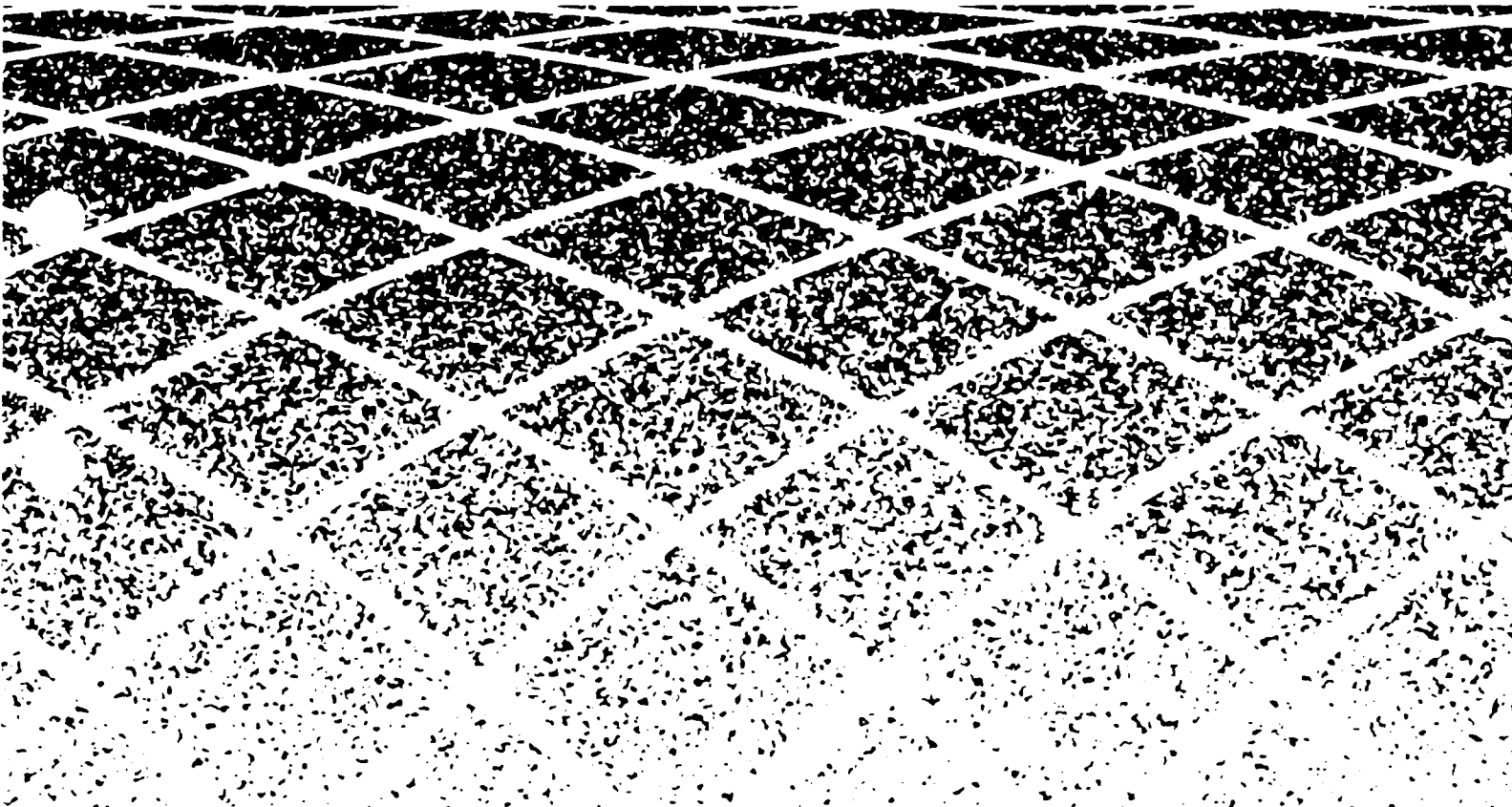




AT&T 234-090-161  
Issue 1  
September 1991

## 4 *ESS*<sup>TM</sup> SWITCH

Product Release Document  
4E16 Release 1 Generic



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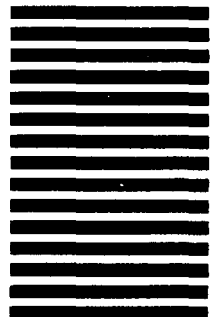
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## Abbreviations and Acronyms

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# Introduction

# 1

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## 1. Overview

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**1.01** This document provides information for engineering, provisioning, operating, administering, and maintaining the features available in the 4 ESS™ switch 4E16 Release 1 Generic. The information is intended only for the introduction and initial maintenance of the new features. Nineteen features are covered in this document. Each feature is assigned to one of the following chapters:

- Chapter 2 — 3B20D Computer UNIX\* RTR Improvements Feature (#080)
- Chapter 3 — Fast Connect Feature (#084)
- Chapter 4 — Generic Address Parameter (GAP) Feature (#085)
- Chapter 5 — Operations, Administration and Maintenance Enhancements Feature (#086)
- Chapter 6 — Handling Additional TR-394 Exceptions Feature (#121)
- Chapter 7 — Coding Standard Field of the Cause Parameter Feature (#122)
- Chapter 8 — Performance and Capacity Improvements Feature (#901)
- Chapter 9 — Common Network Interface (CNI) Integration Feature (#906)
- Chapter 10 — Intranet Signaling Connection Control (SCCP) Routing Verification Test (SRVT) Feature (#908)

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- Chapter 11 — Expanded ISDN Message Associated User-to-User Information (MA-UI) Length Feature (#911)
- Chapter 12 — CCITT No. 7 ISUP Phase 3 Feature (#913)
- Chapter 13 — Intra-LATA Switched 384 Feature (#917)
- Chapter 14 — Intra-LATA 7-Digit Free Calling Feature (#918)
- Chapter 15 — Unsuccessful Call Setup Feature (#919)
- Chapter 16 — Passing Unrecognized Parameters Feature (#920)
- Chapter 17 — Q.931 Information Elements Transport Feature (#921)
- Chapter 18 — Disciplined Rubidium Oscillator (DRO) Feature (#060)
- Chapter 19 — Discontinue Generation of Short Supervisory Transition (SST) Automatic Message Accounting (AMA) Records Feature (#087)
- Chapter 20 — CCITT Message Transfer Part (MTP) Emergency Alignment Feature (#184)

A list of Abbreviations and Acronyms is included at this end of this document.

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## **2. Audience**

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**2.01** This document is intended for feature managers, support personnel, operations centers, headquarters support staff and maintenance, central office and design engineers.

**2.02** The above list is not all inclusive. Other people who are not identified may also find this document useful.

## **3. Contacts**

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**3.01** If problems are encountered with any feature in 4E16 Release 1 Generic, use normal escalation channels for resolution [such as Maintenance Operation Center (MOC) to Technology Control Center (TCC) to National Electronic Switching Assistance Center (NESAC) and/or Product Engineering Control Center (PECC)].

---

## 3B20D Computer UNIX\* RTR Improvements Feature (#080)

# 2

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## 3B20D Computer UNIX\* RTR Improvements Feature (#080)

# 2

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### 1. Feature Description

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**1.01** This feature provides a new operating system, UNIX\* Real Time Reliable (RTR) Release 6.4, for the 3B20D computer. Release 1.4 and 1.5 applications will benefit with performance improvements that have previously been applied to Release 6 only. The 4 ESS™ Switch Application software will be modified to use the RTR availability improvements related to craft I/O recovery and the ability to detect and fault an insane kernel process.

**1.02** The 4 ESS switch generics, 3B20D computer generics, and UNIX RTR releases have the following relationship:

4 ESS Switch Generic	3B20D Computer Generic	RTR Release
4E12	4AP6	1.2.27
4E13	4AP7	1.2.27
4E14	4AP8	1.4
4E15	4AP9	1.5
4E16	4AP10	6.4

The majority of the 4 ESS switches are either at generic 4E14 or 4E15. Therefore, the 3B20D computer RTR release will be changing from 1.4 or 1.5 to 6.4.

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**1.03** UNIX RTR Release 6.4 will execute on any of the 3B20D hardware platforms:

- 3B20D Standard Main Memory (SMM) (Other Applications)
- 3B20D Extended Main Memory (EMM) (4 ESS Switch Application)
- 3B20D Very Large Main Memory (VLMM) (Other Applications)

**⇒ NOTE:**

The 3B20D computer associated with the 4 ESS switch uses EMM. In this chapter it is sometimes referred to as non-VLMM.

**2. Call Flow (Does not apply)**

**3. Provisioning (Does not apply)**

**4. Recording (Does not apply)**

**5. Network Management (Does not apply)**

**6. Maintenance/Troubleshooting**

**Installation Errors**

**6.01** The microcode in 6.4 is designed to flag incorrect mixture of 3B20D-VLMM (other applications) and non-3B20D-VLMM (4 ESS switch application) PROM and RAM code. Incorrect 6.4 mixture results in a set of Processor Recovery Messages (PRMs) like the following:

```
START OF CU-X RECOVERY
PRM_X F000 5F00 0000 0000 YY YY YY
START OF CU-X RECOVERY
PRM_X F000 5F00 0000 0000 YY YY YY
START OF CU-X RECOVERY
PRM_X F000 5F00 0000 0000 YY YY YY
```

The above sequence is displayed when the UN28(b) PROM microstore pack contains non-VLMM (VLMM has UN28 microcode MC3T003A1), and the RAM microstore contains the VLMM (*lboot64*) microcode. The solution to this particular error is to install *lboot32* in the */dev/lboot* partition on the disk.

```
START OF CU-X RECOVERY
PRM_X F000 6000 0000 0000 YY YY YY
START OF CU-X RECOVERY
PRM_X F000 6000 0000 0000 YY YY YY
START OF CU-X RECOVERY
PRM_X F000 6000 0000 0000 YY YY YY
.
```

The above sequence is displayed when the UN28(b) PROM microstore pack contains VLMM (non-VLMM has UN28 microcode MC4C077A1C), and the RAM microstore contains the non-VLMM (*lboot32*) microcode. The solution to this particular error is to install *lboot64* in the */dev/lboot* partition on the disk.

**6.02** Mixing microcode from releases earlier than 6.4 will likely result in an illegal instruction fault in the *lboot* process and a "rolling boot" that has no failing PRMs. For any of the following code mixes,

PROM	RAM	LBOOT
VLMM	VLMM, non-6.4	6.4
non-VLMM	VLMM, non-6.4	6.4
non-VLMM	non-VLMM, non-6.4	6.4

the following PRM sequence would likely occur:

```
START OF CU-X RECOVERY
PRM_X E000 0300 0000 0000 YY YY YY
START OF CU-X RECOVERY
PRM_X E000 0300 0000 0000 YY YY YY
START OF CU-X RECOVERY
PRM_X E000 0300 0000 0000 YY YY YY
.
```

The following sequence will be seen if using non-6.4, non-VLMM microcode with VLMM PROM:

```
START OF CU-X RECOVERY
START OF CU-X RECOVERY
START OF CU-X RECOVERY
.
```

**⇒ NOTE:**

**Installers must be careful to use only microcode for Release 6.4 and with the correct platform combination.**

## **mip**

---

- 6.03** When invoking *mip* for a 3B20D-EMM (4 ESS switch application), users must supply the **-m32** argument.

The *mip* debugger was enhanced to provide the following additional capabilities:

- 3B20D computer register notations similar to those provided in both the 3B20D assembly language and microcode assemblers. For example, while *mip* uses **gr b** for general register 11, enhanced *mip* (*emip*) recognizes **%r11** or, more conventionally, **%sp**.
- 3B20D computer memory and data notations similar to that provided in the 3B20D assembler. For example, the notation "\$0x124" is recognized as an absolute address by *emip* while "&0x124" is recognized as a literal.
- Unary, binary and simple relational (**if-else**) expression evaluation.
- Built-in functions [for example **printf()**].
- *dart*-style directives (for example **#include**, **#define** and **#tee**).
- Symbol table capabilities.

- 6.04** *Emip* has the following restrictions:

- Looping constructs (for example **while**, **for**, **do-while**) are not implemented.
- Macro functions [for example **#define m(x)**] are not supported.

## **7. Transition Considerations**

---

### **Hardware Dependencies**

---

- 7.01** No hardware changes are required to implement RTR 6.4. The circuit packs that were used with RTR 1.4 or 1.5 EMM will also work with RTR 6.4 EMM.

**⇒ NOTE:**  
**While Release 6.4 allows the same software to run on different hardware platforms, it does NOT allow mixing and matching boards to create new hardware configurations. The only valid configuration is listed in Table 2-A except where explicitly documented otherwise (for example, retrofit documentation).**

Table 2-A. Circuit Pack Compatibility for RTR 6.4

Circuit Pack Assembly		UNIX RTR Hardware Platform
Code	Ver	EMM
UN1	C	All
UN2	B	All
UN3	B	All
UN3	C	All
UN6	B	All
UN9	B	All
UN10	C	All
UN10	D	All
UN11	C	All
UN11	D	All
UN16	B	All
UN19	B	All
UN21	B	All
UN22	B	All
UN22	C	All
UN23	C	All
UN25	B	All
UN28(MC4C077A1B)	B	All
UN28(MC4C077A1C)	B	All
UN30	B	All
UN33	B	All
UN43	D	All
UN45	C	All
UN45	D	All
UN46	-	M2,M3
UN46	B	M2,M3
UN46	C	M2,M3
UN46	D	M2,M3
UN48	B	All
UN52	-	All
UN52	B	All
UN54	-	M2,M3
UN55	-	M2,M3
UN59	C	All
UN61	-	All

Table 2-A. Circuit Pack Compatibility for RTR 6.4 (Contd)

Circuit Pack Assembly		UNIX RTR Hardware Platform
Code	Ver	EMM
UN64	-	M2,M3
UN133	B	All
UN133	C	All
UN135(MC4C076A1)	-	All
UN135(MC4C076A1B)	B	All
UN246	-	All
UN248	-	M2,M3
UN608(MC3T001A1)	-	M2,M3
UN609(MC3T002A1)	-	M2,M3
UN616	-	M2,M3
UN617	-	M2,M3
UN618	-	M2,M3
TN2	-	M2
TN2	B	M2
TN3	-	M2,M3
TN3	B	M2,M3
TN5	-	M2,M3
TN5	B	M2,M3
TN6	-	M2,M3
TN6	B	M2,M3
TN9	-	M2,M3
TN10	-	M2,M3
TN19(MC4C127A1)	-	All
TN19(MC4C127A1B)	-	All
TN19(MC4C127A1C)	-	All
TN56	-	All
TN61	B	All
TN68(MC4C061A1B)	-	M1,M2
TN68(MC4C061B1C)	-	M1,M2
TN69	B	All
TN70	B	All

Table 2-A. Circuit Pack Compatibility for RTR 6.4 (Contd)

Circuit Pack Assembly		UNIX RTR Hardware Platform
Code	Ver	EMM
TN74(MC4C011A1B)	B	All
TN75(MC4C048A1B)	C	All
TN82(MC4C051A1)	-	All
TN82(MC4C051A1B)	-	All
TN82(MC4C052A1)	-	All
TN82(MC4C052A1B)	-	All
TN83(MC4C041A1B)	B	All
TN84(MC4C049A1)	-	All
TN84(MC4C049A1B)	-	All
TN84(MC4C049A1C)	-	All
TN983(MC4C132A1)	-	M2,M3
TN2012	-	M2,M3
TF2	-	All
TF4	-	All
ED4C194	-	All
ED4C385	-	M2,M3
ED4C479	-	All
ED4C481	-	All
494GA	-	M2,M3
495FA	-	M2,M3
410AB	-	M2,M3
TM71	-	All
TM72	-	All
TM482	-	All

**KEY:**

All = AT&T 3B20D Model 1, Model 2, and Model 3 Computer System

M1 = AT&T 3B20D Model 1 Computer System

M2 = AT&T 3B20D Model 2 Computer System

M3 = AT&T 3B20D Model 3 Computer System

EMM= AT&T 3B20D Computer System with Extended Main Memory Hardware

## Turn On/Turn Off Mechanism

---

- 7.02** The 3B20D computer operating system UNIX RTR 1.4 or 1.5 is changed to UNIX RTR 6.4 by software deployment.

## Internal Transition Issues

---

### A. Program Administration Impacts

#### Lboot Partition Size

- 7.03** The size of the little boot partition will remain at 273 blocks for the VLMM hardware (other applications). Non-VLMM applications (4 ESS switch application) will see the size of little boot partition grow from 77 blocks to 273 blocks.

- 7.04** The *3bmkdsk* command uses information in the file partition body forms in the System Generation (SG) data base to build a mkdsk tape.

#### ⇒ NOTE:

**Since there are now VLMM and non-VLMM versions of 3B20D microcode, UNIX RTR customers should verify that the SG data base refers to the correct version of microcode before running the *3bmkdsk* command.**

Use the *rcvsg* command to determine which microcode file is specified in a file partition body (fpb) form (pack\_name=rt, pack\_num=0, par\_num=0) in the SG data base. If the inappropriate microcode file is specified in the SG data base, update the data base with the correct microcode file. For non-VLMM machines, the microcode file should be *micro/ucode/prompat32.o*.

#### Top Tapes

- 7.05** Top tapes also contain the microcode for the 3B20D computer. Since there are now VLMM (other applications) and non-VLMM (4 ESS switch application) versions of 3B20D microcode, there are two versions of top tapes.

#### ⇒ NOTE:

**UNIX RTR customers should verify that the SG data base refers to the correct version of the toplevel before making a top tape or running the *3bmkdsk* command.**

Use the *rcvsg* command to determine which toplevel is specified in a file system body (fsb) form (pack\_name=rt, pack\_num=0, par\_num=13, directory=/, fname=toplevel) in the SG data base. For non-VLMM machines, the toplevel file should be *fldop/top/topfile32*.

## B. Command Subsystem Impacts

### Ibrowse Command

**7.06** The command line syntax for the *ibrowse* command was changed in Release 6.4. To execute *ibrowse* on the 3B20D machine, the syntax of the command line is:

```
ibrowse [file]
```

where *file* contains the contents of physical memory, typically /dev/pmem.

To execute *ibrowse* on a support machine, the syntax of the command line is:

```
ibrowse -mach_type [file]
```

where *file* contains the contents of physical memory, and *mach\_type* indicates the type of memory configuration within *file*. Supported *mach\_type* values are:

3B20D	SMM 3B20D machine (other applications)
EMM	3B20D machine with EMM feature (4 ESS switch application)
VLMM	3B20D machine with VLMM feature (other applications)

## C. Resource Utilization

**7.07** Table 2-B lists the typical disk space sizes of various UNIX RTR products in Release 1.5 and Release 6.4. These numbers will assist UNIX RTR customers in evaluating the disk space impacts of Release 6.4. Disk space sizes are expressed in 512 byte disk blocks with the data gathered from stripped products in the official nodes of R<1.5> and R<6.4>.

The disk partition data was gathered from UNIX RTR lab machines running loads 1.5.0 on a 300MB disk and 6.4.0 on a 340MB disk.

**Table 2-B. Disk Space Utilization**

Product	Disk Space Size		Comments
	R<1.5>	R<6.4>	
Disk Driver	299	327	SCSI feature in R<6.4>
File Manager	470	464	
Full I/O Driver	1579	1453	CIRF in R<6.4>
Reduced I/O Driver	1083	1195	
Kernel	548	541	RTIFLT in R<6.4>
Libc	374	328	
LibCFT	243	322	
LibminCFT	130	119	
Process Manager	92	93	
SIM	250	264	CIRF in R<6.4>
Csop	183	182	
Cftshl	287	287	
Bboot Partition	82	82	
BWM Partition	13000	15000	
Lboot Partition	77	273	
ECD Partition	13500	13500	
Etc Partition	3500	3500	
Diag Partition	608	768	
Pdump Partition	400	400	
Root Partition	65000	65000	
Swap Partition	20000	20000	

**7.08** Table 2-C lists the typical sizes of various UNIX RTR products in Release 1.5 and estimates their sizes in Release 6.4. These numbers can vary due to dynamic allocation and return of memory by some processes. These estimates will assist UNIX RTR customers in evaluating the incore memory impacts of Release 6.4. Core memory sizes are expressed in 2K byte pages with the data gathered from loads 1.5.0 and 6.4.0.

**Table 2-C. Incore Memory Utilization**

Product	Core Memory Size		Comments
	R<1.5>	R<6.4>	
Disk Driver	460	472	SCSI feature in R<6.4>
ECD	193	191	Configuration dependent
File Manager	487	503	MOD1 Buffer
Full I/O Driver	878	848	
Reduced I/O Driver	712	640	
Kernel	638	626	Different # of page tables
Libc (text/data/total)	29/6/36	29/4/34	
LibCFT (t/d/tot)	22/4/28	28/2/31	
LibminCFT (t/d/tot)	13/2/16	12/1/14	
Process Manager	26	31	
SIM	394	384	CIRF in R<6.4>
Csop	419	419	
Cftshl	202	204	
PCB/KPCB Segments	1	2-4	

#### **D. Release 6.4 Specific Impacts on Release 1.4 or 1.5 Customers**

##### **User Interfaces**

**7.09** The software interfaces in Release 6.4 are similar to those in Release 1.4 or 1.5 with the following exceptions. The Craft Interface Recovery Feature introduces three levels of Craft Initialization which are as follows:

- Entering an EAI poke 15 will initiate a level 1 Craft Initialization.
- Entering an EAI poke 42,2 then poke 15, will initiate a level 2 Craft Initialization.
- Entering an EAI poke 42,3 then poke 15, will initiate a level 3 Craft Initialization.

##### **Operating System Impacts**

**7.10** The changes in system limits are as follows:

- Maximum number of inodes per filesystem is reduced to 16376.
- Maximum number of mountable filesystems is increased to 64.

## System Integrity Subsystem Impacts

**7.11 ENV=RTR Addition to Output Messages:** String "ENV=RTR" added to all audit output messages. Example, "AUD MSGBUF 1..." becomes "AUD ENV=RTR MSGBUF 1...".

## New Features

**7.12 Craft Interface Recovery Feature:** The purpose of this feature is to reduce the impact of Craft lockouts on the system by providing new recovery mechanisms which allow the Craft Interface to be restarted without rebooting the machine. The feature is not intended to reduce the number of occurrences of Craft lockouts.

**7.13** The Craft Interface Recovery mechanism feature has two main components. The first provides new levels of recovery from Craft lockout, and the second provides a mechanism for data collection regarding system initializations.

**7.14** The Craft Initialization will now have three levels. The current Craft Initialization menu poke (EAI 15) will now be used in conjunction with the application parameter poke (key 42) to select the desired initialization level which are as follows:

- Craft Process Initialization (level 1): The current Craft Initialization capability to terminate all Craft processes will be retained, but it will be modified to use the Sure Kill and Suspend mechanisms.
- UNIX and Supervisor Process and Craft Interface Handler Initialization (level 2): This level of initialization will cause all killable non-essential UNIX and Supervisor processes to be terminated and restarted and the Craft Interface Handler (CIH) to be reinitialized.
- UNIX and Supervisor Process and I/O Driver Initialization (level 3): This level of initialization will cause all killable essential and non-essential UNIX and Supervisor processes to be terminated and restarted and cause the I/O Driver to reinitialize the Input/Output Processors (IOPs), all handlers, and their scratch areas.

Table 2-D indicates which processes will be terminated for the different levels of Craft Initialization.

**Table 2-D. Process Initialization**

User/Supervisor Process Type	Initialization Level		
	1	2	3
Craft Processes	y	y	y
Non-Essential Killable UNIX Supv.	n	y	y
Essential killable UNIX Supv.	n	n	y
Non-Killable UNIX Supv.	n	n	n

Table 2-E indicates which I/O Driver handlers will be reinitialized for the various Craft Initialization levels.

**Table 2-E. Handler Initialization**

I/O Driver Handler	Initialization Level		
	1	2	3
BXSLH - BX Session Layer Handler	n	n	y
CCITT Handlers	n	n	y
CIH - Craft Interface Handler	n	y	y
CPH - Communication Protocol Handler	n	n	y
DUIH - Direct User Interface Handler	n	n	y
MTH - Magnetic Tape Handler	n	n	y
NPH - Network Protocol Handler	n	n	y
SCSDH - Scan and Signal Dist. Handler	n	n	y
SDLH - Sync. Datalink Handler	n	n	y

**7.15** In order for the Craft Suspend Steering Committee to track UNIX RTR's progress in its attempt to reduce the occurrences of Craft lockouts, a method for collecting data must be established. This feature will implement a mechanism to record the number of Craft Initializations.

**7.16 EGRASP Feature:** The new EGRASP debugging capabilities that are provided by the Release 6.4 GRASP depend on the type of utility circuit installed. In addition to existing GRASP functionality, the UN61 utility circuit supports the whole range of EGRASP capabilities. This includes breakpoint on external input, stop trace on condition, retrieve trace memory from inactive Control Unit (CU) across the maintenance channel, and the following five new trace types:

- Data history
- Function call and return
- Function call with parameter
- Simultaneous data history and function call with parameter
- Simultaneous transfer and data history.

**7.17** The UN21 utility circuit supports only a subset of the new EGRASP capabilities. In addition to existing GRASP capability, the UN21 supports breakpoint on external input, stop trace on condition, and retrieve trace memory from inactive CU across maintenance channel.

## **8. Documentation**

---

**8.01** UNIX RTR documents will be updated to reflect the operation of Release 6.4 on the various 3B20D hardware platforms. Documents known to be impacted are as follows:

Assembly Language User's Guide:

This document has been incorporated into the Assembly Language and Microcode Programmer's Manual Volume 8.

UNIX RTR IM/OM Manuals:

These manuals will be updated to reflect the changes in the input and output messages for Release 6.4. Specifically, the following changes will be made:

- The memory module overload detection of Release 1.4 or 1.5 will be included in Release 6.4. The REPT SIMCHK output message page will be modified.
- A new segment out of range error will be included on the REPT PMGR output message page.

UNIX RTR Programmer's Manual Volume 2:

The manual will be updated to reflect the Release 6.4 Software Generation System (SGS) enhancements and operation.

A new section on portability requirements will be added to this volume.

UNIX RTR Programmer's Manual Volume 3:

Manual pages for the Release 6.4 SGS will be added.

Descriptions of the new inline string instructions will be added.

**UNIX RTR Programmer's Manual Volume 4:**

A new section will be added to describe *libhw.a*.

**UNIX RTR Programmer's Manual Volume 7:**

The manual will be updated to include performance data for the new inline string instructions.

**Assembly Language and Microcode Volume 8:**

The manual will be updated to include the new and changed assembly instructions.

The Assembly Language User's Guide will be incorporated into this manual.

**Lab User's Guide Volume 9:**

The manual will be updated to reflect the changes made to the *ibrowse* and *mip* commands.

**Processor Recovery Message Manual:**

The manual will be updated to reflect the new PRMs which are generated by the *mcver* instruction.

**Software Troubleshooting Guide:**

The manual will be updated to reflect the changes made to the *ibrowse* and *mip* commands.

**Craft Interface User's Guide:**

The Operating System Status Page section of the manual will be updated to add a definition of PDT1.

## Fast Connect Feature (#084)

# 3

---

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### Figures

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## Fast Connect Feature (#084)

# 3

---

### 1. Feature Description

- 1.01** In previous generics, a tandem switch returned both an Address Complete Message (ACM) and an Answer Message (ANM) to the originating exchange. If an ANM was received but no ACM, an ACM was generated. This feature allows an ANM to be sent without an ACM to an originating end office where a "fast connect" occurs on the terminating Integrated Services Digital Network (ISDN) interface.
- 1.02** Incorporating this feature ensures that the User-to-User Information (UUI) parameter and the Access Transport Parameter (ATP) is correctly passed through a tandem switch.

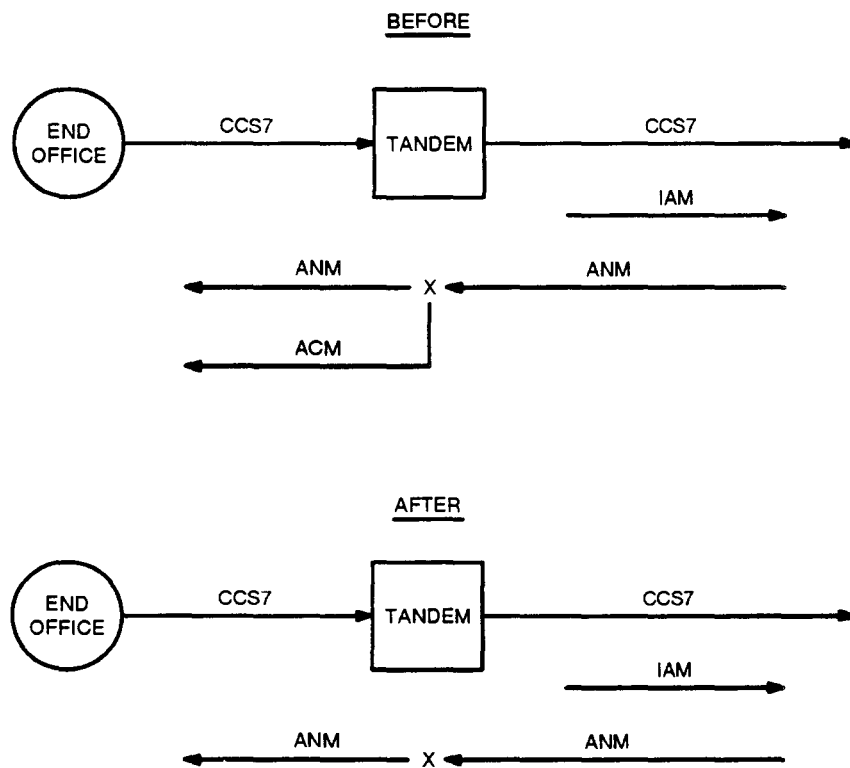
### 2. Call Flow

#### Call Flow Key Points

- 2.01** If a tandem switch receives an ANM before an ACM has been received, no ACM is generated. If the incoming circuit is Common Channel Signaling No. 7 (CCS7) supported, the tandem formulates and sends an ANM for the incoming circuit. If the incoming circuit is not CSS7 supported, there is no change in the way the tandem handles the call.

**2.02** If the ANM includes a Backward Call Indicator (BCI) parameter, the BCI parameter is included in any outgoing ANM. The parameters in the outgoing ANM and their coding are nearly the same as in the received ANM. The only difference is the ISDN User Part (ISUP) Protocol Control Indicator field (bits G thru K) in the BCI parameter. These bits should be coded to reflect any changes resulting from the characteristics of the incoming connection.

**Call Flow Diagram**



**Figure 3-1. Fast Connect Call Flow**

**3. Provisioning (Does not apply)**

**4. Recording (Does not apply)**

**5. Network Management (Does not apply)**

**6. Maintenance/Troubleshooting (Does not apply)**

**7. Transition Considerations**

**Dependencies**

- 7.01 For the UUI parameter and the ATP to be correctly passed and end in a fast connect situation, the tandem switch must have the 4E16 generic installed.

**Turn On/Turn Off Mechanism**

- 7.02 This feature is automatically turned on by software deployment.

**8. Input/Output Manual Pages (Does not apply)**

## Generic Address Parameter (GAP) Feature (#085)

# 4

---

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## Generic Address Parameter (GAP) Feature (#085)

# 4

---

### 1. Feature Description

**1.01** The Generic Address Parameter (GAP) feature provides the capability to transport a nonvalidated, user-provided calling party number (CPN). This feature is important for supporting an end-to-end internetwork operation. Without the GAP feature, user provided numbers such as an Integrated Services Digital Network (ISDN) Numbering Plan number or a Private Numbering Plan number, which are nonvalidated numbers, are dropped.

**1.02** Prior to the 4E16 generic, the 4 ESS™ switch could only transport one network-validated CPN. A nonvalidated number, that is, a CPN that is either not screened by the network or is screened and fails the screening process, was dropped. With the incorporation of this feature, the network-validated CPN is transported to and from the Local Exchange Carrier (LEC) in the CPN parameter, and the nonvalidated CPN is transported in the GAP.

## **2. Call Flow**

---

**2.01** The GAP format is similar to the CPN parameter format; however, the GAP format includes a "type of address" field that defines what the parameter is. This field can have four different values: a dialed number, a destination number, "CPN, user-provided, screening failed," or "CPN, user-provided, not screened." Only two types of addresses, however, are recognized in this field:

- "CPN, user-provided, screening failed"
- "CPN, user-provided, not screened."

A GAP with either of these values in the address field is passed; a GAP with any other value is passed as an "unrecognized parameter."

### **Handling of GAP Through the Network**

---

**2.02** This section describes how the GAP is handled by different types of switches in the network.

#### **A. Originating End Office**

**2.03** If a GAP is received at an originating end office without a CPN parameter in the IAM, the GAP will be discarded. The GAP will also be discarded if the "type of address" field does not equal "CPN, user-provided, screening failed" or "CPN, user provided, not screened." The GAP will be passed by the originating end office only if the CPN parameter is passed.

#### **B. Tandem Switch**

**2.04** A tandem switch passes the GAP without modification. If the tandem switch is acting as a Service Switching Point (SSP), a GAP with anything other than a user-provided CPN in the "type of address" field is handled as an "unrecognized parameter."

#### **C. Originating Toll Switch (OTS)**

**2.05** If a GAP is received by an originating toll exchange and there is no CPN parameter in the Initial Address Message (IAM), the GAP is discarded. The GAP is also discarded if the type of address field is not equal to "CPN, user-provided, screening failed" or "CPN, user-provided, not screened." For all other conditions, the GAP is passed without modification; however, the CPN parameter must also be passed in the outgoing IAM.

#### **D. Intermediate Toll Switch**

- 2.06** If an intermediate toll switch receives a GAP in the incoming IAM, it passes the GAP unchanged in the outgoing IAM.

#### **E. Terminating Toll Switch**

- 2.07** The GAP may or may not be passed from the toll switch. In order for the GAP to be passed from the toll switch to the LEC, the following conditions must be met:

- The value in the "type of address" field must be "CPN, user-provided, screening failed" or "CPN, user-provided, not screened".
- The CPN parameter must be passed.

- 2.08** If the GAP is not available prior to routing the call to the terminating LEC, the switch does not generate a request for the GAP. If the call is being routed to an Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) customer, the GAP is dropped at the terminating switch.

### **3. Provisioning**

---

#### **Office Data Administration (ODA)**

---

##### **A. Overview**

- 3.01** Two new ODA tables, OD4ANIPARM and OD4NIIPARM, have been defined to specify ISUP parameter handling for intra-network and network-interconnect calls. (ISUP trunk handler programs use OD4ANIPARM for intra-network calls and OD4NIIPARM for network-interconnect calls.) Both tables are 256-word structures and are defined in Protected Simplex Backed ODA (PSBO) memory.

### **4. Recording (Does not apply)**

---

### **5. Network Management (Does not apply)**

---

## **6. Maintenance/Troubleshooting (Does not apply)**

---

## **7. Transition Considerations**

---

### **Dependencies**

---

**7.01** For complete utilization, this feature requires all 4 ESS switches in the network to be equipped with the 4E16 generic. If a 4 ESS switch equipped with an earlier generic receives the GAP, the GAP is dropped without further processing.

### **Turn On/Turn Off Mechanism**

---

**7.02** This feature is automatically turned on by software deployment.

## **8. Input/Output Manual Pages (Does not apply)**

---

**Operations, Administration and  
Maintenance Enhancements  
Feature (#086)**

**5**

---

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---

**Operations, Administration and  
Maintenance Enhancements  
Feature (#086)**

**5**

---

**1. Feature Description**

**1.01** This feature provides a new Integrated Services Digital Network User Part (ISUP) measurement at an Access Tandem (AT). The new measurement is a count of the number of ISUP messages containing Access Transport Parameters (ATPs) that an AT receives from an Interexchange Carrier (IXC), another Tandem switch, or an end office. The count is done on a per-trunk subgroup (TSG).

**2. Call Flow (Does not apply)**

**3. Provisioning (Does not apply)**

**4. Recording (Does not apply)**

**5. Network Management (Does not apply)**

## 6. Maintenance/Troubleshooting

### Measurements

**6.01** The name of the new count that records the number of messages containing ATPs received at a Local Exchange Carrier (LEC) owned AT is XL4HC\_ATPRCVD. This count is defined in the TSG head cell in a word that is overlaid with other counts. The count appears in the MSC 13 report under the ATP heading. An example of an MSC 13 report appears below:

```

45 REPT:MEASREPT 2 MSG COMPL
ECHO DO ME STC PRIM MTC
SUN 01/20/91 ACCUMULATION TIME SUN 1430 - SUN 1445
LAST MEASREPT CHANGE 01/20/91
MSC 13 TSG
-----CIN-----
IN S2      OCC      OG ATT      OVFL      RRTO      RRAT      RRCR      RRSU
MAN        AUTO      PATT      ECBS      DATT      DOVF      ATP      SILC
0100ISUP   HA IR PIN ETC
000002    000000    000000    000000    000000    000000    000000    000000
000000    000000    000000    000000    000000    000000    000000    000000
0300ISUP   HA IR PIN OCC
000000    000000    000002    000000    000000    000000    000000    000000
000000    000000    000000    000000    000000    000000    000001    000000
0300ISUP   HA IR PIN LCC
000000    000000    000000    000000    000000    000000    000000    000000
000000    000000    000000    000000    000000    000000    -          000000
01/20/91   14:45:18
#406

```

**6.02** The example shows ATPs received for three types of ISUP trunk subgroups: End Office/Tandem Connecting (ETC), Other Carrier Connecting (OCC), and Local Carrier Connecting (LCC). The values for these trunk subgroups are in bold face type. (A count is not recorded for LCC.)

**6.03** Whenever an ISUP message containing an ATP is received at an Access Tandem, the count is incremented. From this count, operations managers can determine how many ATPs are being received by the LEC network.

**7. Transition Considerations (Does  
not apply)**

---

**8. Input/Output Manual Pages (Does  
not apply)**

---

## Handling Additional TR-394 Exceptions Feature (#121)

# 6

---

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---

## Handling Additional TR-394 Exceptions Feature (#121)

# 6

---

### 1. Feature Description

**1.01** This feature complies with Bellcore TR-394 exceptions that deal with handling Integrated Service Digital Network User Part (ISUP) calls at an Access Tandem (AT) and supporting consistent protocol handling in the Local Exchange Carrier (LEC) networks. Compliance is provided for the following three exceptions:

- Calling Party Category Parameter
- Interworking Cause
- Backward Call Indicator (BCI) for Test Calls.

#### Calling Party Category Parameter

**1.02** This exception pertains to the coding of the Calling Party Category parameter at a 4 ESS™ Access Tandem switch where interworking from MF to ISUP signaling occurs. Prior to the implementation of this feature, the Calling Party Category parameter in the outgoing Initial Address Message (IAM) was coded "ordinary calling subscriber." This feature changes the coding to either "customer" or "unknown." The setting is based either on a check of a type of trunk (TOT) table or whether or not equal access is available on the incoming trunk (ICT). For an End Office or Tandem Connecting (ETC) trunk or an Other Common Carrier (OCC) trunk, the Calling Party Category parameter is set to "unknown." If this is a substituted number (that is, a new routing number received from a data base), then the Calling Party Category parameter is set to "customer."

## **Interworking Cause**

---

- 1.03** This exception also pertains to a 4 ESS switch that is serving as an Access Tandem (AT) where MF to ISUP interworking occurs. The exception defines how the 4 ESS switch will respond when the following conditions exist:
- (a) An on-hook disconnect signal is received on the incoming circuit before receiving either a release (REL) message or a suspend (SUS) message for the outgoing circuit.
  - (b) An IAM has already been sent on the outgoing circuit.
- 1.04** For condition (a), the 4 ESS switch idles the incoming circuit and returns an on-hook signal.
- 1.05** For condition (b), the 4 ESS switch sends a REL message for the outgoing circuit with the Cause parameter coded as follows:
- The Cause value is "interworking unspecified" (1111111).
  - The location is "local local network" (0010).
- 1.06** "Interworking unspecified" will also be sent if a cause has been received via another REL message using either Q.931, ISUP, or CCS6 ISDN User Part (INUP) protocol.
- 1.07** Prior to the incorporation of this feature, when a forward REL message was sent in interworking cases, the Cause value was "normal clearing."

## **Backward Call Indicator (BCI) for Test Calls**

---

- 1.08** This exception pertains to the coding of BCI for incoming test calls on ISUP circuits that terminate on a 4 ESS switch.
- 1.09** If an incoming test call on an ISUP circuit terminates at a 4 ESS switch, and an address complete message (ACM) is sent on the incoming circuit, the BCI parameter is coded as follows:
- The Interworking Indicator is coded "no interworking encountered" (0). (This was previously coded "interworking encountered.")
  - The ISUP indicator is coded "ISDN User Part used all the way" (1). (This was previously coded "ISDN User Part not used all the way.")
  - If the test circuit is available and free, the Called Party Status Indicator is coded "subscriber free" (01). (This was previously coded "no indication.")

**2. Call Flow (Does not apply)**

**3. Provisioning (Does not apply)**

**4. Recording (Does not apply)**

**5. Network Management (Does not apply)**

**6. Maintenance/Troubleshooting (Does not apply)**

**7. Transition Considerations**

**Turn On/Turn Off Mechanism**

**7.01** This feature is automatically turned on by software deployment.

**8. Input/Output Manual Pages (Does not apply)**

---

## Coding Standard Field of the Cause Parameter Feature (#122)

# 7

---

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## Coding Standard Field of the Cause Parameter Feature (#122)

# 7

---

### 1. Feature Description

- 1.01** The Integrated Services Digital Network User Part (ISUP) Cause parameter contains a 2-bit Coding Standard field that can have the following values:
- 00 Consultative Committee on International Telephone and Telegraph (CCITT) standard
  - 01 Reserved for other international standards
  - 10 American National Standards Institute (ANSI) standard
  - 11 Reserved.
- 1.02** Before the incorporation of this feature, the only value in the Coding Standard field that the 4 ESS™ switch recognized and generated was 00, "CCITT standard." All the Cause values that were implemented, for example, "no circuit," "user busy," etc., were related to the CCITT coding standard.
- 1.03** In the future, end offices will start implementing services that define Cause values that relate to other values in the Coding Standard field, for example, ANSI standard. When necessary, failure indications must be sent to calling parties using these new services. This feature gives the 4 ESS switch the capability to pass unchanged all Coding Standard values or to play a default announcement.

## **2. Call Flow**

---

### **Effect of Interworking on Cause Parameter**

---

**2.01** This section describes how an ISUP Cause parameter is affected by the following types of interworking:

- ISUP-to-ISUP
- ISUP-to-Q.931
- ISUP-to-International CCITT 7 ISUP (INUP)

#### **A. ISUP-to-ISUP**

**2.02** ISUP-to-ISUP interworking at an intermediate switch has the following effects on the Cause parameter:

- The value of the received Coding Standard indicator is passed unchanged.
- If the Coding Standard indicator is "CCITT standard," the Cause value is passed and/or recoded per existing procedures. If the Coding Standard indicator is something other than "CCITT standard," the Cause value is passed unchanged.
- The Location value is passed and/or recoded per existing procedures.

#### **B. ISUP-to-Q.931**

**2.03** If a received ISUP Cause parameter in any ISUP message is to be mapped to a Q.931 Cause Information Element (IE) and the Coding Standard Indicator of the ISUP Cause parameter is something other than "CCITT Standard," the Cause IE is coded as follows:

- The Coding Standard field is "CCITT standard."
- The Cause value is "interworking unspecified" (1111111).
- The location is "unknown" (1010).

#### **C. ISUP-to-INUP**

**2.04** There is no change in the way the Cause parameter is handled at an international switching center (ISC) switch where ISUP-to-INUP interworking occurs.

### **Cause Parameter and Playing Tone/Announcement**

---

- 2.05** The Coding Standard field of the Cause parameter is examined at an originating or intermediate switch when the following conditions exist:
- A REL message is received for the Outgoing Trunk (OGT) prior to receiving the address complete message (ACM).
  - A tone and/or announcement is to be played at the 4 ESS switch.

If the Coding Standard value is "CCITT standard," there is no change in the way the tone and/or announcement is determined. For any other value of the Coding Standard, the cause is treated as CCITT standard value "interworking, unspecified" (1111111) with location "unknown" (1010).

- 2.06** The Cause value is mapped to reorder tone for domestic calls or to Reorder Announcement (ROA) for the following international calls:
- International outbound
  - International outbound overflow
  - International transit calls.

### **3. Provisioning (Does not apply)**

### **4. Recording (Does not apply)**

### **5. Network Management (Does not apply)**

## 6. Maintenance/Troubleshooting

### Call Irregularities

#### A. New or Changed Final Handling Codes

**6.01** Final Handling (FH) Codes 2011 and 2012 apply to this feature. Table 41-A describes the restrictions that limit the FH Codes, the last good thing that happened (Previous Action), what went wrong (Error), and what the 4 ESS switch will do next (Action) for these two codes.

**Table 7-A. Final Handling Codes**

<b>FH Code 2011 (Domestic)</b>	
<b>Restrictions</b>	ISUP Outgoing Trunk handler received a backward failure release on a domestic call and coding standard was invalid. Reorder tone treatment.
<b>Previous Action</b>	An Initial Address Message (IAM), Circuit Reservation Message (CRM), or Continuity Check Request (CCR) was sent by the ISUP Outgoing Trunk handler.
<b>Error</b>	A Release (REL) message was received and the Coding Standard was not CCITT.
<b>Action</b>	The call is finaled and the Incoming Trunk initiates a backward failure.
<b>FH Code 2012 (International)</b>	
<b>Restrictions</b>	ISUP Outgoing Trunk handler received a backward failure release on an international call, and the coding standard was invalid. Reorder Announcement treatment.
<b>Previous Action</b>	An IAM, CRM, or CCR was sent by the ISUP Outgoing Trunk handler.
<b>Error</b>	A Release (REL) message was received and the Coding Standard was not CCITT.
<b>Action</b>	The call is finaled and the Incoming Trunk initiates a backward failure.

## **7. Transition Considerations**

### **Turn On/Turn Off Mechanism**

**7.01** This feature is automatically turned on by software deployment.

## **8. Input/Output Manual Pages (Does not apply)**

## Performance and Capacity Improvements Feature (# 901)

# 8

---

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# Performance and Capacity Improvements Feature (# 901)

# 8

---

## 1. Feature Description

**1.01** Several Call Store structures used in processing a call have reached the exhaust point. These structures will be grown and restructured to accommodate new features. This growth and restructuring will be accomplished by the Performance and Capacity Improvements feature. The Performance and Capacity Improvements feature consists of the following parts:

- Move TMADIMAD from Call Store (CS) to Program Store (PS)
- Office Grooming to Pack Pseudo Signal Processors (SPs)
- Trunk Block (TB) / Trunk SubGroup (TSG) Restructure
- Call Type Word Changes
- Stable Call Accumulation Register (SCAR) Restructure
- Call Register (CR) Restructure
- Trunk Maintenance Register (TMR) Restructure

Each part will be covered in the same manner as the other features in this document.

## **2. Move TMADIMAD From Call Store (CS) to Program Store (PS)**

---

### **Core Feature Description**

---

**2.01** Moving TMADIMAD tables from call store to program store would trade 8K words of program store for 8K words of call store. This feature has no impact on functional areas.

### **Data Definition**

---

**2.02** The pident TMADIMAD, which contains the final handling code data table for the call irregularity trapping system, is a 8192-word table that currently resides in call store. Moving this pident to program store will entail the removal of the TM4IMADATA structure currently defined in NO4MEM, and the definition of a new global IMADATA.

### **Functional Design Decomposition (Does not apply)**

---

### **Provisioning (Does not apply)**

---

### **Maintenance Information (Does not apply)**

---

### **Transition Considerations**

---

#### **A. Turn On/Turn Off Mechanism**

**2.03** This feature is automatically turned on by software deployment.

### **Input/Output Manual Pages (Does not apply)**

---

---

### **3. Office Grooming to Pack Pseudo Signal Processors (SPs)**

---

#### **Core Feature Description**

---

**3.01** An administrative activity to groom call store usage in offices will pack pseudo Signal Processors (pseudo SPs) KCODES. This will save 32K to 64K words of call store in large offices. This does not require any wiring changes, but two ODA runs are needed; either an ODA run associated with a generic retrofit or possibly an ODA-only retrofit. This feature does not impact any functional area.

#### **Data Definition (Does not apply)**

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#### **Functional Design Decomposition (Does not apply)**

---

#### **Provisioning (Does not apply)**

---

#### **Maintenance Information (Does not apply)**

---

#### **Transition Considerations (Does not apply)**

---

#### **Input/Output Manual Pages (Does not apply)**

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## **4. Trunk Block (TB) / Trunk Subgroup (TSG) Restructure**

---

### **Core Feature Description**

---

- 4.01** In 4E16, the Trunk SubGroup (TSG) block is doubled in size from 8 to 16 words. The service indicators and some of the per-TSG data (about 3 words) are being moved from the Trunk Block (TB) to the TSG block. This frees up space in the TB for future growth.

### **Data Definition**

---

- 4.02** The Trunk and TSG blocks are being restructured to provide spare memory to support new features for 4E16 and later generics. This change is being done in conjunction with the Call Register (CR) restructure. With the new CR structure, four new words of trunking data will be copied into the CR from the TSG block.
- 4.03** The TSG block is being doubled in size from 8 to 16 words. This allows the movement of trunk block items to the TSG block with enough spare memory remaining in both structures for future growth. This also permits the removal of overlaid items. The data to be moved from the trunk to TSG block are service indicators and items that are needed only by message trunks. TSG blocks will continue to be allocated only for message TSGs. The data that will remain in the trunk block are items that are different per trunk block and items needed by non-message TSGs.
- 4.04** The location of the Trunk SubGroup Number (TSGN) item in the trunk block is being moved into a word that is copied into the CR. This is being done to speed up the retrieval of TSG data. Moving this item affects the trunk block layout for non-message TSGs.
- 4.05** Finally, several spare items are being defined in a CR copy word in the trunk block. Spare fields are being added to the ODA, RC and Verify forms. Three one-bit items and one three-bit item will be added. This will allow easier implementation of fast feature items. The OTHER bit is currently spare, and it will be deleted.

### **Functional Design Decomposition**

---

#### **A. Call Processing**

- 4.06** When a CR is seized, the InComing Trunk (ICT) TB data and CR words from the TSG block are copied to the CR.

### **Provisioning**

- 4.07** The capability masks for Real Time Network Routing (RTNR) have moved from HT4CORETSG to the TSG block.
- 4.08** There is no longer a need for separate Sampling rate INDEX (SINDEX) items for the TSG and trunk block. An unassigned state will be defined for the TSG SINDEX field, and the trunk block item will be deleted.
- 4.09** The Non-Call Associated Temporary (NCAT) signaling connection bit is not being used. The bit will be deleted, and the corresponding field that populates the item will be removed from the ODA and RC/V messages.
- 4.10** A 4E13 fast feature removed the need for domains DEDP and DEVP. DEDP and DEVP will no longer be accepted as inputs in the DOM field for the ODA and RC/V TSG and code grouping messages.

### **Maintenance Information (Does not apply)**

### **Transition Considerations**

#### **A. Turn On/Turn Off Mechanism**

- 4.11** This feature is automatically turned on by software deployment.

### **Input/Output Manual Pages**

- 4.12** The NCAT and OTHER fields will be removed from the Verify TSG output catalogs and the SPARE1, SPARE2, SPARE3 and SPARE4 fields will be added.
- 4.13** The text phrases for the DEDP and DEVP domains will be deleted.

## **5. Call Type Word Changes**

---

### **Core Feature Description**

---

**5.01** Several changes are being made to the call type word layouts. The number of call types is being increased from 32 to 64. Two-word call types are being grown to four words, several items within the call type words are being increased in size, and the acceptable digit count information is being removed from the routing data block structure and stored in the call type word.

### **Data Definition**

---

**5.02** The following changes are being made to the call type word layout:

- Two-word call types are being grown to four words.
- Several items within the call type words are being increased in size:
  - Direct Services Dialing Capability (DSDC) type item grows from 4 to 5 bits
  - Call Handling Instruction (CHI) grows from 6 to 7 bits
  - Service Category (SC) item grows from 6 to 7 bits.
- The Acceptable Digit Count (ADC) and Maximum Acceptable Digit Count (MADC) items are being removed from the Routing Data Block (RDB) structure, and the information stored in the call type word. ADC will have a bit field representing acceptable digit counts of 2 through 15.
- ADC in the indeterminate call type is changed to INDeterminate Acceptable Digit Count (INDADC) and contains a 1-bit representation for digit counts of 3 through 15.

**5.03** The acceptable digit count will now always be available from the call type word (for those call types that have an ADC). The RDB will not longer contain the ADC. The ODA will populate the ADC in all applicable call type words.

### **Functional Design Decomposition (Does not apply)**

---

### **Provisioning**

---

**5.04** Two-word call types become four-word call types. Thus, an additional 128K of call store may be used by this translator. At a minimum, it doubles the amount of memory currently used in the structure.

### **Maintenance Information (Does not apply)**

---

### **Transition Considerations**

---

#### **A. Turn On/Turn Off Mechanism**

**5.05** This feature is automatically turned on by software deployment.

### **Input/Output Manual Pages**

---

**5.06** The removal of the Acceptable Digit Count (ADC) field from the RDB translator and the restructured call type word will cause the removal of the ADC field from the VER:RDB and VER:CODEGRP output messages.

## 6. Stable Call Accumulation Register (SCAR) Restructure

---

### Core Feature Description

---

**6.01** The growing of the Call Register (CR) will allow the Stable Call Accumulation Register (SCAR) to be restructured so that call data not related to Automatic Message Accounting (AMA) recording can be moved to a more appropriate place in the CR. Therefore, the size of the SCAR can be reduced from 32 words to 20 words.

### Data Definition

---

**6.02** Call processing data is moving from the SCAR to the CR. This will reduce the size of SCAR from 32 words to 20 words. By moving this call processing data from SCAR to CR, room is freed up in the SCAR for recording more data. Also by moving this data, the call processing programs can be less complex by not having to seize or retrieve data from SCAR.

### Functional Design Decomposition

---

#### A. System Integrity

**6.03** Because of a reduction in the size of the SCAR, the format for the printed message for audits 81 and 82 will also change.

#### B. Call Processing

**6.04** No external call processing impact.

#### C. Recording

**6.05 *Remove Call Processing Data:*** Call Processing will store and retrieve data directly from the CR. Some of this data will still be needed for AMA records. SCARBILL will copy the data it needs from the CR.

**6.06 *Reduce SCAR size:*** The size of the SCAR will be reduced from 32 to 20 words.

**6.07 *Restructure SCARBILL:*** The 1A recording function will be partially reorganized by restructuring the SCARBILL pident. The restructuring will involve dividing the SCARBILL pident into two pidents. The SCARBILL program units which interface with Call Processing (CP) at the major recording call events will remain in SCARBILL. All other program units will be contained in the second pident SCARSUBS.

## **Provisioning**

---

### **A. Office Data Administration**

#### **Overview**

- 6.08** The size of a SCAR block is being decreased from 2048 to 1280 words. The alignment variable is also being changed to 20.

## **Maintenance Information (Does not apply)**

---

## **Transition Considerations**

---

### **A. Turn On/Turn Off Mechanism**

- 6.09** This feature is automatically turned on by software deployment.

## **Input/Output Manual Pages**

---

- 6.10** No impact to input/output manual pages. However, the format for the printed message for audits 81 and 82 will change.

## **7. Call Register (CR) Restructure**

### **Core Feature Description**

**7.01** The Call Register (CR) is doubling in size from 64 to 128 words. A larger CR is needed to accommodate additional data items requested for new features and capabilities. The existing 64-word CR has run out of unused bits. The CR restructure will also consolidate call processing data in the CR by reducing the call processing access of adjunct data structures [for example, Stable Call Accumulation Register (SCAR)]. The growth of the CR affects other related data structures, such as CR Annex, Non-Call Associated Temporary (NCAT) signaling connection register, and Trunk Maintenance Register (TMR).

### **Data Definition**

**7.02** Table 8-A contains a general layout of the first 64 words of the CR. It highlights the changes from the 4E15 layout. Table 8-B contains a general layout of words 64 through 127 of the CR (the new part of the CR).

**Table 8-A. 4E16 CR Layout (Old Part) Words 0-63**

<b>Word</b>	<b>Description</b>
0-13	
14	Move DSD items to new part of CR
15	Call Type word 1 is removed
16	Remove CR4ADC and CR4MADC from RDB word
17-26	
27	Call Type word 2 is removed
28-36	
37-40	No longer ICT TB words
41-46	
47-49	No longer OGT TB words (non-TB overlay items stay)
50-54	
55	Move PNSA digits overlay items to new part of CR
56-57	
58	Move PNSA digits overlay items to new part of CR
59	Move CR4ACRI to TMR common word Move DSD items to new part of CR
60	Move CR4ACRBI to TMR common word Move CR4DSDCSTPNET to DSD area
61	
62	Move CR4TM items to TMR common area
63	Move audit items to TMR common area Increase size of CR4CRANX_INDEX

**Note:** Only Changes to the existing layout are shown.  
CR4MFC items being deleted are not shown.

**Table 8-B. 4E16 CR Layout (New Part) Words 64-127**

<b>Word</b>	<b>Description</b>
64-67	4 words - Call Type words
68-75	8 words - Incoming TB/TSG data
76-82	7 words - Outgoing TB/TSG data
83-85	3 words - Billing Number (BN)
86-88	3 words - Calling Party Number (CPN)
89-91	3 words - Dialed Number (DN)
92-94	3 words - Alternate Routing Number
95-97	3 words - Redirecting Number
98-100	3 words Previous Stored Number (PSN)
101-104	4 words - Digit Counts, Nature -Type Address, etc. II-OLI values
105-106	2 words - CUG
107-109	3 words - CA-TSC data
110-113	4 spare
114-121	8 words - DSDC words (some existing CR items, items from SCAR, new items)
122-127	6 spare

## **Functional Design Decomposition**

### **A. System Integrity**

**7.03** The Call Register (CR) will be increased from 64 words to 128 words. The growth of the CR affects other data structures, such as, the CR Annex, NCAT Register, and Trunk Maintenance Register (TMR). The maximum number of words in Audit's print buffer will be increased to accommodate the increase in the size of the CR. To avoid possible problems caused by exceeding I/O limitations, the Audit's print routine will be modified to print CR error messages in segments.

### **B. Call Processing**

**7.04** The CR is being increased to 128 words. The larger CR is needed to accommodate additional data items associated with new features and capabilities. The existing 64-word CR had run out of unused bits. This increase will also consolidate call processing data into the CR by reducing the call processing access of adjunct data structures (for example, SCAR).

**7.05** The growth of the CR affects other related data structures, such as, CR Annex, NCAT Register, and Trunk Maintenance Register (TMR). Modifications to the other structures, as they relate to the CR changes, are discussed below.

- 7.06 Data Structure Modifications:** A summary of the changes for the growth in the CR and related data structures is as follows:
- CR - the size of the CR is changed from 64 to 128 words
  - CR Annex - the size of the CR Annex is changed from 64 to 128 words. The maximum number of CR Annexes allowed increases from 256 to 2048 words
  - TMR - the size of the TMR increases from 64 to 128 words
  - Dummy TMR - the size increases from 64 to 128 words
  - NCAT Register - the size of the NCAT Register changes from 128 to 256 words
  - Dummy NCAT Register - the size increases from 128 to 256 words.
- 7.07** Doubling the size of the CR/TMR causes the modified Call Register Annex/Trunk Maintenance Register Annex (CRA/TMRA) to shrink by one bit.
- 7.08 Call Type Words:** The 4E16 CR will reserve four words for call type words. These four words will be in the new part of the CR and will be four contiguous words. The two existing call type words (15 and 27) will be used to store other information.
- 7.09** International and common channel signaling Digit Receptions (DIREs) that handle special test call digit formats may populate the extra call type word in the CR with appropriate data.
- 7.10 Trunk Block/TSG Block Words in the CR:** The 4E16 CR will reserve 15 words for TB/TSG information to be copied into the CR. For the InComing Trunk (ICT), four words will be copied from the TB and four from the TSG. For the OutGoing Trunk (OGT), three words will be copied from the TB and four from the TSG.
- 7.11 Moving Call Processing Data from SCAR to CR:** Call processing data is moving from the SCAR to the CR. This will reduce the size of SCAR from 32 words to 20 words. By moving this call processing data from SCAR to CR, room is freed up in the SCAR for recording more data. Also by moving this data, the call processing programs can be less complex by not having to seize or retrieve data from SCAR.
- 7.12 CR Annex:** The size of the CR Annex will increase from 64 to 128 words. It will be used exclusively for storing MA-UUI (ATP and UUI) and unrecognized ISDN User Part (ISUP) parameters.
- 7.13** The number of allowable CR Annexes in an office increased to 2048 due to LEC requirements of possibly passing unrecognized ISUP parameters on every call. The index in the CR to the CR Annex (CR4CRANX\_INDEX) will grow from 8 to 12 bits.
- 7.14** CA-TSC data (OPC, LRN, etc. about three words) will now be stored in the CR instead of the CR Annex. This affects the Q.931 and ISUP trunk handlers.

- 7.15 The Local Area Signaling Service (LASS) items in the CR Annex will be deleted and the LASS parameters will now be passed as an unrecognized parameter.
- 7.16 The layout of the CR Annex is being modified to incorporate ISUP unrecognized parameters.
- 7.17 The CR Annex contained Network Control Point (NCP) digit items used for an Information Forwarding feature. These items will be removed from the CR Annex layout.
- 7.18 **Direct Services Dialing Capability (DSDC) Words:** In order to have room for additional DSDC items required by future enhancements, eight contiguous words in the CR are reserved. These eight words will contain the existing DSDC items from words 14 and 58 in the CR, the DSDC items moved from the SCAR, and spare words for future growth.
- 7.19 **New Network Management Word:** The old CR has one word (26) reserved for network management. In 4E16, an additional word will be reserved for network management.
- 7.20 **Class of Service Information:** The Class of Service (COS) information input to digit translations will be put in a non-overlaid word.
- 7.21 **Delete Export Items:** All the MultiFrequency Compelled (MFC) items in the CR will be deleted from CPREG in 4E16 as the export pidents are no longer loaded.
- 7.22 **NCAT Register (NR):** The NCAT Register (NR) will increase in size from 128 words to 256 words. The first 128 words of the NR will be identical to the CR layout except for the NCAT specific items (about four words) that will be laid out in the first part of the NR.
- 7.23 The bottom 128 words of the NR will store MA-UUI information passed on an NCAT call.
- 7.24 **Audit Printouts:** In 4E15, audits print out all 64 words of the CR or TMR. In 4E16, audits will print out only non-zero words of the 128 word CR and TMR.

### C. Trunk Maintenance

- 7.25 Trunk maintenance will use a 128 word TMR. Refer to Part 8 for more information on TMR.

### **Provisioning**

---

**7.26** The size of a CR and dummy CR block is being increased to 128 words. The size of a CR Annex and dummy CR Annex block is being increased to 128 words, and the maximum allowed number is being increased to 2048 words. The size of a NCAT Register and dummy NCAT Register block is being increased to 128 words.

### **Maintenance Information (Does not apply)**

---

### **Transition Considerations**

---

#### **A. Turn On/Turn Off Mechanism**

**7.27** This feature is automatically turned on by software deployment.

### **Input/Output Manual Pages**

---

**7.28** The audit printout for the CR and TMR will change from 64 words to 128 words. Refer to Figure 8-1 for an example.

```
57 AUDIT AT 10511614 AUX=35652267 **DATA LOST** CLIENT=OPER CHECK FAILURE
INVALID SOFTWARE STATE
TR INVALID LINKAGE TO SCAR
CC REGS
L=00037777 F=03617070 G=00002022 J=15652267
K=00000005 X=02030600 Y=00223234 Z=02345360
SHADOW REGS
L=00000001 F=00000000 G=04032446 J=04046265
K=01600030 X=02034600 Y=00057764 Z=00121133
TR 20010143 40000000 ADR=1444470 TSN=0'223234 CIN 2004DCHP TS 00 1IN LAB
TR ANNEX 20000000 03411245
SCARPRIM_REL
00001177
IDX CR ADR=2030600
000 00121412 00000000 00000000 00000000 00000000 00000000 00000000 00000000
010 00000000 00000000 42440621 04314400 00000000 40002500 00000000 00000000
020 01400000 00000000 07125550 00000000 10000000 00000000 00000000 00000000
030 37110000 00000000 00000000 00000000 00126000 00000000 00000000 36405006
040 00000000 10070020 00000000 00223234 00152234 00000000 00000000 00000000
050 00000000 00000006 00000000 00000000 00000000 00227243 00156043 00000000
060 00004000 00000000 40000060 10000000 00003752 00000000 00200265 00000000
070 00400000 00040000 00000000 00200000 12353144 00516546 20000000 41010132
100 03003555 00000000 05000000 00500400 12001422 00000000 02000110 00000020
110 03003112 00000001 10600264 46000000 00000000 40000110 00000025 03003112
120 01060001 46000000 00000000 15250526 12520400 00000000 15252142 52523400
130 00000000 42440621 04314400 00000000 00000000 00000000 00000000 00000000
140 00000000 00000000 42521044 50213000 00000000 24000000 00002400 00000000
ANCICPEC_REL
00005060
AUX_FROM
13715176
Q931OCT_REL
00000/22
SCAR ADR= 2370070
00203350 14223052 04432012 50133201 02341047 00203331 36421605 51212400
00000000 00000000 00000001 14550600 00150001 12341061 00000000 20000010
00000560 04007560 04133201 22351444
TR 00000000 00000000 ADR=1016306 TSN=0'10143 CIN 0
TR ANNEX 00000000 00000000
TR 04010143 40757712 ADR=1454506 TSN=0'227243 CIN 1011DCHP TS 00 10T LAB
TR ANNEX 64000007 00000000
05/09/91 09:52:18
#032
```

Figure 8-1. Example of 4E16 Audit Printout for the CR or TMR

---

## 8. Trunk Maintenance Register (TMR) Restructure

---

### Core Feature Description

---

- 8.01** The Trunk Maintenance Register (TMR) will increase in size to 128 words to match the growth in size of the Call Register (CR).

### Data Definition

---

- 8.02** The Trunk Maintenance Register (TMR) will increase to 128 words. Because the Call Register (CR) structure must be increased to accommodate additional data, the TMR must also increase in size. The new layout of the TMR is described below:

- 8.03** The TMR can be divided into four areas which are as follows:

- Words 0 through 31 will contain all those items that must be identical in the Call Register and Trunk Maintenance Register. Previously, these items were located in words 0 through 14 and words 59, 60, 62 and 63.
- Words 33 through 58 will be reserved for client data based on the TM4PIDENT data. TM4PIDENT will be resident in word 33, while the TM4NCP states will be resident in word 34 and increased in size.
- Words 59 through 103 will be reserved for the data common to all TMR Network Control Point (NCP) clients. This data was previously stored in words 21 through 55.
- Words 104 through 109 will be reserved for the data common to all TMRs (for example, TMR to TR linkages). This data was previously contained in words 55 through 61.

The following words are currently spare: words 110 through 127. The TMR contains 18 spare words.

### Functional Design Decomposition

---

#### A. System Integrity

- 8.04** The Trunk Maintenance Register (TMR) will be increased from 64 words to 128 words as a result of a growth in the CR. The maximum number of words in Audit's print buffer will be increased to accommodate the increase in the size of the TMR. To avoid possible problems caused by exceeding I/O limitations, the Audit's print routine will be modified to print TMR error messages in segments.

### **Provisioning**

---

**8.05** The size of a TMR and dummy TMR block is being increased to 128 words.

### **Maintenance Information (Does not apply)**

---

### **Transition Considerations**

---

#### **A. Turn On/Turn Off Mechanism**

**8.06** This feature is automatically turned on by software deployment.

### **Input/Output Manual Pages**

---

**8.07** The audit printout for the CR and TMR will change from 64 words to 128 words. Refer to Figure 8-1 for an example of an audit printout.

## Common Network Interface (CNI) Integration Feature (#906)

# 9

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---

## Common Network Interface (CNI) Integration Feature (#906)

# 9

---

### 1. Feature Description

- 1.01** This feature integrates the Common Network Interface No. 6 (CNI6)/Interprocess Message Switch No. 5 (IMS5) product into the 4 ESS™ switch with the 3B20D Computer. The CNI6 Integration feature provides the fine tuning and customizing needed to fit CNI and IMS with the base 4 ESS switch product.
- 1.02** The CNI Integration feature also provides the support needed for a maximum mix of nodes on the CNI ring and for the different hardware varieties on the CNI ring. The same number of nodes are supported in the 4E16 generic as were supported in the 4E15 generic. Table 9-A lists maximum supported number of CNI nodes.
- 1.03** All nodes types except International Telephone and Telegraph Consultative Committee No. 7 (CCITT7) are supported with Small Scale Integration (SSI) hardware (low density backplane). All node types except Ring Peripheral Controllers (RPCs) are supported with Integrated Ring Node (IRN) hardware (high density backplane). The only Direct Link Node (DLN) hardware option supported in the 4E16 generic is the IRNB/LI4E. The DLN hardware option was introduced in the 4E15 generic, and the transition from the old DLN hardware was required during the 4E15 generic. Table 9-B lists the supported versions and generics.

**Table 9-A. Maximum Supported Number of CNI Nodes**

Type	Number
RPC	2
DLN	4
CCS7	44
CCITT7	44
DCHAN	40

**Table 9-B. CNI Ring Generics Supported**

Type	Generic	Comments
RPC	RPC.1.0	SSI RPC
DLN	DLN4E.1.0 DLNE.1.0	IRNB/LI4E AP IRNB/LI4E Specname
CCS7	CNI7.1.0 C7I.1.0 SDSP.1.0 IDSP.1.0	SSI BEC IRN BEC SSI PCR (N) IRN PCR (N)
CCITT7	IITP.1.0 IIDP.1.0 IITB.1.0 IIDB.1.0	IRN Control node, PCR IRN, PCR IRN, Control node, BEC IRN, BEC
DCHAN	PBXT.1.0 PBXD.1.0 PBXT.2.0 PBXD.2.0	SSI, Control node SSI, Non-control node IRN, Control node IRN, Non-control node

**Notes:**

AP =Attached Processor

BEC =Basic Error Correction

PCR =Preventive Cyclic Retransmission

**2. Call Flow (Does not apply)**

**3. Provisioning (Does not apply)**

**4. Recording (Does not apply)**

**5. Network Management (Does not apply)**

**6. Maintenance/Troubleshooting (Does not apply)**

**7. Transition Considerations (Does not apply)**

**8. Input/Output Manual Pages (Does not apply)**

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**Intranet Signaling Connection  
Control Part (SCCP) Routing  
Verification Test (SRVT) Feature  
(#908)**

# 10

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# Intranet Signaling Connection Control Part (SCCP) Routing Verification Test (SRVT) Feature (#908)

# 10

---

## 1. Feature Description

**1.01** The Intranet Signaling Connection Control Part (SCCP) Routing Verification Test (SRVT) feature tests the ability of the Local Exchange Company (LEC) Network to determine the destination of a message and deliver the message with a Global Title (GT) address (800-XXX-XXXX). The Global Title Translation (GTT) is performed and tested at the 4 ESS™ switch and the Signal Transfer Point (STP). The Intranet SRVT only tests within the same network.

**1.02** The following requirements are needed to use the Intranet SRVT feature across network boundaries:

- (a) If a No. 2 Signal Transfer Point (2STP) in the LEC network receives an SRVT message destined for another network, it will report the destination as inaccessible.
- (b) If a 2STP in the LEC network receives an SRVT message from another network, it discards that message.

**1.03** The Intranet SRVT is a Common Channel Signaling No. 7 (CCS7) protocol that checks for loops in SCCP routing, for excessive length in SCCP routes, and for route accuracy in both directions on SCCP routes. It also runs tests for unknown destinations. With the SRVT feature in the LEC network, GTT data can be verified at the 4 ESS switch prior to moving from the 2STP.

**1.04** The SRVT is an Operations and Maintenance Applications Part (OMAP) test procedure used to verify the accuracy, completeness and consistency of the GTT data and SCCP level routing. The three OMAP test messages used by SRVT are as follows:

- SCCP Routing Verification Test (SRVT) message
- SCCP Routing Verification Acknowledgement (SRVA) message
- SCCP Routing Verification Result (SRVR) message.

**1.05** The SRVT message performs three different functions as follows:

- The Request form of the message is sent by the test Initiating Signaling Point -- (ISP) to request a GTT.
- The destination of this message is a Translation Signaling Point (TSP). If there is more than one translation point in succession, the Request form of the message is also sent from a Intermediate Translation Signaling Point (ITSP) to a Final Translation Signaling Point (FTSP).
- The Verify form of the message is sent by the FTSP to the destination signaling points.

**1.06** The Compare message is sent by a duplexed TSP to its mated TSP to compare results of duplex translation at the mated pair of Signaling Transfer Points (STPs).

**1.07** The SRVA message is sent in the backward direction on a hop-by-hop basis. The recipient of the SRVT message sends the SRVA message to the sender of a SRVT message, informing the sender of the results of the test. In case of failure, the cause of the failure is sent in the SRVA message.

**1.08** The SRVR message is sent in the backward direction by the destination signaling point (SP) or an enroute SP detecting a failure to the SP initiating the test. The SRVR message contains the identity of the TSPs along the route taken by the SRVT message from the initiating SP to the tested destination or to another SP identifying a failure. This is referred to as route trace information. The SRVR message also contains the results of the test (success or failure). In case of failure, the SRVR message identifies the cause of failure.

## **2. Call Flow**

---

### **Call Flow Key Points**

---

**2.01** The typical SRVT network under normal conditions is shown in Figure 10-1. The SRVT message flow is given in Figure 10-2. The GTT is performed at the pair of home 2STPs. The destinations are a pair of Network Control Points (NCPs). The SRVT Request message is routed from the initiating SP (switch) based on alias point codes. The 2STP translates the Global Title (GT) to determine the destinations with Primary Point Codes (PPCs), Secondary Point Codes (SPCs) and a Subsystem Number (SSN).

### **Call Flow Narrative**

---

**2.02** The Translation Signaling Point (TSP) "B" receives the SRVT Request message (SRVT1) and performs GTT on the GT contained in the designated field of the message. This translation can be either intermediate or final. If intermediate translation, it yields a primary or secondary point code. The point code identifies the next TSP in succession. If final translation, it yields a PPC+SSN and, optionally, a SPC+SSN as the destination for the message.

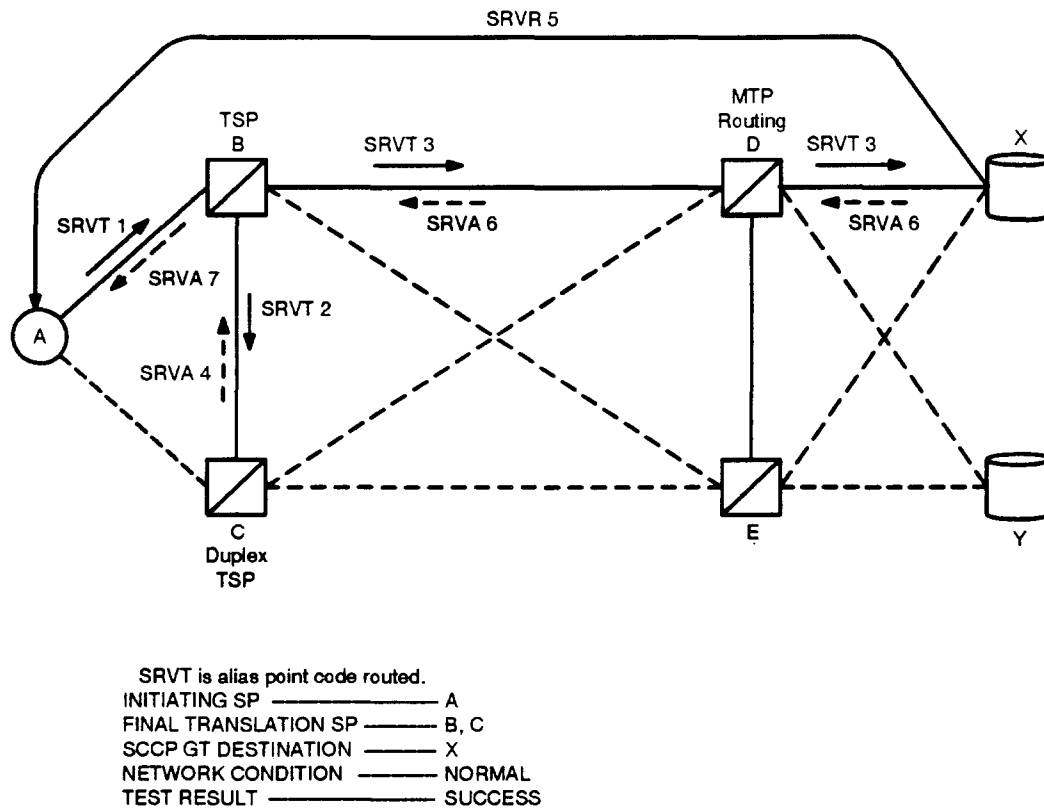
**2.03** If the translation is intermediate, the SRVT message which leaves "B" for the next TSP in succession does not contain a SSN. This message is still the Request form of the SRVT message. If the translation at "B" is final, the SRVT message contains one or two SSNs (PPC+SSN and optionally SPC+SSN). The SRVT messages that leave the Final Translations Signal Point (FTSP) are the Verify form of the SRVT.

### **Network Management Impact on Call Flow**

---

**2.04** This feature requires enhancements to the 4 ESS switch, 2STP and the Network Control Point (NCP). The 4 ESS switch, NCP and Signaling Control Point (SCP) are required to act as initiating signaling points and destination signaling points for the SRVT. The 2STP is required to act as initiating and translation signaling points.

**Call Flow Diagram**



**Figure 10-1. Typical Signaling Connection Control Part (SCCP) Routing Verification Test (SRVT) Network, Indication Success**

SRVT Message Flow

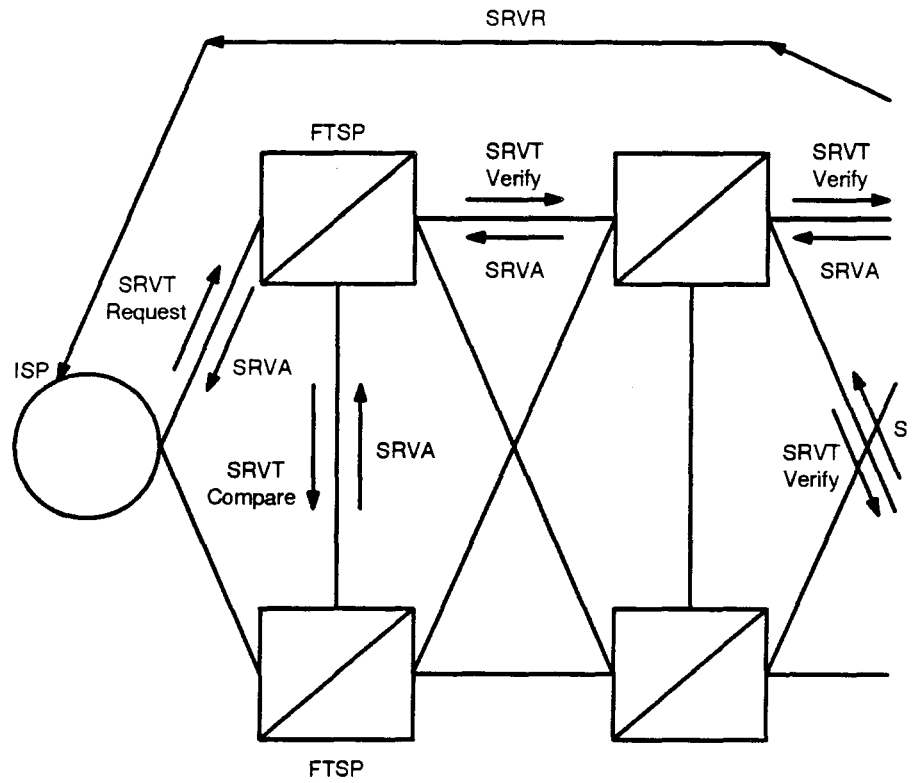


Figure 10-2. Signaling Connection Control Part (SCCP) Routing Verification Test (SRVT) Message Flow (Sheet 1 of 3)

SRVT Example 2

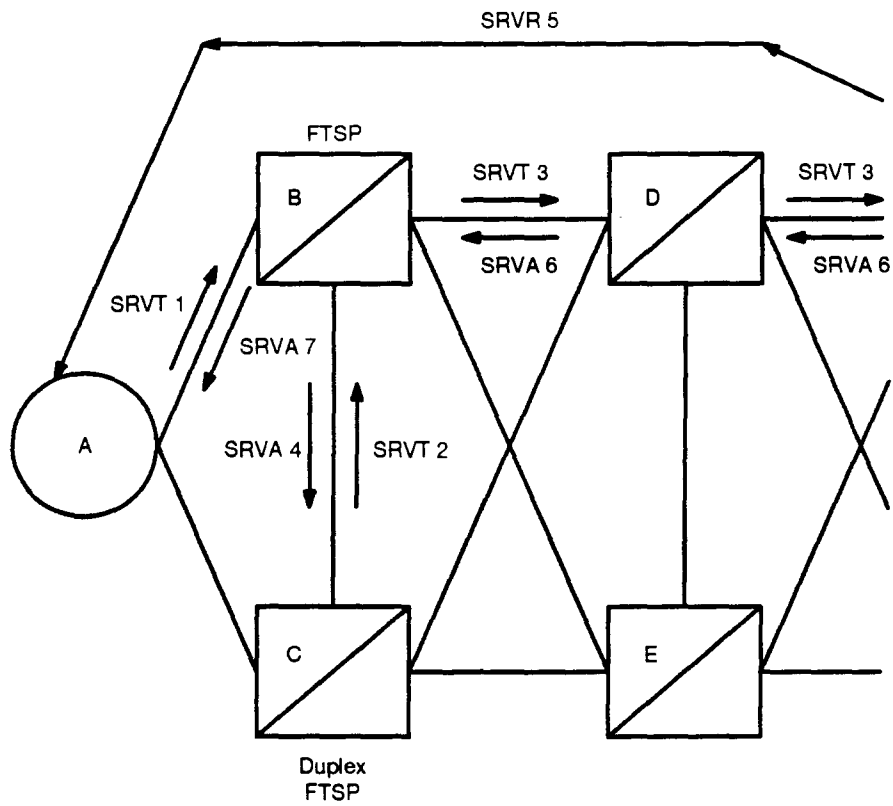


Figure 10-2. Signaling Connection Control Part (SCCP) Routing Verification Test (SRVT) Message Flow (Sheet 2 of 3)

SRVT Example 3

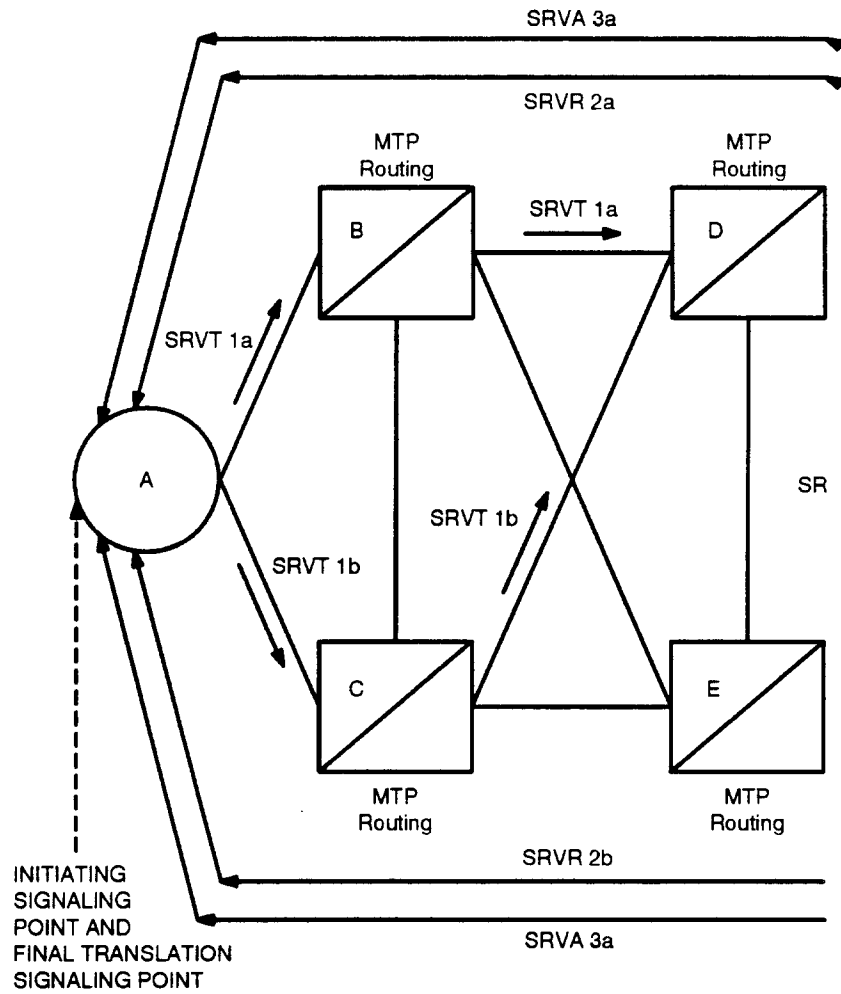


Figure 10-2. Signaling Connection Control Part (SCCP) Routing Verification Test (SRVT) Message Flow (Sheet 3 of 3)

### **3. Provisioning**

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#### **Office Data Administration**

---

##### **A. Data Components**

**3.01** The 4 ESS switch is required for the SRVT initiation, and it also serves as a test destination. In addition to test initiation requirements, the following requirements apply to the 4 ESS switch:

- (a) The SRVT is initiated manually at the switch through the Maintenance Cathode Ray Terminal (MCRT) or remotely from any of the following Operating Systems (OSs):
  - 4 ESS switch: No. 2 Switching Control Center System (2SCCS).
- (b) SRVT is initiated at the 4 ESS switch using a Page Descriptor Shell (PDS) input command.
- (c) Initiation of SRVT requires setting of a T2 Timer , which defines a waiting period for the reception and processing of SRVA messages. T2 Timer has a standard default or it can be reset by the user.
- (d) The switch must generate a report based on the SRVA and SRVR messages received as results of the test. This report must be printed on the Read Only Printer (ROP) if the test was initiated at the switch or sent to the OS where the test was initiated.
- (e) The 4 ESS switch must respond to the supplemental command. The type of syntax (PDS) required for the supplemental command is the same as required for the initiation command. These switches perform all functions of the tested destination.

##### **B. 2STP**

**3.02** The 2STP must have the ability to serve as an SRVT initiator, as it already satisfies all requirements to serve as a TSP. However, the 2STP will not send any output messages to the craft or network administrators when functioning as a TSP unless it is also the initiator of the test.

### C. NCP and SCP

**3.03** The NCP and SCP are required to act as an initiator as well as a tested destination for the SRVT procedure as follows:

- (a) The NCP responds to initiation and supplemental commands from the user work centers [Engineering Network Administration Center (ENAC), Remote Work Center (RWC), Network Operations Center (NOC), Operations, Network, and Administration Center (ONAC), National Electronics Systems Assistance Center (NESAC)]. The commands are available via the MCRT and the Operating System's Network Access Processor (NAP), NCP Administration System (NCPAS) and 2SCCS.
- (b) For LEC application, the initiation and supplemental commands for the 1NCP and 2NCP uses PDS.
- (c) The NCP sends the OS a report based on the information contained in the SRVA and SRVR messages received in response to the SRVT messages.
- (d) The NCP allows administration of  $D_{SRVT}$  from the MCRT and the OSs 2SCCS and NCPAS.  $D_{SRVT}$  is an administered value.

**3.04** The SCP also acts as a test initiator as follows:

- (a) The SCP responds to the initiation command and the supplemental command given in PDS from the MCRT or 2SCCS.
- (b) For SCP, if the initiation was received from the MCRT, the output message is delivered to the MCRT only. If initiation command is received from 2SCCS, the output message is delivered to the 2SCCS and the MCRT at the initiating SP.
- (c) The SCP allows administration of  $D_{SRVT}$  from the MCRT, ACRT, 2SCCS, and Signaling Engineering Administration System (SEAS). Administration through SEAS is done by the SEAS flowthrough message capability.

**3.05** The NCP will satisfy all common requirements as a "Test Initiator".

### 4. Recording (Does not apply)

### 5. Network Management (Does not apply)

## **6. Maintenance/Troubleshooting**

### **Operations, Administration, and Maintenance (OA&M) Interface**

- 6.01** The operating systems and devices which initiate the SRVT receive test results and analyze results are as follows:
- (a) Common Channel Signaling (CCS) Network Operation System (CNOS) impacts 2STP only.
  - (b) No. 2 Switching Control Center System (2SCCS) impacts 4 ESS switch, 1STP, 2STP, NCP and Secondary Point Code (SPC).
  - (c) Administrative Cathode Ray Terminal (ACRT)/Maintenance Cathode Ray Terminal (MCRT) impacts 4 ESS switch, 2STP NCP and SPC.
  - (d) Network Access Processor (NAP) impacts 2STP and NCP.
  - (e) NCP Administration System (NCPAS) impacts NCP only.
  - (f) Testing Operations Provisioning Administration System (TOPAS) impacts 5ESS® switch only.
- 6.02** The Operating Systems for LEC customers are the 2SCCS and the Signaling Engineering Administration System (SEAS). The 2SCCS impacts the 4 ESS switch, 2STP and SPC. The SEAS impacts 2STP only.

### **Preventive and Corrective Maintenance**

- 6.03** Preventive maintenance is performed using the SRVT procedure to verify new installations and recent changes of GTT data to aid in preventing translation errors from entering the network.
- 6.04** The SRVT can also be initiated when a failure is suspected in the GTT as a result of a network surveillance indication or as a result of a customer's trouble report. The SRVT is used to trouble shoot and isolate the problem and to verify that corrective action has been taken by the responsible center to resolve the problem.

## Test Types

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**6.05** Errors are identified in the SRVA and SRVR messages. The SRVA message has the capability to report more than one error. However, the SRVR message can only report one error. If any type of failure occurs, the SRVA contains the information as to whether the SRVR was sent or not sent. The SRVR contains the point code of the SP where the error is detected. The reporting of test results by SRVA and SRVR messages is given in Table 10-A.

**6.06** The success indication occurs at the tested destination if the procedure is successful and no errors are detected or difficulties encountered in sending back the SRVR and SRVA messages from the destination.

### A. Error in SRVT Initiation

**6.07** If the error pertains to the validity of the data in the SRVT initiation command, it is detected at the initiating SP.

### B. Loop

**6.08** An SCCP routing loop is detected when a 2STP acting as a TSP examines the list of crossed TSPs in the SRVT message and finds the point of the next TSP or its mate is already on the list.

### C. Excessive Length Route

**6.09** The excessive length route is detected by a 2STP acting as a TSP when, prior to forwarding the SRVT to the next TSP or to the destination SP, it examines the list of crossed TSPs contained in the SRVT message and finds that the number of crossed TSPs has equaled or exceeded the threshold  $N_{SRVT}$  value contained in the input message.  $N_{SRVT}$  is a parameter which specifies the number of translations allowed in a network. The value of  $N_{SRVT}$  is network dependent as well as location dependent, since the value is based on the position of the initiating signaling point with respect to the destination.

### D. No Translation for Global Title (GT)

**6.10** In the LEC network, the 4 ESS switch does not perform the functions of a final translation signaling point. The no translation for GT is detected by a 2STP acting as a TSP. The error implies that there is no point code corresponding to this GT at the Intermediate Translation Signaling Point (ITSP).

### **E. Inaccessible Signaling Point**

**6.11** The "route inaccessibility" error is detected at the initiating SP or at a TSP. Route inaccessibility means that an SP encounters one or more of the following conditions when attempting to forward a SRVT to the TSP or the tested destination:

- (a) Congestion - The SCCP route selected for forwarding the SRVT to the next SP is congested, and the message priority does not permit its transmittal.
- (b) Blockage - All routes to the intended Signaling Point (SP) are blocked as a result of the link set failures, or the destination SP has encountered Signaling Point Isolation (SPI).
- (c) Crossing Network Boundaries - The SRVT message is not allowed to be sent to a nonlocal network by the 2STP. This condition is treated as a route inaccessibility error; the switch is not required to detect or stop SRVT messages from going across the network boundary.
- (d) Not Signaling System No. 7 (SS7) Equipped - If the SRVT message cannot be forwarded to an SP due to lack of resources, it is treated as an inaccessibility error for purposes of reporting via SRVA and SRVR.
- (e) Subsystems Prohibited - This error is reported when the SRVT message is destined for a prohibited subsystem.
- (f) Receiving Unitdata Service Message - This error is sent if an UnitData Service (UDTS) message is received in response to an SRVT message sent.

### **F. Test Cannot Run Due to Local Conditions**

**6.12** This error results if the test cannot be initiated at an initiating SP or cannot be continued at a TSP as a result of certain conditions. Local conditions prohibiting the initiation at an SP are as follows:

- (a) Processor overload
- (b) Test pertains to a GT which is already under test
- (c) The threshold for maximum number of initiations at an initiating SP has already been reached.

**6.13** The following local conditions prohibit the continuation of SRVT at a TSP:

- (a) Processor overload
- (b) The threshold for maximum number of SRVT tests running at a TSP has already been reached.

**G. Unknown Initiating Signaling Point**

**6.14** This error is detected at the tested destination or at a 2STP acting as a TSP. This error occurs when the SP, which is required to send an SRVR message, determines that in the SRVT message received the Message Transfer Part (MTP) Backward Routing Indicator was not set. This error also occurs if the MTP Backward Routing Required Initiator was set, but the Initiator's Point Code was not recognized (the SRVR cannot be sent).

**H. Timer Expired**

**6.15** The error condition "timer expired," also referred to "Time out waiting for SRVA," is detected at the initiating SP or at a TSP and does not apply to the tested destination. The timer can be changed with the SRVT command.

**I. Message Arrived at the Wrong Signaling Point**

**6.16** If any signaling point which is not a duplexed TSP receives a Compare form of SRVT or a duplexed TSP receives a Compare form of SRVT from a TSP which is not its mate, it reports this error to the initiating SP.

**J. Incorrect Translation for Primary Destination**

**6.17** This error is detected by the mate of a duplexed FTSP and indicates that the translation result of the PPC+SSN at the mate does not match the results at the FTSP. The SRVA message reveals this error.

**K. Incorrect Translation for Secondary Destination**

**6.18** This error is detected at the mate of a duplexed FTSP and indicates a mismatch in SPC+SSN rather than PPC+SSN.

**L. Incorrect Translation for the Intermediate TSP**

**6.19** This error is detected by the mate of a duplexed ITSP and indicates that the translation result of the PPC or SPC or both does not match the results at the ITSP. The error is identified in the SRVR message.

**M. Not Primary Destination**

**6.20** This error is detected at the primary of a mated pair of NCPs/SCPs when the NCP/SCP determines it does not serve the GT as the primary destination. The error is reported by a non-mated NCP/SCP or switch when it determines it does not serve the GT contained in the SRVT message.

**N. Not Secondary Destination**

**6.21** This error is detected at the secondary of a pair of mated NCPs/SCPs when the NCP/SCP determines it does not serve as secondary destination for the GT contained in the SRVT message.

**O. Primary Destination Not Recognized**

**6.22** This error is detected at the secondary of a pair of mated NCPs/SCPs, when NCP/SCP determines it does not recognize PPC+SSN as the primary destination for the GT contained in the SRVT message.

**P. Secondary Destination Not Recognized**

**6.23** This error is detected at the primary of a mated pair of NCPs/SCPs when it determines it does not recognize the SPC+SSN as the secondary destination for the GT contained in the SRVT message.

**Q. Unrecognized Point Code from Translation**

**6.24** This error is detected at a TSP when it cannot route on the point code realized from the GT translation.

**Input/Output Messages**

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**6.25** The SRVT initiation command is issued at the initiator SP or via one of the Operating Systems (OSs) listed under the network element specific requirements. The SRVT results are reported to the medium which initiated the test, and syntax errors are reported using standard PDS/MML error handling. The format for SRVT is as follows:

**FORMAT:**

**EXC:SRVT;TYPE a[,PLAN b,SCHEME c],DIGITS d[,TPC e][,NTSP f]  
[,TRACE][,MODE g]!**

**EXPLANATION OF VARIABLES:**

a= Translation Type, integer range 0 to 254.

b= Numbering Plan, from SCCP protocol, not included unless specified in the initiation command.

c= Encoding Scheme, from SCCP protocol, not included unless specified in the initiation command.

d= Digits in Global Title, 19-digit maximum.

e= Translation Point Code (TPC) where the initiator should address and send an SRVT message. The default is chosen by OMAP if TPC is not included based on translation type.

f= Value of the parameter  $N_{\text{SRVT}}$ , the maximum number of TSPs allowed to be crossed between Initiating Signaling Point (ISP) and Destination Signaling Point (DSP). Default = 1. Valid range is 1 to 15.

g= GTT mode to be used. In Mode 1, the GTT is performed at the 4 ESS switch. In Mode 2, the GTT is performed at the 2STP.

TRACE= If this keyword is present, lists of TSPs crossed during the test are included in the output. If this keyword is not present, lists of TSPs crossed are included only when errors occur.

**6.26** The output messages report the results of an SRVT test at the ISP, in the following format:

**EXC:SRVT TYPE a ... NTSP f [TRACE]result**

**SRVA MESSAGES RECEIVED**

point code result

[error message text]

**TSPs CROSSED**

TPC [TPC TPC ...]

**ERRORS DETECTED**

error message text PC [PC PC ...]

Table 10-A. SRVT Errors Reported

Error Code	Results of Test	SRVA Info Sent To SRVT	SRVR Info Sent To Initiator	
			Success	Point Codes of Crossed TSPs
0	Success	No Error	Success	Point Codes of Crossed TSPs
1	SCCP Routing Loop	X(Error)	X(Error)	TSPs in Loop
2	Excessive Length Route	X	X	Point Codes of Crossed TSPs
3	No GT Translation	X	X	
4	Inaccessible SP	X	X	Point Codes of Inaccessible SP
5	Test Cannot Be Run Due to Local Conditions	X	X	
6	Unknown Initiating SP	X	X	Returning Point Code Caused SRVR To Be Sent
7	Timer Expired	X	X	Point Code of SP Didn't Send SRVA
8	Message Arrival at Wrong SP	X	X	Point Codes Of Crossed TSPs
9	Incorrect Translation for Primary Destination	X	X	Point Codes of Crossed TSPs
10	Incorrect Translation for Secondary Destination	X	X	Point Codes of Crossed TSPs
11	Incorrect Translation For Intermediate TSP	X	X	Point Codes of Crossed TSPs
12	Not Primary Destination	X	X	Point Codes of Crossed TSPs
13	Not Secondary Destination	X	X	Point Codes of Crossed TSPs
14	Primary Destination Not Recognized	X	X	Point Codes of Crossed TSPs
15	Secondary Destination Not Recognized	X	X	Point Codes of Crossed TSPs
16	Unrecognized PC from Translation	X	X	Point Codes of Crossed TSPs

## **7. Transition Considerations**

**7.01** If a switch or other network element without the SRVT capability receives an SRVT message, it will discard the message. However, the initiator of that test will receive an incorrect indication of error and will time out while waiting for a response message. Therefore, it is necessary that the transition period be as short as possible.

## **8. Input/Output Manual Pages**

**8.01** An SP is required to respond to a supplemental command received from the same source as the SRVT initiation command. The response from the supplemental command is delivered to the source of the command. With the supplemental command, the user determines where the SP directs the SCCP message with a given Translation Type (TT) for GTT. If the SP would send a message to a Translation Signaling Point (TSP) for GTT, the TSP responds to the command with a list of all TPCs where the SP could address the message.

**8.02** The format for the supplemental command is as follows:

**FORMAT:**

**OP:TPC;TYPE a**

**EXPLANATION OF VARIABLES:**

a = A specific translation type or "ALL" types. Translation type in the range of 0 to 254. The "ALL" specifies TPCs for all available translation types.

The format for the response is:

**OP:TPC;TYPE a**

**TRANSLATION POINT CODES**

X  
[Y]

where X and Y are the translation point codes. Y is optional and is specified only if different from X. If there are no translation point codes, X is "UNABLE TO DERIVE TPC" and Y is absent.

For the "ALL", the format for the response is:

**OP:TPC;TYPE ALL**

TRANSLATION POINT CODES

$a_n$

$X_n$

[ $Y_n$ ]

where  $a_n$  is from the universe of translation type values under "ALL".  $Y_n$  is optional and specified only if different from  $X_n$

DEFAULT TRANSLATION POINT CODES

X

[Y]

**8.03** The format of the response to request or verify messages sent is given below.

*One Request or Verify Message Sent:*

FORMAT 1:

EXC: SRVT TYPE a [, PLAN b, SCHEME c], DIGITS d [,TPC e], NTSP f SUCCESS  
 SRVA MESSAGES RECEIVED

k m

i

.

.

.

k m

i

.

.

.

FORMAT 2:

EXC: SRVT TYPE a [, PLAN b, SCHEME c], DIGITS d [,TPC e], NTSP f TRACE  
 SUCCESS

SRVA MESSAGES RECEIVED

k m

i

.

.

.

k m

i

.

.

.

TSPs CROSSED

h h ...h

.

.

.

FORMAT 3:

EXC: SRVT TYPE a [, PLAN b, SCHEME c], DIGITS d [,TPC e], NTSP f [, TRACE] g  
SRVA MESSAGES RECEIVED

k m

i

.

.

k m

i

.

.

TSPs CROSSED

h h ...h

ERRORS DETECTED

i [ ]

.

.

*Two Request or Verify Messages Sent for a Single SRVT Limitation:*

FORMAT 1:

EXC: SRVT1 TYPE a [, PLAN b, SCHEME c], DIGITS d [,TPC e], NTSP f SUCCESS

EXC: SRVT2 TYPE a [, PLAN b, SCHEME c], DIGITS d [,TPC e], NTSP f SUCCESS

SRVA MESSAGES RECEIVED

k m

i

.

.

k m

i

.

.

.

FORMAT 2:

EXC: SRVT1 TYPE a [, PLAN b, SCHEME c], DIGITS d [,TPC e], NTSP f TRACE  
SUCCESS

EXC: SRVT2 TYPE a [, PLAN b, SCHEME c], DIGITS d [,TPC e], NTSP f TRACE  
SUCCESS

SRVA MESSAGES RECEIVED

k m

i

.

.

.

k m

i

.

.

.

TSPs CROSSED

h h ...h

FORMAT 3:

EXC: SRVT1 TYPE a [, PLAN b, SCHEME c], DIGITS d [,TPC e], NTSP f [,TRACE] g

EXC: SRVT2 TYPE a [, PLAN b, SCHEME c], DIGITS d [,TPC e], NTSP f [,TRACE] g

SRVA MESSAGES RECEIVED

k m

i

.

.

.

k m

i

.

.

.

TSPs CROSSED

h h ...h

ERRORS DETECTED

i[j]

.

.

**EXPLANATION OF VARIABLES:**

- a = Translation Type, integer range 0 to 254.
- b = Numbering Plan, from SCCP protocol, not included unless specified in the initiation command.
- c = Encoding Scheme, from SCCP protocol, not included unless specified in the initiation command.
- d = Digits in Global Title, 19-digit maximum (for example, an 800 number).
- e = Translation Point Code where the initiator should address and send an SRVT message. If Not included, the default is chosen by Common Network Interface (CNI) based on the translation type. The CNI sends more than one SRVT message if more than one unique TPC is returned using the following formats:
- ANSI Standard - nnnccmmm
  - AT&T - nnnrrcmmm
    - nnn =network identifier
    - ccc =cluster identifier
    - mmm =member identifier
    - rr =region identifier
    - c =cluster identifier
- f = Value of the parameter  $N_{SRVT}$ , which is the maximum number of TSPs allowed to be crossed.

**TRACE =**

If this keyword is present, list(s) of TSPs crossed during the test will be included in the output. If this keyword is not present, list(s) of TSPs crossed will be included only when an error(s) occurs and one or more TSPs had been crossed when the error(s) occurred. No TRACE word will appear if not requested.

- g = PARTIAL SUCCESS or FAILURE depending upon the responses received.
- h = List of TSP point codes in the list of a received SRVR message indicating success. If multiple success-indicating SRVR messages were received, this line would be printed for each such message (for example, three success-indicating SRVR messages result in three lists of point codes). Note that in Format 3, if g = FAILURE, item h will not be present in the output.

i = Text phrases that describe the problem found.

LOOP 1

EXCESSIVE LENGTH ROUTE 2

NO TRANSLATION FOR GLOBAL TITLE 3

INACCESSIBLE SIGNALING POINT 4 (route inaccessible condition is detected at an SP other than the initiating SP)

INACCESSIBLE SIGNALING POINT 4X (error is detected at the initiating SP)

TEST CANNOT BE RUN DUE TO LOCAL CONDITIONS 5 (error is detected at an SP which is not the initiating SP)

TEST CANNOT BE RUN DUE TO LOCAL CONDITIONS 5Y (error is detected at the initiating SP)

UNKNOWN INITIATOR SIGNALING POINT 6

TIMER EXPIRED 7

MESSAGE ARRIVED AT WRONG SIGNALING POINT 8

INCORRECT TRANSLATION FOR PRIMARY DESTINATION 9

INCORRECT TRANSLATION FOR SECONDARY DESTINATION 10

INCORRECT TRANSLATION FOR INTERMEDIATE TSP 11

NOT PRIMARY DESTINATION 12

NOT SECONDARY DESTINATION 13

PRIMARY DESTINATION NOT RECOGNIZED 14

SECONDARY DESTINATION NOT RECOGNIZED 15

UNRECOGNIZED POINT CODE FROM TRANSLATION 16

UNKNOWN ERROR CODE ZZ

j = Point code(s) associated with the failure being reported.

If i = LOOP 1, j = point code of TSP detecting the loop followed by the list of point codes in the loop.

If i = EXCESSIVE LENGTH ROUTE 2, j = point code of the SP detecting the excessive length route followed by the point codes that were in the route up to the detecting SP.

If i = NO TRANSLATION FOR GLOBAL TITLE 3, j = point code of the TSP that does not recognize the Global Title.

If i = INACCESSIBLE SIGNALING POINT 4, j = point code of the SP that cannot access the inaccessible SP followed by the point code of the inaccessible SP.

- If i = INACCESSIBLE SIGNALING POINT 4X, j = point code of the SP that cannot access the inaccessible SP followed by the point code of the inaccessible SP. The value of X is given in Table 10-B.
- If i = TEST CANNOT BE RUN DUE TO LOCAL CONDITIONS 5, j = point code of the SP that cannot run the test.
- If i = TEST CANNOT BE RUN DUE TO LOCAL CONDITIONS 5Y, j = point code of the initiating SP. The value of Y is given in Table 10-C.
- If i = UNKNOWN INITIATOR SIGNALING POINT 6, j = point code of the reporting SP followed by the point code of the SP that does not know the initiator.
- If i = TIMER EXPIRED 7, j = point code of the SP where the timer expired followed by the list of point codes from which expected SRVA messages were not received.
- If i = MESSAGE ARRIVED AT WRONG SIGNALING POINT 8, j = point code of the wrong SP followed by a list of point codes that were in the route prior to the wrong SP.
- If i = INCORRECT TRANSLATION FOR PRIMARY DESTINATION 9, j = point code of the TSP reporting the error in comparison followed by the complete list of TPCs traversed.
- If i = INCORRECT TRANSLATION FOR SECONDARY DESTINATION 10, j = point code of the TSP reporting the error in comparison followed by the complete list of TPCs traversed.
- If i = INCORRECT TRANSLATION FOR INTERMEDIATE TSP 11, j = point code of the TSP reporting the error in comparison followed by the complete list of TPCs traversed.
- If i = NOT PRIMARY DESTINATION 12, j = point code of incorrect primary destination followed by the list of point codes that were in the route prior to the error.
- If i = NOT SECONDARY DESTINATION 13, j = point code of incorrect secondary destination followed by the list of point codes that were in the route prior to the error.
- If i = PRIMARY DESTINATION NOT RECOGNIZED 14, j = point code of the secondary destination which does not recognize the primary destination followed by the list of point codes that were in the route prior to the error.
- If i = SECONDARY DESTINATION NOT RECOGNIZED 15, j = point code of the primary destination which does not recognize the secondary destination followed by the list of point codes that were in the route prior to the error.

If i = UNRECOGNIZED POINT CODE FROM TRANSLATION 16, j = point code of the TSP which does not recognize the translation result followed by the list of point codes that were in the route prior to the translating SP.

If i = UNKNOWN ERROR CODE, j = point code of the signaling point reporting the error followed by the list of point codes that were in the route prior to the reporting SP.

k = The point code from which the SRVA message was received.

m = SUCCESS, PARTIAL SUCCESS or FAILURE, as encoded in the received SRVA message.

n = The point code of the destination sending the SRVR message.

Note that under each SRVA message received is a list of text phrases corresponding to errors reported by that SRVA. These are listed in order of the protocol-associated error number (i). The errors listed under ERRORS DETECTED are grouped and listed in order of increasing error number (i).

**Table 10-B. Inaccessible Signaling Point Error Codes When Error Detected at Initiating SP**

Value of X	Complete Error Code	Cause of Inaccessibility
A	4A	Congestion
B	4B	Blockage
C	4C	Crossing Network Boundaries
D	4D	Not SS7 Equipped
E	4E	Subsystems Prohibited
F	4F	Received Unitdata Service Message

**Table 10-C. Local Conditions Error Codes When Error Detected at Initiating SP**

Value of Y	Complete Error Code	Cause of Local Condition Error
A	5A	Processor Overload
B	5B	Test Pertains to GT which is already under test
C	5C	Tests Limit Threshold Exceeded

**8.04** If all SRVRs are not received, all errors are still reported. If an unknown error code is returned, the value will be reported with text stating that it is unrecognized.

**SYSTEM ACTION**

Input message acknowledgement:

- PF - Printout follows
- RL - Retry later.

The requested test is run, and the report written to the maintenance class and/or the standard output.

**REFERENCES:**

CHG:SRVT Input Manual Page

CHG:SRVT Output Manual Page

EXC:SRVT Input Manual Page

EXC:SRVT Output Manual Page

OP:TPC Input Manual Page

OP:TPC Output Manual Page

The SRVT selection of the CNI Maintenance Manual

**Expanded ISDN Message  
Associated User-to-User  
Information (MA-UUI) Length  
Feature (#911)**

# 11

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# Expanded ISDN Message Associated User-to-User Information (MA-UUI) Length Feature (#911)

# 11

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## 1. Feature Description

**1.01** Message Associated User-to-User Information (MA-UUI) is an Integrated Services Digital Network (ISDN) service that allows for the transfer of user data during call setup and call clearing. This feature expands the maximum length of the MA-UUI allowed in Q.931 [and ISDN User Part (ISUP)] messages from 129 octets to 198 octets. The capability applies only to circuit-switched calls.

**1.02** A Q.931 message is structured in parts called information elements (IEs). Information elements, as the name implies, are the information carrying part of the message. Certain information elements are classified as Message Associated User-to-User Information (MA-UUI). This is information that has significance to end users of a call. The MA-UUI information elements are listed in Table 31-A.

**1.03** Each IE has a predefined length (measured in octets) that is either fixed or variable. For example, the Calling Party Number IE has a variable range from 3 to 17 octets; the Calling Party Subaddress has a range from 3 to 23 octets.

**Table 11-A. Message Associated User-to-User Information Elements**

<b>Information Elements (IE)</b>	<b>Type</b>	<b>Length (Octets)</b>
Calling party number	Optional	3-17
Calling party subaddress	Optional	3-23
Called party subaddress	Optional	3-23
Redirecting number	Optional	3-17
Low layer compatibility	Optional	3-16
High layer compatibility	Optional	3-5
User-user	Optional	3-131
Locking shift to codeset 6	Optional	1
Network-specific (codeset 6)	Optional	1-128
Locking shift to codeset 7	Optional	1
User-specific (codeset 7)	Optional	1-128

**⇒ NOTE:**

Q.931 and ISUP trunk handlers no longer treat the Connected Number IE as Message Associated User-to-User data. In 4E15, when the Connected Number IE was received by an Outgoing Trunk (OGT), it was mapped to both the Access Transport Parameter (ATP) and the Connected Number parameter. With the incorporation of this feature, the Connected Number IE is no longer mapped to the ATP; it is only carried in the Connected Number parameter.

**1.04** With the incorporation of this feature, the following rules apply to the transporting of MA-UUI data in a Q.931 message:

- (a) The length of the User-User IE cannot exceed 131 octets.
- (b) The total length of all other MA-UUI information elements cannot exceed 129 octets.
- (c) The combined length of all the MA-UUI information elements, that is, both 1 and 2, cannot exceed 198 octets.

**1.05** To ensure that these lengths are not exceeded, the length of each MA-UUI information elements is checked whenever a SETUP, ALERT, CONNect, or DISConnect message is received from the user. A generic data table stores the minimum and maximum length allowed for each MA-UUI information element. If the IE length is too long or too short, the IE is dropped. (Corresponding changes have been made to the ISUP protocol handlers to pass the increased IE sizes in the corresponding ISUP messages.)

## **2. Call Flow**

### **Call Flow Key Points**

**2.01** After the length of each MA-UUI information element is checked, the accumulating length of the MA-UUI is checked and compared to a constant. If the MA-UUI includes the User-User IE, the accumulating length is compared to a new constant that has a value of 198 octets. If the MA-UUI does not contain the User-User IE, the accumulating length of the MA-UUI is compared to a constant that has been changed from 131 octets to 129 octets in 4E16.

**2.02** If the accumulating length is greater than the constant, IEs are dropped in the following order:

1. If the total length of all MA-UUI information elements, except the User-User IE, exceeds 129 octets, the Locking Shift to Codeset 7 and the Codeset 7 IEs are dropped.
2. If the total length still exceeds 129 octets, then the Locking Shift to Codeset 6 and Codeset 6 IEs are dropped.
3. If the total length of MA UUI, including the User-User IE, is greater than 198 octets, the User-User IE is dropped and the remaining MA-UUI information elements are passed.

## **3. Provisioning (Does not apply)**

## **4. Recording (Does not apply)**

## **5. Network Management (Does not apply)**

## **6. Maintenance/Troubleshooting (Does not apply)**

## **7. Transition Considerations**

### **Dependencies on Other Network Components**

**7.01** This feature will not work on all calls until all the 4 ESS™ switches in the call path have been upgraded to the 4E16 generic. Although this feature cannot be guaranteed to work on all calls until there is full deployment of the 4E16 Release 1 Generic, the capability may work on some calls during the deployment period.

### **Turn On/Turn Off Mechanism**

**7.02** This feature is turned on automatically by software deployment.

## **8. Input/Output Manual Pages (Does not apply)**

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**CCITT No. 7 ISUP Phase 3  
Feature (# 913)**

# 12

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## CCITT No. 7 ISUP Phase 3 Feature (# 913)

# 12

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### 1. Feature Description

- 1.01** CCITT No. 7 ISDN User Part (ISUP) is an international signaling protocol used in AT&T international ISDN service. CCITT No. 7 ISUP provides the signaling between 4 ESS™ switch International Switching Centers (ISCs) and between ISCs and foreign partners.
- 1.02** CCITT No. 7 ISUP is being upgraded from Phases 1 and 2 to Phase 3. Phase 3 has the following features:
- Protocol Conformance
  - User-to-User Signaling (UUS) Service 1
  - Connected Line Identification Presentation/Restriction (COLP/R).
- 1.03** ***Protocol Conformance:*** The CCITT No. 7 ISUP messages at the international interface shall have the following characteristics:
- No unused octets shall exist within any message
  - If a message has no optional parameter, then no End of Optional Parameter octet shall be sent or received.

**⇒ NOTE:**

The above requirements have been previously implemented in generic 4E14 and are included here for documentation purposes.

**1.04 UUS Service 1:** This feature allows the transfer of User-to-User Information (UUI) during the call setup and normal clearing phases with the UUI embedded within the call control messages. Specifications for the length of the UUI octets, the signaling operation, and the corresponding International Call Detail Record (ICDR) are identified.

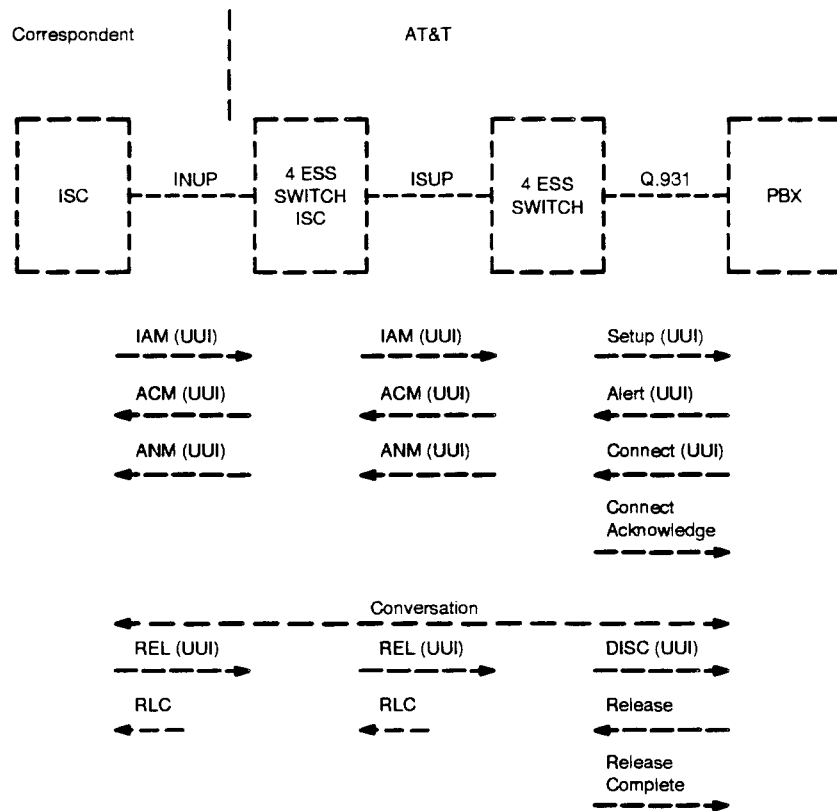
**1.05 COLP/R:** For outbound calls, the connected number shall be always requested from the foreign network in the Initial Address Message (IAM). For inbound calls, the connected number shall continue to be provided whether the calling party requested it or not. The corresponding requirements for the Optional Forward Call Indicator in the IAM for outbound, inbound and transit calls are identified.

**1.06 CCITT No. 7 ISUP, Phase 3,** reflects agreements between AT&T, British Telecom International (BTI), Kokusai Denshin Denwa (KDD) of Japan, Deutsche Bundespost, France Telecom, and Italcable.

## 2. Call Flow

### User-to-User Signaling (UUS) Service 1

#### A. Call Flow Diagrams



- Glossary:
- ACM - Address Complete Message
  - ANM - Answer Message
  - DISC - Disconnect
  - IAM - Initial Address Message
  - INUP - International ISDN User Part
  - ISC - International Switching Center
  - ISUP - ISDN User Part
  - REL - Release
  - RLC - Release Complete
  - UUI - User-to-User Information

Figure 12-1. Inbound Call Flow Diagram for UUS Service 1

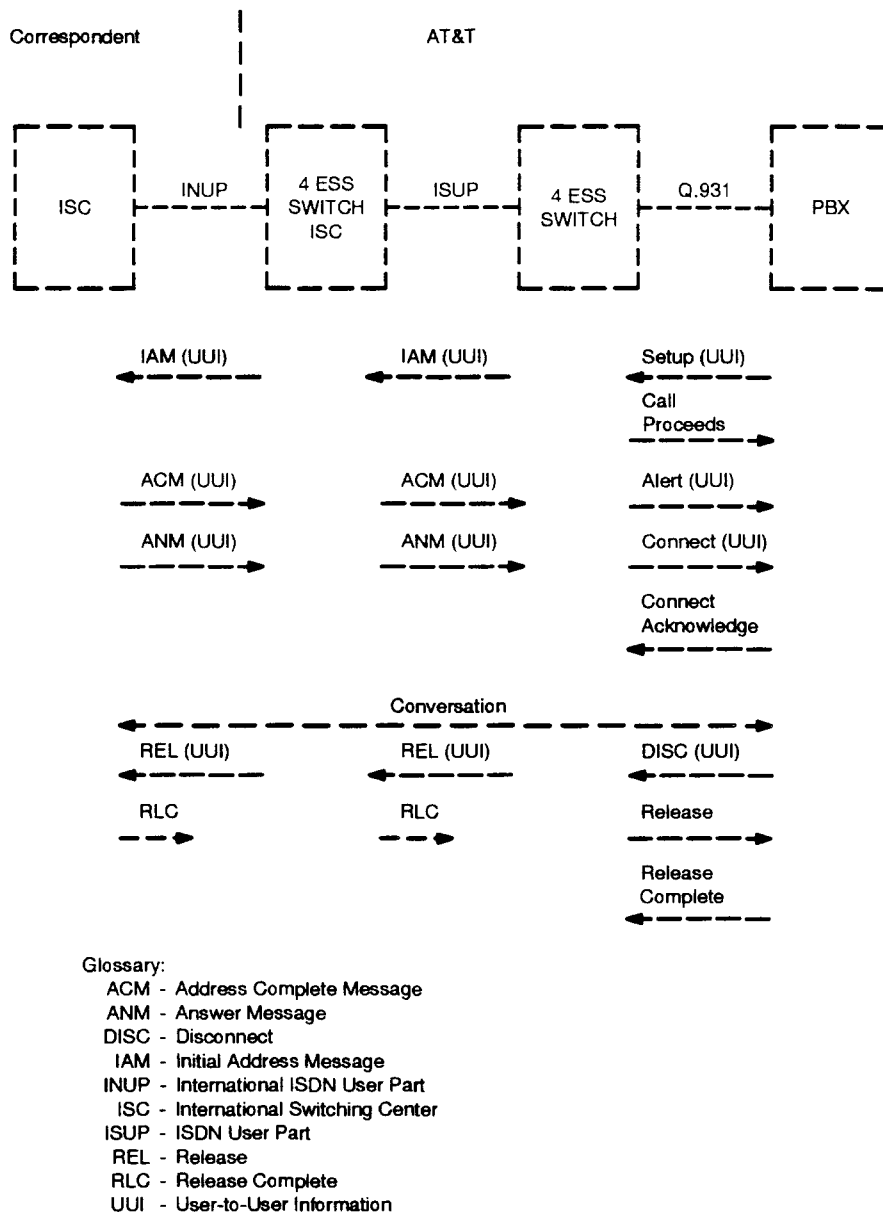
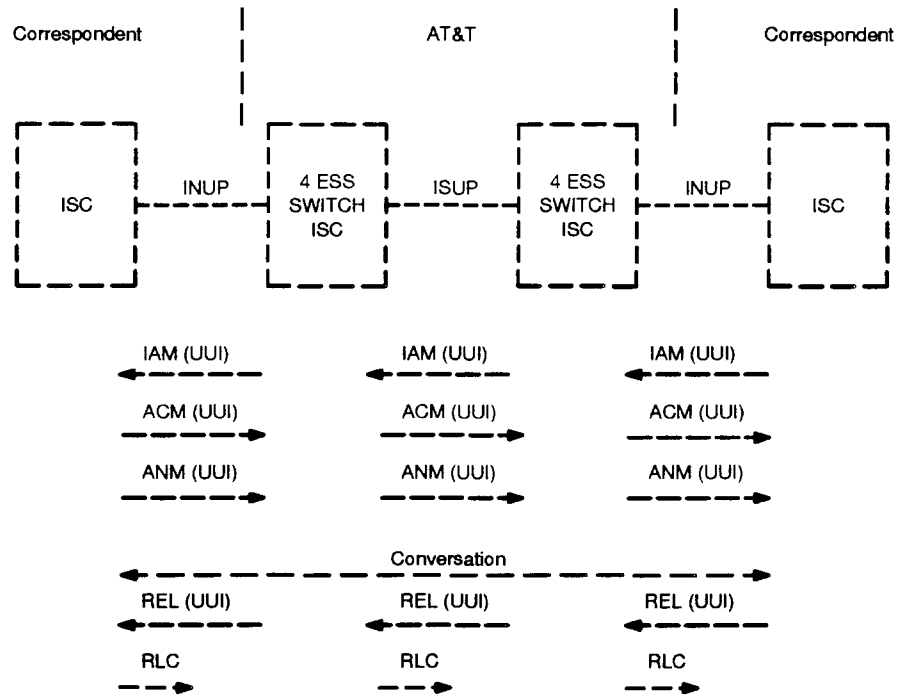


Figure 12-2. Outbound Call Flow Diagram for UUS Service 1



Glossary:

- ACM - Address Complete Message
- ANM - Answer Message
- DISC - Disconnect
- IAM - Initial Address Message
- INUP - International ISDN User Part
- ISC - International Switching Center
- ISUP - ISDN User Part
- REL - Release
- RLC - Release Complete
- UUI - User-to-User Information

Figure 12-3. Transit Call Flow Diagram for UUS Service 1

## B. Call Flow Description

**2.01** The call flow diagrams for Inbound, Outbound, and Transit calls are shown in Figures 12-1, 12-2, and 12-3, respectively. Included in these diagrams is the call setup and disconnect signaling. The following paragraphs concentrate mainly on changes introduced by CCITT No. 7 ISUP Phase 3 and do not include details on call setup and disconnect.

### General

**2.02** For inbound, outbound and transit calls, the ISC shall discard the UUI parameter in the Answer Message (ANM), Address Complete Message (ACM), Call Progress (CPG), and Connect (CON) backward call control messages, and there shall be NO service rejection indication and the call shall proceed, if:

- The UUI parameter exceeds 129 octets (not including the parameter name and length indicator)...or
- The total length of the relevant backward message exceeds 272 octets.

The UUI parameter will be carried by the CON message ONLY for outbound calls or the outbound portion of transit calls.

**2.03** For inbound, outbound and transit calls, there is no need to perform a combined length check on the UUI and Access Transport Parameter (ATP).

### Inbound

**2.04** Upon receiving the CCITT IAM, the ISC shall check the length of the UUI parameter. If the UUI parameter does not exceed 129 octets, not including the parameter name and length indicator, the UUI shall be passed without modification. Otherwise, the UUI parameter will be discarded and a service rejection indication (that is, the User-to-User Indicator coded "0000011") will be included in the first backward message to the foreign network, and the call shall proceed. This procedure exists in generic 4E15 ISC.

**2.05** Interworking between CCITT No. 7 and Common Channel Signaling No. 7 (CCS7) should not cause the length of the CCS7 IAM to exceed 272 octets. However, if interworking causes the CCS7 IAM to exceed 272 octets, the UUI parameter shall be discarded and a service rejection indication (that is, the User-to-User Indicator coded "0000011") shall be included in the first backward message to the foreign network, and the call shall proceed.

### Outbound

**2.06** For outbound calls, the ISC shall check the length of the UUI parameter in the outbound IAM message and the length of the outbound IAM message. If the UUI parameter does not exceed 129 octets, not including the parameter name and length indicator, the UUI shall be passed without modification. However, if the UUI parameter exceeds 129 octets, not including the parameter name or length indicator, or the total length of the IAM message exceeds 272 octets, then the UUI parameter shall be discarded, the call shall proceed, and the following shall occur:

- A Facility Reject message shall be generated and returned in the backward direction
- The User-to-User Indicator parameter with coding Service 1 not-provided shall be included in the first backward message towards the calling party.

**⇒ NOTE:**

The service rejection procedure for the UUI parameter in the outbound IAM message exists in the generic 4E15 ISC.

**2.07** If the UUI parameter is discarded in the foreign network, either a User-to-User Indicator parameter (indicating UUS Service 1 not-provided) or appropriate codes in the Backward Call Indicator parameter will be returned towards the ISC. The backward message handling requirements are as follows:

- If the User-to-User Indicator parameter with Service 1 not-provided coding ("00000011") is received, the User-to-User Indicator shall be passed unchanged, and a CCS7 Facility Reject message shall be generated and sent towards the calling party. This implementation already exists in generic 4E15 ISC.
- If the Backward Call Indicator (BCI) parameter in the first backward message indicates "ISUP to non-ISUP interworking encountered" or "Non-ISDN terminating access" and UUS Service 1 had been requested in the original IAM (that is, the UUI parameter was included in the original IAM), then the following shall occur:
  - A CCS7 Facility Reject message shall be generated and returned towards the calling party
  - The User-to-User Indicator parameter with Service 1 not-provided coding shall be generated and included in the first backward message towards the calling party
  - The BCI parameter shall be passed unchanged.

**Transit**

**2.08** For transit calls, the incoming and outgoing ISCs shall perform message and parameter length checks as in paragraphs 2.02 through 2.07. In addition, if the UUI parameter in the IAM of a transit call is discarded by the destination network, then the service rejection indication from the destination network can be:

- The User-to-User Indicator parameter with Service 1 not-provided coding...or
- The Backward Call Indicator (BCI) parameter with "ISUP to non-ISUP interworking encountered" or "Non-ISDN terminating access" coding

in the first backward message and shall be passed unchanged to the originating network.

**⇒ NOTE:**

The Facility Reject message may be generated in the AT&T Switched Network (ASN) during call processing for this case, but there shall be no impact on the end-to-end requirement.

### Screening

**2.09** Screening for inbound, outbound and transit calls is as follows:

- The UUI parameter in the backward ACM, CPG, ANM or CON messages shall be passed without modification if the UUI parameter was included in the IAM. This refers to the case when the UUI parameter in the IAM was successfully passed by the ISC, and there is no UUI rejection indication subsequently received in the first backward message by the ISC. The UUI parameter will be carried by the CON message ONLY for outbound calls or the outbound portion of transit calls.

**⇒ NOTE:**

If the UUI parameter in the IAM was successfully passed and the UUI rejection indication is subsequently received in the first backward message by the ISC, then the UUI parameter, if included in a backward ACM, CPG, ANM or CON messages, shall be discarded at the ISC, and the call shall proceed.

- If the UUI parameter was not included in the IAM, then the ISC shall discard the UUI parameter in the backward ACM, CPG, ANM or CON messages, and the call shall proceed. This refers to the case when the UUI parameter was:
  - not present in the received IAM or
  - was received in the IAM but not passed to the subsequent exchange.

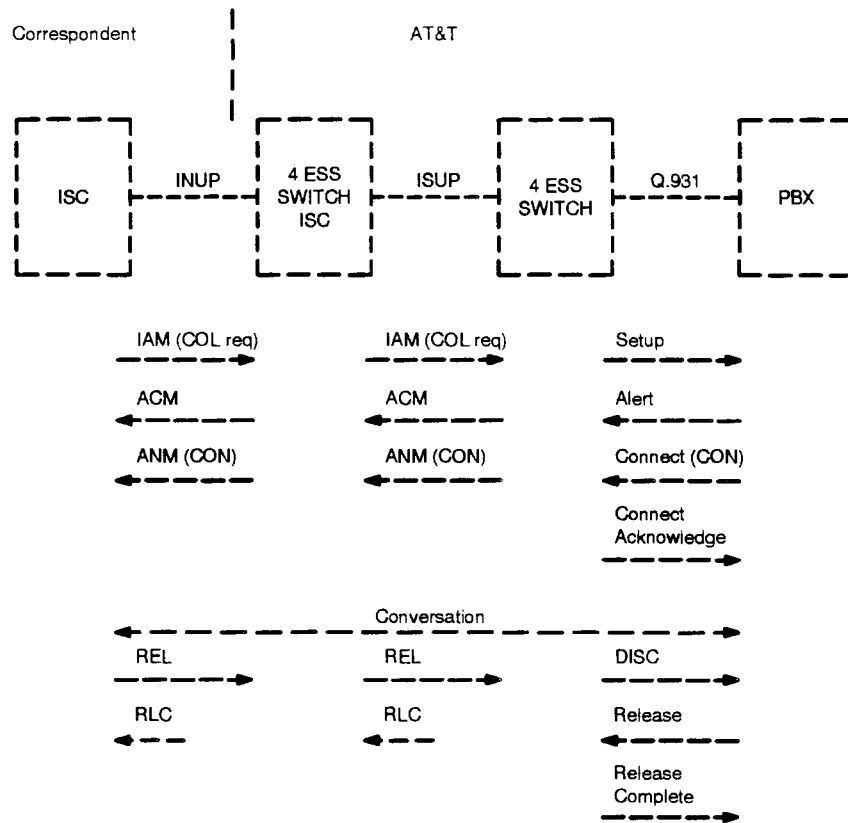
The UUI parameter will be carried by the CON message ONLY for outbound calls or the outbound portion of transit calls.

**⇒ NOTE:**

The above screening requires the ICDR for accomplishment, and the ICDR is subject to administrative control. In addition, screening of the UUI parameter in the forward or backward REL messages (as above) cannot be provided in generic 4E16.

## Connected Line Identification Presentation (COLP)

### A. Call Flow Diagrams



- Glossary:
- ACM - Address Complete Message
  - ANM - Answer Message
  - CON - Connect
  - COL - Connected Line Identification
  - DISC - Disconnect
  - IAM - Initial Address Message
  - INUP - International ISDN User Part
  - ISC - International Switching Center
  - ISUP - ISDN User Part
  - REL - Release
  - RLC - Release Complete
  - UII - User-to-User Information

Figure 12-4. Inbound Call Flow Diagram for COLP

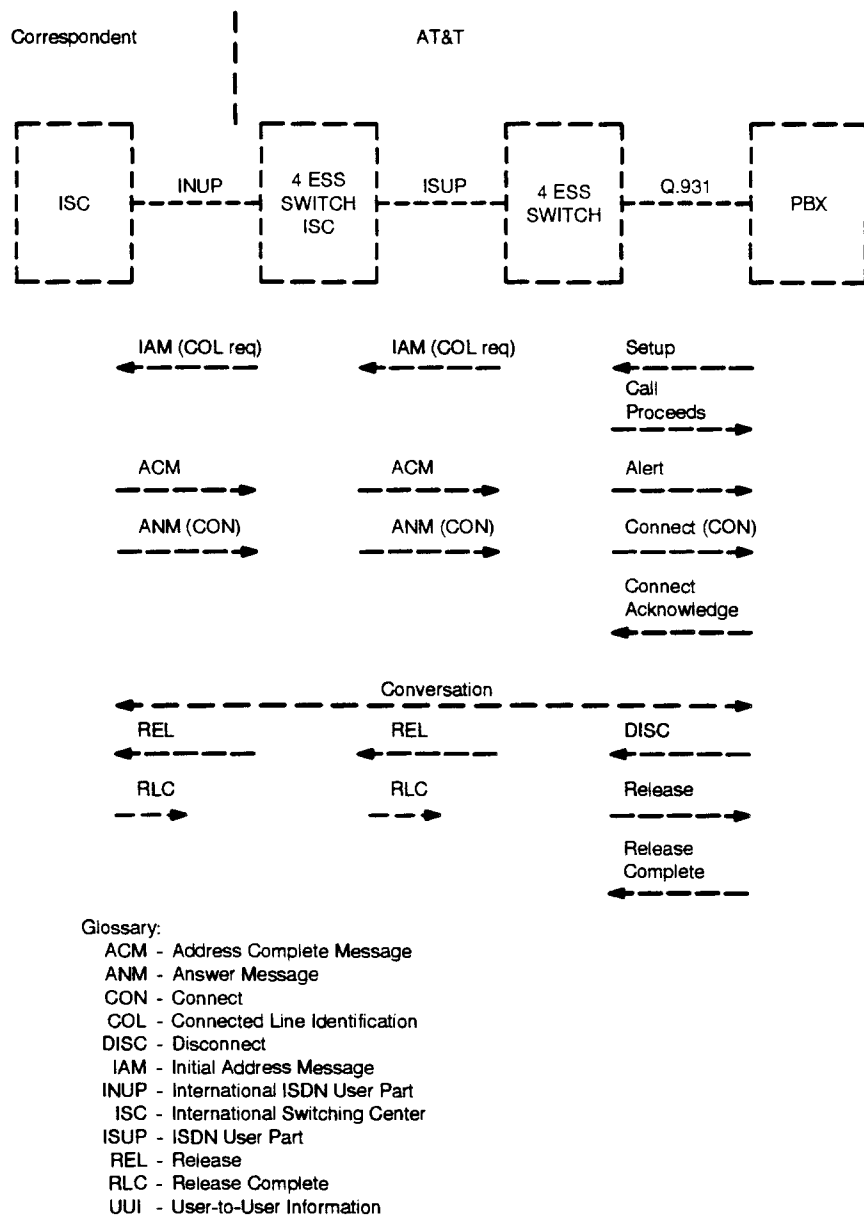
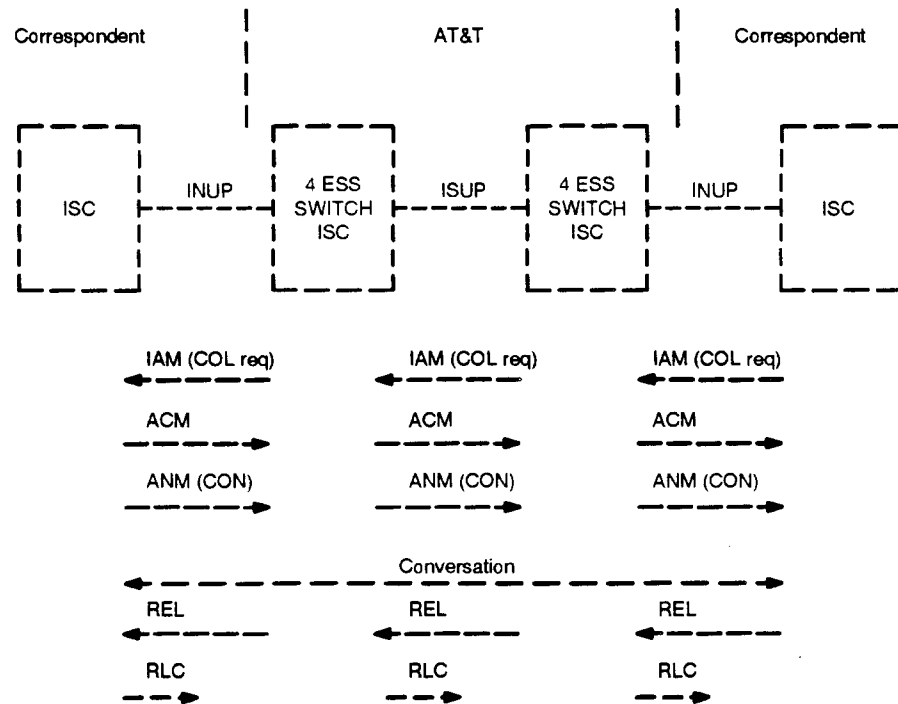


Figure 12-5. Outbound Call Flow Diagram for COLP



Glossary:

- ACM - Address Complete Message
- ANM - Answer Message
- CON - Connect
- COL - Connected Line Identification
- DISC - Disconnect
- IAM - Initial Address Message
- INUP - International ISDN User Part
- ISC - International Switching Center
- ISUP - ISDN User Part
- REL - Release
- RLC - Release Complete
- UII - User-to-User Information

Figure 12-6. Transit Call Flow Diagram for COLP

## **B. Call Flow Description**

**2.10** The call flow diagrams for Inbound, Outbound, and Transit calls are shown in Figures 12-4, 12-5, and 12-6, respectively. Included in these diagrams is the call setup and disconnect signaling. The following paragraphs concentrate mainly on changes introduced by CCITT No. 7 ISUP Phase 3 and do not include details on call setup and disconnect.

### **General**

**2.11** Systematic sending of the Connected Number, if available, whether the calling party requested it or not, will be implemented (in generic 4E15 ISC) between AT&T/KDD/BTI. Because other foreign administrations plan to implement the COLP/R service on a request/response basis, the following requirements are needed at the ISC.

### **Outbound**

**2.12** For all outbound calls, the Optional Forward Call Indicator (OFCI) parameter with the "H" bit set to "1" (that is, parameter value "1000000") shall be included in the outgoing CCITT No.7 IAM message. This procedure shall not apply for transit calls at the outgoing ISC.

### **Inbound**

**2.13** For inbound calls from foreign administrations, the "H" bit of the Optional Forward Call Indicator (OFCI) parameter in the CCITT No.7 IAM message may be set to "1" as an indication of a request for COLP or it may be set to "0" as an indication of non-request. In either case, there are no new requirements for processing of the OFCI parameter at the ISC. The Optional Forward Call Indicator (OFCI) parameter shall be discarded and the Connected Number (if available) shall continue to be provided in the backward ANM message to the foreign administrations as per generic 4E15 requirements.

### **Transit**

**2.14** For transit calls, the "H" bit in the OFCI parameter shall be passed unchanged unless the Closed User Group (CUG) indicator is set to "non-CUG" and the "H" bit = 0. In this case, there will be no need to pass the OFCI parameter.

## **3. Provisioning (Does not apply)**

## 4. International Call Detail Recording (ICDR) for UUS Service 1

**4.01** A new bit (word 5 - bit 6) in the ICDR shall be used to indicate the presence or absence of the UUI parameter in the backward call control message(s) or the forward REL message. See Figure 12-7.

	7	6	5	4	3	2	1	0
0		.	ATME	COS	TRANS		TIME	PHASE
1	GSDN		INCOMING TRAFFIC NUMBER (13-8)					
2	INCOMING TRAFFIC NUMBER (7-0)							
3	CLI	ATP	UUI	CUG	INCOMING TSG NUMBER (11-8)			
4	INCOMING TSG NUMBER (7-0)							
5	UUI REJ	UUI SUB	OUTGOING TRAFFIC NUMBER (13-8)					
6	OUTGOING TRAFFIC NUMBER (7-0)							

Figure 12-7. New ICDR Format for Word 0 - Word 6

**4.02** For all inbound, outbound and transit calls, the following describes the requirements for recording the presence or absence of the UUI parameter in the CCITT No. 7 forward and backward call control messages:

- If the UUI parameter is received in the IAM message, word 3 - bit 5 of the ICDR is set to "1". (This requirement already exists in generic 4E14 ISC.)
- If the UUI parameter is received in the forward REL message or the ACM, CPG, ANM, CON or backward REL messages, then word 5 - bit 6 (the UUI Subsequent Indicator) in the ICDR is set to "1". The UUI parameter will be carried by the CON message ONLY for outbound calls or the outbound portion of transit calls.

**⇒ NOTE:**

The above ICDR requirements may identify service problems or anomalies. For example, if word 3 - bit 5 is "0" (that is, UUS Service 1 not implicitly requested by

the calling party) and word 5 - bit 6 is "1", then such a record indicates improper sequence use of the service.

**4.03** For the UUI Rejection indication in the ICDR:

- If the UUI rejection indication is received by the ISC or
- If the UUI parameter in the inbound or outbound IAM received by the ISC is rejected by the ISC,

then word 5 - bit 7 in the ICDR is set to 1.

**4.04** The UUI rejection indication received by the 4E16 ISC may be:

- For outbound calls:
  - The User-to-User indicator parameter with Service 1 not-provided coding in the first backward message or
  - The Backward Call Indicator (BCI) parameter with "ISUP to non-ISUP interworking encountered" or "Non-ISDN terminating access" coding in the first backward message given that the UUI parameter was present in the IAM received and passed by the ISC.
- For inbound calls:
  - The User-to-User indicator parameter with Service 1 not-provided coding in the first backward message or
  - The CCS7 (AT&T) Facility Reject message or the Q.931 Status message.

**5. Network Management (Does not apply)**

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**6. Maintenance/Troubleshooting (Does not apply)**

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**7. Transition Considerations**

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### **Turn On/Turn Off Mechanism**

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**7.01** This feature is automatically turned on by software deployment.

### **Internal Transition Issues**

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**7.02** The 3B Direct Link Node (DLN) must receive its software first.

## **8. Input/Output Manual Pages (Does not apply)**

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## Intra-LATA Switched 384 Feature (#917)

# 13

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## Intra-LATA Switched 384 Feature (#917)

# 13

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### 1. Feature Description

**1.01** This feature provides switched 384 kbps service (H0) or 1.5 mbps service (H11) to the customers of the Local Exchange Carriers (LECs.) The service is provided on an intra switch and inter switch basis for intra-LATA traffic only. The facilities used for this service are dedicated and can be used for 64 clear channel H0 and H11 data rates.

New domains have been defined to allow LECs access to H0 and H11 service. No other screening or changes in messages are required by this feature.

Under normal operation, the user dials the 10-digit destination address of the called party and specifies that this is a H0/H11 type of call. Assuming that sufficient facilities are available end-to-end and that the called party is H0/H11 capable, the call is completed.

Under any abnormal condition, the call is disallowed. A Q.931 Disconnect Message is returned to the originating Customer Premise Equipment (CPE) with the reason for the call failure coded in the Cause Value.

## 2. Call Flow

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### Call Flow Key Points

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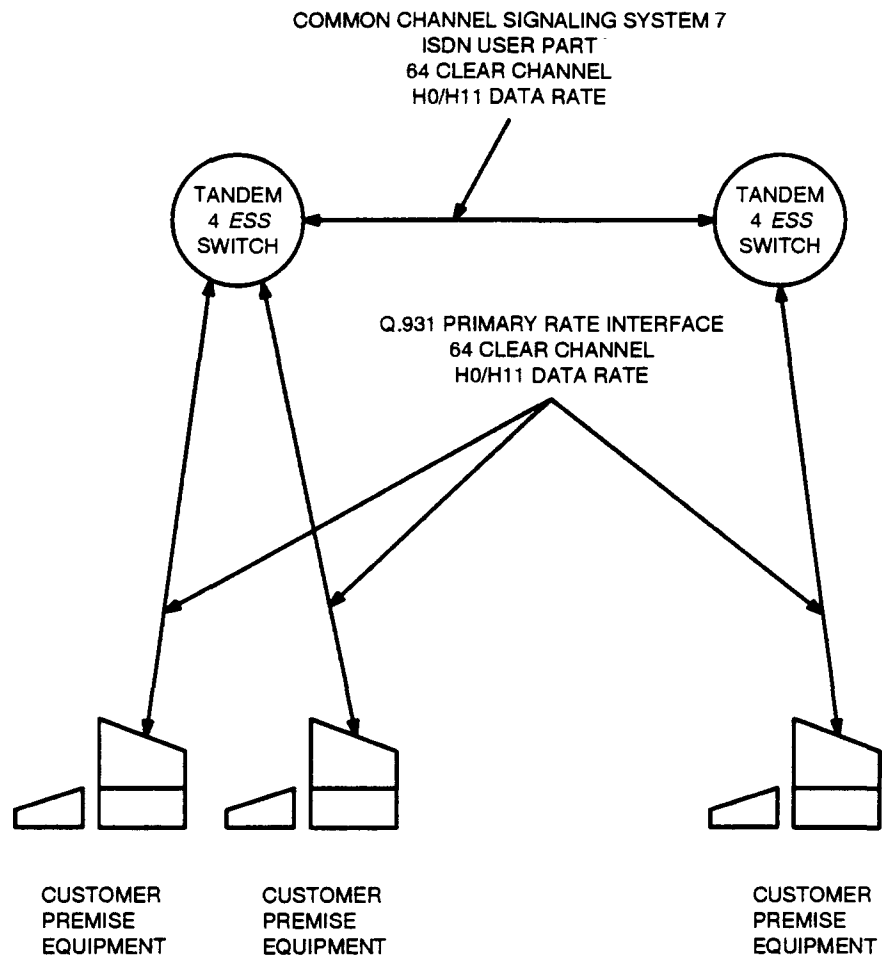
- 2.01** The key points of a H0/H11 call are shown in Figure 13-1, and the call proceeds as follows:
- (1) A H0/H11 capable customer dials the unique address of another H0/H11 customer.
  - (2) The CPE sends a call to a 4 ESS™ switch via Q.931.
  - (3) If the terminating customer is served by the *same* 4 ESS switch, the call is completed over a Primary Rate Interface (PRI) using Q.931.
  - (4) If the terminating customer is served by another 4 ESS switch, Common Channel Signaling System 7 (CCS7) Intra-LATA Integrated Services Digital Network User Part (ISUP) is used to route the call to that 4 ESS switch. The terminating 4 ESS switch then completes the call over a PRI using Q.931.

### Call Flow Narrative

---

**2.02** The H0/H11 Customer Premise Equipment is connected directly to a 4 ESS switch through the Q.931 PRI. The CPE always provides the 4 ESS switch with a 10-digit called party number, and the 4 ESS switch supports this service over facilities that are dedicated to data. These facilities can be used for H0/H11 64 clear channel switched service. When two customers are served by the *same* 4 ESS switch and wish to communicate using H0/H11 service, the following occurs. The 4 ESS switch serving the customer originating the call recognizes the request for the H0/H11 service by identifying the data rate specified in the Bearer Capability Information Element in the Q.931 Set Up Message. The 4 ESS switch then notifies the terminating CPE that an H0/H11 call is available by correctly populating the Bearer Capability Information Element sent to the terminating customer. However, when two customers are served by *different* 4 ESS switches, the switches use CCS7 Intra-LATA ISUP signaling to complete the call. The originating 4 ESS switch identifies an outgoing call as H0/H11 and then populates the User Service Information Parameter of the Intra-LATA ISUP Initial Address Message. The terminating 4 ESS switch identifies the incoming call as H0/H11 by inspecting the User Service Information Parameter of the Intra-LATA ISUP Initial Address Message.

**Call Flow Diagram**



**Figure 13-1. 4 ESS Based H0/H11 Switching**

**2.03** Two new routing domains are needed to route H0/H11 calls. Only the numbers of H0/H11 customers in the same Local Access Transport Area (LATA) are populated in the routing domains used for H0/H11 calls. If a H0/H11 call is attempted to a non-H0/H11 location, the originating 4 ESS switch will not complete the call and will return a Q.931 Disconnect message with the Cause Value set to the coding that was administratively specified for this failure.

**2.04** Two new Office Data Assembler (ODA) tables are needed by call processing to map to the appropriate data domain. An 8-word table, Table 13-A, is used by Q.931, and a 32-word table, Table 13-B, is used by ISUP. The tables are populated differently for AT&T and LEC offices, and default domain values are shown for the LEC Office.

**Table 13-A. Q.931 Data Domain Table - OD4Q931DDOM**

Index (3 Bits)		Domain	
Int'l Indicator	Data Rate	LEC Office	
		Restricted	Clear
Domestic	64	DATAR	DATA
Domestic	56	DATA	DATA
Domestic	384	INV	NH0C*
Domestic	1536	INV	NHIC*
International	64	INV	INV
International	56	INV	INV
International	384	INV	INV
International	1536	INV	INV

\* New domains for 4E16

**A. Q.931 Incoming Trunk Handler**

**2.05** The Q.931 incoming trunk handler derives the domain for data calls from Bearer Capability Information and the type of address in the called party number located in new ODA table OD4Q931DDOM.

**B. ISUP Incoming Trunk Handler**

**2.06** The ISUP incoming trunk handler derives the domain for data calls from User Service Information and the Routing Category in new ODA table OD4ISUPDDOM.

Table 13-B. ISUP Data Domain Table - OD4ISUPDDOM

Index (5 Bits)		Domain	
Routing Cat. (3 Bits)	Data Rate (2 Bits)	LEC Office	
		Restr.	Clear
Data Invalid	64	INV	INV
Data Invalid	56	INV	INV
Data Invalid	384	INV	INV
Data Invalid	1536	INV	INV
Inter Office	64	DATAR	DATA
Inter Office	56	DATA	DATA
Inter Office	384	INV	NH0C*
Inter Office	1536	INV	NH1C*
Dedicated	64	DER6	DEC6
Dedicated	56	DED	DED
Dedicated	384	INV	INV
Dedicated	1536	INV	INV
Intl Inbound	64	INV	INV
Intl Inbound	56	INV	INV
Intl Inbound	384	INV	INV
Intl Inbound	1536	INV	INV
Intl Out/Over	64	INV	INV
Intl Out/Over	56	INV	INV
Intl Out/Over	384	INV	INV
Intl Out/Over	1536	INV	INV
Intl Out to ISC	64	INV	INV
Intl Out to ISC	56	INV	INV
Intl Out to ISC	384	INV	INV
Intl Out to ISC	1536	INV	INV
Intl Transit	64	INV	INV
Intl Transit	56	INV	INV
Intl Transit	384	INV	INV
Intl Transit	1536	INV	INV

\* New domains for 4E16

### 3. Provisioning

#### Overview

- 3.01** Two new domains are defined for routing intra-LATA 384 kbps and 1.5 mbps clear data calls using the 10-digit North American Numbering Plan (NANP).
- 3.02** Two new data tables are provided to determine which domain should be used to route the call. One table is used for Q.931 calls, and the other table is used for ISUP calls.

#### Structures Affected

- 3.03** Two new domains, NH0C and NH1C, are defined for 384 kbps and 1.536 mbps clear data calls using the North American Numbering Plan. A subtranslator is allocated for the appropriate domain if any 403D, E, F, or V input form is entered with NH0C or NH1C in the DOM (domain) field. Test call entries are not automatically populated by ODA in these domains. The form values and their descriptions are as follows:

Form	Description Value
NH0C	NANP 384 kbps clear
NH1C	NANP 1.536 mbps clear

#### A. HT4DIGSUPP

On code group forms, domain values of NH0C or NH1C are valid when CALLTYP is Direct Services Dialing (DSD), CALLDATA is RDOM, and AD1 is NH0C or NH1C.

#### B. HT4SERVICE

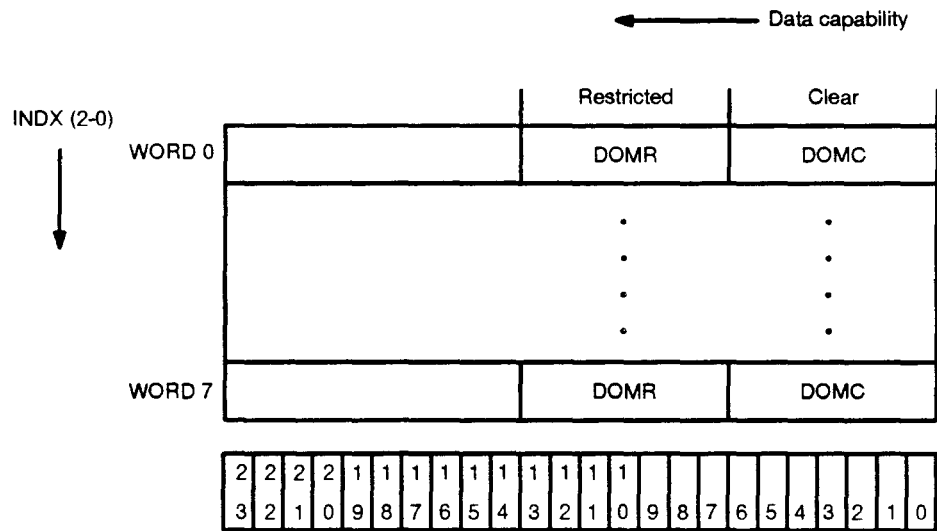
On ODA Form 406V or Recent Change Form 631, the Retranslate Domain (RTDOM) can be populated with NH0C or NH1C. An entry is built in HT4SERVICE for NH0C or NH1C if either is entered in the SRVC field on ODA Form 406V.

#### C. OD4PRXDIG

If DOMAIN on ODA Form 403U is 113, then item OD4PRXDOM is populated with 4XLDOMNH0C. If DOMAIN on ODA Form 403U is 114, then item OD4PRXDOM is populated with 4XLDOMNH1C.

**D. OD4Q931DDOM**

This is a new 8-word 1-level structure defined in Protected, Simplex, Disk Backed, and ODA populated (PSBO) call store. See Table 13-A. This table is used by call processing to map to the appropriate data domain for Q.931 calls. This structure is initially populated by ODA with the default values shown in Figure 13-2. The structure is then copied across to future generics using ODA Form D7. This table is populated differently for AT&T and LEC offices.



All items are prefixed with OD4Q931.

**Figure 13-2. OD4Q931DDOM Table Structure**



**B. 403D, 403E, 403F, 403V**

Two new domain values have been added to the DOM field: NH0C and NH1C. These domains are also allowed in the AD1 field when CALLTYP is DSD and CALLDATA is RDOM.

**C. 403G**

The NH0C and NH1C domains are allowed in the AD1 field when CALLTYP is DSD and CALLDATA is RDOM.

**D. 403G, 403H, 403P**

The new NH0C and NH1C domains fall under the DOM class category for the DOMCLASS field on these forms. No form change is required for this change.

**E. 403U**

The domain change for the prefix digits table is being increased to 114, and the NH0C and NH1C mnemonics are added to the table for this form. For the valid domains, see Table 13-C.

**Table 13-C. Valid Domains**

Value	Domain	Value	Domain
1	POTS Home NPA	106	N64C
4	POTS Intertoll	107	N64R
20-77	Non-POTS	108	164C
81	IVT	109	156D
82	Non-POTS	112	APN
89	DEV	113	NH0C
90	DED	114	NH1C
99	NSR		

**F. 406V**

Two new domain values, NH0C and NH1C, are being added to both the SRVC field and RTDOM field.

**Population Rules**

If RTDOM is NH0C or NH1C, then there must be a code group Form (403D, E, F, or V) with DOM equal to NH0C or NH1C respectively.

### **Recent Change Forms Affected**

**A. 100, 101, 102, 107, 108, 109**

Two new domain values, NH0C and NH1C, have been added to the DOM field.

**B. 300, 301, 302, 303**

Two new domain values, NH0C and NH1C, have been added to the DOM field. These domains are also allowed in the AD1 field when CALLTYP is DSD and CALldata is RDOM.

**C. 304**

The NH0C and NH1C domains are allowed in the AD1 field when CALLTYP is DSD and CALldata is RDOM.

**D. 309, 311, 327, 328, 329, 330**

Two new domain values, NH0C and NH1C, have been added to the DOM field.

**E. 631**

Two new domain values, NH0C and NH1C, have been added to both the SRVC field and RTDOM field.

#### **Population Rules**

If RTDOM equals NH0C or NH1C, then the entry in HT43DIG for the respective domain must not be HT4ALLZERO.

### **Verify Forms Affected**

**A. 1a, 1b, 1c 1h, 11d**

Two new domain values, NH0C and NH1C, have been added to the DOM field.

**B. 3a, 3b, 3c, 3d, 3e, 3f, 3v, 3w, 3ab, 13f, 13m**

Two new domains, NH0C and NH1C, have been added to the DOM field. These domains may also be output in the AD1 field when CALLTYP is DSD and CALldata is RDOM.

**C. 3g, 3z**

The NH0C and NH1C domains may be output in the AD1 field when CALLTYP is DSD and CALldata is RDOM.

**D. 6o, 6p, 6q, 6r, 13b**

Two new domain values, NH0C and NH1C, have been added to the DOM field.

**E. 6ag**

Two new domain values, NH0C and NH1C, have been added to both the SRVC field and RTDOM field.

**F. 16z**

Two new domain values, NH0C and NH1C, have been added to the SRVC field.

**Retrofit/Growth**

ODA needs to initially populate OD4Q931DDOM and OD4ISUPDDOM tables in new start offices. For existing office retrofits after 4E16 generic, ODA needs to preserve the data in the tables across the retrofit/growth.

**4. Recording**

**4.01** The 4 ESS switch that directly serves the customer makes a billing record for each originating intra-LATA call. Each H0/H11 call is recorded as Call Code 061. Structure Code 1081 shown in Table 13-D is used for normal calls, and Structure Code 1083 shown in Table 13-E is used for long duration calls. For both of these Structure Codes, the H0/H11 coding is placed in the Data Rate Indicator shown in Table 13-F. Unanswered calls are recorded with the same Structure Codes but the Answer Indicator is coded for an unanswered call.

Table 13-D. Structure Code 01081

Information	Table * Number	Number Of Characters
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Connect Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Answer Indicator	9	2
Service Observed Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Overseas Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Connect time	18	8
Elapsed time	19	10
Service Indicator	41	4
Data Rate Indicator	42	4
ACI Features	344	4
SID Information	322	12
Count of Message Associated UUI	345	6

Call Codes Recorded: 034 &amp; 061

\* From Standards for AMA data

Table 13-E. Structure Code 01083

Information	Table * Number	Number Of Characters
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Connect Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Answer Indicator	9	2
Service Observed Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Overseas Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Connect time	18	8
Elapsed time	19	10
Service Indicator	41	4
Data Rate Indicator	42	4
ACI Features	344	4
SID Information	322	12
Count of Message Associated UUI	345	6
Present Data	6	6
Present Time	18	8

Call Codes Recorded: 061

\* From Standards for AMA data

**Table 13-F. Data Rate Indicator**

BCD Characters	Meaning
1-3	000 = Not used
1-3	001 = 1,536 kbps Clear
1-3	002 = 1,536 kbps Restricted
1-3	003 = 384 kbps Clear
1-3	004 = 384 kbps Restricted
1-3	005 = 64 kbps Clear
1-3	006 = 56 kbps
1-3	007 = 64 kbps Restricted
4	SIGN (hex C)

## **5. Network Management**

**5.01** New network management is not required for this feature.

### **Office Data**

**5.02** New routing domains are required for the H0/H11 service. The routing domains are described in Section 2 *Call Flow*.

### **Recent Change and Verify**

**5.03** Recent Change and Verify will specify the population of numbers in the H0/H11 routing domains. See sections *Recent Change Forms Affected* and *Verify Forms Affected*.

### **Installation and Retrofit**

**5.04** A normal generic retrofit makes H0/H11 switching available. See section *Retrofit/Growth*.

## **6. Maintenance/Troubleshooting**

**6.01** This feature has no new maintenance requirements.

### **Measurements**

**6.02** Office-wide counts are kept on the number of incoming and outgoing H0/H11 attempts to and from the 4 ESS switch. Routing domain and data domain information and tables for this feature are covered in Section 2 *Call Flow*. Information about data rate indicators and structure codes for this feature is covered in Section 4 *Recording*.

## **7. Transition Considerations**

### **Hardware Dependencies**

**7.01** The H0/H11 service is dependent on the availability of 64 clear channel service and 4 ESS switch supported PRI. The following hardware is required to support these features:

- D-Channel Node on the Common Network Interface (CNI) ring to terminate the Q.931 D-Channel
- DIF-E1 frames equipped with the SM9 or SM10 pack to provide 64 clear channels
- TSI-B frames equipped with FA1816 and FA1817 packs to ensure the time correlation among the six channels of each H0/H11 connection.

### **Dependencies on Other Network Components**

**7.02** The CPE must be connected to the 4 ESS switch via a Q.931 PRI. On originations, the CPE must recognize the H0/H11 request from the user and correctly populate the Bearer Capability Information Element of the Q.931 Setup Message. On terminations, the CPE must determine that an incoming call is H0/H11 by correctly interpreting the Bearer Capability Information Element in the Q.931 Set-Up Message.

**8. Input/Output Manual Pages (Does  
not apply)**

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## Intra-LATA 7-Digit Free Calling Feature (#918)

# 14

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## Intra-LATA 7-Digit Free Calling Feature (#918)

# 14

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### 1. Feature Description

**1.01** This feature provides an intra-LATA 7-digit free call similar to an 800+ call. The 7-digit number can be re-used in each Local Access and Transport Area (LATA) so that nationwide number administration is not required. However, a business may request the same number in multiple LATAs so that its customers need only remember one number.

Under normal operation, the customer dials the 7-digit free number and is connected to the business location nearest the customer. This call is not billed to the originating customer. Under normal conditions, there are no other interactions.

Under any abnormal condition, the interactions are the same as described above, but the call is not completed. The access tandem 4 ESS™ switch notifies the calling party of the abnormal condition based on the actual fault that occurred as in the existing Service Switching Point (SSP) 800 offering.

## **2. Call Flow**

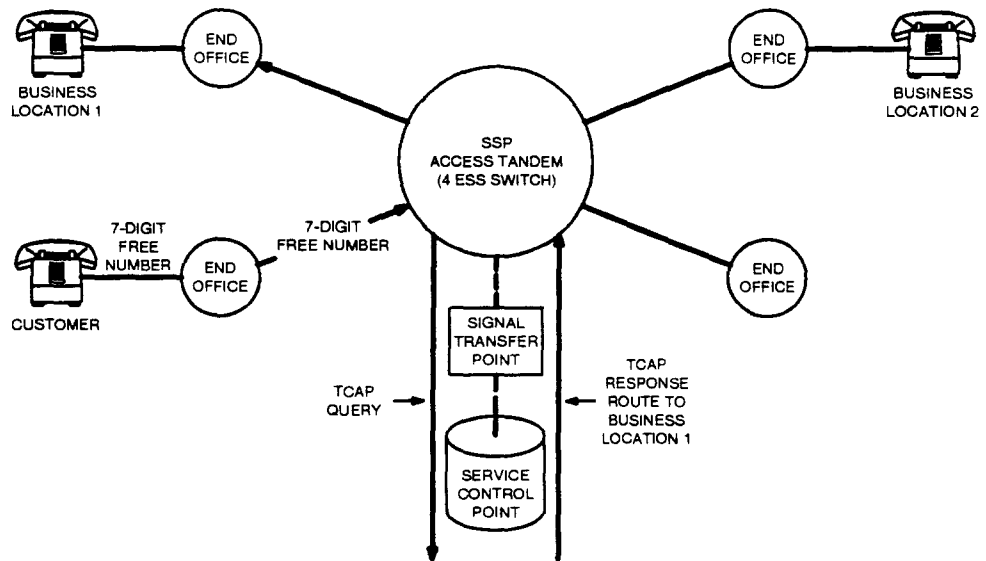
---

### **Call Flow Key Points**

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- 2.01** The key points of a 7-digit free call are shown in Figure 14-1, and the call proceeds as follows:
- (1) The customer dials the number that has been assigned to the intra-LATA 7-digit free call.
  - (2) The end office sends the call to the SSP of the access tandem 4 ESS switch with the correct service indicator [dialed number, OZZ+XXX, Automatic Number Identification (ANI), called party number parameter, or transit network selection parameter].
  - (3) The SSP access tandem recognizes that this is a free call based on the service indicators listed in the previous item.
  - (4) The SSP access tandem generates an SSP-800 type Transaction Capability Application Part (TCAP) query.
  - (5) The Signal Transfer Point (STP) with global title translations for this service converts the translation type and global title digits (that is, NXX+XXX) in the query to the point code of the appropriate Service Control Point (SCP). The query is then routed to the SCP.
  - (6) The SCP converts the ANI and the dialed number to a routing number.
  - (7) The SCP returns the routing number in a SSP-800 type response.
  - (8) The response is routed to the SSP access tandem.
  - (9) The SSP access tandem uses the carrier ID and the routing number in the response to complete the call. The call is completed as if it were an intra-LATA SSP-800 call.
  - (10) The SSP access tandem produces an SSP-800 type billing record for the call. An exception to the SSP-800 type billing is that the Numbering Plan Area (NPA) field in the dialed number contains zeros (that is, 000 NXX XXXX).

**Call Flow Diagram**



**Figure 14-1. Intra-LATA 7-Digit Free Calling**

## **Call Flow Narrative**

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**2.02** The 4 ESS switch recognizes the call as a 7-digit free call based on a pseudo carrier code (the same code used for SSP-800) and the dialed number (dedicated NXXs) for equal access MF and Network Interconnect Common Channel Signaling System 7 (CCS7) signaling. In addition, the switch recognizes the call as a 7-digit free call based on the dialed number for other supported signaling types. If the SSP access tandem does not receive Automatic Number Identification (ANI), the SSP constructs a 6-digit ANI (NPA+NXX) based on the incoming trunk and sends it to the SCP data base. If full ANI is required to complete the call, it is the responsibility of the SCP data base to instruct the SSP to terminate the call.

**2.03** Once a call has been identified as 7-digit free and ANI is available, the 4 ESS switch treats the call as a SSP-800 call. The SSP formulates a SSP-800 query containing the 7-digit dialed number, the calling party number, the originating station type, and the identification of the originating LATA. The SSP uses the SCP's carrier ID and the 10-digit routing number to route the call. The SSP returns termination information to the SCP upon call termination when it is requested by the SCP in the response message.

### **A. Caller Signaling**

**2.04** The caller signals the end office using either dial pulse or touch tone signaling.

### **B. Office to Office Signaling**

**2.05** The end office signals the SSP access tandem using any supported signaling type. SSP call recognition occurs as follows:

- When traditional signaling from a non-Equal Access End Office (EAEO) is used, the SSP recognizes a call as 7-digit free based on the unique NXX of the dialed number.
- When Feature Group D-Multifrequency (FGD-MF) signaling is used, the SSP recognizes a call as 7-digit free based on the OZZ+XXX pseudo carrier code in the first stage of digits and the unique NXX of the dialed number.
- When intra-LATA CCS7 signaling is used, the SSP recognizes a call as 7-digit free based on the unique NXX of the dialed number in the Called Party Number parameter of the Initial Address Message (IAM).

### **C. Access Tandem to Terminating End Office Signaling**

**2.06** A 7-digit free call is treated as a POTS call upon exit from the SSP access tandem. Therefore, the signaling required by the terminating end office is determined by the outgoing trunk selected.

#### **D. Control Point Signaling**

**2.07** The SSP access tandem queries the SCP using a SSP-800 TCAP query with the 7-digit dialed number replacing the 800-NXX-XXXX. The SSP places the first six digits (NXX-XXX) of the 7-digit free number in the Global Title field of the Signaling Connection Control Part (SCCP) to allow the STP network to route the query to the appropriate SCP. Message formats differing from the standard are as follows:

- The service key parameter in the initial query contains the 7-digit dialed number and has a length of 10 octets.
- The digits (Called Party Address) in the Automatic Call Gap (ACG) invoke have a length of 7 octets as only 6-digit ACG is provided.

The message layouts for this feature are shown in Tables 14-A through 14-H.

#### **E. Digit Reception**

**2.08** The vector tables in all domestic Digit Reception (DIRE) for the SSP subtype are changed to include the new subtype. The actions taken are the same as for the SSP-800 subtype data base.

#### **F. Service Switching Point Query and Response**

**2.09** The SSP access tandem formulates a SSP-800 query containing the 7-digit dialed number, ANI, and the identification of the originating LATA. The SSP access tandem uses the carrier ID (intra-LATA) and the 10-digit routing number in response to the SCP data base request to route the call. If the switch does not receive seven digits, the call is killed with the same final handling code (1117) used for SSP 800.

**2.10** All fields populated in the 7-digit free query are the same as those populated in an 800 query with the following exceptions:

- Service Key Length = 10
- Dialed Digits Length = 8
- Number of Dialed Digits = 7.

Currently, there is no test query capability for the intra-LATA 7-digit free calling.

**Table 14-A. Initial Query From SSP**

<b>Parameter</b>	<b>Type</b>	<b>Length (Octets)</b>
Package Type Identifier	M	1
Originating Transaction ID	M	4
Component Type	M	1
Invoke ID	M	1
Operation Code	M	2
Service Key	M	9*
Digits (Calling Party Address)	M	9*
Digits (Originating LATA)	M	6
Originating Station Type	M	1

M = Mandatory Parameter

\* = Value Specific to This Application

**Table 14-B. Response Containing Routing Information**

<b>Parameter</b>	<b>Type</b>	<b>Length (Octets)</b>
Package Type Identifier	M	1
Originating Transaction ID	M	4
Component Type	M	1
Invoke ID	M	1
Correlation ID	M	1
Operation Code	M	2
Digits (Carrier Identification)	M	6
Billing Indicators	M	4
Network Routing Number	M	9*
Billing Number	O	9*

M = Mandatory Parameter

O = Optional Parameter

\* = Value Specific to This Application

**Table 14-C. Invoke (ACG)**

<b>Parameter</b>	<b>Type</b>	<b>Length (Octets)</b>
Component Type	M	1
Operation Code	M	2
Digits (Called Party Address)	M	7
Automatic Call Gap Indicators	M	3

M = Mandatory Parameter

**Table 14-D. Response Containing Return Result (Termination)**

<b>Parameter</b>	<b>Type</b>	<b>Length (Octets)</b>
Package Type Identifier	M	1
Component Type	M	1
Termination Indicators	M	1
Echo Data	M	4*
Connect Time	O	5
Error Code	O	1
Problem Data	O	1
Standard User Error	O	1

M = Mandatory Parameter  
O = Optional Parameter  
\* = Value Specific to This Application

**Table 14-E. Response Containing Return Error**

<b>Parameter</b>	<b>Type</b>	<b>Length (Octets)</b>
Package Type Identifier	M	1
Responding Transaction ID	M	4
Component Type	M	1
Correlation ID	M	1
Error Code	M	1
Problem Data	O	1

M = Mandatory Parameter  
O = Optional Parameter

**Table 14-F. Reject Message**

<b>Parameter</b>	<b>Type</b>	<b>Length (Octets)</b>
Package Type Identifier	M	1
Responding Transaction ID	M	4
Component Type	M	1
Correlation ID	O	1
Problem Code	M	2

M = Mandatory Parameter  
O = Optional Parameter

**Table 14-G. Invoke (Play Announcement)**

<b>Parameter</b>	<b>Type</b>	<b>Length (Octets)</b>
Component Type	M	1
Invoke ID	M	1
Correlation ID	M	1
Operation Code	M	1
Standard Announcement	M	1

M = Mandatory Parameter

**Table 14-H. Error Message From SSP**

<b>Parameter</b>	<b>Type</b>	<b>Length (Octets)</b>
Package Type Identifier	M	1
Component Type	M	1
Operation Code	M	2
Problem Data	M	1

M = Mandatory Parameter

### **3. Provisioning**

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**3.01** Series 300 recent change forms contain a call data field. For the SSP call type, the call data field can now be populated with DB7 for intra-LATA 7-digit free calling.

### **4. Recording**

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**4.01** Records for 7-digit free calls are identical to the records generated for SSP-800 calls. The response message from the SCP indicates the call code to be used in the record. The valid structure codes and associated tables are as follows:

<b>Structure Codes</b>	<b>Title</b>	<b>Table Location</b>
00364	Number Services, Telco	Refer to Table 14-I.
00365	Number Services, Telco, Alternate Billing Number	Refer to Table 14-J.
00366	Number Services, Telco, Long Duration	Refer to Table 14-K.
00367	Number Services, Telco, Long Duration, Alternate Billing Number	Refer to Table 14-L.
00368	Number Services, Telco, Unanswered, Alternate Billing Number	Refer to Table 14-M.
00369	Number Services, Telco, Unanswered, Alternate Billing Number	Refer to Table 14-N.

**Table 14-I. Structure Code 00364 - Number Services, Telco**

<b>Information</b>	<b>Table *</b> <b>Number</b>	<b>Number Of</b> <b>Characters</b>
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6
Timing Indicator	7	6
Study Indicator	8	8
Answer Indicator	9	2
Service Observed Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Dialed NPA	13	4
Dialed Number	14	8
Destination Overseas Indicator	15	2
Destination NPA	16	6
Destination Number	17	8
Answer Time	18	8
Elapsed Time	19	10
Customer's Revenue Accounting Office (RAO) Number	46	4
Operating LATA	197	4

Call Codes Recorded: 142

\* From Standards for AMA data

**Table 14-J. Structure Code 00365 - Number Services, Telco, Alternate Billing Number**

<b>Information</b>	<b>Table *</b> <b>Number</b>	<b>Number Of</b> <b>Characters</b>
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6
Timing Indicator	7	6
Study Indicator	8	8
Answer Indicator	9	2
Service Observed Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Dialed NPA	13	4
Dialed Number	14	8
Destination Overseas Indicator	15	2
Destination NPA	16	6
Destination Number	17	8
Answer Time	18	8
Elapsed Time	19	10
Customer's RAO Number	46	4
Originating LATA	197	4
Alternate Billing Number	138	12

Call Codes Recorded: 142

\* From Standards for AMA data

**Table 14-K. Structure Code 00366 - Number Services, Telco, Long Duration**

<b>Information</b>	<b>Table * Number</b>	<b>Number Of Characters</b>
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6
Timing Indicator	7	6
Study Indicator	8	8
Answer Indicator	9	2
Service Observed Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Dialed NPA	13	4
Dialed Number	14	8
Destination Overseas Indicator	15	2
Destination NPA	16	6
Destination Number	17	8
Answer Time	18	8
Elapsed Time	19	10
Customer's RAO Number	46	4
Operating LATA	197	4
Present Date	6	6
Present Time	18	8

Call Codes Recorded: 142

\* From Standards for AMA data

**Table 14-L. Structure Code 00367 - Number Services, Telco, Long Duration, Alternate Billing Number**

<b>Information</b>	<b>Table *</b> <b>Number</b>	<b>Number Of</b> <b>Characters</b>
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6
Timing Indicator	7	6
Study Indicator	8	8
Answer Indicator	9	2
Service Observed Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Dialed NPA	13	4
Dialed Number	14	8
Destination Overseas Indicator	15	2
Destination NPA	16	6
Destination Number	17	8
Answer Time	18	8
Elapsed Time	19	10
Customer's RAO Number	46	4
Originating LATA	197	4
Alternate Billing Number	138	12
Present Data	6	6
Present Time	18	8

Call Codes Recorded: 061

\* From Standards for AMA data

**Table 14-M. Structure Code 00368 - Number Services, Telco, Unanswered, Alternate Billing Number**

<b>Information</b>	<b>Table *</b> <b>Number</b>	<b>Number Of</b> <b>Characters</b>
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6
Timing Indicator	7	6
Study Indicator	8	8
Answer Indicator	9	2
Service Observed Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Dialed NPA	13	4
Dialed Number	14	8
Destination Overseas Indicator	15	2
Destination NPA	16	6
Destination Number	17	8
Answer Time	18	8
Elapsed Time	19	10
Customer's RAO Number	46	4
Originating LATA	197	4
Circuit Data	6	6
Circuit Time	26	8

Call Codes Recorded: 142

\* From Standards for AMA data

**Table 14-N. Structure Code 00369 - Number Services, Telco, Unanswered, Alternate Billing Number**

<b>Information</b>	<b>Table *</b> <b>Number</b>	<b>Number Of</b> <b>Characters</b>
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6
Timing Indicator	7	6
Study Indicator	8	8
Answer Indicator	9	2
Service Observed Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Dialed NPA	13	4
Dialed Number	14	8
Destination Overseas Indicator	15	2
Destination NPA	16	6
Destination Number	17	8
Answer Time	18	8
Elapsed Time	19	10
Customer's RAO Number	46	4
Originating LATA	197	4
Alternate Billing Number	138	12
Circuit Date	6	6
Circuit Time	26	8

Call Codes Recorded: 142

\* From Standards for AMA data

## **5. Network Management**

---

### **Office Data**

---

5.01 This feature has no new office data requirements.

### **Recent Change and Verify**

---

5.02 The SSP access tandem supports recent changeable assignments of NXXs to the 7-digit free calling feature.

### **Installation and Retrofit**

---

5.03 Normal generic retrofit makes the 7-digit free calling feature available.

### **Measurements**

---

5.04 The same traffic measurements provided for SSP-800 are provided for the 7-digit free calling feature.

### **Voice Network**

---

5.05 New voice network management is not required for this feature.

### **Signaling Network**

---

5.06 New signaling network requirements are not needed for STP overload and outage. The SSP supports the same 6-digit ACG controls for SCP overload and outage as it does for SSP-800.

## **6. Maintenance/Troubleshooting (Does not apply)**

---

## **7. Transition Considerations**

---

### **Dependencies on Other Network Components**

- 7.01** This feature builds on the SSP-800 feature and provides the same limited set of capabilities to the called customer.
- 7.02** The end office must recognize the NXX assigned to this feature. It must populate the OZZ+XXX if FGD-MF is used, or it may populate the Transit Network Selection Parameter if CCS7 is used. This must be done with the same values used for SSP-800.
- 7.03** The SCP must accept a 7-digit dialed number in the TCAP query. In all other respects, the feature is identical to the SSP-800 feature.

### **8. Input/Output Manual Pages (Does not apply)**

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## Unsuccessful Call Setup Feature (#919)

# 15

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## Unsuccessful Call Setup Feature (#919)

# 15

---

### 1. Feature Description

- 1.01** This feature provides the procedures to be used when a Local Exchange Carrier (LEC) encounters failure of a normal call setup. In the 4E16 Generic, the following is provided to handle an unsuccessful call setup:
- The generation of the Optional Backward Call Indicator (OBCI) parameter with appropriate coding, and the inclusion of the OBCI parameter in the Address Complete Message (ACM) for Integrated Services Digital Network (ISDN) originated calls, if inband information indicating call failure is returned from the exchange.
  - Two recent change options ("ISUP Play\_Announcement" and "non-ISUP Play\_Announcement") are provided at a tandem exchange to:
    - Send a Common Channel Signaling System 7 (CCS7) Release (REL) message for the incoming circuit
    - Provide inband tones/announcements for 3.1 kHz audio and speech calls with non-ISDN origination upon encountering call setup failure.
  - The association of cause value and location codings of the cause indicator parameter (received in a CCS7 REL message with inband tones/announcements) has been changed for some cause values.
  - The ability to recognize cause value #102.
  - Exceptions to the "cause transparency rule".

## **2. Call Flow**

---

### **Call Flow Key Points**

---

**2.01** Four recent change indicators apply to local tandem switches for unsuccessful call setup procedures. Each indicator has two possible values as follows:

- Send REL message
- Play tone/announcement.

Table 15-A summarizes the four recent change options for call failure treatment.

### **Call Flow Narrative**

---

**2.02** Figure 15-1 shows a simplified flowchart for the ISUP incoming trunk clearing function. Note that this is a simplified flowchart that omits certain cases, such as already having sent an ACM and AT&T clearing rules.

**Table 15-A. Call Failure Treatment Options Summary**

No.	Indicator	Scope	Default	Use
1	NI ISUP Play_Annc	Per IXC Trunk Group	Send REL	Incoming trunk (ICT) group from interexchange carrier (IXC), for failure of CdP Address failed screening determined at the switch, originating access non-ISDN (FCI.isdn = non-ISDN), FCI.isup = ISDN-UP used all the way
2	NI Non-ISUP Play_Annc	Per IXC Trunk Group	Play T/A	Incoming trunk group (ICT) from IXC, cause = no route to destination (3) determined at the switch, originating access non-ISDN (FCI.isdn = non-ISDN), FCI.isup = ISDN-UP not used all the way
3	ISUP Play_Annc	Per Office	Send REL	Any incoming trunk (ICT), indicators 1 & 2 not applicable, call failure determined at the switch, FCI.isdn = non-ISDN, FCI.isup = ISDN-UP used all the way
4	Non-ISUP Play_Annc	Per Office	Play T/A	Any incoming trunk (ICT), indicators 1 & 2 not applicable, call failure determined at the switch, FCI.isdn = non-ISDN, FCI.isup = ISDN-UP not used all the way.

**Abbreviations Used In Table:**

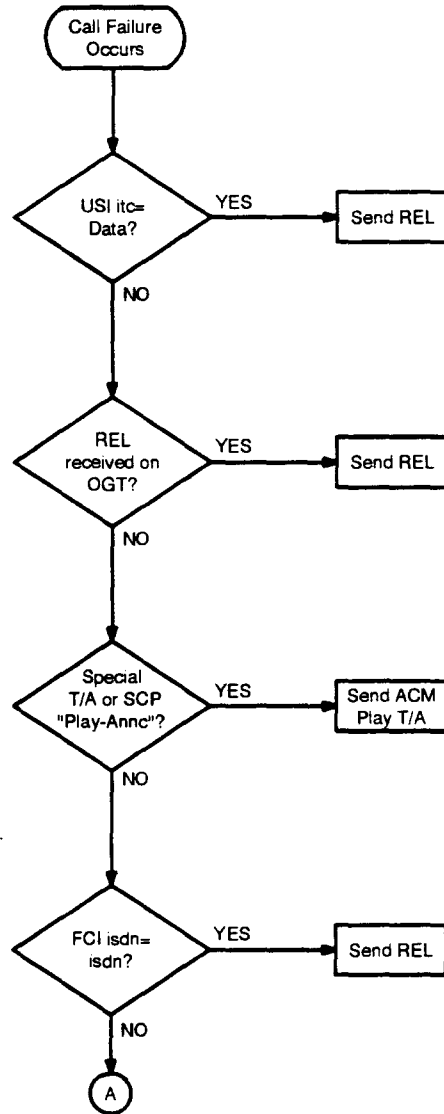
FCI.isdn - ISDN Access bit in the Forward Call Indicator parameter

FCI.isup - ISDN-UP Indicator bit in the Forward Call Indicator parameter

CdP - Called Party

ISUP - ISDN User Part

**Call Failure Handling Diagrams**



USI itc - Information Transfer Capability field in the User Service Information parameter

**Figure 15-1. ISUP Incoming Trunk Clearing Function (Sheet 1 of 2)**

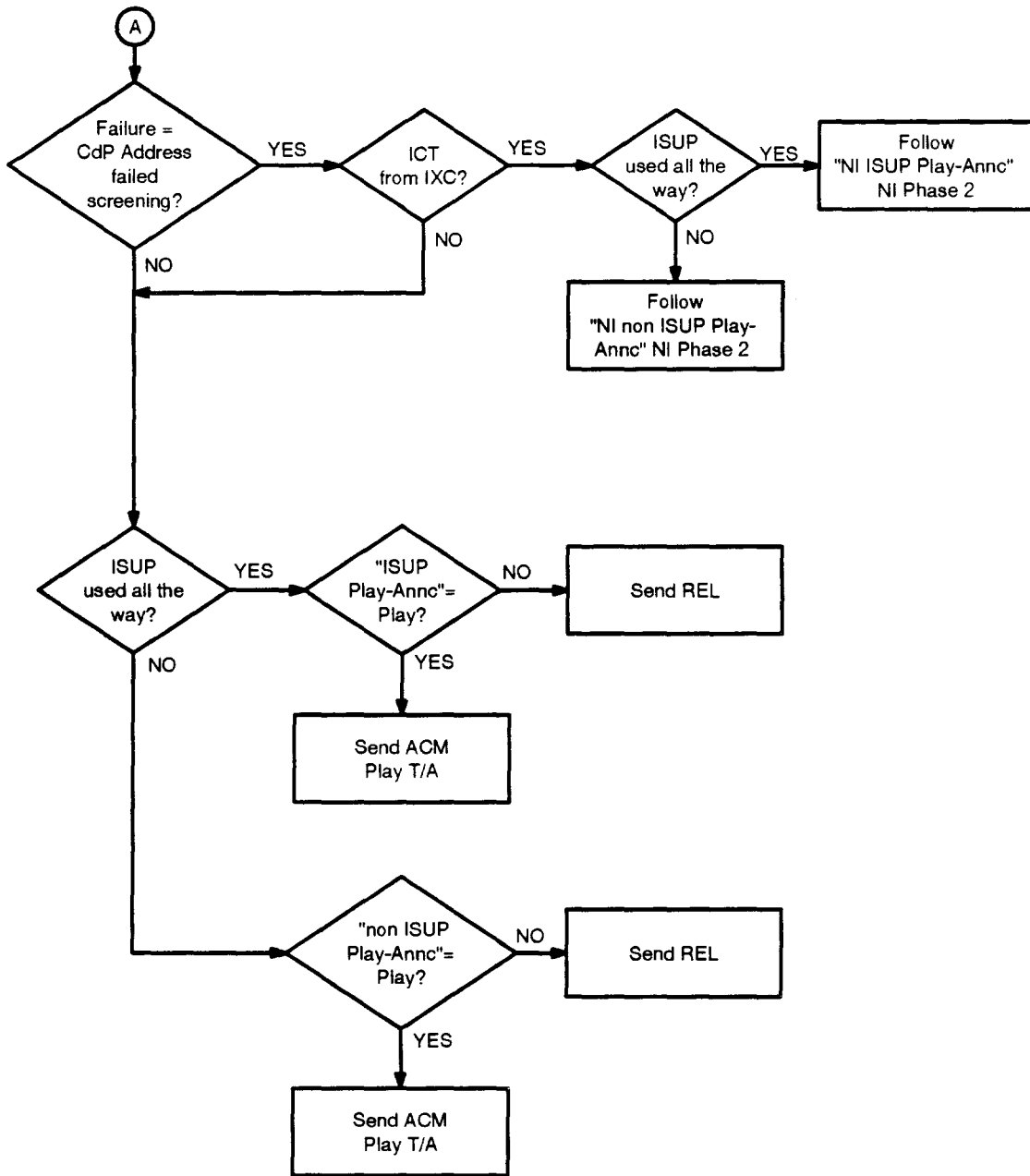


Figure 15-1. ISUP Incoming Trunk Clearing Function (Sheet 2 of 2)

## Detailed Call Flow Narrative

---

**2.03** Call failures are handled in the following order when providing a treatment on the ISUP incoming trunk. First, for a call failure on an unrestricted or restricted digital information call (that is, a data call), a Release message is returned on the incoming circuit.

Second, when a call failure occurs due to the switch receiving a Release message on an outgoing trunk, an incoming ISUP trunk sends a Release message. The exception to this is when an ACM has already been sent. In this case, a tone or announcement is played that corresponds to the cause value received in the Release message.

Third, if a specialized tone/announcement (for example, an emergency announcement) is to be provided for the call failure event, the tone or announcement must be played and the release cannot be sent.

Fourth, if the ISDN indicator in the Forward Call Indicator (FCI) parameter is "ISDN access", a Release message must be sent.

Fifth, if the failure is due to the called party address failing screening and the ICT is from an IXC (TOT = OCC), then the appropriate TSG bit, based on the ISUP indicator in the FCI parameter, is checked to determine whether to play an announcement or send a Release message. The definitions and rules for populating the TSG bits (BFTIS and BFTNI) are shown in the *Provisioning* section. The definitions and rules for populating office bits (OD4\_BFTNI and OD4\_BFTIS) are also shown in the *Provisioning* section.

Finally, for all other failures not covered above, the appropriate office bit, based on the ISUP indicator in the FCI parameter, is checked to determine whether to play an announcement or send a Release message.

**2.04** When sending a Release message for an incoming ISUP trunk, the cause and location value are taken from the cause received from the ISUP Release message or Q.931 Disconnect message received from the outgoing trunk. If the call failure was not due to receiving a Release or Disconnect message from the outgoing trunk, the cause value is based on the mappings in the section *Association of Cause Values With Tones or Announcements*. The location value is coded "local local network".

## Returning Inband Tones or Announcements

### *If the following conditions are present:*

- The exchange encounters failure of normal call setup after the receipt of the Initial Address Message (IAM) and before sending of the ACM
- The exchange determines that an inband tone or announcement is to be provided to the calling party from that exchange.

### *Then:*

The exchange returns an ACM for the incoming circuit and connects the incoming circuit to the appropriate tone or announcement based on the cause value and location associated with the failure.

### **A. Association of Cause Values With Tones or Announcements**

**2.05** Table 15-B shows the inband treatment for received cause values. The location is used to determine treatment only if cause is temporary failure.

**Table 15-B. Mapping of Cause Values to Tones or Announcements**

<b>Received Cause Value</b>	<b>Inband Treatment</b>
No user responding (18)	Send audible ringing
Call rejected (21)	Send audible ringing
Temporary failure (41), location "user"	Send busy tone
Temporary failure (41), location not "user"	Send reorder tone
Other causes	Mapped to announcements as in previous generics

**2.06** In certain situations, a failure condition is mapped directly into an announcement.

Some special tones and announcements do not have a cause value associated with them and, as a result, for voice calls the tone or announcement is always played at the exchange where the failure occurs. For data calls, a release is always sent with the cause value coded "temporary failure (41)". These special tones and announcements are as follows:

- Misrouted Centralized Automatic Message Accounting (CAMA) announcement
- No wink from carrier announcement
- No circuit to carrier announcement
- Audible ringing
- Out of band announcement
- Network call denial announcement
- All international announcements
- Special announcements
- All emergency announcements.

For other tones and announcements Table 15-C shows the associated cause value for each tone or announcement.

**Table 15-C. Mapping of Tones or Announcement to Cause**

<b>Tone or Announcement</b>	<b>Cause Value</b>
No circuit available	No circuit available (34)
Vacant code announcement	No route to destination (3)
Busy tone	User busy (17)
Reorder tone	Temporary failure (41)
Reorder announcement	Temporary failure (41)
No circuit to carrier	No circuit available (34)

## **B. Coding of Address Complete Message**

**2.07** If an exchange (1) encounters failure of normal call setup after the receipt of the IAM and before sending of the ACM and, (2) determines that an inband tone or announcement is to be provided to the calling party from that exchange, then an ACM is returned for the incoming circuit. The coding of the ACM returned is determined by (1) the selection of tone or announcement by the exchange, (2) the type of originating access (ISDN or non-ISDN), and (3) the cause value associated with the call failure event.

### C. Providing Tone or Announcement from the Exchange Encountering Failure

**2.08** If the inband tone or announcement is to be provided by the exchange encountering the call setup failure, the exchange returns an ACM for the incoming circuit and then connects the incoming circuit to an appropriate tone or announcement. The ACM returned contains the Backward Call Indicators (BCI) parameter. In addition, the Optional Backward Call Indicator (OBCI) parameter is included in the ACM if the originating access is ISDN. OBCI is hard-coded to indicate that inband information is available. The cause indicator parameter is included if the originating access is ISDN, and the cause associated with the failure event is available at that exchange. If the cause associated with the failure event is not available, the cause indicator parameter is not included.

### Mapping of Cause Values at Any Tandem Exchange

**2.09** If the cause indicator parameter is received in a CCS7 message at a tandem exchange, the cause value and location are passed as is to the preceding/succeeding exchange in the cause indicator parameter except in the following conditions:

- Location coded "local private network (0001)" is changed to location coded "remote private network (0101)" if the associated circuit is directly joined to an IXC (TOT = OCC).
- Location coded "local local network (0010)" is changed to location coded "remote local network (0100)" if the associated circuit is directly joined to an IXC (TOT = OCC).
- Location coded "local interface controlled by this link (0110)" is changed to location coded "transit network (0011)" if the associated circuit is directly joined to an IXC (TOT = OCC).
- Location received with "spare" encodings are mapped to location coded "unknown (1010)" if the associated circuit is directly joined to an IXC (TOT = OCC).
- Location coded "local interface controlled by this link (0110)" is changed to location coded "local local network (0010)" if the associated circuit is **not** directly joined to an IXC (TOT = ETC).
- Cause values received in the protocol error (class 110), other than the unexpected #102 ("recovery from timer expiry") and "resource unavailable - unspecified (47)", should be changed to "temporary failure (41)".

If the cause value #102 is received, the cause value should be passed as is.

### **3. Provisioning**

---

**3.01** There are two recent changeable Backward Failure Treatment (BFT) indicators per office used to indicate whether to play an announcement or send a Release message. The first indicator, OD4\_BFTIS, applies when the ISUP indicator in the FCI parameter is set to "ISUP used all the way (1)". The second indicator, OD4\_BFTNI, applies for "ISUP not used all the way (0)". The default setting for OD4\_BFTIS is "send a release (0)". The default setting for OD4\_BFTNI is "play a tone or announcement (0)". These indicators can be populated using the 406Z ODA form.

**3.02** There are two existing Trunk Sub-Group (TSG) Backward Failure Treatment bits that indicate whether to play an announcement or send a Release message. These bits can be populated on Recent Change Forms 100, 101, 102, 107, 108, and 109. The field BFTIS is used when ISUP is used all the way, and BFTNI is used when ISUP is not used all the way. These fields can be populated for ISUP trunks. They can contain blank, ANN, or REL. ANN indicates "play an announcement", and REL indicates "send a Release message" for call failures encountered on these trunks. If BFTIS is left blank, it will get the "send Release message" treatment. If BFTNI is left blank it will get the "play announcement" treatment.

### **4. Recording (Does not apply)**

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### **5. Network Management (Does not apply)**

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### **6. Maintenance/Troubleshooting**

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**6.01** The suggested treatments for various unsuccessful call setup conditions are discussed in the section *Call Flow*.

### **7. Transition Considerations (Does not apply)**

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### **8. Input/Output Manual Pages (Does not apply)**

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## Passing Unrecognized Parameters Feature (#920)

# 16

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## Passing Unrecognized Parameters Feature (#920)

# 16

---

### 1. Feature Description

- 1.01** When unrecognized parameters are received at a tandem exchange, it is required that the tandem exchange pass these parameters without any modifications. At the terminating exchange, the unrecognized parameters can then be discarded or treated as some default value. The passing of unrecognized parameters and parameter values is dependent upon the ability of the tandem exchange to continue to route the call.
- 1.02** A recognized parameter is any parameter within a recognized message used by the exchange. An unrecognized parameter is any parameter within a recognized message not used by the exchange. An unrecognized parameter value means a value within a recognized parameter which the exchange has not already implemented.
- 1.03** This feature describes how Bellcore requirements are complied with by passing without any modifications the unrecognized parameters received.

## **2. Call Flow**

---

### **Call Flow Key Points**

---

- 2.01** The unrecognized parameter feature provides the following:
- The ability to pass unrecognized optional parameters within recognized messages at a tandem exchange
  - The ability to pass unrecognized values of recognized parameter fields within recognized messages at the tandem exchange .
  - Rules for the discarding of unrecognized information, and its precedence relationship with the User-to-User Information (UUI) and Access Transport Parameters (ATPs)
  - The passing of Redirection Information (RI) and Redirecting Number (RgN) without causing UUI and ATP to be discarded
  - The RI, RgN, and Original Called Number (OCN) are treated as unrecognized parameters for the Local Exchange Carrier (LEC) tandem 4 ESS™ switch.

### **Unrecognized Parameter Values**

---

- 2.02** Some of the unrecognized parameter values, when received by a tandem exchange, can be interpreted in a reasonable way. The default handling procedures for these unrecognized parameter values are based on the information in Table 16-A.

**Table 16-A. Unrecognized Parameter Value Interpretation**

<b>Field Name</b>	<b>Unrecognized Parameter Value</b>	<b>Default Interpretation</b>
Automatic Congestion Level	00000011-11111111	No congestion control requested
Calling Party Category	00000000-00001001, 00001011, 00001110-11111100, 11111010-11111111	Handle as an ordinary calling subscriber. Call "00001010"
Circuit group blocking type Indicator in the Circuit Group Supervision Message Type Indicator Parameter	10-11	No immediate release (maintenance)
Continuity check indicator in the Nature of Connection Indicator Parameter	11	Continuity check not required
Address signal called (any field)	In the called party number parameter	Release the call
User service information (any field)		Release the call
Circuit state indicator	00000001-00000010 00010000-11111111	Alert maintenance system or personnel

### **Rules For Unrecognized Optional Parameters**

**2.03** If unrecognized optional parameters are received at a tandem exchange within the Initial Address Message (IAM), Address Complete Message (ACM), Answer Message (ANM), Call Progress Message (CPG), Release Message (REL), Information Request Message (INR), and Information Message (INF), the parameters are passed without any modification to the succeeding or preceding exchange.

**2.04** If all of the unrecognized parameters cannot be passed because the total message size exceeds 272 bytes, some of the unrecognized parameters may be dropped. If any unrecognized optional parameters need to be dropped, the parameter received last in the message is dropped first. If, after dropping the last unrecognized parameter, all of the remaining unrecognized parameters still cannot be passed, the last one received (within the ones remaining) is dropped. This procedure should be repeated until all of the remaining unrecognized optional parameters can be passed.

**2.05** The discarding of unrecognized optional parameters does not affect normal call processing (the call proceeds). If any parameter needs to be dropped, the parameter name, the parameter length indicator, and the parameter value are all dropped simultaneously. A parameter is never shortened to accommodate a fixed size limit.

### **3. Provisioning**

---

#### **Translation Structures**

---

##### **A. New Office Data Assembler (ODA) Tables**

**3.01** As a part of the Unrecognized Parameters Feature, two new Office Data Assembler (ODA) tables have been developed to indicate how to handle optional parameters in the IAM, ACM, ANM, CPG, BRL, and FRL messages. See Figure 16-1. ODA tables give customers some degree of freedom and control over handling optional parameters. These tables indicate for each parameter whether the parameter should be processed at this switch, dropped at this switch, or passed to the next switch.

**3.02** Table OD4NIIPARM is used at Network Interconnect (NI) boundaries for Other Carrier Connecting (OCC) type of trunks. Table OD4ANIPARM is used for intranetwork calls and for End Office or Tandem Connecting (ETC) type of trunks. In each section of these tables, there is a column for each of the ISDN User Part (ISUP) messages. There are separate columns for the forward and backward release messages since the optional parameters are handled differently depending on the directionality of the release message. The tables are indexed by the optional parameter identification in the ISUP message.

**3.03** Initially, the tables are built by ODA with default values and are then copied across office retrofits using the D7 form. The tables control the meaning of the parameters as the parameters are received at the 4 ESS™ switch. Default values implement the different requirements for screening, handling, or passing parameters in the LEC offices. Tables 16-B through 16-G summarize the default handling for various messages. The "Drop" value indicates the parameter will be ignored and not passed when it is received. The "Pass" value passes parameters blindly without any attempt to interpret the contents of the parameter. The "Normal" value indicates the parameter is processed. Therefore, if the software knows about the parameter it will handle it; otherwise, the parameter is dropped.

**3.04** The referencing of the ODA table applies only to parameters not required to route the call or provide a specific service.

**OD4ANIPARM (INTRA-NETWORK)**

INDEX BY  
PARAMETER  
ID  
↓

											IAM	ACM	ANM	CPG	BRL	FRL								
0											X	X												
255																								
	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1							
	3	2	1	0	9	8	7	6	5	4	3	2	1	0	9	8	7	6	5	4	3	2	1	0

XX  
00 : NORMAL  
01 : PASS  
10 : DROP  
11 : UNUSED

**OD4NIIPARM (NETWORK-INTERCONNECT)**

INDEX BY  
PARAMETER  
ID  
↓

											IAM	ACM	ANM	CPG	BRL	FRL								
0											X	X												
255																								
	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1							
	3	2	1	0	9	8	7	6	5	4	3	2	1	0	9	8	7	6	5	4	3	2	1	0

XX  
00 : NORMAL  
01 : PASS  
10 : DROP  
11 : UNUSED

IAM = INITIAL ADDRESS MESSAGE                      CPG = CALL PROGRESS MESSAGE  
 ACM = ADDRESS COMPLETE MESSAGE                  BRL = BACKWARD RELEASE MESSAGE  
 ANM = ANSWER MESSAGE                              FRL = FORWARD RELEASE MESSAGE

COLUMNS ARE PREFIXED WITH OD4NILEC.

STATE ASSIGNMENT VALUES: 40DIPNORM = 0, ISUP PARAMETER NORMAL  
 40DIPPASS = 1, ISUP PARAMETER PASS  
 40DIPDROP = 2, ISUP PARAMETER DROP

**Figure 16-1. Office Data Assembler Optional Parameter Tables**

**B. New ODA Bits**

**3.05** A new ODA bit, OD4\_DROPATP, controls and indicates the order in which ATP and unrecognized parameters are dropped. In the LEC network, UUI is always dropped first followed by ATP and then unrecognized parameters. The software checks this ODA bit to determine the ordering of the optional parameters when the ISUP message is built. OD4\_DROPATP set to 1 indicates that ATP should be dropped before unrecognized parameters and, therefore, should be placed after unrecognized parameters in the message. OD4\_DROPATP set to 0 indicates that unrecognized parameters should be dropped before ATP and should be placed after ATP in the message. For LEC switches, the default for OD4\_DROPATP should be 1.

**3.06** There are several new ODA bits that indicate whether a Call Register (CR) Annex can be released at different points in the call flow. The CR annex is used to store UUI, ATP, and unrecognized parameters received in an IAM. These bits exist because with the memory limitations of the 1A processor and the increase in the size of the CR Annex, there is the possibility that large offices may not be able to have as many CR Annexes as needed. If existing CR Annex occupancy counts indicate the office is running low on CR Annexes and the office cannot allocate more CR Annexes, then one or more of these ODA bits can be set to release the CR Annexes sooner. The following ODA bits are defined:

- OD4\_SSP\_RCX = Release the CR Annex if a Service Switching Point (SSP) query is going to be performed.
- OD4\_SDN\_RCX = Release the CR Annex if a Software Defined Network (SDN) query is going to be performed.
- OD4\_IAM\_RCX = Release the CR Annex after an IAM is sent. CR Annex information is not available if the call is retried.

**3.07** These bits are in ODA Form 406z. The default for these bits is zero.

**Table 16-B. Initial Address Message Default Handling**

<b>Index</b>	<b>Parameter ID</b>	<b>AN*</b>	<b>NI**</b>
0	4c7_end_opt_parms	Normal	Normal
3	4c7_access_transport	Normal	Normal
8	4c7_opt_fci	Pass	Pass
10	4c7_calling_address	Normal	Normal
11	4c7_redir_number	Pass	Pass
13	4c7_conn_request	Pass	Pass
26	4c7_cug_interlock	Pass	Pass
29	4c7_bearer_cap	Normal	Normal
32	4c7_uui	Normal	Normal
35	4c7_trans_net	Normal	Normal
192	4c7_gap	Normal	Normal
193	4c7_generic_digits	Pass	Pass
194	4c7_op_sys_ind	Pass	Pass
227	4c7_transaction_req	Pass	Pass
234	4c7_orig_line	Normal	Normal
235	4c7_charge_number	Normal	Normal
238	4c7_carrier_selection	Normal	Normal
250	4c7_route_info	Normal	Normal
All Others		Pass	Pass

\* Intra-Network Table

\*\* Network-Interconnect Table

**Table 16-C. Address Complete Message Default Handling**

Index	Parameter ID	AN*	NI**
0	4c7_end_opt_parms	Normal	Normal
3	4c7_access_transport	Normal	Normal
18	4c7_cause_ind	Normal	Normal
32	4c7_uui	Normal	Normal
39	4c7_acl	Pass	Pass
41	4c7_obci	Normal	Normal
42	4c7_uup	Normal	Normal
All Others		Pass	Pass

\* Intra-Network Table

\*\* Network-Interconnect Table

**Table 16-D. Answer Message Default Handling**

Index	Parameter ID	AN*	NI**
0	4c7_end_opt_parms	Normal	Normal
3	4c7_access_transport	Normal	Normal
17	4c7_bwd_call_ind	Normal	Normal
32	4c7_uui	Normal	Normal
33	4c7_conn_num	Normal	Normal
42	4c7_uup	Normal	Normal
All Others		Pass	Pass

\* Intra-Network Table

\*\* Network-Interconnect Table

**Table 16-E. Call Progress Message Default Handling**

Index	Parameter ID	AN*	NI**
0	4c7_end_opt_parms	Normal	Normal
3	4c7_access_transport	Normal	Normal
17	4c7_cause_bwd_call_ind	Normal	Normal
18	4c7_cause_ind	Normal	Normal
32	4c7_uui	Normal	Normal
41	4c7_obci	Normal	Normal
42	4c7_uup	Normal	Normal
All Others		Pass	Pass

\* Intra-Network Table

\*\* Network-Interconnect Table

**Table 16-F. Backward Release Message**

Index	Parameter ID	AN*	NI**
0	4c7_end_opt_parms	Normal	Normal
3	4c7_access_transport	Normal	Normal
32	4c7_uui	Normal	Normal
39	4c7_aci	Normal	Normal
All Others		Pass	Pass

\* Intra-Network Table

\*\* Network-Interconnect Table

**Table 16-G. Forward Release Message**

Index	Parameter ID	AN*	NI**
0	4c7_end_opt_parms	Normal	Normal
3	4c7_access_transport	Normal	Normal
32	4c7_uui	Normal	Normal
39	4c7_acl	Drop	Drop
All Others		Pass	Pass

\* Intra-Network Table

\*\* Network-Interconnect Table

### Rules For Dropping Parameters

**3.08** The Local Exchange Carrier (LEC) Passing of Unrecognized Parameter Values and Unrecognized Parameters Feature has interactions with Q.931 Information Transport Capability and the User-to-User Signaling Service 1. The interactions of these features relate to the order in which parameters are dropped if a message exceeds the 272 byte maximum message length limit. If the total ISUP message including UUI, ATP, and unrecognized optional parameters is greater than 272 bytes (including the 7 bytes Routing Label) then parameters are dropped until the message size is 272 bytes or less. The order in which the parameters are dropped is as follows:

- (1) UUI
- (2) ATP
- (3) Unrecognized Optional Parameters.

In each of these cases, the parameter is dropped without affecting call processing, and no notification is sent back to the sender of the parameter that is dropped.

#### **4. Recording (Does not apply)**

#### **5. Network Management (Does not apply)**

#### **6. Maintenance/Troubleshooting**

##### **Methods to Conserve Memory Resources**

**6.01** Because of the memory limitations of the 1A processor and the increase in the size of the CR Annex, there is a possibility that large offices may not be able to have as many CR Annexes as needed. To deal with this situation, new ODA bits are defined to indicate if the CR Annex should be released earlier at different points in the call flow. Existing CR Annex occupancy counts on the Machine Load and Service Summary (MLSS) report should be used to determine if an office is running low on CR Annexes. Figure 16-2 shows an example of a Machine Load and Service Summary report. If this report shows that the office is running low on CR annexes, and if the office cannot allocate more CR Annexes, then one or more of these ODA bits can be set to release the CR Annex sooner. These bits are defined in the section *Translation Structures*.

#### **7. Transition Considerations (Does not apply)**

#### **8. Input/Output Manual Pages (Does not apply)**

M 17 REPORT:MACHINE LOAD AND SERVICE SUMMARY MLSS OFFICE:DELTA LAB  
 RPERIOD:0900-1000 PAGE 3 OF 5 DATE:06/05/90

REGISTERS + Q

LINE	ITEM	INS	CCSCAP *	CCS *	COUNT	%OCC	% *	HT
5	CALL REG	1500	48272 *	10331 *	153260	21.4	*	6.74
10	CALL REG ANX	100	3600	0	1	0.0		0.00
15	QOB REG	25	900	0	0	0.0		0.00
20	SVA REG	128	4608	120	0	2.6		4210752.421
25	MF							
30	DP							
35	DTMF							
40	Q931							
45	ISUP							
50	TUP							
55	INUP							
60	CCIS							
65	CCITT 5							
70	CCITT 6							
75	MISC CR							

CALL REGISTER  
ANNEX OCCUPANCY COUNTS

0752

CALL REGISTER Q

80	MF ORIG			0.0	16282			0.0
85	DP	64	2304	0.0	0	0.0		0.0
90	DTS			0.0	0			0.0
95	Q931			0.0	0			0.0
100	ISUP			0.0	0			0.0
105	TUP	8	288	0.0	0	0.0		0.0
110	INUP	0	0	0.0	0	0.0		0.0
115	CCIS	16	576	0.0	0	0.0		0.0
120	CCITT5			0.0	0			0.0
125	CCITT6	8	288	0.0	0	0.0		0.0

CALL REGISTER Q / MF RCVR-BBF / OVERFLOWS

130	DP CR Q				0		0.0
135	DTS CR Q				0		0.0
140	Q931 CR Q				0		0.0
145	ISUP CR Q				0		0.0
150	TUP CR Q				0		0.0
155	INUP CR Q				0		0.0
160	CCIS CR Q				0		0.0
165	CCITT6 CR Q				0		0.0
170	MF RCVR BBF				0		0.0

06/05/90 14:17:32  
#739

Figure 16-2. Machine Load and Service Summary Report Example

**Q.931 Information Elements  
Transport Feature (#921)**

**17**

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## Q.931 Information Elements Transport Feature (#921)

# 17

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### 1. Feature Description

**1.01** This feature allows Integrated Services Digital Network (ISDN) users to exchange user data through call control messages during call setup and call clearing. Procedures required at an Access Tandem switch to support passing user data comply with Bellcore TR-444, Issue 1.

### 2. Call Flow

#### Call Flow Key Points

- 2.01** The Q.931 Information Elements Transport Feature provides the following:
- Limits the maximum size of the Access Transport Parameter (ATP) to 129 octets (not including the parameter identifier and length indicator)
  - Limits the size of the User-to-User Information (UUI) parameter to 129 octets (not including the parameter identifier and the length indicator)
  - Decouples the ATP and UUI parameter and does not perform a combined length check
  - Does not generate a Facility Reject Message when the ATP or UUI parameter is discarded
  - Discards a Facility Reject Message if received
  - Passes ATP and UUI parameter in all Release messages received.

## **Call Flow Narrative**

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**2.02** The Access Tandem switch is allowed to see User-to-User Information (UUI) and Access Transport Parameter (ATP) in several messages. These messages are Initial Address Message, Answer Message, Address Complete Message, Call Progress Message, and Release Message. The two parameters, UUI and ATP, can be forwarded from an End Office and then passed to an Interexchange Carrier, or they can be passed within the Local Access Transport Area. The parameters can also be forwarded from an Interexchange Carrier and then passed to an End Office.

**2.03** When the Access Tandem switch receives the ATP and/or the UUI parameter in any of these messages, it recodes the parameters in the subsequent outgoing message to represent the exact value that was received. The maximum size of each recoded parameter is 129 octets. A combined length check is not performed on the ATP and UUI parameter. Procedures described in the *Data Relationships* section determine whether the ATP and UUI parameter are dropped because of insufficient room in the outgoing message.

**2.04** ISDN User Part (ISUP) is required to pass the ATP and the UUI parameter in failure Release messages for both the Local Exchange Carrier and AT&T. There are two cases where setup Release messages are used to pass the ATP and UUI parameter: (1) setup Release messages received on Outgoing Trunk and, (2) setup Release messages received on Incoming Trunk. If the network interconnecting screening rules are met, the ATP and/or UUI parameter received are passed through the switch. The ATP and UUI parameter are passed in all backward "call failure" Release messages.

**2.05** If either the ATP or UUI parameter is dropped for any reason, notification of the drop is not provided with the Facility Reject Message.

## **Data Relationships**

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**2.06** If the total size of an ISUP message to be sent to preceding or succeeding exchanges, including ATP, UUI and unrecognized optional parameters, is greater than 272 bytes (including the 7 bytes Routing Label), the UUI parameter is discarded without affecting normal call processing. The call proceeds as if no UUI has been discarded, and no notification is sent back to the sender of the UUI being dropped.

**2.07** At the Local Exchange Carriers (LECs), the order for dropping parameters is described as follows. If, after dropping the UUI parameter, the message size is still greater than 272 bytes, the ATP is dropped without affecting normal call processing. The call proceeds as if no ATP has been discarded, and no notification is returned to the sender of the ATP. If, after dropping the ATP, the message is still greater than 272 bytes, the unrecognized optional parameters may be dropped until the message size drops to 272 bytes. These parameters may be dropped without affecting normal call processing. The call proceeds as if no unrecognized parameters have been discarded, and no notification is returned to the sender of the unrecognized optional parameters being dropped.

**2.08** At AT&T, the order for dropping parameters is described as follows. If, after dropping the UUI parameter, the message size is still greater than 272 bytes, the unrecognized parameters are dropped without affecting normal call processing. The call proceeds as if no unrecognized parameter has been discarded, and no notification is returned to the sender of the unrecognized parameter. If, after dropping the unrecognized parameter, the message is still greater than 272 bytes, the ATPs may be dropped until the message size drops to 272 bytes. These parameters may be dropped without affecting normal call processing. The call proceeds as if no ATPs have been discarded, and no notification is returned to the sender of the parameters being dropped.

### **3. Provisioning (Does not apply)**

### **4. Recording (Does not apply)**

### **5. Network Management (Does not apply)**

**6. Maintenance/Troubleshooting  
(Does not apply)**

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**7. Transition Considerations (Does  
not apply)**

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**8. Input/Output Manual Pages (Does  
not apply)**

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**Disciplined Rubidium Oscillator  
(DRO) Feature (#060)**

# 18

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## Disciplined Rubidium Oscillator (DRO) Feature (#060)

# 18

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### 1. Feature Description

- 1.01** This feature introduces the Disciplined Rubidium Oscillator (DRO) as a replacement for the current 4 ESS™ switch 39B oscillator.
- 1.02** The DRO uses state-of-the-art technology which is expected to improve network synchronization performance. DRO's expected performance is contrasted below with 39B oscillator problems:
- Worst case off-frequency performance is projected to be approximately 14 slips in 24 hours. The 39B oscillator can induce approximately 288 slips in 24 hours (worst case).
  - The DRO drift rate over two months is less than the 39B oscillator drift in one day.
- 1.03** The only significant change to the 4 ESS switch with the introduction of the DRO is the need for a new Network Clock Synchronization Unit (NCSU) microprocessor control board. This board will support the DRO and is not compatible with 39B oscillators.

### 2. Call Flow (Does not apply)

**3. Provisioning (Does not apply)**

**4. Recording (Does not apply)**

**5. Network Management (Does not apply)**

**6. Maintenance**

**6.01** DRO maintenance will be included in the Network Clock Frame Task Oriented Practice (TOP) document 234-151-013, Issue 7. The 4 ESS switch Maintenance Reference Handbook 234-010-107, Issue 7 also includes DRO information.

**7. Transition Considerations**

**7.01** TOP document 234-153-050, Issue 6 contains DRO growth procedures.

**8. Input/Output Manual Pages (Does not apply)**

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**Discontinue Generation of Short  
Supervisory Transition (SST)  
Automatic Message Accounting  
(AMA) Records Feature (#087)**

# 19

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# Discontinue Generation of Short Supervisory Transition (SST) Automatic Message Accounting (AMA) Records Feature (#087)

# 19

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## 1. Feature Description

**1.01** In addition to normal Automatic Message Accounting (AMA) records, Short Supervisory Transition (SST) AMA records (call code 034) are also generated if an intermittent on-hook to off-hook condition exists during a call. A record is produced for each on-hook to off-hook transition that lasts for more than 100 milliseconds and less than 2 seconds if the transition occurs before the the call reaches Minimum Chargeable Duration (MCD). If multiple SST events occur before reaching MCD, only the first 16 events will generate SST records.

**1.02** Originally, it was thought that these SST records could be used to identify attempts at network fraud. As it turned out, however, SSTs are more commonly generated as a result of malfunctioning network or customer equipment. The SSTs themselves are of little or no value in correcting these malfunctions.

**1.03** At the present time, no operations centers or systems are using the SST records. Since the SST AMA records are not being used, the generation of these records is being discontinued by this feature to avoid wasting network and billing system resources.

## **2. Call Flow (Does not apply)**

## **3. Provisioning (Does not apply)**

## **4. Recording**

### **AMA Record Information**

- 4.01 Since the network is no longer generating SST AMA records, call code 034 will be eliminated.
- 4.02 Table 7 of the standard AMA record generated at call termination will continue to record the previous occurrence of one or more SST events on a call.

## **5. Network Management (Does not apply)**

## **6. Maintenance/Troubleshooting**

### **Measurements**

- 6.01 Since SST records are being eliminated, counts will no longer be made.

## **7. Transition Considerations**

### **Dependencies on Other Network Components**

**7.01** AMA records are recorded and categorized by downstream billing systems. The elimination of SST recording may have an impact on the processing performed by these systems.

### **Turn On/Turn Off Mechanism**

**7.02** This feature is automatically turned on by software deployment.

## **8. Input/Output Manual Pages (Does not apply)**

**CCITT Message Transfer Part  
(MTP) Emergency Alignment  
Feature (#184)**

# 20

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# CCITT Message Transfer Part (MTP) Emergency Alignment Feature (#184)

# 20

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## 1. Feature Description

**1.01** The International Telephone and Telegraph Consultative Committee (CCITT) Message Transfer Part (MTP) Emergency Alignment feature reduces the signaling link set unavailable time on the Local Exchange Company (LEC) 4 ESS switch, when the switch is required to re-establish signaling capability quickly under a Signaling Point Isolation (SPI) condition. An SPI is a pair of adjacent signaling points where there are no available routes between them. The SPI condition occurs when two directly connected signaling points lose contact with each other and there are no alternate paths to reroute traffic destined for either of these points.

**1.02** This feature provides faster signaling link restoration in the event of SPI. The Link Set Emergency Restart is a Message Transfer Part (MTP) level 3 procedure in the 4 ESS switch/International Switching Center (ISC).

**1.03** In the Common Network Interface (CNI) system, an emergency situation such as an SPI is detectable by the MTP level 3 procedure when there are no available routes between a given pair of directly connected signaling points. The MTP level 3 procedure does not appropriately notify the MTP level 2 during an emergency situation resulting in longer signaling down time. This feature provides an emergency signaling convey channel for the Common Network Interface (CNI) system to initiate and activate the necessary procedures at different MTP levels to re-establish signaling capability quickly when emergencies occur.

**Link Set Emergency Restart Conditions**

**1.04** Link Set Emergency Restart procedures are initiated under the following conditions:

- (a) The 4 ESS switch must initiate the Link Set Emergency Restart on all link sets connected to an adjacent point when a link or link set failure occurs that causes SPI between a 4 ESS switch and one of its adjacent signaling points.
- (b) The 4 ESS switch must initiate the Link Set Emergency Restart on all link sets connected to an adjacent point when the 4 ESS switch receives a Transfer Prohibited (TFP) message with respect to an adjacent signaling point that causes SPI. Figure 20-1 shows the functional flow of these two conditions.

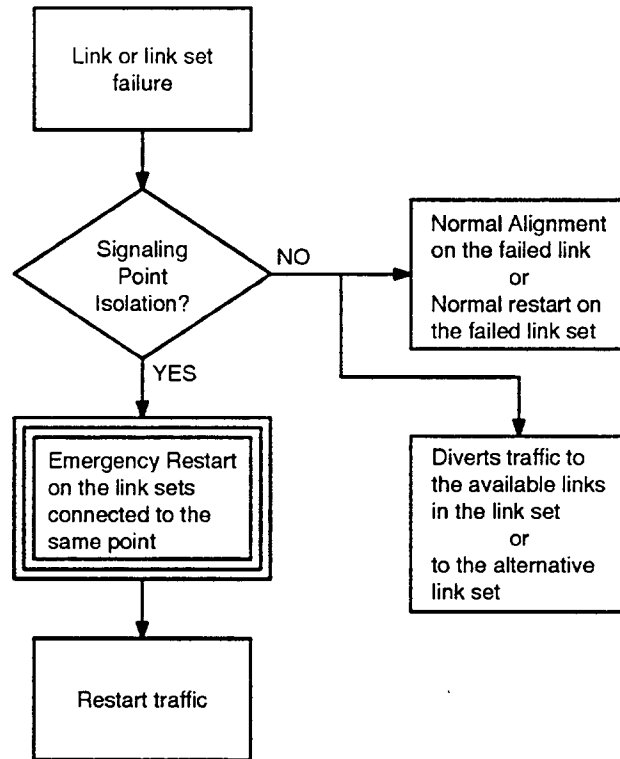


Figure 20-1. Link Set Emergency Restart (Sheet 1 of 2)

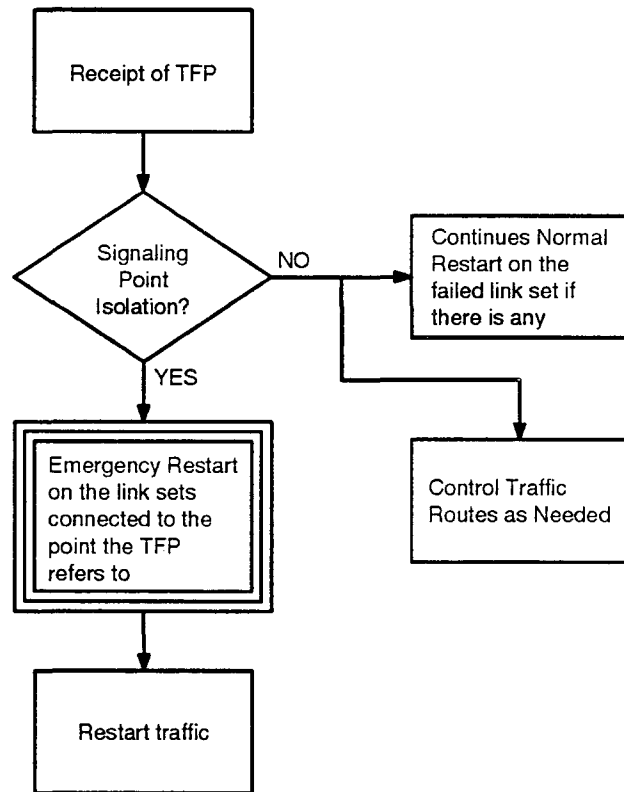


Figure 20-1. Link Set Emergency Restart (Sheet 2 of 2)

### Link Set Emergency Restart Initiation and Procedure

**1.05** When the Signaling Link Management (SLM) in the CNI detects that a link or a link set can no longer carry the traffic due to reasons such as link failed, link blocked, etc., it reports to both the Signaling Traffic Management (STM) and the Management System (MGMT) in MTP level 3. The link is then marked unavailable. If this event causes the count of available links in that link set to become zero and no alternate routes to the adjacent signaling point which the failed link connected to are available (Condition 1), the process control must be transferred from Link Availability Control (TLAC) to the Signaling Routing Control (TSRC) in the STM. The TSRC then sends an emergency indication to the Link Set Control (LLSC) in the SLM.

**1.06** If the receipt of a TFP message causes SPI (Condition 2), the STM/MGMT recognizes the existence of the urgency and notifies the TSRC to send an emergency indication to the LLSC in the SLM.

1.07 Upon receipt of the emergency indication from STM, the SLM must transfer process control from LLSC to the Signaling Link Activity Control (LSAC). The LSAC must initiate the Link Set Emergency Restart procedure by sending an emergency restart indication to the Link State Control (LSC) at MTP level 2 on as many links as possible.

1.08 Upon receipt of the emergency restart indication in MTP level 2, the LSC must transfer process control to the Initial Alignment Control (IAC). The process control switch and emergency set within and between MTP levels are shown in Figure 20-2.

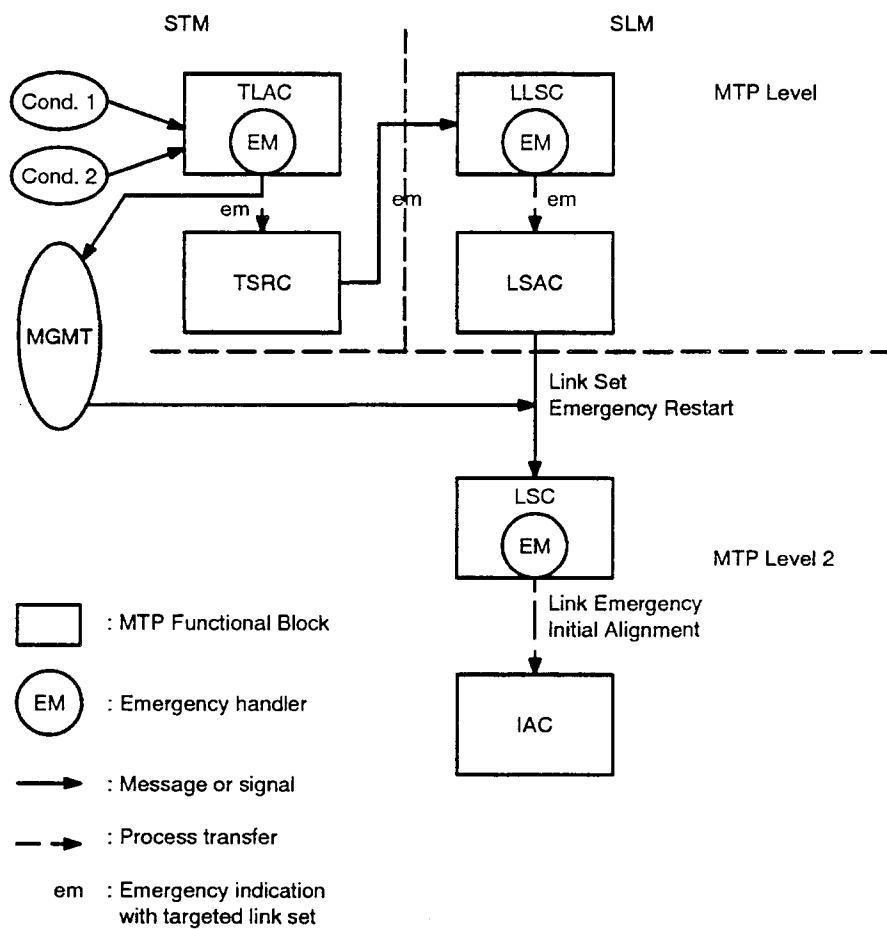


Figure 20-2. Process Control and Emergency Set

### Switch-Over from Normal to Emergency

**1.09** To initiate the link emergency initial alignment during switch-over, the IAC must continue the current procedure but change the alignment mode to emergency on the concerned link. The IAC must also change the T4 timer value and the Alignment Error Rate Monitor (AERM) threshold. The IAC must remain in its current state at the beginning of switch-over as follows:

- (a) If the IAC is currently in the "idle" state, it starts sending Status Indication "Out of alignment" (SIO) messages until the next SIO is received from the far end, then it starts sending Status Indication "Errors" (SIEs).
- (b) If the IAC is currently in the "not aligned" state, it waits for the arrival of the next SIO, then it starts sending SIEs.
- (c) If the IAC is currently in the "aligned" state, it starts sending SIEs.

**1.10** Upon receipt of the next Status Indication "Normal alignment" (SIN) or SIE, the IAC starts the emergency proving procedure with a new T4 and AERM values to shorten the proving period. If the IAC is currently in the "proving" state, it continues the proving procedure with respect to the new T4 value and AERM threshold as follows:

- (a) Restarts T4 timer with short (emergency) value
- (b) Sends SIEs continuously
- (c) Executes proving procedures in accordance with emergency AERM threshold.

### Link Set Emergency Restart Cease

**1.11** The termination of an emergency is determined when the above conditions no longer exist. The channel that provides emergency signals and the responding commands should be used for notifying MTP level 2 of normal conditions resuming.

**1.12** If the emergency is set and cleared between the initialization and completion of the link emergency alignment, the system must apply the normal initial alignment procedure unless it receives SIE from the far end.

**2. Call Flow (Does not apply)**

**3. Provisioning (Does not apply)**

**4. Recording (Does not apply)**

**5. Network Management (Does not apply)**

**6. Maintenance/Troubleshooting**

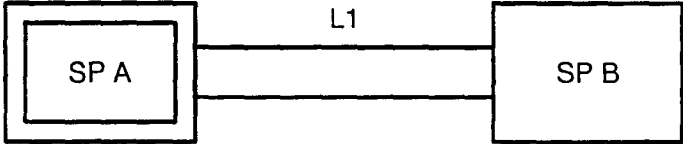
**Test Plan**

6.01 The test plan for this feature consists of two parts, the Basic and the Enhanced test specifications. The Basic test specifications are procedures that are recommended in the Blue Book Recommendation Q.780 series. The Enhanced test specifications are procedures identified by Systems Engineering which are not specified in the Blue Book. All Enhanced tests are performed in order to evaluate the robustness and backward compatibility of the feature. The SIO is responsible for executing these test specifications.

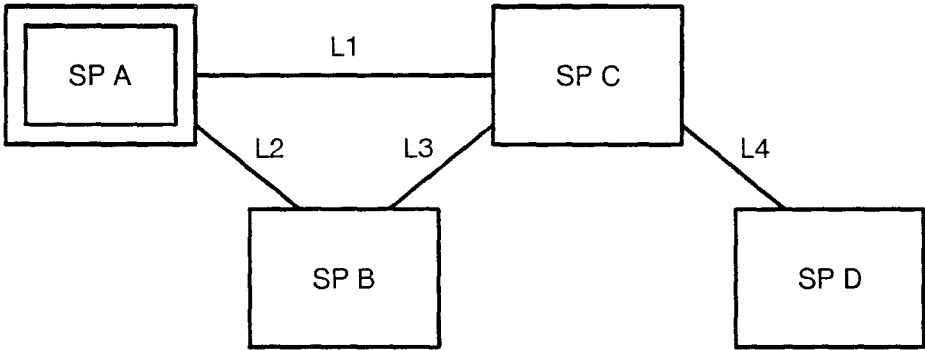
6.02 This set of tests assumes that the point under test is inserted in a test environment called "test configuration". A test configuration is defined as follows:

- (a) The set of points, linked between them by signaling link sets, real or simulated
- (b) The set of routing rules applied in point under test
- (c) The flow of test traffic generated and received by a set of means to run the described tests.

The set of enhanced tests requires two different configurations (A and B in Figure 20-3). For each test, the above three aspects (set of points, set of routing rules and test traffic flow) are precisely defined.



Configuration A



Configuration B

Figure 20-3. Test Configurations of MTP Level 3 Test (Sheet 1 of 4)

TEST NUMBER: E.1		PAGE: 1 of 1	
REFERENCE: Q.704 Sec. 12.2.4.1; FSD Sec. 1.1.1 ; Req. #2			
TITLE: Signaling link management			
SUBTITLE: Link set normal restart			
PURPOSE: To check continuity of link set normal restart upon receipt of TFP			
PRE-TEST CONDITIONS: All linksets and routes available			
CONFIGURATION: B	TYPE OF TEST: VAT	TYPE OF SP: ALL	
MESSAGE SEQUENCE:			
SP A Link	SP B Link	SP C Link	SP D Link
:Start traffic			
1 - 1	TRAFFIC	----->	4 - 1 ----->
1 - 1	: Deactivate (MML command or failure)		
2 - 1	TRAFFIC	----->	3 - 1 ----->
2 - 1	TRAFFIC	----->	3 - 1 ----->
			4 - 1 :Deactivate
			-----< 3 - 1 TFP, PC=D
			-----< 2 - 1
:Wait			
:Stop Traffic			
TEST DESCRIPTION			
1.	Start traffic to C and D.		
2.	Deactivate link 1 - 1 and check link set normal restart is initiated on link set 1.		
3.	Deactivate link 4 - 1 and check that a TFP concerning D is sent to A via B.		
4.	Stop traffic and check that traffic to C has not been disturbed.		
5.	Check link set normal restart on link set 1 is continued to its end.		

Figure 20-3. Test Configurations of MTP Level 3 Test (Sheet 2 of 4)

TEST NUMBER: E.2		PAGE: 1 of 1
REFERENCE: Q.704 Sec. 12.2.4.2; FSD Sec. 1.1.1; Req. #1		
TITLE: Signaling link management		
SUBTITLE: Link set emergency restart - Condition 1		
PURPOSE: To check initialization of link set emergency restart		
PRE-TEST CONDITIONS: Linkset 1 activated		
CONFIGURATION: A	TYPE OF TEST: VAT	TYPE OF SP: ALL
MESSAGE SEQUENCE:		
SP A		SP B
Link		Link
:Start traffic		
1 - 1 TRAFFIC		1 - 1
1 - 2 TRAFFIC		1 - 2
1 - 1 :Deactivate		
1 - 2 TRAFFIC		1 - 2
1 - 2 :Deactivate		
TEST DESCRIPTION		
1.	Start the traffic for all SLS.	
2.	Deactivate link 1 - 1.	
3.	Deactivate link 1 - 2 before link 1 - 1 returns to service	
4.	Check that the signaling linkset becomes unavailable and signaling point isolation is detected.	
5.	Check that emergency is set and the link set emergency restart is initiated.	

Figure 20-3. Test Configurations of MTP Level 3 Test (Sheet 3 of 4)

TEST NUMBER: E.3		PAGE: 1 of 1	
REFERENCE: Q.704 Sec. 12.2.4.1; FSD Sec. 1.1.1 ; Req. #2			
TITLE: Signaling link management			
SUBTITLE: Link set emergency restart - Condition 2			
PURPOSE: To check the initiating of link set emergency restart upon receipt of TFP			
PRE-TEST CONDITIONS: All linksets and routes available			
CONFIGURATION: B	TYPE OF TEST: VAT	TYPE OF SP: ALL	
MESSAGE SEQUENCE:			
SP A Link	SP B Link	SP C Link	SP D Link
:Start traffic			
1 - 1	TRAFFIC	----->	4 - 1
1 - 1	: Deactivate (MML command or failure)		
2 - 1	TRAFFIC	----->	3 - 1
2 - 1	TRAFFIC	----->	3 - 1
			----->
			4 - 1
			3 - 1 :Deactivate
			-----<
			2 - 1 TFP, PC=C
:Wait			
:Stop Traffic			
TEST DESCRIPTION			
1.	Start traffic to C and D.		
2.	Deactivate link 1 - 1 and check link set normal restart is initiated on link set 1.		
3.	Deactivate link 3 - 1 and check that a TFP concerning C is sent to A.		
4.	Check that SPI emergency is set and the link set emergency restart is applied to link set 1.		

Figure 20-3. Test Configurations of MTP Level 3 Test (Sheet 4 of 4)

- 6.03** The Enhanced test specifications perform the MTP level 3 validation tests and combined level 3 and level 2 validation tests as follows:
- E.1 - Link set normal restart.  
Purpose: To check the continuity of the link set normal restart if the receipt of a TFP does not cause SPI.
  - Link set emergency restart - Condition 1.  
Purpose: To check initialization of link set emergency restart if a link failure causes SPI.
  - Link set emergency restart - Condition 2.  
Purpose: To check initialization of link set emergency restart if the receipt of a TFP causes SPI.

### Performance Assessment

**6.04** As stated, the purpose of the link emergency alignment procedure is to improve the availability of links over the normal alignment procedure. To calculate the performance assessment of the Enhanced procedure, two formulas are used to present the total time saved during a fixed time interval and the average time required, per emergency event, for completing the procedure.

**6.05** The formula for the average proving time for switch-over within a normal proving state is  $T_e + (1/2) * T_n$ . The variables are as follows:

N	-total number of events in a fixed time interval that initiate link initial alignment procedure
$P_n$	-Proportion of N that initiates the link normal initial alignment
$P_e$	-Proportion of N that initiates the link emergency initial alignment
$P_{n/e}$	-Proportion of N that initiates the link normal alignment, but later changes to the emergency procedure
	$(P_n + P_e + P_{n/e} = 100\%)$
$T_n$	-Average time needed to complete the normal proving
$T_e$	-Average time needed to complete the emergency proving
$t_i$	-Time interval between two process transition states
K	-Total process transition states interrupted by the emergency procedure
$T_i$	-Time interval between leaving the idle state and entering the proving state.

6.06 Total time saved during the fixed time interval is expressed as follows:

$$N * [T_n - (P_e * T_e + (P_n + P_{n/e} * t_k / T_n) * T_n + P_{n/e} * (T_e + (\sum_{j=0}^{j=k-1} \sum_{i=j}^{i=j} (t_j / T_n) * t_i)))]$$

The average time needed per emergency event for completing the procedure is expressed as follows:

$$[1 / (T_i + T_n)] * [T_i^2 + T_i * T_n * (T_i + T_e + (1/2) * T_n)]$$

## 7. Transition Considerations

### Turn On/Turn Off

7.01 When a link or link set failure occurs that causes SPI between the 4 ESS switch and one of its adjacent signaling points, the 4 ESS switch must initiate the link set emergency restart on all link sets connected to that adjacent point. When the 4 ESS switch receives a TFP message with respect to an adjacent signaling point that causes SPI, the 4 ESS switch must initiate the link set emergency restart on all link sets connected to that adjacent point.

7.02 To initiate the link set emergency initial alignment during switch-over, the IAC must continue the current procedure, but change the alignment on the concerned link. The IAC must also change the T4 timer value and the AERM threshold.

7.03 If the emergency is set and cleared prior to the start of MTP level 2 alignment, the system must apply the normal initial alignment procedure, unless it receives SIE from the far end.

## 8. Input/Output Manual Pages (Does not apply)

## Abbreviations and Acronyms

---

### A

**ACG**

Automatic Call Gap

**ACM**

Address Complete Message

**ACRT**

Administrative Cathode Ray Terminal

**ADC**

Acceptable Digit Count

**AERM**

Alignment Error Rate Monitor

**AMA**

Automatic Message Accounting

**ANI**

Automatic Number Identification

**ANM**

Answer Message

**ANSI**

American National Standards Institute

**AP**

Attached Processor

**ASN**

AT&amp;T Switched Network

**AT**

Access Tandem

**ATP**

Access Transport Parameter

### B

**BCI**

Backward Call Indicator

**BFT**

Backward Failure Treatment

### C

**CAMA**Centralized Automatic Message  
Accounting**CCITT**International Telephone and Telegraph  
Consultative Committee**CCS7**

Common Channel Signaling System 7

**CHI**

Call Handling Instruction

**CNI**

Common Network Interface

**CNI6**

Common Network Interface No. 6

**CNOS**Common Channel Signaling (CCS)  
Network Operation System**COLP/R**Connected Line Identification  
Presentation/Restriction**CON**

Connect

**COS**

Class of Service

**CP**

Call Processing

**CPE**  
Customer Premises Equipment

**CPG**  
Call Progress

**CPN**  
Called Party Number

**CR**  
Call Register

**CS**  
Call Store

**CU**  
Control Unit

**CUG**  
Closed User Group

---

## **D**

**DIRE**  
Digit Reception

**DLN**  
Direct Link Node

**DOM**  
Domain

**DRO**  
Disciplined Rubidium Oscillator

**DSD**  
Direct Services Dialing

**DSDC**  
Direct Services Dialing Capability

**DSP**  
Destination Signaling Point

---

## **E**

**EAEO**  
Equal Access End Office

**EMM**  
Extended Main Memory

**ENAC**  
Engineering Network Administration  
Center

**ETC**  
End Office or Tandem Connecting

---

## **F**

**FGD**  
Feature Group D

**FTSP**  
Final Translation Signaling Point

---

## **G**

**GAP**  
Generic Address Parameter

**GTT**  
Global Title Translation

---

## **I**

**IAC**  
Initial Alignment Control

**IAM**  
Initial Address Message

---

**ICDR**  
International Call Detail Record

**ICT**  
Incoming Trunk

**IE**  
Information Element

**IMS5**  
Interprocess Message Switch No. 5

**INDADC**  
INDeterminate Acceptable Digit Count

**INF**  
Information Message

**INR**  
Information Request Message

**INUP**  
International ISDN User Part

**IOP**  
Input/Output Processor

**IRAS**  
Integrated Routing Assignment System

**ISC**  
Incoming Signaling Characteristic

**ISC**  
International Switching Center

**ISDN**  
Integrated Services Digital Network

**ISP**  
Initiating Signaling Point

**ISUP**  
Integrated Services Digital Network  
User Part

**ITSP**  
Intermediate Translation Signaling  
Point

**IXC**  
Interexchange Carrier

---

**L**

**LASS**  
Local Area Signaling Service

**LATA**  
Local Access Transport Area

**LCC**  
Local Carrier Connecting

**LEC**  
Local Exchange Carrier

**LLSC**  
Link Set Control

**LSAC**  
Link Activity Control

**LSC**  
Link State Control

---

**M**

**MA-UUI**  
Message Associated User-to-User  
Information

**MADC**  
Maximum Acceptable Digit Count

**MCD**  
Minimum Chargeable Duration

**MCRT**  
Maintenance Cathode Ray Terminal

**MF**  
Multifrequency

**MFC**  
Multifrequency Compelled

**MGMT**  
Management System

**MML**  
Man-Machine Language

**MOC**

Maintenance Operation Center

**MTP**

Message Transfer Part

---

**N**

**NANP**

North American Numbering Plan

**NAP**

Network Access Processor

**NCAT**

Non-Call Associated Temporary  
signaling connection

**NCP**

Network Control Point

**NCPAS**

NCP Administration System

**NCSU**

Network Clock Synchronization Unit

**NEMOS**

Network Management Operations  
Support

**NESAC**

National Electronic Systems Assistance  
Center

**NI**

Network Interconnect

**NOC**

Network Operations Center

**NPA**

Numbering Plan Area (Area Code)

**NR**

NCAT Register

**NSD**

AT&T Network Services Division

**O**

**OA&M**

Operations, Administration, and  
Maintenance

**OBCI**

Optional Backward Call Indicator

**OCC**

Other Carrier Connecting

**OCC**

Other Common Carrier

**ODA**

Office Data Assembler

**OFCI**

Optional Forward Call Indicator

**OGT**

Outgoing Trunk

**OMAP**

Operations and Maintenance  
Applications Part

**ONAC**

Operations, Network, and  
Administration Center

**OS**

Operating System

**OSC**

Outgoing Signaling Characteristic

---

**P**

**PDS**

Page Descriptor Shell

**PDT1**

Physical Pages in use in Memory  
Module 1

**PECC**

Product Engineering Control Center

**POTS**  
Plain Old Telephone Service

**PPC**  
Primary Point Code

**PRI**  
Primary Rate Interface

**PRM**  
Processor Recovery Message

**PROM**  
Programmable Read Only Memory

**PS**  
Program Store

**PSBO**  
Protected Simplex Backed ODA

---

## R

**RAM**  
Random Access Memory

**RAO**  
Revenue Accounting Office

**RDB**  
Routing Data Block

**REL**  
Release

**RgN**  
Redirecting Number

**RI**  
Redirection Information

**ROA**  
Reorder Announcement

**ROP**  
Read Only Printer

**RPC**  
Ring Peripheral Controller

**RTDOM**  
Retranslate Domain

**RTR**  
Real Time Reliable

**RWC**  
Remote Work Center

---

## S

**SC**  
Service Category

**SCAR**  
Stable Call Accumulation Register

**SCCP**  
Signaling Connection Control Part

**SCCS**  
Signaling Control Center System

**SCP**  
Service Control Point

**SCP**  
Signaling Control Point

**SDN**  
Software Defined Network

**SEAS**  
Signaling Engineering Administration System

**SG**  
System Generation

**SIN**  
Status Indication in Normal Alignment

**SIO**  
Status Indicator Out of Alignment

**SLM**  
Signaling Link Management

**SMM**  
Standard Main Memory

**SPC**  
Secondary Point Code

**SPI**  
Signaling Point Isolation

**SP**  
Signal Processor

**SRRC**  
Switch Ring Recent Change

**SRVA**  
SCCP Routing Verification  
Acknowledgement

**SRVR**  
SCCP Routing Verification Result

**SRVT**  
SCCP Routing Verification Test

**SSI**  
Small Scale Integration

**SSN**  
Subsystem Number

**SSP**  
Service Switching Point

**SST**  
Short Supervisory Transition

**STM**  
Signaling Traffic Management

**STP**  
Signal Transfer Point

---

## T

**TB**  
Trunk Block

**TCAP**  
Transaction Capability Application Part

**TCC**  
Technical Control Center

**TFP**  
Transfer Prohibited

**TLAC**  
Transferred Link Availability Control

**TMR**  
Trunk Maintenance Register

**TOP**  
Task Oriented Practices

**TOPAS**  
Testing Operations Provisioning  
Administration System

**TPC**  
Translation Point Code

**TSG**  
Trunk Subgroup

**TSP**  
Translation Signaling Point

**TSRC**  
Transferred Signaling Routing Control

**TT**  
Trunk Termination

---

## U

**UUI**  
User-to-User Information

**UUS**  
User-to-User Signaling

---

## V

**VLMM**  
Very Large Main Memory