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.

Publication History

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Digital Switching Systems

UCS DMS-250

International Protocol Reference Manual

UCS08 Standard 02.02 June 1998

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Digital Switching Systems

UCS DMS-250

International Protocol Reference Manual

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Initial release of the UCS DMS-250 Global Protocol Reference Manual.

Contents

About this document

This manual serves as a reference for protocols used by the UCS DMS-250 switch in the International marketplace. This manual describes the signaling and messaging information used by the International Telecommunications Union (ITU) Integrated Services Digital Network User Part (ISUP) inter-machine trunk (IMT), Mexican ISUP IMT, and Mexican R2 protocols.

When to use this document

This NTP should be used to obtain a high-level overview of the UCS DMS-250 switch and to answer questions such as:

- What is the UCS DMS-250 switch?
- How does it fit into the network?
- What types of features and services are available and how are they used?
- How does it handle billing?
- How is it maintained?

Intended audience

This document is written for planners, installers, support and maintenance technicians, and engineers.

To find this document most useful:

- The UCS DMS-250 switch you are working with should be installed, commissioned, and active.
- You should receive training for Table Editor and complete Nortel (Northern Telecom)-approved training for datafill, translations, and maintenance.

How this document is organized

The information in this manual is arranged as follows:

Chapter 1, Overview

- Chapter 1 provides a general definition of the International protocols.

Chapter 2, ITU ISUP IMT protocol

- Chapter 2 provides specific details about the ITU ISUP IMT protocol signaling and messaging.

Chapter 3, Mexican ISUP IMT protocol

- Chapter 3 provides specific details about the Mexican ISUP IMT signaling and messaging.

Chapter 4, Mexican R2

- Chapter 4 provides details about the R2 protocol.

Chapter 5, Interworkings

- Chapter 5 provides information and examples of the interworkings between various International protocols that the UCS DMS-250 switch uses.

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 *second* 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 released again in the *same* software release cycle. For example, the second release of a document in the first 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 *UCS DMS-250 Master Index*, 297-2621-001.

This document is written for all UCS DMS-250 offices in World Zone 1 (US, Canada, Caribbean, except Haiti and Cuba). 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 *UCS DMS-250 Master Index*, 297-2621-001.

References in this document

The following documents are referred to in this document:

- *UCS DMS-250 General Description*, 297-2621-100
- *UCS DMS-250 International Application Guide*, 297-2621-327
- *Common Channel Signaling 7 Product Guide*, 297-1001-011

Information about related documents can be found in either the *UCS DMS-250 Master Index*, 297-2621-001, or the *Product Documentation Directory*, 297-8991-001.

What precautionary messages mean

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

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

Examples of the precautionary messages follow.

ATTENTION Information needed to perform a task

ATTENTION

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

DANGER Possibility of personal injury

DANGER

Risk of electrocution

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

WARNING Possibility of equipment damage

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

CAUTION Possibility of service interruption or degradation

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

How commands, parameters, and responses are represented

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

Input prompt (>)

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

>BSY

Commands and fixed parameters

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

>BSY CTRL

Variables

Variables are shown in lowercase letters:

>BSY CTRL ctrl_no

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

Responses

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

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

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

1 Manually busy the CTRL on the inactive plane by typing

>BSY CTRL ctrl_no
and pressing the Enter key.

where

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

Example of a MAP response:

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

Overview

This document serves as a reference for specific signaling and messaging protocols used by the UCS DMS-250 switch in international applications outside of World Zone 1. Protocol details are provided in the following chapters.

International protocols

The following protocols are discussed in this document:

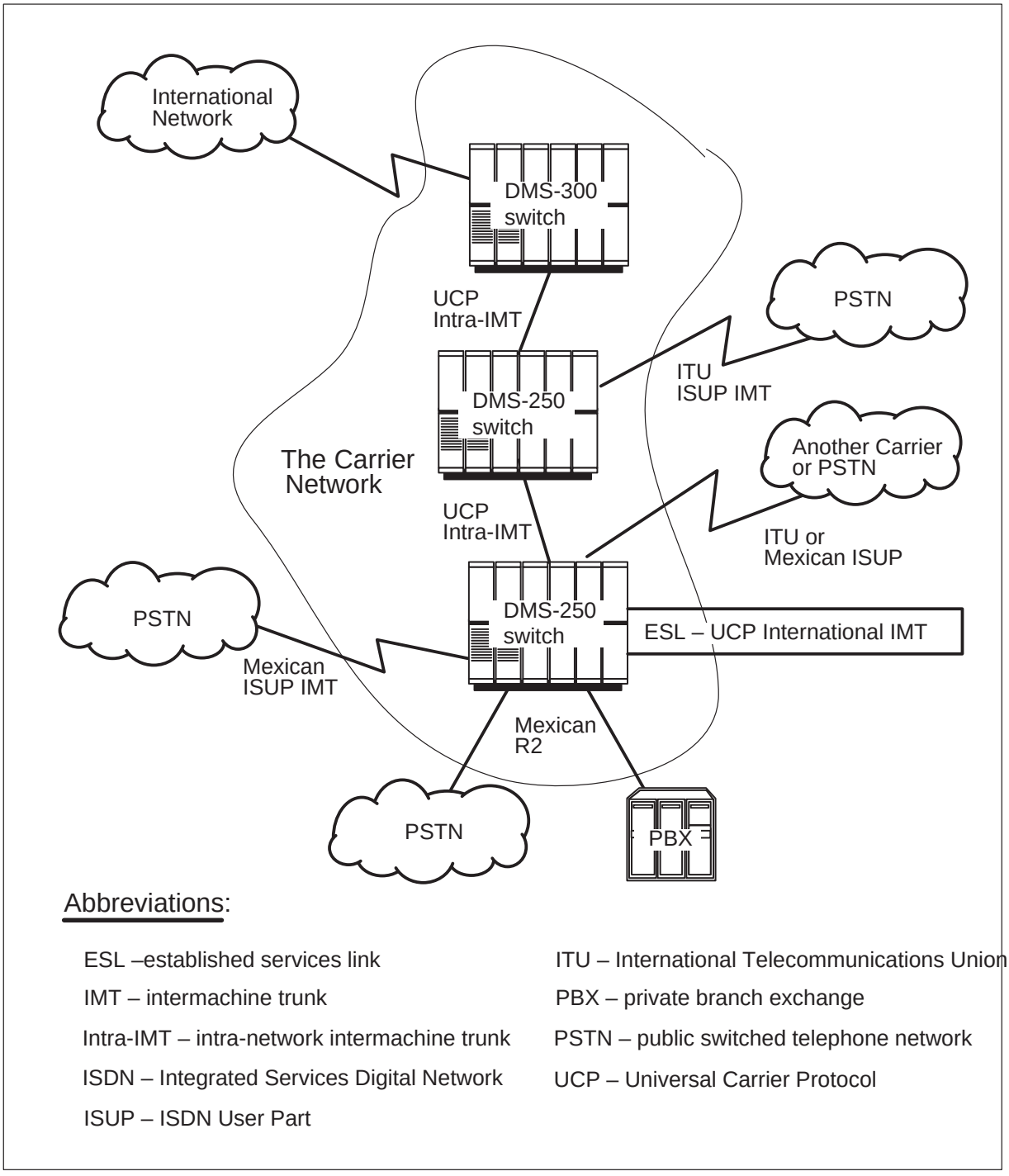
- **ITU ISUP** is a subset of the Q.764 International Telecommunications Union (ITU) Integrated Services Digital Network User Part (ISUP) protocol used by the UCS DMS-250 switch. ITU ISUP is supported over the intermachine (IMT) Global trunk agency and is used for access into the UCS International network from the public switched telephone network (PSTN) or another carrier network.
- **Mexican ISUP** is a Common Channel Signaling 7 (CCS7) signaling protocol defined by the standard NOM-112-SCTI-1995 (English translation). Mexican ISUP is a variation of the ITU-T recommendation Q.764. This variant is supported on the Global IMT. The Mexican ISUP IMT is used for access into the UCS International network from the Mexican PSTN or another carrier network.
- **Mexican R2 protocol** is a domestic per trunk signaling protocol defined by ITU standards Q.400–490. Various non-World Zone 1 countries use different versions of ITU R2 as a signaling system to connect between alternative long distance carriers and either the PSTN or a PBX. One such variant is the Mexican R2. This variant allows independent carriers in Mexico to connect to Telmex (previously the sole provider of long distance services for Mexico) and also connect to PBXs.

Two additional protocols used on the UCS DMS-250 switch for international applications are the Universal Carrier Protocol (UCP) Global ISUP IMT and the UCP intra-network ISUP IMT. The UCP protocol is independent of the the IMT type entered in the NETWKSPC field.

For information on these protocols as well as information on the features and services supported, please refer to the *UCS DMS-250 International Applications Guide.*

Figure 1-1 shows an International UCS DMS-250 switch in a carrier network in Mexico.

Figure 1-1
International UCS DMS-250 switch in a UCS International carrier network in Mexico



ITU ISUP IMT protocol

Protocol definition

International Telecommunications Union (ITU) Integrated Services Digital Network User Part (ISUP) is a protocol on the UCS DMS-250 switch that is supported over the intermachine (IMT) Global trunk agency. ITU ISUP IMTs are ISUP IMT trunks with the NETWKSPC field in table TRKGRP datafilled as GLOBAL, the PROTOCOL field in table TRKSGRP datafilled as CCITT and the VARIANT subfield datafilled as V1, V3, V4, or V5.

ITU ISUP signaling and message protocols

A subset of ITU Q.761–Q.764 (White Book) signaling is supported for the interface between the International UCS DMS-250 switch and the public switched telephone network (PSTN). En-bloc mode signaling is supported, meaning that outpulsing does not begin until all digits are received from the incoming call trunk.

Signaling types

The following are the two types of signaling:

- In en-bloc mode, when all digits must be received from the incoming trunk before outpulsing begins, all address digit information is transferred in the Initial Address Message (IAM).
- Overlap mode of signaling is defined with respect to the PSTN.
  - — Overlap sending – outpulsing the remaining Called Party Number in Subsequent Address Messages (SAM) from the PSTN network to the International UCS DMS-250 network.
  - — Overlap receiving – outpulsing the remaining Called Party Number in SAMs from the International UCS DMS-250 network to the PSTN network.

  Note: ITU ISUP IMT on the UCS DMS-250 switch supports only overlap sending. En-bloc mode signaling and overlap receiving are not supported from the PSTN.

For ITU ISUP IMT origination (with OVLAP subfield of the PROTOCOL field in table TRKSGRP set to Y), the International UCS DMS-250 switch

can collect the Called Party Number in multiple messages. Only after collecting all the digits does the UCS DMS-250 switch process the address digits and send out an IAM towards the terminating switch to initiate call setup; the International UCS DMS-250 switch sends out the Called Party Number in en-bloc mode.

When the Calling Party Number parameter is absent, empty or incomplete (as indicated by the Calling Party Number Incomplete [NI] indicator in the Calling Party Number parameter of the ITU ISUP IAM) and the CLI required (CLIREQ) field in table TRKGRP is Y, then the UCS DMS-250 switch sends an Information Request Message (INR) to the preceding switch requesting the complete calling party address.

For the ITU value of the PROTOCOL field in table TRKSGRP, there exists another subfield VARIANT. This can have values ranging from V1 to V5. If an INR is received in the forward direction (from the originating switch on a ITU ISUP IMT), the UCS DMS-250 switch decides the action to be performed depending on the value datafilled in this subfield. See Table 2-1. For ITU ISUP IMT, the VARIANT subfield is datafilled with V1, V3, V4, or V5. Therefore, an Information Message (INF) will be sent back to the preceding switch on an ITU ISUP IMT.

Table 2-1
Action taken when originator receives an INR

Datafill in subfield VARIANT	Action taken
V1, V3–V5	Send an INF in the backward direction with no information.
V2	Ignore INR.
Note: If the switch receives an INR after the call is established in the backward direction, then the INR is tandemed. If the switch receives the INR on the terminator, then the INR is tandemed.	

When an unknown message is received on the originating/terminating ITU ISUP IMT trunk, the UCS DMS-250 switch either sends a confusion message or just ignores the message depending on the value datafilled for the VARIANT subfield of the PROTOCOL field. Refer to Table 2-2. Since the VARIANT subfield for ITU ISUP IMT is datafilled with V1, V3, V4, or V5, a confusion message will be sent in the backward direction.

Table 2-2
Action taken when originator receives an unknown message

Datafill in subfield VARIANT	Action taken
V1, V3–V5	Send a confusion message in the backward direction.
V2	No confusion message.

Supported ITU ISUP messages

Table 2-3 lists the messages supported for ITU ISUP IMTs.

- Datafill in the process column indicates that the message is processed as follows:
  - — S indicates that the UCS DMS-250 switch supports sending the message.
  - — R indicates that the UCS DMS-250 switch supports reception.
  - — T indicates that the message is ignored when the UCS DMS-250 switch receives the message, but that the message is tandemed to the next exchange.
- An asterisk (*) in the Discard column indicates that the switch blocks the message and does no processing.

Table 2-3
Supported ITU ISUP messages

Messages	Process	Discard
Address Complete Message (ACM)	S/R	
Answer Message (ANM)	S/R	
Blocking Message (BLO)	S/R	
Blocking Acknowledgment (BLA)	S/R	
Note 1: This message is tandemed only if it is received in the backward direction. ***Note 2:*** Optionally sent depending on TRKSGRP datafill. ***Note 3:*** This message is tandemed only if it is received in the forward direction. ***Note 4:*** Optionally supported depending on TRKSGRP datafill. ***Note 5:*** If the Resume indicator (in the RES message) is set to network initiated and the message is received at terminator after ANM, the message is tandemed. For all other cases it is discarded. ***Note 6:*** If the Suspend indicator (in the SUS message) is set to network initiated and the message is received at terminator after ANM, the message is tandemed. For all other cases, it is discarded.		

—continued—

Table 2-3
Supported ITU ISUP messages (continued)

Messages	Process	Discard
Call Progress Message (CPG)	T (See Note 1.)	
Charge Information Message (CRG)		X
Circuit Group Blocking Message (CGB)	S/R	
Circuit Group Blocking Acknowledgment Message (CGBA)	S/R	
Circuit Group Reset Message (GRS)	S/R	
Circuit Group Reset Acknowledgment Message (GRA)	S/R	
Circuit Group Unblocking Message (CGU)	S/R	
Circuit Group Unblocking Acknowledgment Message (CGUA)	S/R	
Circuit Group Query Message (CQM)	S/R	
Circuit Group Query Response Message (CQR)	S/R	
Confusion Message (CFN)	S (See Note 2.)	
Connect Message (CON)	S/R	
Continuity Message (COT)	S/R	
Continuity Check Request Message (CCR)	S/R	
Delayed Release Message (DRS)		X
Facility Accepted Message (FAA)		X
Facility Message (FAC)		X
Facility Reject Message (FRJ)		X
Facility Request Message (FAR)		X
Forward Transfer Message (FOT)	T (See Note 3.)	
Identification Request Message (IDR)		X
Identification Response Message (IRS)		X

Note 1: This message is tandemed only if it is received in the backward direction.
Note 2: Optionally sent depending on TRKSGRP datafill.
Note 3: This message is tandemed only if it is received in the forward direction.
Note 4: Optionally supported depending on TRKSGRP datafill.
Note 5: If the Resume indicator (in the RES message) is set to network initiated and the message is received at terminator after ANM, the message is tandemed. For all other cases it is discarded.
Note 6: If the Suspend indicator (in the SUS message) is set to network initiated and the message is received at terminator after ANM, the message is tandemed. For all other cases, it is discarded.

—continued—

Table 2-3
Supported ITU ISUP messages (continued)

Messages	Process	Discard
Information Message (INF)	S/R (See Note 4.)	
Information Request Message (INR)	S/R (See Note 4.)	
Initial Address Message (IAM)	S/R	
Loop Back Acknowledgment Message (LPA)		X
Network Resource Management Message (NRM)		X
Overload Message (OLM)		X
Pass-along Message (PAM)		X
Release Message (REL)	S/R	
Release Complete Message (RLC)	S/R	
Reset Circuit Message (RSC)	S/R	
Resume Message (RES)	T (See Note 5.)	
Segmentation Message (SGM)		X
Subsequent Address Message (SAM)	R	
Suspend Message (SUS)	T (See Note 6.)	
Unblocking Message (UBL)	S/R	
Unblocking Acknowledgment Message (UBA)	S/R	
Unequipped Circuit Identification Code Message (UCIC)		X
User Part Available Message (UPA)		X
User Part Test Message (UPT)		X
User-to-User Information Message (USR)		X

Note 1: This message is tandemed only if it is received in the backward direction.
Note 2: Optionally sent depending on TRKSGRP datafill.
Note 3: This message is tandemed only if it is received in the forward direction.
Note 4: Optionally supported depending on TRKSGRP datafill.
Note 5: If the Resume indicator (in the RES message) is set to network initiated and the message is received at terminator after ANM, the message is tandemed. For all other cases it is discarded.
Note 6: If the Suspend indicator (in the SUS message) is set to network initiated and the message is received at terminator after ANM, the message is tandemed. For all other cases, it is discarded.

—end—

Supported ITU ISUP parameters

Table 2-4 shows the parameters supported by ITU ISUP IMTs. The switch discards parameters in incoming messages for which call processing is not supported (if the message is discarded) or passes them along transparently if the message is tandemed.

Table 2-4
Supported ITU ISUP parameters

Parameters	Parameter processing	Messages associated with the parameter
Access Delivery Information	Discard	ACM, ANM, CON, REL
Access Delivery Information	Tandem	CPG
Access Transport	Tandem	ACM, ANM, CPG, CON, REL
Automatic Congestion Level	Discard	REL
Backward Call Indicators	Process	ACM, ANM, CON
Backward Call Indicators	Tandem	CPG
Call Diversion Information	Discard	ACM
Call Diversion Information	Tandem	CPG
Call History Information	Discard	ACM, CPG
Call Reference	Discard	ACM, ANM, IAM, INF, INR
Call Reference	Tandem	CPG, FOT, SUS, RES
Called Party Number	Process	IAM
Calling Party Number	Process	IAM, INF
Calling Party Category	Process	IAM
Calling Party Category	Discard	INF
Circuit State Indicator	Process	CQM, CQR
Cause Indicator	Process	REL
Cause Indicator	Tandem	ACM
Cause Indicator	Discard	CFN
Circuit Group Supervision Message Type Indicator	Process	CGB, CGBA, CGU, CGUA
Closed User Group Interlock Code	Tandem	IAM
Connected Number	Tandem	ANM, CON

—continued—

Table 2-4
Supported ITU ISUP parameters (continued)

Parameters	Parameter processing	Messages associated with the parameter
Connection Request	Discard	IAM, INF
Continuity Indicators	Process	COT
Echo Control Information	Discard	ANM, ACM, CON
End of Optional Parameters	Process	ACM, ANM, CON, IAM, REL, RLC, INF, INR
End of Optional Parameters	Tandem	CPG, FOT, SUS, RES
Event Information	Tandem	CPG
Facility Indicator	Discard	FAR, FRJ, FAA
Forward Call Indicators	Process	IAM
Generic Digits	Discard	IAM
Generic Notification Indicator	Discard	ACM, ANM, CON, IAM
Generic Notification Indicator	Tandem	CPG
Generic Number	Discard	IAM, ANM, CON
Generic Reference	Discard	IAM
Information Indicators	Process	INF
Information Request Indicators	Process	INR
Location Number	Discard	IAM
MCID Request Indicator	Discard	IDR
MCID Response Indicator	Discard	IRS
Message Compatibility Information	Discard	FAC, NRM, IDR, IDS, SGM
MLPP Precedence	Discard	IAM
Nature of Connection Indicators	Process	IAM
Network-specific Facilities	Discard	ACM, ANM, REL, IAM, CON, INF, INR
Network-specific Facilities	Tandem	CPG
Optional Backward Call Indicators	Discard	ACM, ANM, CON
Optional Backward Call Indicators	Tandem	CPG
Optional Forward Call Indicators	Discard	IAM

—continued—

Table 2-4
Supported ITU ISUP parameters (continued)

Parameters	Parameter processing	Messages associated with the parameter
Original Called Number	Tandem	IAM
Origination ISC Point Code	Discard	IAM
Parameter Compatibility Information	Discard	ACM, ANM, CON, INF, INR, IAM, REL
Parameter Compatibility Information	Tandem	CPG
Propagation Delay Counter	Discard	IAM
Range and Status	Process	CGB, CGBA, CGU, CGUA, GRS, GRA
Redirecting Number	Tandem	IAM
Redirection Information	Tandem	IAM, REL
Redirection Number	Tandem	ACM, ANM, CPG, CON, REL
Redirection Number Restriction	Tandem	ACM, ANM, CPG, CON, REL
Remote Operations	Discard	ACM, ANM, CON, IAM
Remote Operations	Tandem	CPG
Service Activation	Discard	ACM, ANM, CON, IAM
Signaling Point Code	Tandem	REL
Subsequent Number	Process	SAM
Suspend/Resume Indicators	Tandem	SUS, RES
Transit Network Selection	Process	IAM
Transmission Medium Requirement	Process	IAM
Transmission Medium Requirement Prime	Discard	IAM
Transmission Medium Used	Discard	ACM, ANM, CON
Transmission Medium Used	Tandem	CPG
User Service Information	Process	IAM
User Service Information Prime	Discard	IAM

—continued—

Table 2-4
Supported ITU ISUP parameters (continued)

Parameters	Parameter processing	Messages associated with the parameter
User-to-User Indicators	Tandem	ACM, ANM, CPG, CON, IAM, REL
User-to-User Information	Tandem	ACM, ANM, CPG, CON, IAM, REL
—end—		

For interworking information between the ITU ISUP IMT protocols and other International UCS DMS-250 switch protocols, refer to Chapter 5, “Interworkings.”

Mexican ISUP IMT protocol

Protocol definition

Mexican Integrated Services Digital Network User Part (ISUP) is a protocol on the UCS DMS-250 switch that is supported over the intermachine (IMT) Global trunk agency. Mexican ISUP IMTs are ISUP IMT trunks with the NETWKSPC field in table TRKGRP datafilled as GLOBAL, the PROTOCOL field in table TRKSGRP datafilled as CCITT, and the VARIANT sub field in table TRKSGRP datafilled as V2.

Mexican ISUP signaling and message protocols

Mexican ISUP is a subset of the International Telecommunications Union (ITU) Q.764 ISUP protocol and is defined by NOM-112-SCTI-1995 (English translation). The Mexican ISUP IMT protocol on the UCS DMS-250 switch is compliant in the Mexican market. It is used to connect the UCS DMS-250 switch to the Mexican public switched telephone network (PSTN) or other carriers operating in Mexico.

Signaling types

The following are the two types of signaling modes:

- In en-bloc mode, when all digits must be received from the incoming trunk before outpulsing begins, all address digit information is transferred in the Initial Address Message (IAM).
- Overlap mode of signaling is defined with respect to the PSTN.
  - — Overlap sending – outpulsing the remaining Called Party Number in Subsequent Address Messages (SAMs) from the PSTN network to the UCS DMS-250 network.
  - — Overlap receiving – outpulsing the remaining Called Party Number in SAMs from the UCS DMS-250 network to the PSTN network. Only overlap sending (on two-way trunks) is supported by Mexican ISUP.

For Mexican ISUP (Global) IMT origination (with OVLAP sub-field of the PROTOCOL field in table TRKSGRP set to Y), the UCS DMS-250 switch can collect the Called Party Number in multiple messages.

If the IAM does not contain the complete Called Party Address digits, the switch can receive the remaining address digits in Subsequent Address Messages (SAM). An F digit in the last address digit position of the Called Party Address parameter in the IAM or in the Subsequent Address Parameter in the SAM indicates that the switch has received all the called party digits.

Only after collecting *all* the digits does the UCS DMS-250 switch process them and send out an IAM towards the terminating switch to initiate call setup. In other words, the UCS DMS-250 switch sends the Called Party Number in en-bloc mode.

The UCS DMS-250 switch sends an Information Request Message (INR) to the preceding switch requesting the complete calling party address when the following are true:

- when the Calling Party Number parameter is absent, empty, or incomplete as indicated by the NI (Calling Party Number Incomplete) indicator in the Calling Party Number parameter of the IAM
- when the Charge Number parameter is absent or empty
- when field CLIREQ in table TRKGRP for originating trunk is set to Y

If the UCS DMS-250 switch receives an INR message from the PSTN before the call is established in the backward direction, it ignores the INR message. If the UCS DMS-250 switch receives an INR message on the originator after the call is established in the backward direction, it tandems the message. It also tandems the INR, if the terminator receives it.

When an unknown message is received on the originating/ terminating ITU ISUP (Global) IMT trunk, the UCS DMS-250 switch either sends a confusion message or just ignores the message depending on the value datafilled for the VARIANT subfield of the PROTOCOL field. Refer to Table 3-1.

Table 3-1
Action taken when originator or terminator receives an unknown message

Datafill in subfield VARIANT	Action taken
V1, V3–V5	Send a confusion message in the backward direction.
V2	No confusion message.

Supported Mexican ISUP messages

Table 3-2 lists the messages supported for Mexican ISUP IMTs.

- Datafill in the process column indicates that the message is processed as follows:
  - — S indicates that the UCS DMS-250 switch supports sending the message.
  - — R indicates that the UCS DMS-250 switch supports reception.
  - — T indicates that the message is ignored when the UCS DMS-250 switch receives it, but that the message is tandemed to the next exchange.
- An asterisk (*) in the Discard column indicates that the switch blocks the message and does no processing.

Table 3-2
Supported Mexican ISUP messages

Messages	Process	Discard
Address Complete Message (ACM)	S/R	
Answer Message (ANM)	S/R	
Blocking Message (BLO)	S/R	
Blocking Acknowledgment (BLA)	S/R	
Call Modification Completed Message		X
Call Modification Reject Message		X

Note 1: This message is tandemed only if it is received in the backward direction.
Note 2: Optionally sent depending on TRKSGRP datafill.
Note 3: This message is tandemed only if it is received in the forward direction.
Note 4: INF is supported to receive calling party number from PSTN. The UCS DMS-250 switch will not generate this message. If an INF comes in after the call has been established in the backward direction it is tandemed.
Note 5: INR is supported to request calling party number from PSTN. If an INR is received from the PSTN on the originator before the call is established in the backward direction, it is ignored. In other cases it is tandemed.
Note 6: If the Resume indicator (in the RES message) is set to network initiated and the message is received on the terminator after the ANM, the message is tandemed. For all other cases, it is discarded.
Note 7: If the Suspend indicator (in the SUS message) is set to network initiated and the message is received on the terminator after the ANM, the message is tandemed. For all other cases, it is discarded.

—continued—

Table 3-2
Supported Mexican ISUP messages (continued)

Messages	Process	Discard
Call Modification Request Message		X
Call Progress Message (CPG)	T (See Note 1)	
Charge Information Message (CRG)		X
Circuit Group Blocking Message (CGB)	S/R	
Circuit Group Blocking Acknowledgment Message (CGBA)	S/R	
Circuit Group Reset Message (GRS)	S/R	
Circuit Group Reset Acknowledgment Message (GRA)	S/R	
Circuit Group Unblocking Message (CGU)	S/R	
Circuit Group Unblocking Acknowledgment Message (CGUA)	S/R	
Circuit Group Query Message (CQM)	S/R	
Circuit Group Query Response Message (CQR)	S/R	
Confusion Message (CFN)	S	X (See Note 2)
Connect Message (CON)	S/R	
Continuity Message (COT)	S/R	
Continuity Check Request Message (CCR)	S/R	
Delayed Release Message (DRS)		X
Facility Accepted Message (FAA)		X

Note 1: This message is tandemed only if it is received in the backward direction.
Note 2: Optionally sent depending on TRKSGRP datafill.
Note 3: This message is tandemed only if it is received in the forward direction.
Note 4: INF is supported to receive calling party number from PSTN. The UCS DMS-250 switch will not generate this message. If an INF comes in after the call has been established in the backward direction it is tandemed.
Note 5: INR is supported to request calling party number from PSTN. If an INR is received from the PSTN on the originator before the call is established in the backward direction, it is ignored. In other cases it is tandemed.
Note 6: If the Resume indicator (in the RES message) is set to network initiated and the message is received on the terminator after the ANM, the message is tandemed. For all other cases, it is discarded.
Note 7: If the Suspend indicator (in the SUS message) is set to network initiated and the message is received on the terminator after the ANM, the message is tandemed. For all other cases, it is discarded.

—continued—

Table 3-2
Supported Mexican ISUP messages (continued)

Messages	Process	Discard
Facility Reject Message (FRJ)		X
Facility Request Message (FAR)		X
Forward Transfer Message (FOT)	T (See Note 3)	
Information Message (INF)	R (See Note 4)	
Information Request Message (INR)	S (See Note 5)	
Initial Address Message (IAM)	S/R	
Loop Back Acknowledgment Message (LPA)		X
Overload Message (OLM)		X
Pass-along Message (PAM)		X
Release Message (REL)	S/R	
Release Complete Message (RLC)	S/R	
Reset Circuit Message (RSC)	S/R	
Resume Message (RES)	T (See Note 6)	
Subsequent Address Message (SAM)	R	
Suspend Message (SUS)	T (See Note 7)	
Unblocking Message (UBL)	S/R	
Unblocking Acknowledgment Message (UBA)	S/R	

Note 1: This message is tandemed only if it is received in the backward direction.
Note 2: Optionally sent depending on TRKSGRP datafill.
Note 3: This message is tandemed only if it is received in the forward direction.
Note 4: INF is supported to receive calling party number from PSTN. The UCS DMS-250 switch will not generate this message. If an INF comes in after the call has been established in the backward direction it is tandemed.
Note 5: INR is supported to request calling party number from PSTN. If an INR is received from the PSTN on the originator before the call is established in the backward direction, it is ignored. In other cases it is tandemed.
Note 6: If the Resume indicator (in the RES message) is set to network initiated and the message is received on the terminator after the ANM, the message is tandemed. For all other cases, it is discarded.
Note 7: If the Suspend indicator (in the SUS message) is set to network initiated and the message is received on the terminator after the ANM, the message is tandemed. For all other cases, it is discarded.

—continued—

Table 3-2
Supported Mexican ISUP messages

Messages	Process	Discard
Unequipped Circuit Identification Code Message (UCIC)		X
User-to-user Information Message (USR)		X

Note 1: This message is tandemed only if it is received in the backward direction.
Note 2: Optionally sent depending on TRKSGRP datafill.
Note 3: This message is tandemed only if it is received in the forward direction.
Note 4: INF is supported to receive calling party number from PSTN. The UCS DMS-250 switch will not generate this message. If an INF comes in after the call has been established in the backward direction it is tandemed.
Note 5: INR is supported to request calling party number from PSTN. If an INR is received from the PSTN on the originator before the call is established in the backward direction, it is ignored. In other cases it is tandemed.
Note 6: If the Resume indicator (in the RES message) is set to network initiated and the message is received on the terminator after the ANM, the message is tandemed. For all other cases, it is discarded.
Note 7: If the Suspend indicator (in the SUS message) is set to network initiated and the message is received on the terminator after the ANM, the message is tandemed. For all other cases, it is discarded.

—end—

Supported Mexican ISUP parameters

Table 3-3 shows the parameters supported by Mexican ISUP IMTs. The switch discards parameters in incoming messages for which call processing is not supported (if the message is discarded) or passes them along transparently (if the message is tandemed).

Table 3-3
Supported Mexican ISUP parameters

Parameters	Parameter processing	Messages associated with the parameter
Access Delivery Information	Discard	ACM, ANM, CON, REL
Access Delivery Information	Tandem	CPG
Access Transport	Tandem	ACM, ANM, CPG, IAM, CON
Access Transport	Discard	REL

—continued—

Table 3-3
Supported Mexican ISUP parameters (continued)

Parameters	Parameter processing	Messages associated with the parameter
Automatic Congestion Level	Tandem	REL
Backward Call Indicators	Process	ACM, ANM, CON
Backward Call Indicators	Tandem	CPG
Call Diversion Information	Discard	ACM
Call Diversion Information	Tandem	CPG
Call Redirection Information	Tandem	IAM
Call Reference	Discard	ACM, ANM, IAM, INF, INR
Call Reference	Tandem	CPG, FOT, SUS, RES
Called Party Number	Process	IAM
Calling Party Number	Process	IAM, INF
Calling Party Category	Process	IAM
Cause Indicator	Process	REL
Cause Indicator	Tandem	ACM, CPG
Cause Indicator	Discard	CFN
Charge Number	Process	IAM
Circuit Group Supervision Message Type Indicator	Process	CGB, CGBA, CGU, CGUA
Circuit State Indicator	Process	CQM, CQR
Closed User Group Interlock Code	Tandem	IAM
Connected Number	Tandem	ANM, CON
Continuity Indicators	Process	COT
End of Optional Parameters	Process	ACM, ANM, IAM, INF, INR, REL, RLC, SAM
End of Optional Parameters	Tandem	CPG, FOT, SUS, RES
Event Information	Tandem	CPG
Facility Indicator	Discard	FAA, FAR, FRJ
Forward Call Indicators	Process	IAM
Generic Digits	Discard	IAM

—continued—

Table 3-3
Supported Mexican ISUP parameters (continued)

Parameters	Parameter processing	Messages associated with the parameter
Generic Notification	Discard	ACM, ANM, CON, IAM
Generic Notification	Tandem	CPG
Information Indicators	Process	INF
Information Request Indicators	Process	INR
Nature of Connection Indicators	Process	IAM
Operator Selection Information	Tandem	IAM
Optional Backward Call Indicators	Discard	ACM, ANM, CON
Optional Backward Call Indicators	Tandem	CPG
Optional Forward Call Indicators	Discard	IAM
Original Called Number	Tandem	IAM
Range and Status	Process	CGB, CGBA, CGU, CGUA, GRA, GRS
Redirecting Number	Tandem	CPG, IAM
Redirection Information	Tandem	ACM, IAM, REL, CON
Redirection Number	Tandem	ANM, CPG, REL
Signaling Point Code	Discard	REL
Subsequent Number	Process	SAM
Suspend/Resume Indicators	Tandem	SUS, RES
Transit Network Selection	Process	IAM
Transmission Medium Requirement	Process	IAM
User Service Information	Process	IAM
User-to-User Indicators	Tandem	ACM, ANM, CPG, CON, IAM
User-to-User Indicators	Discard	REL
User-to-User Information	Tandem	ACM, ANM, CPG, CON, IAM, REL

—end—

Mexican R2 protocol

Protocol definition

Regional number 2 (R2) is a domestic per trunk signaling protocol defined by International Telecommunication Union (ITU) standards Q.400-490. Various non-World Zone 1 countries use different versions of ITU R2 as a signaling system to connect between alternative long distance carriers and either the public switching telephone network (PSTN) or a private branch exchange (PBX). One such variant is the Mexican R2. This variant allows independent carriers in Mexico to connect to Telmex, previously the sole provider of long distance services in Mexico, as well as to and from PBXs.

R2 signaling systems are Multiple Frequency Compelled (MFC) systems where tones are sent in one direction and acknowledgment tones are returned. The information sent is described within a protocol specification that is usually country dependent.

This implementation of R2 is based on a variation of ITU Q.400-490. This feature supports R2 signaling in the link-by-link mode. Up to 24 called party digits and 11 calling part digits are supported.

Message protocols

R2 signaling systems use a combination of line and register signaling to control trunk usage and to transfer information over the trunk between exchanges.

Line signaling

Line signals use two signaling bits in each direction. The signaling bits are referred to as Af and Bf in the forward direction, and as Ab and Bb in the backward direction. Line signaling for R2 protocol is shown in Table 4-1.

Table 4-1
Line signaling for R2 protocol

Line signal	Code	Function	Af	Af	Ba	Bb
Idle	IDL	circuit available for use	1	0	1	0
Seize signal	SZG	transition from idle to seize state	0	0	1	0
Seizing acknowledge	SZA	sent in response to the seizing signal	0	0	1	1
Answer	ANS	sent when terminating switch answers	0	0	0	1
Clear forward signal	CLF	originator goes on-hook	1	0	0/1	1
Clear back signal	CLB	terminator goes on-hook	0	0	1	1
Blocking signal	BLO	block incoming calls	1	0	1	1
Unblock Return to idle Release guard	UBL	unblocks incoming calls circuit again available for use	1	0	1	0

This implementation of R2 does not support pulsed backward metering or other such line signals from the PSTN. The ‘C’ and ‘D’ forward and backward line signaling bits must take on default values, C=0, D=1.

Register signaling

During register signaling, the outgoing trunk applies a forward signal. The incoming trunk applies an acknowledgment signal (a backward signal). The outgoing trunk holds its signal until it “hears” the incoming trunk’s backward signal. When the outgoing trunk stops applying its forward signal, the incoming trunk ‘hears’ this and stops applying its backward signal. In this way, the incoming trunk compels the outgoing trunk through a sequence of signals during call establishment.

For a certain register signal to be supported as a valid activity, the tables R2PROT, CATCLASS, ACTSIG, SIGACT and ACTCTL must be appropriately datafilled. Refer to the *UCS DMS-250 International Application Guide.*

Table 4-2 shows the forward register signals that are supported.

Table 4-2
Forward register signals

Signal code	Group I	Group II	Group III
1	DIGIT_1	OPER	DIGIT_1
2	DIGIT_2	REGULAR (Note 4)	DIGIT_2
3	DIGIT_3	COIN	DIGIT_3
4	DIGIT_4	TIME_AND_CHG	DIGIT_4
5	DIGIT_5	RESERVED (Note 2)	DIGIT_5
6	DIGIT_6	MAINTENANCE_EQ	DIGIT_6
7	DIGIT_7	SHARED_1 (Note 3)	DIGIT_7
8	DIGIT_8	SPARE (See Note 2)	DIGIT_8
9	DIGIT_9	SHARED_1 (Note 3)	DIGIT_9
10	DIGIT_0	SPARE (See Note 2)	DIGIT_0
11	SPARE (Note 1)	SPARE (See Note 2)	SPARE (Note 1)
12	DIGIT_C (Note 1)	SPARE (See Note 2)	SPARE (Note 1)
13	SPARE (Note 1)	SPARE (See Note 2)	SPARE (Note 1)
14	SPARE (Note 1)	SPARE (See Note 2)	SPARE (Note 1)
15	END_OF_DIGITS	SPARE (See Note 2)	END_OF_DIGITS

Note 1: Not supported for this implementation of R2.

Note 2: If these categories are not datafilled in table CATCLASS as valid calling or billing categories, then a default category of REGULAR is sent on the outgoing trunk. The same applies to all other categories in Group II.

Note 3: SHARED_1 indicates LADATEL and SHARED_2 indicates PRIVATE_SUBSCRIBER for this implementation of R2.

Note 4: REGULAR must be datafilled in table CATCLASS as a valid calling and billing category.

Forward Group I signals

Forward Group I signals are used to send the called party address.

DIGIT_0, DIGIT_1, DIGIT_2, DIGIT_3, DIGIT_4, DIGIT_5, DIGIT_6, DIGIT_7, DIGIT_8, DIGIT_9

These activities correspond to called party digit 0 to digit 9.

END_OF_DIGITS (1-15)

This activity indicates the end of called party number. It is not a mandatory activity. As an originating exchange, the UCS DMS-250 sends this activity in response to the NEXT_DIGIT where no digits remains to be sent. As a terminating exchange, the UCS DMS-250 switch accepts this signal to indicate the end of called number.

Forward Group II signals

Forward group II signals are used to indicate the calling category and the billing category of the ‘A’ party. When a particular activity is received on the originating trunk, prior to outpulsing it onto the terminating trunk, it is validated in table CATCLASS. This table indicates if an activity is a calling category or billing category or both. A default (billing or calling) category of REGULAR is outpulsed in the following cases:

- If the billing category or calling category received is not datafilled in table CATCLASS.
- If calling category is received, but the category is not a valid calling category (but is a valid billing category) in the table.
- If billing category is received, but the category is not a valid billing category (but is a valid calling category) in the table.

OPER (II-2)

This activity indicates that an operator has established the call, in other words, the call has originated from an operator platform.

REGULAR (II-2)

This activity indicates that the originator is a regular subscriber without priority.

COIN (II-3)

This activity indicates that the call was initiated by a coin box.

TIME_AND_CHG (II-4)

This signal is always associated with calls requiring operator assistance or supervision. This signal indicates that the subscriber wants the operator to provide time and charge information once the call is completed.

MTC_EQ (II-6)

This activity describes the calling party's category and indicates the call is initiated by maintenance equipment and it is a test call. The processing of this category is handled by a different feature.

SHARED_1 (II-7)

SHARED_1 is used to indicate the category LADATEL in this implementation of R2. LADATEL indicates that the call has originated from a special type of phone that is supported by Telmex. This call is treated as a COIN call.

SHARED_2 (II-9)

SHARED_2 is used to indicate the category PRIVATE SUBSCRIBER in this implementation of R2. PRIVATE SUBSCRIBER indicates that the originator is a special subscriber that the Telmex supports. This subscriber is treated as REGULAR.

Forward Group III signals

Forward Group III signals are used to send calling party digits.

DIGIT_0, DIGIT_1, DIGIT_2, DIGIT_3, DIGIT_4, DIGIT_5, DIGIT_6, DIGIT_7, DIGIT_8, DIGIT_9

These activities correspond to calling party digit 0 to digit 9.

END_OF_DIGITS (III-15)

This activity indicates the end of calling party number. As an originating exchange, the UCS DMS-250 switch sends this activity in response to the NEXT_ANI_DIGIT where no digits remains to be sent. As a terminating exchange, the UCS DMS-250 switch accepts this signal to indicate the end of calling number.

Note: As a terminating exchange, the UCS DMS-250 switch continues to send the NEXT_ANI_DIGIT activity until it receives the END_OF_DIGITS or until it receives 11 calling party digits, whichever occurs first. If no calling party digit or END_OF_DIGITS is received in response to NEXT_ANI_DIGIT the call is taken down.

Table 4-3 shows the backward register signals that are supported.

Table 4-3
Backward register signals

Signal code	Group A	Group B	Group C
1	NEXT_DIGIT	CONNECT_CALL_CHG	NEXT_ANI_DIGIT
2	FIRST_DIGIT	SUB_BUSY	FIRST_DIGIT (Note 1)
3	REQ_CAT (Note 2)	Spare	FEQ_CAT (Note 2)
4	CONGESTION	CONGESTION	CONGESTION
5	Spare	CONNECT_CALL_NOCHG	NEXT_DIGIT (Note 1)
6	REQ_DN_CAT (Note 3)	Spare	LAST_DIGIT (Note 1)
7	Spare	Spare	Spare
8	Spare	Spare	Spare
9	Spare	Spare	Spare
10	Spare	Spare	Spare
11	Spare	Spare	Spare
12	Spare	Spare	Spare
13	Spare	Spare	Spare
14	Spare	Spare	Spare
15	Spare	Spare	Spare

Note 1: Change to receive Group A digits.

Note 2: Change to receive Group B digits.

Note 3: Change to receive Group C digits.

Backward Group A signals

NEXT_DIGIT (A-1)

This activity indicates to the preceding exchange to send the next digit (n + 1), in other words, send the digit which follows the last digit (n) received.

As an originating exchange, the UCS DMS-250 switch responds to NEXT_DIGIT by sending the next digit of the called number. If there are no more digits in the called number to send, the originating exchange either does not send an activity or sends the signal END_OF_DIGITS. If no signal is sent, the terminating exchange uses time-out to determine that no more digits are to be sent.

As a terminating exchange, the UCS DMS-250 switch sends NEXT_DIGIT after a digit is received (until a time-out occurs or until an end_of_digits is received.)

FIRST_DIGIT (A-2)

As a terminating exchange, the UCS DMS-250 switch sends NEXT_DIGIT after a digit is received (until a time-out occurs or until an end_of_digits is received.)

As an originating exchange, the UCS DMS-250 switch re-sends the first digit of the called number when it receives this activity.

As a terminating exchange, the UCS DMS-250 switch never sends this activity.

REQ_CAT (A-3)

This activity indicates that the succeeding exchange requires the calling subscriber’s category.

As an originating exchange the UCS DMS-250 switch sends the calling subscriber’s category when it receives this activity.

As a terminating exchange the UCS DMS-250 switch sends this activity when it has received the called number if no calling party number digits are required (option CLIREQ in Table TRKGRP is not set). If calling party digits are required (CLIREQ is chosen in TRKGRP) and the UCS DMS-250 switch enters the B-A-B mode of signaling, the switch sends this activity after receiving the calling number and billing category and the remaining ‘B’ party digits.

CONGESTION (A-4)

This activity indicates congestion of outgoing links (no route available) or a time-out or abnormal release of the R2 register.

As an originating exchange, if the UCS DMS-250 switch receives this activity, it accesses table ACTTRTMT to determine the treatment to apply to the originating trunk.

As a terminating exchange, the UCS DMS-250 switch sends CONGESTION as the called subscriber status if a signaling error or abnormal release of the R2 register occurs. If a treatment is set for a call, and the treatment applied maps to CONGESTION in table TRTMTACT, then this activity is sent in the backward direction.

REQ_DN_CAT (A-6)

This activity indicates that the succeeding exchange requires the calling number and billing category.

As an originating exchange the UCS DMS-250 switch sends the billing category in response to receiving this activity.

As a terminating exchange the UCS DMS-250 switch sends this activity to request for billing category and calling party digits, when the CLIREQ option in table TRKGRP is set for the originating trunk.

Backward Group B signals

CONNECT_CALL_CHG (B-1)

This signal is sent when the called party is available. This signal may also be sent if local treatment in the form of tones/announcements is to be applied, in which case, the UCS DMS-250 switch sends a CONNECT_CALL_CHG and then applies the tone or announcement.

SUB_BUSY (B-2)

This activity indicates that the called party's line is busy. As an originating exchange, the UCS DMS-250 switch accesses table ACTTRTMT when it receives SUB_BUSY to determine the treatment to apply or activity to send to the originator.

As a terminating exchange, if the UCS DMS-250 switch receives information that the called party is busy, it sets a treatment. If the treatment maps to this activity in table TRTMTACT, sub_busy signal is sent in the backward direction.

CONGESTION (B-4)

This activity indicates congestion of outgoing links (no route available) or a time-out or abnormal release of the R2 register.

As an originating exchange, if the UCS DMS-250 switch receives this activity, it accesses table ACTTRTMT to determine the treatment to apply to the originating trunk.

As a terminating exchange, the UCS DMS-250 switch sends CONGESTION as the called subscriber status if a signaling error or abnormal release of the R2 register occurs. If a treatment is set for a call, and the treatment applied maps to CONGESTION in table TRTMTACT, then this activity is sent in the backward direction.

CONNECT_CALL_NOCHG (B-5)

As an originating exchange, if this signal received, the UCS DMS-250 switch propagates this signal back to the originating R2 trunk. The processing of this signal is no different from the processing of the activity ‘Connect _call_chg’. This signal is never generated by the UCS DMS-250 switch, and is only propagated when received from the terminating trunk.

Backward Group C signals

NEXT_ANI_DIGIT (C-1)

This activity is sent to the preceding exchange to request for the next calling party digit.

As a terminating exchange, the UCS DMS-250 switch sends the NEXT_ANI_DIGIT to request for the next digit of the calling party number.

As an originating exchange, the UCS DMS-250 switch sends the next digit of the calling number in response to this signal. If all the calling number digits have previously been sent or if there are no calling digits to send, the UCS DMS-250 switch sends an END_OF_DIGITS.

FIRST_DIGIT (C-2)

This activity indicates that the originating exchange should re-send the first digit of the called party number. As an originating exchange, the UCS DMS-250 switch re-sends the first digit of the called number when it receives this activity. As a terminating exchange, the UCS DMS-250 switch never sends this activity.

REQ_CAT (C-3)

This activity indicates that the succeeding exchange requires the calling subscriber’s category.

As an originating exchange, the UCS DMS-250 switch sends the calling subscriber's category when it receives this activity.

As a terminating exchange, the UCS DMS-250 switch sends this activity when it has received all the called party digits, calling number and billing category.

CONGESTION (C-4)

This activity indicates congestion of outgoing links (no route available) or a time-out or abnormal release of the R2 register.

As an originating exchange, if the UCS DMS-250 switch receives this activity, it accesses table ACTTRTMT to determine the treatment to apply to the

As a terminating exchange, the UCS DMS-250 switch sends CONGESTION as the called subscriber status if a signaling error or abnormal release of the R2 register occurs. If a treatment is set for a call, and the treatment applied maps to CONGESTION in table TRTMTACT, then this activity is sent in the backward direction.

NEXT_DIGIT (C-5)

This activity indicates to the preceding exchange to send the next digit (n + 1), in other words, send the digit which follows the last digit (n) received.

As an originating exchange, the UCS DMS-250 switch responds to NEXT_DIGIT by sending the next digit of the called number. If there are no more digits in the called number to send, the originating exchange either does not send an activity or sends the signal END_OF_DIGITS. If no signal is sent, the terminating exchange uses inter-digit time-out to determine that no more digits are to be sent.

As a terminating exchange, the UCS DMS-250 switch sends NEXT_DIGIT after a digit is received (until a time-out occurs or until an end_of_digits is received.)

LAST_DIGIT (C-6)

This activity indicates that the originating exchange should re-send the last sent digit of the called party number. As an originating exchange, the UCS DMS-250 switch re-sends the last sent digit of the called party number when it receives this signal. The UCS DMS-250 switch, as a terminating exchange never generates this signal.

Signaling modes

Link-by-link mode

An R2 to R2 call operating in link-by-link mode implies that the incoming trunk collects all the called party address digits from the preceding office prior to selecting an outgoing route. The calling party category and called party status are propagated between the originating R2 office and the terminating R2 office after all called party digits have been collected.

End-to-end mode

An R2 to R2 call operating in end-to-end mode implies that the incoming trunk collects just sufficient called party address digits from the preceding office to determine the outgoing route. For an R2 tandem call to be in the end-to-end mode, sufficient number of digits must be received to establish the route. It is NOT necessary to collect the remaining digits of the called number.

If the rest of the called party digits are necessary, the office requests the preceding exchange to send the remaining digits in the called number stream. This is done by sending a specific signal to the preceding exchange. This signal serves as an acknowledgment to the last digit received. The signal can be one of the following:

- next_digit
- last_digit
- first_digit

Once the activity is sent and the outgoing trunk is seized, a voice connection is established with the succeeding exchange so that the preceding office can communicate directly with it. The remaining digits are then transmitted through the speech path to the succeeding exchange. The trunks at the tandem office only have to monitor the line signals. The register signals are ignored.

This implementation of R2 supports only link-by-link signaling.

Calling party address collection

After receiving called party address digits (either partial or all), table TRKGRP is accessed.

If the option CLIREQ is set, REQ_DN_CAT is sent to the originator. If an END_OF_DIGITS is received in response to NEXT_ANI_DIGIT , and no calling party address digits are received, the call is routed to ADBF (Ani Data Base Failure) treatment.

If the option CLIREQ is not set, no REQ_DN_CAT is sent to the originator.

Calling party address collection methods

The different Calling Party Address collection methods simply deal with the placement of the Calling Party Address digits within the digit stream. The two methods are known as:

- B-A signaling
- B-A-B signaling

Note: 'B' represents the Called Party Address and 'A' represents the Calling Party Address.

B-A signaling

The B-A signaling method is straightforward. It involves the collection of all the called digits ('B' party number) before collecting the billing category and the calling party digits ('A' party number).

The following table illustrates B-A signaling. The called party number is 5021181234, and the calling party number is 2144241212. On a UCS DMS-250 switch, the B-A signaling sequence is as illustrated in Table 4-4.

Table 4-4
B-A signaling for a tandem call

B-A Signaling	Called party "B"			Calling party "A"		
Forward signals	5021181234	F	II-2	2144241212	III-F	II-2
Backward signals	1111111111	A-6	A-6	1111111111	C-3	B-1
Time ––––––––>	**Outpulse B digits**	**ANI phase begins, Group III and C signals used**				

B-A-B signaling

B-A-B signaling refers to the method of collecting partial called party digits (party B), then proceeding to collect the calling party digits (party A) and finally, collecting the remaining called party digits (party B).

The actual mechanics of the digit collection is performed using the digit analysis tables DGHEAD and DGCODE.

The following table illustrates B-A-B signaling. The calling party number is 2144241212, and the called party number is 21181234. On a UCS DMS-250 switch, the B-A-B signaling sequence is as illustrated in Table 4-5.

Table 4-5
B-A-B signaling for a tandem call

B-A-B Signaling	Called "B"		Calling "A"		Called "B"	
Forward signals	21	II-2	2144241212	III-F	181234	II-2
Backward signals	16	A-6	1111111111	C-3	111113	B-1
Time ––––––––>	**"B" routing digits**		**ANI phase**	**End ANI**	**Rest of "B"**	

When the tables DGHEAD and DGCODE are datafilled as shown in Tables 4-6 and 4-7, the option CLIREQ in table TRKGRP is set, B-A-B signaling is enabled. If the DIGCOL option is datafilled in table TRKSGRP and the DGNAME is R2CONT, the table DGCODE is indexed into. After the called party digits 21 or 22 are obtained, a REQ_DN_CAT is sent to collect billing category and calling digits. After all the 'A' party digits have been obtained, digit analysis is resumed with the DGNAME 'R2CONT2'. In this example, a minimum of 1 digit and a maximum of 15 called party digits are collected.

Table 4-6
Table DGHEAD for B-A-B signaling for a tandem call

DBNAME	INIT TMO	IDGT TMO	NUM DGTS	STOP DGT	D TONE	DGTYPE
R2CONT	20	10	20	0	NONE	BOTH
R2CONT2	20	0	20	0	NONE	TRK

Table 4-7
Table DGCODE for B-A-B signaling for a tandem call

DBNAME	FROM DGS	TO DGS	DGCLSEL	REFINEMENTS			
R2CONT	21	22	CONT	R2CONT	Y	NONE	
R2CONT2	0	9	RAN	1	14	5	N

Message flow diagrams

Figures 4-1 through 4-6 illustrate the flow of messages for R2-R2 calls for both register and line signaling. Register signaling is shown with solid lines (_____) while line signaling is shown using dashed lines (— — —).

The following notes apply to Figures 4-1 through 4-6:

Note 1: The inter-digit time-out value is specified in Table RGSIGSYS.

Note 2: Whenever a treatment is set in a call, an attempt is made to map the treatment to a valid R2 activity if register signaling is on. If a mapping is found, in Table TRTMTACT, that backward activity is sent to the originator of the call, failing which local treatment is applied. If a backward activity is received from the terminator to indicate unsuccessful call setup, the activity is mapped to a treatment according to the datafill in Table ACTTRTMT. If a corresponding activity is found in Table TRTMTACT, that activity is sent to the originator; else, local treatment is applied. Local treatment is applied if the voice path has been established and register signaling is completed.

Note 3: CLIREQ is an option in Table TRKGRP. When it is set, REQ_DN_CAT is sent to the originator, to collect billing category and calling party digits. If CLIREQ is not specified, REQ_DN_CAT is not sent. CLIDELV is the terminology used in this document to indicate the delivery of calling party number to the terminator based on the calling party address delivery logic. CLIDELV is not a valid field or option in any table.

Note 4: Call take-down is point-to-point; the originating release sequence is not based on the terminating release sequence and vice versa.

Note 5: As an originating exchange, if the Connect_call_nochg signal is received, the UCS DMS-250 switch propagates this signal back to the originating R2 trunk. The processing of this signal is no different from the processing of the activity ‘Connect _call_chg’. This signal is never generated by the UCS DMS-250 switch, and is only propagated when received from the terminating trunk.

Figure 4-1
Basic R2 to R2 call, clear forward (See Note 3)

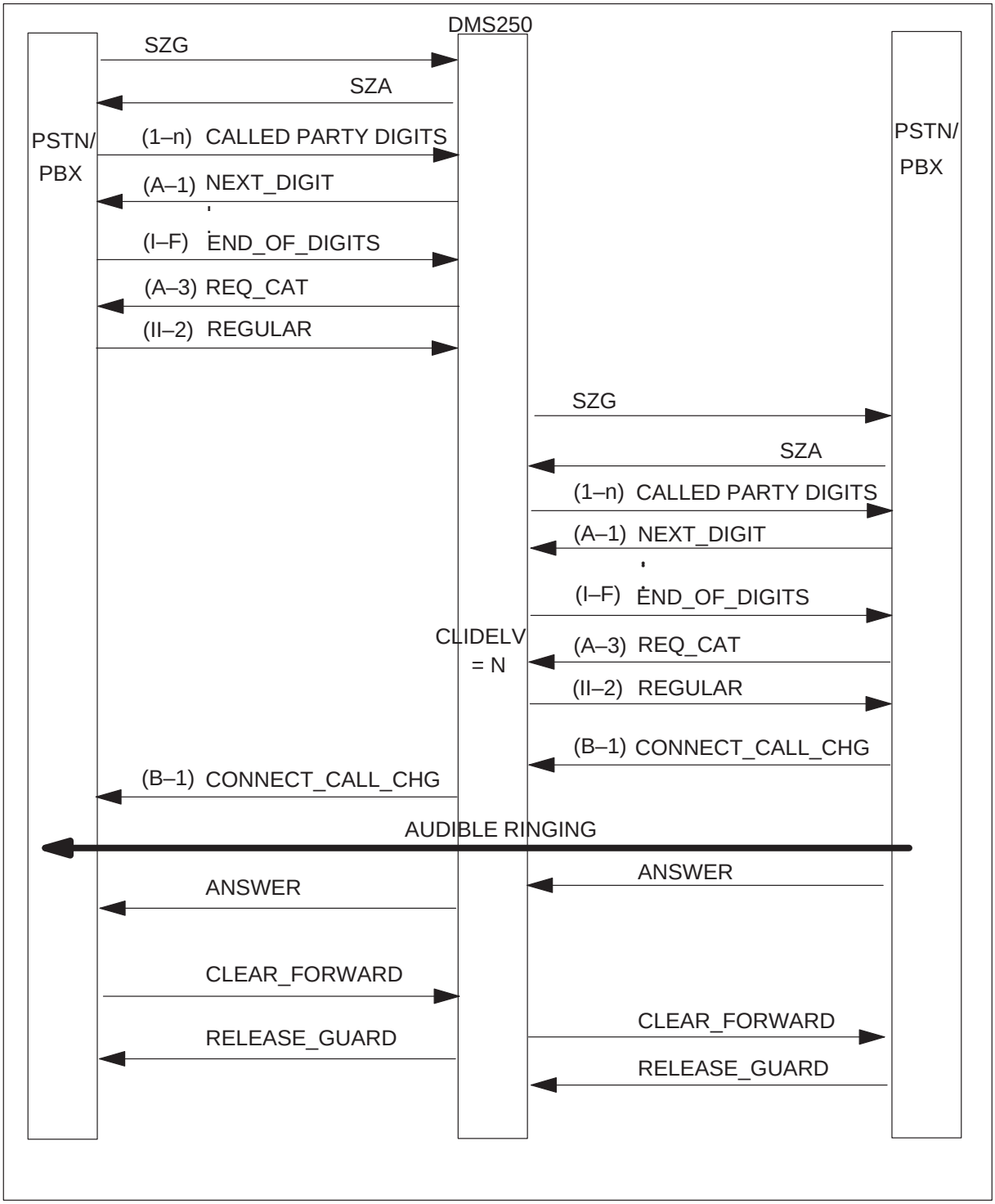


Figure 4-2
Basic R2 to R2 call, inter-digit time-out occurs for called party digits from originator, with CLI digits, clear forward (See Note 1)

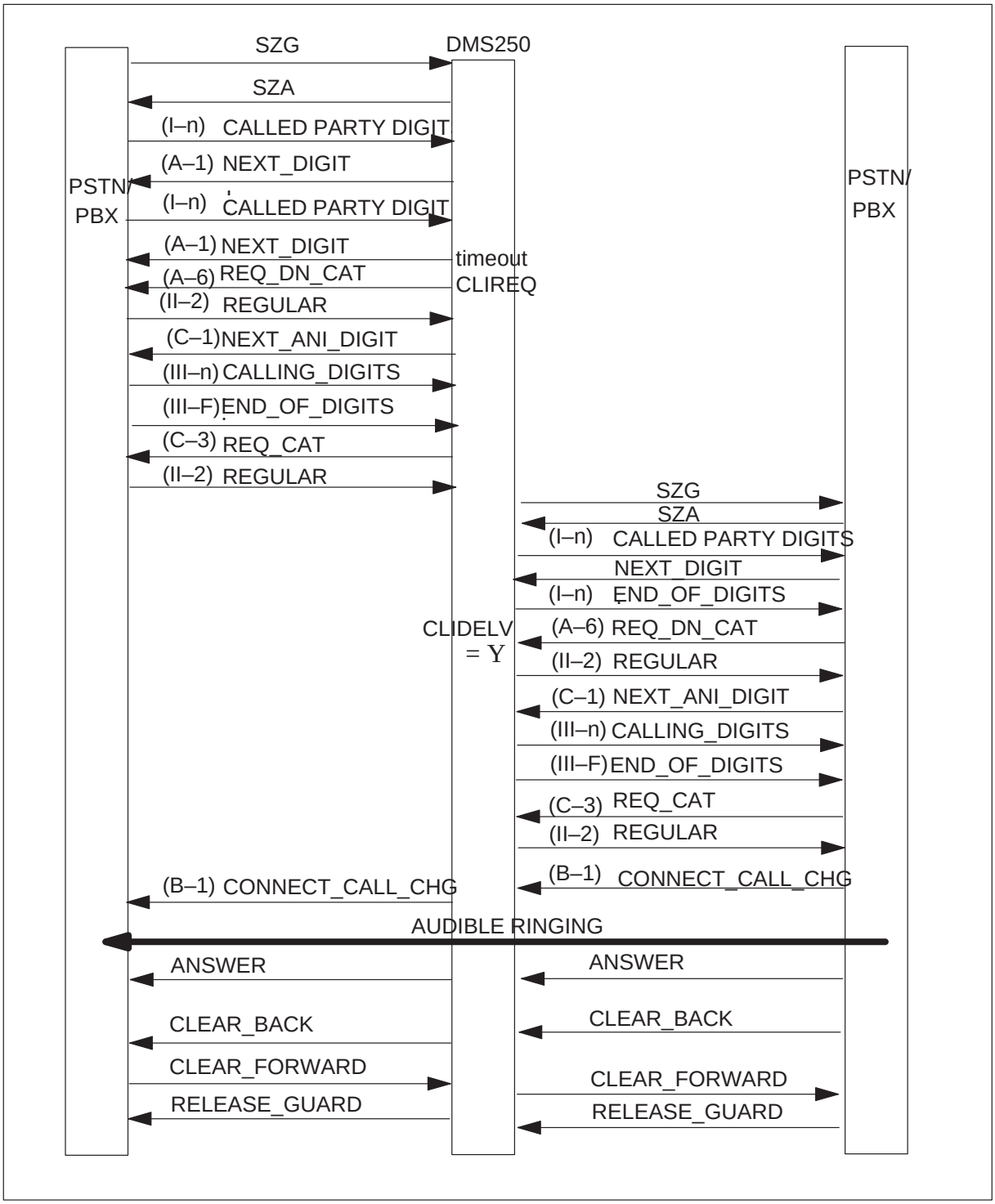


Figure 4-3
R2 to R2 call, connect_call_nochg received from terminator (See Note 5)

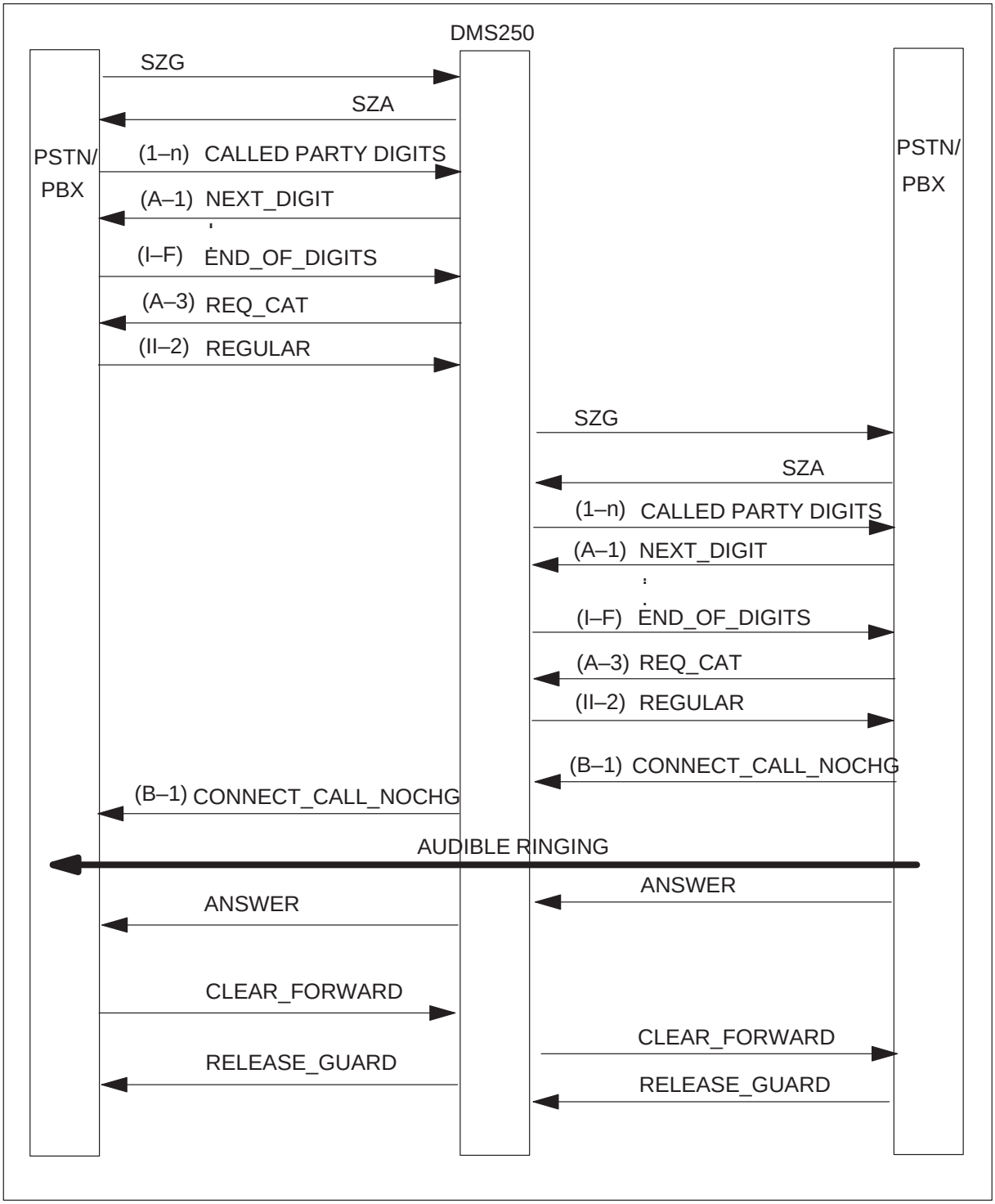


Figure 4-4
R2 to R2 call, B-A-B signaling at the originator

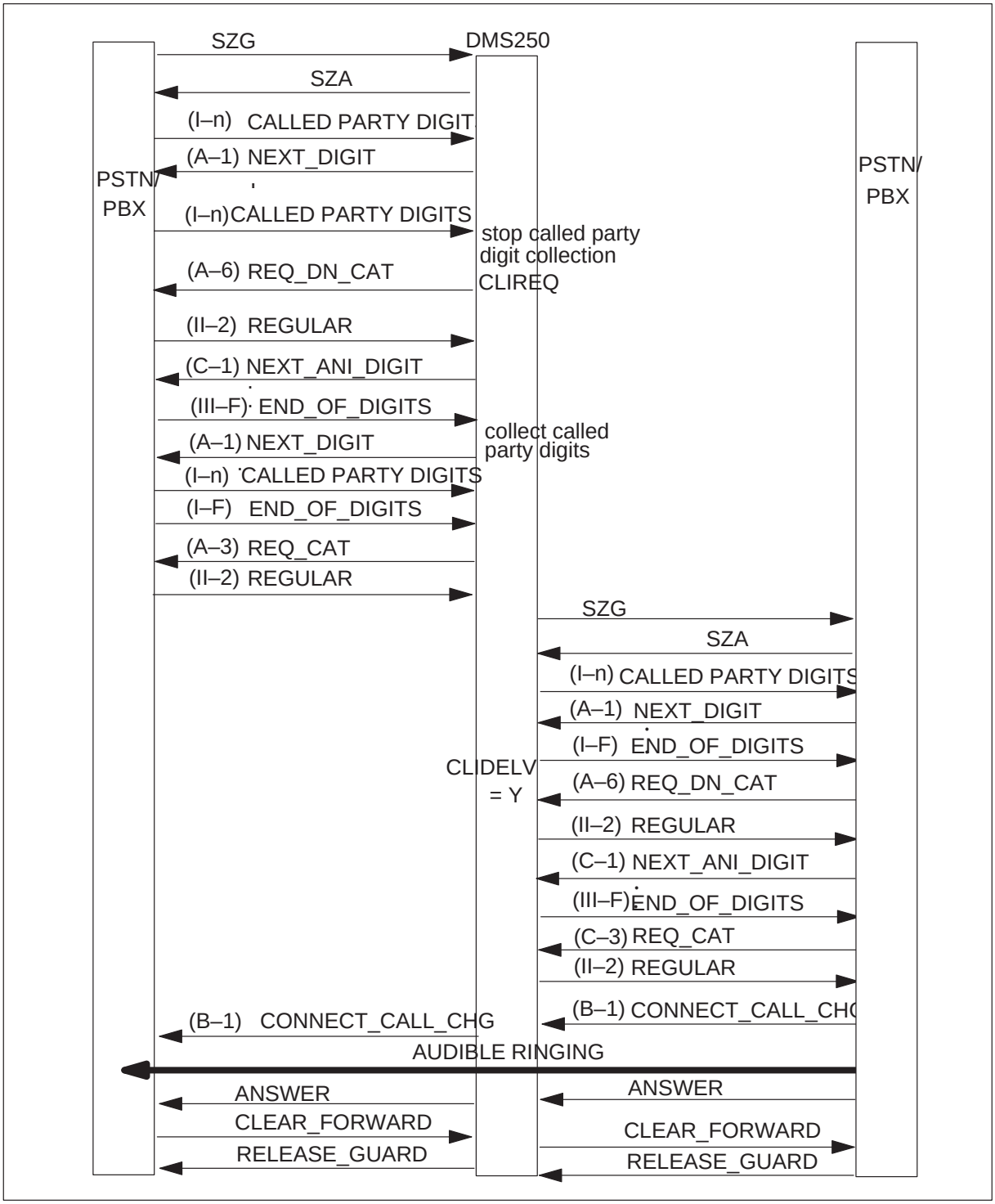


Figure 4-5
R2 to R2 call, congestion activity arrives at terminator, local treatment is applied to originator (See Note 2)

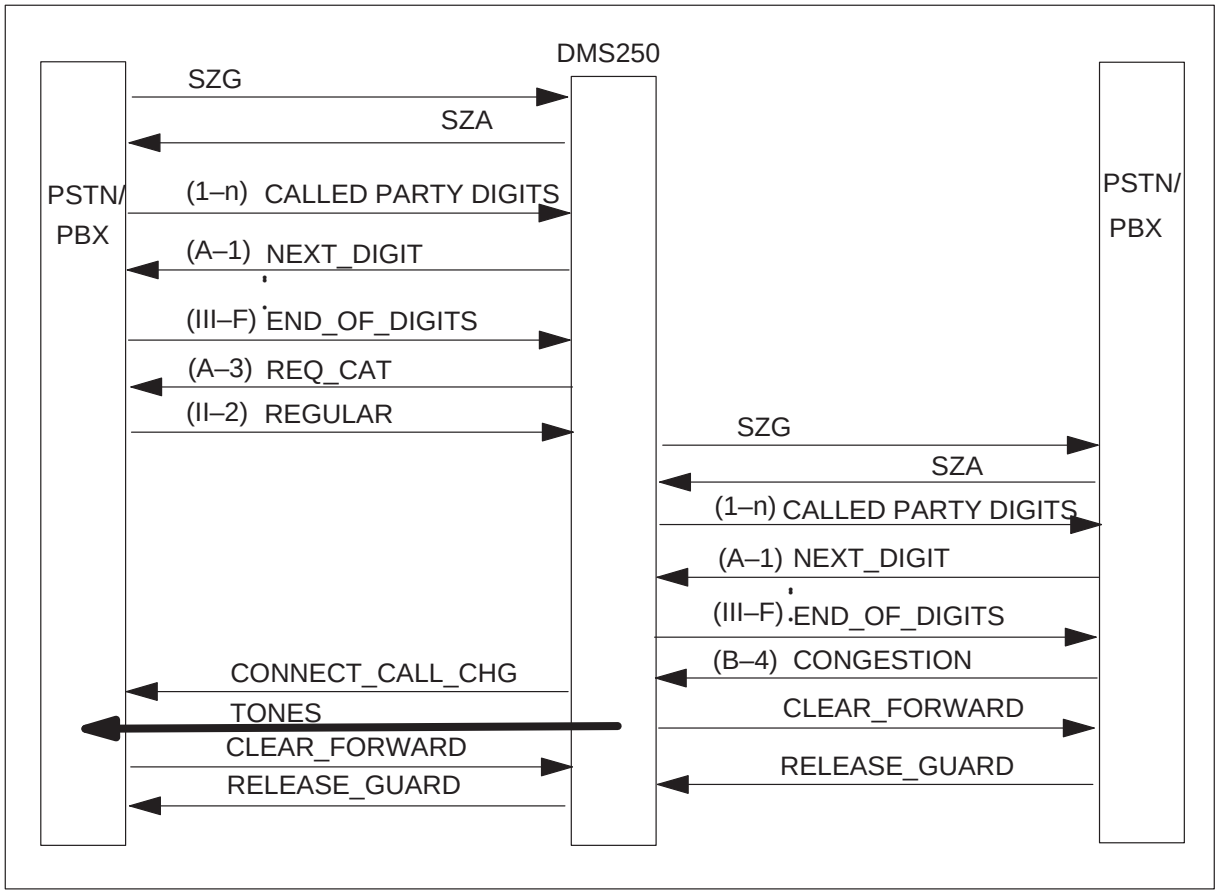
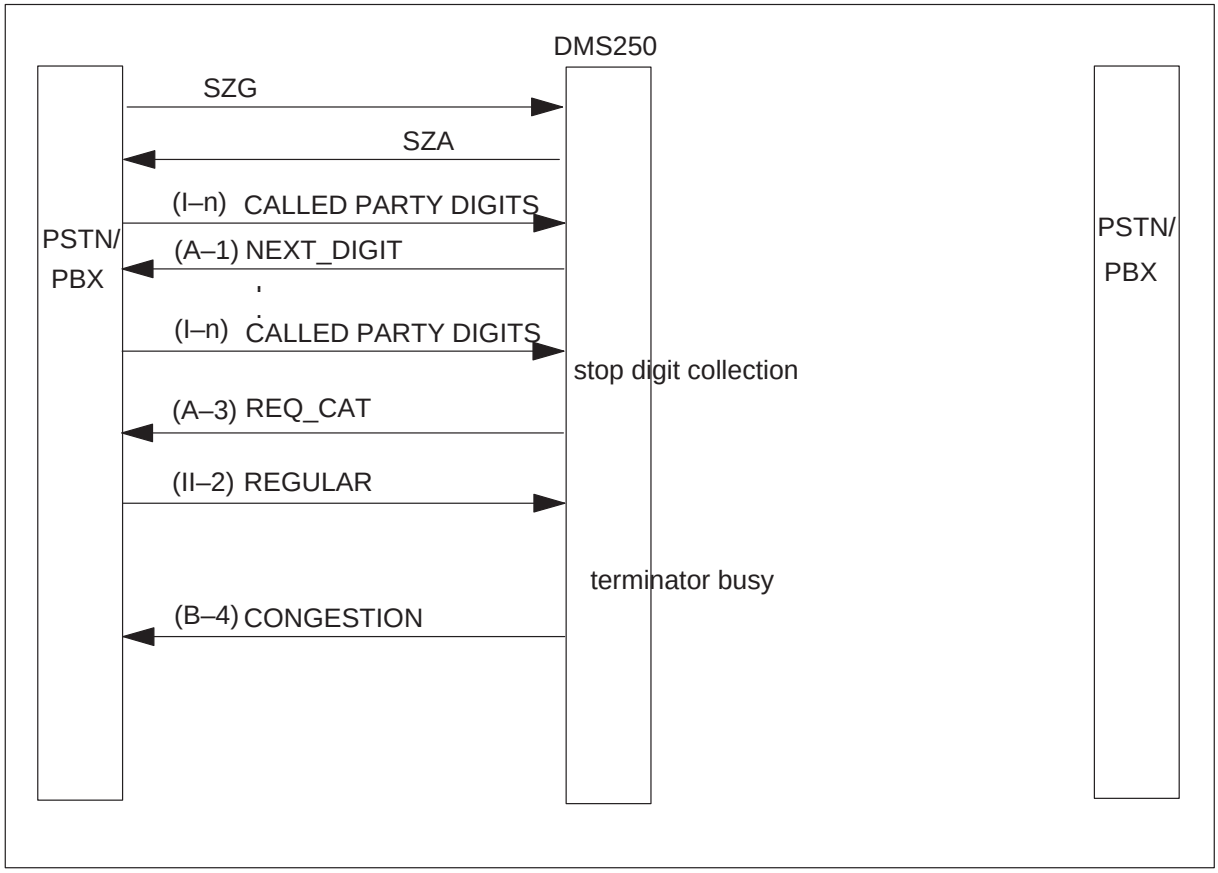


Figure 4-6
R2 to R2 call, terminating route busy



General glare handling strategy

External GLARE is handled based on the value of the GLAREYD field in table TRKSGRP. If GLAREYD=N then this office has priority to seize the trunk; the outgoing call continues normally and the incoming call is ignored. If GLAREYD=Y then this office does not have priority to seize the trunk; the incoming call continues normally and the outgoing call reselects another circuit.

Interworkings

Interworking definition

Interworking is defined as the controlled transfer of information across the interface between different signaling systems where the significance of the transferred information is identical or where the significance is translated into a defined number, and as the performance of appropriate switching procedures in association with the transfer.

UCS DMS-250 switch interworkings

Table 5-1 show the supported interworkings for the International trunk agencies on the UCS DMS-250 switch. Interworkings marked with an asterisk (*) are covered in this reference manual.

Table 5-1
International trunk agency interworkings for the UCS DMS-250 switch

Originating agencies	Terminating agencies				
	UCP Intra IMT	**UCP Int'l IMT**	**ITU ISUP IMT**	**Mexican ISUP IMT**	**Mexican R2**
UCP Intra IMT	yes	yes	yes *	yes *	yes *
UCP Int'l IMT	yes	yes	yes *	yes *	yes *
ITU ISUP IMT	yes *	yes *	yes *	yes *	yes *
Mexican ISUP IMT	yes *	yes *	yes *	yes *	yes *
Mexican R2	yes *	yes *	yes *	yes *	yes *

Note: Interworkings marked with an asterisk (*) are covered in this reference manual.

ITU ISUP IMT and UCP (Intra and Global) IMT interworkings

The supported UCP ISUP messages that are interworked to ITU ISUP are

- Address Complete Message (ACM)
- Answer Message (ANM)
- Initial Address Message (IAM)
- Release (REL)

The supported ITU ISUP messages that are interworked to UCP ISUP are

- Address Complete Message (ACM)
- Answer Message (ANM)
- Initial Address Message (IAM)
- Release (REL)
- Connect message (CON). The CON message is mapped to an ANM message on the UCP trunk.

Message interworkings

Tables 5-2 through 5-9 list the interworked message parameters. These parameters are keyed as F for fixed, mandatory; V for variable length mandatory; and O for optional. These keys are applicable to both the originating network and the terminating network.

Table 5-2
IAM-UCP ISUP to ITU ISUP

UCP ISUP IAM	ITU ISUP IAM
Nature of Connection Indicator (F) (See Note.)	Nature of Connection Indicator (F) (See Note.)
Forward Call Indicator (F)	Forward Call Indicator (F)
Calling Party Category (F)	Calling Party Category (F)
User Service Information (V)	Transmission Medium Requirement (F) User Service Information (O)
Note: The satellite indicator in the NOC parameter is not checked. If the SAT field in table TRKSGRP for the incoming trunk is set, then the outgoing satellite indicator in the NOC is set to 1. Call is route advanced if the SAT indicator is set on both the originator and the terminating trunks. The satellite indicator in the NOC is set to zero if the terminating trunk has SAT field set.	
—continued—	

Table 5-2
IAM-UCP ISUP to ITU ISUP (continued)

UCP ISUP IAM	ITU ISUP IAM
Calling Party Number (O)	Calling Party Number (O)
Transit Network Selection Parameter (O) Carrier Identification Parameter (O)	Transit Network Selection Parameter (O)
Note: The satellite indicator in the NOC parameter is not checked. If the SAT field in table TRKSGRP for the incoming trunk is set, then the outgoing satellite indicator in the NOC is set to 1. Call is route advanced if the SAT indicator is set on both the originator and the terminating trunks. The satellite indicator in the NOC is set to zero if the terminating trunk has SAT field set.	
—end—	

Table 5-3
IAM-ITU ISUP to UCP ISUP

ITU ISUP IAM	UCP ISUP IAM
Nature of Connection Indicator (F) (See note)	Nature of Connection Indicator (F) (See note)
Forward Call Indicator (F)	Forward Call Indicator (F)
Calling Party Category (F)	Calling Party Category (F)
Transmission Requirement (F)	User Service Information (V)
User Service Information (O)	
Calling Party Number (O)	Calling Party Number (O)
Note: The satellite indicator in the NOC parameter is not checked. If the SAT field in table TRKSGRP for the incoming trunk is set, then the outgoing satellite indicator in the NOC is set to 1. Call is route advanced if the SAT indicator is set on both the originator and the terminating trunks. The satellite indicator in the NOC is set to zero if the terminating trunk has SAT field set.	

Table 5-4
ACM-UCP ISUP to ITU ISUP

UCP ISUP ACM	ITU ISUP ACM
Backward Call Indicator (F)	Backward Call Indicator (F)
Note: The ACM is reported only if the parameter INTER_INTRA_UNANS_CALL is set to Y in table OFCVAR.	

Table 5-5
ACM-ITU ISUP to UCP ISUP

ITU ISUP ACM	UCP ISUP ACM
Backward Call Indicator (F)	Backward Call Indicator (F)
Note: The ACM is reported only if the parameter INTER_INTRA_UNANS_CALL is set to Y in table OFCVAR.	

Table 5-6
ANM-UCP ISUP to ITU ISUP

UCP ISUP ANM	ITU ISUP ANM
Backward Call Indicator (O)	Backward Call Indicator (O)

Table 5-7
ANM-ITU ISUP to UCP ISUP

ITU ISUP ANM	UCP ISUP ANM
Backward Call Indicator (O)	Backward Call Indicator (O)

The Release message is reported for all International calls originating or terminating on UCP IMT trunks with the NETWKSPC field in table TRKGRP datafilled as GLOBAL. The Release message is handled differently depending upon the call releasing first from the originator or terminator.

If the originating trunk releases first, the Release message is tandemed across the network without any treatment to cause or cause to treatment mapping. See Tables 5-19 and 5-18 for the way interworking is done with the UCP ISUP IMTs mapping of Cause Indicator parameters.

If the terminating trunk releases first, the Release message is tandemed across the network when its Cause Indicator Parameter has Cause Value CI_NORMAL_CLEARING. The Location and Coding Standard fields are mapped as shown in Tables 5-19 and 5-18 for interworking with UCP ISUP IMTs. If the Cause Indicator parameter has a Cause Value other than CI_NORMAL_CLEARING or if the call goes to Treatment, then the switch uses tables TMTMAP (Treatment to Cause Mapping) and CSEMAP (Cause to Treatment mapping) and maps according to datafill in those tables.

Table 5-8
REL-UCP ISUP to ITU ISUP

UCP ISUP REL	ITU ISUP REL
Cause Indicator (V)	Cause Indicator (V)

Table 5-9
REL-ITU ISUP to UCP ISUP

UCP ISUP REL	ITU ISUP REL
Cause Indicator (V)	Cause Indicator (V)

Parameter interworkings

The following tables indicate the mapping for parameter values which cannot be mapped in a straight-forward manner. Other values are passed along without any changes

Table 5-10
UCP ISUP-ITU ISUP Backward Call Indicator parameter mapping

UCP ISUP parameter	ITU ISUP parameter
Called Party's Status Indicator: • Connect when free 1 0 • Excessive Delay 1 1	Called Party's Status Indicator: • No indication 0 0 • No indication 0 0
Reverse Holding Indicator: • Reverse holding required 1	Holding Indicator: • Holding not requested 0
End-to-end Method Indicator: • No end-to-end method available • Pass along method available • SCCP method available • Pass along and SCCP methods available	End-to-end Method Indicator: • No end-to-end method available • No end-to-end method available • No end-to-end method available • No end-to-end method available

Table 5-11
ITU ISUP-UCP ISUP Backward Call Indicator parameter mapping

ITU ISUP parameter	UCP parameter
Called Party's Status Indicator: • Spare 1 1 Called Party's Category Indicator: • Spare 1 1	Called Party's Status Indicator: • No indication 0 0 Called Party's Category Indicator: • No indication 0 0

Table 5-12
UCP ISUP-ITU ISUP Called Party Number parameter mapping

UCP ISUP parameter	ITU ISUP parameter
Numbering Plan Indicator: • Unknown 000 • Telephony Numbering Plan 010	Numbering Plan Indicator: • Spare 000 • ISDN Numbering Plan 001

Table 5-13
ITU ISUP-UCP ISUP Called Party Number parameter mapping

ITU ISUP parameter	UCP parameter
Numbering Plan Indicator: • Spare 000 • Spare 010	Numbering Plan Indicator: • Unknown 000 • Unknown 000

Table 5-14
UCP ISUP-ITU ISUP Calling Party Number parameter mapping

UCP ISUP parameter	ITU ISUP parameter
Nature of Address Indicator	Nature of Address Indicator
• Spare 000 0010	• Spare 000 0000
• Unique 3-digit National number 110 0111	• National number 0000011
• No ANI received 110 1000	• Parameter will be discarded
• Spare 111 0000	• Spare 000 0000
• Non-unique subscriber number 111 0001	• Subscriber number 0000001
• Spare 111 0010	• Spare 000 0000
• Non-unique national number 111 0011	• National number 0000011
• Non-unique international number 111 0100	• International number 0000100
• Spare 111 0101 to 111 0110	• Spare 000 0000
• Test line 111 0111	• Parameter will be discarded
• International number, operator requested	• National number
• Treated call	• National number
• No address present, operator requested	• National number
• No address present, cut-through call to carrier	• National number
• Call from a hotel/motel, Equal Access End Office	• National number
Numbering Plan Indicator:	Numbering Plan Indicator:
• Telephony Numbering Plan 010	• ISDN Numbering Plan 001
Address Presentation Restricted:	Address Presentation Restricted:
• Address unavailable due to interworking 10	• Map to Presentation restricted 01
Screening Indicator:	Screening Indicator:
• User provided, not screened 0 0	• Parameter will be discarded
• User provided, screening failed 0 1	• Parameter will be discarded

Table 5-15
UCP ISUP-ITU ISUP Calling Party Category parameter mapping

UCP ISUP parameter	ITU ISUP parameter
Calling Party Category: • Unknown 0000 0000 • Operator English 0000 0010	Calling Party Category: • Ordinary calling subscriber 0000 1010 • Operator Spanish 0000 0101

Table 5-16
ITU ISUP-UCP ISUP Calling Party Category parameter mapping

ITU ISUP parameter	UCP parameter
Calling Party Category: Operator (all values): • French 0000 0001 • English 0000 0010 • German 0000 0011 • Russian 0000 0100 • Spanish 0000 0101	Calling Party Category: English Operator requested 0000 0001
Operator with call offer 0000 1001	English Operator requested 0000 0001
Calling subscriber with priority 0000 1011	Ordinary calling subscriber 0000 1010
Data call 0000 1100	Ordinary calling subscriber 0000 1010
Note: The Calling Party Category is recorded in the Info digits of the CDR, if Information Digits are not present in the Called Party Number.	

Table 5-17
UCP ISUP-ITU ISUP Forward Call Indicator parameter mapping

UCP ISUP parameter	ITU ISUP parameter
End-to-end method Indicator: • No end-to-end method available • Pass along method available • SCCP method available • Pass along and SCCP methods available	End-to-end method Indicator: • No end-to-end method available • No end-to-end method available • No end-to-end method available • No end-to-end method available
End-to-end information Indicator: • No end-to-end information available • End-to-end information available	End-to-end information Indicator: • No end-to-end information available • No end-to-end information available

Table 5-18
UCP ISUP-ITU ISUP Cause Indicator parameter mapping

UCP ISUP parameter	ITU ISUP parameter
Coding Standard: • International 0 1 • National 1 0	Coding Standard: • UIT standard 0 0 • UIT standard 0 0
Location: • Local Private Network 0001 • Local Network 0010	Location: • International network 0111 • International network 0111
Cause Value: • No route to specified transit network (0000010) • Incorrectly dialed trunk prefix (0000101) • Translations fail (0011001) • Call returns (0011010) • Apply locally (0011110) • User information discarded (0101011)	Cause Value: • No route to destination (0000011) • Normal unspecified (0011111) • Normal unspecified (0011111) • Normal unspecified (0011111) • Normal unspecified (0011111) • Resource unavailable – unspecified (0101111)

—continued—

Table 5-18
UCP ISUP-ITU ISUP Cause Indicator parameter mapping

UCP ISUP parameter	ITU ISUP parameter
• Preemption (0101110)	• Resource unavailable – unspecified (0101111)
• No preemption circuit available (0101110)	• Resource unavailable – unspecified (0101111)
• Outgoing calls barred (0110100)	• Incoming calls barred (0110111)
• Incompatible agents (0110101)	• Service/option not available unspecified (0111111)
• Channel type not implemented (1000010)	• Service/option not available unspecified (0111111)
• Facility not implemented (1000101)	• Service/option not available unspecified (0111111)
• Only restricted digital information bearer capability available (1000110)	• Service/option not available unspecified (0111111)
• Invalid call reference value (1010001)	• Invalid message – unspecified (1011111)
• Message type not implemented (1100001)	• Protocol error – unspecified (1101111)
• Parameter not implemented (1100011)	• Protocol error – unspecified (1101111)
• Invalid parameter contents (1100100)	• Protocol error – unspecified (1101111)
• Parameter not passed (1100111)	• Protocol error – unspecified (1101111)
—end—	

Table 5-19
ITU ISUP-UCP ISUP Cause Indicator parameter mapping

ITU ISUP parameter	UCP parameter
Location:	Location:
• International Network 0111	• Unknown 1010
• No route to specified transit network (0000010)	• No route to destination (0000011)
• Incoming calls barred within CUG (0110111)	• Outgoing calls barred (0110100)

Table 5-20
ITU-UCP mapping when the switch receives no USI on the incoming ITU ISUP IAM

ITU ISUP IAM		UCP ISUP IAM
TMR	**Optional USI**	**Mandatory USI**
3.1 kHz Audio/Speech	None	Information transfer capability (ITC) (See Note.) • Mapped to the Transmission Medium Requirement (TMR) value Information transfer rate (ITR) • 64 kbit/s Coding Standard • National Standard Transfer Mode • Circuit mode Layer 1 information • value taken from table CARRMTC
64 K Unrestricted	None	Information transfer capability • 64 kbit/s Unrestricted Information transfer rate • 64 kbit/s Coding Standard • National Standard Transfer Mode • Circuit mode Layer 1 information • Layer 1 rate adaptation User rate • 56 kbit/s

Note: The information transfer capability in the UCP ISUP IAM takes on the value of the TMR of the ITU ISUP IAM.

Table 5-21
ITU-UCP mapping when the switch receives a 2-byte USI on the incoming ITU ISUP IAM

ITU ISUP IAM		UCP ISUP IAM
TMR	**Optional USI**	**Mandatory USI**
3.1 kHz/Speech/64 kbit/s Unrestricted	Information Transfer Capability • Any value supported	Information Transfer Capability • Mapped to the Transmission Medium Requirement (TMR) value
	Information transfer rate • 64 kbit/s • 2X64 kbit/s • Packet mode calls (00000) • For other values give Bearer Capability Not Implemented (BCNI) treatment (See Note 1.)	Information transfer rate • 64 kbit/s • 64 kbit/s • 64 kbit/s
	Coding Standard • All Values	Coding Standard • National Standard
	Transfer Mode • Circuit mode • Packet mode (See Note 2.)	Transfer Mode • Circuit mode • Packet mode

Note 1: BCNI is given when wideband data calls are originated on non-wideband trunks. Wideband data calls on wideband trunks are blocked with FNAL treatment.
Note 2: Packet mode data calls are blocked with FNAL treatment.

Table 5-22
ITU-UCP mapping when the switch receives a 3-byte USI on the incoming ITU ISUP IAM

ITU ISUP IAM		**UCP ISUP IAM**
TMR	**Optional USI**	**Mandatory USI**
3.1 kHz/Speech	Information Transfer Capability • Any value supported	Information Transfer Capability • Mapped to the Transmission Medium Requirement (TMR) value
	Information transfer rate • 64 kbit/s • 2X64 kbit/s • Packet mode calls • For other values give Bearer Capability Not Implemented (BCNI) treatment. (See Note 1.)	Information transfer rate • 64 kbit/s • 64 kbit/s • 64 kbit/s
	Coding Standard • All Values	Coding Standard • National Standard
	Transfer Mode • Circuit mode • Packet mode (See Note 2.)	Transfer Mode • Circuit mode • Packet mode
	Layer 1 information • Any supported value	Layer 1 information • Value is taken from table CARRMTC

Note 1: BCNI is given when wideband data calls are originated on non-wideband trunks. Wideband data calls on wideband trunks are blocked with FNAL treatment.
Note 2: Packet mode data calls are blocked with FNAL treatment.

Table 5-23
ITU-UCP mapping when the switch receives a 4-byte USI on the incoming ITU ISUP IAM

ITU ISUP IAM		**UCP ISUP IAM**
TMR	**Optional USI**	**Mandatory USI**
64 kbit/s unrestricted	ITC • Any value supported Information transfer rate (See Note 1.) • 64 kbit/s • 2X64 kbit/s • Packet mode calls • For other values give Bearer Capability Not Implemented (BCNI) treatment. Coding Standard • All Values Transfer Mode • Circuit mode • Packet mode Layer 1 information • Any supported value User Rate • 56 kbit/s • All other Values	ITC • 64 kbit/s Unrestricted Information transfer rate • 64 kbit/s • 64 kbit/s • 64 kbit/s Coding Standard • National Standard Transfer Mode • Circuit mode • Packet mode Layer 1 information (See Note 2.) • Tandemed User Rate • 56 kbit/s • Not built on the UCP side

Note 1: Information Transfer Rate with values of 1472 kbit/s and Multirate are unrecognized.

Note 2: The layer 1 information is built on the UCP only if the user rate is 56 kbit/s. The 4-byte incoming USI is sent out as a 4-byte USI only if the user rate is 56 kbit/s. For all other values, the 4-byte USI is sent out as a 2-byte USI.

When mapping the UCP ISUP USI to the TMR and USI in the ITU IAM, the following applies:

- In the case of a non-tandem call (on optional parameters in the incoming IAM or if the TRKGRP of the origination does not have the option ISDNXFER) the default TMR and USI is build. See Tables 5-24 and 5-25.
- If the incoming UCP ISUP IAM comes in with an ITC of 64kbit/s restricted or 64 kbit/s unrestricted, then it is a data call. For a data call, a default 4 byte USI is built and the TMR value is sent out as 64 kbit/s unrestricted. See Table 5-24.
- In the case of a tandem call (if either the originator has optional parameters in the IAM or the options ISDNXFER is set in table TRKGRP of the originator) then the mapping of the USI in the incoming UCP IAM to the TMR and USI in the outgoing ITU IAM is as shown in Table 5-26.

Table 5-24
ITU ISUP USI and TMR for a non-tandem case (data call)

Outgoing ITU ISUP IAM	
TMR	**Optional USI**
64 kbit/s unrestricted	ITC • 64 kbit/s unrestricted ITR • 64 kbit/s unrestricted Coding Standard • National Standard Transfer Mode • Circuit mode Layer 1 information • Layer 1 rate adaptation User Rate • 56 kbit/s

Table 5-25
ITU ISUP USI and TMR for a non-tandem case (non-data call)

Outgoing ITU ISUP IAM	
TMR	**Optional USI**
Speech	ITC • Speech Information transfer rate Coding Standard • National Standard Transfer Mode • Circuit mode Layer 1 information • Value is taken from table CARRMTC

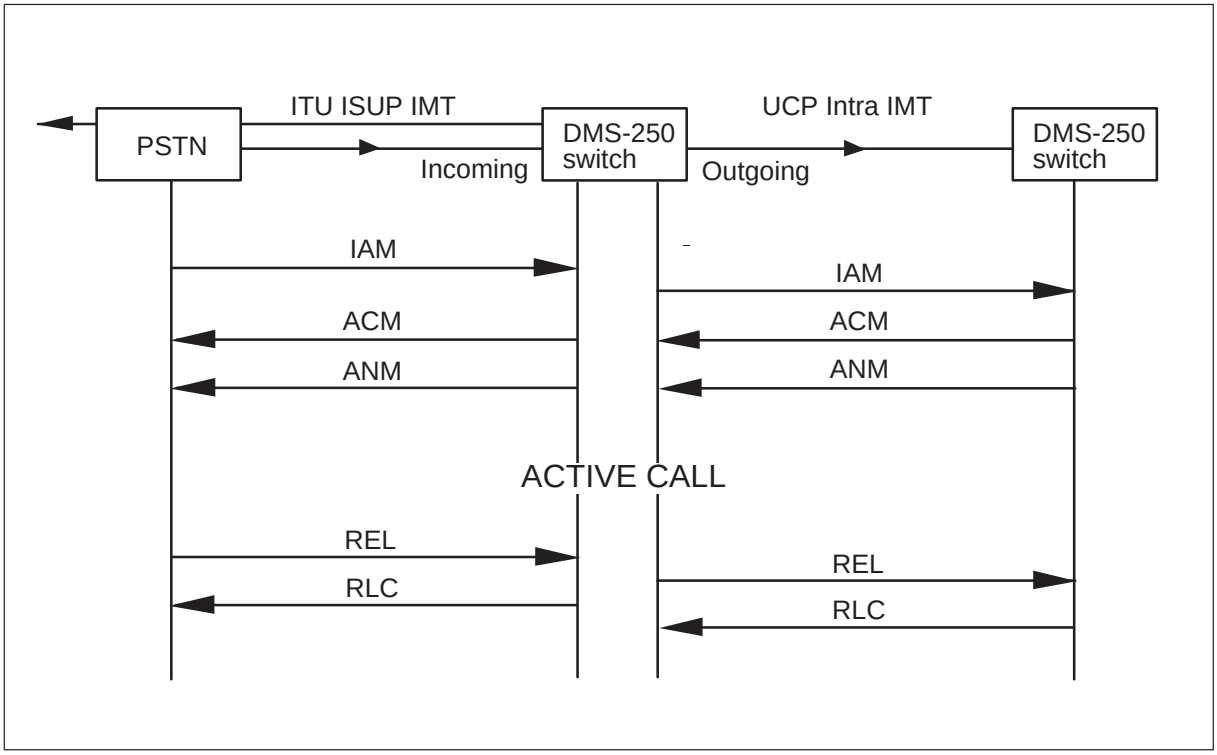
Table 5-26
UCP-ITU mapping with USI received in the incoming ITU IAM for a tandem case

UCP ISUP IAM	**UCP ISUP IAM**	
Mandatory USI	**TMR**	**Optional USI**
Information transfer capability • 64 kbit/s unrestricted • 64 kbit/s restricted • speech • 3.1 kHz audio • 7 kHz audio • 15 kHz audio • Video	 • 64 kbit/s unrestricted • 64 kbit/s unrestricted • speech • 3.1 kHz audio • 3.1 kHz audio • 3.1 kHz audio • 3.1 kHz audio	Information transfer capability • 64 kbit/s unrestricted • 64 kbit/s restricted • speech • 3.1 kHz audio • 7 kHz audio • 15 kHz audio • Video
Information transfer rate • 64 kbit/s • 2X64 kbit/s • Packet mode calls • For other values give BCNI treatment.		Information transfer rate • 64 kbit/s • 64 kbit/s • 64 kbit/s
Coding Standard • All values		Coding Standard • National Standard
Transfer Mode • Circuit mode • Packet mode		Transfer Mode • Circuit mode • Packet mode
Layer 1 information • Any supported value		Layer 1 information • Value is taken from table CARRMTC

Call flows

The switch uses the en-bloc mode of address signaling when it sends all the address digits of the Called Party Number parameter in the IAM. Figure 5-1 shows the normal call flow when the switch uses en-bloc signaling to interwork the ITU ISUP IMT and UCP ISUP (Intra) IMT trunk agencies.

Figure 5-1
Call flow diagram for ITU ISUP IMT and UCP Intra IMT trunk agency interworking with en-bloc signaling mode



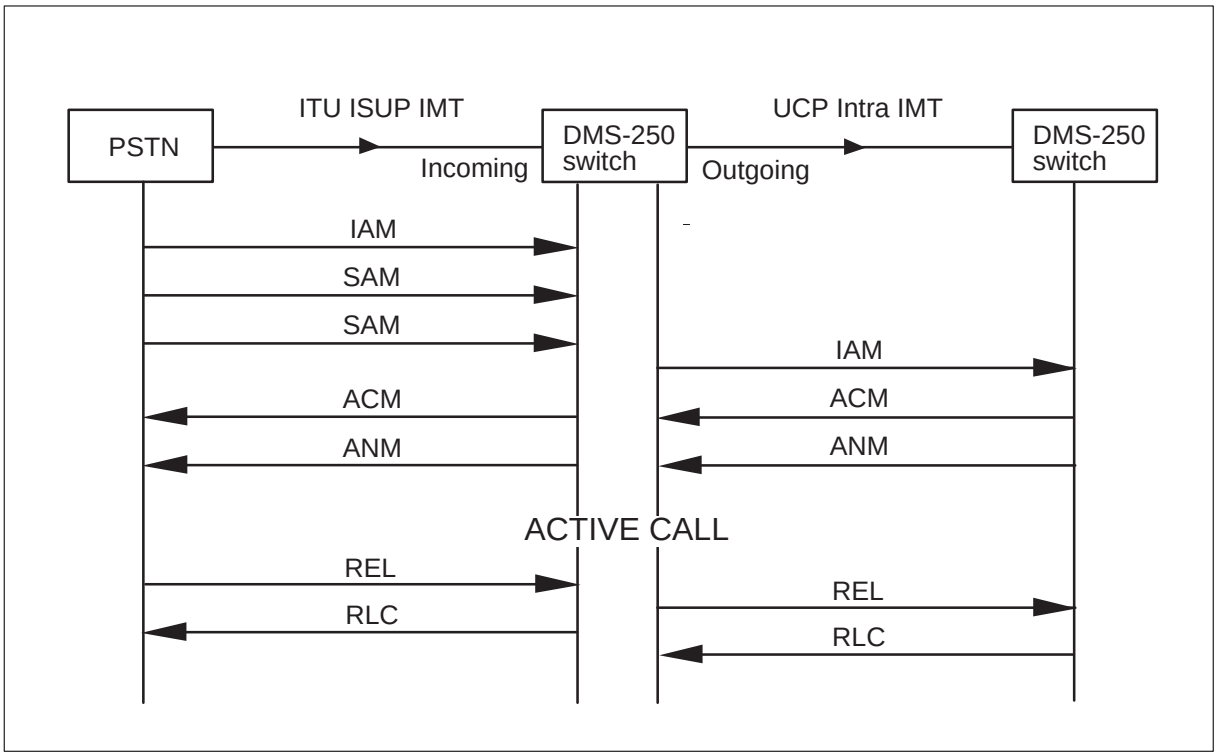
In the overlap signaling mode, the UCS DMS-250 switch receives the Called Party Number in multiple messages. If the incoming IAM contains no digits in the Called Party Number or incomplete digits in Called Party Number, the UCS DMS-250 switch enters overlap sending (from the PSTN's perspective) mode (if OVLAP is datafilled as Y in TRKSGRP).

An F digit in the last address digit position of the Called Party Number in the IAM indicates that all the called party address digits have been received. Similarly, if the Subsequent Number in the SAM does not contain the F digit in the last address digit position, then the switch waits for the next SAM. A timer (four seconds) starts when the switch receives an IAM with an incomplete Called Party Number. The UCS DMS-250 switch stays in overlap sending mode until all the information about the called party becomes available (by way of SAMs). After receiving the Called Party

Number, the UCS DMS-250 switch processes the Called Party Number and sends out an IAM to initiate call setup. (in en-bloc mode)

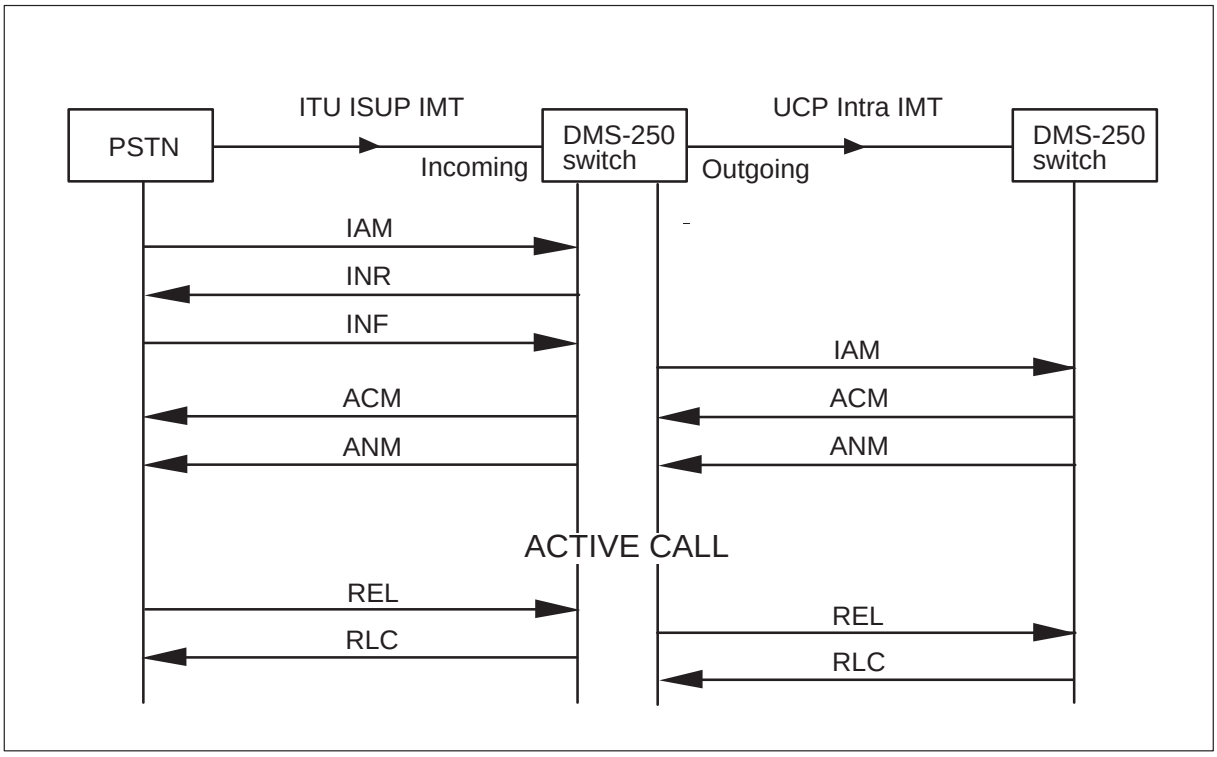
Figure 5-2 shows the normal call flow when the switch uses overlap signaling to interwork the ITU ISUP (Global) IMT and UCP ISUP (Intra) IMT trunk agencies.

Figure 5-2
Call flow diagram for ITU ISUP IMT and UCP Intra IMT trunk agency interworking with overlap signaling mode



When the Calling Party Number is absent, empty, or incomplete in the IAM the switch receives and CLIREQ field in table TRKGRP is set to Y, then the UCS DMS-250 switch sends an Information Request message (INR) to the preceding switch requesting the complete calling party address, as shown in the call flow diagram in Figure 5-3.

Figure 5-3
Call flow diagram for ITU ISUP IMT and UCP Intra IMT trunk agency interworking with the INR sent on the originator



ITU ISUP and ITU ISUP IMT interworkings

This section contains interworking information for the TMR and USI parameters of the IAM message when originating and terminating on ITU ISUP.

Parameter interworkings

Tables 5-27 and 5-28 indicate the mapping for parameter values which cannot be mapped in a straight-forward manner. Other values are passed along without any changes.

The supported values of TMR and USI are tandemed in case of an ITU-ITU call. If no USI is received, then a default USI is built on the outgoing side. The default USI is a two byte USI if the incoming TMR is 64 kbit/s unrestricted, as shown in Table 5-27. A 3-byte USI is built if the TMR is speech or 3.1 Khz, as shown in Table 5-28.

Table 5-27
ITU-ITU call with TMR 64 kbit/s and no USI

Outgoing ITU ISUP TMR/USI	
TMR	**Optional USI**
64 kbit/s unrestricted	ITC • 64 kbit/s unrestricted ITR • 64 kbit/s unrestricted Coding standard • National standard Transfer mode • Circuit mode

Table 5-28
ITU-ITU call with TMR speech/3.1 kHz and no USI

Outgoing ITU ISUP TMR/USI	
TMR	**Optional USI**
Speech/3.1 kHz audio	ITC • Speech/3.1 kHz audio ITR • 64 kbit/s unrestricted Coding standard • National standard Transfer mode • Circuit mode Layer 1 information • Layer 1 A – Law

ITU ISUP IMT and Mexican R2 interworkings

This section documents the interworkings between the ITU ISUP IMT and Mexican R2 protocols. ITU ISUP messages that are interworked with Mexican R2 include:

- Initial Address Message (IAM)
- Subsequent Address Message (SAM)
- Address Complete Message (ACM)
- Connect message (CON)
- Answer Message (ANM)
- Release (REL)
- Information Message (INF)

ISUP message/parameter and R2 signal interworkings

The following Tables 5-29 through 5-41 explain the mappings between the ISUP message/ parameters and the corresponding R2 activities. Only the messages/ parameters that map to R2 activity/signals are shown.

Table 5-29
ITU ISUP to R2 parameter mapping

Message	ITU ISUP parameters	Type	R2 signal/activity
IAM	Called Party Number	V	Called Party Digits (Grp I-DIGIT_0 to DIGIT_9)
	Calling Party Number	O	Calling Party Digits (Grp III-DIGIT_0 to DIGIT_9)
	Calling Party Category (CPC)	F	Calling Party Category
			Billing Party Category
SAM	Called Party Number	V	Called Party Digits (Grp I-DIGIT_0 to DIGIT_9)
ACM	Backward Call Indicator	F	Connect_call_chg
	Charge Indicator	–	–
CONNECT	–	–	Connect_call_chg, line signal - Answer
ANM	–	–	line signal - Answer
REL	Cause Indicator	V	See Treatment section.
INF	Information Indicators	F	Calling Party Digits (Grp III-DIGIT_0 to DIGIT_9)
RSC (Note 2)			Maps to Congestion if register signal is still on. Otherwise, local treatment is applied.
BLO (Note 2)			Maps to Congestion if register signal is still on. Otherwise, local treatment is applied.

Note 1: Type: V-variable; O-optional; F-fixed

Note 2: RSC and BLO Messages are mapped to R2 activities. Congestion on ISUP termination if register signaling is not completed.

Note 3: ISUP Calling Party Category is mapped to both R2 Calling Party Category and Billing Category.

Table 5-30
Mapping of ISUP Calling Party Category value to Calling Party Category/Billing Category value on R2

ITU ISUP Calling Party Category	Calling Party Category on R2	Billing Category on R2
Ordinary subscriber	Regular	Regular
Test call	Mtc_eq	Mtc_eq
Operator (All values)	Oper	Oper
Unknown	Regular	Regular
	Oper	Oper
Calling subscriber with priority	Regular	Regular
Data call	Regular	Regular
Payphone	Coin	Coin
Other values	Regular	Regular

Table 5-31
R2 signal/activity to ITU ISUP parameter mapping

R2 signal/activity	ITU ISUP Message	ITU ISUP Parameters
called party digits (Grp I-DIGIT_0 to DIGIT_9)	IAM	Called Party Number digits
calling party digits (Grp III-DIGIT_0 to DIGIT_9)		Calling Party Number digits
calling party category (Grp II)		Calling Party Category
connect_call_chg1 (See Note 1)	ACM	Backward call indicator: Charge Indicator-charge
connect_call_nochg		
line signal - Answer	ANM	Backward call indicator: Charge Indicator

Note 1: Connect_call_chg can be sent before the switch receives the ACM.
Note 2: Clear forward (line signal) is mapped to the REL message if it is not in response to congestion, sub_busy or clear backward messages.

—continued—

Table 5-31
R2 signal/activity to ITU ISUP parameter mapping

R2 signal/activity	ITU ISUP Message	ITU ISUP Parameters
congestion (Grp A,B,C)	REL	Cause Indicator: cause value
sub_busy (Grp B)		See Treatment handling section.
line signal - clear forward (See Note 1)	REL	Cause Indicator: cause value-normal clearing
line signal - clear backward		Cause Indicator: cause value-normal clearing
line signal-blocking		Cause Indicator: cause value (depends on the state of the call)
Note 1: Connect_call_chg can be sent before the switch receives the ACM. ***Note 2:*** Clear forward (line signal) is mapped to the REL message if it is not in response to congestion, sub_busy or clear backward messages.		
—end—		

Table 5-32
Mapping of R2 (When Billing and CPC are received on R2) to ISUP Calling Party Category

Billing Category on R2	Calling Party Category on R2	ITU ISUP CPC
Regular	Any value	Ordinary subscriber (0A)
Mtc_eq	Any value	Test call (0D)
Oper	Any value	Operator, English (02)
Time and charge	Any value	Ordinary subscriber (0A)
Private subscriber	Any value	Ordinary subscriber (0A)
Coin	Any value	Payphone (0F)
Ladatel	Any value	Payphone (0F)

Table 5-33
Mapping of R2 Group II signals (when only CPC is received on R2) to CPG on ISUP

Calling Party Category on R2	ITU ISUP Calling Party Category
Regular	Ordinary subscriber (0A)
Mtc_eq	Test call (0D)
Oper	Operator, English (02)
Others (See Note 1)	Ordinary subscriber (0A)
Note 1: Mexican R2 only defines Regular, Mtc_eq, and Oper as CPC. The datafill should be such that other values are not defined. The entry here is just for completeness.	

Table 5-34
Default values for ISUP parameter "Called Party Number" in the IAM

ISUP parameter field	ISUP value
Nature of Address	based on in-switch translation offnet ——–> NATL ((ext)0000011) International ——–> INTL (0000100) others ———>NATL ((ext)0000011) Mtc_eq
Numbering Plan Indicator	ISDN Numbering Plan (001)
Odd/Even Indicator	odd (1)– if odd number of digits in the called party, even (0)– if even number of digits in called party
Internal Network Number Indicator	Routing to internal network number allowed

Table 5-35
Default values for ISUP parameter “Calling Party Number” in the IAM

ISUP parameter field	ISUP value
Odd/Even Indicator	odd– (1) if odd number of digits in the calling party, even– (0) if even number of digits in calling party
Nature of Address Indicator	Unknown (0)
Number Incomplete Indicator (NI)	Complete(0)
Numbering Plan	ISDN Numbering Plan(001)
Address Presentation Restricted	Presentation restricted (01)
Screening Indicator	Network provided(11)

Table 5-36
Default values for ISUP parameter “Cause Indicator” in REL/ACM

ISUP parameter field	ISUP value
Cause Location	Network beyond interworking point (1010)
Coding Standard	CCITT standardized coding (00)
Extension Indicator	Octet continues through the next octet (0)

Table 5-37
Default values for ISUP parameter “Backward Call Indicators” in ACM/ANM

Backward Call Indicator fields	Value
Called Party’s Status Indicator	No indication (00)
Called Party’s Category Indicator	No indication (00)
End to End Method Indicator	No Method available (00)
Interworking Indicator	Interworking encountered (1)
End to End Information Indicator	No end to end info available (0)
ISDN User Part Indicator	ISDN user part not used all the way(0)
Holding Indicator	Holding not required/requested (0)
ISDN Access Indicator	Terminating access non–ISDN (0)

—continued—

Table 5-37
Default values for ISUP parameter "Backward Call Indicators" in ACM/ANM

Backward Call Indicator fields	Value
Echo Control Device Indicator	Incoming half echo control device not included (0)
SCCP Method Indicator	No indication (00)
	—end—

Table 5-38
Default values for ISUP parameter "Forward Call Indicator" in the IAM

ISUP parameter field	ISUP value
National / International Call Indicator	Call to be treated as National (0) / Call to be treated as International (1) depending on the translation
End to End Method Indicator	No end to end method available(00)
Interworking Indicator	No interworking encountered (0)
End to End Information Indicator	No end to end information available (0)
ISDN User Part Indicator	ISDN User part not used all the way (0)
ISDN User Part Preference Indicator	ISDN user part preferred all the way (00)
ISDN Access Indicator	Originating access non–ISDN (0)
SCCP Method Indicator	No indication (00)

Table 5-39
Default values for ISUP parameter "Nature of Connection Indicators"

ISUP parameter field	ISUP value
Satellite Indicator	No satellite circuit in the connection
Echo Control Device Indicator	Outgoing half echo control device not included (0)

Table 5-40
Default values for ISUP parameter “Transmission Medium Requirements” in the ITU ISUP IAM

ISUP parameter field	ISUP value
Transmission Medium Requirement	AUDIO 3_1 KHZ

Table 5-41
Default values for ISUP parameter “User Service Information” in the IAM

ISUP parameter field	ISUP value
Coding standards	CCIT Standard (00)
Information transfer rate	64_KB PER/S (10000)
Information transfer mode	Circuit mode (00)
Information transfer capability	AUDIO 3_1 kHz (10000)

Call flows

Figure 5-4 shows the interworking from ITU ISUP and R2, while Figure 5-5 shows interworking from R2 to ITU ISUP. Table 5-42 shows the responses to various ISUP message in an R2 to ITU ISUP call.

Figure 5-4
ITU ISUP to R2, normal call setup

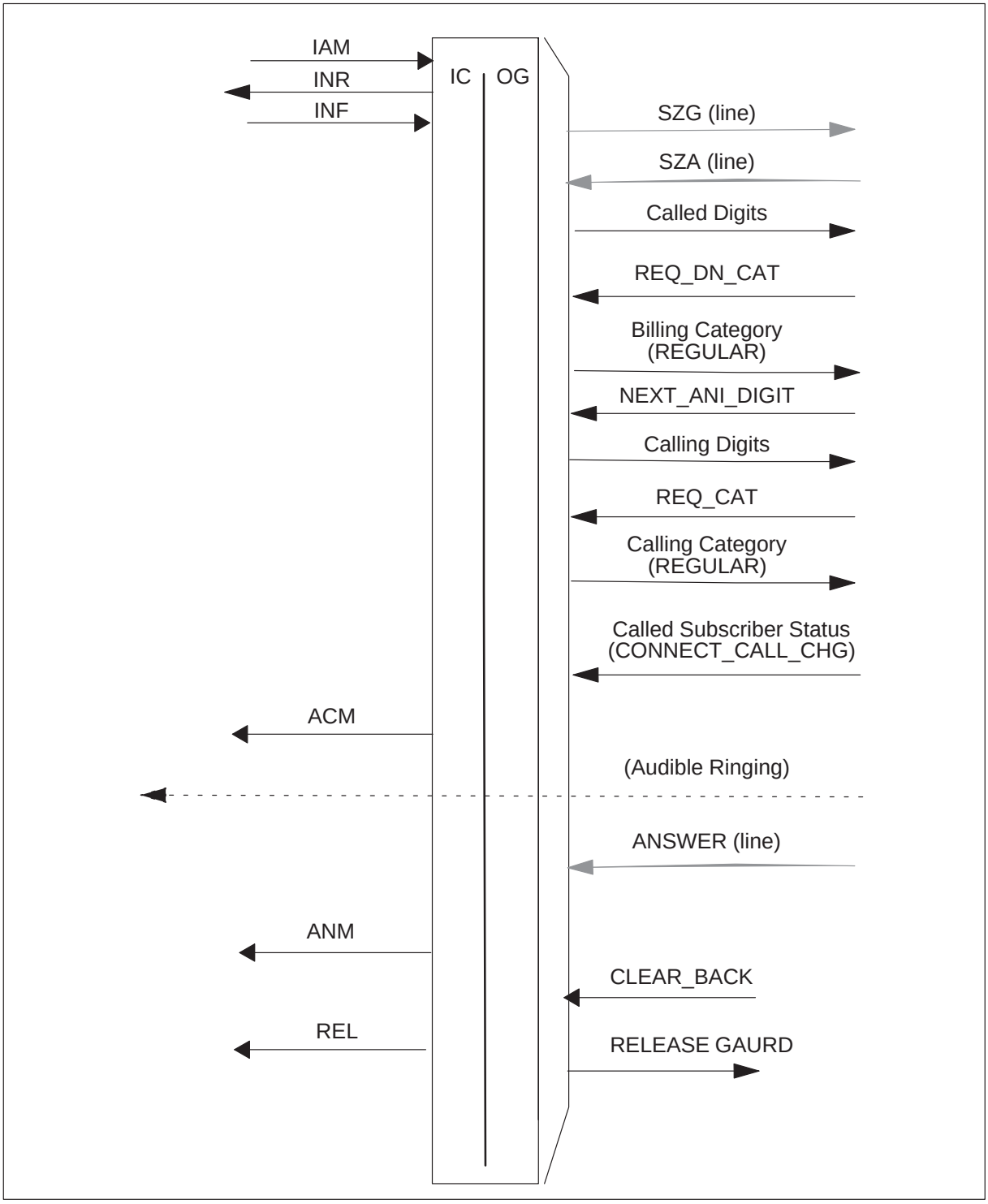


Figure 5-5
R2 to ITU ISSUP call flow

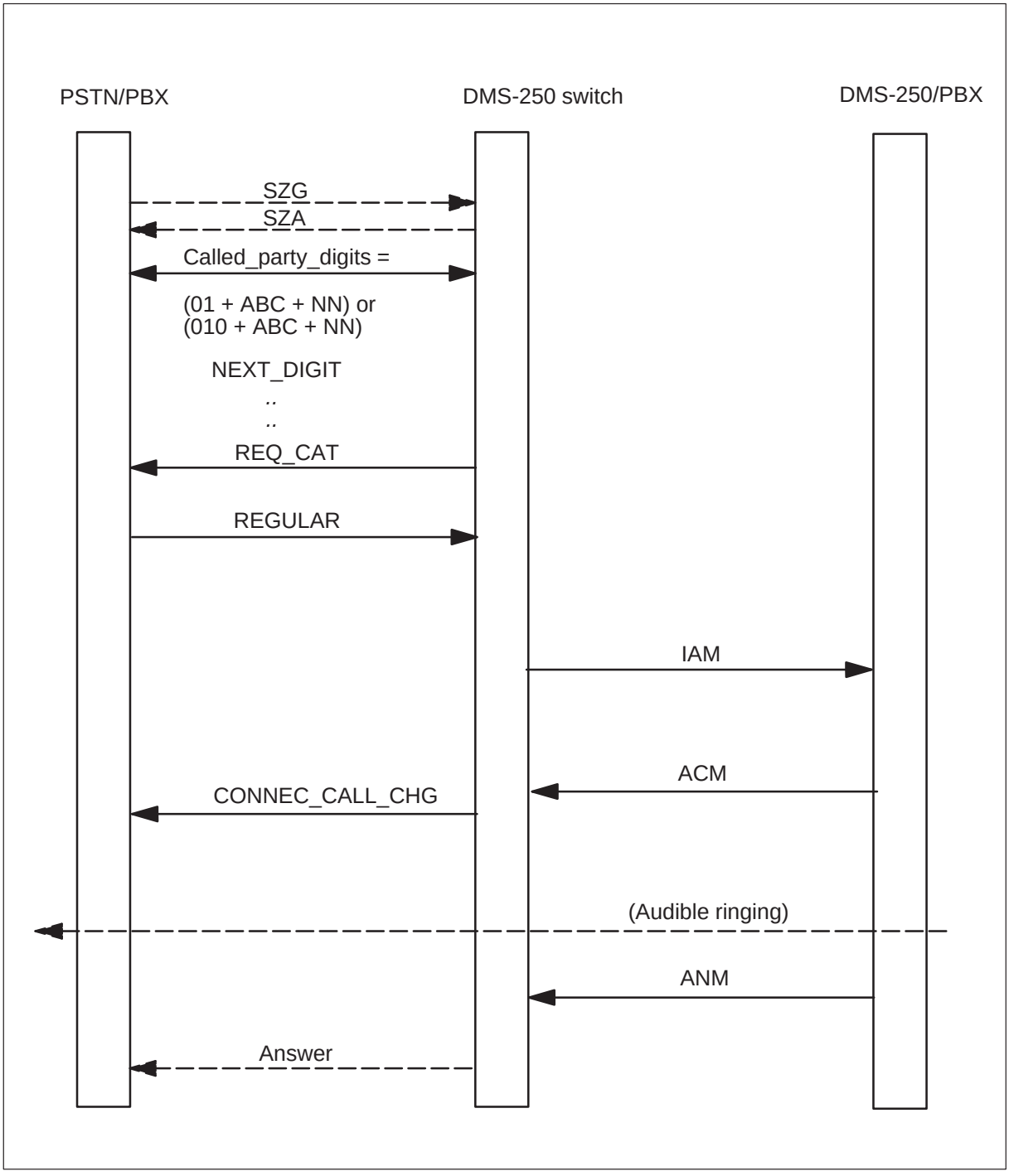


Table 5-42
Responses to various ISUP messages in an R2 to ITU ISUP call

ISUP message received	Response after voice path	Response before voice path
CCR	Ignored	RSC received, call clears giving CONGETION on R2.
IRS	Ignored	Ignored
CQM	Ignored	Receive CQR call continues,
UPT	Ignored	Ignored
CFN	Ignored	RSC received, call clears giving CONGETION on R2.
FOT	Ignored	RSC received, call clears giving CONGETION on R2.
NRM	Ignored	Ingored.
OLM	Ignored	Ingored.
UCIC	Ignored	Ingored.
USR	Ignored	Ingored.
CON/FAST ANM	Ignored	No need to send ACM and ANM after this message. Call passes.
ACM	Ignored	Normal scenario.
ANM	Ignored	Call fails ACM timeout, if sent before ACM.
SGM	Ignored	Ignored
FAC	Ignored	Ignored
SUS	Ignored	RSC received, call clears giving CONGETION on R2.
GRS	GRA received.	GRA received, any further message will send back RSC, call will be taken down.
BLO	BLA received.	BLA received, immediately REL message received clearing the call. CONGETION received on R2.
RSC	RLC received.	RLC received.

Mexican ISUP IMT and UCP (Intra and Global) IMT interworkings

The supported UCP ISUP messages that are interworked to Mexican ISUP are:

- Address Complete Message (ACM)
- Answer Message (ANM)
- Initial Address Message (IAM)
- Release (REL)

The supported Mexican ISUP messages that are interworked to UCP ISUP are:

- Address Complete Message (ACM)
- Answer Message (ANM)
- Initial Address Message (IAM)
- Release (REL)
- Connect message (CON). The CON message is mapped to an ANM on the UCP trunk.

Message interworking

Tables 5-43 through 5-50 list the interworked message parameters. These parameters are keyed as F for fixed, mandatory; V for variable length mandatory; and O for optional. These keys are applicable to both the originating network and the terminating network.

Table 5-43
IAM-UCP ISUP to Mexican ISUP

UCP ISUP IAM	Mexican ISUP IAM
Nature of Connection Indicator (F) (See Note 1.)	Nature of Connection Indicator (F) (See Note 1.)
Called Party Number (V)	Called Party Number (V)
Calling Party Number (O)	Calling Party Number (O)
Charge Number (O) (See Note 2.)	Charge Number (O)
Transit Network Selection Parameter (O) Carrier Identification Parameter (O)	Transit Network Selection (O)
Forward Call Indicator (F)	Forward Call Indicator (F)

Table 5-43
IAM-UCP ISUP to Mexican ISUP

UCP ISUP IAM	Mexican ISUP IAM
Calling Party Category (F)	Calling Party Category (F)
User Service Information (V)	Transmission Medium Requirement (F) User Service Information (O)

Note 1: The satellite indicator in the NOC parameter is not checked. If you set the SAT field in table TRKSGRP for the incoming trunk, then the outgoing satellite indicator in the NOC is set to 1. Call is route advanced if the SAT indicator is set on both the originator and the terminating trunks. The satellite indicator in the NOC is set to zero if the terminating trunk has SAT field set.

Note 2: If only the Charge Number is present in the UCP ISUP IAM, then it is mapped to the Charge Number of the Mexican ISUP IAM. In this case, the Charge Number is recorded in the CDR. If both the Charge Number and the Calling Party Number are present in the UCP ISUP IAM, then they are mapped to the Charge Number and the Calling Party Number of the Mexican ISUP IAM, respectively. If only the Calling Party Number is present in the UCP IAM, then it is mapped to the Calling Party Number parameter in the Mexican ISUP IAM.

Table 5-44
IAM-Mexican ISUP to UCP ISUP

Mexican ISUP IAM	UCP ISUP IAM
Nature of Connection Indicator (F)	Nature of Connection Indicator (F)
Forward Call Indicator (F)	Forward Call Indicator (F)
Calling Party Category (F)	Calling Party Category (F)
Called Party Number (V)	Called Party Number (V)
User Service Information (O)	User Service Information (O)
Charge Number (O) (See Note.)	Charge Number (O)
Calling Party Number (O)	Calling Party Number (O)

Note: If only the Charge Number is present in the UCP ISUP IAM, then it is mapped to the Charge Number of the Mexican ISUP IAM. In this case, the Charge Number is recorded in the CDR. If both the Charge Number and the Calling Party Number are present in the UCP ISUP IAM, then they are mapped to the Charge Number and the Calling Party Number of the Mexican ISUP IAM, respectively. If only the Calling Party Number is present in the UCP IAM, then it is mapped to the Calling Party Number parameter in the Mexican ISUP IAM.

—continued—

Table 5-44
IAM-Mexican ISUP to UCP ISUP

Mexican ISUP IAM	UCP ISUP IAM
Transit Network Selection (O)	Transit Network Selection (O)
Transmission Medium Requirement (F)	User Service Information (V)
User Service Information (O)	
Note: If only the Charge Number is present in the UCP ISUP IAM, then it is mapped to the Charge Number of the Mexican ISUP IAM. In this case, the Charge Number is recorded in the CDR. If both the Charge Number and the Calling Party Number are present in the UCP ISUP IAM, then they are mapped to the Charge Number and the Calling Party Number of the Mexican ISUP IAM, respectively. If only the Calling Party Number is present in the UCP IAM, then it is mapped to the Calling Party Number parameter in the Mexican ISUP IAM.	
—end—	

Table 5-45
ACM-UCP ISUP to Mexican ISUP

UCP ISUP ACM	Mexican ISUP ACM
Backward Call Indicator (F)	Backward Call Indicator (F)

Table 5-46
ACM-Mexican ISUP to UCP ISUP

Mexican ISUP ACM	UCP ISUP ACM
Backward Call Indicator (F)	Backward Call Indicator (F)

Table 5-47
ANM-UCP ISUP to Mexican ISUP

UCP ISUP ANM	Mexican ISUP ANM
Backward Call Indicator (O)	Backward Call Indicator (O)

Table 5-48
ANM-Mexican ISUP to UCP ISUP

Mexican ISUP ANM	UCP ISUP ANM
Backward Call Indicator (O)	Backward Call Indicator (O)

The Release message is reported for all International calls originating or terminating on UCP IMT trunks with the NETWKSPC field in table TRKGRP datafilled as GLOBAL. The Release message is handled differently depending upon the call releasing first from the originator or terminator.

If the originating trunk releases first, the Release message is tandemed across the network without any treatment to cause or cause to treatment mapping. See Tables 5-60 and 5-61 for the way interworking is done with the UCP ISUP IMTs mapping of Cause Indicator parameters.

If the terminating trunk releases first, the Release message is tandemed across the network when its Cause Indicator parameter has Cause Value CI_NORMAL_CLEARING. The Location and Coding Standard fields are mapped as shown in Tables 5-60 and 5-61 for interworking with UCP ISUP IMTs. If the Cause Indicator Parameter has a Cause Value other than CI_NORMAL_CLEARING or if the call goes to treatment, then the switch uses tables TMTMAP (Treatment to Cause Mapping) and CSEMAP (Cause to Treatment mapping) and maps according to datafill in those tables.

Table 5-49
REL-UCP ISUP to Mexican ISUP

UCP ISUP REL	Mexican ISUP REL
Cause Indicator (V)	Cause Indicator (V)

Table 5-50
REL-Mexican ISUP to UCP ISUP

UCP ISUP REL	Mexican ISUP REL
Cause Indicator (V)	Cause Indicator (V)

Parameter interworkings

Tables 5-51 through 5-72 indicate the mapping for parameter values which cannot be mapped in a straight-forward manner. Other values are passed along without any changes.

Table 5-51
UCP ISUP-Mexican ISUP Backward Call Indicator parameter mapping (continued)

UCP ISUP parameter	Mexican ISUP parameter
Charge Indicator: • No indication (0 0) • No charge (0 1) • Charge (1 0) • Spare (1 1)	Charge Indicator: • No indication (0 0) • No charge (0 1) • Charge (1 0) • Spare (1 1)
Called Party's Status Indicator: • No indication (0 0) • Subscriber free (0 1) • Connect when free (1 0) • Excessive Delay (1 1)	Called Party's Status Indicator: • No indication (0 0) • Subscriber free (0 1) • No indication (0 0) • No indication (0 0)
Called Party's Category Indicator: • No indication (0 0) • Ordinary subscriber (0 1) • Payphone (1 0) • Spare (1 1)	Charge Party's Category Indicator: • No indication (0 0) • Ordinary subscriber (0 1) • Payphone (1 0) • Spare (1 1)
End-to-end Method Indicator: • No end-to-end method available (0 0) • Pass-along method available (0 1) • SCCP method available (1 0) • Pass-along/SCCP methods available (1 1)	End-to-end Method Indicator: • No end-to-end method available (0 0) • No end-to-end method available (0 0) • No end-to-end method available (0 0) • No end-to-end method available (0 0)
Interworking Indicator: • No interworking encountered (0) • Interworking encountered (1)	Interworking Indicator: • No interworking encountered (0) • Interworking encountered (1)

—continued—

Table 5-51
UCP ISUP-Mexican ISUP Backward Call Indicator parameter mapping (continued)

UCP ISUP parameter	Mexican ISUP parameter
End-to-end Information Indicator • No end-to-end information available (0) • End-to-end information available (1)	End-to-end Information Indicator • No end-to-end information available (0) • No end-to-end information available (0)
ISDN User Part Indicator • ISDN User Part not used all the way (0) • ISDN User Part used all the way (1)	ISDN User Part Indicator • ISDN User Part not used all the way (0) • ISDN User Part used all the way (1)
Reverse Holding Indicator • Reverse holding required (1)	Holding Indicator • Holding not requested (0)
ISDN Access Indicator • Terminating access non-ISDN (0) • Terminating access ISDN (1)	ISDN Access Indicator • Terminating access non-ISDN (0) • Terminating access ISDN (1)
	Echo control device indicator • Incoming half echo control device not included (0)
SCCP method indicator • No indication (0 0)	SCCP method indicator • No indication (0 0)

—end—

Table 5-52
Mexican ISUP-UCP ISUP Backward Call Indicator parameter mapping

Mexican ISUP parameter	UCP ISUP parameter
Charge Indicator: • No indication (0 0) • No charge (0 1) • Charge (1 0) • Spare (1 1)	Charge Indicator: • No indication (0 0) • No charge (0 1) • Charge (1 0) • Spare (1 1)
Called Party's Status Indicator: • No indication (0 0) • Subscriber free (0 1) • Spare (1 1)	Called Party's Status Indicator: • No indication (0 0) • Subscriber free (0 1) • No indication (0 0)
Called Party's Category Indicator: • No indication (0 0) • Ordinary subscriber (0 1) • Payphone (1 0) • Spare (1 1)	Called Party's Category Indicator: • No indication (0 0) • Ordinary subscriber (0 1) • Payphone (1 0) • No indication (0 0)
End-to-end Method Indicator: • No end-to-end method available (0 0)	End-to-end Method Indicator: • No end-to-end method available (0 0)
Interworking Indicator: • No interworking encountered (0) • Interworking encountered (1)	Interworking Indicator: • No interworking encountered (0) • Interworking encountered (1)
End-to-end Information Indicator • No end-to-end information available (0)	End-to-end Information Indicator • No end-to-end information available (0)
ISDN User Part Indicator • ISDN User Part not used all the way (0) • ISDN User Part used all the way (1)	ISDN User Part Indicator • ISDN User Part not used all the way (0) • ISDN User Part used all the way (1)
Holding Indicator • Holding not requested (0)	Reverse Holding Indicator • Reverse holding not required (1)

—continued—

Table 5-52
Mexican ISUP-UCP ISUP Backward Call Indicator parameter mapping (continued)

Mexican ISUP parameter	UCP ISUP parameter
ISDN Access Indicator • Terminating access non-ISDN (0) • Terminating access ISDN (1)	ISDN Access Indicator • Terminating access non-ISDN (0) • Terminating access ISDN (1)
Echo control device indicator • Incoming half-echo control device not included (0) • Incoming half-echo control device included (1)	
SCCP method indicator • No indication (0 0)	SCCP method indicator • No indication (0 0)
—end—	

Table 5-53
Mexican ISUP-UCP ISUP Called Party Number Parameter Mapping

Mexican ISUP parameter	UCP ISUP parameter
Nature of Address Indicator: • Subscriber number (0000001) • National number (0000011) • International number (0000100) • Spare (0000000) • Unknown (0000010) • Spare (1111111) • Spare (0000101) • Spare (0000111) • Spare (0000111 to 1101111)	Nature of Address Indicator: • All based on call type
Numbering Plan Indicator: • Spare (000) • ISDN Numbering Plan (001) • Spare 010	Numbering Plan Indicator: • Unknown (000) • ISDN Numbering Plan (001) • Telephony Numbering Plan (010)

Table 5-54
UCP ISUP-Mexican ISUP Called Party Number parameter mapping

UCP ISUP parameter	Mexican ISUP parameter
Nature of Address Indicator: • Spare (0000000) • Subscriber number (0000001) • Spare (0000010) • National number (0000011) • International number (0000100) • National number, operator requested (0000101) • International number, operator requested (0000110) • Spare (0000111 to 1101111) • Treated call (1110000) • Subscriber number, operator requested (1110001) • National number, operator requested (1110010) • International number, operator requested (1110011) • Unknown (0000010) • No address present, operator requested (1110100) • No address present, cut-through call to carrier (1110101) • Call from a hotel/motel, Equal Access End Office (1110110) • Test line (1110111)	Nature of Address Indicator: • All based on call type
Numbering Plan Indicator: • Unknown (000) • ISDN Numbering Plan (001) • Telephony Numbering Plan (010)	Numbering Plan Indicator: • Spare (000) • ISDN Numbering Plan (001) • ISDN Numbering Plan (001)

Table 5-55
UCP ISUP-Mexican ISUP Calling Party Number parameter mapping

UCP ISUP parameter	Mexican ISUP parameter
Nature of Address Indicator	Nature of Address Indicator
• Spare (0000000)	• Spare (0000000)
• Subscriber number (0000001)	• Subscriber number (0000001)
• Spare (0000010)	• Spare (0000000)
• National number (0000011)	• National number (0000011)
• International number (0000100)	• International number (0000100)
• Spare (1110101 to 1110110)	• Spare (0000101 to 1100110)
• Spare (1100111)	• National number (0000011)
• No ANI received (1101000)	• Parameter will be discarded
• Spare (1101001 to 11 01111)	• Spare (1101001 to 1101111)
• Treated call (1110000)	• Spare (0000000)
• Subscriber number, operator requested (1110001)	• Subscriber number (0000001)
• National number, operator requested (1110010)	• Spare (0000000)
• International number, operator requested (1110011)	• National number (0000011)
• No address present, operator requested (1110100)	• International number (0000100)
• No address present, cut-through call to carrier (1110101)	• Spare (0000000)
• 950+ call from a local exchange carrier public station, hotel/motel line (1110110)	• Spare (0000000)
• Testline (1110111)	• Parameter will be discarded
• Spare (1111000 to 1111111)	• Spare (1111000 to 1111111)
Numbering Plan Indicator:	Numbering Plan Indicator:
• Unknown (000)	• Spare (000)
• ISDN Numbering Plan (001)	• ISDN Numbering Plan (001)
• Telephony Numbering Plan (010)	• ISDN Numbering Plan (001)

—continued—

Table 5-55
UCP ISUP-Mexican ISUP Calling Party Number parameter mapping

UCP ISUP parameter	Mexican ISUP parameter
Address Presentation Restricted: • Presentation allowed (00) • Presentation restricted (01) • Address unavailable due to interworking (10) • Spare (11)	Address Presentation Restricted: • Presentation allowed (00) • Presentation restricted (01) • Presentation restricted (01) • Spare (11)
Screening Indicator: • User provided, not screened (0 0) • User provided, screening passed (0 1) • User provided, screening failed (1 0) • Network provided (1 1)	Screening Indicator: • Discard parameter • User provided, screening passed (0 1) • Discard parameter • Network provided (1 1)
—end—	

Table 5-56
Mexican ISUP-UCP ISUP Calling Party Number parameter mapping

Mexican ISUP parameter	UCP ISUP parameter
Nature of Address Indicator • Subscriber number (0000001) • National number (0000011) • International number (0000100) • Spare (000 0000) • Spare (0000101 to 11 01111)	Nature of Address Indicator • Subscriber number (0000001) • National number (0000011) • International number (0000100) • Spare (000 0000) • Spare (0000101 to 11 01111)
Numbering Plan Indicator: • ISDN Numbering Plan (001) • Spare (000) • Spare (010)	Numbering Plan Indicator: • ISDN Numbering Plan (001) • Unknown (000) • Unknown (000)
—continued—	

Table 5-56
Mexican ISUP-UCP ISUP Calling Party Number parameter mapping

Mexican ISUP parameter	UCP ISUP parameter
Address Presentation Restricted: • Presentation allowed (00) • Presentation restricted (01) Screening Indicator: • User provided, verified, and passed (0 1) • Network provided (1 1)	Address Presentation Restricted: • Presentation allowed (00) • Presentation restricted (01) Screening Indicator: • User provided, verified, and passed (0 1) • Network provided (1 1)
—end—	

Table 5-57
UCP ISUP-Mexican ISUP Calling Party Category parameter mapping

Mexican ISUP/UCP ISUP parameter	UCP ISUP/Mexican ISUP parameter
Calling Party Category: • All values	Calling Party Category: • Tandemed

The Calling Party's Category parameter obtained in the UCP ISUP IAM message is interworked with the calling party's category in the Mexican ISUP IAM message as follows:

Case I:

If the ISDNXFER option is set in the table TRKGRP of the originator and the incoming IAM contains optional parameters, then:

Table 5-58
UCP ISUP-Mexican ISUP mapping of Calling Party Category parameter

UCP ISUP parameter	Mexican ISUP parameter
Calling Party Category • All Values	Calling Party Category • Tandemed

Case II:

If the ISDNXFER option is not set in the table TRKGRP of the originator and the incoming IAM does not contain any optional parameters, then:

Table 5-59
UCP ISUP-Mexican ISUP mapping of Calling Party Category parameter

UCP ISUP parameter	Mexican ISUP parameter
Calling Party Category • All Values	Calling Party Category • ISUP CPC Subscriber1 (0A)

Table 5-60
Mexican ISUP-UCP ISUP Cause Indicator parameter mapping

Mexican ISUP parameter	UCP parameter
Coding standard: • UIT standard (00) Location: • User (0000) • Transit network (0011) • Public network serving remote user (0100) • Private network serving remote user (0101) • International Network (0111) • Beyond an interworking point (1010)	Coding standard: • CCITT standard (00) Location: • User (0000) • Transit network (0011) • Remote local network (0100) • Remote private network (0101) • Unknown (1010) • Unknown (1010)

—continued—

Table 5-60
Mexican ISUP-UCP ISUP Cause Indicator parameter mapping (continued)

Mexican ISUP parameter	UCP parameter
Cause Value (Resource available):	Cause Value (Resource available):
• Unallocated number (0000001)	• Unallocated number (0000001)
• No route to specified transit network (0000010)	• No route to destination (0000011)
• No route to destination (0000011)	• No route to destination (0000011)
• Send special information tone (0000100)	• Send special information tone (0000100)
• Normal call clearing (0010000)	• Normal call clearing (0010000)
• User busy (0010001)	• User busy (0010001)
• No user responding (0010010)	• No user responding (0010010)
• No answer from user (0010011)	• No answer from user (0010011)
• Call rejected (0010101)	• Call rejected (0010101)
• Number changed (0010110)	• Number changed (0010110)
• Destination out of order (0011011)	• Destination out of order (0011011)
• Address incomplete (0011100)	• Address incomplete (0011100)
• Facility rejected (0011101)	• Facility rejected (0011101)
• Normal unspecified (0011111)	• Normal unspecified (0011111)
Cause Value (Resource unavailable):	Cause Value (Resource unavailable):
• No circuit available (0100010)	• No circuit available (0100010)
• Network out of order (0100110)	• Network out of order (0100110)
• Temporary failure (0101001)	• Temporary failure (0101001)
• Switching equipment congestion (0101010)	• Switching equipment congestion (0101010)
• Requested channel not available (0101100)	• Requested channel not available (0101100)
• Resource unavailable – unspecified (0101111)	• Resource unavailable – unspecified (0101111)

—continued—

Table 5-60
Mexican ISUP-UCP ISUP Cause Indicator parameter mapping (continued)

Mexican ISUP parameter	UCP parameter
Cause Value (Service or option unavailable): • Incoming calls barred (0110010) • Incoming calls barred within CUG (0110111) • Bearer capability not authorized (0111001) • Bearer capability presently not available (0111010) • Service/option not available – unspecified (0111111)	Cause Value (Service or option unavailable): • Outgoing calls barred (0110010) • Outgoing calls barred (0110111) • Bearer capability not authorized (0111001) • Bearer capability presently not available (0111010) • Service/option not available – unspecified (0111111)
Cause Value (Service or option not implemented): • Bearer capability not implemented (1000001) • Service/option not implemented – unspecified (1001111)	Cause Value (Service or option not implemented): • Bearer capability not implemented (1000001) • Service/option not implemented – unspecified (1001111)
Cause Value (Invalid message): • Called user not member of CUG (1010111) • Incompatible destination (1011000) • Invalid message – unspecified (1011111)	Cause Value (Invalid message): • Called user not member of CUG (1010111) • Incompatible destination (1011000) • Invalid message – unspecified (1011111)
Cause Value (Protocol error): • Protocol error – unspecified (1101111)	Cause Value (Protocol error): • Protocol error – unspecified (1101111)
Cause Value (Interworking): • Interworking unspecified (1111111)	Cause Value (Interworking): • Interworking unspecified (1111111)
—end—	

Table 5-61
UCP ISUP-Mexican ISUP Cause Indicator parameter mapping

UCP ISUP parameter	Mexican ISUP parameter
Coding standard: • CCITT standard (00) • International (01) • National (10)	Coding standard: • UIT standard (00) • UIT standard (00) • UIT standard (00)
Location: • User (0000) • Local Private Network (0001) • Local Network (0010) • Transit network (0011) • Remote local network (0100) • Remote private network (0101) • Unknown (1010)	Location: • User (0000) • International network (0111) • International network (0111) • Transit network (0011) • Public network serving remote user (0100) • Private network network serving remote user (0101) • Beyond an interworking point (1010)

—continued—

Table 5-61
UCP ISUP-Mexican ISUP Cause Indicator parameter mapping (continued)

UCP ISUP parameter	Mexican ISUP parameter
Cause Value (Resources available): • Unallocated number (0000001) • No route to specified transit network (0000010) • No route to destination (0000011) • Send special information tone (0000100) • Incorrectly dialed trunk prefix (0000101) • Normal call clearing (0010000) • User busy (0010001) • No user responding (0010010) • No answer from user (0010011) • Call returns (0011010) • Destination out of order (0011011) • Address incomplete (0011100) • Facility rejected (0011101) • Apply locally (0011110) • Normal unspecified (0011111)	Cause Value (Resources available): • Unallocated number (0000001) • No route to specified transit network (0000010) • No route to destination (0000011) • Send special information tone (0000100) • Normal unspecified (0011111) • Normal call clearing (0010000) • User busy (0010001) • No user responding (0010010) • No answer from user (0010011) • Call rejected (0010101) • Destination out of order (0011011) • Address incomplete (0011100) • Facility rejected (0011101) • Normal unspecified (0011111) • Normal unspecified (0011111)

—continued—

Table 5-61
UCP ISUP-Mexican ISUP Cause Indicator parameter mapping (continued)

UCP ISUP parameter	Mexican ISUP parameter
Cause Value (Resource unavailable):	Cause Value (Resource unavailable):
• No circuit available (0100010)	• No circuit available (0100010)
• Network out of order (0100110)	• Network out of order (0100110)
• Temporary failure (0101001)	• Temporary failure (0101001)
• Switching equipment congestion (0101010)	• Switching equipment congestion (0101010)
• Requested channel not available (0101100)	• Requested channel not available (0101100)
• User information discarded (0101011)	• Resource unavailable – unspecified (0101111)
• Preemption (0101101)	• Resource unavailable – unspecified (0101111)
• No preemption circuit available (0101110)	• Resource unavailable – unspecified (0101111)
• Resource unavailable – unspecified (0101111)	• Resource unavailable – unspecified (0101111)
Cause Value (Service or option unavailable):	Cause Value (Service or option unavailable):
• Outgoing calls barred (0110010)	• Incoming calls barred (0110010)
• Incompatible agents (0110101)	• Service/option not available – unspecified (0111111)
• Bearer capability not authorized (0111001)	• Bearer capability not authorized (0111001)
• Bearer capability presently not available (0111010)	• Bearer capability presently not available (0111010)
• Service/option not available – unspecified (0111111)	• Service/option not available – unspecified (0111111)

—continued—

Table 5-61
UCP ISUP-Mexican ISUP Cause Indicator parameter mapping (continued)

UCP ISUP parameter	Mexican ISUP parameter
Cause Value (Service or option not implemented):	Cause Value (Service or option not implemented):
• Bearer capability not implemented (1000001)	• Bearer capability not implemented (1000001)
• Service/option not implemented – unspecified (1001111)	• Service/option not implemented – unspecified (1001111)
• Incompatible agents (0110101)	• Service/option not implemented – unspecified (1001111)
• Channel type not implemented (1000010)	• Service/option not implemented – unspecified (1001111)
• Facility not implemented (10000101)	• Service/option not implemented – unspecified (1001111)
• Only restricted digital information bearer capability available (1000110)	• Service/option not implemented – unspecified (1001111)
Cause Value (Invalid message):	Cause Value (Invalid message):
• Invalid call reference value (1010001)	• Invalid message – unspecified (1011111)
• Called user not member of CUG (1010111)	• Called user not member of CUG (1010111)
• Incompatible destination (1011000)	• Incompatible destination (1011000)
• Invalid message – unspecified (1011111)	• Invalid message – unspecified (1011111)
Cause Value (Protocol error):	Cause Value (Protocol error):
• Message type not implemented (1100001)	• Protocol error – unspecified (1101111)
• Parameter not implemented (1100011)	• Protocol error – unspecified (1101111)
• Invalid parameter contents (1100100)	• Protocol error – unspecified (1101111)
• Parameter not passed (1100111)	• Protocol error – unspecified (1101111)
• Protocol error – unspecified (1101111)	• Protocol error – unspecified (1101111)
Cause Value (Interworking):	Cause Value (Interworking):
• Interworking unspecified (1111111)	• Interworking unspecified (1111111)
—end—	

Table 5-62
Mexican ISUP-UCP ISUP Charge Number parameter mapping

Mexican ISUP parameter	UCP parameter
Nature of Address Indicator (Calling party's charge number): • Subscriber number (0000001) • National number (0000011) • Unavailable (0000010) • Subscriber number (0000001) • National number (0000111) • Unavailable (0000110)	Nature of Address Indicator (ANI of calling party): • Subscriber number (0000001) • National number (0000011) • Unavailable (0000010) • Subscriber number (0000001) • National number (0000111) • Unavailable (0000110)
Numbering Plan Indicator: • Unknown (000) • ISDN Numbering Plan (001) • Private Numbering Plan (101)	Numbering Plan Indicator: • Unknown (000) • ISDN Numbering Plan (001) • Private Numbering Plan (101)

Table 5-63
UCP ISUP-Mexican ISUP Charge Number parameter mapping

UCP ISUP parameter	Mexican ISUP parameter
Odd/Even Indicator: • Even number of address digits (0) • Odd number of address digits (1)	Odd/Even Indicator: • Even number of address digits (0) • Odd number of address digits (1)
Nature of Address Indicator (ANI of calling party): • Subscriber number (0000001) • National number (0000011) • Unavailable (0000010) • Subscriber number (0000001) • National number (0000111) • Unavailable (0000110)	Nature of Address Indicator(Calling party's charge number): • Subscriber number (0000001) • National number (0000011) • Unavailable (0000010) • Subscriber number (0000001) • National number (0000111) • Unavailable (0000110)
—continued—	

Table 5-63
UCP ISUP-Mexican ISUP Charge Number parameter mapping (continued)

UCP ISUP parameter	Mexican ISUP parameter
Numbering Plan Indicator: • Unknown (000) • ISDN Numbering Plan (001) • Telephony Numbering Plan (010) Address digits (0000 to 1100)	Numbering Plan Indicator: • Unknown (000) • ISDN Numbering Plan (001) • Telephony Numbering Plan (010) Address signals (0000 to 1100)
—end—	

Table 5-64
UCP ISUP-Mexican ISUP Forward Call Indicator parameter mapping

UCP ISUP parameter	Mexican ISUP parameter
National/international Indicator: • Incoming national call (0) • Incoming international call (0) End-to-end method Indicator: • No end-to-end method available (00) • Pass along method available (01) • SCCP method available (10) • Pass along and SCCP methods available (11) Interworking Indicator: • No interworking encountered (0) • Interworking encountered (1) End-to-end Information Indicator: • No end-to-end information available (0) • End-to-end information available (1) ISUP indicator • ISUP not used all the way (0) • ISUP used all the way (1)	National/international Indicator: • Call to be treated as national call (0) • Call to be treated as international call (0) End-to-end method Indicator: • No end-to-end method available (00) • No end-to-end method available (00) • No end-to-end method available (00) • No end-to-end method available (00) Interworking Indicator: • No interworking encountered (0) • Interworking encountered (1) End-to-end Information Indicator: • No end-to-end information available (0) • No end-to-end information available (0) ISUP indicator • ISUP not used all the way (0) • ISUP used all the way (1)
—continued—	

Table 5-64
UCP ISUP-Mexican ISUP Forward Call Indicator parameter mapping (continued)

UCP ISUP parameter	Mexican ISUP parameter
ISUP Preference Indicator • ISUP preferred all the way (00) • ISUP not required all the way (01) • ISUP required all the way (10) • Spare (11)	ISUP Preference Indicator • ISUP preferred all the way (00) • ISUP not required all the way (01) • ISUP required all the way (10) • Spare (11)
ISDN Access Indicator • Originating access non-ISDN (0) • Originating access ISDN (1)	ISDN Access Indicator • Originating access non-ISDN (0) • Originating access ISDN (1)
—end—	

Table 5-65
Mexican ISUP-UCP ISUP Forward Call Indicator parameter mapping

Mexican ISUP parameter	UCP ISUP parameter
National/international Indicator: • Call to be treated as national call (0) • Call to be treated as international call (1)	National/international Indicator: • Incoming national call (0) • Incoming international call (1)
End-to-end method Indicator: • No end-to-end method available (00)	End-to-end method Indicator: • No end-to-end method available (00)
Interworking Indicator: • No interworking encountered (0) • Interworking encountered (1)	Interworking Indicator: • No interworking encountered (0) • Interworking encountered (1)
End-to-end Information Indicator: • No end-to-end information available (0) • End-to-end information available (1)	End-to-end Information Indicator: • No end-to-end information available (0) • No end-to-end information available (1)
ISUP indicator • ISUP not used all the way (0) • ISUP used all the way (1)	ISUP indicator • ISUP not used all the way (0) • ISUP used all the way (1)
—continued—	

Table 5-65
Mexican ISUP-UCP ISUP Forward Call Indicator parameter mapping (continued)

Mexican ISUP parameter	UCP ISUP parameter
ISUP Preference Indicator • ISUP preferred all the way (00) • ISUP not required all the way (01) • ISUP required all the way (10) • Spare (11)	ISUP Preference Indicator • ISUP preferred all the way (00) • ISUP not required all the way (01) • ISUP required all the way (10) • Spare (11)
ISDN Access Indicator • Originating access non-ISDN (0) • Originating access ISDN (1)	ISDN Access Indicator • Originating access non-ISDN (0) • Originating access ISDN (1)
—end—	

Table 5-66
Mexican-UCP mapping when no USI is received in the incoming Mexican ISUP IAM

Mexican ISUP IAM		UCP ISUP IAM
TMR	**OPTIONAL USI**	**MANDATORY USI**
3.1 kHz Audio/Speech	None	Information transfer capability (ITC)(See Note 1) • Mapped to the Transmission Medium Requirement (TMR) value Information transfer rate (ITR): • 64 kbit/s Coding Standard: • National Standard Transfer Mode: • Circuit mode Layer 1 information • value taken from table CARRMTC
Note 1: The information transfer capability in the UCP ISUP IAM takes on the value of the TMR of the Mexican ISUP IAM.		
—continued—		

Table 5-66
Mexican-UCP mapping when no USI is received in the incoming Mexican ISUP IAM (continued)

Mexican ISUP IAM		**UCP ISUP IAM**
TMR	**OPTIONAL USI**	**MANDATORY USI**
64 K Unrestricted	None	Information transfer capability: • 64 kbit/s Unrestricted Information transfer rate: • 64 kbit/s Coding Standard: • National Standard Transfer Mode: • Circuit mode Layer 1 information: • Layer 1 rate adaptation User rate: 56 kbit/s • 56 kbit/s
Note 1: The information transfer capability in the UCP ISUP IAM takes on the value of the TMR of the Mexican ISUP IAM.		
		—end—

Table 5-67
Mexican-UCP mapping when a 2-byte USI is received in the incoming Mexican ISUP IAM

Mexican ISUP IAM		**UCP ISUP IAM**
TMR	**OPTIONAL USI**	**MANDATORY USI**
3.1 kHz/Speech	Information Transfer Capability • Any value supported	Information Transfer Capability • Mapped to the Transmission Medium Requirement (TMR) value
	Information transfer rate • 64 kbit/s • Packet mode calls (00000) • For other values give BCNI treatment	Information transfer rate • 64 kbit/s • 64 kbit/s
	Coding Standard • All Values	Coding Standard • National Standard
	Transfer Mode • Circuit mode • Packet mode	Transfer Mode • Circuit mode • Packet mode
64 kbit/s Unrestricted	Information Transfer Capability • Any value supported	Information Transfer Capability • 64 kbit/s Unrestricted
	Information transfer rate • 64 kbit/s • Packet mode calls (00000) • For other values give BCNI treatment	Information transfer rate • 64 kbit/s • 64 kbit/s
	Coding Standard • All values	Coding Standard • National Standard
	Transfer Mode • Circuit mode • Packet mode	Transfer Mode • Circuit mode • FNAL treatment

Table 5-68
Mexican-UCP mapping when a 3-byte USI is received in the incoming Mexican ISUP IAM

Mexican ISUP IAM		**UCP ISUP IAM**
TMR	**OPTIONAL USI**	**MANDATORY USI**
3.1 kHz/Speech	Information Transfer Capability • Any value supported	Information Transfer Capability • Mapped to the Transmission Medium Requirement (TMR) value
	Information transfer rate • 64 kbit/s • Packet mode calls • For other values give BCNI treatment.	Information transfer rate • 64 kbit/s • 64 kbit/s
	Coding Standard • All Values	Coding Standard • National Standard
	Transfer Mode • Circuit mode • Packet mode	Transfer Mode • Circuit mode • Packet mode
	Layer 1 information • Any supported value	Layer 1 information • Value is taken from table CARRMTC
Note: If a USI parameter comes from the originating agency with layer 2 or layer 3 information, the call routes to treatment PROTOCOL_ERROR. If a USI comes in with Packet mode and a transmission requirement of 64 kbit/s Unrestricted, the call goes to FNAL treatment.		

Table 5-69
Mexican-UCP mapping when a 4-byte USI is received in the incoming Mexican ISUP IAM

Mexican ISUP IAM		**UCP ISUP IAM**
TMR	**OPTIONAL USI**	**MANDATORY USI**
64 kbit/s unrestricted (See Note 1.)	ITC • Any value supported	ITC • 64 kbit/s Unrestricted
	Information transfer rate (See Note 2) • 64 kbit/s • Packet mode calls • For other values give BCNI treatment.	Information transfer rate • 64 kbit/s • 64 kbit/s
	Coding Standard • All Values	Coding Standard • National Standard
	Transfer Mode • Circuit mode • Packet mode	Transfer Mode • Circuit mode • Packet mode

Note 1: A 4-byte USI in the incoming Mexican ISUP IAM can come only if the TMR is 64 kbit/s unrestricted.

Note 2: Information Transfer Rate with values of 1472 kbit/s and Multirate are unrecognized USI values.

Note 3: The layer 1 information is built on the UCP only if the User Rate is 56 kbit/s. The 4-byte incoming USI is sent out as a 4-byte USI only if the User Rate is 56 kbit/s. For all other values, the 4-byte USI is sent out as a 2-byte USI.

—continued—

Table 5-69
Mexican-UCP mapping when a 4-byte USI is received in the incoming Mexican ISUP IAM

Mexican ISUP IAM		UCP ISUP IAM
TMR	**OPTIONAL USI**	**MANDATORY USI**
	Layer 1 information • Any supported value User Rate • 56 kbit/s • All other values	Layer 1 information (See Note 3) • Tandemed User Rate • 56 kbit/s • Not built on the UCP side
Note 1: A 4-byte USI in the incoming Mexican ISUP IAM can come only if the TMR is 64 kbit/s unrestricted. ***Note 2:*** Information Transfer Rate with values of 1472 kbit/s and Multirate are unrecognized USI values. ***Note 3:*** The layer 1 information is built on the UCP only if the User Rate is 56 kbit/s. The 4-byte incoming USI is sent out as a 4-byte USI only if the User Rate is 56 kbit/s. For all other values, the 4-byte USI is sent out as a 2-byte USI.		
—end—		

In the case of non-tandem calls (if there are no optional parameters in the incoming IAM or if the originator's TRKGRP is missing the option ISDNXFER), the switch builds the default TMR and USI. See Tables 5-70 and 5-71.

If the incoming UCP ISUP IAM comes in with an ITC of 64 kbit/s, restricted or unrestricted, it is a data call. The switch builds a default 4-byte USI for a data call and sends out the TMR value as 64 kbit/s unrestricted. See Table 5-70.

Table 5-70
Mexican ISUP USI and TMR for a non-tandem case (data call)

Outgoing Mexican ISUP IAM	
TMR	**OPTIONAL USI**
64 kbit/s unrestricted	ITC: • 64 kbit/s unrestricted ITR: • 64 kbit/s unrestricted Coding Standard: • National Standard Transfer Mode: • Circuit mode Layer 1 information: • Layer 1 rate adaptation User Rate: • 56 kbit/s

Table 5-71
Mexican ISUP USI and TMR for a non-tandem case (non-data call)

Outgoing Mexican ISUP IAM	
TMR	**OPTIONAL USI**
Speech	ITC: • Speech Information transfer rate Coding Standard: • National Standard Transfer Mode: • Circuit mode Layer 1 information • Value is taken from table CARRMTC

In the case of tandem calls (if the originator has optional parameters in the incoming IAM or if the originator's TRKGRP has option ISDNXFER set), the switch maps the USI in the incoming UCP IAM to the TMR and USI in the outgoing Mexican ISUP IAM as shown in Table 5-72.

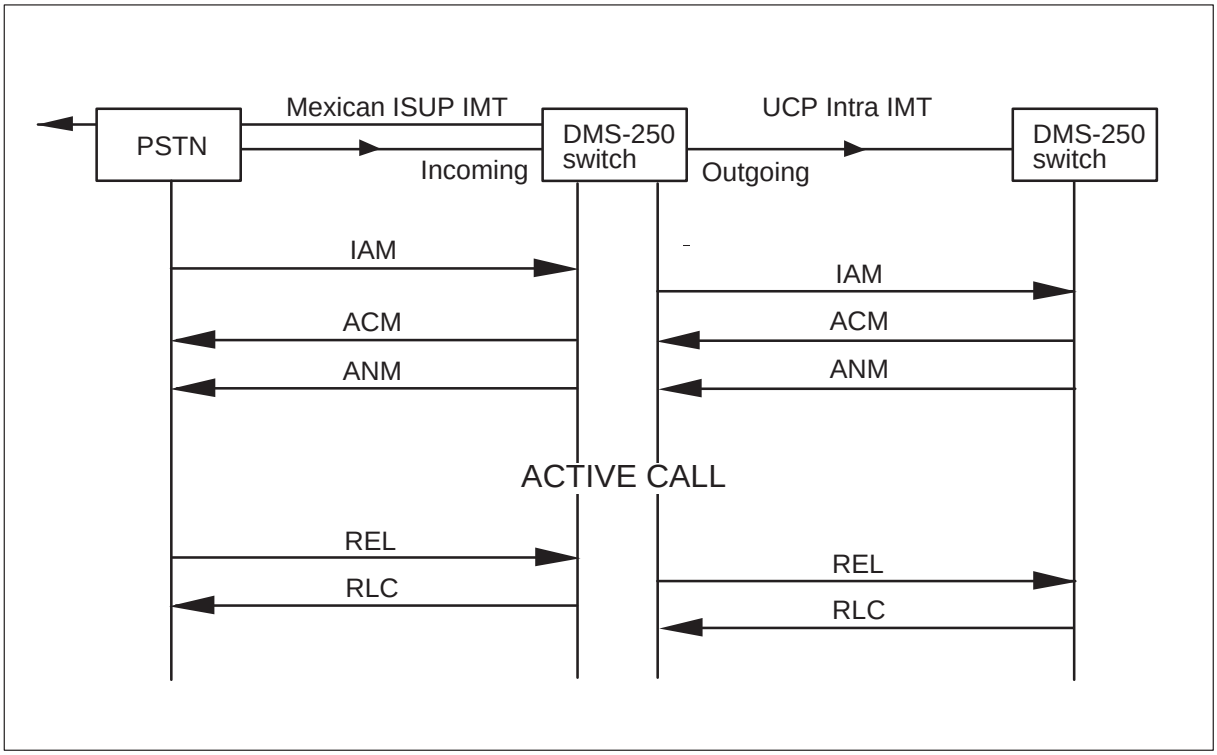
Table 5-72
UCP-Mexican mapping with USI received in the incoming Mexican IAM for a tandem case

UCP ISUP IAM	**Mexican IAM**	
MANDATORY USI	**TMR**	**OPTIONAL USI**
Information transfer capability		Information transfer capability
• 64 kbit/s unrestricted	• 64 kbit/s unrestricted	• 64 kbit/s unrestricted
• 64 kbit/s restricted	• 64 kbit/s unrestricted	• 64 kbit/s restricted
• speech	• speech	• speech
• 3.1 kHz audio	• 3.1 kHz audio	• 3.1 kHz audio
• 7 kHz audio	• 3.1 kHz audio	• 3.1 kHz audio
• 15 kHz audio	• 3.1 kHz audio	• 3.1 kHz audio
• Video	• 3.1 kHz audio	• 3.1 kHz audio
Information transfer rate		Information transfer rate
• 64 kbit/s		• 64 kbit/s
• Packet mode calls		• 64 kbit/s
• For other values give BCNI treatment		
Coding Standard		Coding Standard
• All values		• National Standard
Transfer Mode		Transfer Mode
• Circuit mode		• Circuit mode
• Packet mode (See Note)		• Packet mode
Layer 1 information		Layer 1 information
• Any supported value		• Value is taken from table CARRMTC
Note: Data calls with Packet mode are given FNAL treatment.		

Call flows

The UCS DMS-250 switch uses the en-bloc mode of address signaling when sending all the address digits of the Called Party Number parameter in the IAM. Figure 5-6 shows the normal call flow when the switch uses en-bloc signaling to interwork the Mexican ISUP IMT and UCP Intra IMT trunk agencies.

Figure 5-6
Call flow diagram for Mexican ISUP (Global) IMT and UCP Intra IMT trunk agency interworking with en-bloc signaling mode



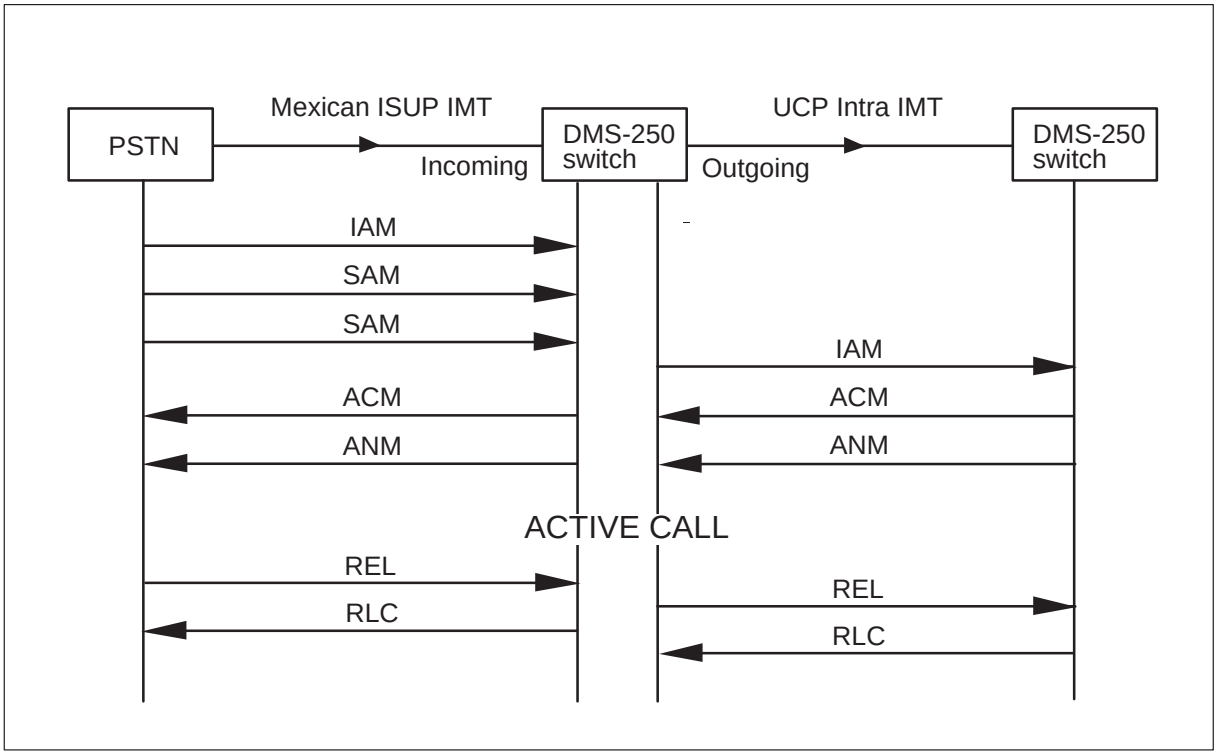
In the overlap signaling mode, the UCS DMS-250 switch receives the Called Party Number in multiple messages. If the incoming IAM contains no digits in the Called Party Number or incomplete digits in Called Party Number, the UCS DMS-250 switch enters overlap sending (from the PSTN's perspective) mode (if OVLAP is datafilled as Y in TRKSGRP).

An F digit in the last address digit position of the Called Party Number in the IAM indicates that all the called party address digits have been received. Similarly, if the Subsequent Number in the SAM does not contain the F digit in the last address digit position, then the switch waits for the next SAM. A timer (four seconds) starts when the switch receives an IAM with an incomplete Called Party Number. The UCS DMS-250 switch stays in overlap sending mode until all the information about the called party

becomes available (by way of SAMs). After receiving the Called Party Number, the UCS DMS-250 switch processes the Called Party Number and sends out an IAM to initiate call setup. (in en-bloc mode).

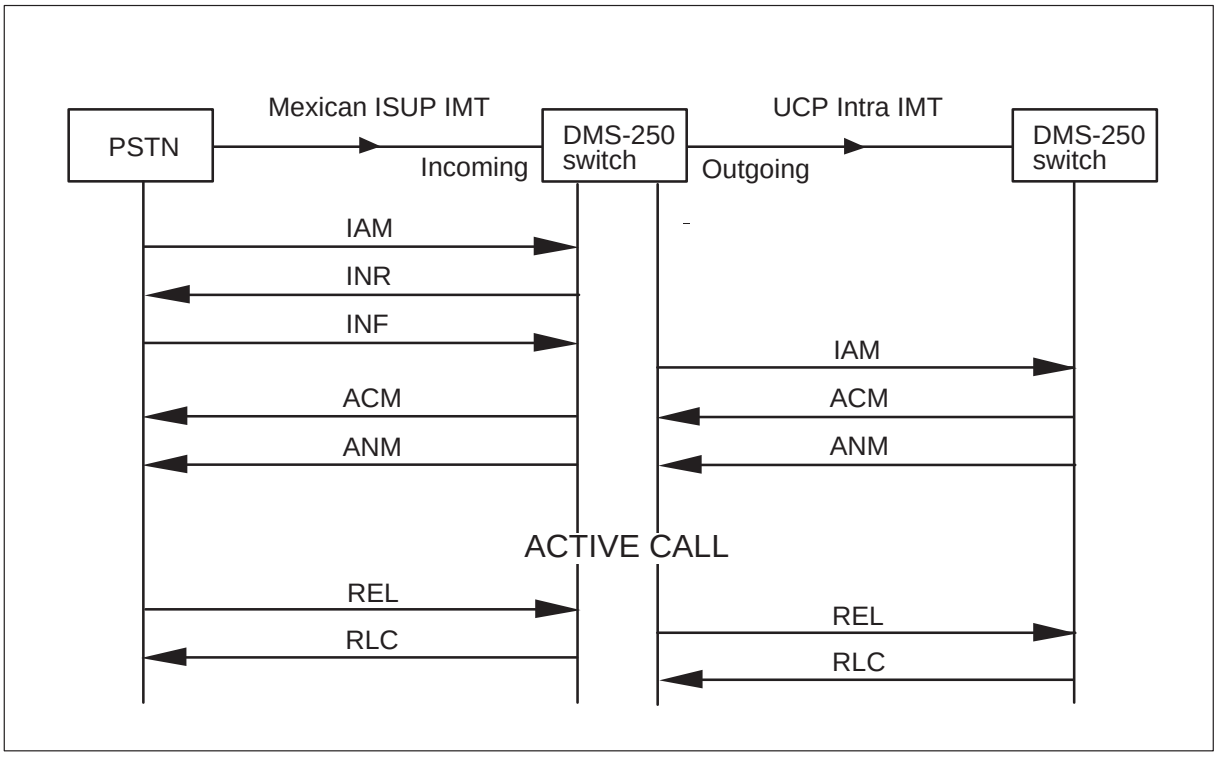
Figure 5-7 shows the normal call flow when the switch uses overlap signaling to interwork the Mexican ISUP IMT and UCP Intra IMT trunk agencies.

Figure 5-7
Call flow diagram for Mexican ISUP IMT and UCP Intra IMT trunk agency interworking with overlap signaling mode



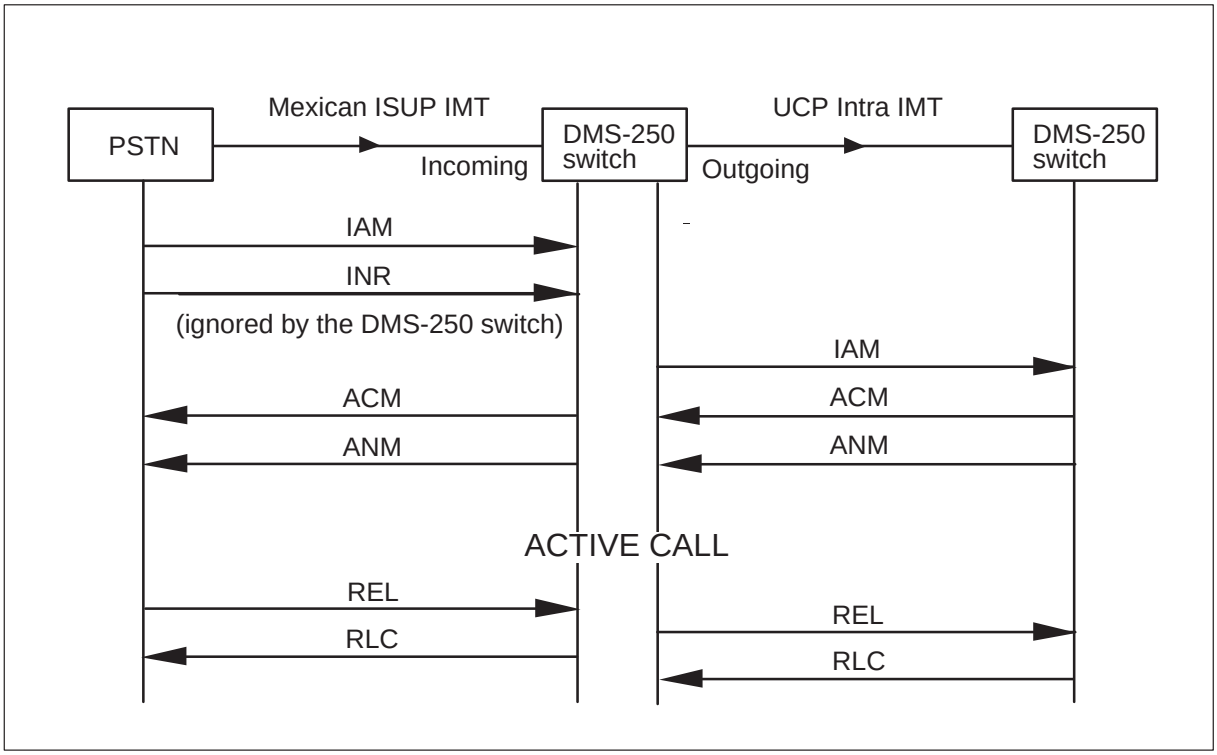
When the Calling Party Number is absent, empty, or incomplete in the IAM the switch receives and the CLIREQ field in table TRKGRP is set to Y, then the UCS DMS-250 switch sends an Information Request message (INR) to the preceding switch requesting the complete calling party address, as shown in the call flow diagram in Figure 5-8.

Figure 5-8
Call flow diagram for Mexican ISUP IMT and UCP Intra IMT trunk agency interworking with the INR sent on the originator



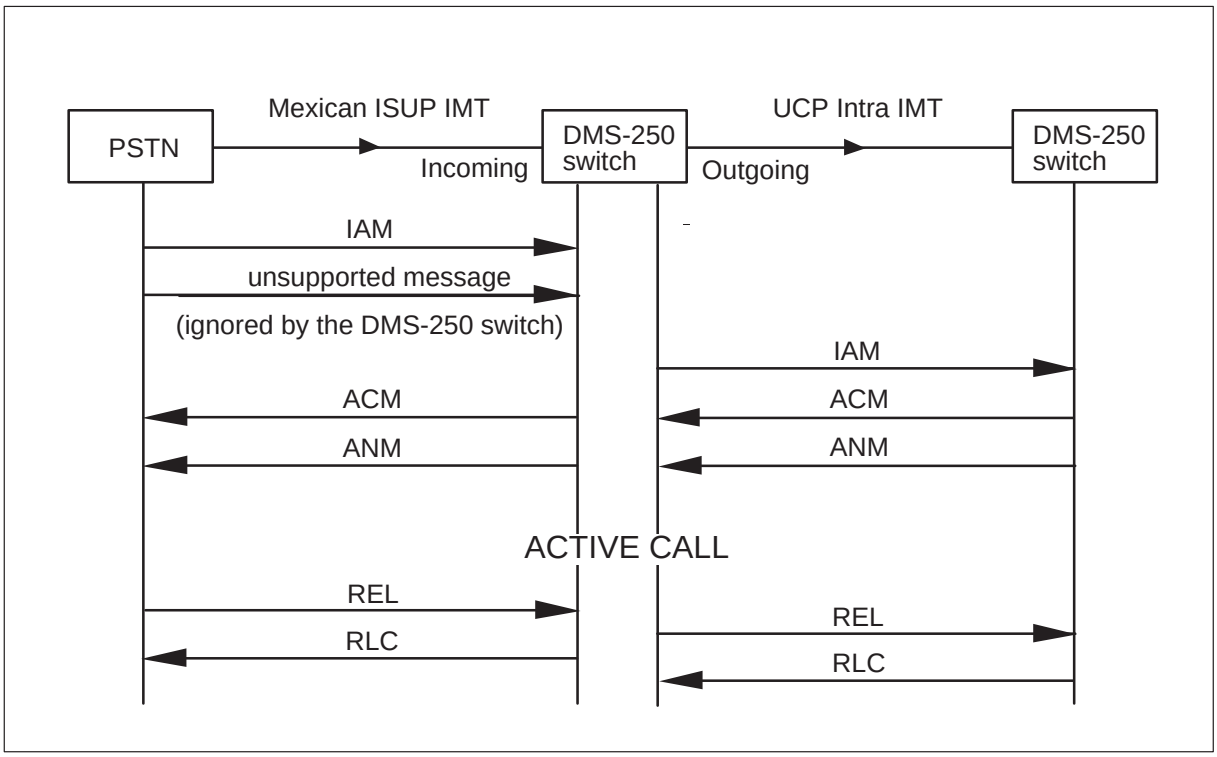
When an INR is received from the originator, the received INE message is ignored by the UCS DMS-250 switch. See Figure 5-9.

Figure 5-9
Call flow diagram for Mexican ISUP IMT and UCP Intra IMT trunk agency interworking with the INR received on the Originator



When an unsupported message is received from the originator, the unexpected message is ignored by the UCS DMS-250 switch, as shown in Figure 5-10.

Figure 5-10
Call flow diagram for Mexican ISUP IMT and UCP Intra IMT trunk agency interworking when the originator receives an unsupported message



The Connect (CON) message is reported internally to the UCS DMS-250 switch as an ANM. UCP ISUP does not support the Connect message. The Connect message is interworked to a UCP trunk as an ANM.

If the UCS DMS-250 switch receives a CPG message from the terminator, then the message is tandemed.

If the UCS DMS-250 switch receives a FOT message after the ACM, then the message is tandemed. The switch can receive the FOT message only in the Forward direction.

If the UCS DMS-250 switch receives a COT message, it checks for the continuity indicators. If the continuity indicators show that the continuity test has failed, the switch waits for the CCR message. If the continuity test fails, the UCS DMS-250 switch releases the call.

If the UCS DMS-250 switch receives a CCR message, it applies a loop on that particular trunk for the COT frequency. It then expects a subsequent COT message after which it releases the trunk.

When the UCS DMS-250 switch receives an unknown message on the originating or terminating Mexican ISUP (Global) IMT trunk, the unknown message is discarded no matter what the state of the call.

Mexican ISUP IMT and Mexican ISUP IMT interworkings

This section contains interworking information for the TMR and USI parameters of the IAM message when originating and terminating on ITU ISUP. In addition, call flow information is provided for the following cases:

- ACM does not come after IAM
- INF does not come after INR

Parameter interworkings

Tables 5-73 through 5-76 indicate the mapping for parameter values which cannot be mapped in a straight-forward manner. Other values are passed along without any changes.

In the case of a Mexican ISUP to Mexican ISUP call, the supported values of the TME and USI parameters are tandemed. If not USI is received, then a default USI is built on the outgoing side. The default USI is a two-bye USI. If the incoming TMR is 64 kbit/s unrestricted and is a three-byte USI if the TMR is speech/3.1 kHz. See Tables 5-73 through 5-76.

Table 5-73
Mapping for TMR values of Speech and 3.1 kHz audio

Mexican ISUP IAM	Mexican ISUP IAM
Transmission Medium Requirement: • Speech • 3.1 kHz Audio Information transfer capability • Any supported value	Transmission Medium Requirement: • Speech • 3.1 kHz Audio Information transfer Capability • Mapped to the Transmission Medium Requirement (TMR) value
Note: This mapping is done if the switch receives a 3-byte USI.	
—continued—	

Table 5-73
Mapping for TMR values of Speech and 3.1 kHz audio (continued)

Mexican ISUP IAM	Mexican ISUP IAM
Information Transfer Rate: • 64 kbit/s • 2X64 kbit/s • Packet mode calls (00000) • For other values give BCNI treatment	Information Transfer Rate: • 64 kbit/s • 64 kbit/s • 64 kbit/s
Layer 1 Information (See Note): • Any supported value	Layer 1 Information: • Mapped based upon the datafill in table CARRMTC
Note: This mapping is done if the switch receives a 3-byte USI.	
—end—	

Table 5-74
Mapping for TMR values of 64 kbit/s

Mexican ISUP IAM	Mexican ISUP IAM
Transmission Medium Requirement: • 64 kbit/s unrestricted Information transfer capability • Any supported value Information Transfer Rate: • 64 kbit/s • 2X64 kbit/s • Packet mode calls (00000) • For other values give BCNI treatment	Transmission Medium Requirement: • 64 kbit/s unrestricted Information transfer capability • Mapped to the TMR value Information Transfer Rate: • 64 kbit/s • 64 kbit/s • 64 kbit/s
—continued—	

Table 5-74
Mapping for TMR values of 64 kbit/s (continued)

Mexican ISUP IAM	Mexican ISUP IAM
Layer 1 Information: • Any supported value User Rate: • All supported Values	Layer 1 Information: • Layer 1 rate adaptation User Rate: • tandemed
—end—	

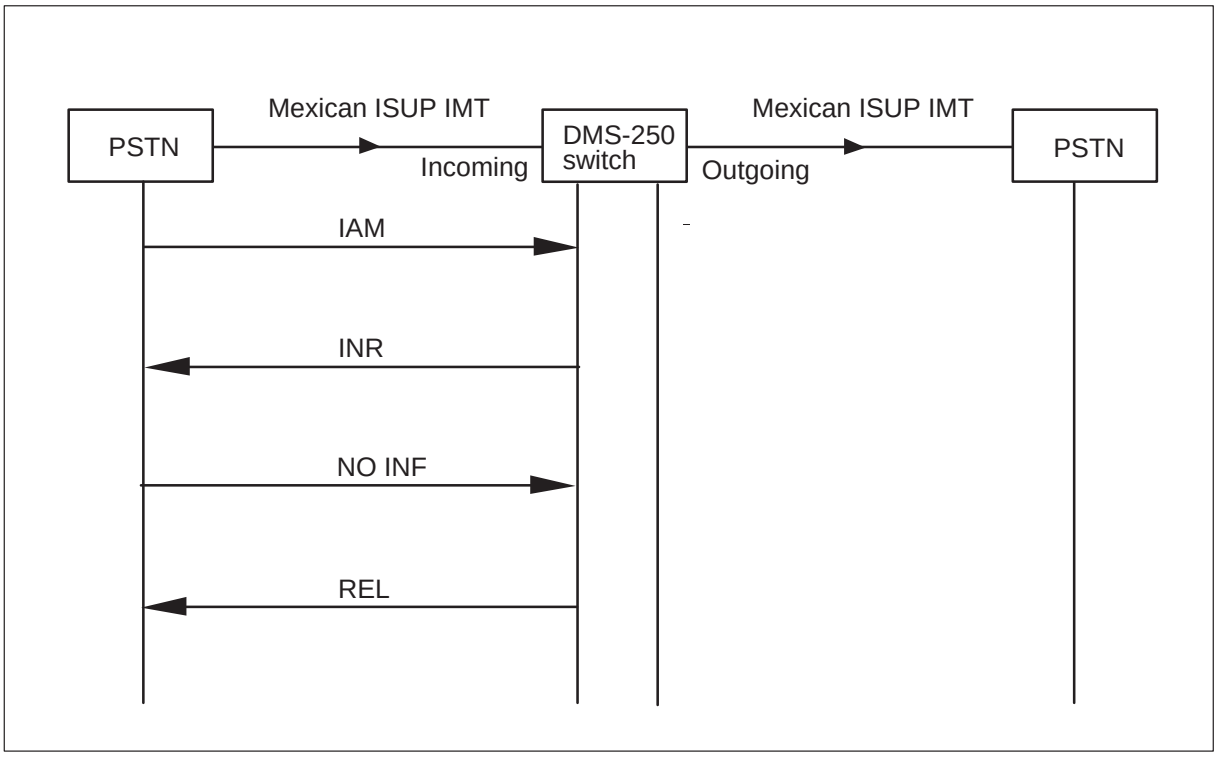
Table 5-75
Mapping for the TMR when the switch receives no USI and TMR is speech/3.1 kHz audio

Mexican ISUP IAM	Mexican ISUP IAM
Transmission Medium Requirement: • Speech • 3.1 KHz Audio	Transmission Medium Requirement: • Speech • 3.1 KHz Audio Information transfer Capability • Mapped to the Transmission Medium Requirement (TMR) value Information Transfer Rate: • 64 KB/S Layer 1 Information: • Value is based upon the datafill in table CARRMTC

Table 5-76
Mapping for the TMR when USI is not received and TMR is 64 kbit/s unrestricted

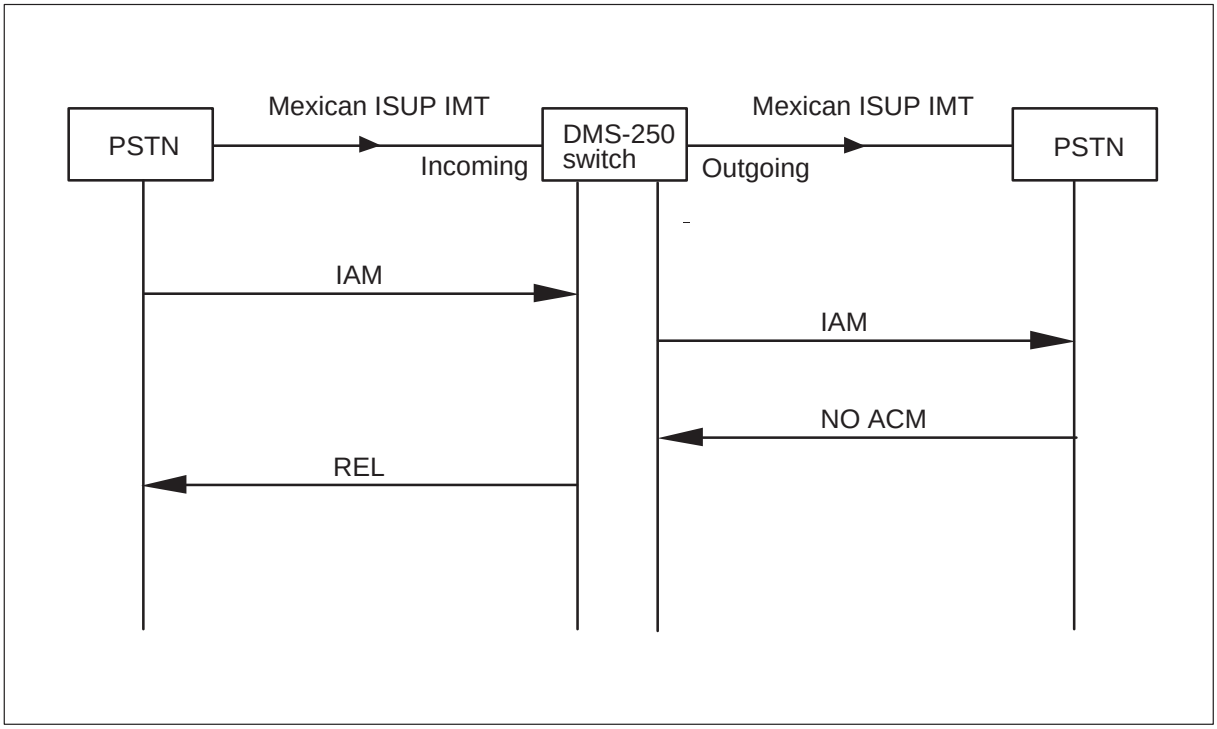
Mexican ISUP IAM	Mexican ISUP IAM
Transmission Medium Requirement 64kbit/s Unrestricted	Transmission Medium Requirement • 64kbit/s Unrestricted Information Transfer Capability • Mapped to the Transmission Medium Requirement (TMR) value. Information Transfer Rate: 64 kbit/s Layer 1 Information: Layer 1 rate adaptation User Rate: 56 kbit/s

Figure 5-11
Mexican ISUP IMT and Mexican ISUP IMT interworking – unsuccessful call (no INF after INR)



When an INF does not arrive after the UCS DMS-250 switch sends an INR, the call is taken down.

Figure 5-12
Mexican ISUP IMT and Mexican ISUP IMT interworking – unsuccessful call (no ACM after IAM)



When an ACM does not arrive after the UCS DMS-250 switch sends an IAM, the call is taken down.

Mexican ISUP IMT and Mexican R2 interworkings

This section documents the interworkings between the Mexican ISUP IMT and the Mexican R2 protocols. Mexican ISUP messages that are interworked with Mexican R2 include:

- Initial Address Message (IAM)
- Subsequent Address Message (SAM)
- Information Message (INF)
- Address Complete Message (ACM)
- Answer Message (ANM)
- Release Message (REL)

Mexican ISUP message/parameter and Mexican R2 signal interworkings

The following Tables 5-77 through 5-89 explain the mappings between the Mexican ISUP message/parameters and the corresponding Mexican R2 activities. Only the messages/ parameters that map to R2 activity/signals are shown.

Table 5-77
Mexican ISUP to R2 parameter mapping

Message	Mex ISUP parameters	Type	R2 signal/activity
IAM	Called Party Number	V	Called Party Digits (Grp I-DIGIT_0 to DIGIT_9)
	Calling Party Number	O	Calling Party Digits (Grp III-DIGIT_0 to DIGIT_9)
	Calling Party Category (CPC)	F	Calling Party Category
			Billing Party Category
SAM	Called Party Number	V	Called Party Digits (Grp I-DIGIT_0 to DIGIT_9)
ACM	Backward Call Indicator	F	Connect_call_chg
	Charge Indicator	–	–
CONNECT	–	–	Connect_call_chg, line signal - Answer
ANM	–	–	line signal - Answer
REL	Cause Indicator	V	See Treatment section.
INF	Information Indicators	F	Calling Party Digits (Grp III-DIGIT_0 to DIGIT_9)
RSC (Note 2)			Maps to Congestion if register signal is still on. Otherwise, local treatment is applied.
BLO (Note 2)			Maps to Congestion if register signal is still on. Otherwise, local treatment is applied.

Note 1: Type: V-variable; O-optional; F-fixed

Note 2: RSC and BLO Messages are mapped to R2 activities. Congestion on ISUP termination if register signaling is not completed.

Note 3: ISUP Calling Party Category is mapped to both R2 Calling Party Category and Billing Category.

Table 5-78
Mapping of Mexican ISUP Calling Party Category value to Calling PartyCategory/Billing Category value on R2

Mexican ISUP CPC	Calling Party Category on R2	Billing Category on R2
Ordinary subscriber	Regular	Regular
Test call	Mtc_eq	Mtc_eq
Operator (All values)	Oper	Oper
	Regular	Regular
Operator with call offer capacity	Oper	Oper
Calling subscriber with priority	Regular	Regular
Data call	Regular	Regular
Payphone	Coin	Coin
Other values	Regular	Regular

Table 5-79
R2 signal/activity to Mexican ISUP parameter mapping

R2 signal/activity	Mex ISUP Message	Mexican ISUP Parameters
called party digits (Grp I-DIGIT_0 to DIGIT_9)	IAM	Called Party Number digits
calling party digits (Grp III-DIGIT_0 to DIGIT_9)		Calling Party Number digits
calling party category (Grp II)		Calling Party Category
connect_call_chg1 (See Note 1)	ACM	Backward call indicator: Charge Indicator-charge
connect_call_nochg		
line signal - Answer	ANM	Backward call indicator: Charge Indicator
Note 1: Connect_call_chg can be sent before the switch receives the ACM. ***Note 2:*** Clear forward (line signal) is mapped to the REL message if it is not in response to congestion, sub_busy or clear backward messages.		

—continued—

Table 5-79
R2 signal/activity to Mexican ISUP parameter mapping (continued)

R2 signal/activity	Mex ISUP Message	Mexican ISUP Parameters
congestion (Grp A,B,C)	REL	Cause Indicator: cause value
sub_busy (Grp B)		See Treatment handling section.
line signal - clear forward (See Note 2)	REL	Cause Indicator: cause value-normal clearing
line signal - clear backward		Cause Indicator: cause value-normal clearing
line signal-blocking		Cause Indicator: cause value (depends on the state of the call)
Note 1: Connect_call_chg can be sent before the switch receives the ACM. ***Note 2:*** Clear forward (line signal) is mapped to the REL message if it is not in response to congestion, sub_busy or clear backward messages.		
—end—		

Table 5-80
Mapping of R2 (When Billing and CPC are received on R2) to Mexican ISUP CPC

Billing Category on R2	Calling Party Category on R2	Mexican ISUP CPC
Regular	Any value	Ordinary subscriber (0A)
Mtc_eq	Any value	Test call (0D)
Oper	Any value	Operator, Spanish (05)
Time and charge	Any value	Ordinary subscriber (0A)
Private subscriber	Any value	Ordinary subscriber (0A)
Coin	Any value	Payphone (0F)
Ladatel	Any value	Payphone (0F)

Table 5-81
Mapping of R2 Group II signals (when only CPC is received on R2) to CPG on Mexican ISUP

Calling Party Category on R2	Mexican ISUP Calling Party Category
Regular	Ordinary subscriber (0A)
Mtc_eq	Test call (0D)
Oper	Operator, Spanish (05)
Others (See Note 1.)	Ordinary subscriber (0A)
Note 1: Mexican R2 only defines Regular, Mtc_eq, and Oper as CPC. The datafill should be such taht other values are not defined. The entry here is just for completeness.	

Table 5-82
Default values for ISUP parameter "Called Party Number" in the IAM

ISUP parameter field	ISUP value
Nature of Address	based on inswitch translation
	offnet ——> NATL ((ext)0000011)
	nternational ——> INTL (0000100)
	others ———>NATL ((ext)0000011)
	Mtc_eq
Numbering Plan Indicator	ISDN Numbering Plan (001)
Odd/Even Indicator	odd (1)– if odd number of digits in the called party, even (0)– if even number of digits in called party
Internal Network Number Indicator	Routing to internal network number allowed

Table 5-83
Default values for ISUP parameter “Calling Party Number” in the IAM

ISUP parameter field	ISUP value
Odd/Even Indicator	odd– (1) if odd number of digits in the calling party, even– (0) if even number of digits in calling party
Nature of Address Indicator	Unknown (0)
Number Incomplete Indicator (NI)	Complete(0)
Numbering Plan	ISDN Numbering Plan(001)
Address Presentation Restricted	Presentation restricted (01)
Screening Indicator	Network provided(11)

Table 5-84
Default values for ISUP parameter “Cause Indicator” in REL/ACM

ISUP parameter field	ISUP value
Cause Location	Network beyond interworking point (1010)
Coding Standard	CCITT standardized coding (00)
Extension Indicator	Octet continues through the next octet (0)

Table 5-85
Defaults for ISUP parameter “Backward Call Indicators” in ACM/AMN

Backward Call Indicator fields	Value
Called Party’s Status Indicator	No indication (00)
Called Party’s Category Indicator	No indication (00)
End to End Method Indicator	No Method available (00)
Interworking Indicator	Interworking encountered (1)
End to End Information Indicator	No end to end info available (0)
ISDN User Part Indicator	ISDN user part not used all the way(0)
Holding Indicator	Holding not required/requested (0)
ISDN Access Indicator	Terminating access non–ISDN (0)

—continued—

Table 5-85
Defaults for ISUP parameter "Backward Call Indicators" in ACM/AMN

Backward Call Indicator fields	Value
Echo Control Device Indicator	Incoming half echo control device not included (0)
SCCP Method Indicator	No indication (00)
	—end—

Table 5-86
Default values for ISUP parameter "Forward Call Indicator" in the IAM

ISUP parameter field	ISUP value
National / International Call Indicator	Call to be treated as National (0) / Call to be treated as International (1) depending on the translation
End to End Method Indicator	No end to end method available(00)
Interworking Indicator	No interworking encountered (0)
End to End Information Indicator	No end to end information available (0)
ISDN User Part Indicator	ISDN User part not used all the way (0)
ISDN User Part Preference Indicator	ISDN user part preferred all the way (00)
ISDN Access Indicator	Originating access non–ISDN (0)
SCCP Method Indicator	No indication (00)

Table 5-87
Default values for ISUP parameter "Nature of Connection Indicators"

ISUP parameter field	ISUP value
Satellite Indicator	No satellite circuit in the connection
Echo Control Device Indicator	Outgoing half echo control device not included (0)

Table 5-88
Default values for ISUP parameter “Transmission Medium Requirment” in the Mexican ISUP IAM

ISUP parameter field	ISUP value
Transmission Medium Requirement	AUDIO 3_1 KHZ

Table 5-89
Default values for ISUP parameter “User Service Information” in the IAM

ISUP parameter field	ISUP value
Coding standards	CCIT Standard (00)
Information transfer rate	64_KB PER/S (10000)
Information transfer mode	Circuit mode (00)
Information transfer capability	AUDIO 3_1 kHz (10000)

Call flows

Figure 5-13 shows the interworking from Mexican ISUP and R2, while Figure 5-14 shows interworking from R2 to Mexican ISUP. Table 5-90 shows the responses to various ISUP message in an R2 to Mexican ISUP call.

Figure 5-13
Mexican ISUP to R2, normal call setup

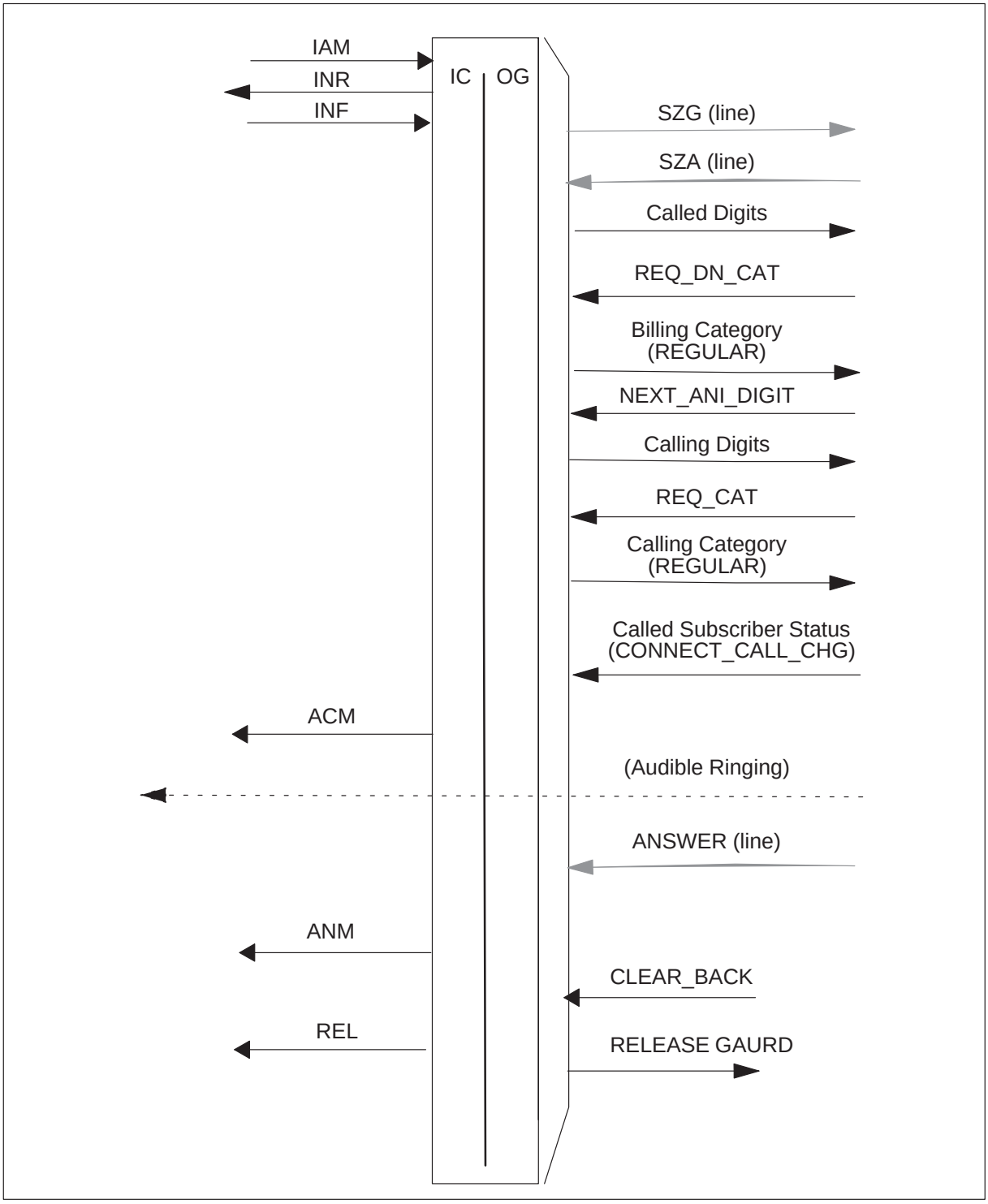


Figure 5-14
R2 to Mexican ISUP call flow

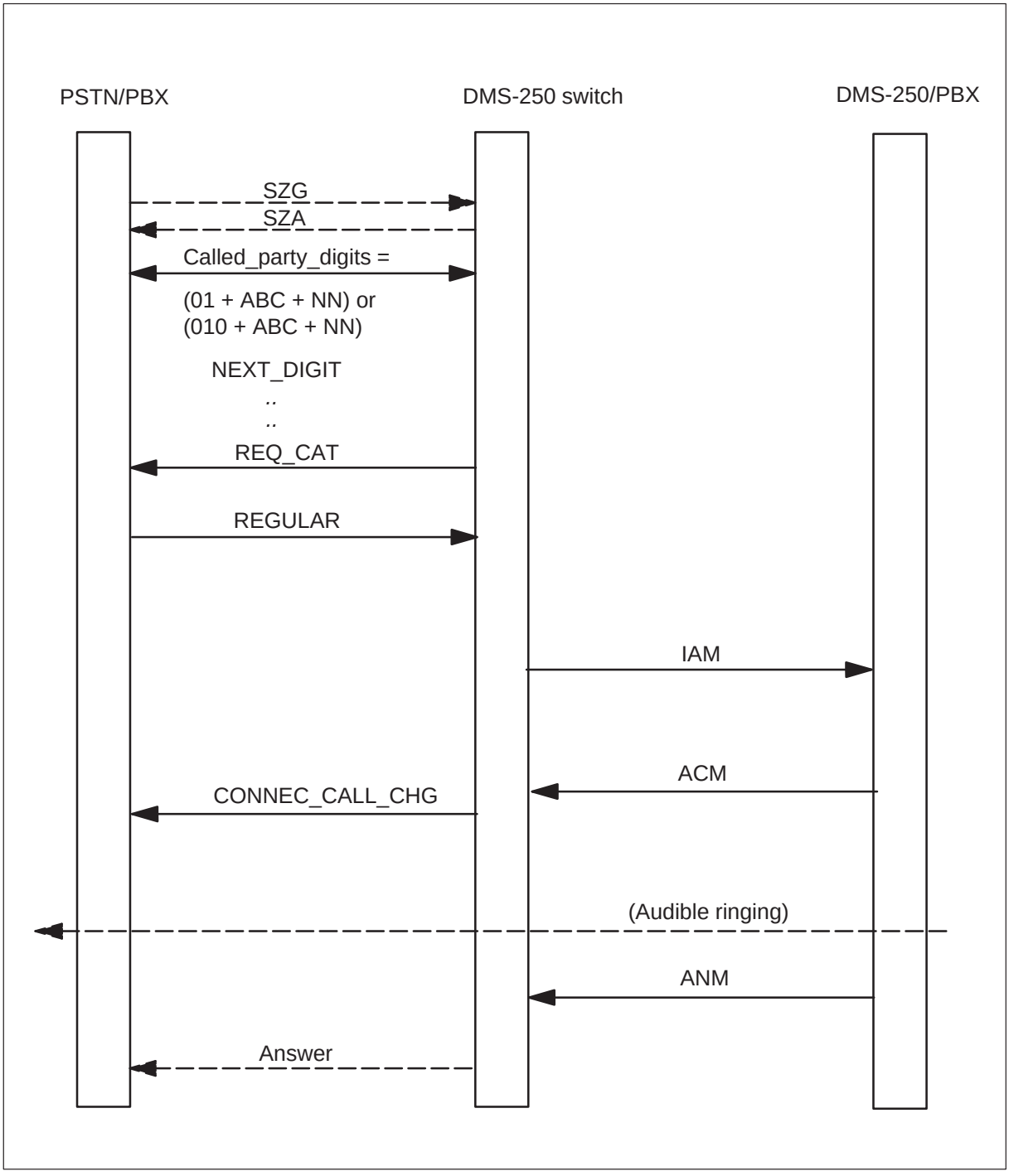


Table 5-90
Responses to various ISUP messages in an R2 to Mexican ISUP call

ISUP message received	Response after voice path	Response before voice path
CCR	Ignored	RSC received, call clears giving CONGETION on R2.
IRS	Ignored	Ignored.
CQM	Ignored	Receive CQR call continues,
UPT	Ignored	Ignored.
CFN	Ignored	RSC received, call clears giving CONGETION on R2.
FOT	Ignored	RSC received, call clears giving CONGETION on R2.
NRM	Ignored	Ingored.
OLM	Ignored	Ingored.
UCIC	Ignored	Ingored.
USR	Ignored	Ingored.
CON/FAST ANM	Ignored	No need to send ACM and ANM after this message. Call passes.
ACM	Ignored	Normal scenario.
ANM	Ignored	Call fails ACM timeout, if sent before ACM.
SGM	Ignored	Ignored.
FAC	Ignored	Ignored.
SUS	Ignored	RSC received, call clears giving CONGETION on R2.
GRS	GRA received.	GRA received, any further message will send back RSC, call will be taken down.
BLO	BLA received.	BLA received, immediately REL message received clearing the call. CONGETION received on R2.
RSC	RLC received.	RLC received.

Mexican R2 and UCP (Intra and Global) IMT interworkings

This section documents the interworkings between the Mexican R2 and UCP (Intra and Global) IMT protocols. ITU ISUP messages that are interworked with Mexican R2 include:

- Initial Address Message (IAM)
- Subsequent Address Message (SAM)
- Information Message (INF)
- Address Complete Message (ACM)
- Answer Message (ANM)
- Release Message (REL)

Mexican R2 and UCP IMT interworkings

The following Tables 5-91 through 5-103 explain the mappings between the UCP ISUP message/parameters and the corresponding Mexican R2 activities. Only the messages/parameters that map to R2 activity/signals are shown.

Table 5-91
UCP (Intra and International) to R2 parameter mapping

Message	UCP ISUP parameters	Type	R2 signal/activity
IAM	Called Party Number	V	Called Party Digits (Grp I-DIGIT_0 to DIGIT_9)
	Calling Party Number	O	Calling Party Digits (Grp III-DIGIT_0 to DIGIT_9)
	Calling Party Category (CPC)	F	Calling Party Category
			Billing Party Category
ACM	Backward Call Indicator	F	Connect_call_chg
	Charge Indicator	–	–

Note 1: Type: V-variable; O-optional; F-fixed

Note 2: RSC and BLO Messages are mapped to R2 activities Congestion on ISUP termination if register signaling is not completed.

Note 3: ISUP Calling Party Category is mapped to both R2 Calling Party Category and Billing Category.

—continued—

Table 5-91
UCP (Intra and International) to R2 parameter mapping (continued)

Message	UCP ISUP parameters	Type	R2 signal/activity
ANM	–	–	Connect_call_chg (mapped only if fast ANM is received Line signal - Answer
REL	Cause Indicator	V	See Treatment section.
RSC (Note 2)			Maps to Congestion if register signal is still on. Otherwise, local treatment is applied.
BLO (Note 2)			Maps to Congestion if register signal is still on. Otherwise, local treatment is applied.

Note 1: Type: V-variable; O-optional; F-fixed

Note 2: RSC and BLO Messages are mapped to R2 activities Congestion on ISUP termination if register signaling is not completed.

Note 3: ISUP Calling Party Category is mapped to both R2 Calling Party Category and Billing Category.

—end—

Table 5-92
Mapping of UCP ISUP Calling Party Category value to Calling PartyCategory/Billing Category value on R2

UCP ISUP CPC	Calling Party Category on R2	Billing Category on R2
Ordinary subscriber	Regular	Regular
Test call	Mtc_eq	Mtc_eq
Operator (All values)	Oper	Oper
Unknown	Regular	Regular
Spare “00001111”	Coin	Coin
Other values	Regular	Regular

Table 5-93
R2 signal/activity to UCP ISUP (Intra and International) parameter mapping

R2 signal/activity	UCP ISUP Message	UCP ISUP Parameters
called party digits (Grp I-DIGIT_0 to DIGIT_9)	IAM	Called Party Number digits
calling party digits (Grp III-DIGIT_0 to DIGIT_9)		Calling Party Number digits
calling party category (Grp II)		Calling Party Category
connect_call_chg1 (See Note 1)	ACM	Backward call indicator: Charge Indicator-charge
connect_call_nochg		
line signal - Answer	ANM	Backward call indicator: Charge Indicator
congestion (Grp A,B,C)	REL	Cause Indicator: cause value
sub_busy (Grp B)		See Treatment handling section.
line signal - clear forward	REL	Cause Indicator: cause value-normal clearing
line signal - clear backward		Cause Indicator: cause value-normal clearing
line signal-blocking		Cause Indicator: cause value (depends on state of the call)

Note 1: Connect_call_chg can be sent before the switch receives the ACM.

Table 5-94
Mapping of R2 (When Billing and CPC are received on R2) to UCP ISUP CPC

Billing Category on R2	Calling Party Category on R2	UCP ISUP CPC
Regular	Any value	Ordinary subscriber (0A)
Mtc_eq	Any value	Test call (0D)
Oper	Any value	Operator, English (02)
Time and charge	Any value	Ordinary subscriber (0A)
Private subscriber	Any value	Ordinary subscriber (0A)
Coin	Any value	Spare value “000111”
Ladatel	Any value	Spare value “000111”

Table 5-95
Mapping of R2 Group II signals (when only CPC is received on R2) to CPG on UCP ISUP

Calling Party Category on R2	Mexican ISUP Calling Party Category
Regular	Ordinary subscriber (0A)
Mtc_eq	Test call (0D)
Oper	Operator, English (05)

Table 5-96
Default values for ISUP parameter "Called Party Number" in the IAM

ISUP parameter field	ISUP value
Nature of Address	based on inswitch translation offnet ——–> NATL ((ext)0000011) nternational ——–> INTL (0000100) others ———>NATL ((ext)0000011) Mtc_eq
Numbering Plan Indicator	ISDN Numbering Plan (001)
Odd/Even Indicator	odd (1)– if odd number of digits in the called party, even (0)– if even number of digits in called party
Internal Network Number Indicator	Routing to internal network number allowed

Table 5-97
Default values for ISUP parameter "Calling Party Number" in the IAM

ISUP parameter field	ISUP value
Odd/Even Indicator	odd– (1) if odd number of digits in the calling party, even– (0) if even number of digits in calling party
Nature of Address Indicator	Unknown (0)
Number Incomplete Indicator (NI)	Complete(0)
Numbering Plan	ISDN Numbering Plan(001)
Address Presentation Restricted	Presentation restricted (01)
Screening Indicator	Network provided(11)

Table 5-98
Default values for ISUP parameter “Cause Indicator” in REL/ACM

ISUP parameter field	ISUP value
Cause Location	Network beyond interworking point (1010)
Coding Standard	CCITT standardized coding (00)
Extension Indicator	Octet continues through the next octet (0)

Table 5-99
Default values for ISUP parameter “Backward Call Indicators” in ACM/ANM

Backward Call Indicator fields	Value
Called Party’s Status Indicator	No indication (00)
Called Party’s Category Indicator	No indication (00)
End to End Method Indicator	No Method available (00)
Interworking Indicator	Interworking encountered (1)
End to End Information Indicator	No end to end info available (0)
ISDN User Part Indicator	ISDN user part not used all the way(0)
Holding Indicator	Holding not required/requested (0)
ISDN Access Indicator	Terminating access non–ISDN (0)
Echo Control Device Indicator	Incoming half echo control device not included (0)
SCCP Method Indicator	No indication (00)

Table 5-100
Default values for ISUP parameter “Forward Call Indicator” in the IAM

ISUP parameter field	ISUP value
National / International Call Indicator	Call to be treated as National (0) / Call to be treated as International (1) depending on the translation
End to End Method Indicator	No end to end method available(00)
Interworking Indicator	No interworking encountered (0)
End to End Information Indicator	No end to end information available (0)
ISDN User Part Indicator	ISDN User part not used all the way (0)
ISDN User Part Preference Indicator	ISDN user part preferred all the way (00)
ISDN Access Indicator	Originating access non–ISDN (0)
SCCP Method Indicator	No indication (00)

Table 5-101
Default values for ISUP parameter “Nature of Connection Indicators”

ISUP parameter field	ISUP value
Satellite Indicator	No satellite circuit in the connection
Echo Control Device Indicator	Outgoing half echo control device not included (0)

Table 5-102
Default values for ISUP parameter “Transmission Medium Requirment” in the Mexican ISUP IAM

ISUP parameter field	ISUP value
Transmission Medium Requirement	AUDIO 3_1 KHZ

Table 5-103
Default values for ISUP parameter “User Service Information” in the IAM

ISUP parameter field	ISUP value
Coding standards	CCIT Standard (00)
Information transfer rate	64_KB PER/S (10000)
Information transfer mode	Circuit mode (00)
Information transfer capability	AUDIO 3_1 kHz (10000)

Call flows

Figure 5-15 through Figure 5-23 show the various interworking between Mexican ISUP and R2,. Table 5-104 shows the responses to various ISUP messaged in an R2 to Mexican ISUP call.

Figure 5-15
Mexican ISUP to R2, normal call setup

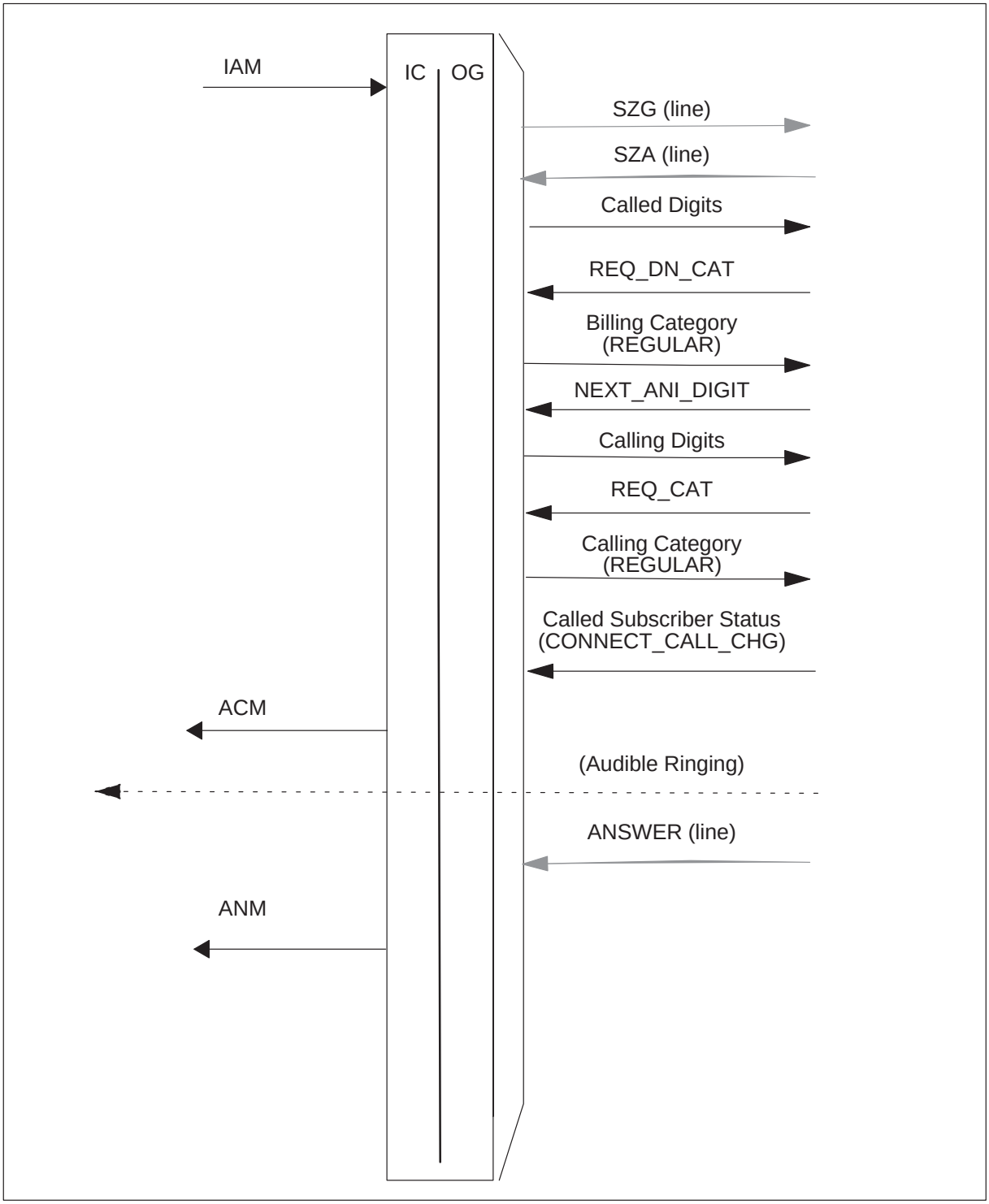


Figure 5-16
R2 to Mexican ISUP call flow

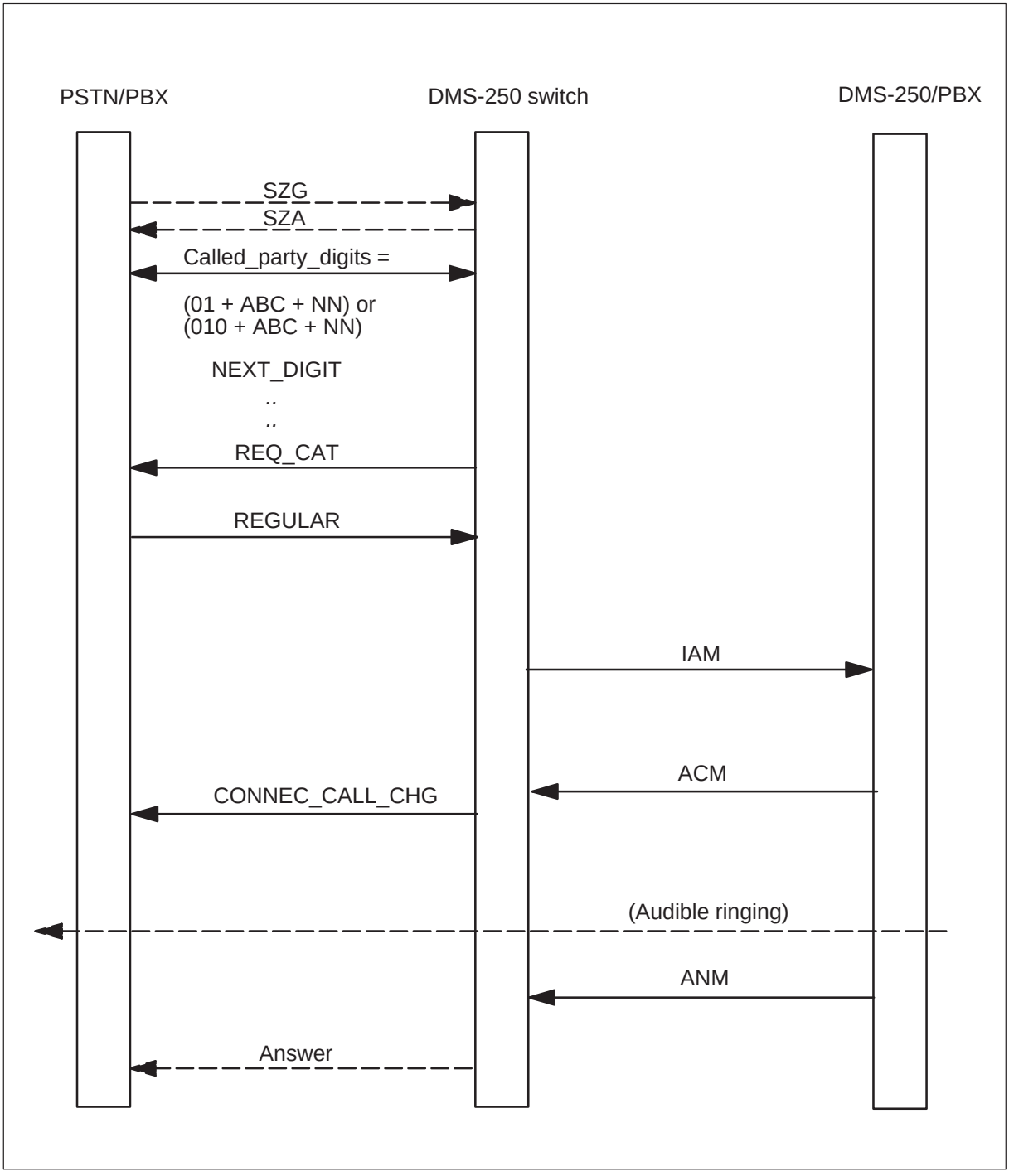


Figure 5-17
UCP ISUP to R2, normal call setup but call unsuccessful due to called subscriber busy

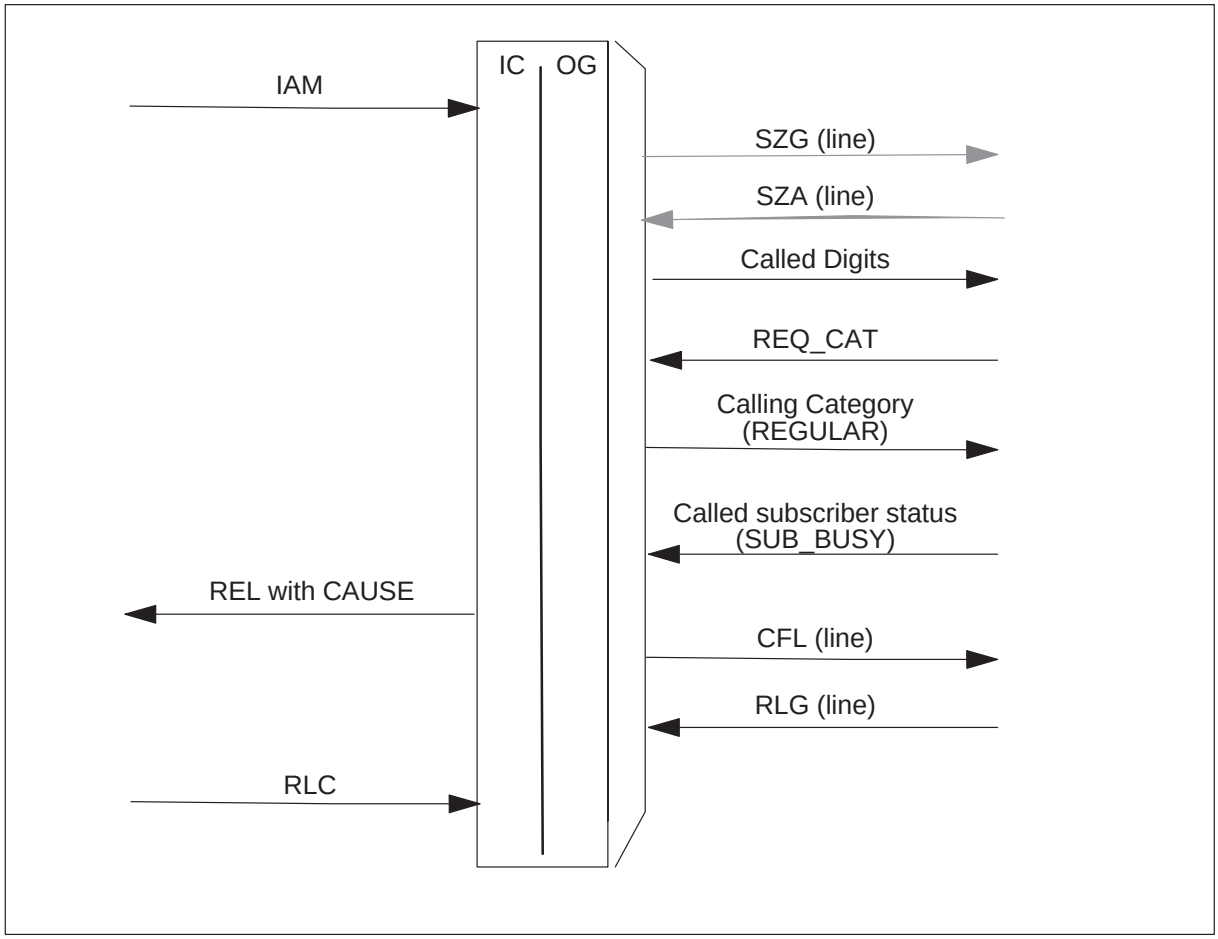


Figure 5-18
CLI screened call requiring account code and/or pin digits

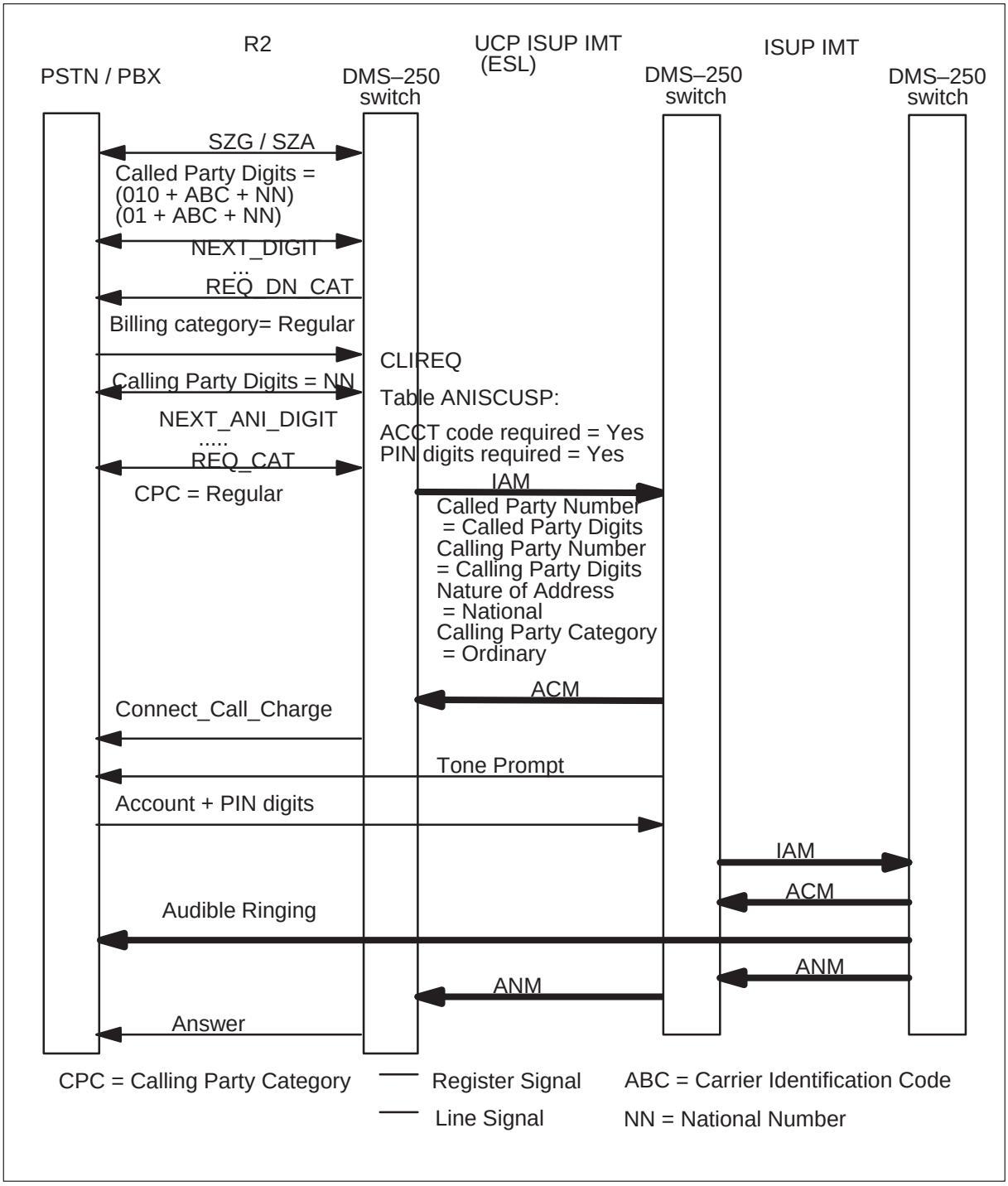


Figure 5-19
Call flow for universal access card calls

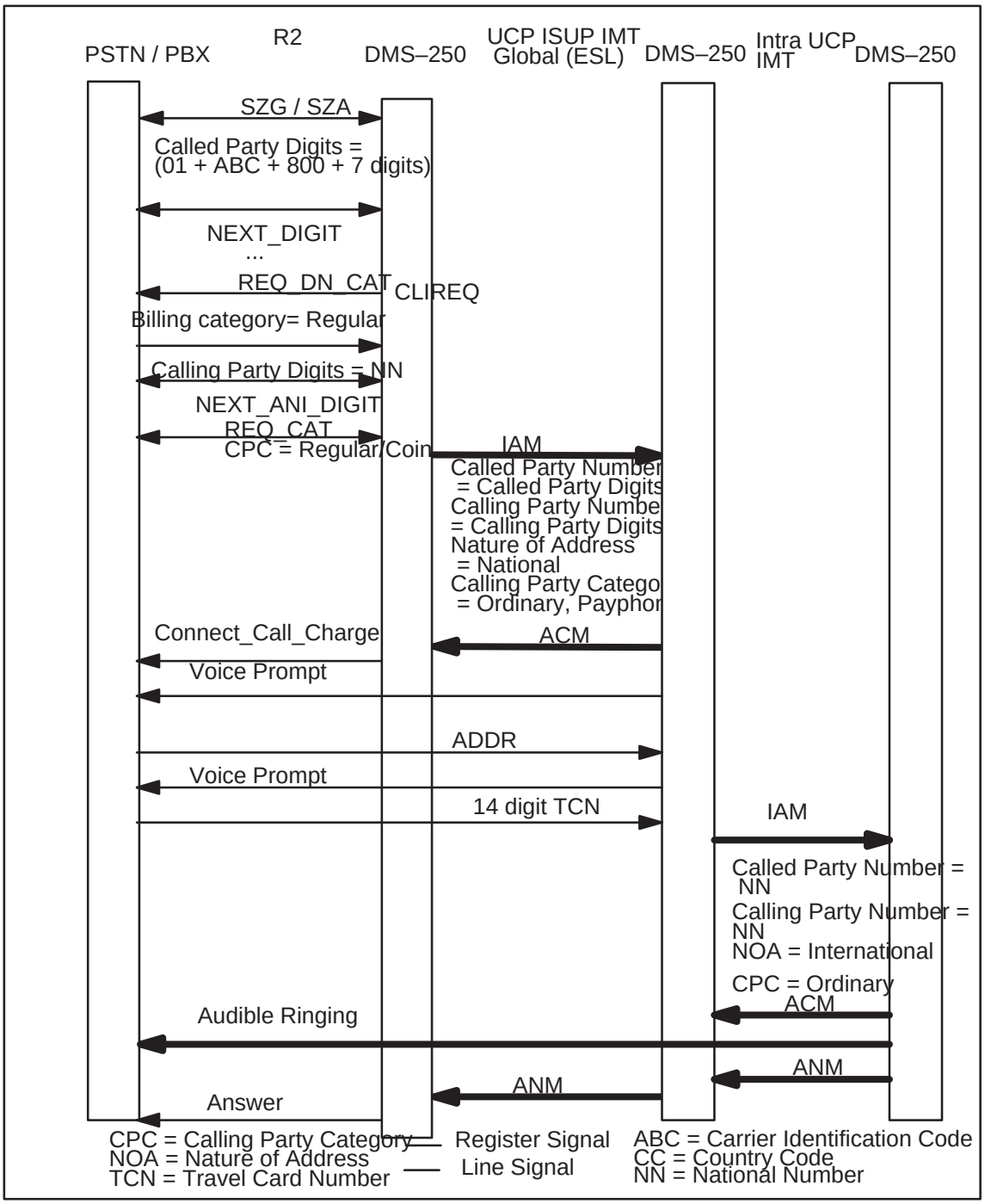


Figure 5-20
Universal access call requiring ACCT code

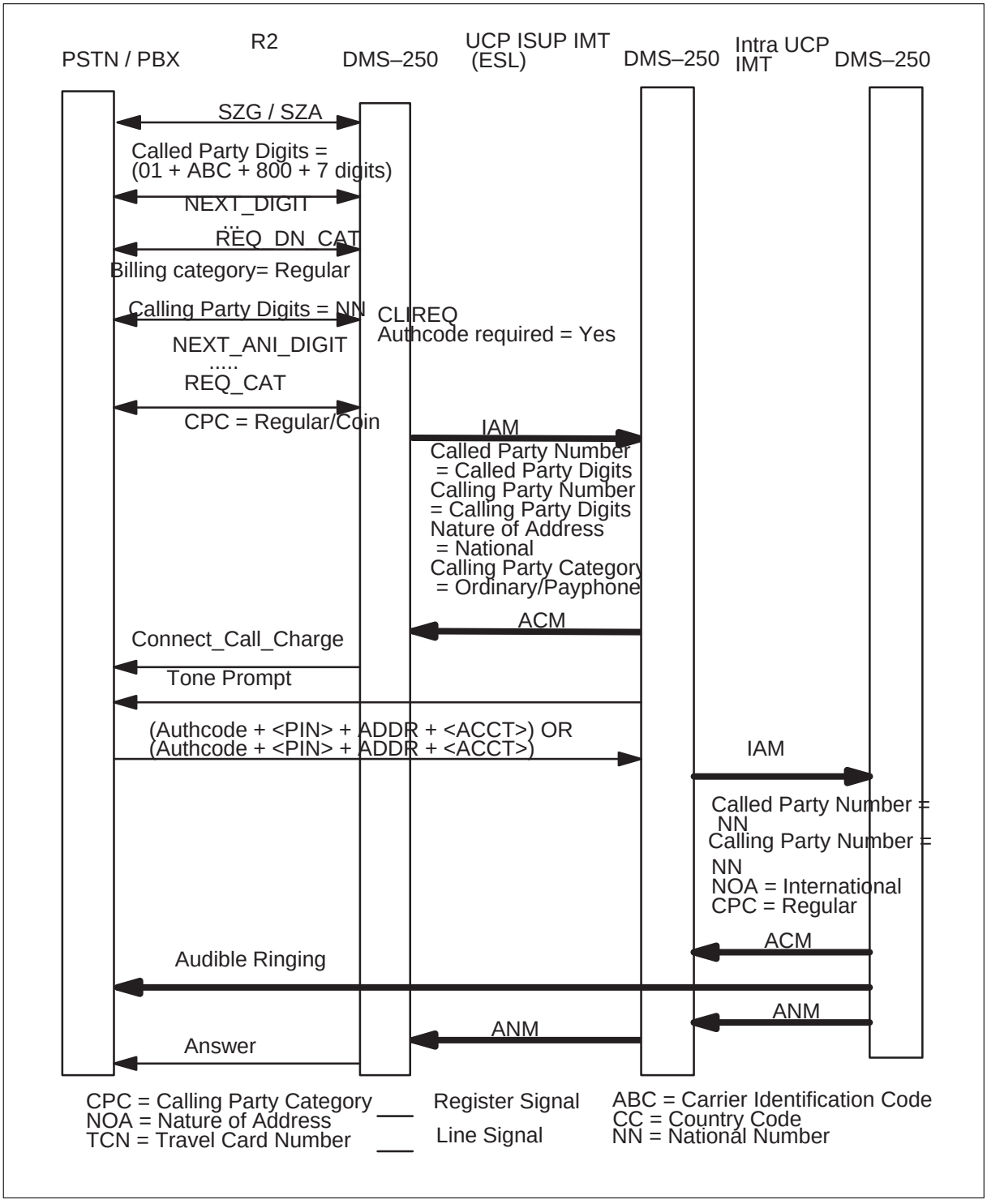


Figure 5-21
Universal access call with reorganization

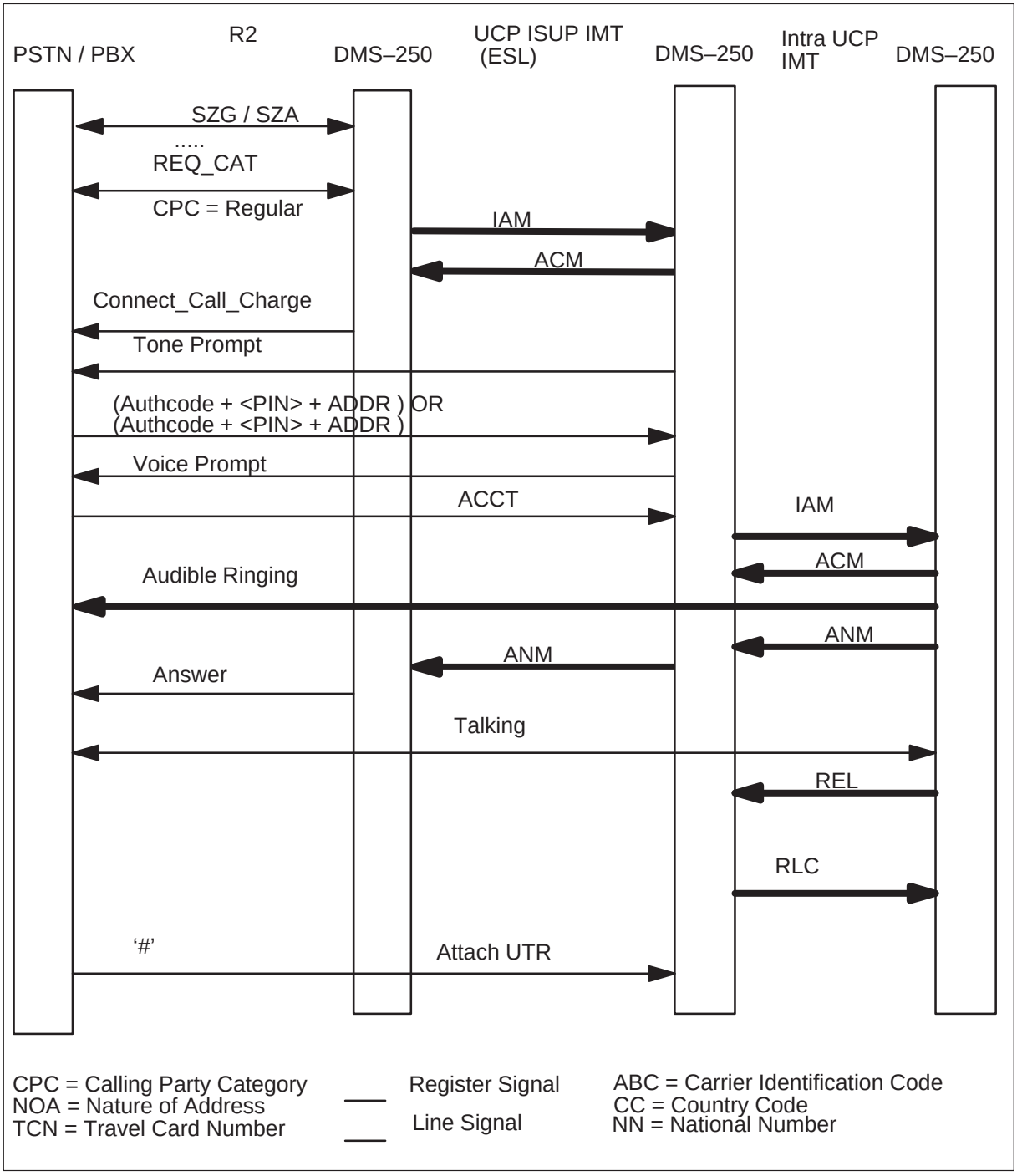


Figure 5-22
National non-geographic address call

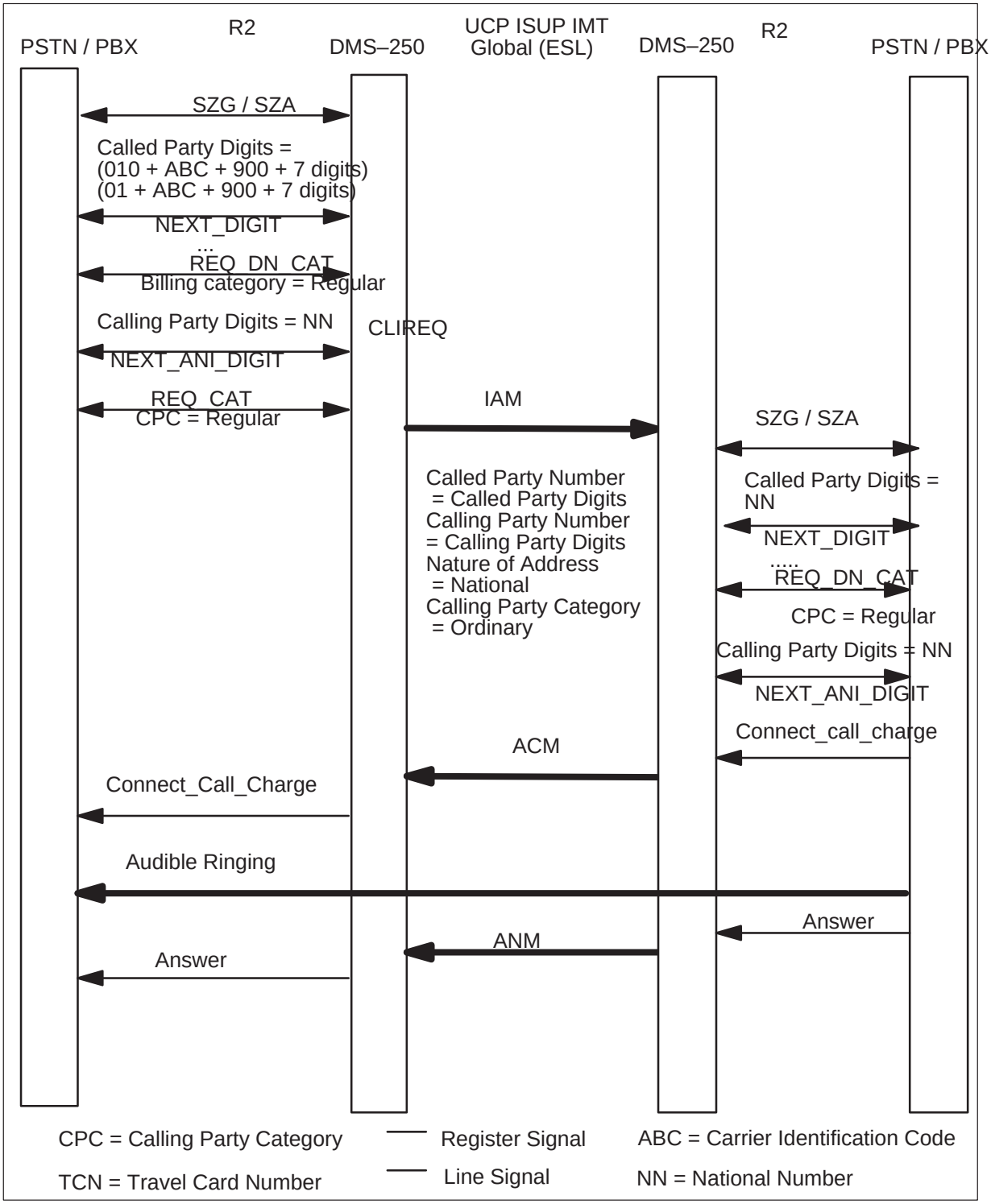


Figure 5-23
International non-geographic address call

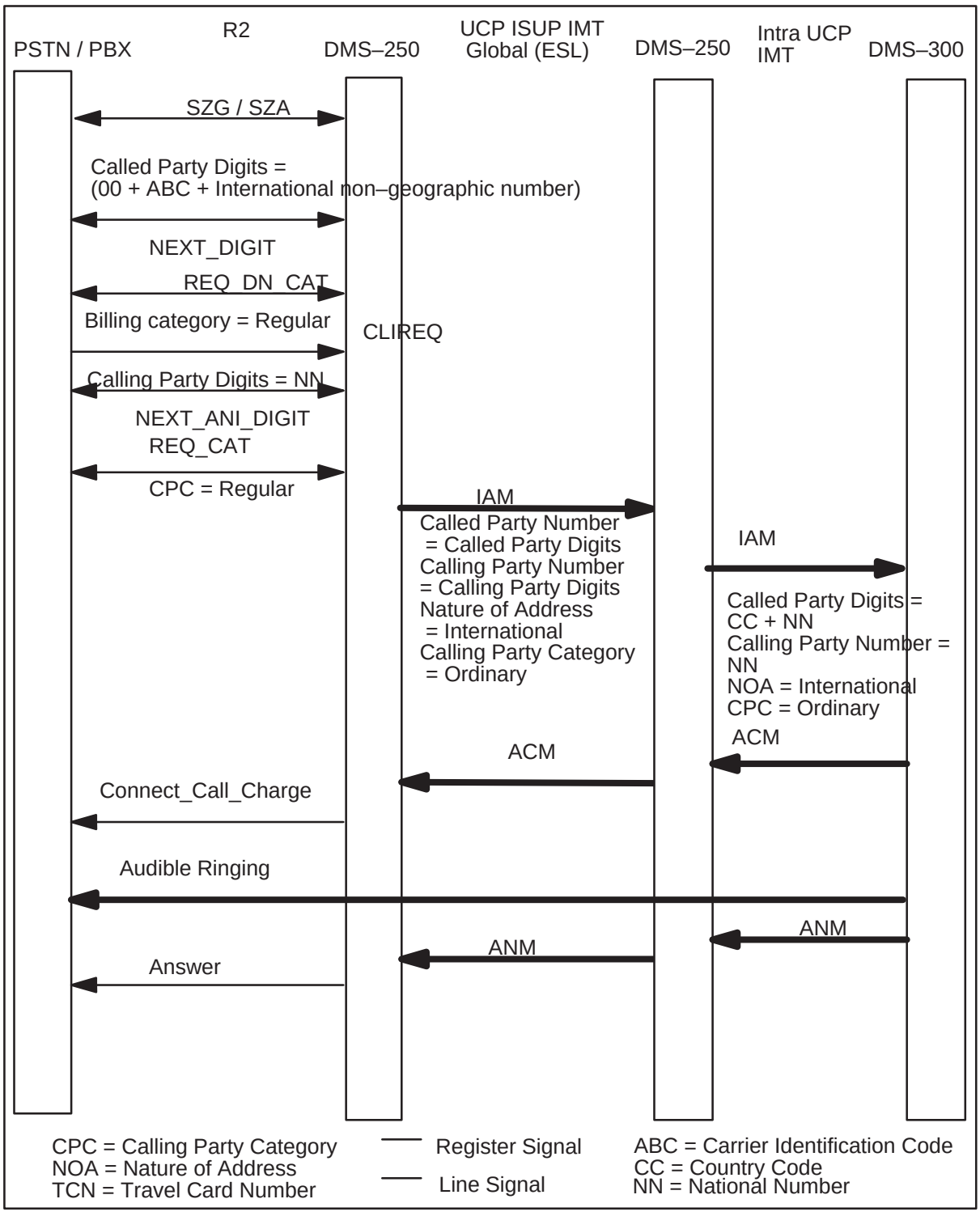


Table 5-104
Responses to various ISUP messages in an R2 to Mexican ISUP call

ISUP message received	Response after voice path	Response before voice path
CCR	Ignored	RSC received, call clears giving CONGETION on R2.
IRS	Ignored	Ignored
CQM	Ignored	Receive CQR call continues,
UPT	Ignored	Ignored
CFN	Ignored	RSC received, call clears giving CONGETION on R2.
FOT	Ignored	RSC received, call clears giving CONGETION on R2.
NRM	Ignored	Ingored.
OLM	Ignored	Ingored.
UCIC	Ignored	Ingored.
USR	Ignored	Ingored.
CON/FAST ANM	Ignored	No need to send ACM and ANM after this message. Call passes.
ACM	Ignored	Normal scenario.
ANM	Ignored	Call fails ACM timeout, if sent before ACM.
SGM	Ignored	Ignored
FAC	Ignored	Ignored
SUS	Ignored	RSC received, call clears giving CONGETION on R2.
GRS	GRA received.	GRA received, any further message will send back RSC, call will be taken down.
BLO	BLA received.	BLA received, immediately REL message received clearing the call. CONGETION received on R2.
RSC	RLC received.	RLC received.

Mexican R2 and Mexican R2 interworkings

This section contains call flow information when originating and terminating on a Mexican R2 trunk.

Call flows

Figure 5-24 through Figure 5-26 show the interworking between Mexican R2 and Mexican R2.

Figure 5-24
Basic R2 to R2 call, congestion from terminator

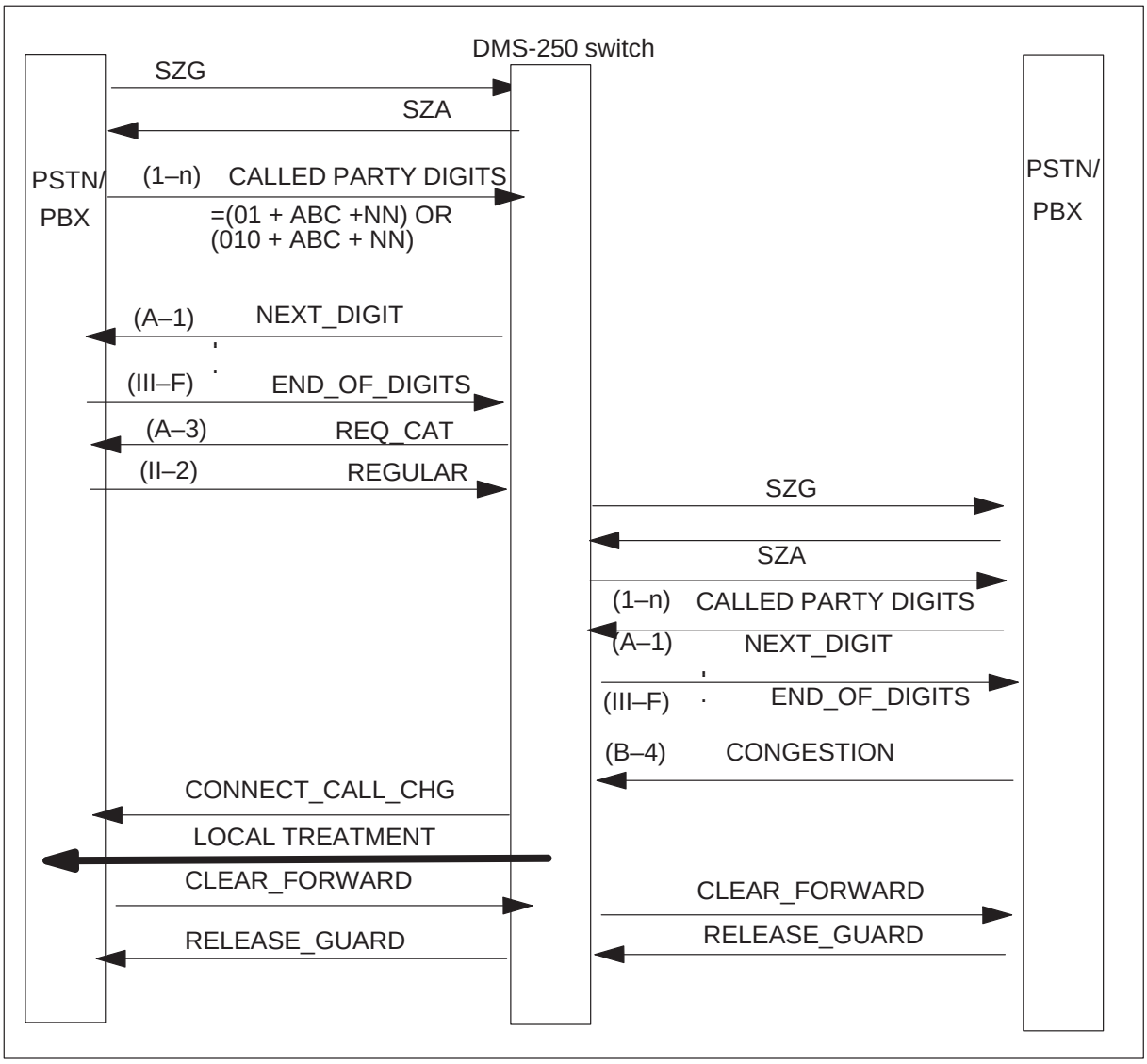


Figure 5-25
Basic R2 to R2 call with clear forward

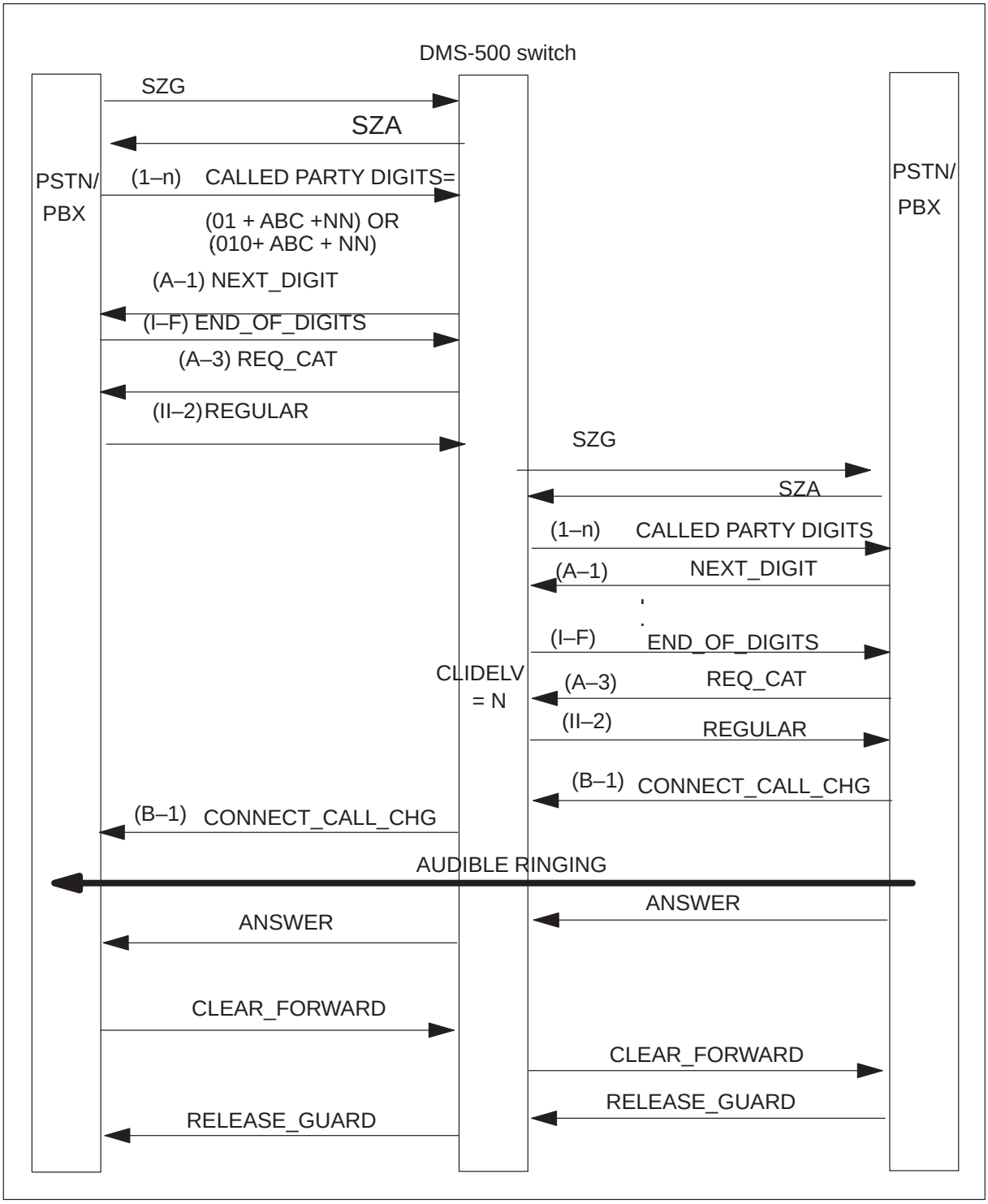
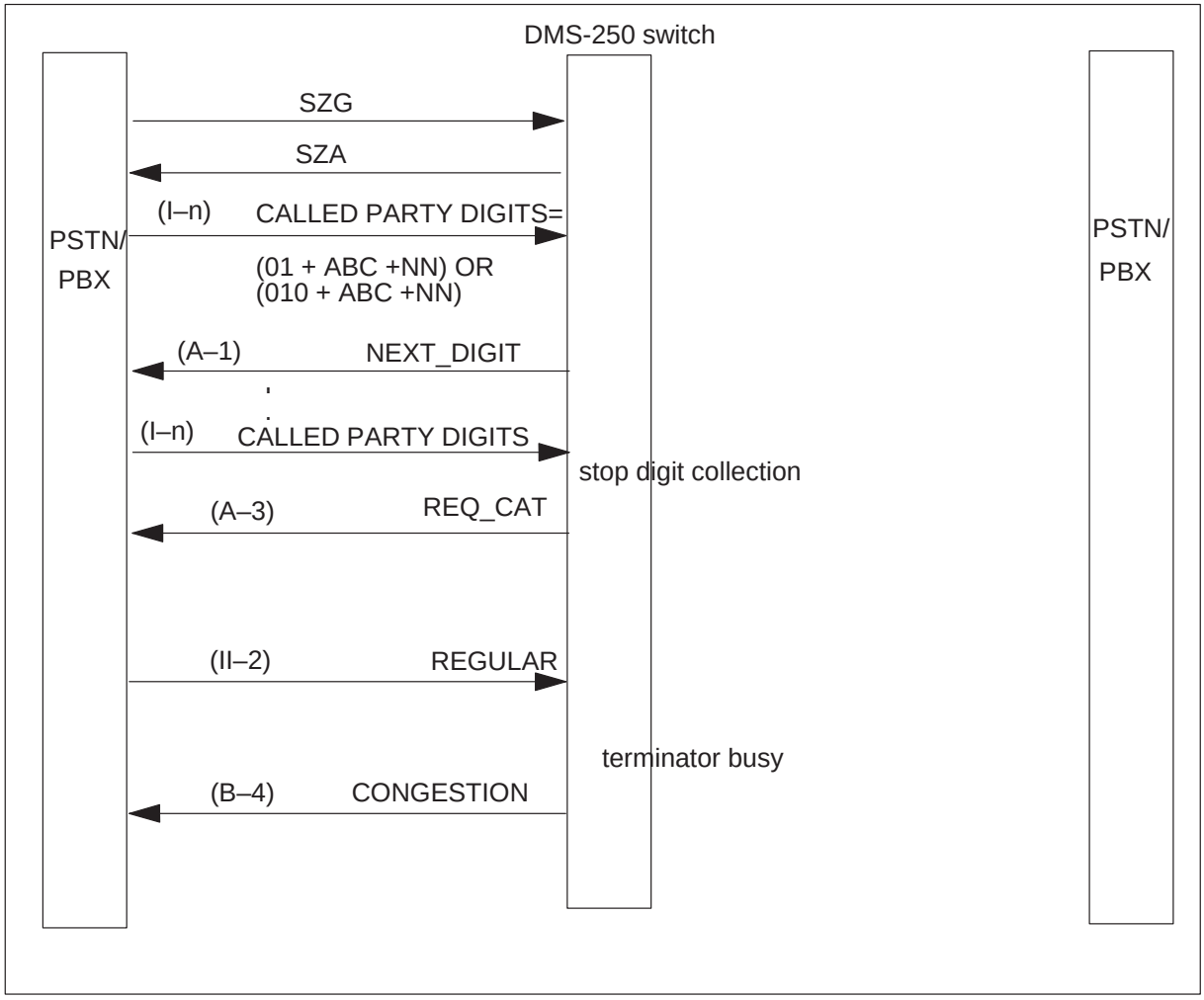


Figure 5-26
Basic R2 to R2 call, terminating route busy



List of terms

A Party Address
In R2 signaling, the calling party address is denoted as the A party address.

ACM
See address complete message.

address complete message
A Common Channel Signaling 7 protocol message that indicates all the address signals required to route a call to the called party are received and the call can be routed.

ADIN
Authcode Database INdex

AMA
See automatic message accounting.

American National Standards Institute (ANSI)
This is the forum that determines communication standards for the United States and Canada.

ANI
See Automatic Number Identification.

ANM
Answer message

ANSI
See American National Standards Institute.

ATR
See Automatic Trunk Routing system.

ATT
See automatic trunk testing.

automatic message accounting (AMA)

This is an automatic recording system that documents all the necessary billing data of subscriber-dialed long distance calls.

automatic number identification (ANI)

This is a system that automatically identifies a calling number and transmits it to the automatic message accounting (AMA) office equipment for billing.

Automatic Trunk Routing system

The Automatic Trunk Routing system remotely tests both IMT and external operating company trunks. The ATR system accesses the UCS DMS-250 switch through a digital four-wire trunk known as an ATRT (ATR Trunk).

automatic trunk testing (ATT)

The automatic trunk testing system is a set of hardware and software entities that provide automatic testing for outgoing trunks and the outgoing portions of two-way trunks.

B Party Address

The called party address is the B party address.

BA signaling

BA signaling refers to the method of collecting all the called party digits (B party address), then proceeding to collect the billing category and the calling party digits (A party address).

BAB signaling

In BAB signaling, the switch collects part of the called party (B party) digits, and, if the switch can determine a route based on this partial set of digits, the exchange will proceed to collect Calling Party (A party) information. If later the switch determines that it needs more B party digits, the exchange must request these from the preceding exchange.

backward signaling

Register signaling applied from a terminating exchange in acknowledgment to forward signaling is called backward signaling.

basic call

A basic call is a CLI screened and billed call, without account code and PIN digits. It may be either a national or international call.

BC

See Bearer capability.

BCNI

Bearer Capability Not Implemented

Bearer capability

A characteristic associated with a directory number that indicates the type of call (voice or data) and the rate of transmission allowed. Bearer capability is also an information element carried in the setup message for functional signaling to indicate the type of call (voice or data) and the rate of transmission required (for ISDN).

bus

A bus is an electrical connection that allows two or more wires or lines to be connected together.

call detail recording (CDR)

A system that collects and records data on all calls that are processed by the DMS-300 gateway international switching system. CDR data is stored on a recording device, and it is used to compile studies on service (traffic and equipment), division of revenue, engineering, and fraud.

calling line identification (CLID)

A supplementary service that allows the originator to inform the terminating party of the network address of the originator. Screening of the CLI is performed only during call setup. CLI is similar to the ANI of World Zone 1. CLI identifies the originating subscriber's phone set.

card

A plug-in circuit pack containing components. In a DMS-300/INode switch, card is the preferred term for a printed circuit pack or a printed circuit board.

Carrier Identification Code

In a scenario where multiple carriers operate, each carrier is assigned a Carrier Identification Code (CIC). The UCS DMS-250 provides translation and routing capabilities based on the CIC digits of the incoming call. The CIC comes in the IAM in either the Transit Network Selector (TNS) or Carrier Identification Parameter (CIP) of the Initial Address Message (IAM).

CC

country code/central controller, depending on context

CCITT

See Consultative Committee on International Telephony and Telegraphy.

CCS7

See Common Channel Signaling 7.

CDR

See call detail recording.

CI

See command interpreter.

CIC

See Carrier Identification Code.

CIP

Carrier Identification Code parameter

CLI

See calling line identification.

CLIREQ

CLI Required

CLLI

Common Language Location Identifier

CM

See computing module.

command interpreter (CI)

The CI is a support operating system component that functions as the main interface between machine and user. Its principal roles are to read lines entered by a terminal user, to break each line into recognizable units, to analyze the units, to recognize command item-numbers on the input lines, and to invoke these commands.

common channel signaling (CCS)

A signaling technique in which signaling information relating to a multiple number of circuits and to other information, such as information used for network management, is conveyed over a single channel by addressed messages.

Common Channel Signaling 7 (CCS7)

A signaling platform used to send supervisory signals across a signaling number 7 network using a separate transmission channel than the user's communication channel.

computing module (CM)

Computing modules are processors that manage high-level call processing functions within the DMS-300/INode switch.

Consultative Committee on International Telephony and Telegraphy (CCITT)

The Consultative Committee on International Telephony and Telegraphy (CCITT) was the forum for international agreement on recommendations for international communications systems, including data. CCITT is now known as the International Telegraph and Telephone Consultative Committee (ITU-T).

COS

See Class of Service Screening.

CPC

calling party category

CUG

closed users group

DDD

direct distance dialing

decadic signaling

See dial pulse.

dial pulse

Dial pulse is a method of transmitting signaling information from a telephone set or a trunk circuit. Dial pulses are generated by alternately opening and closing a contact in the telephone through which the direct current flows. It is also called decadic signaling. Decadic interregister signaling takes place using the same frequency and the sender/receiver equipment as line signaling. See also multifrequency signaling.

digital recorded announcement machine (DRAM)

The DRAM is a peripheral module developed for the DMS family switches, in which voice messages are stored in digital form, providing access to up to 30 different service voice announcements.

digital trunk controller

The digital trunk controller is a peripheral module that connects DS-30 links from the network to digital trunk circuits.

direct distance dialing (DDD)

DDD is a telephone exchange service that permits subscribers to call a number outside their local area without operator assistance.

DRAM

See digital recorded announcement machine.

DS-30

This is a link used internally in the UCS DMS-250 switch. The DS-30 handles a data rate of 2.54 Mbit/s.

DTC

See digital trunk controller.

DTCO+

digital trunk controller offshore plus

DTMF

See dual-tone multifrequency.

dual-tone multifrequency (DTMF)

DTMF is a signaling method that uses set combinations of two specific voice-band frequencies. One of these voice-band frequencies is selected from a group of four low frequencies, and the other is selected from a group of three or four relatively high frequencies.

end-to-end signaling

An R2 to R2 call operating in end-to-end mode implies that the incoming trunk collects just sufficient called party address digits from the preceding office to determine the outgoing route.

ENET

See enhanced network.

enhanced network

ENET is a channel-matrixed time switch that provides pulse code modulated voice and data connections between peripheral modules. It also provides message paths to the DMS-bus components.

ESL

enhanced services link

Flexible Service Access Code

Flexible SAC (FSAC) is a functionality that corresponds to the N00 service functionality of the World Zone 1 market. It removes the restrictions of the N00 functionality and supports service access codes of 1 to 20 digit length. FSAC calls function on International ISUP IMTs and Mexican IMTs. These calls are also known as free phone and premium services.

forward signaling

Register signaling applied from an originating exchange is called forward signaling.

FSAC

See Flexible Service Access Code.

IAM

See Initial Address Message.

IDDD

international direct distance dialing

IMT

intermachine trunk

incoming trunk

From the perspective of the UCS DMS-250 switch the originating trunk of the call is the incoming trunk.

INF

Information Message

Initial Address Message (IAM)

This is the first message in a call (connection-oriented or connection-less). It contains information required to route the call to its destination.

INR

Information Request Message

integrated services digital network (ISDN)

A set of standards proposed by the Consultative Committee on International Telephony and Telegraphy (CCITT) to establish compatibility between the telephone network and various data terminals and devices. ISDN provides a path for transmission of voice, data, and images.

integrated services digital network user part (ISUP)

Provides the signaling functions within a CCS7 network for voice and data services in an integrated services digital network (ISDN).

Interexchange Carrier (IXC)

Interexchange carrier is a World Zone 1 term that refers to a long distance service provider.

International Telecommunication Union

The specialized telecommunication agency of the United Nations, established to provide standardized communication procedures and practices, including frequency allocation and radio regulations, around the world.

International Telegraph and Telephone Consultative Committee (ITU-T)

The forum for international agreement on recommendations for international communications systems, including data. ITU-T was formerly known as the Consultative Committee on International Telephony and Telegraphy (CCITT).

interworking

This is the controlled transfer of information across the interface between different signaling systems where the significance of the transferred information is identical or where the significance is translated into a defined number, and as the performance of appropriate switching procedures in association with the transfer.

IP

international partitioned calls

ISDN

Integrated Services Digital Network

ISUP

Integrated Services Digital Network User Part

ITR

information transfer rate

ITU

International Telecommunication Union

IXC

See Interexchange Carrier (IXC).

junctor

The junctor is interface equipment at the end of any interoffice circuit or intraoffice trunk that provides circuit and signaling compatibility.

line signaling

Line signaling is a term given to signals sent over a trunk between two offices to control the usage of the trunk (i.e. answer, clear forward, etc.).

link-by-link signaling

An R2-to-R2 call operating in link-by-link mode implies that the incoming trunk collects all of the called party address from the preceding office prior to selecting an outgoing route.

MCCS

See Mechanized Calling Card Service.

Mechanized Calling Card Service

MCCS is a service that allows a subscriber to make chargeable long distance calls without operator assistance. A subscriber makes these calls by using a credit card and entering special billing information.

MFC

See multifrequency compelled signaling.

multifrequency compelled signaling

This is a signaling method that combines the aspects of multifrequency signaling and compelled signaling. More specifically, it makes use of pairs of standard tones to transmit signaling information while inhibiting the transmission of another signal in the same direction after one signal has been sent until the following conditions are fulfilled: the receiving terminal acknowledges the signal, and the originating terminal receives this acknowledgement.

NN

national number

NOA

Nature of Address parameter/indicator

NPA

numbering plan area

off-net

off network

OLI

Originating Line Information

OM

operational measurements

on-net

on-network

originating exchange

The UCS DMS-250 switch is an originating exchange when it wishes to put through a call by terminating on an R2 trunk connected to it.

outgoing trunk

From the perspective of the UCS DMS-250 switch, the terminating trunk of the call is the outgoing trunk.

PBX

private branch excahnge

PCM

pulse code modulation

PCM30

PCM30 is a 32-channel 2.048-Mbit/s multiplexed carrier system. It is an international standard for digital trunks and uses 30 voice channels for each carrier and two channels for messaging.

PCM30 digital trunk controller

A digital trunk interface that has the hardware configuration of an international digital trunk controller but runs the software of a digital trunk controller.

PDTC

See PCM30 digital trunk controller

peripheral module (PM)

A generic term referring to all hardware modules in the switch that provide interfaces with external line, trunk, or service facilities.

per-trunk signaling

This is a conventional telephony method of signaling that multiplexes the control signal of a call with voice or data over the same trunk.

PIN

Personal Identification Number

POTS

Plain ordinary telephone service. In the context of service screening, POTS is a pseudo service, derived from the combination of a bearer service of speech and without additional supplementary services.

PSTN

public switched telephone network

R1

CCITT signaling system R1. Standardized inband signaling system suitable for terminal, or inside the same world zone, working.

R2

R2 signaling systems are multiple frequency compelled (MFC) systems where tones are sent in one direction and acknowledgement tones are returned. The R2 signaling system is commonly used in many countries outside of World Zone 1. It is a domestic per-trunk signaling protocol defined by ITU standards Q.400-490.

register signaling

Register signaling refers to the sending of tones representing information about the call. The tones are sent over the voice channel of the trunk and transfer information such as called party address, billing information and called party status.

reorigination

Reorigination is a feature that enables subscribers to make multiple calls without having to re-enter their authcode or calling card number. Reorigination is only possible after all digits have been dialed and a terminator has been selected.

RTS

return to service

SAC

See Service Access Code calls.

SACREMOTE calls

See Service Access Code Remote Translations calls

SAM

Subsequent Address Message

SCP

See Service Control Point.

Service Access Code (SAC) calls

SAC calls are special type of calls supported by the UCS DMS-250 switch. The subscriber dials a SAC (usually a 700, 800, or 900 number in the World Zone 1 market) and this SAC number is mapped to a another number in the switch or at the remote database. The switch also obtains a Serving Translation Scheme (STS) from the translation tables. The switch uses the STS for further routing.

Service Access Code Remote Translations calls

Service Access Code calls are calls that are translated at the SCP.

Service Control Point

This is a network node that provides information to other nodes (database access).

serving translation scheme (STS)

The UCS DMS-250 switch uses the three-digit serving translation scheme codes (000 to 999) to derive routing information.

signaling network 7

An N7 signaling network consists of a number of switching and processing nodes that are connected to each other by signaling links. N7 networks have signaling links and the following nodes: signaling point (SP), service switching point (SSP), signaling transfer point (STP), and service control point (SCP).

signaling point (SP)

Any node on the signaling network.

signaling transfer point (STP)

A signaling point that does not generate or terminate signaling messages, but transfers messages between incoming and outgoing signaling links.

SNPA

serving numbering plan area

SOC

See Software Optionality Control (SOC).

Software Optionality Control (SOC)

The software optionality control (SOC) utility provides the operating company with a secure method of quickly deploying new services into their switch. SOC includes software license keys that control access to individual feature or entire services.

SS7

Signaling System #7

STS

See serving translation scheme.

TBI

See Toll Break In.

TCN

See traveling card number

Terminating Exchange

The UCS DMS-250 switch is a terminating exchange whenever a call originates on an R2 trunk connected to the UCS DMS-250 switch.

testcalls

Testcalls are calls originating from test facilities on the near-end switch. Test facilities include Automatic Trunk Testing (ATT), and the TST and OP commands of the Trunk Test Position (TTP) MAP level.

TLT

test line tests

TMR

Transmission Medium Requirement

TNS

See Transit Network Selector parameter.

TOD

time of day

Toll Break In (TBI)

TBI is a service that allows the operator to interrupt a call between two subscribers when a toll call requires connection to one of the subscribers.

TOPS

See Traffic Operator Position System.

Traffic Operator Position System (TOPS)

When calls require operator services, the UCS DMS-250 switch routes these calls to the Traffic Operator Position System (TOPS) platform, a semi-automatic telephone switchboard.

Transit Network Selector (TNS) parameter

The TNS contains information in the Circuit Code subfield which correlates to 1NX code on MF originations.

TTP

Trunk Test Position

TTT

Transmission Test Trunk

UA

See Universal Access (UA) code.

UCP

Universal Carrier Protocol

UCS

Universal Carrier Services

Universal Access (UA) Code

The Universal Access Code is a number that is assigned to an Interexchange Carrier (IXC) which allows a subscriber to access the IXC network. The subscriber can access the IXC network from any geographical location using one consistent UA code.

USI

User Service Information

World Zone 1

World Zone 1 countries include Canada, the USA, and the Caribbean (except Haiti and Cuba). Outside World Zone-1 markets are referred to as the International market.

XPM

eXtended Peripheral Module

Ordering information

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

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	Nortel	Consult your Nortel sales representative * Employee	Yes

When ordering publications on CD

Please have the CD number and software version available, for example, **HLM-2621-001 02.03**.

When ordering individual paper documents

Please have the document number and name available, for example, **297-2621-001, UCS DMS-250 Master Index of Publications**.

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Please have the eight-digit ordering code, for example, **UCS00007**, as well as the ordering codes for the features you wish to purchase. Contact your Nortel representative for assistance.

Digital Switching Systems

UCS DMS-250

International Protocol Reference Manual

Product Documentation—Dept 3423
Northern Telecom
P.O. Box 13010
RTP, NC 27709–3010
1-877-662-5669, Option 4 + 1

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