Hotline) is used for travel card validation. This table translates a non-zero Trap Class into a 7/10–digit hotline.

Table TCNTCH has two fields as follows:

- TRAPCLAS — This field corresponds to the non-zero Trap Classes that can be datafilled. Range of values is one through seven.
- TRPHOTLN — This field is a 7- or 10-digit number to which a particular Trap Class terminates. Each digit has a range of zero through nine.

If table TCNTCH is not datafilled, CCNV treatment is applied.

For more information, refer to the *DMS-500 Data Schema Reference Manual*.

Setting up office parameters

In table OFCVAR, five parameters are used for travel card validation:

- TESTSS250_MAX_USERS — This parameter specifies the maximum number of simultaneous users that can execute the DMS250 TESTSS MAP command for each of the applications.
- TCN_DCP_RESPONSE_TIMEOUT — This parameter specifies the time interval within which the DMS-500 switch expects to receive a response message from the SCP.

- DEFAULT_TCN_COS_INDEX — This parameter is used for travel card validation. This parameter specifies the default TCN parameters that are used to route a TCN call. If the value is zero, COS screening is not performed. If the value is non-zero, COS screening is performed and this parameter is used as an index into table COSUS.
- ENHANCED_TCN_TCAP — This parameter, if set to **Y**, extends the travel card validation Invoke TCAP message to include the called number parameter and the calling number parameter. SOC CRDS0004 is a state SOC only used by table control for ENHANCED_TCN_TCAP. SOC CRDS0004 must be in the **ON** state for the customer to change ENHANCED_TCN_TCAP to **Y**. An error message displays when ENHANCED_TCN_TCAP is changed without SOC CRDS0004 set to **ON**.
- MCCS_VERIFY_TYPE — This parameter determines whether the travel card is to be validated in-switch or via TCAP to the SCP. If the value of this parameter is **INSWITCH**, travel card validation is performed in-switch. If the value of this parameter is **DCP**, travel card validation is performed at the SCP using TCAP.

In table OFCENG, two parameters are used for TCAP operation:

- NUM_RDB_EXTS — This parameter specifies the number of Extension Blocks to allocate for remote database (RDB) facility.
- NUM_TCAP_TRANSACTIONS — This parameter specifies the maximum number of concurrent TCAP transactions which may be used at one time among all UCS IN/1 TCAP applications.

For more information, refer to the *DMS-500 Office Parameters Reference Manual*.

Authcode validation

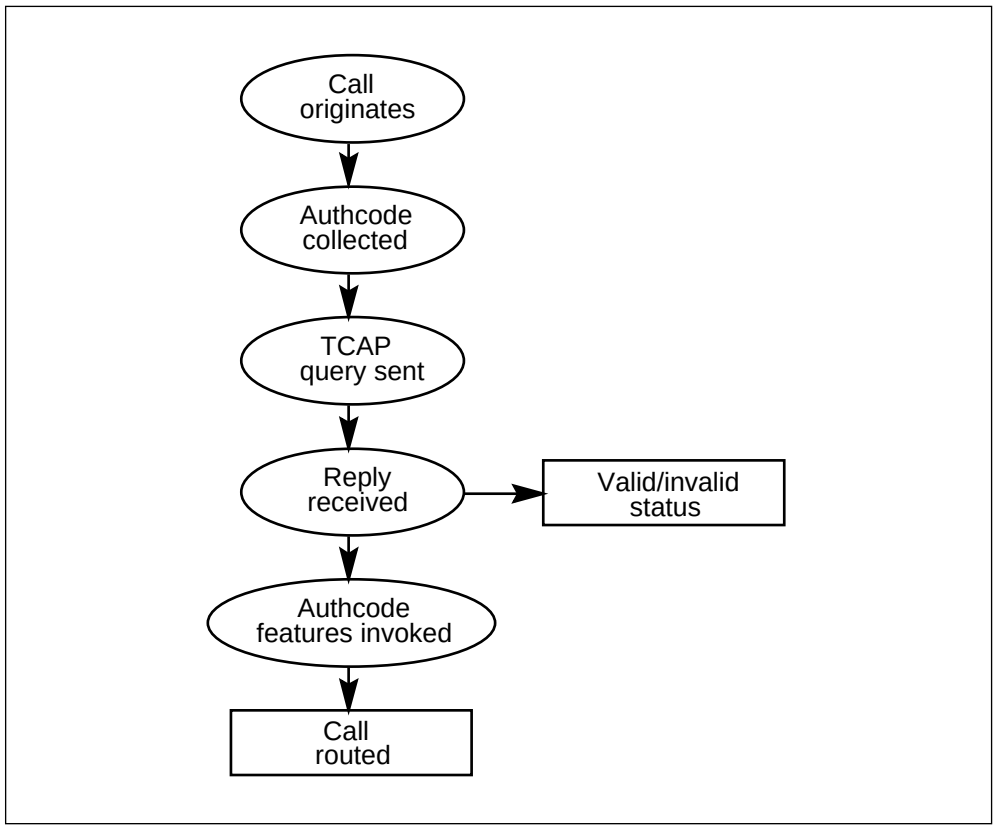
Description

Authcode validation at the Service Control Point (SCP) using Transaction Capabilities Application Part (TCAP) allows DMS-500 switches to send authcode numbers for validation to remote databases over the Common Channel Signaling #7 (CCS7) network.

Call scenario

The call scenario for an authcode validation is provided in Figure 4-1.

Figure 4-1
Authcode validation call scenario



Call originates

The call is originated and call processing collects the authcode digits from the dialed digits stream, the originating trunk group, or aggregated from partially filed and partially dialed data.

Authcode collected

The authcode is collected and the AUTHDIN (Authcode Database Index Number) table is searched to determine the type of authcode validation to be performed. There are three validation options:

- search only an in-switch authcode database (maximum of five databases available) in the DMS-500 switch
- search only a remote authcode database (maximum of 100 databases available) at the SCP
- search an in-switch authcode database in the DMS-500 switch first; if not found, search a remote authcode database at the SCP

TCAP query sent

If a remote authcode database search at the SCP is selected, an Invoke query is sent from the DMS-500 switch to the SCP over the CCS7 links. This query contains the authcode billing number (5 to 7 digits) that needs to be validated by the SCP.

Reply received

After the authcode billing number is either validated or not validated at the SCP, results of the validation are sent back over the CCS7 links to the DMS-500 switch.

Authcode validation response

A result response is returned from the SCP containing the following:

- authcode status (valid, invalid, permanent invalid, or temporary invalid)
- travel allowed (restricted or allowed)
  - — If travel is allowed, the subscriber may place a call from a trunk group whose originating OPART is different from the OPART datafilled against the authcode.
  - — If travel is restricted, the subscriber may not place a call from a trunk group whose originating OPART is different from the OPART datafilled against the authcode.
- authcode abuse trap
- personal identification number (PIN) length

— The PIN length field indicates the number of significant digits for the PINs, either within the authcode data parameter or the multiple PIN list parameter. If a PIN number is less than four digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero. In addition, the PIN length field indicates the number of digits the DMS-500 switch should collect from the subscriber and validate. The PIN length must be set to zero if no PINs are included in the response message.

- private speed number allowed (yes or no)
- originating partition
- terminating partition
- satellite restriction
- account code length (1–5) or (1–12)
- account code validation required (yes or no)
- multiple PIN indicator
- hotline length
- class of service screening index
- single PIN number (up to 4 digits)
- hotline number (7 or 10 digits)
- splashback class [see table SPLASHID (Splashback Identification)]
- multiple PIN numbers (2 to 50)

Return Error reply

If an error (unsuccessful completion) is detected by the SCP, a Return Error reply is sent back over the CCS7 links to the DMS-500 switch. For a list of error code reasons that can be returned in the Return Error reply, refer to Table 1-10.

Reject reply

If a protocol error is detected by either the SCP or the DMS-500 switch, a Reject reply is sent to the node at the other end of the CCS7 links. For a list of the type of problems that can be identified in the Reject reply, refer to Tables 1-12 and 1-13.

Authcode features invoked

If authcode status is valid, the identified applicable authcode feature such as account code validation or private speed number translation is performed. For information on account code validation, refer to Chapter 5, "Account code validation." For information on speed number translation, refer to Chapter 6, "Private speed number translation."

Call routed

The call is then routed to its destination.

Selecting account code length

The account code length is determined by the value of parameter ENHANCED_ACCTCODE_LENGTH in the OFCVAR table.

- If this parameter is set to **N**, the DMS-500 switch allows account codes of 1 to 5 digits to be sent to the SCP.
- If this parameter is set to **Y**, the DMS-500 switch allows account codes 1 to 12 digits to be sent to the SCP.

Messaging

Authcode validation is performed at the SCP. The Invoke query is sent from the Service Switching Point (SSP) requesting the transaction to be performed at the SCP. Depending on the results, the SCP responds with one of following messages:

- Return Result
- Return Error
- Reject

If an error message is returned from the SCP for authcode validation, a Reject message is sent from the SSP to the SCP.

Invoke query sent to SCP

The format of an Invoke query message sent to SCP for authcode validation is shown in Table 4-1.

Table 4-1
Authcode validation Invoke TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0010	Query with permission
2	Package length	1	0001 1111	31 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Originating transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0001 0101	23 bytes
6	Component type ident.	1	1110 1001	Invoke (last)
7	Component ID ident.	1	1100 1111	
8	Component ID length	1	0000 0001	1 byte
9	Component ID	1		Invoke ID
10	Operation code ident.	1	1101 0000	National TCAP
11	Operation code length	1	0000 0010	2 bytes
12	Operation code family	1	1000 0001	Parameter (reply required)
13	Operation code specifier	1	0000 0001	Provide value
14	Parameter set identifier	1	1111 0010	
15	Parameter set length	1	0000 1100	12 bytes
16	Parameter ident.	2	1101 1111 0100 1001	Private digits (Authcode)

Note 1: ADIN is used to index table AUTHDIN for the location of the authcode database to be searched.

Note 2: Digits D6 and D7 are treated as filler and coded 0000, as necessary, when the authcode is less than seven digits in length.

—continued—

Table 4-1
Authcode validation Invoke TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
17	Parameter length	1	0000 1001	9 bytes
18	Parameter	9	0000 0101 0000 0000 1110 1110	Billing number Nature of number (not applicable) Authcode number/TBCD Number of digits = 7 to 9 digits ADIN digits (D2, D1) (Note 1) Authcode digits (D2, D1) Authcode digits (D4, D3) Authcode digits (D6 Note 2, D5) Authcode digit (filler, D7 Note 2)
Note 1: ADIN is used to index table AUTHDIN for the location of the authcode database to be searched. ***Note 2:*** Digits D6 and D7 are treated as filler and coded 0000, as necessary, when the authcode is less than seven digits in length.				
—end—				

Return Result response from SCP

The format of a Return Result response message returned from the SCP is shown in Table 4-2.

Table 4-2
Authcode validation Return Result TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1		(variable)
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1		
7	Component seq. length	1		
8	Component type ident.	1	1110 1010	Return result (last)
9	Component length	1		
10	Component ID ident.	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	2		Invoke ID/correlation ID
13	Parameter set identifier	1	1111 0010	
14	Parameter set length	1		
15	Parameter ident.	2	1101 1111 0100 0001	Private (Authcode data)
16	Parameter length	1		(variable)
17	Parameter	13 or 14		Refer to authcode record response parameter format in Table 4-3 or 4-4.
18	Parameter ident. (optional)	2	1101 1111 0100 0010	Private (PIN list)

—continued—

Table 4-2
Authcode validation Return Result TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
19	Parameter length	1		(variable)
20	Parameter			Refer to authcode multiple PIN response parameter format in Table 4-5.
		—end—		

Authcode record response parameter format

The format of the authcode record response parameter is shown in Tables 4-3 and 4-4.

The format for the authcode record response parameter when ENHANCED_ACCTCODE_ LENGTH is set to **N** is shown in Table 4-3.

The format for the authcode record response parameter when ENHANCED_ACCTCODE_ LENGTH is set to **Y** is shown in Table 4-4.

Table 4-3
Authcode record response parameter format with ENHANCED_ACCTCODE_ LENGTH = N

Code	Meaning
First parameter word (byte):	
Bits A–B	Authcode status 0 = Valid 1 = Invalid (INAU treatment) 2 = Permanent invalid (SCFL treatment) 3 = Temporary invalid (TINV treatment)
Note 1: If multiple PIN is set, then the authcode multiple PIN numbers response parameter format in Table 4-5 is also sent. ***Note 2:*** If the PIN number is less than four digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero.	
—continued—	

Table 4-3
Authcode record response parameter format with ENHANCED_ACCTCODE_LENGTH = N (continued)

Code	Meaning
Bit C	Travel allowed 0 = Restricted 1 = Allowed
Bit D	Authcode abuse trap 0 = No abuse trap 1 = Abuse trap
Bits E–G	PIN length 0 = No PIN 1 = 1 digit PIN 2 = 2 digit PIN 3 = 3 digit PIN 4 = 4 digit PIN
Bit H	Private speed number allowed 0 = No 1 = Yes
Second parameter word (byte):	
Bits A–H	Originating partition (LSB)
Third parameter word (byte):	
Bits A–B	Originating partition (MSB)
Bits C–G	Terminating partition
Bit H	Satellite restriction 0 = No 1 = Yes
Fourth parameter word (byte):	
Bits A–C	Account code length 0–5 (0 = No account code)
Bit D	Account code validation required 0 = No 1 = Yes

Note 1: If multiple PIN is set, then the authcode multiple PIN numbers response parameter format in Table 4-5 is also sent.

Note 2: If the PIN number is less than four digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero.

—continued—

Table 4-3
Authcode record response parameter format with ENHANCED_ACCTCODE_LENGTH = N (continued)

Code	Meaning
Bit E	Multi PIN 0 = Single PIN number 1 = Multiple PIN numbers (Note 1)
Bit F	Hotline length 0 = 7–digit hotline 1 = 10–digit hotline
Bits G–H	Class of service (LSB)
Fifth parameter word (byte):	
Bits A–H	Class of service (MSB)
Sixth parameter word (byte):	
Bits A–D	First PIN digit (Note 2)
Bits E–H	Second PIN digit (Note 2)
Seventh parameter word (byte):	
Bits A–D	Third PIN digit (Note 2)
Bits E–H	Fourth PIN digit (Note 2)
Eighth parameter word (byte):	
Bits A–D	First hotline digit
Bits E–H	Second hotline digit
Ninth parameter word (byte):	
Bits A–D	Third hotline digit
Bits E–H	Fourth hotline digit
Tenth parameter word (byte):	
Bits A–D	Fifth hotline digit

Note 1: If multiple PIN is set, then the authcode multiple PIN numbers response parameter format in Table 4-5 is also sent.

Note 2: If the PIN number is less than four digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero.

—continued—

Table 4-3
Authcode record response parameter format with ENHANCED_ACCTCODE_LENGTH = N (continued)

Code	Meaning
Bits E–H	Sixth hotline digit
11th parameter word (byte):	
Bits A–D	Seventh hotline digit
Bits E–H	Eighth hotline digit
12th parameter word (byte):	
Bits A–D	Ninth hotline digit
Bits E–H	Tenth hotline digit
13th parameter word (byte):	
Bits A–C	Splashback class 0–4 (0 = No tone)
Bits D–H	Spare
Note 1: If multiple PIN is set, then the authcode multiple PIN numbers response parameter format in Table 4-5 is also sent.	
Note 2: If the PIN number is less than four digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero.	
—end—	

Table 4-4
Authcode record response parameter format with ENHANCED_ACCTCODE_LENGTH = Y

Code	Meaning
First parameter word (byte):	
Bits A–B	Authcode status 0 = Valid 1 = Invalid (INAU treatment) 2 = Permanent invalid (SCFL treatment) 3 = Temporary invalid (TINV treatment)
Bit C	Travel allowed 0 = Restricted 1 = Allowed
Bit D	Authcode abuse trap 0 = No abuse trap 1 = Abuse trap
Bits E–G	PIN length 0 = No PIN 1 = 1 digit PIN 2 = 2 digit PIN 3 = 3 digit PIN 4 = 4 digit PIN
Bit H	Private speed number allowed 0 = No 1 = Yes
Second parameter word (byte):	
Bits A–H	Originating partition (LSB)
Third parameter word (byte):	
Bits A–B	Originating partition (MSB)

Note 1: If multiple PIN is set, then the authcode multiple PIN numbers response parameter format in Table 4-5 is also sent.

Note 2: If the PIN number is less than four digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero.

Note 3: If the HOTLINE number is less than 10 digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero. If no number is present, all digits are filled with binary zero.

—continued—

Table 4-4
Authcode record response parameter format with ENHANCED_ACCTCODE_LENGTH = Y (continued)

Code	Meaning
Bits C–G	Terminating partition
Bit H	Satellite restriction 0 = No 1 = Yes
Fourth parameter word (byte):	
Bits A–D	Spare
Bit E	Multi PIN 0 = Single PIN number 1 = Multiple PIN numbers (Note 1)
Bit F	Hotline length 0 = 7–digit hotline 1 = 10–digit hotline
Bits G–H	Class of service (LSB)
Fifth parameter word (byte):	
Bits A–H	Class of service (MSB)
Sixth parameter word (byte):	
Bits A–D	First PIN digit (Note 2)
Bits E–H	Second PIN digit (Note 2)
Seventh parameter word (byte):	
Bits A–D	Third PIN digit (Note 2)
Bits E–H	Fourth PIN digit (Note 2)
Eighth parameter word (byte):	
Bits A–D	First hotline digit (Note 3)

Note 1: If multiple PIN is set, then the authcode multiple PIN numbers response parameter format in Table 4-5 is also sent.

Note 2: If the PIN number is less than four digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero.

Note 3: If the HOTLINE number is less than 10 digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero. If no number is present, all digits are filled with binary zero.

—continued—

Table 4-4
Authcode record response parameter format with ENHANCED_ACCTCODE_LENGTH = Y (continued)

Code	Meaning
Bits E–H	Second hotline digit (Note 3)
Ninth parameter word (byte):	
Bits A–D	Third hotline digit (Note 3)
Bits E–H	Fourth hotline digit (Note 3)
Tenth parameter word (byte):	
Bits A–D	Fifth hotline digit (Note 3)
Bits E–H	Sixth hotline digit (Note 3)
11th parameter word (byte):	
Bits A–D	Seventh hotline digit (Note 3)
Bits E–H	Eighth hotline digit (Note 3)
12th parameter word (byte):	
Bits A–D	Ninth hotline digit (Note 3)
Bits E–H	Tenth hotline digit (Note 3)
13th parameter word (byte):	
Bits A–C	Splashback class 0–4 (0 = No tone)
Bits D–G	Account code length 1–12
Bit H	Account code validation required 0 = No 1 = Yes
14th parameter word (byte):	
Note 1: If multiple PIN is set, then the authcode multiple PIN numbers response parameter format in Table 4-5 is also sent.	
Note 2: If the PIN number is less than four digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero.	
Note 3: If the HOTLINE number is less than 10 digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero. If no number is present, all digits are filled with binary zero.	

—continued—

Table 4-4
Authcode record response parameter format with ENHANCED_ACCTCODE_LENGTH = Y (continued)

Code	Meaning
Bits A–H	Spare
Note 1: If multiple PIN is set, then the authcode multiple PIN numbers response parameter format in Table 4-5 is also sent. ***Note 2:*** If the PIN number is less than four digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero. ***Note 3:*** If the HOTLINE number is less than 10 digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero. If no number is present, all digits are filled with binary zero.	
—end—	

Authcode multiple PIN response parameter format

The format of the authcode multiple PIN response parameter is shown in Table 4-5.

The PIN field contains a 1- to 4-digit PIN in TBCD. If the PIN length is zero, or the multiple PIN list parameter is present, these digits must be set to binary zero. If a PIN number is less than four digits, the first digit is the most significant digit and the remaining extra digits must be set to binary zero.

Table 4-5
Authcode multiple PIN response parameter format

Code	Meaning
First parameter word (byte):	
Bits A–D	First digit of first PIN number
Bits E–H	Second digit of first PIN number
Second parameter word (byte):	
Bits A–D	Third digit of first PIN number
Bits E–H	Fourth digit of first PIN number
Third parameter word (byte):	
Bits A–D	First digit of second PIN number
Bits E–H	Second digit of second PIN number
Fourth parameter word (byte):	
Bits A–D	Third digit of second PIN number
Bits E–H	Fourth digit of second PIN number
.	
.	
.	
99th parameter word (byte):	
Note: PIN list are of variable length (4 to 100 bytes). Each PIN number occupies 2 bytes. The PIN list must have at least 2 PIN numbers. If a PIN number is less than four digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero.	

—continued—

Table 4-5
Authcode multiple PIN response parameter format (continued)

Code	Meaning
Bits A–D	First digit of 50th PIN number
Bits E–H	Second digit of 50th PIN number
100th parameter word (byte):	
Bits A–D	Third digit of 50th PIN number
Bits E–H	Fourth digit of 50th PIN number
Note: PIN list are of variable length (4 to 100 bytes). Each PIN number occupies 2 bytes. The PIN list must have at least 2 PIN numbers. If a PIN number is less than four digits, the first digit is the most significant digit and the remaining extra digits are filled with binary zero.	
—end—	

Return Error from SCP

The format of an error message returned from the SCP for authcode validation is shown in Table 4-6.

Table 4-6
Authcode validation Return Error TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0010	18 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1010	10 bytes
8	Component type ident.	1	1110 1011	Return Error
9	Component length	1	0000 1000	8 bytes
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Correlation ID
13	Error code identifier	1	1101 0011	
14	Error code length	1	0000 0001	1 byte
15	Error code	1		Refer to error code definitions in Table 1-10.
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0000	No parameters
			—end—	

Reject from SCP

The format of a Reject message returned from the SCP for authcode validation is shown in Table 4-7.

Table 4-7
Authcode validation Reject from the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0011	19 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1011	11 bytes
8	Component type ident.	1	1110 1100	Reject
9	Component length	1	0000 1001	9 bytes
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0001	
12	Component ID	1		Correlation ID
13	Problem code identifier	1	1101 0101	
14	Problem code length	1	0000 0010	
15	Problem type	1		Refer to problem type definitions in Table 1-12.
16	Problem specifier	1		Refer to problem specifier definitions in Table 1-13.
17	Parameter set identifier	1	1111 0010	
18	Parameter set length	1	0000 0000	
			—end—	

Reject to SCP

If an erroneous message is returned from the SCP for authcode validation, a Reject message is sent from the SSP to the SCP. The format of a reject message sent to the SCP for authcode validation is shown in Table 4-8.

Table 4-8
Authcode validation Reject to the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0001	Unidirectional
2	Package length	1	0000 1110	14 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0000	
5	Component seq. ident.	1	1110 1000	
6	Component seq. length	1	0000 1011	11 bytes
7	Component type ident.	1	1110 1100	Reject
8	Component length	1	0000 1001	9 bytes
9	Component ID identifier	1	1100 1111	
10	Component ID length	1	0000 0001	1 byte
11	Component ID	1		Correlation ID
12	Problem code identifier	1	1101 0101	
13	Problem code length	1	0000 0010	2 bytes
14	Problem type	1		Refer to problem type definitions in Table 1-12.
15	Problem specifier	1		Refer to problem specifier definitions in Table 1-13.
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0000	No parameters
			—end—	

Authcode validation implementation

Authcode validation discusses the following process for setting up office parameters.

Setting up office parameters

In table OFCVAR (Office Variables), three parameters are used for authcode validation:

- TESTSS250_MAX_USERS — This parameter specifies the maximum number of simultaneous users that can execute the DMS-500 TESTSS MAP command for each of the applications.
- AUTH_DCP_RESPONSE_TIMEOUT — This parameter specifies the length of time that authcode application TESTSS and call processing will wait for a response from the SCP.
- ENHANCED_ACCTCODE_LENGTH — This parameter specifies the length of authcodes:
  - — If this parameter is set to **N**, the DMS-500 switch allows account codes of 1 to 5 digits to be sent to the SCP. Authcode record response message allows up to 5 account code digits.
  - — If this parameter is set to **Y**, the DMS-500 switch allows account codes of 1 to 12 digits to be sent to the SCP. Authcode record response message allows up to 12 account code digits.

In table OFCENG, two parameters are used for TCAP operation:

- NUM_RDB_EXTS — This parameter specifies the number of Extension Blocks to allocate for remote database (RDB) facility.
- NUM_TCAP_TRANSACTIONS — This parameter specifies the maximum number of concurrent TCAP transactions which may be used at one time among all UCS IN/1 TCAP applications.

Also in table OFCENG (Office Engineering), the parameter NUMBER_ECCB_SCRATCHPAD_AREAS is used for authcode validation. This parameter specifies the number of scratchpad data areas particular to authcode validation at the SCP.

For more information, refer to the *DMS-500 Office Parameters Reference Manual*.

Account code validation

Description

Account code validation at the Service Control Point (SCP) using Transaction Capabilities Application Part (TCAP) allows DMS-500 switches to send account codes for validation to the centralized databases over the Common Channel Signaling #7 (CCS7) network.

The account code can be validated against one of the following types of numbers:

- authcode
- automatic number identification (ANI)
- travel card number (TCN)

Note: The account code can also be validated along with a private speed number against the same authcode.

Call scenario

This section discusses the following call scenario:

- account code validation required
- TCAP query sent
- reply received

Account code validation required

If the authcode validation response parameter or the travel card validation response parameter indicates that an account code validation is required, remote account code validation is performed at the SCP.

TCAP query sent

An Invoke query is sent from the DMS-500 switch to the SCP over the CCS7 links. This query contains one of the following:

- an Authcode and an account code number (1 to 5 or 1 to 12 digits) that needs to be validated against that authcode by the SCP
- an ANI (10 digits) and an account code number (1 to 5 or 1 to 12 digits) that needs to be validated against that ANI by the SCP
- a TCN (14 digits) and an account code number (1 to 5 digits) that needs to be validated against that TCN by the SCP
- an authcode number (5 to 7 digits) and an account code number (1 to 5 or 1 to 12 digits) that needs to be validated and a private speed number (2 digits) that needs to be translated against that authcode by the SCP

The SCP interprets the Invoke query based on the number of parameters in the message, the type of digits for each, and the length and numbering plans of the numbers in those digits parameters.

Reply received

After the SCP validates the account code number (and translates the private speed number, if present), results of the validation/translation are sent back over the SCC7 links the DMS-500 switch.

Account code validation response

A return response is returned from the SCP containing one of the following:

- account code validation result (valid or invalid) against an authcode
- account code validation result (valid or invalid) against an ANI
- account code validation result (valid or invalid) against a TCN
- both an account code validation result (valid or invalid) and a private speed number translation result (10 digits) against the same authcode

Return Error reply

If an error (unsuccessful completion) is detected by the SCP, a Return Error reply is sent back over the CCS7 links to the DMS-500 switch. For a list of error code reasons that can be returned in the Return Error reply, refer to Table 1-10.

Reject reply

If a protocol error is detected by either the SCP or the DMS-500 switch, a Reject reply is sent to the node at the other end of the CCS7 links. For a list of the types of problems that can be identified in the Reject Reply, refer to Tables 1-12 and 1-13.

Call routed

The call is then routed to its destination.

Selecting account code length

The account code length is determined by the value of parameter ENHANCED_ACCTCODE_LENGTH in the OFCVAR table.

- If this parameter is set to **N**, the DMS-500 switch allows account codes of 1 to 5 digits to be sent to the SCP.
- If this parameter is set to **Y**, the DMS-500 switch allows account codes 1 to 12 digits to be sent to the SCP.

Messaging

Account code validation is performed at the SCP. The invoke query is sent from the Service Switching Point (SSP) requesting the transaction to be performed at the SCP. Depending on the results, the SCP responds with one of following messages:

- Return Result
- Return Error
- Reject

If an error message is returned from the SCP for account code validation, a Reject message is sent from the SSP to the SCP.

Invoke query sent to SCP

The format of an Invoke query message sent to SCP for account code validation is shown in Tables 5-1 through 5-3.

Account code validation against an authcode

Account code validation against an authcode is provided in Table 5-1.

Table 5-1
Account code validation for authcode Invoke TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0010	Query with permission
2	Package length	1	0010 1000	40 bytes (variable)
3	Transaction ID ident.	1	1100 0111	

—continued—

Table 5-1
Account code validation for authcode Invoke TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Originating transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0010 0000	32 bytes (variable)
8	Component type ident.	1	1110 1001	Invoke (last)
9	Component ID ident.	1	1100 1111	
10	Component ID length	1	0000 0001	1 byte
11	Component ID	1		Invoke ID
12	Operation code ident.	1	1101 0000	National TCAP
13	Operation code length	1	0000 0010	2 bytes
14	Operation code family	1	1000 0001	Parameter (reply required)
15	Operation code specifier	1	0000 0001	Provide value
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0001 0110	22 bytes (variable)
18	Parameter ident.	2	1101 1111 0100 1001	Private digits (Authcode)
19	Parameter length	1	0000 1001	9 bytes
20	Parameter	9	0000 0101 0000 0000 1110 1110	Dialed number Nature of number (not applicable) Authcode number/TBCD Number of digits = 7 to 9 ADIN digits (D2, D1) Authcode digits (D2, D1) Authcode digits (D4, D3) Authcode digits (D6 Note 1, D5) Authcode digit (filler, D7 Note 1)

Note 1: Digits D6 and D7 are treated as filler and coded 0000, as necessary, when the authcode is less than seven digits in length.

Note 2: When both account code validation and private speed number translation are being invoked, the private speed number parameter is located after the account code parameter. For details of the speed number parameter, refer to Table 6-1.

—continued—

Table 5-1
Account code validation for authcode Invoke TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
21	Parameter ident.	2	1101 1111 0100 1001	Private digits (Account code)
22	Parameter length	1		(variable)
23	Parameter	7 or 10	0000 0101 0000 0000 1100 1110	Billing number Nature of number (not applicable) Account code numbe/TBCD If ENHANCED_ACCTCODE _LENGTH parameter is set to N, the number of digits = 1 to 5 Account code digits (D2, D1) Account code digits (D4, D3) Account code digits (filler, D5) If ENHANCED_ACCTCODE _LENGTH parameter is set to Y, the number of digits = 1 to12 Account code digits (D2, D1) Account code digits (D4, D3) Account code digits (D6, D5) Account code digits (D8, D7) Account code digits (D10, D9) Account code digits (D12, D11)
	(Note 2)			

Note 1: Digits D6 and D7 are treated as filler and coded 0000, as necessary, when the authcode is less than seven digits in length.

Note 2: When both account code validation and private speed number translation are being invoked, the private speed number parameter is located after the account code parameter. For details of the speed number parameter, refer to Table 6-1.

—end—

Account code validation against an ANI

Account code validation against an ANI is provided in Table 5-2.

Table 5-2
Account code validation for ANI Invoke TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0010	Query with permission
2	Package length	1		
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Originating transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1		
8	Component type ident.	1	1110 1001	Invoke (last)
9	Component ID ident.	1	1100 1111	
10	Component ID length	1	0000 0001	1 byte
11	Component ID	1		Invoke ID
12	Operation code ident.	1	1101 0000	National TCAP
13	Operation code length	1	0000 0010	2 bytes
14	Operation code family	1	1000 0001	Parameter (reply required)
15	Operation code specifier	1	0000 0001	Provide value
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1		
18	Parameter ident.	2	1101 1111 0100 1001	Private digits (ANI)
19	Parameter length	1		(variable)

Note: If digits D4 through D10 are absent, fill with binary zeros.

—continued—

Table 5-2
Account code validation for ANI Invoke TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
20	Parameter	9	0000 0010 0000 0000 0010 1110 0000 1010	ANI Nature of number (not applicable) Telephony numbering/TBCD Number of digits = 10 Digits (D2, D1) Digits (D4, D3) (Note) Digits (D6, D5) (Note) Digits (D8, D7) (Note) Digits (D10, D9) (Note)
21	Parameter ident.	2	1101 1111 0100 1001	Private digits (Account code)
22	Parameter length	1		(variable)
23	Parameter	7 or 10	0000 0101 0000 0000 1100 1110	Billing number Nature of number (not applicable) Account code number/TBCD If ENHANCED_ACCTCODE _LENGTH parameter is set to N, the number of digits = 1 to 5 Account code digits (D2, D1) Account code digits (D4, D3) Account code digits (filler, D5) If ENHANCED_ACCTCODE _LENGTH parameter is set to Y, the number of digits = 1 to12 Account code digits (D2, D1) Account code digits (D4, D3) Account code digits (D6, D5) Account code digits (D8, D7) Account code digits (D10, D9) Account code digits (D12, D11)

Note: If digits D4 through D10 are absent, fill with binary zeros.

—end—

Account code validation against a TCN

Account code validation against a TCN is provided in Table 5-3.

Table 5-3
Account code validation for TCN Invoke TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0010	Query with permission
2	Package length	1	0010 1001	41 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Originating transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1		
8	Component type ident.	1	1110 1001	Invoke (last)
9	Component ID ident.	1	1100 1111	
10	Component ID length	1	0000 0001	1 byte
11	Component ID	1		Invoke ID
12	Operation code ident.	1	1101 0000	National TCAP
13	Operation code length	1	0000 0010	2 bytes
14	Operation code family	1	1000 0001	Parameter (reply required)
15	Operation code specifier	1	0000 0001	Provide value
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0001 0111	23 bytes
18	Parameter ident.	1	1101 1111 0100 1001	Private digits (TCN)
19	Parameter length	1	0000 1011	11 bytes

—continued—

Table 5-3
Account code validation for TCN Invoke TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
20	Parameter	11	0000 0101	Billing number
			0000 0000	Nature of number (not applicable)
			1101 1110	Travel card number/TBCD
			0000 1110	Number of digits = 14
				Digits (D2, D1)
				Digits (D4, D3)
				Digits (D6, D5)
				Digits (D8, D7)
				Digits (D10, D9)
				Digits (D12, D11)
				Digits (D14, D13)
21	Parameter ident.	2	1101 1111	Private digits (Account code)
			0100 1001	
22	Parameter length	1	0000 1010	10 bytes
23	Parameter	10	0000 0101	Billing number
			0000 0000	Nature of number (not applicable)
			1100 1110	Account code number/TBCD
				Number of digits = 1 to 5
				Account code digits (D2, D1)
				Account code digits (D4, D3)
				Account code digits (filler, D5)
			—end—	

Return Result response from SCP

The format of a Return Result response message returned from the SCP is shown in Table 5-4.

Table 5-4
Account code validation for authcode Return Result TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0100	20 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1100	12 bytes
8	Component type ident.	1	1110 1001	Return result (last)
9	Component length	1		
10	Component ID ident.	1	1100 1111	
11	Component ID length	1	0000 0002	2 bytes
12	Component ID	2		Invoke ID / correlation ID
13	Parameter set identifier	1		
14	Parameter set length	1	0000 0100	4 bytes
15	Parameter ident.	2	1101 1111 0100 0110	Private digits (Account code result parameter)
16	Parameter length	1	0000 0001	1 byte

Note: When both account code validation and private speed number translation results are being returned, the private speed number parameter is located after the account code parameter. For details of the speed number parameter, refer to Table 6-2.

—continued—

Table 5-4
Account code validation for authcode Return Result TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
17	Parameter (Note)	1	0000 000X	Parameter word (byte): Bit A Significance 0 Invalid 1 Valid
Note: When both account code validation and private speed number translation results are being returned, the private speed number parameter is located after the account code parameter. For details of the speed number parameter, refer to Table 6-2.				
—end—				

Return Error from SCP

The format of an error message returned from the SCP for account code validation is shown in Table 5-5.

Table 5-5
Account code validation Return Error TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0010	18 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1010	10 bytes
8	Component type ident.	1	1110 1011	Return error
9	Component length	1	0000 1000	8 bytes
10	Component ID identifier	1	1100 1111	
—continued—				

Table 5-5
Account code validation Return Error TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Correlation ID
13	Error code identifier	1	1101 0011	
14	Error code length	1	0000 0001	1 byte
15	Error code	1		Refer to error code definitions in Table 1-10.
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0000	No parameters

—end—

Reject from SCP

The format of a Reject message returned from the SCP for account code validation is shown in Table 5-6.

Table 5-6
Account code validation Reject from the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0011	19 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1011	11 bytes
8	Component type ident.	1	1110 1100	Reject
9	Component length	1	0000 1001	9 bytes
10	Component ID identifier	1	1100 1111	

—continued—

Table 5-6
Account code validation Reject from the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Correlation ID
13	Problem code identifier	1	1101 0101	
14	Problem code length	1	0000 0010	2 bytes
15	Problem type	1		Refer to problem type definitions in Table 1-12.
16	Problem specifier	1		Refer to problem specifier definitions in Table 1-13.
17	Parameter set identifier	1	1111 0010	
18	Parameter set length	1	0000 0000	No parameters
			—end—	

Reject to SCP

If an erroneous message is returned from the SCP for account code validation, a Reject message is sent from the SSP to the SCP. The format of a Reject message sent to the SCP for account code validation is shown in Table 5-7.

Table 5-7
Account code validation Reject to the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0001	Unidirectional
2	Package length	1	0000 1110	14 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0000	
5	Component seq. ident.	1	1110 1000	
6	Component seq. length	1	0000 1011	11 bytes
7	Component type ident.	1	1110 1100	Reject
			—continued—	

Table 5-7
Account code validation Reject to the SCP TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
8	Component length	1	0000 1001	9 bytes
9	Component ID identifier	1	1100 1111	
10	Component ID length	1	0000 0001	1 byte
11	Component ID	1		Correlation ID
12	Problem code identifier	1	1101 0101	
13	Problem code length	1	0000 0010	2 bytes
14	Problem type	1		Refer to problem type definitions in Table 1-12.
15	Problem specifier	1		Refer to problem specifier definitions in Table 1-13.
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0000	No parameters
			—end—	

Private speed number translation

Description

Private speed number translation at the Service Control Point (SCP) using Transaction Capabilities Application Part (TCAP) allows DMS-500 switches to send private speed numbers for translation to remote databases over the Common Channel Signaling #7 (CCS7) network.

Note: The private speed number can be either translated by itself against an authcode or along with an account code against the same authcode.

Call scenario

This section discusses the following call scenario:

- private speed number translation required
- TCAP query sent
- reply received
- call routed

Private speed number translation required

If the authcode validation response parameter indicates that a private speed number is allowed, remote private speed number (2 digits) to a destination number (10 digits) translation is performed at the SCP.

TCAP query sent

An invoke query is sent from the DMS-500 switch to the SCP over the CCS7 links. This query contains one of the following:

- an authcode number (5 to 7 digits) and a private speed number (2 digits) that needs be translated against that authcode by the SCP
- an authcode number (5 to 7 digits) and an account code number (1 to 5 or 1 to 12 digits) that needs to be validated and a private speed number (2 digits) that needs to be translated against that authcode by the SCP

The SCP interprets the Invoke query based on the number of parameters in the message, the type of digits for each, and the lengths and numbering plans of the numbers in those digits parameters.

Reply received

After the SCP translates the private speed number (and validates the account code, if present), results of the translation/validation are sent back over the CCS7 links to the DMS-500 switch.

Private speed number translation response

A return response is returned from the SCP containing one of the following:

- private speed number result (7 or 10 digits) that was translated against an authcode
- both a private speed number translation result (7 or 10 digits) and an account code validation result (valid or invalid) against the same authcode

Return Error reply

If an error (unsuccessful completion) is detected by the SCP, a Return Error reply is sent back over the CCS7 links to the DMS-500 switch. For a list of error code reasons that can be returned in the Return Error reply, refer to Table 1-10.

Reject reply

If a protocol error is detected by either the SCP or the DMS-500 switch, a Reject reply is sent to the node at the other end of the CCS7 links. For a list of the types of problems that can be identified in the Reject reply, refer to Tables 1-12 and 1-13.

Call routed

The call is then routed to its destination.

Messaging

Private speed number translation is performed at the SCP. The Invoke query is sent from the Service Switching Point (SSP) requesting the translation to be performed at the SCP. Depending on the results, the SCP responds with one of following messages:

- Return Result
- Return Error
- Reject

If an erroneous message is returned from the SCP for private speed number translation, a Reject message is sent from the SSP to the SCP.

Invoke query sent to SCP

The format of an Invoke query message sent to SCP for private speed number translation is shown in Table 6-1.

Table 6-1
Private speed number translation Invoke TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0010	Query with permission
2	Package length	1	0010 0110	38 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Originating transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0001 1110	30 bytes
8	Component type ident.	1	1110 1001	Invoke (last)
9	Component ID ident.	1	1100 1111	
10	Component ID length	1	0000 0001	1 byte
11	Component ID	1		Invoke ID
12	Operation code ident.	1	1101 0000	National TCAP
13	Operation code length	1	0000 0010	2 bytes
14	Operation code family	1	1000 0001	Parameter (reply required)
15	Operation code specifier	1	0000 0001	Provide value
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0001 0100	20 bytes
18	Parameter ident.	2	1101 1111 0100 1001	Private digits (Authcode)
19	Parameter length	1	0000 1001	9 bytes

Note 1: Digits D6 and D7 are treated as filler and coded 0000, as necessary, when the authcode is less than seven digits in length.

Note 2: When both private speed number translation and account code validation are being invoked, the account code parameter is located after the authcode parameter and before the private speed number translation parameter. For details of the account code parameter, refer to Table 5-1.

—continued—

Table 6-1
Private speed number translation Invoke TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
20	Parameter	9	0000 0101 0000 0000 1110 1110	Billing number Nature of number (not applicable) Authcode number/TBCD Number of digits = 7 to 9 ADIN digits (D2, D1) Authcode digits (D2, D1) Authcode digits (D4, D3) Authcode digits (D6 Note 1, D5) Authcode digit (filler, D7 Note 1)
	(Note 2)			
21	Parameter ident.	2	1101 1111 0100 1001	Private digits (Speed number)
22	Parameter length	1	0000 0101	5 bytes
23	Parameter	5	0000 0001 0000 0000 1011 1110 0000 0010	Dialed number Nature of number (not applicable) Private speed number/TBCD Number of digits = 2 Private speed digits (D2, D1)

Note 1: Digits D6 and D7 are treated as filler and coded 0000, as necessary, when the authcode is less than seven digits in length.

Note 2: When both private speed number translation and account code validation are being invoked, the account code parameter is located after the authcode parameter and before the private speed number translation parameter. For details of the account code parameter, refer to Table 5-1.

—end—

Return Result response from SCP

The format of a Return Result response message returned from the SCP for private speed number translation is shown in Table 6-2.

Table 6-2
Private speed number translation Return Result TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1		
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1		
8	Component type ident.	1	1110 1010	Return result (last)
9	Component length	1		
10	Component ID ident.	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	2		Invoke ID / correlation ID
13	Parameter set identifier	1	1111 0010	
14	Parameter set length (Note)	1		
15	Parameter ident.	2	1101 1111 0100 1001	Private digits (Address)

Note: When both private speed number translation and account code validation results are being returned, the account code parameter is located before the private speed number translation parameter. For details of the account code parameter, refer to Table 5-4.

—continued—

Table 6-2
Private speed number translation Return Result TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
16	Parameter length	1	0000 1001	9 bytes
17	Parameter	9	0000 0110 0000 0000 0010 1110	Destination number Nature of number (not applicable) Telephony number/TBCD Number of digits = 7 or10 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9)
Note: When both private speed number translation and account code validation results are being returned, the account code parameter is located before the private speed number translation parameter. For details of the account code parameter, refer to Table 5-4.				
—end—				

Return Error from SCP

The format of an error message returned from the SCP for private speed number translation is shown in Table 6-3.

Table 6-3
Private speed number translation Return Error TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0010	18 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1010	10 bytes
8	Component type ident.	1	1110 1011	Return error
—continued—				

Table 6-3
Private speed number translation Return Error TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
9	Component length	1	0000 1000	8 bytes
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Correlation ID
13	Error code identifier	1	1101 0011	
14	Error code length	1	0000 0001	1 byte
15	Error code	1		Refer to error code definitions in Table 1-10.
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0000	No parameters

—end—

Reject from SCP

The format of a Reject message returned from the SCP for private speed number translation is shown in Table 6-4.

Table 6-4
Private speed number translation Reject from the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0011	19 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1011	11 bytes
8	Component type ident.	1	1110 1100	Reject

—continued—

Table 6-4
Private speed number translation Reject from the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
9	Component length	1	0000 1001	9 bytes
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Correlation ID
13	Problem code identifier	1	1101 0101	
14	Problem code length	1	0000 0010	2 bytes
15	Problem type	1		Refer to problem type definitions in Table 1-12.
16	Problem specifier	1		Refer to problem specifier definitions in Table 1-13.
17	Parameter set identifier	1	1111 0010	
18	Parameter set length	1	0000 0000	No parameters

—end—

Reject to SCP

If an erroneous message is returned from the SCP for private speed number translation, a reject message is sent from the SSP to the SCP. The format of a Reject message sent to the SCP for private speed number translation is shown in Table 6-5.

Table 6-5
Private speed number translation Reject to the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0001	Unidirectional
2	Package length	1	0000 1110	14 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0000	
5	Component seq. ident.	1	1110 1000	

—continued—

Table 6-5
Private speed number translation Reject to the SCP TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
6	Component seq. length	1	0000 1011	11 bytes
7	Component type ident.	1	1110 1100	Reject
8	Component length	1	0000 1001	9 bytes
9	Component ID identifier	1	1100 1111	
10	Component ID length	1	0000 0001	1 byte
11	Component ID	1		Correlation ID
12	Problem code identifier	1	1101 0101	
13	Problem code length	1	0000 0010	2 bytes
14	Problem type	1		Refer to problem type definitions in Table 1-12.
15	Problem specifier	1		Refer to problem specifier definitions in Table 1-13.
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0000	No parameters
			—end—	

Global title translation

Description

Global title addressing is a Signaling Connection Control Part (SCCP) feature used by Transaction Capabilities Application Part (TCAP) messages to avoid hard-coding the Service Control Point (SCP) address into the message at the originating switch. Instead, a digit string address together with an application-specific translation type are placed into the outgoing message, which is passed to a Signaling Transfer Point (STP) for translation to the appropriate point code and subsystem number of the SCP that handles the query. Global title addressing provides substantial flexibility in routing TCAP queries within a network.

Note: UCS TCAP features provide limited global title support for routing TCAP messages to the SCP.

Global title address

All of the TCAP applications, except for the N00 Translation, use a fixed global title address for the SCCP called party address in the outgoing TCAP message. This global title has the fixed address string of a single 0 digit.

N00 translation uses either "type-only" or "type/encoding" format. The "Type-only" format uses a fixed global title address string of a single 0 digit in the outgoing TCAP message. The "Type/encoding" format uses a 10-digit N00 number for the SCCP called party address in the outgoing TCAP message.

The digits to be placed in the SCCP called party address for N00 translation is determined by the value of parameter N00_ENHANCED_GLOBAL _TITLE in the OFCOPT (Office Options) table.

- If this parameter is set to **N**, the format is "type-only" and the SCCP Global Title Address Information holds the single 0 digit.
- If this parameter is set to **Y**, the format is "type/encoding" and the SCCP Global Title Address Information holds the 10-digit N00 number.
- The default value of this parameter is **N**.

The N00_ENHANCED_GLOBAL_TITLE office parameter cannot be set to N when the VER_2_N00_TCAP office parameter is set to **Y**. Also, the VER_2_N00_TCAP office parameter cannot be set to **Y** unless the N00_ENHANCED_GLOBAL_TITLE office parameter has been previously set to **Y**.

ATTENTION

When the VER_2_N00_TCAP office parameter is set to **Y**, global title type/encoding format is disabled but a 10-digit GTT is still used.

For more information, refer to the *DMS-500 Office Parameters Reference Manual*.

The translation type is fixed in software; a separate type is used for each of the TCAP operations. Table 7-1 lists the translation type used for each TCAP operation.

Table 7-1
Global translation types

Translation type	TCAP Operation
N00GT	N00 translation
TCNGT	Travel card validation
AUTHGT	Authcode validation
ACCTGT	Account code/private speed number translation

—end—

Global title routing

When only the single 0 digit is used as the global title address, all TCAP queries for a particular subsystem must be routed to the same SCP (or mated pair). It is not possible to segregate queries based on items such as the dialed digits in an N00 query, or the travel card number (TCN) in a TCN query. However, this form of global title address does allow the TCAP message to be routed by an STP to a pair of replicated SCPs.

All outgoing queries are encoded using a global title address. Table C7GTT (Common Channel Signaling No. 7 Global Title Translation) is used to route the message to an STP for global title translation.

For more information on datafilling global title translation in the DMS-500 switch and the DMS-STP transfer point, refer to the *DMS-500 Data Schema Reference Manual*.

SCCP addressing process

All outgoing queries from the DMS-500 switch contain an SCCP calling party address in point code/subsystem number (PC/SSN) format. This allows the responding SCP to route its response directly back to the switch by removing the calling party address from the incoming message and placing it into the response message's called party address.

This process is also used when the switch must return a message (for example, an error message) to the SCP. The switch removes the SCP's calling party address from its response, and places it into the called party address of the error message.

Subsequent messages from the switch for an existing TCAP transaction should never perform global title translation again; only the first message (the switch-originated query) should perform that translation. This prevents a retranslation from sending the error message to an SCP other than the one which originally responded (this is important even if there is only a single mated pair of SCPs in the network).

Therefore, the SCP's calling party address must always be in PC/SSN format, containing the point code of the SCP and the subsystem number of the responding application, and must not contain a global title. Routing of all subsequent messages should be by SSN and not by global title.

Version 2 N00 number translation

Description

Version 2 N00 number translation supports additional parameters in the N00 number translation Query message and the handling of new call processing Service Switching Point (actions being returned from the Service Control Point (SCP).

For the most part, this version can handle the protocol of the version described in Chapter 2, although a few fundamental differences in parameter encoding and decoding make this version incompatible with previous versions:

- Queries are encoded using BCD-digit format instead of TBCD, and the additional LATA and information digit parameters are encoded in the query message.
- The parameter ID for the Billing Indicator parameter is changed from #DF #44 to #DF #41. Additionally, only the enhanced version of the parameter is supported.

Aside from these differences, Version 2 TCAP can fully support the protocol interaction identified in Chapter 2.

Version 2 TCAP has the following additional benefits:

- announcement parameter support
- N00 passthru support
- datafilled ACG handling
- SCP overload ACG handling
- greater parameter support and more flexible parameter parsing
- multiple invoke component support
- DNIS parameter handling
- CIC parameter handling with application of CIC routing support
- Feature Byte processing

- overflow routing numbers

N00 number translation at the SCP using Transaction Capabilities Application Part (TCAP) allows a DMS-500 switch to send N00 numbers (received as part of the subscriber's dialed digits) for translation to remote databases over the Common Channel Signaling #7 (CCS7) network.

Activation

Activate Version 2 N00 number translation on the DMS-500 switch by setting the VER_2_N00 TCAP office parameter to **Y**.

Before setting the VER_2_N00 TCAP office parameter to **Y**, set the N00_ENHANCED_GLOBAL_TITLE office parameter to **Y**. The N00_ENHANCED_GLOBAL_TITLE office parameter cannot be **N** while the VER_2_N00_TCAP parameter is **Y**.

ATTENTION

When the VER_2_N00_TCAP office parameter is **Y**, global title type/encoding format is disabled but a 10-digit GTT is still used.

To activate remote N00 translation, the dialed N00 number must be within the range of digits identified as valid for ES selection SACREMOT in the SVCFEAT field of the STDPRT (Standard Pretranslator) subtable within the STDPRTCT (Standard Pretranslator Control) table.

Call scenario

This section discusses the following call scenario:

- Call originates
- N00 pretranslated
- TCAP query sent
- Reply received
- N00 number not translated
- Automatic code gapping
- Return error reply
- Reject reply
- FlexDial AXXESS agent processing

Call originates

N00 service calls (700, 800, or 900) can originate from various trunk types as follows:

- 700 calls can come from feature group A (FGA), feature group B (FGB), feature group D (FGD), and dedicated access line (DAL) trunks.
- 800 calls can come from feature group C (FGC) and FGD trunks.
- 900 calls can come from FGD trunks.

Note: 800 supporting agencies support NXX translation where N = 2 through 9 and X = 0 through 9. This allows support of numbers such as 888, 500, etc.

N00 pretranslated

If the dialed N00 number is marked in the pretranslator as a call to be translated remotely, the DMS-500 switch communicates to the SCP by sending a query over the CCS7 links.

TCAP query sent

An Invoke query is sent from the DMS-500 switch to the SCP over the CCS7 links. This query contains the dialed number and, if available, the 3-, 6-, or 10-digit automatic number identification (ANI) number.

The ANI transmitted in the invoke query is the ANI or calling line identifier (CLID) received on the originating trunk, with a length of 10 digits. If an ANI is not available, a pseudo automatic number identification (PANI) may be constructed and used instead. If neither an ANI nor a PANI is available, the trunk group serving numbering plan area (SNPA) is sent as a three-digit ANI value, and if present, the trunk group SNXX is also sent as a three-digit ANI value for the ANI billing number. The ANI billing number is padded as necessary to ten digits with trailing zeros.

An originating number (LATA) and information digits are also sent in Invoke query. The LATA is a three-digit number containing an originating value that is always encoded as 000. The information digits consist of one byte of data containing the information digits value in binary format.

The information digits value consists of information digits received by the DMS-500 switch. If no information digits are received, then the value encoded is identified as follows:

- If the origination is not FGD and the PANI feature is active, then the PANIINFO trunk group field identifies the information digits for the parameter.

- If the PANI feature is not active, then a value of #02 is encoded as the data for this parameter.

Reply received

After the N00 number is either translated or not translated at the SCP, results of the translation are sent back over the CCS7 links to the DMS-500 switch.

N00 number translated

If the N00 number is translated, an Invoke response is returned from the SCP containing as many as three parameters per response message. The parameters that may be included in the message are as follows:

- Routing Number parameter (digits) — used in connection control operation (connect specifier) and contains the called party number to be used for translation of the N00 call.
- Billing Indicator parameter — used in connection control operation (connect specifier) and contains the following information used to translate and process the call:
  - — billed party (calling party or called party)
  - — calling party's identity (CPI)
  - — satellite restriction
  - — nature of number (off-net or on-net)
  - — terminating partition
  - — originating partition
  - — translation billing type
- Carrier Identification Code (CIC) parameter (digits) — used in connection control operation (connect specifier) and can identify either the primary, secondary, or international carrier. Currently, the DMS-500 switch ignores received secondary or international carrier codes. The primary code indexes the CICROUTE (Carrier Indentification Code Routing) table.
- Feature Bytes parameter — used in connection control operation (connect specifier) and contains information applicable to how the call is processed. For non-AXXESS originating agents, N00 passthru is activated by this parameter. For AXXESS agents for the FlexDial framework feature, the FEATBYTE (Feature Byte) table is accessed to determine the interaction with the originating agent (For additional information, see "FlexDial Framework AXXESS agent processing" on page 8-10).

- Billing Number parameter (digits) — used in connection control operation (connect specifier) and contains the number to bill the call. The billing number received in the TCAP response message is stored in the Call Detail Record (CDR). The office parameter VER_2_BILL_FLEXTYPE defines an index into the FLEXTYPE (FlexDial Subscriber and Call Type Definitions) table. The BILLFLD option of the tuple identified by the VER_2_BILL_FLEXTYPE office parameter determines the field within the CDR in which to write the billing number.
- Dialed Number Identification Service (DNIS) number parameter (digits) — used in connection control operation (connect specifier) and contains the number to outpulse when leaving the network.

N00 number not translated

If the N00 number is not translated, an Invoke response is returned from the SCP containing the following:

- Diagnostic parameter — used in connection control operation (disconnect specifier) and identifies the following reasons for the disconnect operation
  - — translation not found
  - — translation blocked

Automatic Code Gapping (ACG)

Automatic Code Gapping (ACG) allows the DMS-500 switch to reduce the number of queries sent to the SCP at the request of the SCP. The request from the SCP comes in the form of an ACG parameter which is part of the standard TCAP Invoke response.

The ACG parameter is returned in an Invoke response in response to a query sent by the Service Switching Point (SSP) when the SCP is in one of the following conditions:

- calls are being received for an unassigned code (vacant code)
- calls are being received for a band that a customer has not subscribed to (out-of-band)
- database is overloaded (database overload)
- an excessive number of calls are being received for a destination (destination mass calling)
- ACG control has been externally initiated by an operation support system (service management system initiated)

An Automatic Code Gapping Invoke response that is returned from the SCP contains an ACG parameter which contains the following:

- Cause control indicator. This parameter describes the following conditions:
  - — vacant code
  - — out-of-band
  - — database overload
  - — destination mass calling
  - — service management system initiated
- Duration index which is indexed to table ACGDUR (Automatic Call Gap Duration) for specific duration value to be applied by the DMS-500 switch.
- Gap control interval which is indexed to table ACGGAP (Automatic Call Gap Value) for specific gap value to be applied by the DMS-500 switch.

Note 1: ACG for Version 2 N00 TCAP application follows ANSI T1.114-1988 or Bellcore standards with respect to the encoding of the ACG message and its parameters. ACG allows both formats for parameters.

Note 2: The actual duration and gap values in tables ACGDUR and ACGGAP are not those specified by ANSI or Bellcore, but can be provisioned to match specifications with the following exception: ANSI and Bellcore specify 600 seconds for a gap timer. The largest gap timer supported by table ACGGAP is 327 seconds.

ACG on control number

ACG occurs when a network management component with ACG indicators is included in the TCAP response message.

The use of ACG indicates that the SCP wishes to reduce the number of TCAP queries involving the identified control number. This control number must be the dialed N00 number used in the TCAP query in order for ACG control to be properly administered on subsequent calls.

For the duration of time identified by an ACG duration indicator, the DMS-500 switch is limited to sending a query to the SCP for the particular N00 (control) number once every elapsed period of time identified by the ACG gap indicator (for "duration" seconds, the switch is limited to sending a single query every "gap" identified milliseconds).

If the TCAP query cannot be sent due to ACG control, the call is terminated to the treatment defined by the N00_ACG_TRMT office parameter. Once

the duration time expires, the DMS-500 switch is no longer limited in the amount of queries that may be sent to the SCP for the control number.

ACG control is the same as used in Chapter 2, "N00 number translation," with the following exceptions:

- The ACG duration and gap values received are indexed into the new ACGDUR and ACGGAP tables to identify the duration and gap time values. Previously, the time values were hardcoded against the duration and gap values.
- Two modes of screening the duration and gap values are provided, and are based on the parameter identifier of the ACG indicator parameter. These modes are identified as BELLCORE and ANSI. This mode value is a part of the key to tables ACGDUR and ACGGAP for the duration and gap value lookup.
- If a play announcement, N00 passthru, route using translated number, or disconnect action is also received in the TCAP response message, then ACG is first applied as defined by the network management component operation, and then the identified action is handled. If no other action is identified, then the call terminates to the treatment identified by the N00_ACG_TRMT office parameter.
- A received cause value of 3 in the ACG indicator identifies SCP overload, and is used to block all queries sent to the ACG for the N00 application.
- The combination of an infinite duration value and infinite gap value are not allowed. An ACG401 log is sent, ACG control is ignored, and no Reject message is sent.
- If ACG is returned, the call which resulted in the query is routed and all subsequent calls (for duration or gap) are blocked. In the original version of N00 number translation, the call which resulted in the query receives N00_ACG_TRMT and all subsequent calls (for duration or gap) receive treatment.

The ACG control duration and gap time limits may be reset with subsequent TCAP network management operations applicable to the specific ACG control number.

ACG controls may only be removed if the "remove gap" ACG gap indicator value is received on subsequent TCAP network management operations for the ACG control number, or if the duration timer expires.

The duration value received in the TCAP response message is mapped to a control duration time through the ACGDUR table and identifies the length of time the ACG control is applicable for the control number. From the ACGDUR table, this time may be infinite, or a duration between 1 and 2048 seconds in one second increments.

The gap value received in the TCAP response message is mapped to a control gap time through the ACGGAP table. The table indicates whether the ACG control should be removed (remove gap), indicates an infinite gap (stop all calls), or identifies the periodic length of time after which a TCAP query may be sent for the specified control number. The range of time allowed is from 10 ms to 27.31 minutes in ten-millisecond increments (1 to 16384 10ms tics).

The combination of an infinite duration and infinite gap value is not permitted. In this case, ACG is not applied to the control number, and the call terminates to the treatment identified by the N00_ACG_TRMT office parameter, unless an additional non-network management action is identified in the TCAP response message. An ACG401 log is sent, ACG control is ignored, and no Reject message is sent.

ACG on all calls

ACG on all calls occurs when the cause value of the ACG indicators received in a network management component is equal to 3, identifying SCP overload.

The use of SCP overload indicates that the SCP wishes to limit all TCAP queries sent from the DMS-500 switch. This type of ACG control takes precedence over an ACG control applied to a specific N00 (control) number.

For the duration of time identified by the ACG duration indicator, the DMS-500 switch is limited to sending a query to the SCP for all N00 numbers once every elapsed period of time identified by the ACG gap indicator (for "duration" seconds, the switch is limited to sending a single query every "gap" identified milliseconds).

After checking for SCP overload ACG controls, the DMS-500 switch checks for ACG controls on the N00 number. If both control checks are passed, then the query is sent to the SCP for N00 translation.

All other characteristics of ACG control identified in "ACG on control number" apply to ACG control for SCP overload, with the exception that the ACG control applies to all calls using the N00 TCAP application, and not just to those using a specific N00 number.

Play announcement

Play announcement action occurs when a caller interaction component operation is received in the TCAP response message.

The parameters that may be included in the play announcement action message are as follows:

- standard announcement parameter
- custom announcement parameter
- referral number parameter

For this action, the standard or custom announcement parameter received identifies the index into the TCAPANNC (TCAP Announcement) table. If a referral number parameter is also included, 128 is added to the standard or custom announcement parameter value before indexing the TCAPANNC table. The referral number is stored as the called party digits for the call. The received referral number is also captured in the CALLEDNO field of the call detail record.

The provisioned entry in the table identifies one of three possible destinations for the call:

- termination to an announcement
- termination to a tone
- termination to a defined treatment

Table TCAPANNC identifies a provisioned destination for the call. Table TCAPANNC uses a two-part key, which consists of an announcement index and a numeric index. For AXXESS originating trunks for the FlexDial framework feature, the announcement index is determined by the data value within the announcement parameter. The announcement parameter value has a range of from 0 to 255, which directly translates into the announcement index. Also, the numeric index is determined from the processing of an option in table FLEXFEAT (FlexDial Subscriber Number and Call Type Features) for a previously executed subscriber number or calltype collectable. The numeric index has a default value of 0.

Return Error reply

If an error (unsuccessful completion) is detected by the SCP, a Return Error reply is sent back over the CCS7 links to the DMS-500 switch. For a list of error code reasons that can be returned in the Return Error reply, see Table 1-10.

Reject reply

If a protocol error is detected by either the SCP or the DMS-500 switch, a Reject reply is sent to the node at the other end of the CCS7 links. For a list

of the type of problems that can be identified in the Reject reply, refer to Tables 1-12 and 1-13 in Section 1, "Overview of TCAP".

FlexDial framework AXXESS agent processing

AXXESS agent processing for FlexDial framework is described in the following topics:

- Feature Byte processing for AXXESS agents
- overflow parameters
- limitations and restrictions

Note: For more information on AXXESS agents, see the *UCS DMS-250 FlexDial Framework Application Guide.*

Feature Byte processing for AXXESS agents

For calls originating on AXXESS agents, the Feature Byte parameter is used in the connection control component operation (with "connect" operation specifier) and consists of eight bytes of data that define how the call is to continue processing.

Call processing uses the feature bytes from a TCAP response message and the FEATBYTE office parameters to derive the initial set of key values. The key values index table FEATBYTE to obtain the options associated with that key. The options returned from table FEATBYTE define the interactions with the originating agent for that feature byte.

A tuple in the FEATBYTE table contains any or all of the following possible options:

- The FEATB option allows the examination of additional feature bytes within the FEATBYTE table.
- The DPIDX option provides an index into the FLEXDIAL (FlexDial Agent Interaction Definition) table and an associated action to take.
- The PROCESS option identifies the feature byte value used as a specific call processing data value.

As part of the feature bytes processing, a filed message is always posted to the MSGCTR for the SUBR collectable. This message contains the N00 digits dialed and a FLEXTYPE index (defined by the FLEXDIAL_N00_FLEXTYPE office parameter). The processing of the feature bytes (and the data provisioned in the FEATBYTE and FLEXDIAL tables) determine if the filed MSGCTR message for the SUBR collectable is ever used.

If the SUBR collectable (with the same FLEXTYPE as defined by FLEXDIAL_N00_FLEXTYPE) reads the filed MSGCTR message, the N00

digits and the features associated with it are processed. The features associated with the N00 digits are determined from the FLEXFEAT table.

Note: For more information on table FEATBYTE, see the *DMS-500 Data Scheme Reference Manual.*

Overflow parameters

Up to three routing numbers and their associated (optional) Dialed Number Identification Service (DNIS) and billing numbers can be received in a TCAP response message. All originating agents process the first combination of routing, DNIS, and billing numbers as described in Figure 8-1. Only AXXESS agents process the second and third combination of the routing, DNIS, and billing number parameters. For each additional routing number parameter received, a filed MSGCTR message is generated and sent to the ADDR collectable. Thus, if the call returns to the collect information point, the next filed message for the ADDR collectable is processed and the additional routing number parameter is used.

Limitations and restrictions

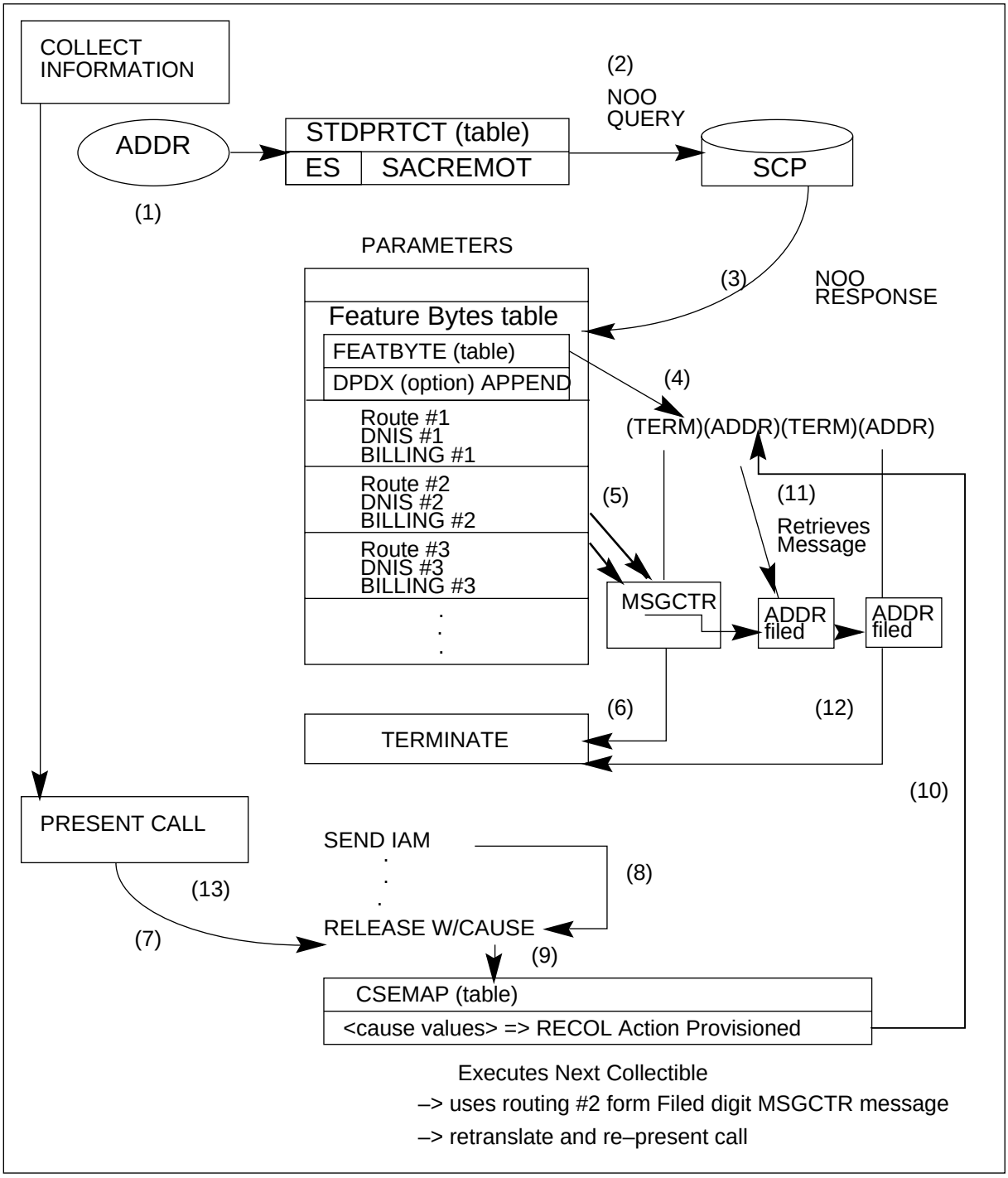
The following limitations and restrictions apply for AXXESS agent processing:

- Overflow (more than one) routing numbers received in the TCAP response message are only used by subsequent ADDR or ADDRPARM digit collectables.
- Call process functionality depends on datafill in the FEATBYTE, FLEXDIAL, and CSEMAP (Cause Treatment Mapping) tables.
- The Clear Call Features (CLRFTRS) with MSGCTR option in FlexDial does not clear the filed MSGCTR message generated by this feature for the ADDR collectable.

Example

Figure 8-1 describes how multiple routing numbers are used by the TCAP response message in the AXXESS agent processing call scenario. The numbers in parentheses show each step taken in this process. Step 12 and step 13 correspond to step 6 and step 7, respectively, but the second routing number is used. The third routing number is processed in a similar way to the second routing number.

Figure 8–1
AXXESS agent processing call scenario



Messaging

N00 translation is performed at the SCP for the off-switch translation. The invoke query is sent from the SSP requesting the translation to be performed at the SCP. Depending on the results, the SCP responds with one or more of the following messages:

- invoke response (N00 number translated)
- invoke response (N00 number not translated)
- automatic code gapping (ACG)
- play announcement
- return error
- reject

A connection control connect message takes precedence over a connection control disconnect message.

If an erroneous message is returned from the SCP for N00 translation, a Reject message is sent from the SSP to the SCP.

Invoke query sent to SCP

The format of an Invoke query message sent to the SCP for N00 translation is shown in Table 8-1.

Table 8-1
N00 translation Invoke TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0010	Query with permission
2	Package length	1	0010 1011	43 bytes (variable)
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0010 0011	35 bytes (variable)

Note 1: If digits D4 through D10 are absent, fill with binary zeros.

Note 2: LATA digits are encoded as 000.

—continued—

Table 8-1
N00 translation Invoke TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE	Code DCBA	Remarks
8	Component type ident.	1	1110	1001	Invoke (last)
9	Component length	1	0010	0001	33 bytes (variable)
10	Component ID identifier	1	1100	1111	
11	Component ID length	1	0000	0001	1 byte
12	Component ID	1			Invoke ID assigned
13	Operation code identifier	1	1101	0000	National TCAP
14	Operation code length	1	0000	0010	2 bytes
15	Operation code family	1	1000	0011	Provide instruction (reply required)
16	Operation code specifier	1	0000	0001	Start
17	Parameter set identifier	1	1111	0010	
18	Parameter set length	1	0001	1000	24 bytes (variable)
19	Parameter ident.	1	1010	1010	ANSI service key
20	Parameter length	1	0000	1011	11 bytes
21	Parameter ident.	1	1000	0100	National TCAP digits parameter
22	Parameter length	1	0000	1001	9 bytes
23	Parameter	9	0000 0000 0010 0000	0001 0000 0001 1010	N00 dialed number Nature of number (not applicable) Telephony numbering/BCD Number of digits = 10 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9)
24	Parameter ident.	1	1000	0100	National TCAP digits parameter
25	Parameter length	1	0000	1001	9 bytes

Note 1: If digits D4 through D10 are absent, fill with binary zeros.

Note 2: LATA digits are encoded as 000.

—continued—

Table 8-1
N00 translation Invoke TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
26	Parameter	9	0000 0010 0000 0000 0010 0001 0000 1010	ANI billing number Nature of number (not applicable) Telephony numbering/BCD Number of digits = 10 Digits (D2, D1) Digits (D4, D3) (Note 1) Digits (D6, D5) (Note 1) Digits (D8, D7) (Note 1) Digits (D10, D9) (Note 1)
27	Parameter ident.	1	1000 0100	National TCAP digits parameter
28	Parameter length	1	0000 0110	6 bytes
29	Parameter	6	0000 0111 0000 0000 0000 0001 0000 0011	LATA (originating) number Nature of number (not applicable) Unknown numbering plan/BCD Number of digits = 3 (Note 2) Digits (D2, D1) Digits (D3)
30	Parameter ident.	1	1101 1111 0100 0101	Private TCAP parameter – information digits
31	Parameter length	1	0000 0001	1 byte
32	Parameter	1		Encode information digits value in binary format

Note 1: If digits D4 through D10 are absent, fill with binary zeros.

Note 2: LATA digits are encoded as 000.

—end—

Invoke response from SCP (number translated)

The format of an Invoke response message (N00 number translated) returned from the SCP is shown in Table 8-2.

Table 8-2
Invoke response (N00 number translated) TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0010 0110	38 bytes (variable)
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0001 1110	30 bytes (variable)
8	Component type ident.	1	1110 1XXX	Invoke: Bit C B A Significance 0 0 1 Last component type 1 0 1 Not last component type
9	Component length	1	0001 1100	28 bytes (variable)
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0010	2 bytes
12	Component ID	2		Invoke ID / correlation ID
13	Operation code identifier	1	1101 0000	National TCAP
14	Operation code length	1	0000 0010	2 bytes
15	Operation code family	1	0000 0100	Connection control (no reply required)
16	Operation code specifier	1	0000 0001	Connect
17	Parameter set identifier	1	1111 0010	
18	Parameter set length	1		(variable)

Note: CIC digits value indexes the CICROUTE table.

—continued—

Table 8-2
Invoke response (N00 number translated) TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
19 thru 21	Refer to Routing number parameter format in table 8-3 or 8-4.			
22	Parameter ident.	2	1101 1111 0100 0001	Private digits (Billing indicator parameter)
23	Parameter length	1	0000 0101	5 bytes
24	Parameter	5		Refer to Billing indicator parameter format in Table 8-5.
25	Parameter ident.	1	1000 0100	National TCAP (CIC parameter)
26	Parameter length	1	0000 0110	6 bytes
27	Parameter	6	0000 1101 0000 0000 0010 0001 0000 0011	Primary CIC Nature of number (National) Telephony numbering/BCD Number of digits = 3 Digits (D2, D1) Digits (filler, D3)
28	Parameter ident.	2	1101 1111 0100 0100	Private digits (Feature bytes parameter)
29	Parameter length	1	0000 1000	8 bytes
30	Parameter	8	XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX XXXX	Feature byte data
Note: CIC digits value indexes the CICROUTE table.				
—end—				

Routing number parameter format

The format of the routing number parameter is shown in Tables 8-3 and 8-4.

The format for the routing number parameter when VER_2_DECODE_INTL_NUM is set to AS_1988 is shown in Table 8-3.

The format for the routing number parameter when VER_2_DECODE_INTL_NUM is set to AS_1992 is shown in Table 8-4.

Parameter VER_2_DECODE_INTL_NUM is set in table OFCVAR (Office Variables).

Table 8-3
Routing number parameter format with VER_2_DECODE_INTL_NUM set to AS_1988

Item no.	Name	No. of bytes	Code HGFE	Code DCBA	Remarks
19	Parameter ident.	1	1000	0100	National TCAP (Routing number parameter)
20	Parameter length	1	0000	1001	9 bytes
21	Parameter	9	0000	0100	Routing number
			0000	0000	Nature of number (not applicable)
			00XX		Numbering plan: Bit F E Significance 0 0 International routing number 0 1 National routing number 1 0 National routing number 1 1 Not used
				0001 or 1110	BCD or TBCD
			0000	1010	Number of digits = 10 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9)

—end—

Table 8-4
Routing number parameter format with VER_2_DECODE_INTL_NUM set to AS_1992

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
19	Parameter ident.	2	1101 1111 0100 1001	Private digits (Routing number parameter)
20	Parameter length	1	0000 1011	11 bytes
21	Parameter	11	0000 0100 0000 000X	Routing number Nature of number: Bit A Significance 0 National routing number 1 International routing number
			00XX	Numbering plan: Bit F E Significance 0 0 Unknown numbering plan 0 1 DAL numbering plan 1 0 Telephony numbering plan 1 1 Not used
			0001 0000 1110	BCD Number of digits = 14 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9) Digits (D12, D11) Digits (D14, D13)

—end—

Billing indicator parameter format

The format of Billing indicator parameter is shown in Table 8-5.

Table 8-5
Billing indicator parameter format

Code	Meaning
First parameter word (byte):	
Bit A	Billed party 0 = Calling party 1 = Called party
Bit B	Calling party's identity (CPI) 0 = CPI not transmitted to the terminator in the call. 1 = CPI transmitted to the terminator in the call.
Bit C	Satellite restriction 0 = Off 1 = On
Bit D	Spare
Bit E	Nature of number 0 = Off-net 1 = On-net
Bit F-H	Spare
Second parameter word (byte):	
Bits A-H	Spare
Third parameter word (byte):	
Bits A-E	Terminating partition
Bits F-H	Spare
Fourth parameter word (byte):	
Bits A-H	Originating partition (LSB)
Fifth parameter word (byte):	
Bits A-B	Originating partition (MSB)
Bits C-H	Translation billing type
—end—	

Default billing indicator parameter

If the billing indicator parameter is not received in the connection control component, the information used to set up the call is defaulted or taken from the existing call processing data. The contents of the default billing indicator parameter response is shown in Table 8-6.

Table 8-6
Default billing indicator parameter

Item	Value
Billing party	called party billed
Calling party's identity	not needed
Satellite restriction	value set from subscriber number screening
Nature of number	off-net
Terminating partition	value set from subscriber number screening
Originating partition	value set from subscriber number screening
Translation billing type	0
—end—	

Billing number parameter

A received billing number parameter is used in the Call Detail Record (CDR).

The contents of the billing number parameter is shown in Table 8-7. The billing number parameter has the same format as the routing number (with Type_of_digits = 5).

Table 8-7
Billing number parameter

Item	Value
Parameter identifier	National TCAP digits (#84) Private TCAP digits (#DF #49)
Type of digits	Billing number type (#05)
—end—	

DNIS number parameter

A received DNIS number parameter is outpulsed by the DMS-500 switch.

The contents of the DNIS number parameter is shown in Table 8-8. The DNIS number parameter has the same format as the routing number (with Type_of_digits = 6).

Table 8-8
DNIS number parameter

Item	Value
Parameter identifier	National TCAP digits (#84) Private TCAP digits (#DF #49)
Type of digits	Destination number type (#06)
—end—	

Feature Bytes parameter

The Feature Bytes parameter is used in the connection control component operation (with connect operation specifier). The Feature Bytes parameter defines how the call is to continue processing. If this parameter is not received in a connection control component operation (with connect operation specifier), then the Feature Bytes parameter is considered invalid and results in a decoding error. Receiving more or less than exactly eight bytes also results in a decoding error.

The contents of the Feature Bytes parameter is shown in Table 8-9.

Table 8-9
Features Bytes parameter

Item	Value
Parameter identifier	Private TCAP parameter (#DF #44)
Parameter length	Exactly 8 bytes of data (#08)
—end—	

Invoke response from SCP (number not translated)

The format of an Invoke response message (N00 number not translated) returned from the SCP is shown in Table 8-10.

Table 8-10
Invoke response (N00 number not translated) TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 1000	24 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0001 0000	16 bytes
8	Component type ident.	1	1110 1XXX	Invoke: Bit C B A Significance 0 0 1 Last component type 1 0 1 Not last component type
9	Component length	1	0000 1110	14 bytes
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0010	2 bytes
12	Component ID	2		Invoke ID/correlation ID
13	Operation code identifier	1	1101 0000	National TCAP
14	Operation code length	1	0000 0010	2 bytes
15	Operation code family	1	0000 0100	Connection control (no reply required)

Note 1: If a not used bit configuration is detected, the switch applies a service communication failure (SCFL) treatment.

Note 2: If translation not found is returned, the switch applies a vacant code (VACT) treatment.

Note 3: If translation blocked is returned, the switch applies a N00 call blocked (N00B) treatment.

—continued—

Table 8-10
Invoke response (N00 number not translated) TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
16	Operation code specifier	1	0000 0011	Disconnect
17	Parameter set identifier	1	1111 0010	
18	Parameter set length	1	0000 0100	4 bytes
19	Parameter ident.	2	1101 1111 0100 0101	Private TCAP (Diagnostic parameter)
20	Parameter length	1	0000 0001	1 byte
21	Parameter	1	0000 00XX	Parameter word (byte): Bit B A Significance 0 0 Not used (Note 1) 0 1 Translation not found (Note 2) 1 0 Translation blocked (Note 3) 1 1 Not used (Note 1)

Note 1: If a not used bit configuration is detected, the switch applies a service communication failure (SCFL) treatment.

Note 2: If translation not found is returned, the switch applies a vacant code (VACT) treatment.

Note 3: If translation blocked is returned, the switch applies a N00 call blocked (N00B) treatment.

—end—

ACG Invoke response from SCP

The format of an ACG Invoke response message returned from the SCP is shown in Table 8-11.

Table 8-11
ACG Invoke response TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0010 0100	36 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0001 1011	27 bytes
8	Component type ident.	1	1110 1XXX	Invoke: Bit C B A Significance 0 0 1 Last component type 1 0 1 Not last component type
9	Component length	1	0001 1001	25 bytes
10	Component ID identifier	1	0000 0000	
11	Component ID length	1	0000 0001	1 byte
11	Component ID	1		Invoke ID
12	Operation code identifier	1	1101 0010	National operation
13	Operation code length	1	0000 0010	2 bytes
14	Operation code family	1	0000 0111	Network management
15	Operation code specifier	1	0000 0001	Automatic code gap
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0001 0000	16 bytes

Note: If tables ACGDUR or ACGGAP are not datafilled, an error occurs and a Reject message is sent to the SCP.

—continued—

Table 8-11
ACG Invoke response TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
18 thru 20	Refer to Routing number parameter format in table 8-12 or 8-13.			
21	Parameter ident.	1 or 2	1000 0001 or 1101 1111 0100 0111	National (ANSI) ACG parameter or Private (Bellcore) ACG parameter
22	Parameter length	1	0000 0011	3 bytes
23	Parameter	3	0000 0XXX	Control cause indicator: Bit C B A — Significance 0 0 0 — Not used 0 0 1 — Vacant code 0 1 0 — Out-of-band 0 1 1 — Database overload 1 0 0 — Destination mass calling 1 0 1 — Service management system initiated
			XXXX XXXX	Duration (indexed to table ACGDUR for specific duration value to be applied) (Note)
			XXXX XXXX	Gap control interval (indexed to table ACGGAP for specific gap value to be applied) (Note)

Note: If tables ACGDUR or ACGGAP are not datafilled, an error occurs and a Reject message is sent to the SCP.

—end—

ACG control number parameter format

The format of the ACG control number parameter is shown in Tables 8-12 and 8-13.

The format for the ACG control number parameter when an ANSI ACG parameter is used is shown in Table 8-12.

The format for the ACG control number parameter when a Bellcore ACG parameter is used is shown in Table 8-13.

Table 8-12
ACG control number parameter format when an ANSI ACG parameter is used

Item no.	Name	No. of bytes	Code HGFE	Code DCBA	Remarks
18	Parameter ident.	2	1000	0100	National TCAP (ACG control number parameter – ANSI)
19	Parameter length	1	0000	1001	9 bytes
20	Parameter	9	0000	0001	ACG control number – ANSI (dialed)
			0000	0000	Nature of number (not applicable)
			00XX		Numbering plan: Bit F E Significance 0 0 Unknown numbering plan 0 1 Dal numbering plan 1 0 Telephone numbering plan 1 1 Not used
				0001 or 1110	BCD or TBCD
			0000	1010	Number of digits = 10 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9)
			—end—		

Table 8-13
ACG control number parameter format when a Bellcore ACG parameter is used

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
18	Parameter ident.	2	1101 1111 0100 1001	Private digits (ACG control number parameter – Bellcore)
19	Parameter length	1	0000 1011	11 bytes
20	Parameter	11	0000 0001	ACG control number – Bellcore (dialed)
			0000 000X	Nature of number: Bit A Significance 0 National routing number 1 International routing number
			00XX	Numbering plan: Bit F E Significance 0 0 Unknown numbering plan 0 1 DAL numbering plan 1 0 Telephony numbering plan 1 1 Not used
			0000 1110	0001 BCD Number of digits = 14 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9) Digits (D12, D11) Digits (D14, D13)
			—end—	

Play Announcement Invoke response from SCP

The format of a Play Announcement Invoke response message returned from the SCP is shown in Table 8-14.

Table 8-14
Play Announcement Invoke response TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0010 0100	36 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0001 1011	27 bytes
8	Component type ident.	1	1110 1XXX	Invoke: Bit C B A Significance 0 0 1 Last component type 1 0 1 Not last component type
9	Component length	1	0001 1001	25 bytes
10	Component ID identifier	1	0000 0000	
11	Component ID length	1	0000 0001	1 byte
11	Component ID	1		Invoke ID
12	Operation code identifier	1	1101 0010	National operation
13	Operation code length	1	0000 0010	2 bytes
14	Operation code family	1	0000 0101	Call interaction
15	Operation code specifier	1	0000 0001	Play announcement
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0001	1 byte

Note: If a referral number is present, 128 is added to the announcement value before indexing the TCAPANNC table (range of 128 to 255 is used).

—continued—

Table 8-14
Play Announcement Invoke response TCAP message format (continued)

Item no.	Name	No. of bytes	Code HGFE	Code DCBA	Remarks
18	Parameter ident.	1	1000	00XX	Announcement parameter: Bit B A Significance 1 0 Standard announcement 1 1 Custom announcement
19	Parameter length	1	0000	0001	1 byte
20	Parameter	1	0XXX	XXXX	Data value (indexed to table TCAPANNC) valid range is 0 to 127. (Note)
21 thru 23	Refer to Referral number parameter format in table 8-15 or 8-16.				

Note: If a referral number is present, 128 is added to the announcement value before indexing the TCAPANNC table (range of 128 to 255 is used).

—end—

Referral number parameter format

The format of the routing number parameter is shown in Tables 8-15 and 8-16.

The format for the referral number parameter when VER_2_DECODE_INTL_NUM is set to AS_1988 is shown in Table 8-15.

The format for the referral number parameter when VER_2_DECODE_INTL_NUM is set to AS_1992 is shown in Table 8-16.

Parameter VER_2_DECODE_INTL_NUM is set in table OFCVAR.

Table 8-15
Referral number parameter format with VER_2_DECODE_INTL_NUM set to AS_1988

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
21	Parameter ident.	2	1000 0100	National TCAP (Routing number parameter)
22	Parameter length	1	0000 1001	9 bytes
23	Parameter	9	0000 0001	Routing number
			0000 0000	Nature of number (not applicable)
			00XX	Numbering plan: Bit F E Significance 0 0 International number 0 1 National number 1 0 National number 1 1 Not used
			0001 or 1110	BCD or TBCD
			0000 1010	Number of digits = 10 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9)
			—end—	

Table 8-16
Referral number parameter format with VER_2_DECODE_INTL_NUM set to AS_1992

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
21	Parameter ident.	2	1101 1111 0100 1001	Private digits (Referral number parameter)
22	Parameter length	1	0000 1011	11 bytes
23	Parameter	11	0000 0001 0000 000X	Routing number Nature of number: Bit A Significance 0 National routing number 1 International routing number
			00XX	Numbering plan: Bit F E Significance 0 0 Unknown numbering plan 0 1 DAL numbering plan 1 0 Telephony numbering plan 1 1 Not used
			0000 0001 0000 1110	BCD Number of digits = 14 Digits (D2, D1) Digits (D4, D3) Digits (D6, D5) Digits (D8, D7) Digits (D10, D9) Digits (D12, D11) Digits (D14, D13)

—end—

Return Error from SCP

The format of a Return Error message returned from the SCP for N00 translation is shown in Table 8-17.

Table 8-17
N00 translation Return Error TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0010	18 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1010	10 bytes
8	Component type ident.	1	1110 1011	Return Error
9	Component length	1	0000 1000	8 bytes
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Correlation ID
13	Error code identifier	1	1101 0011	
14	Error code length	1	0000 0001	1 byte
15	Error code	1		Refer to error code definitions in Table 1-10.
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0000	No parameters

—end—

Reject from SCP

The format of a Reject message returned from the SCP for N00 translation is shown in Table 8-18.

Table 8-18
N00 translation Reject from the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0100	Response
2	Package length	1	0001 0011	19 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0100	4 bytes
5	Transaction ID	4		Responding transaction ID
6	Component seq. ident.	1	1110 1000	
7	Component seq. length	1	0000 1011	11 bytes
8	Component type ident.	1	1110 1100	Reject
9	Component length	1	0000 1001	9 bytes
10	Component ID identifier	1	1100 1111	
11	Component ID length	1	0000 0001	1 byte
12	Component ID	1		Correlation ID
13	Problem code identifier	1	1101 0101	
14	Problem code length	1	0000 0010	2 bytes
15	Problem type	1		Refer to problem type definitions in Table 1-12.
16	Problem specifier	1		Refer to problem specifier definitions in Table 1-13.
17	Parameter set identifier	1	1111 0010	
18	Parameter set length	1	0000 0000	No parameters
			—end—	

Reject to SCP

If an erroneous message is returned from the SCP for N00 translation, a Reject message is sent from the SSP to the SCP. The format of a Reject message sent to the SCP for N00 translation is shown in Table 8-19.

Table 8-19
N00 translation Reject to the SCP TCAP message format

Item no.	Name	No. of bytes	Code HGFE DCBA	Remarks
1	Package type ident.	1	1110 0001	Unidirectional
2	Package length	1	0000 1110	14 bytes
3	Transaction ID ident.	1	1100 0111	
4	Transaction ID length	1	0000 0000	
5	Component seq. ident.	1	1110 1000	
6	Component seq. length	1	0000 1011	11 bytes
7	Component type ident.	1	1110 1100	Reject
8	Component length	1	0000 1001	9 bytes
9	Component ID identifier	1	1100 1111	
10	Component ID length	1	0000 0001	1 byte
11	Component ID	1		Correlation ID
12	Problem code identifier	1	1101 0101	
13	Problem code length	1	0000 0010	2 bytes
14	Problem type	1		Refer to problem type definitions in Table 1-12.
15	Problem specifier	1		Refer to problem specifier definitions in Table 1-13.
16	Parameter set identifier	1	1111 0010	
17	Parameter set length	1	0000 0000	No parameters
			—end—	

Billing information

The OPART returned in the N00 response data is written to the ORIGOPRT field of the call detail record.

The translation billing type returned in the N00 response data is written to the BILLTYPE field of the call detail record.

If no billing number parameter is received, then the dialed N00 number is written to the BILLNUM field when the number is called-party billed. If the billing number parameter is received, the datafill determines which field to write the billing number in the CDR.

Version 2 N00 TCAP translation tables

This section discusses datafilling of the following tables:

- ACGDUR
- ACGGAP
- TCAPANNC
- FEATBYTE

For more information on these tables, see the *DMS-500 Data Schema Reference Manual.*

Datafilling the ACGDUR table

Table ACGDUR provides the ability to provision specific time periods against ACG parameter duration values received in a TCAP response message for Version 2 N00 TCAP translation.

Note: The ACGDUR table has the ability to support the full range of values identified by the ANSI and Bellcore TCAP specifications.

The ACGDUR table is indexed when the DMS-500 switch receives an N00 TCAP response message, and an ACG parameter is contained within a network management component. This table is used to retrieve a time duration value corresponding to the duration value.

The table is indexed by a two-part key consisting of the duration mode and duration index value from the ACG parameter. The entry retrieved contains a time duration indication. This time duration value is used for the ACG control.

The key to the table consists of a two-part index:

- ACG Mode – {Bellcore, ANSI}
- ACG Duration Index – {0 to 255}

Datafilling the ACGGAP table

Table ACGGAP provides the ability to provision specific time periods against ACG parameter gap values received in a TCAP response message.

Note: The ACGDUR table has the ability to support the full range of values identified by the ANSI and Bellcore TCAP specifications, with one exception: the maximum gap value supported by table ACGGAP is 327 seconds instead of 600 seconds.

The ACGGAP table is indexed when the DMS-500 switch receives an N00 TCAP response message, and an ACG parameter is contained within a network management component. This table is used to retrieve a time duration value corresponding to the gap value.

The table is indexed by a two-part key consisting of the gap mode and gap index value from the ACG parameter. The entry retrieved contains a time duration indication. This time duration value is used for the ACG control.

Datafilling the TCAPANNC table

Table TCAPANNC provides the ability to provision a specific destination against a received TCAP standard or custom announcement parameter value. The call processing action directs the call to connect to an announcement, a tone, or to an identified treatment.

The table is indexed by a two-part key consisting of a numeric index and the announcement index value from the standard or custom announcement TCAP parameter. The entry retrieved identifies the destination of the call for call processing. The call can terminate to either an announcement CLLI (as identified in table ANNS), a tone CLLI (as identified in table TONES), or a defined treatment. Treatment routes are provisioned in table TMTCNTL (Treatment Control).

Also, for AXXESS trunks, the numeric index is determined from the processing of an option in table FLEXFEAT for a previously executed subscriber number or calltype collectable. The numeric index has a default value of 0. When call processing attempts to index the table with a custom numeric index one, and no provisioning exists against the announcement index for this numeric index, then the destination provisioned against the standard announcement index is automatically used.

Datafilling the FEATBYTE table

Table FEATBYTE is only applicable for AXXESS originating agents. This table provides the ability to define specific interactions based on the feature bytes received in the TCAP response message.

The FEATBYTE table is indexed by a numeric index, the feature byte number, and individual feature byte values to identify the required processing options for that feature byte.

N00 number translation implementation

This section discusses the following topics:

- Datafilling tables
- Setting up office parameters

Datafilling tables

Two database tables are used for N00 translation:

- STDPRTCT
- TMTCNTL

In table STDPRTCT, subtable STDPRT, there are two fields used for N00 translation.

The PRERTSEL field is set to ES

The SVCFEAT field has a range of two subfields as follows:

- INWATS — This subfield indicates the type of N00 service feature available.
- SACREMOT — This subfield contains the range of numbers that are used during pretranslation to determine whether remote N00 translation is to be performed on the dialed number.

In table TMTCNTL, subtable OFFTREAT, field TREATM is used to indicate two values. These values (treatments) are as follows:

- SCFL — DBS communication failure treatment
- N00B — N00 call blocked treatment

Setting up office parameters

In table OFCVAR (Office Variables), eleven parameters are used for N00 translation:

- TESTS250_MAX_USERS — This parameter specifies the maximum number of simultaneous users that can execute the DMS-500 TESTSS MAP command for each of the applications.

- N00_DCP_RESPONSE_TIMEOUT — This parameter specifies the time interval within which the DMS-500 switch expects to receive a response message from the SCP.
- IE_LAS_ON_900_CGB — This parameter specifies whether Incoming Exclusion and/or InterLATA/State screening is performed for a 900 calling-party-billed call.
- IE_LAS_ON_900_CDB — This parameter specifies whether Incoming Exclusion and/or InterLATA/State screening is performed for a 900 called-party-billed call.
- IE_LAS_ON_700_CGB — This parameter specifies whether Incoming Exclusion or InterLATA/State screening is performed for a 700 calling-party-billed call.
- IE_LAS_ON_700_CDB — This parameter specifies whether Incoming Exclusion and/or InterLATA/State screening is performed for a 700 called-party-billed call.
- N00_ACG_TRMT — This parameter specifies the treatment to be applied on a N00 call that is blocked because of Automatic Code Gapping.
- VER_2_N00_TCAP — This parameter identifies whether the new TCAP development for the N00 application (Version 2) is to be used. If the parameter is **Y**, the new encoding and decoding schemes are used as discussed in this Chapter. If the parameter is **N**, the previous version of DMS-500 switch capability is used for the N00 application as discussed in Chapter 2.
- VER_2_N00_DECODE_INTL_NUM — This parameter specifies whether the nature of number field or the numbering plan field is used to identify international numbers in a returned TCAP digits parameter. If the parameter is AS_1988, the numbering plan field is used. If the parameter is AS_1992, the nature of number field is used.
- VER_2_N00_BILL_INDIC_AVAIL — This parameter identifies whether a received TCAP billing indicator parameter for the VER 2 N00 TCAP application can be properly decoded. If the parameter is **Y**, the TCAP parameter can be decoded as specified. If the parameter is **N**, the DMS-500 switch ignores a received TCAP billing indicator parameter.
- VER_2_N00_PASSTHRU — This parameter identifies the destination of the call when the N00 PASSTHRU feature is active.

In table OFCVAR, six office parameters are used for FEATBYTE and billing number related processing:

- FEATBYTE_FIRST_INDEX — This office parameter has a range of from 0 to 8191. This parameter identifies the first feature byte value used in the initial lookup in table FEATBYTE. The default value for this office parameter is 0.

- FEATBYTE_FIRST_BYTE — This office parameter has a range of from 1 to 8. This parameter identifies the first feature byte value of the eight available used in the initial lookup in table FEATBYTE. The default value for this office parameter is 1.
- FEATBYTE_FIRST_MASK — This office parameter has a range of from 0 to 255. This parameter identifies the mask applied to the first feature byte value used in the initial lookup in table FEATBYTE. The default value for this office parameter is 255.
- FEATBYTE_NOANSDUR_MULT — This office parameter has a range of from 0 to 20. This parameter identifies the multiplier used in the equation: [offset + (featbyte_value * multiplier)]. The value derived from this equation is used as the No Answer Duration timer. The default value for this office parameter is 1.
- FEATBYTE_NOANSDUR_OFFSET — This office parameter has a range of from 0 to 20. This parameter identifies the offset used in the equation: [offset + (featbyte_value * multiplier)]. The derived value is used as the No Answer Duration timer. The default value for this office parameter is 0.
- VER_2_BILL_FLEXTYPE — This office parameter resides in table OFCVAR and identifies an index into table FLEXTYPE. The BILLFLD option in the FLEXTYPE tuple identifies the CDR field that stores the billing number. The billing number is not used from the TCAP response message when the tuple identified by this office parameter does not contain the BILLFLD option. The default value for this office parameter is ANI.
- FLEXDIAL_N00_FLEXTYPE — This office parameter resides in table OFCVAR and identifies the FLEXTYPE table index used in a SUBR MSGCTR message that is formatted containing an N00 or access number (typically 800, 888, or 950 numbers). The office parameter is used during ADDR or ADDRPARM collectable processing when processing a UAX STDPRTCT table selector or when processing a TCAP response message for the N00 application. The default value is the first entry in table FLEXTYPE.

In table OFCENG (Office Engineering), three parameters are used for TCAP operation:

- NUM_RDB_EXTS — This parameter specifies the number of Extension Blocks to allocate for remote database (RDB) facility.
- NUM_TCAP_TRANSACTIONS — This parameter specifies the maximum number of concurrent TCAP transactions which may be used at one time among all UCS IN/1 TCAP applications.

- N00_ACG_AUDIT_TIME — This parameter specifies the time interval at which the audit runs that deletes ACG control codes from the control list.

In table OFCOPT (Office Options), one parameter is used for TCAP operation:

- N00_ENHANCED_GLOBAL_TITLE — This parameter determines whether a fixed global title address string of a single 0 digit or a 10-digit N00 number for the SCCP called party address in the outgoing TCAP message. For more information, refer to "Global title address," in Chapter 7, "Global Title Translation."

For more information, refer to the *DMS-500 Office Parameters Reference Manual*.

List of abbreviations

ACG
automatic code gapping

ACGDUR
Automatic Call Gap Duration table

ACGGAP
Automatic Call Gap Value table

ANI
automatic number identification

ASP
Application Service Part

AUTHDIN
Authcode Database Index Number table

BC
bearer capability

C7GTT
Common Channel Signaling No. 7 Global Title Translation table

CCS7
Common Channel Signaling #7

CICROUTE
Carrier Identification Code Routing table

CLID
calling line identifier

CLLI
common language location identifier

COS
class of service

CPI
calling party’s identity

CSEMAP
Cause Treatment Mapping table

DAL
dedicated access line

DCP
Database Control Point

DNIS
dialed number identification service

DDD
direct distance dialing

FEATBYTE
Feature Byte table

FGA
feature group A

FGB
feature group B

FGC
feature group C

FGD
feature group D

FLEXDIAL
FlexDial Agent Interaction Definition table

FLEXFEAT
FlexDial Subscriber Number and Call Type Features table

FLEXTYPE
FlexDial Subscriber and Call Type Definitions table

IMT
intermachine trunk

ISDN
Integrated Services Digital Network

ISUP
Integrated Services Digital Network (ISDN) User Part

MCCS
mechanized calling card service

MTP
Message Transfer Part

NSP
Network Services Part

OFCENG
Office Engineering table

OFCOPT
Office Options table

OFCVAR
Office Variables table

OSI
Open Systems Interconnection

PANI
pseudo automatic number identification

PC/SSN
point code/subsystem number

PIN
personal identification number

RDB
remote database

SCCP
Signaling Connection Control Part

SCP
Service Control Point

SNPA
serving numbering plan area

SPLASHID
Splashback Identification table

SSP
Service Switching Point

STDPRTCT
Standard Pretranslator Control table

STP
Signaling Transfer Point

TBCD
Telephony Binary Coded Decimal

TCAP
Transaction Capabilities Application Part

TCAPANNC
Transaction Capabilities Application Part (TCAP) Announcement table

TCN
travel card number

TCNTCH
Travel Card Number Trap Class Hotline table

TONES
Tones table

TMTCNTL
Treatment Control table

Ordering information

Use the following table for ordering Nortel (Northern Telecom) NTPs (Northern Telecom Publications) and PCLs (Product Content Loads):

Type of product	Source	Phone	Cost
Technical documents (paper or CD-ROM)	Nortel Product Documentation	1-877-662-5669, Option 4 + 1	Yes
Individual NTPs (paper)	Merchandising Order Service	1-800-347-4850	Yes
Marketing documents	Sales and Marketing Information Center (SMIC)	1-800-4NORTEL (1-800-466-7835 * ESN 444-5930	No
PCL software	Northern Telecom	Consult your Nortel sales rep-resentative * Employee	Yes

When ordering publications on CD

Please have the CD number and software version available, for example, **HLM-2663-001 02.03**.

When ordering individual paper documents

Please have the document name and number available, for example, **297-2663-900, DMS-500 User Guide**.

When ordering software

Please have the eight-digit ordering code, for example, **LLT0B005**, as well as the ordering codes for the features you wish to purchase. Contact your Nortel representative for assistance.

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DMS-500

TCAP Application Guide

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