Tekelec EAGLE® 5
Integrated Signaling System

Feature Manual - INP

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TEKELEC

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Introduction

Overview

This manual presents an overview of the INP (INAP-based Number Portability) feature, a product that allows wireline and wireless operators to support service provider portability in telephone networks in locations worldwide except North America. This arrangement allows subscribers to change to a new service provider while retaining their original phone number. In many parts of the world except North America, wireless operators are planning to implement this service via the use of an IN (Intelligent Network)-based solution using the INAP (Intelligent Network Application Protocol). The INP feature supports ported variable-length numbers up to 15 digits, without requiring the padding of numbers in the provisioning interfaces.

The INP feature can be turned on, but not off, via a feature bit. Note that INP and North American LNP (Local Number Portability) are mutually exclusive on an EAGLE 5 ISS node. The global title translations (GTT) feature is required for operation of the INP feature.

Scope and Audience

This manual is intended for anyone responsible for installing, maintaining, and using the INP feature in the EAGLE 5 ISS. Users of this manual and the others in the EAGLE 5 ISS family of documents must have a working knowledge of telecommunications and network installations.

Manual Organization

This document is organized into the following chapters:

- Chapter 1, "Introduction," contains general information about the INP documentation, organization of this manual, and how to get technical assistance.
- Chapter 2, "Feature Description," outlines the concepts and highlights of the INP feature. It describes the functions of INP, the services provided by the EPAP and PDBA programs operating in the MPS hardware, the INP user interface, and the INP message protocol.
- Chapter 3, "EAGLE 5 ISS INP Commands," describes the new or updated EAGLE 5 ISS commands that support the INP feature. It provides some sample reports and explanations of appropriate command usage.
- Chapter 4, "INP Feature Activation," describes the commands and procedures necessary to configure the INP feature for the INP subsystem and EAGLE 5 ISS.
- Chapter 5, "Maintenance and Measurements," explains these functions: EPAP status and alarm reporting, DSM status reporting to the EPAP, system hardware verification, system status reporting, commands, code and application data loading, feature related alarms, and measurements.
- Chapter 6, "Prepaid IDP Query Relay Feature," describes functionality and behavior of the Prepaid IDP Query Relay feature and outlines the concepts and highlights of the IDPR feature.

Related Publications

The *Feature Manual – INP* is part of the EAGLE 5 ISS documentation set and may reference related manuals of this set. The documentation set includes the following manuals:

- The *Commands Manual* contains procedures for logging into or out of the EAGLE 5 ISS, a general description of the terminals, printers, the disk drive used on the system, and a description of all the commands used in the system.
- The *Commands Pocket Guide* is an abridged version of the *Commands Manual*. It contains all commands and parameters, and it shows the command-parameter syntax.
- The *Commands Quick Reference Guide* contains an alphabetical listing of the commands and parameters. The guide is sized to fit a shirt-pocket.
- The *Commands Error Recovery Manual* contains the procedures to resolve error message conditions generated by the commands in the *Commands Manual*. These error messages are presented in numerical order.
- The *Database Administration Manual – Features* contains procedural information required to configure the EAGLE 5 ISS to implement these features:
  - X.25 Gateway
  - STPLAN
  - Database Transport Access
  - GSM MAP Screening
  - EAGLE 5 ISS Support for Integrated Sentinel
- The *Database Administration Manual - Gateway Screening* contains a description of the Gateway Screening (GWS) feature and the procedures necessary to configure the EAGLE 5 ISS to implement this feature.
- The *Database Administration Manual – Global Title Translation* contains procedural information required to configure an EAGLE 5 ISS to implement these features:
  - Global Title Translation
  - Enhanced Global Title Translation
  - Variable Length Global Title Translation
  - Interim Global Title Modification
  - Intermediate GTT Load Sharing
  - ANSI-ITU-China SCCP Conversion

- The *Database Administration Manual - IP7 Secure Gateway* contains procedural information required to configure the EAGLE 5 ISS to implement the SS7-IP Gateway.
- The *Database Administration Manual – SEAS* contains the EAGLE 5 ISS configuration procedures that can be performed from the Signaling Engineering and Administration Center (SEAC) or a Signaling Network Control Center (SNCC). Each procedure includes a brief description of the procedure, a flowchart showing the steps required, a list of any EAGLE 5 ISS commands that may be required for the procedure but that are not supported by SEAS, and a reference to optional procedure-related information, which can be found in one of these manuals:
  - Database Administration Manual – Gateway Screening
  - Database Administration Manual – Global Title Translation
  - Database Administration Manual – SS7
- The *Database Administration Manual – SS7* contains procedural information required to configure an EAGLE 5 ISS to implement the SS7 protocol.
- The *Database Administration Manual – System Management* contains procedural information required to manage the EAGLE 5 ISS database and GPLs, and to configure basic system requirements such as user names and passwords, system-wide security requirements, and terminal configurations.
- The *Dimensioning Guide for EPAP Advanced DB Features* is used to provide EAGLE Provisioning Application Processor (EPAP) planning and dimensioning information. This manual is used by Tekelec personnel and EAGLE 5 ISS customers to aid in the sale, planning, implementation, deployment, and upgrade of EAGLE 5 ISS systems equipped with one of the EAGLE 5 ISS EPAP Advanced Database (EADB) Features.
- The *ELAP Administration Manual* defines the user interface to the EAGLE LNP Application Processor (ELAP) on the MPS/ELAP platform. The manual defines the methods for accessing the user interface, menus, screens available to the user and describes their impact. It provides the syntax and semantics of user input, and defines the output the user receives, including information and error messages, alarms, and status.
- The *EPAP Administration Manual* describes how to administer the EAGLE 5 ISS Provisioning Application Processor on the Multi-Purpose Server (MPS)/EPAP platform. The manual defines the methods for accessing the user interface, menus, and screens available to the user and describes their impact. It provides the syntax and semantics of user input and defines the output the user receives, including messages, alarms, and status.

- The *Feature Manual - EIR* provides instructions and information on how to install, use, and maintain the EIR feature on the MPS/EPAP platform of the EAGLE 5 ISS. The feature provides network operators with the capability to prevent stolen or disallowed GSM mobile handsets from accessing the network.
- The *Feature Manual - G-Flex C7 Relay* provides an overview of a feature supporting the efficient management of Home Location Registers in various networks. This manual gives the instructions and information on how to install, use, and maintain G-Flex features on the MPS/EPAP platform of the EAGLE 5 ISS.
- The *Feature Manual - G-Port* provides an overview of a feature providing the capability for mobile subscribers to change the GSM subscription network within a portability cluster while retaining their original MSISDNs. This manual gives the instructions and information on how to install, use, and maintain G-Port features on the MPS/EPAP platform of the EAGLE 5 ISS.
- The *Feature Manual - INP* provides the user with information and instructions on how to implement, utilize, and maintain INAP-based Number Portability (INP) features on the MPS/EPAP platform of the EAGLE 5 ISS.
- The *FTP-Based Table Retrieve Application (FTRA) User Guide* describes how to set up and use a PC to serve as the offline application for the EAGLE 5 ISS FTP Retrieve and Replace feature.
- The *Hardware Manual* - EAGLE 5 ISS contains hardware descriptions and specifications of Tekelec's signaling products. These include the EAGLE 5 ISS, OEM-based products such as the ASi 4000 Service Control Point (SCP), the Netra-based Multi-Purpose Server (MPS), and the Integrated Sentinel with Extended Services Platform (ESP) subassembly.

  The Hardware Manual provides an overview of each system and its subsystems, details of standard and optional hardware components in each system, and basic site engineering. Refer to this manual to obtain a basic understanding of each type of system and its related hardware, to locate detailed information about hardware components used in a particular release, and to help configure a site for use with the system hardware.
- The *Hardware Manual - Tekelec 1000 Application Server* provides general specifications and a description of the Tekelec 1000 Applications Server (T1000 AS). This manual also includes site preparation, environmental and other requirements, procedures to physically install the T1000 AS, and troubleshooting and repair of Field Replaceable Units (FRUs).

- The *Hardware Manual - Tekelec 1100 Application Server* provides general specifications and a description of the Tekelec 1100 Applications Server (T1100 AS). This manual also includes site preparation, environmental and other requirements, procedures to physically install the T1100 AS, and troubleshooting and repair of Field Replaceable Units (FRUs).
- The *Installation Manual* - EAGLE 5 ISS contains cabling requirements, schematics, and procedures for installing the EAGLE 5 ISS along with LEDs, Connectors, Cables, and Power Cords to Peripherals. Refer to this manual to install components or the complete systems.
- The *Installation Manual - Integrated Applications* provides the installation information for integrated applications such as EPAP 4.0 or earlier (Netra-based Multi-Purpose Server (MPS) platform) and Sentinel. The manual includes information about frame floors and shelves, LEDs, connectors, cables, and power cords to peripherals. Refer to this manual to install components or the complete systems.
- The *LNP Database Synchronization Manual - LSMS with* EAGLE 5 ISS describes how to keep the LNP databases at the LSMS and at the network element (the EAGLE 5 ISS is a network element) synchronized through the use of resynchronization, audits and reconciles, and bulk loads. This manual is contained in both the LSMS documentation set and in the EAGLE 5 ISS documentation set.
- The *LNP Feature Activation Guide* contains procedural information required to configure the EAGLE 5 ISS for the LNP feature and to implement these parts of the LNP feature on the EAGLE 5 ISS:
  - — LNP services
  - — LNP options
  - — LNP subsystem application
  - — Automatic call gapping
  - — Triggerless LNP feature
  - — Increasing the LRN and NPANXX Quantities on the EAGLE 5 ISS
  - — Activating and Deactivating the LNP Short Message Service (SMS) feature
- The *Maintenance Manual* contains procedural information required for maintaining the EAGLE 5 ISS and the card removal and replacement procedures. The *Maintenance Manual* provides preventive and corrective maintenance procedures used in maintaining the different systems.
- The *Maintenance Pocket Guide* is an abridged version of the Maintenance Manual and contains all the corrective maintenance procedures used in maintaining the EAGLE 5 ISS.

- The *Maintenance Emergency Recovery Pocket Guide* is an abridged version of the Maintenance Manual and contains the corrective maintenance procedures for critical and major alarms generated on the EAGLE 5 ISS
- The *MPS Platform Software and Maintenance Manual* - EAGLE 5 ISS *with Tekelec 1000 Application Server* describes the platform software for the Multi-Purpose Server (MPS) based on the Tekelec 1000 Application Server (T1000 AS) and describes how to perform preventive and corrective maintenance for the T1000 AS-based MPS. This manual should be used with the EPAP-based applications (EIR, G-Port, G-Flex, and INP).
- The *MPS Platform Software and Maintenance Manual* - EAGLE 5 ISS *with Tekelec 1100 Application Server* describes the platform software for the Multi-Purpose Server (MPS) based on the Tekelec 1100 Application Server (T1100 AS) and describes how to perform preventive and corrective maintenance for the T1100 AS-based MPS. This manual should be used with the ELAP-based application (LNP).
- The *Provisioning Database Interface Manual* defines the programming interface that populates the Provisioning Database (PDB) for the EAGLE 5 ISS features supported on the MPS/EPAP platform. The manual defines the provisioning messages, usage rules, and informational and error messages of the interface. The customer uses the PDBI interface information to write his own client application to communicate with the MPS/EPAP platform.
- The *Previously Released Features Manual* summarizes the features of previous EAGLE, EAGLE 5 ISS, and IP^7 Secure Gateway releases, and it identifies the release number of their introduction.
- The *Release Documentation* contains the following documents for a specific release of the system:
  - — *Feature Notice* - Describes the features contained in the specified release. The Feature Notice also provides the hardware baseline for the specified release, describes the customer documentation set, provides information about customer training, and explains how to access the Customer Support website.
  - — *Release Notice* - Describes the changes made to the system during the lifecycle of a release. The Release Notice includes Generic Program Loads (GPLs), a list of PRs resolved in a build, and all known PRs.

    NOTE: The *Release Notice* is maintained solely on Tekelec's Customer Support site to provide you with instant access to the most up-to-date release information.
  - — *System Overview* - Provides high-level information on SS7, the IP7 Secure Gateway, system architecture, LNP, and EOAP.
  - — *Master Glossary* - Contains an alphabetical listing of terms, acronyms, and abbreviations relevant to the system.

— *Master Index* - Lists all index entries used throughout the documentation set.

- The *System Manual – EOAP* describes the Embedded Operations Support System Application Processor (EOAP) and provides the user with procedures on how to implement the EOAP, replace EOAP-related hardware, device testing, and basic troubleshooting information.

Documentation Packaging, Delivery, and Updates

Customer documentation is provided with each system in accordance with the contract agreements. It is updated whenever significant changes that affect system operation or configuration are made. Updates may be issued as an addendum, or a reissue of the affected documentation.

The document part number appears on the title page along with the current revision of the document, the date of publication, and the software release that the document covers. The bottom of each page contains the document part number and date of publication.

Two types of releases are major software releases and maintenance releases. Maintenance releases are issued as addenda with a title page and change bars. On changed pages, the date and document part number are changed; on unchanged pages that accompany the changed pages, the date and document part number are unchanged.

When the software release has a minimum affect on documentation, an addendum is provided. The addendum contains an instruction page, a new title page, a change history page, and replacement chapters with the date of publication, the document part number, and change bars.

If a new release has a major impact on documentation, such as a new feature, the entire documentation set is reissued with a new part number and a new release number.

Documentation Admonishments

Admonishments are icons and text occurring throughout the EAGLE 5 ISS manual set that alert the reader to assure personal safety, to minimize possible service interruptions, and to warn of the potential for equipment damage. The EAGLE 5 ISS manuals have three admonishments, listed in descending levels of priority.

	**DANGER:** (This icon and text indicate the possibility of ***personal injury***.)
	**WARNING:** (This icon and text indicate the possibility of ***equipment damage***.)
	**CAUTION:** (This icon and text indicate the possibility of ***service interruption***.)

Customer Assistance

The Tekelec Customer Contact Center offers a point of contact through which customers can receive support for problems. The Tekelec Customer Contact Center is staffed with highly-trained engineers to provide solutions to technical questions and issues seven days a week, twenty-four hours a day. A variety of service programs are available through the Tekelec Customer Contact Center to maximize the performance of Tekelec products that meet and exceed customer needs

Customer Contact Center

To receive technical assistance, call the Tekelec Customer Contact Center at one of the following locations by one of the following methods:

- Tekelec, UK

  Phone: +44 1784 467804

  Fax: +44 1784 477120

  Email: *ecsc@tekelec.com*

- Tekelec, USA

  Phone (within continental US): (888) 367-8552

  (outside continental US): +1 919-460-2150

  Email: *support@tekelec.com*

When the call is received, a Customer Service Report (CSR) is issued to record the request for service. Each CSR includes an individual tracking number.

Once a CSR is issued, Technical Services determines the classification of the trouble. If a critical problem exists, emergency procedures are initiated. If the problem is not critical, information regarding the serial number of the system, COMMON Language Location Identifier (CLLI), initial problem symptoms (includes outputs and messages) is recorded. A primary Technical Services engineer is also assigned to work on the CSR and provide a solution to the problem. The CSR is closed when the problem is resolved.

Emergency Response

In the event of a critical service situation, emergency response is offered by Tekelec Technical Services twenty-four hours a day, seven days a week. The emergency response provides immediate coverage, automatic escalation, and other features to ensure that the critical situation is resolved as rapidly as possible.

A critical situation is defined as a problem with an EAGLE 5 ISS that severely affects service, traffic, or maintenance capabilities, and requires immediate corrective action. Critical problems affect service and/or system operation resulting in:

- A total system failure that results in loss of all transaction processing capability
- Significant reduction in system capacity or traffic handling capability
- Loss of the system's ability to perform automatic system reconfiguration
- Inability to restart a processor or the system
- Corruption of system databases that requires service affecting corrective actions
- Loss of access for maintenance or recovery operations
- Loss of the system ability to provide any required critical or major trouble notification

Any other problem severely affecting service, capacity/traffic, billing, and maintenance capabilities may be defined as critical by prior discussion and agreement with Tekelec Technical Services.

Acronyms and Abbreviations

ACN	Application Context Name
ADL	Application Data Loader
ADU	Application Defined User Alarms
AuC	Authentication Center
APDU	Application Protocol Data Unit
CC	E.164 Country Code
CCBS	Completion of Call to Busy Subscriber
CCNR	Completion of Call on No Reply
CDPA	Called Party Address, an SCCP parameter in a UDT message
CDPN	INP Called Party Number (TCAP parameter in IDP message)
CDPNNAI	CDPN Nature of Address Indicator
CDPNPFX	CDPN Prefix digits
CGPA	Calling Party Address, an SCCP parameter in a UDT message
CDU	CAP Download Utility
CPC	Capability Point Code
CSL	Common Screening List
DCB	Device Control Block
DLTPFX	Delete CDPN Prefix digitis
DN	Directory Number
DPC	Destination Point Code
DRA	Destination Routing Address, a parameter containing RN or RN+DN in INP Connect response
DSM	Database Services Module
EMS	Element Management System
EOAP	Embedded OAP
EPAP	Eagle Provisioning Application Processor
ES	Encoding Scheme

ETSI.....European Telecommunications Standards Institution

FTA .....File Transfer Area

GDB.....G-Flex/G-Port/INP Database

GFDB .....G-Flex Database

G-Flex.....GSM Flexible Numbering

GMSC .....Gateway MSC

GPDB .....G-Port Database

G-Port .....GSM Mobile Number Portability

GPL .....Generic Program Load

GSM .....Global System for Mobile communications

GTA .....Global Title Address

GTAI.....Global Title Address Information

GTI .....Global Title Indicator

GTT .....Global Title Translation

HCAP.....High Capacity/Speed Application Processor

HLR.....Home Location Register

HRN .....Home Routing Number

IAM .....Initial Address Message

IDP .....Initial Detection Point

IDPR.....Prepaid IDP Query Relay Feature

IEC.....International Escape Code

IMSI.....International Mobile Station Identifier

IN.....Intelligent Network

IS-NR .....In Service - NoRmal

INAP .....Intelligent Network Application Protocol

INE .....Interrogating Network Entity

INN .....Internal Network Number

INP .....INAP-based Number Portability

IP .....Internet Protocol

ISDN .....Integrated Services Digital Network

ISUP	ISDN User Part
ITU	International Telecommunications Union
LIM	Link Interface Module
LNP	Local Number Portability
LSS	Local Subsystem
MAP	(1) Mobile Application Part (2) Mated APplication
MAS	Maintenance and Administration Subsystem
MCAP	MAS Communication Application Processor Card
MEA	Mismatch of Equipment and Attributes
MGT	Mobile Global Title
MNP	Mobile Number Portability
MPS	Multi-Purpose Server
MR	INP Message Relay
MS	Mobile Station
MSC	Mobile Switching Center
MSISDN	Mobile Station international ISDN number
MSRN	Mobile Station Roaming Number
MSU	Message Signaling Unit
MTP	Message Transfer Part
NAI	Nature of Address Indicator
NAIV	NAI Value
NC	E.214 Network Code, either the National Destination Code (NDC), as defined in Recommendation E.164, or the NDC and some additional E.164 digits
NDC	E.164 National Destination Code
NE	Network Element
NEBS	Network Equipment-Building System generic equipment requirements
NEC	National Escape Code
NP	(1) Number Portability (2) Numbering Plan

NPA.....Numbering Plan Area

NPDB.....Number Portability Database

NPV.....Numbering Plan Value

NSD.....Network Switching Division, Tekelec

OAM .....Operation Administration & Maintenance

OAP.....Operations Support System/Application Processor

OPS.....Operator Provisioning System

OTID .....Originating Transaction ID

PC .....Point Code

PDB .....Provisioning Database

PDBI.....Provisioning Database Interface

PFS.....Product Functional Specification

PLMN .....Public Land Mobile Network

PMTC.....Peripheral Maintenance

POI .....Point of Interconnection

PPP.....Point-to-Point Protocol

Provlk.....Link between EPAP and external provisioning system

QS.....INP Query Service

RAID .....Redundant Array of Independent Disks

RI .....Routing Indicator

RMTP.....Reliable Multicast Transport Protocol, a product of Globalcast Communications

RN .....Routing Number

RNDN.....Routing Number + Directory Number

RNIDN .....Routing Number + International DN

RNNDN.....Routing Number + National DN

RNSDN.....Routing Number + Subscriber DN

SAS.....Signaling Application System

RTDB.....Real-Time DataBase (also called the MPS database)

SCCP .....Signalling Connection Control Part

SCF.....Service Control Function

SCM .....System Configuration Manager

SCP.....Service Control Point

SIM.....Subscriber Identity Module

SMS .....Service Management System

SMSC .....Short Message Service Center

SNAI .....Service Nature of Address Indicator

SNP .....Service Numbering Plan

SP.....Signalling Point

SOR .....Support of Optimal Routing

SPC.....Secondary Point Code

SRF .....Signaling Relay Function

SRI.....Send Routing Information

SSF.....Service Switching Function

SSN.....Subsystem Number

SSP .....Service Switching Point

ST.....Stop Digit, BCD value 15 (0xF)

STP .....Signal Transfer Point

TCAP .....Transaction Capabilities Application Part

TCP .....Transmission Control Protocol

TDM.....Terminal Disk Module

TPC .....True Point Code

TT .....Translation Type

UAM .....Unsolicited Alarm Message

UDP .....User Datagram Protocol

UDT .....Unitdata

UDTS .....Unit Data Transfer Service

UIM.....Unsolicited Information Message

VLR .....Visitor Location Register

VMSC .....Visited MSC

VMSC.....Voice Mail Service Center

VSCCP .....VxWorks Signalling Connection Control Part GPL

2

Feature Description

Overview

Throughout the world, wireline and wireless operators are receiving directives from their national regulators to support service provider number portability in their networks. This feature provides subscribers the ability to switch their telephone service to a new service provider while retaining their original telephone number.

In Europe and other parts of the world, except North America, wireline providers are implementing this service via the Intelligent Network-based solution, using the INAP (Intelligent Network Application Part) protocol. This solution is consistent with developed ITU Number Portability supplements current Supplements to ITU-T Q series recommendations. European Telecommunications Standards Institution (ETSI) standards for MNP (Mobile Number Portability) also define an IN-based solution as suitable for use at the operator's discretion.

While the advent of number portability is good news for consumers, it presents many challenges for network operators. Tekelec's INAP-based Number Portability (INP) feature minimizes those challenges for network operators, while enabling them to efficiently meet their regulatory obligations. (INP and its North American equivalent, LNP, are mutually exclusive on an EAGLE 5 ISS node.)

Tekelec provides fully functional INP support, including ported number lengths up to 15 digits. In addition, true variable-length numbers are supported without requiring padding of numbers in the provisioning and other input/output interfaces.

Number lengths vary between countries and may even vary within a country. As a result, the INP database structure supports numbers of varying length in a flexible way without requiring software modifications. A maximum number length of 15 digits for ported numbers is supported.

The INP feature can be provisioned to remove automatically a special prefix (that is, an access code such as '0' or '1'). This capability allows INP to accommodate SSPs that do or do not include the prefix in their queries to the INP database. Also, INP can be provisioned to accept queries with or without special prefixes on the DN. In this situation, INP can strip off the prefix, perform a database query using the international version of the DN, and return a response to the switch. These capabilities, referred to as INP number normalization, are options the customer can provision.

INP number normalization also allows the operator to specify NAI values via configuration parameters. The configuration parameters are set to specify rules that map incoming NAI values to service NAI values for the purpose of number conditioning.

The INP feature can be deployed either in the same node that also performs the STP function or as a stand-alone INP node. The INP executes on the same MPS platform as other Tekelec features G-Flex and G-Port.

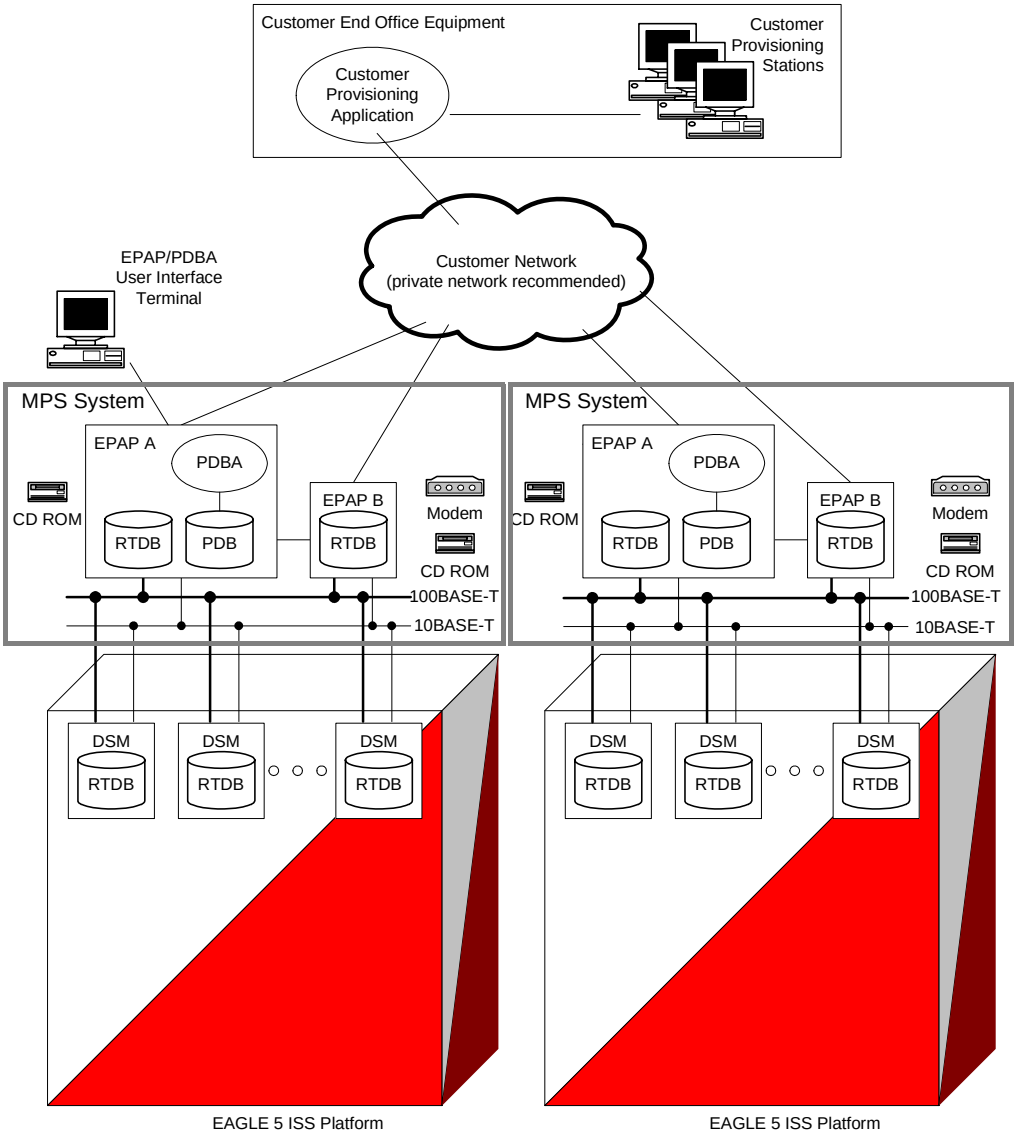
MPS/EPAP Platform

Tekelec provides the MPS (Multi-Purpose Server) platform as a subsystem of the EAGLE 5 ISS. The MPS provides support for multiple features, which initially are the INP, EIR, G-Flex, and G-Port features.

The MPS is composed of hardware and software components that interact to create a secure and reliable platform. (For details about the MPS hardware, refer to the *Tekelec 1000 Application Server Hardware Manual*.) The MPS provides the means of interfacing the customer provisioning application with the EAGLE 5 ISS. It connects the customer with the EAGLE 5 ISS and accepts the customer number portability data, while accommodating numbers of varying lengths.

The EAGLE Provisioning Application Processor (EPAP) is the software that runs on the MPS hardware platform. It collects and organizes customer provisoning data, and forwards it to the EAGLE 5 ISS DSM cards. Figure 2-1 shows the overall system architecture, providing a graphic overview of MPS/EPAP platform from customer provisioning through the MPS subsystem to the EAGLE 5 ISS DSM databases.

Figure 2-1. MPS/EPAP Platforms for Provisioning INP



Design Overview and System Layout

Figure 2-1 illustrates the overall system architecture of INP and identifies the different tasks, databases and interfaces involved. The system consists of two mated MPS servers. Each MPS contains two EPAP platforms, EPAP A and EPAP B, a RealTime Database, a Provisioning Database, servers, CD ROMS, modems, and network hubs. Each MPS and its EPAPs may be thought of as an 'EPAP system'; the EPAP system at the mated EAGLE 5 ISS is referred to as the 'mated EPAP system'. Each EPAP system is a T1000 AS system with a total of four Ethernet interfaces.

On the EAGLE 5 ISS platform side, a set of DSMs, which hold the INP database, is part of the STP. Two high-speed Ethernet links connect the DSMs and the EPAPs. One of the links is a 100BASE-T Ethernet bus, and the other is a 10BASE-T Ethernet bus.

The INP database is provisioned and maintained through the EPAPs. EPAP A and EPAP B act as the active EPAP and the standby EPAP. One link serves as the active link, and the other as the standby link. At any given time, there is only one active EPAP and one active link. The database is provisioned through the active link by the active EPAP; the other EPAP provides redundancy.

In case of failure of the active EPAP, the standby EPAP takes over the role of active EPAP and continues to provision the INP database. In the case where the active link fails, the active EPAP switches to the standby link to continue provisioning the DSMs. The two Ethernet links are part of the DSM network. See "DSM Networks" on page 2-14.

Another 100BASE-T Ethernet link exists between the EPAPs; that link is called the EPAP sync network. See the "EPAP Sync Network" on page 2-13.

Major modules on the EPAP are the:

- DSM provisioning module
- Maintenance module
- RTDB module
- PDB module

The DSM provisioning module is responsible for updating INP databases on the EAGLE 5 ISS DSM cards using the RMTP multicast. The maintenance module is responsible for the proper functioning of the EPAP platform. The PDB module is responsible for preparing and maintaining the Real Time Database, which is the "golden copy" of the INP database. The PDB module can run on one of the EPAPs of either of the mated EAGLE 5 ISSs.

Functional Overview

The main function of the MPS/EPAP platform is to provision the INP data from the customer network to the DSM cards on the STP. INP database records are continuously updated from the customer network to the PDB. The PDB module communicates with the maintenance module and the RTDB task over a TCP/IP socket to provision the DSM cards on the EAGLE 5 ISS. The maintenance module is responsible for the overall stability and performance of the system.

It is possible for the DSM database to get out-of-sync due to missed provisioning or card rebooting. Therefore, the RTDB contains a coherent, current copy of the DSM database. The EPAP-DSM provisioning task sends database information out on the provisioning link. The DSM cards act as the receivers and are reprovisioned.

EPAP/PDBA Overview

The EAGLE Provisioning Application Processor (EPAP) platform and the Provisioning Database Application (PDBA) coupled with the Provisioning Database Interface (PDBI) facilitate the database required for the INP feature. It performs the following two basic functions in support of the INP feature:

- Accept and store INP data provisioned by the customer
- Update and reload INP databases on the DSM cards

The PDBA operates on the master INP provisioning database (PDB). The EPAP and PDBA are both installed on the MPS hardware platform. Figure 2-1 shows the overall system architecture, including a graphic path of INP data from the customer provisioning through the MPS subsystem to the EAGLE 5 ISS DSM databases.

The EPAP platform maintains an exact copy of the real-time database (RTDB) required by the EAGLE 5 ISS DSM cards, provisions the EAGLE 5 ISS DSM cards, and maintains redundant copies of both databases on mated EPAP hardware. The EPAP platform is a mated pair of processors (the upper processor, called EPAP A, and the lower processor, EPAP B) contained in one frame.

During normal operation, information flows through the EPAP/PDBA software with no intervention. INP data is generated at one or more operations centers and is delivered to the PDBA through a TCP socket interface (PDBI). The PDBA software stores and replicates data on EPAP A on the mated EPAP system. The data is then transmitted across a private network to the DSM cards located in the EAGLE 5 ISS frame by the EPAPs.

The primary interface to the PDBA consists of machine-to-machine messages. The interface is defined by Tekelec and is available in the *Provisioning Database Interface Manual*. Use that manual to update or create provisioning software compatible with the EPAP socket interface.

A direct user interface is provided on each EPAP to allow configuration, maintenance, debugging, and platform operations. A direct user interface is also provided by the PDBA for configuration and database maintenance.

The MPS/EPAP is an open systems platform and easily accommodates the high provisioning rates that INP requires. Implementing the persistent database and provisioning as an open systems platform, compared to the traditional OAM platform, provides these benefits:

- Variety of hardware components and vendors
- Availability of third party communication and database tools
- Standard communication protocols
- Availability of personnel with related experience

Each EPAP server maintains a copy of the real-time database in order to provision the EAGLE 5 ISS DSM cards. The EPAP server must comply with the hardware requirements in *Tekelec 1000 Application Server Hardware Manual*. Figure 2-1 illustrates the EPAP architecture contained in the MPS subsystem.

Each EPAP has a dedicated CD ROM drive. One EPAP per EAGLE 5 ISS platform has a modem capable of supporting remote diagnostics, remote configuration, and remote maintenance; these remote operations are performed through EPAP login sessions. These sessions are accessible across the customer network (that is, the telnet) as well as through direct terminal connection to the EPAP via an RS232 connection. Also, tape drives support backup and restore operations. Refer to the *Tekelec 1000 Application Server Hardware Manual* for details about the hardware devices and network connections.

INP Feature

The INP feature minimizes challenges for network operators while they plan to implement number portability via the use of Intelligent Network-based solution using INAP protocol for their subscribers.

INP can operate on the same node as Tekelec features G-Port and G-Flex. Because the number lengths can vary between countries (sometimes even within a country), the INP feature supports numbers of varying lengths in a flexible way, without requiring software modifications. The maximum number length of 15 digits for ported numbers is supported.

INP performs number portability translations based on the received Called Party Number (CDPN) in the INAP portion of the message. For call-related messages, the database query is performed by using the digits from the Called Party Number parameter and converting them to an international number, if the number is not already in international format.

The INP feature avoids problem situations with its number normalization feature. In certain cases, problems could occur where operators do not use NAI values that match the EAGLE 5 ISS's current number conditioning process. For example, a switch might send an NAI of a subscriber and expect the number to be treated as a National number, leading to problems.

The number normalization feature also allows the user to specify how certain NAI (Nature of Address Indicator) values are to be treated. This value treatment is performed by setting up rules that map incoming NAI values to internal SNAI (Service Nature of Address Indicator) values for the purpose of number conditioning.

Another potential difficulty in some networks, users dial a special prefix, such as a '0' or '1' (that is, an "access code"), before dialing the digits for the party they are trying to reach. Some SSPs strip of this prefix and do not include it in the INAP query to the INP database. However, other SSPs send the query using the entire dialed number, including the prefix.

The INP number normalization feature lets INP accept queries either with or without special prefixes on the DN. Upon receipt, INP strips off the prefix, if present, converts the DN to an international number, performs the database query, and returns a response to the switch. The Called Party Number in the response can include the special prefix or not, depending on how the operator configures the feature.

EPAP (Eagle Provisioning Application Processor)

As shown in Figure 2-1, a MPS/EPAP platform contains two EPAP servers to provide INP service. At any given time, only one EPAP actively communicates with the DSMs. The other EPAP is in standby mode.

The primary purpose of the EPAPs is to maintain the provisioning database (PDB) and to download copies of the RTDB to the DSM cards. The EPAP receives INP data from the customer network through the PDBI, the external source of INP provisioning information. The PDBI continually updates the active EPAP's PDB. Once an update is applied to the active PDB, it is sent to the RTDBs on the active and standby EPAPs.

Each EPAP maintains a copy of the RTDB. When a DSM needs a copy of the RTDB, the EPAP downloads the file to the DSM for its own resident copy of the RTDB database.

The EPAP maintains a file of database updates to be sent to the DSMs. This file contains the changes necessary to keep the DSM files current relative to the RTDB database.

DSM (Database Services Module)

The INP feature can provision from 1 to 25 DSM cards. The DSM cards have two Ethernet links, as shown in Figure 2-1.

Multiple DSMs provide a means of load balancing in high-traffic situations. The DSM database is in a format that facilitates rapid lookups. Each DSM contains an identical database. Furthermore, all DSM INP databases are identical to the RTDB maintained by the EPAPs.

However, the various databases may not be identical at all times for several reasons. First of all, when a DSM card is initialized, it downloads the current copy of the database from the EPAP. While that card is being downloaded, it cannot provide VSCCP services. Another condition that can result in databases being out-of-sync occurs when the EPAP receives updates from its provisioning source, but it has not yet sent them down to the DSM cards. Updates are applied to the provisioning database as they are received.

Two possible scenarios contribute to a condition where a DSM may not have enough memory to hold the entire database. In the first case, the database is downloaded successfully to the DSM, but subsequent updates eventually increase the size of the database beyond the capacity of the DSM memory. In this situation, it is desirable to continue processing INP transactions, even though the database may not be as up-to-date as it could be.

The other case occurs when a DSM card is booted. If it is determined then that the card does not have enough memory for the entire database, the database is not loaded on that card. Each DSM is responsible for recognizing and reporting its out-of-memory conditions by means of alarms.

Overview of EPAP to DSM Communications

Before discussing DSM status reporting or EPAP status reporting, it is helpful to understand the communications between the DSMs and the EPAP in broad terms.

- UDP - sending DSM status messages

The DSMs and EPAPs create a UDP (User Datagram Protocol) socket, which is used for status messages. One of the last things a DSM does when it is initialized is to send a status message to the EPAP, containing the DSM ID, database level, and memory size. The EPAP maintains tables containing the last known status of each DSM. EPAP uses these to determine whether or not the DSM needs to download the database.

- IP - reporting EPAP maintenance data

The DSMs create an TCP/IP socket when they are initialized, and listen for connection requests. During initialization or after a loss of connectivity, the active EPAP chooses one of the DSMs and issues a *Connect* to establish the TCP/IP connection with that DSM (referred to as the Primary DSM). The purpose of this link is to provide a path for reporting EPAP alarms and to forward maintenance blocks to the DSM.

- IP Multicast - downloading GSM database

Because of the large size of the database and the need to download it quickly on up to 25 DSM cards, INP uses a technique known as IP multicasting. This technique is based on Reliable Multicast Transport Protocol-II (RMTP-II), a product of Globalcast Communications. IP multicasting downloads the RTDB and database updates to the DSMs.

The administration of IP multicasting is based on the concept of a "tree", or stream of data, which is constantly being broadcast by the EPAP. DSMs that need to download the real time database or to receive database updates "join the tree". DSMs can also "leave the tree", typically when the database fills their available memory.

Incremental Downloading

Once a download is in progress, it is possible for another DSM to determine that it also needs to download the file. The new DSM can "jump in" and join the download in progress and begin its download with whatever record is currently being sent. When the last record in the file has been sent, the EPAP restarts the download from the beginning. The EPAP then sends the records that the new DSM needs to complete its database.

EPAP Status and Error Reporting via Maintenance Blocks

The EPAPs forward all status and error messages to the DSMs in maintenance blocks. Maintenance blocks are asynchronously sent whenever the EPAP has something to report. The maintenance blocks eventually update EPAP DCBs located on the EAGLE 5 ISS.

INP Considerations

The following list contains considerations you should think over before installing and operating the INP feature.

1. INP responses are not routed by Global Title Translation.

2. The maximum length of the Application Context Name Object Identifier is 32 digits.

3. It is possible that PCs and/or PC + SSNs that are in the entity table of the database and are referenced by subscriber entries do not have the required data present on the EAGLE 5 ISS to route messages to them.

   For example, the PC may not have a route, or the PC+SSN may not be in the MAP table for a final GTT. In these cases, a UIM is output only when a message is discarded due to the lack of data. These data problems can be reduced by careful provisioning of the route and MAP tables.

4. For INP Message Relay messages with E.164 numbers in the SCCP CDPA, it is assumed that no truncation occurred if and when the routing number was prepended and that SCCP CDPA has the full DN of the subscriber.

5. INP Message Relay to the EAGLE 5 ISS local subsystem is not supported.

6. Only the first 21 digits of the CDPA are decoded for INP Message Relay. For example, if the CDPA contains an RN prefixed to a DN, the RN is seven digits, and the DN is 15 digits, then the total is 22 digits, and the DN used for processing will be only 14 digits (21 total digits less 7 RN digits).

7. GTT currently handles decimal digits only. Thus, if an operator/country is using hexadecimal digits ‘A’ through ‘F’ in RNs and the operator is providing GTT to messages that have RN prefixes other than its own prefixes, the operator must enter the RN+DN number ranges as DN ranges in the INP database. The only problem with this is that the beginning and ending DNs can only be 15 digits, which may not be enough for an RN+DN.

8. If ported-in numbers use RN entity, replacing the CDPA GT with the entity address of a Signalling Point is not supported. There is at least one case where this is required: Subsequent GTT is desired, but the STP providing subsequent GTT does not have Number Portability capability.

9. If you choose to provision number normalization, INP always removes the specified prefix digits from the beginning of the DN before searching the database. Take care that the digit sequence of the specified prefix never matches the initial digit sequence of a valid DN. For example, if a valid DN without any special prefix is **5551234**, then **55** should not be provisioned as a special prefix. If it were, INP would remove the first two digits from the DN, resulting in an invalid DN: **51234**.

   Other number normalization considerations include:

   - INP supports up to five special prefixes per INP node.
   - Special prefixes may not exceed 15 digits. All configurations of the 15 digit prefix are valid; that is, any digit from '0' to 'F' in any sequence is valid for the prefix.
   - An INP option (**cdpnpfx, chg-inpopts** command) lets an operator enter the prefix digits to be deleted from the Called Party Number before the database lookup.
   - The operator can return either the complete Called Party Number in the response to the SSP including the special prefix, or the DN without the special prefix. Option **dltpfx** is provisionable on a per-prefix basis. Up to five prefix-response combinations are supported.
   - The operator can specify mappings from NAI to SNAI (Service NAI). Up to five mappings (for five unique NAI values) are supported. The only valid SNAI values are subscriber (**sub**), national (**natl**), international (**intl**), and none (**none**, which is used to delete existing entries).
   - INP searches for the specified prefix at the beginning of the DN. If the beginning digits of the DN match the provisioned prefix, they are removed before conditioning the number to the international format.
   - If the beginning digits of the DN do not match the provisioned prefix, the unchanged number is conditioned to the international format, which is used for the database search.
   - If the Called Party Number NAI value received in the INP query matches a NAI value provisioned in the NAI to SNAI mapping table, the value of SNAI is used when conditioning the number to international format according to existing rules defined for INP.
   - After the database search, the response to the SSP is constructed using either the complete number as received in the query (with special prefix), or just the DN (without a prefix). This handling of the prefix depends on the user's specification of the **dltpfx** option during configuration.

Network Connections

Several customer- and Tekelec-installed private networks are required to support the INP feature. These networks are:

- Customer provisioning network
- EPAP sync network
- DSM networks
- Dial-up network

The following discussion is an overview of these private networks. It expands on the networks in the INP architecture diagram shown in Figure 2-1. (For details about configuring these networks, refer to the *EPAP User Interface Manual*.)

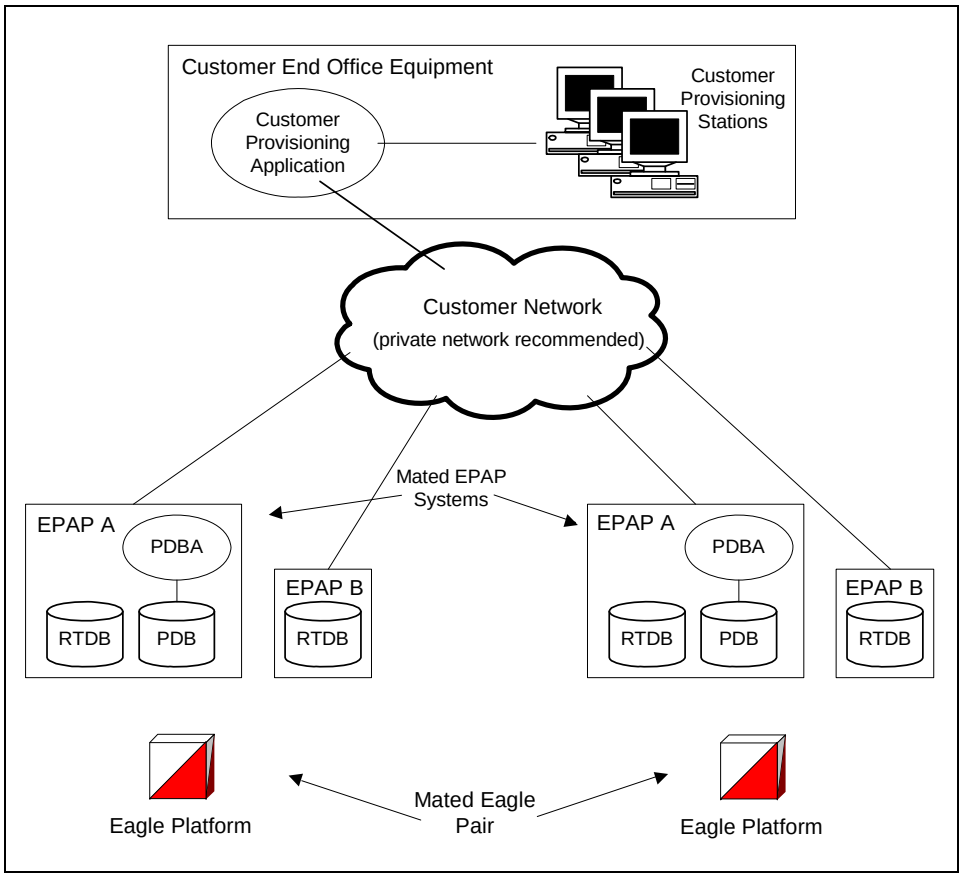
Customer Provisioning Network

The customer network carries the following traffic:

- Customer queries and responses to the PDB via the PDBI from the customer provisioning network
- Updates between PDBs of a mated EAGLE 5 ISS pair
- Updates between a PDB on one EAGLE 5 ISS and RTDBs on a mated EAGLE 5 ISS
- RTDB reload traffic if the active PDBA is not collocated on the same EPAP
- PDBA import/export (file transfer) traffic
- Traffic from a PDBA reloading from its mate
- EPAP and PDBA user interface traffic.

A typical customer network is shown in Figure 2-2.

Figure 2-2. Customer Provisioning Network

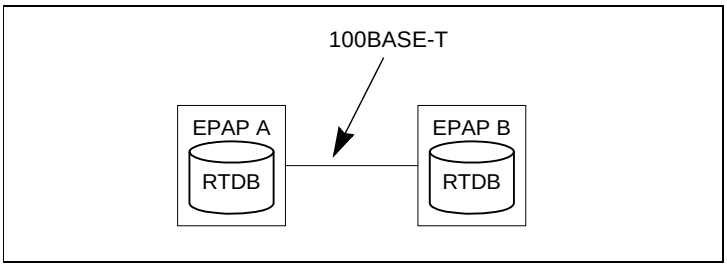


Although a dedicated network is recommended, it is possible that unrelated customer traffic can use the network as well. The determination , either to have a dedicated network or to allow other customer traffic, should be based on available external Ethernet bandwidth and network performance considerations.

EPAP Sync Network

The EPAP sync network carries RTDB and maintenance application traffic between active and standby EPAP servers on an EPAP system. It synchronizes the contents of the RTDBs of both EPAP A and B. The EPAP network is a single Ethernet cable between EPAP A and EPAP B running at 100BASE-T, as shown in Figure 2-3.

Figure 2-3. EPAP Sync Network

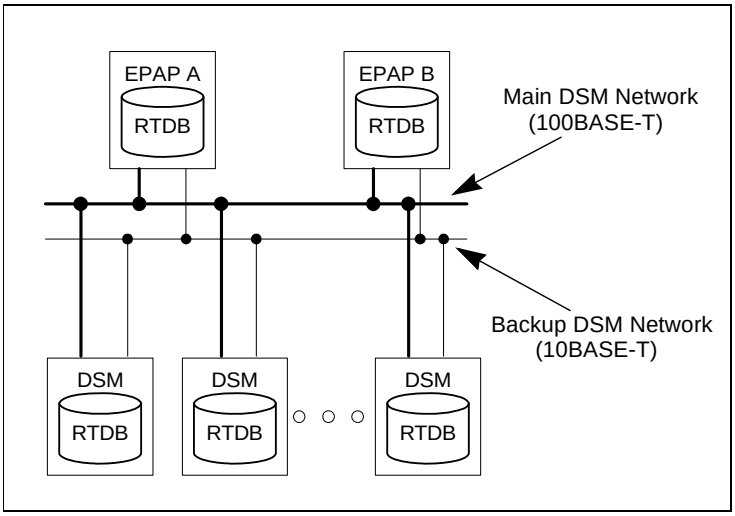


DSM Networks

The DSM networks are shown in Figure 2-4. They carry provisioning data from the Real Time Data Bases (RTDBs) from the active EPAP to the DSM cards. They also carry reload and maintenance traffic to the DSMs.

The DSM networks consist of two Ethernet networks, which are the main DSM network running at 100BASE-T and the backup DSM network running at 10BASE-T. Both Ethernet networks connect EPAP A and EPAP B with every DSM card on a single EAGLE 5 ISS platform.

Figure 2-4. DSM Networks



Maintenance information is sent from the active EPAP to an arbitrarily selected DSM card. The selected DSM is known as the primary DSM. Static information is exchanged across this interface at initialization, and dynamic information is exchanged on occasion.

While much of the traditional OAM provisioning and database functionality is implemented on the EPAP, the maintenance reporting mechanism is still the OAM.

The first and second octets of the EPAP network addresses for this network are 192.168. (The first two octets for private class C networks are defined in RFC 1597.)

The third octet is a customer specifiable for each DSM network. Be sure to select values that do not interfere with the customer's network addressing scheme.

The fourth octet of the address is specified as follows:

- If the EPAP is configured as "EPAP A", the fourth octet has a value of 100.
- If the EPAP is configured as "EPAP B", the fourth octet has a value of 200.

Table 2-1 summarizes the contents of each octet.

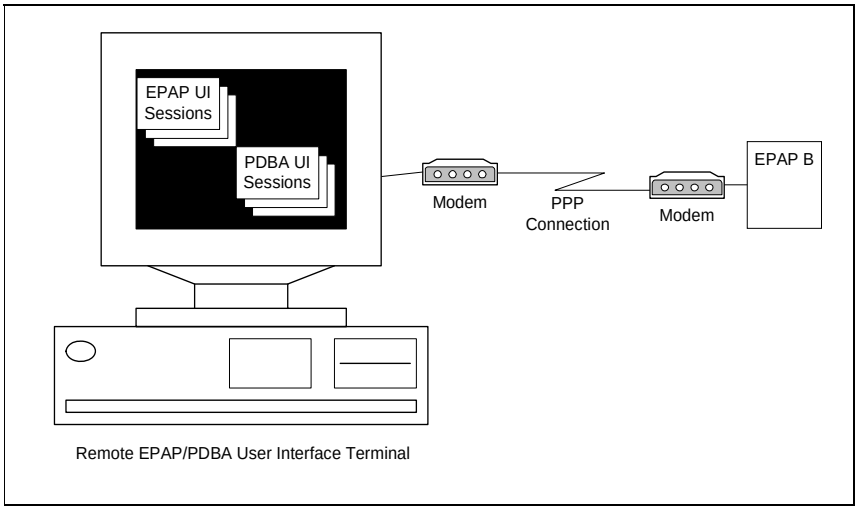
Table 2-1. EPAP IP Addresses in the DSM Network

Octet	Value
1	'192'
2	'168'
3	One customer-provisioned value for DSM network A, and another for DSM network B
4	'100' for EPAP A '200' for EPAP B

Dial-Up PPP Network

The dial-up PPP network, which is not illustrated in Figure 2-1, allows multiple user interface sessions to be established with the EPAP. The network connects a remote EPAP/PDBA user interface terminal with the EPAP in the EAGLE 5 ISS's MPS subsystem. The dial-up PPP network is illustrated in Figure 2-5.

Figure 2-5. Dial-up PPP Network



Serviceability Hints

Receiving INP Data from a National Database

The operator provisioning system (OPS) must address certain concerns when it gets its portability information from a national database.

1. Consider a two-step querying process where all but the recipient network uses a RN that identifies the recipient network and the recipient network itself uses a RN that identifies a particular exchange within its network. In this case, the data from the national database is the RN identifying the recipient network. If the operator is the recipient, its provisioning system must override the “national” RN with the “local” RN.

2. The translation from the national database associated with an RN is to the point of interconnection (POI) for the recipient network. The recipient network operator's provisioning system must override this translation with one that directs non-circuit related messages to the correct signalling point within its network. If this is not done, the result will be either message discard or circular routing.

3. The same problem as item 2 above occurs when the national database provides RNs and associated translations for non-ported numbers. The number range owner's provisioning system must do one of the following:

   - Override the translations to its POI with one that directs non-circuit related messages to the correct signaling points within its network, or
   - Remove the RNs and the associated translations, which activity causes the messages to use normal GTT, or
   - Replace the RN entities with SP entities when G-Flex is used.

4. When bulk loading the national database, the OPS must not wipe out any G-Flex data nor any data change done to solve the above issues.

Signaling Point (SP) Entity ID

Another issue for operators can be resolved by the operator provisioning system (OPS). When the user wants a MR translation for a DN that does not have an RN, an entity ID number for the signalling point must be provided to the PDB even if one is not normally assigned.

Use the OPS to generate a unique ID number for an SP entity when it is entered, and use that number when communicating with the PDB, but identify the entity to the OPS user via other methods. If a number is desired that does not require the use of the OPS to correlate to a specific entity, use the following rule of thumb: Use the PC (converted to a 5-digit decimal number) and SSN to identify the entity, since the PC and SSN, together, are guaranteed to be unique within a network.

This means that if an International PC is used, some method is required to set it off from the National PCs because it is a separate network. One way of doing this is to use an extra digit to specify the network. These examples show how to use a '1' to identify National PCs and '2' to identify International PCs:

- Intermediate GTT to another STP whose PCN = 2345 **`EntityID = 102345`**
- Final GTT to an SCP whose PCN = 2346 and SSN = 5 **`EntityID = 102346005`**
- Final GTT to a different service (SSN = 7) on the same SCP **`EntityID = 102346007`**
- Intermediate GTT to another STP whose PCI = 3-4-5 **`EntityID = 206181`**

Mated Application Considerations

An EPAP-administered entity data can possibly become out-of-sync with the EAGLE 5 ISS mated application table because the creation of entity point codes (and/or subsystem numbers) in the mated application table is not performed at EPAP administration time.

If this mismatch is discovered at real time, a UIM message (such as "SCCP did not route - DPC not in MAP tbl" or "SCCP did not route - SS not in MAP tbl") is sent to the EAGLE 5 ISS maintenance terminal. This message means the MSU was discarded.

For this reason, it is recommended that the entity (SP or RN) not be administered until the entity PC (and/or SSN) has been entered into the EAGLE 5 ISS mated application (MAP) table.

Entity Point Codes and Routes

Verification that an entity point code exists in the route table and has a route is not performed at database administration time. Therefore, it is possible for the EPAP entity data to be out-of-sync with the EAGLE 5 ISS route table.

If an out-of-sync condition is discovered at real time, a UIM is sent to the EAGLE 5 ISS maintenance terminal, indicating one of these conditions:

- Destination point code is not in the route table.
- Destination point code exists in the route table but is not assigned a route.
- Destination point code exists in the route table and has been assigned a route, but it is out of service.

For this reason, it is recommended that the entity not be administered until the entity PC (and/or SSN) has been entered into the EAGLE 5 ISS route table.

Provisioning of Routing Number Prefix of the Node (HOMERN)

When the portability cluster uses RN prefixes for relayed messages, a message for a ported-in number arrives at the EAGLE 5 ISS with an RN prefixed to the DN in the CDPA. In this case, the RN is one of the RNs for the EAGLE 5 ISS operator's network.

Because the database contains only the DN, the following logic is performed to remove the RN before performing the database look-up:

- When the SNAI (from SRVSEL entry) for a message is RNSDN, RNNDN, or RNIDN, the EAGLE 5 ISS searches all Home RNs (HRNs) entered by the operator for a match with the same number of leading digits in the CDPA.
- If one or more matches are found, the match with the greatest number of digits is considered the HRN for that message. The CDPA digits matching the HRN are removed from the CDPA for database look-up purposes.
- If a matching HRN is not found, the entire string of the received digits (except for any ST digit on the end) is considered for the database look-up. If the database does not contain that entry, the database searching fails, resulting in the MSU being handled by GTT.

Because the correct removal of RN prefixes depends on the data entered by the operator, care must used:

- First, all combinations of service selectors for incoming INP MR messages with RN prefixes should have the appropriate SNAI (RNSDN, RNNDN, or RNIDN).
- Second, all RNs to be removed should be entered by the HOMERN command.

Messages without an RN prefix can, in some cases, use the same selector values as messages with RN prefixes. If so, the SNAI must be set to RNxDN, but the leading CDPA digits of the non-prefix messages *must not match* any HOMERN entries. If the digits do match, that part of the DN is removed before database look-up, resulting in the database look-up failing to find the full DN.

Provisioning the INP Number Normalization

When the MSC/SSP uses prefixed CDPN in the queries, a message arrives at the INPQ with a prefixed CDPN number. The prefix in this case is (one of) the prefix(es) defined in the **`chg-inpopts`** commands.

The operator must take care because the correct removal of prefixes depends on the content of the data that is entered. All prefixes to be removed from the CDPN are entered by the **`chg-inpopts`** command. It is possible that CDPNs without a prefix can have the same first digits as the prefix digits. If the digits match, that portion of the DN would be removed before database look up, which situation would result in a failure of the database look-up finding the full DN.

The following logic is performed to remove the prefix before doing a database look up.

- When any prefix(es) are provisioned in **chg-inpopts**, the decoded INAP CDPN digits are compared with the list of provisioned prefixes.
- If a matching prefix is found, INP strips the prefix digits from the number.
- If a matching prefix is not found, the entire string of the received digits, except for any ST digit on the end, is considered for the database look up without stripping the prefix.
- Number conditioning, if required, is applied after deleting the prefix.

Provisioning the INPQ Service NAI

When the MSC/SSP uses one of the non-standard values for CDPN NAI or intends INPQ to treat a standard NAI value differently, the CDPN NAI is defined by the **cdpnnai** parameter in the **chg-inpopts** command with a corresponding service NAI (SNAI). If the CDPN NAI is not specified in the **chg-inpopts** command, SNAI is treated as national unless CDPN NAI is subscriber or international. INPQ performs any number conditioning based on the SNAI value and converts the CDPN digits to international number.

Since the correct use of **cdpnnai** depends on the data entered in **chg-inpopts** and in the EPAP database, the operator must exercise care in the entering data consistent with the features provisioned.

Two UIMs for One MSU

A MSU that is invalid for INP MR, which consequently falls through to the GTT, may result in two UIMs being issued. For example, the first UIM results from the INP MR due to a number conditioning error. The second results from the GTT, due to a routing failure or a translation not provisioned for the GTAI.

In these cases, one UIM may not be issued because of frequency limiting. For example, the frequencies for a MR UIM and a PC Unavailable UIM are one message every 200 milliseconds. In the case of two problems with one MSU, the UIMs occur within microseconds of each other, so that one of the UIMs is not printed. It is the timing of UIMs with regard to any UIMs for other MSUs that determines which, if either, is printed. In the example, assuming no UIMs occurred in the previous 200 ms for any other MSUs, the INP MR is printed because it was generated first.

INP Message Protocol

Primary INP Functions

INP provides the following main functions:

- *Message discrimination*: INP translates ported numbers, and consequently can differentiate between messages for INP or other services. Discrimination is performed via a service selector table where you can define the INP service for a combination of selectors. These selectors define whether INP Message Relay or INP Query is to be performed on an incoming message.
- *Number conditioning*: Because the subscriber database stores international DNs only, INP can condition incoming numbers to be international DNs by inserting a default CC and/or a default NDC for the database look up.
    - If the service is INPMR and SNAI is either a RNSDN or RNNDN or RNIDN, INP strips off the RN prefix if it matches the home network RN prefix and then conditions the number, if needed, before performing a database lookup.
    - If the service is INPQ and the message is destined to the INP subsystem, INPQ strips off CDPN prefix if it matches the **`cdpnpfx`** parameters defined in the **`chg-inpopts`** command, and then condition, if needed, before performing a database lookup.
- *Connect Response:* INPQS generates a Connect response for an InitialDP message if the conditioned number is found in the subscriber database lookup. INP uses the routing number (RN) associated with the DN entry to build the Destination Routing Address number equal to RN+DN or the RN only, based on the INPOPTS DRA parameter.
- *Continue Response:* A Continue response is generated for an InitialDP message if the conditioned number is not found in the subscriber database lookup.
- *INP Message Relay:* INP performs Message Relay when a combination of service selectors (like domain (ITU or ANSI), Global Title Indicator (GTI), Translation Type (TT), Numbering Plan (NP), and Nature of Address Indicator (NAI)) indicate INP Message Relay is to be performed. If the translation data exists, INP Message Relay either:
    - Provides the ability to prefix the entity ID to the CDPA digits after deleting any home RN prefix, or
    - Replaces the CDPA digits with the RN prefix, or
    - Performs no change to the CDPA digits.

The Stages of INP Execution

INP is performed in the following stages:

1. The message arrives at EAGLE 5 ISS. If the CDPA RI is *route-on-gt*, continue here. If not, go to step 4.

   - The SCCP portion is decoded; the data is used to perform the service selection, based on the CDPA GT fields other than ES and GTAI.
   - The result of this selection identifies the SNAI and SNP to be used for INP and also specifies if INP Message Relay or INP Query is to be performed on the message. If a selector does not match the incoming GT fields, then GTT is performed.

2. If stage 1 indicates INP is required and the message is not a UDTS (Unit Data Transfer Service) generated by EAGLE 5 ISS:

   - The remaining SCCP portion is decoded.
   - If INP Query is required, the TCAP and INAP portions are also decoded.
   - If the message is a UDTS generated by the EAGLE 5 ISS, GTT is performed on the message.

3. If the service indicator is INP Message Relay:

   - If SNAI is either RNSDN or RNNDN or RNIDN, the leading digits of the DN number from the SCCP portion of the message are checked for the Home Routing Number (HOMERN), if any are provisioned. If found, INP strips off the HOMERN and condition the DN to be an international number.
   - The conditioned number's length is validated and the number is looked up in the subscriber database. First, the individual number database is searched. If the number is absent, the number range database is searched.
   - If the number is found, the EAGLE 5 ISS uses the Message Relay GT information from the associated entity and prefixes the entity ID to the DN if specified or, based on the option, can replace the CDPA digits with the entity ID or leave the DN unchanged. If no entity is associated with the DN or if the entity does not have translation (MR) data, he GTT is performed on the message.
   - If no match is found for the conditioned number in the subscriber database, GTT is performed on this message.
   - If the DPC in the translation data is the EAGLE 5 ISS's Point Code or is for a different domain that the message (i.e., ANSI vs. ITU or ITU vs. ANSI), a UDTS is sent and the processing stops here.

4. If the service indicator is INP Query:

   - INP allows only the messages with InitialDP as the INAP op-code.
   - If the INAP op-code is InitialDP, INP decodes the CDPN parameter and performs number conditioning to convert the INAP CDPN to an international number. This operation is performed in these steps:

     a. Leading digits of the CDPN number from the INAP portion of the message are checked for the prefixes (**`cdpnpfx`**), if any are provisioned. If any are found, INP strips the prefix from the CDPN digits.

     b. When the prefix is striped, INP maps the CDPN NAI to the Service NAI by doing a lookup in the INPOPTS table. If the CDPN NAI is entered in the INPOPTS table, its corresponding SNAI value is used for number conditioning. Otherwise, INP treats the number as national (**`natl`**), unless the NAI field in the CDPN is subscriber (**`sub`**) or international (**`intl`**).

   - The conditioned number's length is validated, and the number is looked up in the subscriber database. First, the individual number database is searched. If the number is absent, the number range database is searched.
   - If the number is found and is associated with an RN entity, INP generates a Connect message as response with the Destination Routing Address as RN or RN+DN, depending on the provisioned option. Otherwise, a Continue message as response is sent.
   - If the number is not found, INP generates a Continue message.

3

EAGLE 5 ISS INP Commands

Introduction

This chapter describes the EAGLE 5 ISS Commands used for maintenance, measurements, and administration of the INP features. EAGLE 5 ISS INP commands provide for the provisioning, operations, and maintenance activities of the EAGLE 5 ISS DSM cards and associated network connections.

EAGLE 5 ISS Commands for INP

This section provides a description of the user interface for maintenance, operations, and measurements commands for the INP features. The commands that follow allow provisioning, operations, and maintenance activities for DSM cards.

Complete descriptions of these commands are shown in detail in the *Commands Manual*, including parameter names, valid values, and output examples for the commands.

Commands

The command examples shown illustrate the requirements and provide suggestions for suitable names and output. The commands are described in detail in the *Commands Manual*, where the actual parameter names, valid values, and output for the commands are provided.

Commands described in this section include:

- chg-stpopts / rtrv-stpopts
- ent-srvsel / dlt-srvsel / chg-srvsel / rtrv-srvsel
- ent-homern / dlt-homern / rtrv-homern
- chg-sid / rtrv-sid
- chg-feat / rtrv-feat
- rept-stat-sys
- rept-stat-sccp
- rept-stat-mps
- rept-meas
- chg-measopts
- rept-stat-meas
- rept-ftp-meas
- rtrv-measopts
- rept-stat-trbl
- rept-stat-alm
- rept-stat-db
- ent-cspc / dlt-cspc / rtrv-cspc
- chg-inpopts / rtrv-inpopts
- inh-card / alw-card
- ent-card / rtrv-card / dlt-card
- ent-map / dlt-map / chg-map / rtrv-map
- alw-map-ss / inh-map-ss
- ent-ss-appl / chg-ss-appl / dlt-ss-appl / rtrv-ss-appl
- chg-gpl / act-gpl / rtrv-gpl / rept-stat-gpl / copy-gpl
- inh-alm / unhb-alm
- chg-ip-card / rtrv-ip-card
- chg-ip-lnk / rtrv-ip-lnk
- ent-ip-host / dlt-ip-host / rtrv-ip-host
- pass, including ping, netstat, nslookup, arp, and help commands

chg-stpopts / rtrv-stpopts

The STP system options commands (**stpopts**) change and display STP wide options in the EAGLE 5 ISS database. It has two variations, each of which is described in the following: **chg-stpopts** and **rtrv-stpopts**.

The **chg-stpopts** command changes STP system options in the database. This command updates the STPOPTS table. The **defcc** and **defndc** parameters are used to convert non-international numbers received in the MSU to an international number. The parameters can only be changed if the G-Port, G-Flex, or INP feature bit is ON.

The **chg-stpopts** command is also used to configure the EAGLE 5 ISS send the `Connect` or `Continue` message when an IDP message is received for INP service

The **rtrv-stpopts** command is used to retrieve all STP options from the database. This command updates the STPOPTS table. The **defcc** and **defndc** parameters are the additional options displayed when the G-Port, G-Flex, or INP feature bit is ON.

For further details on using these commands, refer to the *Commands Manual*.

ent-srvsel / dlt-srvsel / chg-srvsel / rtrv-srvsel

The INP service selector (**srvsel**) commands are used to provision new selectors for the INP service, providing greater flexibility when provisioning the type of messages that require INP processing. There are four variants, each of which is described in the following sections: **ent-srvsel**, **chg-srvsel**, **dlt-srvsel**, and **rtrv-srvsel**. For further details on the EAGLE 5 ISS INP service selector commands (such as command rules and output format), refer to the *Commands Manual*.

ent-homern / dlt-homern / rtrv-homern

These commands allow you to provision, remove, and report on the up-to-100 routing number prefixes for the operating network in the HOMERN table. Refer to the *Commands Manual* for details of these commands.

chg-sid / rtrv-sid

These commands are used to change and report on the self-identification of the EAGLE 5 ISS. The self-identification identifies the EAGLE 5 ISS to other signaling points in the network. Refer to the *Commands Manual* for details of these commands.

chg-feat / rtrv-feat

The **chg-feat** command administers the INP feature. The **chg-feat** command is used to activate optional features available for the system. Features can only be turned on. Once the feature is activated, it cannot be turned off. The **chg-feat** command also provides the processor, DRAM, and disk capacity validation required to support the INP feature. This command updates the MAS configuration table.

The **rtrv-feat** command is used to display the feature status for the INP feature. An example of command output follows.

```
tekelecstp 99-04-02 14:23:37 EST EAGLE 35.0.0
    EAGLE FEATURE LIST

    GTT      = on      GWS      = off     NRT      = off
    X25G     = off     LAN      = off     CRMD     = off
    SEAS     = off     LFS      = off     MTPRS    = off
    LNP      = on      FAN      = off     DSTN4000 = off
    WNP      = off     CNCF     = off     LNP12MIL = off
    TLNP     = off     SCCPCNV  = off     TCAPCNV  = off
    X252000  = off     PLNP     = off     NCR      = off
    ITUMTPRS = off     SLSOCB   = off     EGTT     = off
    IPISUP   = on      DYNRTK   = on      PVGTT    = off
    PRFXDLGT = on      MPC      = on      INP      = on
    ITUDUPPC = on      GFLEX    = off     GPORT    = on
;
```

For further details on these commands, please refer to the *Commands Manual*.

rept-stat-sys

The **rept-stat-sys** command is used to determine the location of troubles in the system. The display shows the number of these items that are in service (IS-NR) and how many are in another state (IS-ANR, OOS-MT, OOS-MT-DSBLD).

rept-stat-sccp

This command is used to display the status of the SCCP and VSCCP cards and the GTT (Global Title Translation), G-Flex (GSM Flexible Numbering), G-Port (GSM Mobile Number Portability), INP (INAP-based Number Portability), and EIR (Equipment Identity Register) services executing on those cards. This command also displays any cards that are denied SCCP service.

Here are two sample commands and their outputs.

- **rept-stat-sccp**

```
    Command entered at terminal #3.
;

   tekelecstp 00-06-23 13:34:22 EST EAGLE 35.0.0-30.10.0
    SCCP SUBSYSTEM REPORT IS-NR          Active      -----
    GSM  SUBSYSTEM REPORT IS-NR          Active      -----

    SCCP Cards Configured= 4  Cards IS-NR= 2  Capacity Threshold = 100%
    CARD   VERSION      PST          SST          AST       MSU USAGE  CPU USAGE
------------------------------------------------------------------------------
    1212   101-001-000  IS-NR        Active       ALMINH       45%         30%
    1301   101-001-000  IS-NR        Active       ------       35%         20%
    1305   -----------  OOS-MT       Isolated     ------        0%          0%
    2112   -----------  OOS-MT-DSBLD Manual       ------        0%          0%
------------------------------------------------------------------------------
    SCCP Service Average MSU Capacity = 40%       Average CPU Capacity = 25%

    AVERAGE CPU USAGE PER SERVICE:
      GTT   = 15%  GPORT =  5%  GPORT =  10%
      INPMR =  2%  INPQS =  3%

    TOTAL SERVICE STATISTICS:
      SERVICE    SUCCESS    ERRORS    WARNINGS    FORWARD TO GTT    TOTAL
      GTT:          1995         5           -                 -     2000
      GFLEX:         500         1           4                10      515
      GPORT:         800         0           2                 3      800
      INPMR:          50         5           1                15       70
      INPQS:         499         1           -                 -      500

    Command Completed.
;
```

- **rept-stat-sccp:loc=1106**

```
Command entered at terminal #4.
;
    tekelecstp 00-06-23 13:34:22 EST EAGLE 35.0.0-33.10.0
    CARD  VERSION      TYPE    PST          SST       AST
    1106  103-010-000  DSM     IS-NR        Active    -----
      ALARM STATUS       = No Alarms.
      GTT:   STATUS = ACT       MSU USAGE = 10%
      GFLEX: STATUS = ACT       MSU USAGE = 10%
      GPORT: STATUS = ACT       MSU USAGE = 10%
      INPMR: STATUS = ACT       MSU USAGE = 13%
      INPQS: STATUS = ACT       MSU USAGE = 20%
CPU USAGE = 15%

    CARD SERVICE STATISTICS:
      SERVICE    SUCCESS    ERRORS    WARNINGS    FORWARD TO GTT    TOTAL
      GTT:          1995         5           -                 -     2000
      GFLEX:         500         1           4                10      515
      GPORT:         500         1           4                10      515
      INPMR:          50         2           3                15       70
      INPQS:         499         1           -                 -      500

   Command Completed.
;
```

rept-stat-mps

This command is used to display the overall status of the application running on the MPS (multi-purpose server).

- If the LNP ELAP Configuration feature is turned on, the status of the ELAP (EAGLE LNP Application Processor) subsystem is displayed.
- If the INP (INAP number portability) feature is turned on, the status of the EPAP (EAGLE Provisioning Application Processor) subsystem is displayed.
- If the G-Port (GSM mobile number portability) feature or G-Flex (GSM flexible numbering) feature is turned on, the status of the GSM (Global System for Mobile Telecommunications) and the EPAP (EAGLE Provisioning Application Processor) is displayed.
- If the EIR (Equipment Identity Registser) feature is enabled and turned on, the status of the EIR component on the card is displayed.

A sample command and the associated output follows:

- **rept-stat-mps**

```
Command entered at terminal #4.
```

```
rlghncxa03w 01-03-07 10:23:93 EST  EAGLE 31.6.0
                   VERSION       PST            SST        AST
EPAP A             027-015-000   IS-NR          Active     -----
    CRITICAL PLATFORM    ALARM DATA = No Alarms
    MAJOR    PLATFORM    ALARM DATA = No Alarms
    MINOR    PLATFORM    ALARM DATA = No Alarms
    CRITICAL APPLICATION ALARM DATA = No Alarms
    MAJOR    APPLICATION ALARM DATA = No Alarms
    MINOR    APPLICATION ALARM DATA = No Alarms
          ALARM STATUS = No Alarms

                   VERSION       PST            SST        AST
EPAP B             027-015-000   IS-NR          Standby    -----
    CRITICAL PLATFORM    ALARM DATA = No Alarms
    MAJOR    PLATFORM    ALARM DATA = No Alarms
    MINOR    PLATFORM    ALARM DATA = No Alarms
    CRITICAL APPLICATION ALARM DATA = No Alarms
    MAJOR    APPLICATION ALARM DATA = No Alarms
    MINOR    APPLICATION ALARM DATA = No Alarms
          ALARM STATUS = No Alarms

CARD   PST          SST       INP STAT
1106 P IS-NR        Active    ACT
1201   IS-ANR       Active    SWDL
1205   OOS-MT-DSBLD Manual    -------
1302   OOS-MT       Isolated  -------
1310   IS-ANR       Standby   SWDL

CARD 1106 ALARM STATUS = No Alarms
  DSM PORT A:      ALARM STATUS       = No Alarms
  DSM PORT B:      ALARM STATUS       = No Alarms
CARD 1201 ALARM STATUS = No Alarms
  DSM PORT A:      ALARM STATUS       = **  0084 IP Connection Unavailable
  DSM PORT B:      ALARM STATUS       = **  0084 IP Connection Unavailable
CARD 1205 ALARM STATUS = No Alarms
  DSM PORT A:      ALARM STATUS       = **  0084 IP Connection Unavailable
  DSM PORT B:      ALARM STATUS       = **  0084 IP Connection Unavailable
CARD 1302 ALARM STATUS = ** 0013 Card is isolated from the system
  DSM PORT A:      ALARM STATUS       = **  0084 IP Connection Unavailable
  DSM PORT B:      ALARM STATUS       = **  0084 IP Connection Unavailable
CARD 1310 ALARM STATUS = No Alarms
  DSM PORT A:      ALARM STATUS       = **  0084 IP Connection Unavailable
  DSM PORT B:      ALARM STATUS       = **  0084 IP Connection Unavailable

Command Completed.
;
```

rept-meas

This command is used to generate measurement reports on demand. The reports display on the UI terminal, and are not transferred to the customer FTP server when the Measurements Platform feature is enabled. Refer to the *Commands Manual* for details of this command.

chg-measopts

Used to enable or disable the automatic generation and FTP transfer of scheduled measurement reports to the FTP server. Refer to the *Commands Manual* for details of this command.

rept-stat-meas

Reports the status of the measurements subsystem including card location and state, Alarm level, and Subsystem State. Refer to the *Commands Manual* for details of this command.

rept-ftp-meas

Manually initiates generation and FTP transfer of a measurements report from the MCPM to the FTP server. Refer to the *Commands Manual* for details of this command.

rtrv-measopts

Generates a user interface display showing the enabled/disabled status of all FTP scheduled reports. Refer to the *Commands Manual* for details of this command.

rept-stat-trbl

This command is used to display a summary report of all the device trouble notifications that are logged currently in the OAM's RAM storage area.This command includes the INP subsystem and DSM/EPAP IP link alarms. Refer to the *Commands Manual* for details of this command. Here is an example of the command and output.

```
rept-stat-trbl

Command Accepted - Processing
    eagle10605 99-06-24 14:34:08 EST EAGLE 35.0.0
    rept-stat-trbl
    Command entered at terminal #10.
;
    eagle10605 99-06-24 14:34:08 EST EAGLE 35.0.0
    Searching devices for alarms...
;
```

```
    eagle10605 99-06-24 14:34:09 EST EAGLE 35.0.0
    SEQN UAM  AL DEVICE   ELEMENT      TROUBLE TEXT
    0002.0143  * CARD 1113 OAM         System release GPL(s) not approved
    0011.0176  * SECULOG 1116          Stdby security log -- upload required
    3540.0203 ** SLK 1201,A lsn1       REPT-LKF: lost data
    3541.0203 ** SLK 1201,B lsn4       REPT-LKF: lost data
    3542.0203 ** SLK 1202,A lsn2       REPT-LKF: lost data
    3544.0202 ** SLK 1203,A lsn3       REPT-LKF: HWP - too many link interrupts
    0021.0318 ** LSN lsn1              REPT-LKSTO: link set prohibited
    0022.0318 ** LSN lsn2              REPT-LKSTO: link set prohibited
    0023.0318 ** LSN lsn3              REPT-LKSTO: link set prohibited
    0010.0318 ** LSN lsn4              REPT-LKSTO: link set prohibited
    3537.0084 ** DSM A   1215          IP Connection Unavailable
    3536.0084 ** EPAP B   7100         IP Connection Unavailable
    0003.0313 *C DPC 010-010-003       DPC is prohibited
    0004.0313 *C DPC 010-010-004       DPC is prohibited
    0005.0313 *C DPC 010-010-005       DPC is prohibited
    0028.0313 *C DPC 252-010-001       DPC is prohibited
    0006.0313 *C DPC 252-010-003       DPC is prohibited
    0008.0313 *C DPC 252-010-004       DPC is prohibited
    0009.0313 *C DPC 252-011-*         DPC is prohibited
    0029.0308 *C SYSTEM                Node isolated due to SLK failures
Command Completed.
;
```

rept-stat-alm

This command is used to provide status of all alarms. This includes the alarm totals of the INP subsystem and DSM/EPAP IP links. Refer to the *Commands Manual* for details of this command. Here is an example of the command and output.

rept-stat-alm

```
Command Accepted - Processing

    eagle10605 99-06-24 23:59:39 EST EAGLE 35.0.0
    rept-stat-alm
    Command entered at terminal #10.
;

    eagle10605 99-06-24 23:59:39 EST EAGLE 35.0.0
    ALARM  TRANSFER= RMC
    ALARM  MODE      CRIT= AUDIBLE     MAJR= AUDIBLE     MINR= AUDIBLE
    ALARM  FRAME 1     CRIT=   9         MAJR=  12         MINR=   2
    ALARM  FRAME 2     CRIT=   0         MAJR=   0         MINR=   0
    ALARM  FRAME 3     CRIT=   0         MAJR=   0         MINR=   0
    ALARM  FRAME 4     CRIT=   0         MAJR=   0         MINR=   0
    ALARM  FRAME 5     CRIT=   0         MAJR=   0         MINR=   0
    ALARM  FRAME 6     CRIT=   0         MAJR=   0         MINR=   0
    ALARM  FRAME GPF   CRIT=   1         MAJR=   2         MINR=   1
    PERM. INH. ALARMS  CRIT=   0         MAJR=   0         MINR=   0
    TEMP. INH. ALARMS  CRIT=   0         MAJR=   0         MINR=   0
    ACTIVE ALARMS      CRIT=  10         MAJR=  14         MINR=   3
    TOTAL ALARMS       CRIT=  10         MAJR=  14         MINR=   3
    Command Completed.
;
```

rept-stat-db

This command displays both EAGLE 5 ISS and INP database status and level information for each DSM network card, and for the active and standby EPAP databases. It reports database exception status such as corrupted, incoherent, or inconsistent, as well as providing the birthdates and levels. For details about this command, refer to the *Commands Manual*.

inh-card / alw-card

The *inh-card* command is used to change the state of the card from in-service normal (IS-NR) to Out-of-Service Maintenance-Disabled (OOS-MT-DSBLD). A craftsperson then can test the DCM/LIM/ACM/ASM/DSM/GPSM-II/MIM card or physically remove it from the shelf.

The *alw-card* command is used to change the card from OOS-MT-DSBLD (out-of-service maintenance-disabled) to IS-NR (in-service normal) if the loading is successful.

Refer to the *Commands Manual* for details of these commands.

ent-card / rtrv-card / dlt-card

The *ent-card* command is used to add a card to the database. The card type and application specifies the function assigned to the card.

The *rtrv-card* command is used to display the information about a card. This command displays thecard type, the application the card is running, the linkset name, the signaling link code, and the ports.

The *dlt-card* command is used to remove a card entry from the system database.

Refer to the *Commands Manual* for details on using these commands.

ent-map / dlt-map / chg-map / rtrv-map

These commands are used to provision, remove, change, and report on the mate point code and subsystem number and its attributes. A mate point code defines an adjacent signaling point, which is considered the mated signal transfer point (STP) to the EAGLE 5 ISS. Refer to the *Commands Manual* for details of these commands.

alw-map-ss / inh-map-ss

The *alw-map-ss* command is used to allow the INP subsystem which brings the subsystem back on-line. The command is rejected if the subsystem specified with the SSN parameter is not the INP subsystem. The current state of the INPQS or EIR subsystem must be OOS-MT-DSBLD (out of service maintenance disabled) in order for the command to be accepted.

When the *inh-map-ss* is entered for the INP subsystem, a coordinated shutdown is attempted. If the coordinated shutdown fails, a UIM is output indicating the shutdown failed. If the FORCE parameter is specified, the specified subsystem is forced to shutdown. A coordinated shutdown is not performed.

Refer to the *Commands Manual* for details of these commands.

ent-ss-appl / chg-ss-appl / dlt-ss-appl / rtrv-ss-appl

These commands are used to provision, remove, change, and report on the entry of a subsystem number for an application and set the application status online or offline. Only one subsystem can be defined per application, and the application must be unique. This command adds new subsystem application value for INP.

Refer to the Commands Manual for details of these commands.

chg-gpl / act-gpl / rtrv-gpl / rept-stat-gpl / copy-gpl

The *chg-gpl* command is used to copy a generic program load from the source disk to the destination disk (both active and standby disks). The new GPL becomes the trial version on each of the destination disks. This command also copies the system release table to the fixed disks.

The *act-gpl* command is used to change the status of the trial GPL from “trial” to “approved.” The status of the previously approved GPL is changed to “trial.”

The *rtrv-gpl* command is used to show the version numbers of the GPLs stored on each fixed disk (TDM) or removable cartridge (MDAL, if available) and the system release table stored on each fixed disk.

The *rept-stat-gpl* command is used to display the version of GPLs currently running for an application, plus the approved and trial versions of the GPL that will run if the card is restarted.

The *copy-gpl* command is used to copy all approved GPLs from one drive to another. The GPLs can be copied only from the fixed disk on the active TDM to the removable cartridge, or from the removable cartridge to the fixed disk on the standby TDM.

Refer to the *Commands Manual* for details of these commands.

Here are samples of the reports produced by these commands.

```
chg-gpl:appl=vsccp:ver=101-3-0

    Command entered at terminal #3.
;
    tekelecstp 99-10-24 06:54:39 EST EAGLE 35.0.0
    VSCCP upload to 1114 completed
    VSCCP upload to 1116 completed
;
```

```
act-gpl:appl=vsccp:ver=101-3-0

    Command entered at terminal #3.
;
    tekelecstp 99-10-24 06:54:39 EST EAGLE 35.0.0
    VSCCP activate on 1114 completed
    VSCCP activate on 1116 completed
;
```

```
rtrv-gpl:appl=vsccp

    Command entered at terminal #3.
;
    tekelecstp 99-10-04 07:01:08 EST EAGLE 35.0.0
    GPL Auditing  ON

    APPL  CARD  RELEASE      APPROVED         TRIAL        REMOVE TRIAL
    VSCCP 1114  101-001-000  101-003-000      101-001-000  101-003-000
    VSCCP 1116  101-001-000  101-003-000      101-003-000  -----------
;
```

```
rept-stat-gpl:appl=vsccp

    Command entered at terminal #3.
;
    tekelecstp 99-10-04 12:55:50 EST EAGLE 35.0.0
    APPL  CARD      RUNNING            APPROVED      TRIAL
    VSCCP 1205      101-003-000 ALM    101-003-000   101-003-000
    VSCCP 1211      101-001-000 ALM+   101-003-000   -----------
    Command Completed.
;
```

ent-cspc / dlt-cspc / rtrv-cspc

These commands are used to provision, remove, and report on the broadcast concerned signaling point code groups. These point codes are notified of the receipt by EAGLE 5 ISS of subsystem-prohibited and subsystem-allowed SS7 SCCP management messages from an application at an adjacent signaling point and subsystem. Refer to the *Commands Manual* for details of these commands.

chg-inpopts / rtrv-inpopts

These commands are used to change and report on the INP-specific data. These commands provision and report on the contents of the INPOPTS table. Refer to the *Commands Manual* for details of these commands.

inh-alm / unhb-alm

The *inh-alm* command is used inhibit the reporting of alarms for the given device. Inhibited alarms will not generate unsolicited output or cause alarm indicators to be turned on. All *rept-stat-xxx* commands continue to display the alarm with an indication that the device has its alarms inhibited.

The *unhb-alm* command is used to restore the reporting of alarms for the given device.

Refer to the *Commands Manual* for details of using these commands.

chg-ip-card / rtrv-ip-card

The *chg-ip-card* command is used to provision the Internet Protocol networking parameters for any given DSM card.

The *rtrv-ip-card* command is used to report on the Internet Protocol networking parameters for any given DSM card.

Refer to the *Commands Manual* for details of these commands.

chg-ip-lnk / rtrv-ip-lnk

The *chg-ip-lnk* command is used to provision the Internet Protocol link table.

The *rtrv-ip-lnk* command is used to report on the Internet Protocol link table.

Refer to the *Commands Manual* for details of these commands.

ent-ip-host / dlt-ip-host / rtrv-ip-host

These commands are used to provision, remove, and report on the entries in the Internet Protocol host table. The IP host table defines local and remote host names for IP addresses.

Refer to the *Commands Manual* for details of these commands.

pass

The **pass** command allows remote execution of a selected command by the targeted card. (These commands recognize the DSM boards.) Selected commands are allowed as follows.

- **pass:cmd="ping"**
- **pass:cmd="netstat"**
- **pass:cmd="nslookup"**
- **pass:cmd="arp"**
- **pass:cmd="help"**

For this feature, the **loc** parameter must be a VSCCP card location. For other details of the pass command, refer to *Commands Manual*.

pass: cmd="Ping"

The **'ping' pass** command supports troubleshooting of the private EPAP/DSM IP network. The following example demonstrates typical usage.

```
    eagle10506 99-08-11 08:43:45 EST EAGLE 35.0.0

    pass:loc=1215:cmd="ping     -h"
    Command entered at terminal #2.
;

    eagle10506 99-08-11 08:43:45 EST EAGLE 35.0.0
    PASS: Command sent to card
;

    eagle10506 99-08-11 08:43:45 EST EAGLE 35.0.0

    Usage: ping <hostname | ipaddr> [-h] [-i size] [-n count]
    Options:
    -h        Displays this message
    -i count  Number of pings to send. Range=1..5. Default=3.
    -n size   Sets size of ICMP echo packet. Range=12..2048. Default=64.
    hostname  Name of machine to ping
    ipaddr    IP Address of machine to ping (d.d.d.d)

;
```

pass:cmd="netstat"

The **'netstat' pass** command supports troubleshooting of network interface and routing configuration problems within the private EPAP/DSM IP network.

The following examples demonstrate typical usage.

```
    eagle10506 99-08-11 08:43:00 EST EAGLE 35.0.0

    pass:loc=1215:cmd="netstat  -h"

    Command entered at terminal #2.
;

    eagle10506 99-08-11 08:43:00 EST EAGLE 35.0.0

    PASS: Command sent to card
;

    eagle10506 99-08-11 08:43:00 EST EAGLE 35.0.0

    Usage: netstat [-a] [-i] [-h] [-m data|sys|dd] [-p icmp|ip|tcp|udp] [-r]

    Options:
        -a        display socket information for all protocols
        -h        Displays this message
        -i        display interface information for all interfaces
        -m        display buffer pool information for 1 of the system pools
        -p        display socket information for 1 of the protocols
        -r        display the route table information
;
```

pass:cmd="nslookup"

The **'nslookup' pass** command supports debugging of domain name server (DNS) to IP addressing tables. DNS is not supported for EPAP cards for the initial release.

The following examples demonstrate typical usage.

```
    eagle10506 99-08-11 08:45:57 EST EAGLE 35.0.0

    pass:loc=1215:cmd="nslookup"
    Command entered at terminal #2.
;

    eagle10506 99-08-11 08:45:57 EST EAGLE 35.0.0
    PASS: Command sent to card
;

    eagle10506 99-08-11 08:45:57 EST EAGLE 35.0.0

    Usage: nslookup [hostname|ipaddr]

    Options:
        hostname  String name
        ipaddr    d.d.d.d
;
```

pass:cmd="arp"

The **'arp' pass** command supports the verification of and correction of IP stack ARP tables. In general, this command is not required for normal operation.

The following examples demonstrates typical usage.

```
    eagle10506 99-08-11 08:43:23 EST EAGLE 35.0.0
    pass:loc=1215:cmd="arp      -h"
    Command entered at terminal #2.
;

    eagle10506 99-08-11 08:43:23 EST EAGLE 35.0.0
    PASS: Command sent to card
;

    eagle10506 99-08-11 08:43:23 EST EAGLE 35.0.0

    Usage: arp [-a] [-d ipaddr] [-f] [-h] [-s ipaddr enetaddr]

    Options:
        -a        Display All entries in ARP table
        -d        Delete specified entry (ipaddr) from ARP table
        -f        Flush all entries from ARP table
        -h        Displays this message
        -s        Set ARP table entry to associate ipaddr with enetaddr
        enetaddr  x:x:x:x:x:x
        ipaddr    d.d.d.d
;

    eagle10506 99-08-11 08:43:25 EST EAGLE 35.0.0
```

```
    ARP command complete
;
```

pass:cmd="help"

The **'help' pass** command provides a list of supported **pass** commands for the target location.

The following examples demonstrates typical usage.

```
    eagle10506 99-08-11 08:42:18 EST EAGLE 35.0.0
    pass:loc=1215:cmd="help"
    Command entered at terminal #2.
;

    eagle10506 99-08-11 08:42:18 EST EAGLE 35.0.0
    PASS: Command sent to card
;

    eagle10506 99-08-11 08:42:18 EST EAGLE 35.0.0
    List of commands supported is:
    nslookup
    netstat
    arp
    ping
    help

    END of LIST
;
```

System Debug Services (SDS) Commands

The following section describes SDS command **ent-trace** used with INP.

MSU Trap and Trace Command

INP uses the existing **ent-trace** command to provide a trap-and-trace function for MSUs on the SCCP card.

The user can create a MSU trigger on the SCCP card on one or more criteria (both old and new) defined in the following using the **ent-trace** command. When multiple trigger criteria are entered, the MSU is trapped when any one of the criteria are satisfied.

CAUTION: As with other debug commands, this command can cause OAM to reset if too many MSUs are trapped.

- **RN or SP address (Entity ID) -** Use this new criterion to trap messages immediately after performing the RTDB database lookup. If the RN or SP obtained from the database lookup matches the Entity ID provisioned in the

command, the message is trapped. This parameter supports a variable number of hexadecimal digits from 1 to 15 digits, and the Entity ID specified must be the one stored in the INP RTDB.

- **E.164 MSISDN number (DN)** – Use this criterion to trap messages immediately before performing a INP search based on the MSISDN numbers defined in the INP RTDB. This parameter accepts a range of digits, from 5 to 15. The number specified must be an International E.164 number (MSISDN or Entity Number).
- **Global Title digits (GT)** – Use this criterion to trap messages based on CdPA Global Title Address (that is, either MSISDN (+ST) number or RN + MSISDN (+ST)) present in the SCCP part of the message.
- **Origination point code** (SSPI/SSPN) – Use this criterion to trap messages based on CgPA SPC present in the SCCP part of the message. If no point code is present in the CgPA SPC, the criteria is matched with the OPC present in the MTP part of the message.

A trace must still be set on all SCCP cards; specify **`card=sccp-all`**. Use a repetition parameter (**`rep`**) to control the number of MSUs that are trapped.

MSUs that satisfy any trigger criteria are trapped on the SCCP card, are forwarded to OAM, and are displayed. Refer to *Commands Manual* for a complete description of the **`ent-trace`** command.

4

INP Feature Activation

CAUTION: For an in-service environment, contact "Customer Contact Center" on page 1-9 before continuing to activate INP. For an environment that is not yet in-service, you may continue with this procedure.
The INP feature bit cannot be enabled if any of the DSMs have less than 1 GB of memory installed. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the DSM database capacity requirements.

Introduction

This chapter identifies prerequisites for the INP feature activation procedure, an overview of the activation steps, and a matching number of detailed step descriptions to turn on the INP feature. The INP feature activation is performed at the EAGLE 5 ISS.

The INP feature supports numbers of varying lengths in a flexible way without requiring software modifications. The INP features applies to ITU-I (international) and ITU-N (national) network environments. INP Query Services apply to ITU-N networks only.

The INP feature, and other related features, are optional and can be purchased from Tekelec. If you are not sure whether you have purchased a specific feature, contact your Tekelec Sales or Account Representative.

CAUTION: Once a feature has been turned on with the `chg-feat` command, it cannot be turned off. Since features may overwrite other features or create changes in the database, assure that you have a license and full technical support from Tekelec before turning on this or any feature.

NOTE: The INP feature requires a DSM card running the VSCCP application. Systems with TSM cards running the SCCP application need to be upgraded to DSM cards prior to turning on the INP feature.

Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the DSM database capacity requirements.

Procedures described in the remainder of this manual apply only to the INP feature and can only be performed if the INP feature is turned on.

The following features are related to the GSM (Global System for Mobile communications) Flexible Numbering feature (see your Tekelec Sales or Account Representative for additional information):

- Global Title Translation (GTT)
- Enhanced Global Title Translation (EGTT)
- Variable-Length Global Title Translation (VGTT)
- EAGLE Provisioning Application Processor (EPAP)

Prerequisites

The INP feature activation assumes that the features Global Title Translation (GTT), Enhanced Global Title Translation (EGTT), and Variable-Length Global Title Translation (VGTT) are already provisioned. Refer to the *Database Administration Manual - Features* for provisioning procedures.

The INP feature activation assumes that the EPAP software is already configured; refer to *EPAP Administration Manual*, EPAP Software Configuration.

The INP feature activation assumes that DSM cards to be installed and TSM cards to be removed are identified:

- Note installed DSM card locations if any
- Note available odd-even card slots for DSM card installation
- Note installed TSM card locations;
- Note adjacent odd-even TSM card slot number positions for DSM card replacement

NOTE: TSM cards use one card slot; DSM cards require two card slots, odd-even.

NOTE: The INP feature cannot be turned on until the TSM cards running the SCCP application are removed from the system.

- Determine DSM card IP addresses and have them available during the activation procedure.

For in-service systems, schedule DSM card replacement in maintenance window that allows the reboot of DSM cards (**`init-card:loc=<DSM card location>`**) one at a time.

CAUTION: In an in-service environment and when replacing TSM cards with DSM cards, initialize one DSM card at a time. Verify its return to IS-NR state before initializing another card. This precaution keeps cards in service and precludes an interruption of SCCP services.

For in-service systems with TSM cards running SCCP traffic, one DSM card must be installed in an available double-slot odd-even location and provisioned for VSCCP prior to inhibiting the SCCP card. The DSM card running the VSCCP application will take over the SCCP traffic (**`alw-card`**) once the SCCP card becomes inhibited.

CAUTION: SCCP traffic redundancy will be lost if inhibiting two SCCP cards at a time with only one VSCCP card available in their place. Redundancy will be re-established once the two SCCP cards are replaced with a second VSCCP card.

For in-service systems that already have the G-Port and/or G-Flex feature enabled, only perform steps 70 through 93 to turn on and configure the INP feature. With the G-Port and/or G-Flex feature enabled, the DSM cards already contain the RTDB database.

For new systems, DSM cards may be rebooted all at one time using the **`init-card:appl=vsccp`** command.

For new systems, GTT, EGTT, and VGTT features may be turned on prior to or immediately following the reboot of all DSM cards.

Feature Activation Overview

This section provides an overview of the INP feature activation procedure. The procedure is described in detail in section "Feature Activation Procedure" on page 4-10.

The feature activation consists of these sections:

- Configure system for HLR destinations in steps 1 through 28.
- Install DSM cards in available slots and configure for VSCCP in steps 29 through 44.
- Replace TSM cards configured for SCCP with DSM cards configured for VSCCP and inhibit/remove any remaining SCCP cards in steps 45 through 69.
- Turn on and configure the INP feature in steps 70 through 93.

Steps 1 through 28 configure the system to be able to communicate with the system of the HLR database. The route to this database may already be configured. Perform these steps to verify that you have entered all HLR destinations for INP and make configuration changes as needed.

1. Display and note current system settings for point codes (PCs) and capability point codes (CPCs), destination point codes (DPCs), routes, and linksets using steps 1 through 7.
2. Use **`rtrv-sid`** command to display current PCs and CPCs.
3. Use **`rtrv-dstn`** command to display current DPCs.
4. Use **`rtrv-rte`** command to display current route configurations.
5. Identify PCs and CPCs; determine new PC and CPC to be entered in step 9.
6. Use **`rtrv-stpopts`** command to display PC or CPC format if ITU-N network.
7. Use **`rtrv-map`** command to display PCs of mated applications in database; remove system PC from table if necessary (refer to *Database Administration Manual - Features*, Removing A Mated Application)

CAUTION: Changing a system's point code requires a system reboot using the `init-sys` command to fully implement the changes. The `init-sys` command causes a complete system reload and should be used only in an environment that is not in service. Using this command ensures the updated self identification information is loaded onto all cards, but does interrupt service.

8. Change PC, CPC, DPC, route, linkset, and LIM card configurations for the HLR database using steps 9 through 28.
9. Use **`chg-sid`** command to configure PC and CPC by network type.

10. Use **init-sys** command to initialize system if changes were made in step 9 to any **pca/pci/pcn** parameter.

CAUTION: The init-sys command causes a complete system reload and should be used only in an environment that is not in service. Using this command ensures the updated self identification information is loaded onto all cards, but does interrupt service.

CAUTION: When the init-sys command executes, the system does not retain the manually initiated state (for example, OOS-MT-DSBLD) for the signaling link, card, or terminal. After the command executes, the system attempts to bring all provisioned links, cards, and terminals on line, including those that were previously out of service. You will need to manually put each device back into its previous state after the system is back on line. Print or electronically capture the output of the rept-stat-slk, rept-stat-card, and rept-stat-trm commands for reference prior to issuing the init-sys command. To restore a device to its previous state, issue the appropriate inhibit/deactivate command listed in the *Eagle STP Commands Manual* in the Related Commands section for each of the above rept-stat commands.

11. Use **rtrv-sid** command to display new PC and CPC.
12. Use **ent-dstn** command to enter DPC for HLR destinations.
13. Use **rtrv-dstn** command to display new HLR DPC.
14. Use **ent-ls** command to enter linkset and assign DPC for HLR destinations.
15. Use **rtrv-ls** command to display new linkset and assigned DPC for HLR destinations.
16. Use **ent-card** command to enter LIM card(s) into database.
17. Use **rtrv-card** command to display new LIM card(s) in database.
18. Use **ent-slk** command to assign signaling link(s) to LIM card(s).
19. Use **rtrv-slk** command to display new signaling link(s) assigned to LIM card(s).
20. Use **ent-rte** command to assign route to new DPC.
21. Use **rtrv-rte** command to display route assigned to new DPC.
22. Use **ent-map** command to enter mated application into database.
23. Use **rtrv-map** command to display new mated application in database.
24. Use **alw-card** command to allow LIM card(s).
25. Use **rept-stat-card** command to display status of new LIM card(s) in database.

26. Use **act-slk** command to activate new signaling link(s) for LIM card(s).

27. Use **rept-stat-slk** command to display IS-NR status of signaling link(s).

28. Use **rtrv-card** command to confirm the new LIM card(s) and identify VSCCP cards (DSM cards running VSCCP application) and SCCP cards (TSM cards running SCCP application).

CAUTION: When adding DSM cards in an in-service environment, you must take care not to interrupt traffic. Before replacing SCCP cards with DSMs, first install a VSCCP card in an available odd-even double-slot prior to removing SCCP cards to make additional room for other DSM cards.

29. Install and configure DSM card(s) in available odd-even slots as needed using steps 30 through 44.

30. Install DSM card(s) in available odd-even slots and verify green IMT bus LEDs.

31. Use **ent-card** command to enter DSM card(s) as VSCCP card(s) into database.

32. Use **rtrv-card** command to display new VSCCP card(s) in database.

33. Use **rtrv-ip-host** command to display current IP host information in database.

34. Use **ent-ip-host** command to add host name and IP address for each VSCCP link.

35. Use **rtrv-ip-host** command to display changed IP host information.

36. Use **chg-ip-card** command to set local domain and IP router address if necessary.

37. Use **rtrv-ip-card** command to display changed VSCCP card information.

38. Use **rtrv-ip-lnk** command to display current link parameters associated with the VSCCP card.

39. Use **chg-ip-lnk** command to set the IP address port and speed associated with the VSCCP card.

40. Use **rtrv-ip-lnk** command to display changed link parameters.

41. Use **alw-card** command to boot DSM card in TSM emulation mode.

42. Use **rept-stat-card** command to display IS-NR status of VSCCP card.

43. Use **pass** command to test presence of EPAP hosts on network.

44. Repeat steps 30 through 43 to add all DSM cards (N+1) to be installed in available slots. Go to the next step to start replacing TSM cards.

45. Replace TSM card(s) with DSM cards if applicable, and add DSM card(s) to database using steps 46 through 68.
46. Use **rtrv-card** command to display TSM cards running the SCCP application (SCCP cards) in database.
47. Use **rept-stat-card** command to display SCCP cards in IS-NR status.
48. Use **inh-card** command to inhibit SCCP card(s)
49. Use **rept-stat-card** command to display OOS-MT-DSBLD status of SCCP card(s).
50. Use **dlt-card** command to delete SCCP card(s) from database.
51. Use **rtrv-card** command to verify removal of SCCP cards from database.
52. Remove first TSM card from shelf.
53. Remove second TSM card from shelf.
54. Install DSM card in shelf and verify green IMT bus LEDs.
55. Use **ent-card** command to enter DSM card as VSCCP card into database.
56. Use **rtrv-card** command to display new VSCCP card in database.
57. Use **rtrv-ip-host** command to display IP host information in database.
58. Use **ent-ip-host** command to add host name and IP address for VSCCP link.
59. Use **rtrv-ip-host** command to display changed IP host information in database.
60. Use **chg-ip-card** command to set local domain and IP router address if necessary.
61. Use **rtrv-ip-card** command to display changed VSCCP card information.
62. Use **rtrv-ip-lnk** command to display current link parameters associated with VSCCP card.
63. Use **chg-ip-lnk** command to set the IP address port and speed associated with VSCCP card.
64. Use **rtrv-ip-lnk** command to display changed link parameters associated with the VSCCP card.
65. Use **alw-card** command to boot DSM card in TSM emulation mode.
66. Use **rept-stat-card** command to display IS-NR status of VSCCP card.
67. Use **pass** command to test presence of EPAP hosts on network.
68. Repeat steps 46 through 67 to replace all adjacent TSM cards identified in the prerequisites and to be replaced with DSM cards.

69. Repeat steps 48 through 52 to inhibit any remaining TSM cards running the SCCP application and remove them from database and shelf.

NOTE: The INP feature cannot be turned on until TSM cards running the SCCP application are removed from the system.

CAUTION: Contact Tekelec Technical Services at this point for assistance in completing this INP activation procedure (see "Customer Assistance" on page 1-9). Do not proceed without consulting with Tekelec Technical Services.

70. Turn on and configure INP feature using steps 71 through 93.

71. Use **chg-feat** command to turn on INP feature.

72. Use the **chg-sid** command to enter INP capability point codes (for INP Query Services).

73. Use **rtrv-sid** command to display new INP capability point codes.

74. Use the **ent-cspc** command to enter the point code of the EAGLE 5 ISS mate and of any nodes that will send route-on-subsystem queries to the local INP subsystem (for INP Query Services).

75. Use the **rtrv-cspc** command to verify changes.

76. Use the **ent-map** command to enter local INP subsystem and its mate subsystem (on the other EAGLE 5 ISS) with the concerned point code list from the previous step (for INP Query Services).

Use the **ent-map** command to enter any new nodes to which INP message relay will do final GTT.

77. Use **rtrv-map** command to display new mated applications in database.

78. Use the **ent-ss-appl** command to enter the state and subsystem number for the INP local subsystem (for INP Query Services).

79. Use the **rtrv-ss-appl** command to verify the changes.

80. Use **chg-stpopts** command to enter default country code (CC) and default network destination code (NDC) if handling non-international numbers.

81. Use **rtrv-stpopts** command to verify changes of CC and NDC.

82. Use the **chg-inpopts** command to enter various INP system options used for number conditioning and INP normalization (for INP Query Services).

83. Use the **rtrv-inpopts** command to verify changes.

84. Use the **ent-homern** command to enter any Home RNs that are prefixed to DNs for incoming INP MR messages.

85. Use **rtrv-homern** command to verify routing number prefixes.

86. Use **ent-srvsel** command to enter INP service selectors.

87. Use **rtrv-srvsel** command to verify changes to INP service selectors.

88. Use the **alw-map-ss** command to bring the local INP subsystem into service (for INP Query Services).

89. Use the **rept-stat-sccp** command to verify activation of INP subsystem.

CAUTION: When you have an in-service environment and you are replacing TSM cards with DSM cards, initialize one DSM card at a time. Verify its return to IS-NR state before initializing another card. This precaution keeps cards in service and precludes an interruption of SCCP services.

90. Use **init-card:loc=<DSM card>** command to load RTDB, OAM, GPL, and GTT data to VSCCP card.

91. Use **rept-stat-card** command to display IS-NR status of VSCCP card.

92. Repeat steps 90 and 91 to reboot each DSM card.

NOTE: Once the INP feature is turned on, always boot the DSM cards with the init-card:loc=<DSM card location> command.

93. Confirm success of activation procedure with **rept-stat-sccp**, **rept-stat-mps**, and **rept-stat-db:display=all** commands.

EPAP can now administer INP entity objects and INP subscribers. For the details about performing these actions, refer to the *EPAP Administration Manual*.

The detailed INP activation procedure is described next.

Feature Activation Procedure

Procedure

1. Before changing a true point code (PC) and adding a capability point code (CPC) for the INP feature, display the current values of the self-identification configuration (shown in step 2), the destination point codes (DPCs) (shown in step 3), and the routes and linksets assigned to the DPCs (shown in step 4). The INP feature applies to ITU-I (international) and ITU-N (national) networks.

2. Display the current self identification of the system (PC and CPC) using the **rtrv-sid** command. This is an example of the possible output:

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 35.0.0
PCA           PCI           PCN           CLLI            PCTYPE
------------- 1-100-1       11111         rlghncxa03w     OTHER

CPCA
-------------

CPCI
1-101-1       1-101-2           1-101-3          1-101-4

CPCN
11121         11122             11123            11124
```

   If the ITUDUPPC (ITU national duplicate point code) feature is on, the ITU national point code also contains a group code. The group code is a two-character field from aa to zz that is entered as the last subfield of an ITU national point code, nnnnn-gc (for example, 2112-aa)

3. Display the current destination point codes in the destination point code table (**dpci**/**dpcn**) using the **rtrv-dstn** command. This is an example of the possible output:

```
rlghncxa03w 01-10-10 11:43:04 GMT EAGLE 35.0.0
DPCA        CLLI        BEI ELEI  ALIASI      ALIASN   DOMAIN
----------  ----------  --- ---   -------     -------  ---

DPCI        CLLI        BEI ELEI  ALIASA       ALIASN  DOMAIN
2-100-1     rlghncxa03w no  ---   222-210-000  12001   SS7

DPCN        CLLI        BEI ELEI  ALIASA       ALIASI  DOMAIN
21111       rlghncxa03w no  ---   222-200-200  2-121-1 SS7

DESTINATION ENTRIES ALLOCATED:       2000
       FULL DPC(s):                     2
       NETWORK DPC(s):                  0
       CLUSTER DPC(s):                  0
       TOTAL DPC(s):                    2
       CAPACITY (% FULL):              1%
X-LIST ENTRIES ALLOCATED:             500
```

4. Display the current route configuration using the **rtrv-rte** command. This is an example of the possible output:

```
rlghncxa03w 01-10-07 11:43:04 GMT  EAGLE 35.0.0
DPCA           ALIASI     ALIASN      CLLI     LSN          RC APCA
-----------    -------    -------     -----    --------    -- -----------

DPCI         ALIASN      ALIASA      CLLI     LSN          RC APCI
2-100-1      121111      --------    idp1     ls100001     10 1-234-5
                                             ls100002     10 1-234-6
                                             ls100003     20 1-234-7
                                             ls100004     30 1-234-1
                                             ls100005     40 1-234-2
                                             ls100006     50 1-234-3

DPCN         ALIASA      ALIASI      CLLI     LSN          RC APCN
21111        --------    0-001-1     ndp1     ls200001     10 11111
                                             ls200002     10 11112
                                             ls200003     20 11113
                                             ls200004     30 11114
                                             ls200005     40 11115
                                             ls200006     50 11116
```

---

5. If the system's point code **(pci/pcn)** or capability point code **(cpci/cpcn)** to be configured in this procedure is shown in steps 2, 3, or 4, choose another point code to configure with this procedure (step 9).

---

6. If configuring the system point code or capability point code **(pcn** or **cpcn)** of an ITU-N network, view the current value of the ITU-N point code format. Otherwise continue with step 7.

   Enter the **rtrv-stpopts** command and specify the ITU-N point code format option **npcfmti**. The **npcfmti** option identifies how the ITU-N point code is entered into the database and how it is displayed in any outputs. The value is shown in the NPCFMTI field. This is an example of the possible output:

```
rlghncxa03w  01-10-17 16:02:05 GMT  EAGLE 35.0.0
STP OPTIONS
-----------------------
MTPT31CTL            1
MTPLTI             yes
MTPLTCTDPCQ          3
MTPLTST          10000
MTPXLQ             500
MTPXLET           0100
MTPXLOT            90%
MTPDPCQ           1750
TFATFRPR          1000
MTPRSI             yes
MTPRSIT           5000
MTPLPRST           yes
MTPT10ALT        30000
SLSCNV           perls
UIMRD              yes
CRITALMINH          no
DISPACTALMS         no
NPCFMTI        4-4-4-2
DEFCC                49
DEFNDC              177
DSMAUD               on
```

   If you wish to change the format of the ITU-N point code, go to section "ITU National Point Code Formats" in the *Eagle STP Database Administration Manual - SS7*. Then continue with step 7.

---

7. Display the mated applications in the database using the **rtrv-map** command. These are examples of possible output:

```
rlghncxa03w 01-10-07  11:43:04  GMT  EAGLE 35.0.0
PCN           SSN  RC  MPCN           MSSN MATERC SRM MRC GRP NAME
11111           5  10  12347             5    20


rlghncxa03w 01-10-07  11:43:04  GMT  EAGLE 35.0.0
PCI           SSN  RC  MPCI           MSSN MATERC SRM MRC GRP NAME
2-100-1         5  20  3-200-1         250      99 --- --- abcdefgh
```

If the system's point code is shown in the **rtrv-map** command output (in the **PCA**, **PCI**, **PCN**, **MPCA**, **MPCI**, or **MPCN** fields), remove the system's point code from the mated application table. Refer to procedure "Removing a Mated Application" in the *Eagle STP Database Administration Manual - Features*.

If the system's point code or capability point code is a destination point code of a route, select a point code that is not the destination point code of a route (see output of the **rtrv-rte** command in step 4) and not in the destination point code table (see output of the **rtrv-dstn** command in step 3).

---

8. Change PC, CPC, DPC, route, linkset, and LIM card configurations for the HLR database using steps 9 through 28.

CAUTION: Changing a system's point code requires a system reboot using the init-sys command to fully implement the changes. The init-sys command causes a complete system reload and should be used only in an environment that is not in service. Using this command ensures the updated self identification information is loaded onto all cards but does interrupt service.

9. Configure the system's point code (**pci/pcn**) and capability point code (**cpci/cpcn**) by network type using the **chg-sid** command. For example, enter one of these commands:

chg-sid:pci=1-100-2:cpci=1-102-1

chg-sid:pcn=11112:cpcn=11125

where:

:pci/pcn – The point code used to uniquely identify the system.

:cpci/cpcn – The point code used by the SS7 protocol to identify a group of functionally related EAGLE 5 ISSs in the signaling network to which the EAGLE 5 ISS belongs.

After successful completion of this command, the system returns the following output:

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 35.0.0
CHG-SID: MASP A - COMPLTD
```

When any of the **pci/pcn** parameters have changed, the system needs to be reinitialized. The following caution message is displayed:

```
CAUTION: SYSTEM SITE ID HAS BEEN CHANGED, MANUAL RE-INITIALIZATION IS NEEDED
```

CAUTION: The `init-sys` command causes a complete system reload and should be used only in an environment that is not in service. Using this command ensures the updated self identification information is loaded onto all cards, but does interrupt service.

CAUTION: When the `init-sys` command executes, the system does not retain the manually initiated state (for example, OOS-MT-DSBLD) for the signaling link, card, or terminal. After the command executes, the system attempts to bring all provisioned links, cards, and terminals on line, including those that were previously out of service. You will need to manually put each device back into its previous state after the system is back on line. Print or electronically capture the output of the `rept-stat-slk`, `rept-stat-card`, and `rept-stat-trm` commands for reference prior to issuing the `init-sys` command. To restore a device to its previous state, issue the appropriate inhibit/deactivate command listed in the *Eagle STP Commands Manual* in the Related Commands section for each of the above `rept-stat` commands.

10. Reinitialize the system by entering the **`init-sys`** command if changes were made in step 9 to any **`pca/pci/pcn`** parameter.

    NOTE: The `init-sys` command must be entered twice within 30 seconds for the system to re-initialize. If the `init-sys` command is not executed twice within 30 seconds, the attempt to re-initialize the system is aborted.

    When the **`init-sys`** command is first entered, this message should appear.

    ```
    rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 35.0.0
    CAUTION: This command causes a complete system reload, and
    will result in traffic loss.
    Re-enter command within 30 seconds to confirm.
    ```

    When the **`init-sys`** command is re-entered within the 30 second time limit, this message should appear.

    ```
    rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 35.0.0
    Init System command issued at terminal #3
    ```

    From the time that the **`init-sys`** command is accepted, you must wait approximately two minutes before you can perform step 11 (logging into the system). If the terminal is in the VT-100/VT-320 mode, the terminal display will be refreshed with non-zero alarm counts. During this two-minute interval, an intermediate screen refresh occurs, which is caused by the MASP's role change from active to standby and from standby to active. This screen refresh is typically a partial refresh and the alarm indicators are set to zero.

    If you are logged into the system in the KSR mode, the only response you will receive of being able to log into the system is the message 'UAM 0009, MASP became active'. UAM 0009 could be issued twice due to a possible transient

MASP role change (switching from active to standby). Following the execution of the **init-sys** command, the MASP that was active before the **init-sys** command was entered will be the active MASP again when the system has finished reinitializing.

---

11. Verify the SID changes using the **rtrv-sid** command. This is an example of the possible output:

```
durhncxa03w 01-10-07 00:57:31 GMT EAGLE 35.0.0
PCA             PCI             PCN           CLLI             PCTYPE
-------------   1-100-1         11111         rlghncxa03w      OTHER

CPCA
-------------

CPCI
1-101-1           1-101-2           1-101-3          1-101-4
1-102-1

CPCN
11121             11122             11123            11124
11125
```

---

12. Enter a destination point code for the HLR location in the Destination Point Code table by network type using the **ent-dstn** command. For example, enter one of these commands:

ent-dstn:dpci=2-100-2

ent-dstn:dpcn=21112

where:

:dpci/dpcn – The destination point code being added to the database

The system returns this message:

```
rlghncxa03w 01-10-17 15:35:05 GMT EAGLE 35.0.0
Destination table is (40 of 4000) 1% full
ENT-DSTN: MASP A - COMPLTD
```

---

13. Verify the changes using the **rtrv-dstn** command and specifying the DPC that was entered in step 74. For example, enter one of these commands:

rtrv-dstn:dpci=2-100-2

rtrv-dstn:dpcn=21112

This is an example of the possible output **for DPCI**s.

```
rtrv-dstn:dpci=2-100-2

RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 35.0.0
DPCI        CLLI        BEI ELEI  ALIASA       ALIASN      DOMAIN
2-100-2     --------    no  ---   --------     21112       SS7

            SPC          NCAI
            -----------  no

Destination table is (20 of 2000) 1% full
```

This is an example of the possible output **for DPCNs**.

```
rtrv-dstn:dpcn=21112

RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 35.0.0
DPCN        CLLI        BEI ELEI  ALIASA       ALIASI  DOMAIN
21112       --------    no  ---   --------     2-100-2 SS7

            SPC          NCAI
            -----------  no

Destination table is (20 of 2000) 1% full
```

---

14. Enter a linkset with the **ent-ls** command, and assign it to the destination point code by network type. For example, enter one of these commands:

ent-ls:lsn=ls400001:apci=2-200-2:lst=c

ent-ls:lsn=ls500001:apcn=21122:lst=c

where:

:lsn – The name of the linkset

:apci/apcn – Adjacent point code – the point code identifying the node that is next to the system

:lst – The linkset type of the specified linkset

After successful completion of this command, the system returns the following message:

```
RLGHNCXA03W 01-10-17 16:23:21 GMT  EAGLE 35.0.0
Link set table is ( 114 of 1024)  12% full
ENT-LS: MASP A - COMPLTD
```

---

15. Verify the changes using the **rtrv-ls** command and specifying the linkset name. For example, enter one of these commands:

rtrv-ls:lsn=ls400001

rtrv-ls:lsn=ls500001

For lsn400001, the system returns output similar to the following:

```
                          L3T  SLT
LSN          APCI (SS7)  SCRN  SET  SET BEI LST LNKS GWSA GWSM GWSD SLSCI
NIS
ls400001   2-200-2     scr1  1    2   no  a   0    on   off  off  no    on
CLLI         TFATCABMLQ  MTPRSE  ASL8
RLGHNCXA03W  1           no      no
                     L2T       L1              PCR PCR
LOC  PORT SLC TYPE   SET BPS   MODE TSET ECM   N1  N2

Link set table is (114 of 1024) 12% full
```

For lsn500001, the system returns output similar to the following:

```
                              L3T  SLT
LSN          APCN (SS7)  SCRN  SET  SET BEI LST LNKS GWSA GWSM GWSD SLSCI
NIS
ls500001   21122       scr3  1    2   no  a   0    on   off  off  no    on
CLLI         TFATCABMLQ  MTPRSE  ASL8
RLGHNCXA03W  1           no      no
                    L2T       L1              PCR PCR
LOC  PORT SLC TYPE  SET BPS   MODE TSET ECM   N1  N2

Link set table is (114 of 1024) 12% full
```

---

16. Add the LIM cards to the database using the **ent-card** command. For this example, enter these commands:

ent-card:loc=1105:type=limocu:appl=ccs7itu

ent-card:loc=1106:type=limocu:appl=ccs7itu

where:

:loc - specifies the slot number for the card.

:type - specifies that the card is a LIMOCU card.

:appl - specifies that the application is CCS7ITU.

After successful completion of this command, the system returns the following message:

```
RLGHNCXA03W 01-10-12 09:12:36 GMT  EAGLE 35.0.0
ENT-CARD: MASP A - COMPLTD
```

---

17. Verify the changes using the **rtrv-card** command with the card location specified. For this example, enter these commands:

rtrv-card:loc=1105

rtrv-card:loc=1106

These are examples of the possible output:

```
RLGHNCXA03W 01-10-30 09:12:36 GMT EAGLE 35.0.0
CARD   TYPE          APPL      PORT A LSET (SLC)   PORT B LSET (SLC)
1105   LIMOCU       CCS7ITU   --------    (--)    --------    (--)


RLGHNCXA03W 01-10-30 09:12:36 GMT EAGLE 35.0.0
CARD   TYPE          APPL      PORT A LSET (SLC)   PORT B LSET (SLC)
1106   LIMOCU       CCS7ITU   --------    (--)    --------    (--)
```

---

18. Assign signaling links to the LIM cards using the **ent-slk** command. For example, enter these commands:

ent-slk:loc=1105:port=a:lsn=ls400001:slc=0:l2tset=1

ent-slk:loc=1106:port=a:lsn=ls500001:slc=0:l2tset=1

where:

:loc – The card location of the LIM that the SS7 signaling link will be assigned to.

:port – The port on the card specified in the **loc** parameter.

:lsn – The name of the linkset that will contain the signaling link.

:slc – The signaling link code. The **slc** must be unique within the linkset. It must be the same at both the system location and the distant node.

:l2tset – The level 2 timer set table. A signaling link may be assigned to any of the twenty tables.

After successful completion of this command, the system returns the following message:

```
RLGHNCXA03W 01-10-07 08:29:03 GMT  EAGLE 35.0.0
ENT-SLK: MASP A - COMPLTD
```

Signaling links are the only elements in the database directly supported by a hardware device. When a link is added to a linkset, the link remains in the state OOS-MT-DSBLD (out of service maintenance disabled) until it is activated; see step 26.

---

19. Verify the changes using the **rtrv-slk** command, specifying the card location and port of the signaling link entered in step 18.

rtrv-slk:loc=1105:port=a

rtrv-slk:loc=1106:port=a

This is an example of the possible output.

```
RLGHNCXA03W 01-10-19 21:16:37 GMT EAGLE 35.0.0
                                  L2T          L1                PCR  PCR
LOC   PORT LSN       SLC TYPE     SET  BPS     MODE TSET  ECM    N1   N2
1105  A    ls400001  0   LIMOCU   1    56000   ---  ---   BASIC  ---  -----


RLGHNCXA03W 01-10-19 21:16:37 GMT EAGLE 35.0.0
                                  L2T          L1                PCR  PCR
LOC   PORT LSN       SLC TYPE     SET  BPS     MODE TSET  ECM    N1   N2
1106  A    ls500001  0   LIMOCU   1    56000   ---  ---   BASIC  ---  -----
```

---

20. Add a route for the new DPC by network type using the **ent-rte** command. For example, enter one of these commands:

ent-rte:dpci=2-100-2:lsn=ls400001:rc=10

ent-rte:dpcn=21112:lsn=ls500001:rc=10

where:

:dpci/dpcn – Destination point code of the node that the traffic is bound for

:lsn – The name of the linkset that will carry the traffic bound for the node specified by the destination point code.

:rc – The relative cost (priority) for this route.

After successful completion of this command, the system returns the following message:

```
RLGHNCXA03W 01-10-07 08:28:30 GMT  EAGLE 35.0.0
ENT-RTE: MASP A - COMPLTD
```

---

21. Verify the changes using the **rtrv-rte** command and specifying the destination point code of the route. This is an example of the possible output:

```
rlghncxa03w 01-10-07 11:43:04 GMT  EAGLE 35.0.0
DPCA         ALIASI      ALIASN      CLLI        LSN      RC APCA
-----------  -------     -------     -----       -------- -- -----------

DPCI         ALIASN      ALIASA       CLLI       LSN      RC APCI
2-100-1      121111      240-111-111  idp1       ls100001 10 1-234-5
                                                ls100002 10 1-234-6
                                                ls100003 20 1-234-7
                                                ls100004 30 1-234-1
                                                ls100005 40 1-234-2
                                                ls100006 50 1-234-3
2-100-2      121111      240-111-111   idp1      ls400001 10 1-200-2

DPCN         ALIASA      ALIASI        CLLI      LSN      RC APCN
21111        011-222-111 0-001-1       ndp1      ls200001 10 11111
                                                ls200002 10 11112
                                                ls200003 20 11113
                                                ls200004 30 11114
                                                ls200005 40 11115
                                                ls200006 50 11116
21112        011-222-111 0-001-1       ndp1      ls500001 10 11122
```

---

22. Add a mated application to the database by network type using the **ent-map** command. For this example, enter this command:

ent-map:pci=2-100-1:ssn=12:rc=20:mpci=3-200-1:mssn=50 :materc=99:grp=grp03

ent-map:pcn=11112:ssn=12:rc=10:mpcn=11114:mssn=250:materc=99 :grp=grp07

where:

:pci/pcn – The point code of the primary signaling point that is to receive the message.

:ssn – Subsystem number – the subsystem address of the primary point code that is to receive the message.

:rc – The relative cost

:mpc/mpca/mpci/mpcn – The point code of the backup signaling point that is to receive the message.

:mssn – Mate subsystem number – the subsystem address of the backup point code that is to receive the message.

:materc – Mate relative cost.

:grp – The name of the concerned signaling point code group that contains the point codes that should be notified of the subsystem status. This parameter applies to both RPCs/SSNs.

When each of these commands have successfully completed, this message should appear.

```
RLGHNCXA03W  01-10-07 00:28:31 GMT EAGLE 35.0.0
ENT-MAP:  MASP A - COMPLTD
```

---

23. Verify the changes using the **rtrv-map** command. These are examples of possible output.

```
rlghncxa03w 01-10-07  11:43:04  GMT  EAGLE 35.0.0
PCN            SSN  RC  MPCN          MSSN MATERC SRM MRC GRP NAME
11111            5  20  12347         250      99 --- --- GRP07
11112           12   0  12347         250      99 --- --- GRP07

rlghncxa03w 01-10-07  11:43:04  GMT  EAGLE 35.0.0
PCI            SSN  RC  MPCI          MSSN MATERC SRM MRC GRP NAME
1-100-1          5   0  3-200-1       250      99 --- --- GRP03
2-100-1         12  20  3-200-1        50      99 --- --- GRP03
```

---

24. Allow the LIM cards that were entered in step 16 by using the **alw-card** command. For example, enter these commands:

alw-card:loc=1105

alw-card:loc=1106

This message appears:

```
RLGHNCXA03W  01-10-30 21:20:37 GMT EAGLE 35.0.0
Card has been allowed.
```

---

25. Verify the in-service normal (IS-NR) status of the cards using the **rept-stat-card** command. This is an example of the possible output:

```
RLGHNCXA03W 01-10-27 16:43:42 GMT  EAGLE 35.0.0
CARD  VERSION            TYPE    APPL      PST          SST       AST
1101  100-000-00003-000  ASM     SCCP      IS-NR        Active    ---
1102  100-000-00003-000  ASM     SCCP      IS-NR        Active    ---
1103  100-000-00003-000  ACMENET STPLAN    IS-NR        Active    ---
1104  100-000-00003-000  ACMENET GLS       IS-NR        Active    ---
1105  100-000-00003-000  LIMOCU  CCS7ITU   IS-NR        Active    ---
1106  100-000-00003-000  LIMOCU  CCS7ITU   IS-NR        Active    ---
1113  100-000-00002-000  MCAP    OAM       IS-NR        Active    ---
1114  100-000-00002-000  TDM               IS-NR        Active    ---
1115  100-000-00002-000  MCAP    OAM       IS-NR        Active    ---
1116  100-000-00002-000  TDM               IS-NR        Active    ---
1117  100-000-00002-000  MDAL              IS-NR        Active    ---
1201  100-000-00003-000  LIMDS0  SS7ANSI   IS-NR        Active    ---
1202  100-000-00002-000  LIMV35  SS7GX25   IS-NR        Active    ---
1203  100-000-00003-000  LIMV35  SS7ANSI   IS-NR        Active    ---
1204  100-000-00003-000  LIMATM  ATMANSI   IS-NR        Active    ---
1205  100-000-00001-000  DCM     IPLIM     IS-NR        Active    ---
1207  100-000-00001-000  DCM     SS7IPGW   IS-NR        Active    ---
1303  100-000-00001-000  DCM     IPLIM     IS-NR        Active    ---
1305  100-000-00001-000  DCM     SS7IPGW   IS-NR        Active    ---
```

---

26. Activate the signaling links entered in step 18 using the **act-slk** command. For example, enter these commands

act-slk:loc=1105:port=a

act-slk:loc=1106:port=a

The link changes its state from *OOS-MT-DSBLD* (out-of-service maintenance-disabled) to *IS-NR* (in-service normal).

The output confirms the activation.

```
RLGHNCXA03W 01-10-07 11:11:28 GMT EAGLE 35.0.0
Activate Link message sent to card
```

---

27. Verify the in-service normal (IS-NR) status of the signaling link using the **rept-stat-slk** command. For example, enter these commands:

rept-stat-slk:loc=1105

rept-stat-slk:loc=1106

This message should appear.

```
RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 35.0.0
SLK      LSN        CLLI       PST     SST     AST
1105,A  ls400001  ---------- IS-NR   Avail   ----
Command Completed.

RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 35.0.0
SLK      LSN        CLLI       PST     SST     AST
1106,A  ls500001  ---------- IS-NR   Avail   ----
Command Completed.
```

---

28. Display the new LIM cards in the database using the **rtrv-card** command. This is an example of the possible output:

```
RLGHNCXA03W 01-10-15 16:34:56 GMT EAGLE 35.0.0
CARD   TYPE          APPL      PORT A LSET (SLC)   PORT B LSET (SLC)
1101   ASM           SCCP      --------    (--)    --------    (--)
1102   ASM           SCCP      --------    (--)    --------    (--)
1103   ACMENET       STPLAN    --------    (--)    --------    (--)
1104   ACMENET       GLS       --------    (--)    --------    (--)
1105   LIMOCU        CCS7ITU   ls400001    (00)    --------    (--)
1106   LIMOCU        CCS7ITU   ls500001    (00)    --------    (--)
1113   MCAP          OAM
1114   TDM
1115   MCAP          OAM
1116   TDM
1117   MDAL
1201   LIMDS0        SS7ANSI   lsn1        (00)    lsn2        (01)
1202   LIMV35        SS7GX25   lsngwy      (00)    --------    (--)
1203   LIMV35        SS7ANSI   lsn2        (00)    lsn1        (01)
1204   LIMATM        ATMANSI   atmgwy      (00)    --------    (--)
1205   DCM           IPLIM     ipgwy1      (00)    ipgwy3      (01)
1207   DCM           SS7IPGW   ipgwy2      (00)    --------    (--)
1303   DCM           IPLIM     ipgwy1      (00)    ipgwy3      (01)
1305   DCM           SS7IPGW   ipgwy4      (00)    --------    (--)
```

Determine a location where the double-slot DSM card can be inserted. The output shows slots 1107 and 1108 are not occupied. Also determine adjacent (odd-even slots) SCCP cards for later TSM card replacements.

---

29. Install and configure DSM card(s) as needed in available odd-even slots using steps 30 through 44. For our example, install a DSM card in slots 1107 and 1108.

---

30. Install the DSM card in slots 1107 and 1108. The DSM card requires two slots and must be installed in an odd slot with an adjacent empty even slot on its right side.

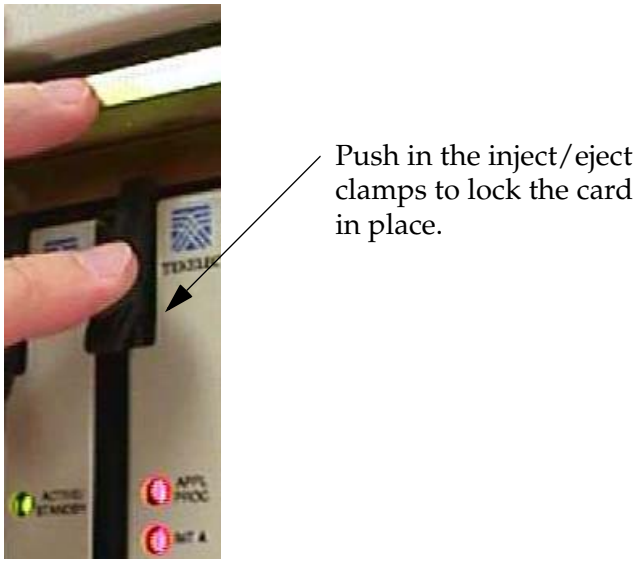
a. Open the ejector levers on the DSM card. Carefully align the card's edges with the top and bottom card guides. Then push the card along the length of the card guides until the rear connectors on the card engage the mating connectors on the target shelf backplane.

b. Press the left edge of the card's faceplate using constant pressure until you feel the card's progress cease.

WARNING: Do not impact the faceplate in order to mate the connectors. Any impact to the card's faceplate can damage the faceplate, the pins, or the connectors.

c. Push in the top and bottom inject/eject clamps. This locks the card in place and ensures a strong connection with the pins on the target shelf backplane.

Figure 4-1. Push in Inject/Eject Clamps



d. Verify that both IMT bus LEDs are green.

e. Install the cabling required to connect the DSM card to the MPS. Refer to the *Installation Manual* for details.

---

31. Add the DSM card to the database and configure it as VSCCP card using the **ent-card** command. For this example, enter this command.

ent-card:loc=1107:type=dsm:appl=vsccp

where:

:loc - specifies the slot number for the card. The slot number must be an odd number.

:type - specifies that the card is a DSM card.

:appl - specifies that the application is VSCCP.

After successful completion of this command, the system returns the following message:

```
RLGHNCXA03W 01-10-12 09:12:36 GMT  EAGLE 35.0.0
ENT-CARD: MASP A - COMPLTD
```

---

32. Verify the VSCCP card using the **rtrv-card** command with the card location specified. For this example, enter this command:

rtrv-card:loc=1107

This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 09:12:36 GMT EAGLE 35.0.0
CARD   TYPE          APPL      PORT A LSET (SLC)   PORT B LSET (SLC)
1107   DSM           VSCCP     --------    (--)    --------    (--)
```

---

33. Display the current IP host information in the database by entering the **rtrv-ip-host** command. This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:17:37 GMT EAGLE 35.0.0

IPADDR          HOST
192.1.1.32      KC_HLR2
192.1.1.50      DN_MSC1
192.1.1.52      DN_MSC2
```

---

34. Add the host name and IP address for each VSCCP link using the **ent-ip-host** command. For example, enter these commands:

ent-ip-host:host=vsccp_1107_a:ipaddr=192.168.122.1

ent-ip-host:host=vsccp_1107_b:ipaddr=192.168.123.1

where:

:host - specifies the host name. Each VSCCP link must be specified separately.

:ipaddr - specifies the IP network address for each EPAP. The first three octets of the IP address must be the same as MPS A and B ports, respectively. The fourth octet identifies the DSM card and must have a a unique octet identifier for the card's IP address; we recommend numbering the DSM cards sequentially, using values 1 to 25. (This example shows the assignment of the first DSM card.)

After successful completion of this command, the system returns the following message:

```
RLGHNCXA03W 01-10-30 21:18:37 GMT EAGLE 35.0.0
ENT-IP-HOST: MASP A - COMPLTD
```

---

35. Verify the new IP host information in the database by entering the **rtrv-ip-host** command. The following is an example of the possible output.

```
RLGHNCXA03W 01-10-30 21:19:37 GMT EAGLE 35.0.0

IPADDR          HOST
192.1.1.32      KC_HLR2
192.1.1.50      DN_MSC1
192.1.1.52      DN_MSC2
192.168.122.1   VSCCP_1107_A
192.168.123.1   VSCCP_1107_B
```

NOTE: Most INP customer private networks do not require setting up a default router for the DSM card. However, if your network configuration does require a default router to connect the DSM card communication to the EPAP, then only one default router is assignable to each DSM card. Assign the default router address to each DSM card as shown in this step.

36. Enter local domain and IP router address for the VSCCP card using the **chg-ip-card** command. For this example, enter this command:

```
chg-ip-card:loc=1107:domain=nc.tekelec.com
:defrouter=192.168.122.250
```

where

:loc – The location of the VSCCP card within the EAGLE 5 ISS.

:domain – The domain name of domain server.

:defrouter – Default router address. The IP address for default router. This is a TCP/IP address expressed in standard "dot notation". IP addresses consist of the system's network number and the machine's unique host number.

After successful completion of this command, the system returns the following message:

```
RLGHNCXA03W 01-10-30 21:20:37 GMT EAGLE 35.0.0
CHG-IP-CARD: MASP A - COMPLTD
```

---

37. Verify the new TCP/IP parameters associated with the VSCCP card in the database by entering the **rtrv-ip-card** command. This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:21:37 GMT EAGLE 35.0.0
   LOC 1107
     SRCHORDR  LOCAL
     DNSA      -----------
     DNSB      -----------
     DEFROUTER 192.168.122.250
     DOMAIN    NC.TEKELEC.COM
```

---

38. Display the current link parameters associated with the VSCCP card in the database by entering the **rtrv-ip-lnk** command. This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:14:37 GMT EAGLE 35.0.0
LOC   PORT IPADDR          SUBMASK          DUPLEX SPEED MACTYPE AUTO MCAST
1107  A    ------------     ------------     HALF   10    DIX     NO   NO
1107  B    ------------     ------------     HALF   10    DIX     NO   NO
```

---

39. Enter the IP address port and speed associated with the VSCCP card in the database using the **chg-ip-lnk** command. For this example, enter these commands:

```
chg-ip-lnk:loc=1107:port=a:duplex=half:ipaddrr=192.168.122.1
  :mactype=dix:speed=100:mcast=yes:submask=255.255.255.0
chg-ip-lnk:loc=1107:port=b:duplex=half:ipaddrr=192.168.123.1
  :mactype=dix:speed=10:mcast=yes:submask=255.255.255.0
```

where:

:loc – The card location of the VSCCP card within the EAGLE 5 ISS.

:port – The port ID. The **port** parameter of the **chg-ip-lnk** command specifies the physical interface of the DSM card.

:ipaddr – IP address assigned to the port. This is a TCP/IP address expressed in standard "dot notation." IP addresses consist of the system's network number and the machine's unique host number.

:duplex – This is the mode of operation of the interface.

:speed – This is interface bandwidth in megabits per second. The speed is either 100 Mbps for main DSM network or 10 Mbps for backup DSM network.

:mactype – This is the Media Access Control Type of the interface. Specify **dix** for the Digital/Inter/Xerox *de facto* standard for the Ethernet.

:mcast – This is the Multicast Control of the interface.

:submask – The subnet mask of the IP interface, in the form of an IP address with a restricted range of values.

When this command has successfully completed, the following message appears:

```
RLGHNCXA03W 01-10-30 21:18:37 GMT EAGLE 35.0.0
CHG-IP-LNK: MASP A - COMPLTD
```

---

40. Verify the IP address port and speed associated with the VSCCP card in the database by entering the **rtrv-ip-lnk** command. This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:14:37 GMT EAGLE 35.0.0
LOC   PORT IPADDR           SUBMASK          DUPLEX SPEED MACTYPE AUTO MCAST
1107  A    192.168.122.1    255.255.255.0    HALF   100   DIX     NO   YES
1107  B    192.168.123.1    255.255.255.0    HALF   10    DIX     NO   YES
```

41. Boot the DSM card that was added in step 31 in TSM emulation mode by using the **alw-card** command. For example, enter this command:

```
alw-card:loc=1107
```

This message appears:

```
RLGHNCXA03W  01-10-30 21:20:37 GMT EAGLE 35.0.0
Card has been allowed.
```

42. Verify the in-service normal (IS-NR) status of the VSCCP card using the **rept-stat-card** command. This is an example of the possible output.

```
RLGHNCXA03W 01-10-27 16:43:42 GMT  EAGLE 35.0.0
CARD  VERSION            TYPE    APPL      PST          SST       AST
1101  100-000-00003-000  ASM     SCCP      IS-NR        Active    ---
1102  100-000-00003-000  ASM     SCCP      IS-NR        Active    ---
1103  100-000-00002-000  ACMENET STPLAN    IS-NR        Active    ---
1104  100-000-00003-000  ASM     GLS       IS-NR        Active    ---
1105  100-000-00003-000  LIMOCU  CCS7ITU   IS-NR        Active    ---
1106  100-000-00003-000  LIMOCU  CCS7ITU   IS-NR        Active    ---
1107  100-000-00003-000  DSM     VSCCP     IS-NR        Active    ---
1113  100-000-00002-000  MCAP    OAM       IS-NR        Active    ---
1114  100-000-00002-000  TDM               IS-NR        Active    ---
1115  100-000-00002-000  MCAP    OAM       IS-NR        Active    ---
1116  100-000-00002-000  TDM               IS-NR        Active    ---
1117  100-000-00002-000  MDAL              IS-NR        Active    ---
1201  100-000-00003-000  LIMDS0  SS7ANSI   IS-NR        Active    ---
1202  100-000-00002-000  LIMV35  SS7GX25   IS-NR        Active    ---
1203  100-000-00003-000  LIMV35  SS7ANSI   IS-NR        Active    ---
1204  100-000-00003-000  LIMATM  ATMANSI   IS-NR        Active    ---
1205  100-000-00001-000  DCM     IPLIM     IS-NR        Active    ---
1207  100-000-00001-000  DCM     SS7IPGW   IS-NR        Active    ---
1303  100-000-00001-000  DCM     IPLIM     IS-NR        Active    ---
1305  100-000-00001-000  DCM     SS7IPGW   IS-NR        Active    ---
```

43. Test the presence of the EPAP hosts on the network using the **pass** command with the **ping** parameter. This command is invoked with a destination (either a hostname or IP address). For example, enter the following command:

pass:loc=1107:cmd="ping 192.168.122.100".

pass:loc=1107:cmd="ping 192.168.122.200".

pass:loc=1107:cmd="ping 192.168.123.100".

pass:loc=1107:cmd="ping 192.168.123.200".

After successful completion of each command, the system returns output similar to the following:

```
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 35.0.0
pass: loc=1107: cmd="ping 192.168.122.100"
Command entered at terminal #1.
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 35.0.0
PASS: Command sent to card
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 35.0.0
PING command in progress
;
rlghncxa03w 00-06-27 08:30:46 GMT EAGLE 35.0.0
PING 192.168.122.100: 56 data bytes
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=0.time=5. ms
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=1.time=0. ms
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=2.time=0. ms
----192.168.100.3 PING Statistics----
3 packets transmitted, 3 packets received, 0% packet loss
round-trip (ms) min/avg/max = 0/1/5
PING command complete
```

If the **pass** commands with the **ping** parameter is not successful, verify the the correct connection of the hardware cabling and try again. If the command fails again, contact Technical Services (see "Customer Assistance" on page 1-9).

---

44. Repeat steps 30 through 43 to add all DSM cards (N+1) to be installed in available slots. Go to the next step to start replacing TSM cards with DSM cards.

---

45. Replace TSM card(s) with DSM cards if applicable and add DSM card(s) to the database using steps 46 through 68. In this procedure, we are removing two existing adjacent TSM cards and replace them with a double-slot DSM card in slots 1101 and 1102.

NOTE: When adding DSM cards in an in-service environment, you must take care not to interrupt traffic. Before replacing SCCP cards with DSMs, first install a VSCCP card in an available double-slot.

---

46. Display the TSM cards running the SCCP application in the database using the **rtrv-card** command. This is an example of the possible output:

```
RLGHNCXA03W 01-10-15 16:34:56 GMT EAGLE 35.0.0
CARD   TYPE          APPL      PORT A LSET (SLC)   PORT B LSET (SLC)
1101   ASM           SCCP      --------    (--)    --------    (--)
1102   ASM           SCCP      --------    (--)    --------    (--)
1103   ACMENET       STPLAN    --------    (--)    --------    (--)
1104   ACMENET       GLS       --------    (--)    --------    (--)
1105   LIMOCU        CCS7ITU   ls300001    (00)    --------    (--)
1106   LIMOCU        CCS7ITU   ls400001    (00)    --------    (--)
1107   DSM           VSCCP     ls300001    (00)    --------    (--)
1113   MCAP          OAM
1114   TDM
1115   MCAP          OAM
1116   TDM
1117   MDAL
1201   LIMDS0        SS7ANSI   lsn1        (00)    lsn2        (01)
1202   LIMV35        SS7GX25   lsngwy      (00)    --------    (--)
1203   LIMV35        SS7ANSI   lsn2        (00)    lsn1        (01)
1204   LIMATM        ATMANSI   atmgwy      (00)    --------    (--)
1205   DCM           IPLIM     ipgwy1      (00)    ipgwy3      (01)
1207   DCM           SS7IPGW   ipgwy2      (00)    --------    (--)
1303   DCM           IPLIM     ipgwy1      (00)    ipgwy3      (01)
1305   DCM           SS7IPGW   ipgwy4      (00)    --------    (--)
```

Determine the cards to be removed from the database. In this procedure, we will remove the SCCP cards in card locations **1101 and 1102**.

---

47. Display the SCCP cards that are in service with the **rept-stat-card:stat=nr** command. For this example, enter the following command:

rept-stat-card:stat=nr

This is an example of the possible output:

```
RLGHNCXA03W 01-10-27 16:43:42 GMT  EAGLE 35.0.0
CARD  VERSION            TYPE    APPL      PST          SST       AST
1101  100-000-00003-000  ASM     SCCP      IS-NR        Active    ---
1102  100-000-00003-000  ASM     SCCP      IS-NR        Active    ---
1103  100-000-00003-000  ACMENET STPLAN    IS-NR        Active    ---
1104  100-000-00003-000  ACMENET GLS       IS-NR        Active    ---
1105  100-000-00003-000  LIMOCU  CCS7ITU   IS-NR        Active    ---
1106  100-000-00003-000  LIMOCU  CCS7ITU   IS-NR        Active    ---
1107  100-000-00003-000  DSM     VSCCP     IS-NR        Active    ---
1113  100-000-00002-000  MCAP    OAM       IS-NR        Active    ---
1114  100-000-00002-000  TDM               IS-NR        Active    ---
1115  100-000-00002-000  MCAP    OAM       IS-NR        Active    ---
1116  100-000-00002-000  TDM               IS-NR        Active    ---
1117  100-000-00002-000  MDAL              IS-NR        Active    ---
1201  100-000-00003-000  LIMDS0  SS7ANSI   IS-NR        Active    ---
1202  100-000-00002-000  LIMV35  SS7GX25   IS-NR        Active    ---
1203  100-000-00003-000  LIMV35  SS7ANSI   IS-NR        Active    ---
1204  100-000-00003-000  LIMATM  ATMANSI   IS-NR        Active    ---
1205  100-000-00001-000  DCM     IPLIM     IS-NR        Active    ---
1207  100-000-00001-000  DCM     SS7IPGW   IS-NR        Active    ---
1303  100-000-00001-000  DCM     IPLIM     IS-NR        Active    ---
1305  100-000-00001-000  DCM     SS7IPGW   IS-NR        Active    ---
```

---

48. Inhibit the SCCP cards using the **inh-card** command and specifying the card locations.

inh-card:loc=1101

inh-card:loc=1102

When each command has successfully completed, this message appears:

```
RLGHNCXA03W 01-10-12 09:12:36 GMT  EAGLE 35.0.0
Card has been inhibited.
```

---

49. Verify that the SCCP cards are in the Out-of-Service Maintenance-Disabled (OOS-MT-DSBLD) state with the **rept-stat-card** command. This is an example of the possible output:

```
RLGHNCXA03W 01-10-27 16:43:42 GMT  EAGLE 35.0.0
CARD  VERSION            TYPE    APPL      PST             SST       AST
1101  100-000-00003-000  ASM     SCCP      OOS-MT-DSBLD    Isolated  ---
1102  100-000-00003-000  ASM     SCCP      OOS-MT-DSBLD    Isolated  ---
1103  100-000-00002-000  ACMENET STPLAN    IS-NR           Active    ---
1104  100-000-00002-000  ACMENET STPLAN    IS-NR           Active    ---
1105  100-000-00003-000  LIMOCU  CCS7ITU   IS-NR           Active    ---
1106  100-000-00003-000  LIMOCU  CCS7ITU   IS-NR           Active    ---
1107  100-000-00003-000  DSM     VSCCP     IS-NR           Active    ---
1113  100-000-00002-000  MCAP    OAM       IS-NR           Active    ---
1114  100-000-00002-000  TDM               IS-NR           Active    ---
1115  100-000-00002-000  MCAP    OAM       IS-NR           Active    ---
1116  100-000-00002-000  TDM               IS-NR           Active    ---
1117  100-000-00002-000  MDAL              IS-NR           Active    ---
1201  100-000-00003-000  LIMDS0  SS7ANSI   IS-NR           Active    ---
1202  100-000-00002-000  LIMV35  SS7GX25   IS-NR           Active    ---
1203  100-000-00003-000  LIMV35  SS7ANSI   IS-NR           Active    ---
1204  100-000-00003-000  LIMATM  ATMANSI   IS-NR           Active    ---
1205  100-000-00001-000  DCM     IPLIM     IS-NR           Active    ---
1207  100-000-00001-000  DCM     SS7IPGW   IS-NR           Active    ---
1303  100-000-00001-000  DCM     IPLIM     IS-NR           Active    ---
1305  100-000-00001-000  DCM     SS7IPGW   IS-NR           Active    ---
```

---

50. Remove the SCCP cards from the database using the **dlt-card** command. The **dlt-card** command has only one parameter, **loc**, which is the location of the card. For this example, enter these commands:

dlt-card:loc=1101

dlt-card:loc=1102

After successful completion of this command, the system returns the following message:

```
RLGHNCXA03W 01-10-12 09:12:36 GMT  EAGLE 35.0.0
DLT-CARD: MASP A - COMPLTD
```

---

51. Verify that the SCCP cards are removed from the database using the **rtrv-card** command and specifying the cards that were removed in step 50. For this example, enter these commands:

rtrv-card:loc=1101

rtrv-card:loc=1102

After successful completion of this command, the system returns the following message:

```
E2144 Cmd Rej: Location invalid for hardware configuration
```

---

52. Locate the TSM card to be removed from the shelf.

Because the TSM card takes just one slot and the DSM card requires two slots, the DSM card must be installed in an odd slot that is adjacent to an even slot on its right side. In this procedure, we will remove two TSM cards from slots 1101 and 1102 to make space for one DSM card.

a. Push the inject/eject clamps outward from the card's faceplate (top clamp in the "UP" position, bottom clamp in the "DOWN" position).Pull the levers away from the shelf until they are parallel to the floor. Gently pull the card towards you until the card clears the shelf.

Figure 4-2. Push Inject/Eject Clamps Outward

b. Place the card you have removed in an electrostatic discharge (ESD) protective container, or place the card in the spare card storage shelf.

---

53. Repeat step 52 to remove the second TSM card.

---

54. Install the DSM card in slots 1101 and 1102.

a. Open the ejector levers on the DSM card. Carefully align the card's edges with the top and bottom card guides. Then push the card along the length of the card guides until the rear connectors on the card engage the mating connectors on the target shelf backplane.

b. Press the left edge of the card's faceplate using constant pressure until you feel the card's progress cease.

WARNING: Do not impact the faceplate in order to mate the connectors. Any impact to the card's faceplate can damage the faceplate, the pins, or the connectors.

c. Push in the top and bottom inject/eject clamps. This locks the card in place and ensures a strong connection with the pins on the target shelf backplane.

Figure 4-3. Push in Inject/Eject Clamps

d. Verify that both IMT bus LEDs are green.

e. Install the cabling required to connect the DSM card to the MPS. Refer to the *Installation Manual* for details.

---

55. Add the DSM card to the database and assign the VSCCP application using the **`ent-card`** command. For this example, enter this command:

```
ent-card:loc=1101:type=dsm:appl=vsccp
```

where:

`:loc -` specifies the slot number for the card. The slot number must be an odd number.

`:type -` specifies that the card is a DSM card.

`:appl -` specifies that the application is VSCCP.

After successful completion of this command, the system returns the following message:

```
RLGHNCXA03W 01-10-12 09:12:36 GMT  EAGLE 35.0.0
ENT-CARD: MASP A - COMPLTD
```

56. Display the new VSCCP card using the **rtrv-card** command with the card location specified. For this example, enter this command:

rtrv-card:loc=1101

This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 09:12:36 GMT EAGLE 35.0.0
CARD   TYPE          APPL      PORT A LSET (SLC)    PORT B LSET (SLC)
1101 DSM           VSCCP     --------     (--)     --------     (--)
```

57. Display the current IP host information in the database by entering the **rtrv-ip-host** command. The following is an example of the possible output.

```
RLGHNCXA03W 01-10-30 21:17:37 GMT EAGLE 35.0.0

IPADDR          HOST
192.1.1.32      KC_HLR2
192.1.1.50      DN_MSC1
192.1.1.52      DN_MSC2
192.168.122.1   VSCCP_1107_A
192.168.123.1   VSCCP_1107_B
```

58. Add the host name and IP address for each VSCCP link using the **ent-ip-host** command. For example, enter these commands:

ent-ip-host:host=vsccp_1101_a:ipaddr=192.168.122.2

ent-ip-host:host=vsccp_1101_b:ipaddr=192.168.123.2

where:

:host - specifies the host name. Each VSCCP link must be specified separately.

:ipaddr - specifies the IP network address for each EPAP. The first three octets of the IP address must be the same as MPS A and B ports, respectively. The fourth octet identifies the DSM card and must have a a unique octet identifier for the card's IP address; we recommend numbering the DSM cards sequentially, using values 1 to 25. (This example shows the assignment of the second DSM card.)

After successful completion of this command, the system returns the following message:

```
RLGHNCXA03W 01-10-30 21:18:37 GMT EAGLE 35.0.0
ENT-IP-HOST: MASP A - COMPLTD
```

59. Verify the new IP host information in the database by entering the **rtrv-ip-host** command. This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:19:37 GMT EAGLE 35.0.0

IPADDR          HOST
192.1.1.32      KC_HLR2
192.1.1.50      DN_MSC1
192.1.1.52      DN_MSC2
192.168.122.1   VSCCP_1107_A
192.168.123.1   VSCCP_1107_B
192.168.122.2   VSCCP_1101_A
192.168.123.2   VSCCP_1101_B
```

NOTE: Most INP customer private networks do not require setting up a default router for the DSM card. However, if your network configuration does require a default router to connect the DSM card communication to the EPAP, then only one default router is assignable to each DSM card. Assign the default router address to each DSM card as shown in this step.

60. Enter local domain and IP router address for the VSCCP card using the **chg-ip-card** command. For this example, enter this command:

chg-ip-card:loc=1107:domain=nc.tekelec.com
:defrouter=192.168.122.250

where

:loc – The card location of the card within the EAGLE 5 ISS.

:domain – The domain name of domain server.

:defrouter – Default router address. The IP address for default router. This is a TCP/IP address expressed in standard "dot notation". IP addresses consist of the system's network number and the machine's unique host number.

After successful completion of this command, the system returns the following message:

```
RLGHNCXA03W 01-10-30 21:20:37 GMT EAGLE 35.0.0
CHG-IP-CARD: MASP A - COMPLTD
```

---

61. Verify the local domain and IP router address associated with the VSCCP card in the database by entering the **rtrv-ip-card** command. This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:21:37 GMT EAGLE 35.0.0
   LOC 1101
     SRCHORDR  LOCAL
     DNSA      -----------
     DNSB      -----------
     DEFROUTER 192.168.122.250
     DOMAIN    NC.TEKELEC.COM
```

---

62. Display the current link parameters associated with the VSCCP card in the database by entering the **rtrv-ip-lnk** command. This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:14:37 GMT EAGLE 35.0.0
LOC   PORT IPADDR          SUBMASK          DUPLEX SPEED MACTYPE AUTO MCAST
1101  A    -----------     -----------      HALF   10    DIX     NO   NO
1101  B    -----------     -----------      HALF   10    DIX     NO   NO
1107  A    -----------     -----------      HALF   10    DIX     NO   NO
1107  B    -----------     -----------      HALF   10    DIX     NO   NO
```

---

63. Change the link parameters associated with the VSCCP card in the database using the **chg-ip-lnk** command. For this example, enter these commands:

```
chg-ip-lnk:loc=1101:port=a:duplex=half:ipaddrr=192.168.122.2
  :mactype=dix:speed=100:mcast=yes:submask=255.255.255.0
chg-ip-lnk:loc=1101:port=b:duplex=half:ipaddrr=192.168.123.2
  :mactype=dix:speed=10:mcast=yes:submask=255.255.255.0
```

where:

:loc – The card location of the card within the EAGLE 5 ISS.

:port – The port ID. The `port` parameter of the **chg-ip-lnk** command specifies the physical interface of the DSM card.

:ipaddr – IP address assigned to the port. This is a TCP/IP address expressed in standard "dot notation." IP addresses consist of the system's network number and the machine's unique host number.

:duplex – This is the mode of operation of the interface.

:speed – This is interface bandwidth in megabits per second. The speed is either 100 Mbps for main DSM network or 10 Mbps for backup DSM network.

:mactype – This is the Media Access Control Type of the interface. Specify **dix** for the Digital/Inter/Xerox *de facto* standard for the Ethernet.

:mcast – This is the Multicast Control of the interface.

:submask – The subnet mask of the IP interface, in the form of an IP address with a restricted range of values.

When this command has successfully completed, the following message should appear.

```
RLGHNCXA03W 01-10-30 21:18:37 GMT EAGLE 35.0.0
CHG-IP-LNK: MASP A - COMPLTD
```

---

64. Verify the new link parameters associated with the VSCCP card in the database by entering the **rtrv-ip-lnk** command. The following is an example of the possible output.

```
RLGHNCXA03W 01-10-30 21:14:37 GMT EAGLE 35.0.0
LOC   PORT IPADDR          SUBMASK          DUPLEX SPEED MACTYPE AUTO MCAST
1101  A    192.168.122.2   255.255.255.0    HALF   100   DIX     NO   YES
1101  B    192.168.123.2   255.255.255.0    HALF   10    DIX     NO   YES
1107  A    192.168.122.1   255.255.255.0    HALF   100   DIX     NO   YES
1107  B    192.168.123.1   255.255.255.0    HALF   10    DIX     NO   YES
```

---

65. Boot the DSM card that was inhibited in step 48 in TSM emulation mode by using the **alw-card** command. For example, enter this command:

alw-card:loc=1101

This message appears:

```
RLGHNCXA03W  01-10-30 21:20:37 GMT EAGLE 35.0.0
Card has been allowed.
```

---

66. Verify the in-service normal (IS-NR) status of the VSCCP card using the **rept-stat-card** command. This is an example of the possible output:

```
RLGHNCXA03W 01-10-27 16:43:42 GMT  EAGLE 35.0.0
CARD  VERSION            TYPE    APPL      PST          SST       AST
1101  100-000-00003-000  DSM     VSCCP     IS-NR        Active    ---
1103  100-000-00002-000  ACMENET STPLAN    IS-NR        Active    ---
1104  100-000-00003-000  ASM     GLS       IS-NR        Active    ---
1105  100-000-00003-000  LIMOCU  CCS7ITU   IS-NR        Active    ---
1106  100-000-00003-000  LIMOCU  CCS7ITU   IS-NR        Active    ---
1107  100-000-00003-000  DSM     VSCCP     IS-NR        Active    ---
1113  100-000-00002-000  MCAP    OAM       IS-NR        Active    ---
1114  100-000-00002-000  TDM               IS-NR        Active    ---
1115  100-000-00002-000  MCAP    OAM       IS-NR        Active    ---
1116  100-000-00002-000  TDM               IS-NR        Active    ---
1117  100-000-00002-000  MDAL              IS-NR        Active    ---
1201  100-000-00003-000  LIMDS0  SS7ANSI   IS-NR        Active    ---
1202  100-000-00002-000  LIMV35  SS7GX25   IS-NR        Active    ---
1203  100-000-00003-000  LIMV35  SS7ANSI   IS-NR        Active    ---
1204  100-000-00003-000  LIMATM  ATMANSI   IS-NR        Active    ---
1205  100-000-00001-000  DCM     IPLIM     IS-NR        Active    ---
1207  100-000-00001-000  DCM     SS7IPGW   IS-NR        Active    ---
1303  100-000-00001-000  DCM     IPLIM     IS-NR        Active    ---
1305  100-000-00001-000  DCM     SS7IPGW   IS-NR        Active    ---
```

---

67. Test the presence of the EPAP hosts on the network using the **pass** command with the **ping** parameter. This command is invoked with a destination (either a hostname or IP address). For example, enter the following command:

pass:loc=1101:cmd="ping 192.168.122.100".

pass:loc=1101:cmd="ping 192.168.122.200".

pass:loc=1101:cmd="ping 192.168.123.100".

pass:loc=1101:cmd="ping 192.168.123.200".

After successful completion of each command, the system returns output similar to the following:

```
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 35.0.0
pass: loc=1101: cmd="ping 192.168.122.100"
Command entered at terminal #1.
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 35.0.0
PASS: Command sent to card
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 35.0.0
PING command in progress
;
rlghncxa03w 00-06-27 08:30:46 GMT EAGLE 35.0.0
PING 192.168.122.100: 56 data bytes
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=0.time=5. ms
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=1.time=0. ms
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=2.time=0. ms
----192.168.100.3 PING Statistics----
3 packets transmitted, 3 packets received, 0% packet loss
round-trip (ms) min/avg/max = 0/1/5
PING command complete
```

If the **pass** command with the **ping** parameter is not successful, verify the the correct connection of the hardware cabling and try again. If the command fails again, contact Technical Services (see "Customer Assistance" on page 1-9).

---

68. Repeat steps 46 through 67 to replace all adjacent TSM cards identified in the prerequisites and to be replaced with DSM cards.

---

69. Repeat steps 48 through 52 to inhibit any remaining TSM cards running the SCCP application and remove them from database and shelf.

NOTE: The INP feature cannot be turned on until TSM cards running the SCCP application are removed from the system.

CAUTION: At this point in the procedure, contact Tekelec Technical Services for assistance in completing this INP activation procedure (see "Customer Assistance" on page 1-9).
Do not proceed without consulting with Technical Services.

70. Turn on and configure the INP feature using steps 71 through 93.

---

71. Enable the INP feature using the following command:

chg-feat:inp=on

The system returns the following output:

```
rlghncxa03w 01-10-11 11:34:04 GMT EAGLE 35.0.0
CHG-FEAT: MASP A - COMPLD
```

---

72. Configure an INP capability point code using the **chg-sid** command. For example, enter these commands:

chg-sid:pcn=1:cpci=1-300-1:cpctype=inp

chg-sid:cpcn=11131:cpctype=inp

where:

pci/pcn – The point code of the primary signaling point that is to receive the message.

:cpca/:cpci/cpcn – The point code used by the SS7 protocol to identify a group of functionally related EAGLE 5 ISSs in the signaling network to which the EAGLE 5 ISS belongs.

:cpctype – the type of capability point code

After successful completion of this command, the system returns the following output:

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 35.0.0
CHG-SID: MASP A - COMPLTD
```

---

73. Verify the changes using the **rtrv-sid** command. This is an example of the possible output.

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 35.0.0
PCA           PCI           PCN           CLLI            PCTYPE
------------- 1-100-1       11111         rlghncxa03w     OTHER

CPCA
-------------

CPCI
1-101-1           1-101-2           1-101-3         1-101-4
1-102-1           1-300-1

CPCN
11121             11122             11123           11124
11125

CPCN (INP)
11131
```

---

74. Enter the signaling points to a broadcast signaling point code group using the **ent-cspc** command (for INP Query Services). You use this command to enter the point code of the EAGLE 5 ISS mate and of any nodes that will send route-on-subsystem queries to the local INP subsystem. These point codes are notified of the receipt by EAGLE 5 ISS of subsystem-prohibited and subsystem-allowed SS7 SCCP management messages from an application at an adjacent signaling point and subsystem and when the local subsystem experiences a status change.

ent-cspc:grp=cspc

ent-cspc:grp=cspc:pcn=2

where:

:grp – The name to be assigned to the new group. This parameter is a character string associated with this broadcast list.

:pcn – The ITU national point code in the form of ITU number (*nnnnn*).

The system returns this message:

```
rlghncxa03w 01-10-17 15:35:05 GMT EAGLE 35.0.0
ENT-CSPC: MASP A - COMPLTD
```

---

75. Verify the changes using the **rtrv-cspc** command and showing the list of concerned signaling point codes that are to notified when subsystem-prohibited or subsystem-allowed messages are received for an associated mate application. For this example, enter these commands.

rtrv-cspc:grp=cspc

rtrv-cspc:grp=cspc:pcn=2

This is an example of the possible output.

```
rtrv-cspc:grp=cspc

RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 35.0.0
CSPC GRP    PERCENT FULL
CSPC        0%

This is an example of the possible output.

rtrv-cspc:grp=cspc:pcn=2

RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 35.0.0
CSPC PC TABLE IS 15% FULL.
CSPC GRP    PC
CSPC        2
```

---

76. Add a mated application to the database using the **ent-map** command. Use this command for INP Query Services. Enter the local INP subsystem and its mate subsystem (on the other EAGLE 5 ISS) with the concerned point code list from the previous steps. For this example, enter this command:

ent-map:pcn=1:ssn=12:grp=cspcs:mpcn=2:mssn=12

where:

:pc/pca/pci/pcn – The point code of the primary signaling point that is to receive the message.

:mpc/mpca/mpci/mpcn – The point code of the backup signaling point that is to receive the message.

:ssn – Subsystem number – the subsystem address of the primary point code that is to receive the message.

:mssn – Mate subsystem number – the subsystem address of the backup point code that is to receive the message.

:grp – The name of the concerned signaling point code group that contains the point codes that should be notified of the subsystem status. This parameter applies to both RPCs/SSNs.

When each of these commands have successfully completed, this message should appear.

```
RLGHNCXA03W  01-10-07 00:28:31 GMT EAGLE 35.0.0
ENT-MAP:  MASP A - COMPLTD
```

---

77. Verify the changes using the **rtrv-map** command. This command shows the mated application relationship maintained by the EAGLE 5 ISS. This information supports the routing of SCCP management SSP/SSA messages. Here is an example of the possible output.

```
RLGHNCXA03W  01-10-07 00:29:31 GMT EAGLE 35.0.0
. . .
PCN          SSN   MPCN          MSSN SRM  MRC   GRP NAME
1            12    2             12   YES  YES   CSPC
. . .
```

---

78. Enter the **ent-ss-appl** command to reserve a subsystem number for an application and set the application to be online or offline. Use this command for INP Query Services. Enter the state and subsystem number for the INP local subsystem. For example, enter this command:

ent-ss-appl:ssn=12:appl=inp:stat=online

where:

:ssn – The primary subsystem number *(range = 2-255)*. This value should match the INPQ SSN you define with **ent-map** in the MAP database.

:appl – The application type (*inp*).

:stat – The status of online or offline (*online*).

The system returns this message:

```
rlghncxa03w 01-10-17 15:35:05 GMT EAGLE 35.0.0
ENT-SS-APPL: MASP A - COMPLTD
```

---

79. Verify the change made in the previous step with the **rtrv-ss-appl** command retrieve all applications from the database. The commands displays the application type, subsystem number, and application status. For example, enter this command.

rtrv-ss-appl

This is an example of the possible output.

```
rtrv-cspc:grp=cspc

RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 35.0.0
AAPL  SSN  STAT
INP   12   online
SS-APPL table is (1 of 100) 100% full
```

---

80. Enter the default country code (CC) and default network destination code (NDC) to convert the nature of address indicator (NAI) of MSISDNs to the international format (**nai=intl**) with the **chg-stpopts** command. This command can change the values of one or more of the STP node level processing option indicators kept in the STP option table. All values are assigned initially to system defaults at STP installation time, and they can be updated subsequently with this command. For example, enter the following command:

chg-stpopts:defcc=1:defndc=38:dsmaud=on:npcfmti=2-9-2-1

where:

:defcc – The default country code.

:defndc – The default network destination code.

:dsmaud – The DSM audit running state (*on* or *off*).

:npcfmt1 – The ITU National Point Code Format Identifier, which identifies how the ITU-N point code is entered into the database and how it is displayed in all EAGLE 5 ISS outputs. This code is a 14-bit integer.

After successful completion of this command, the system returns the following output:

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 35.0.0
CHG-STPOPTS: MASP A - COMPLTD
```

---

81. Verify the new country code and network destination code using the **rtrv-stpopts** command. This is an example of the possible output:

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 35.0.0
STP OPTIONS
-----------------------
NPCFMTI        2-9-2-1
DEFCC               1
DEFNDC             38
DSMAUD             on
```

---

82. Use the **chg-inpopts** command for number conditioning and INP normalization. Use this command for INP Query Services. For example, enter the following commands to enter a series of entries for the INPOPTS:

chg-inpopts:dra=rndn:dranp=e164:dranai=intl

chg-inpopts:cdpnpfx=200

chg-inpopts:cdpnpfx=fed123:dltpfx=yes

chg-inpopts:cdpnnai=1:snai=sub

chg-inpopts:cdpnnai=70:snai=intl

where:

:dra – The destination routing address, where the values are *rndn* (routing number and dialed number) and *rn* (routing number).

:dranp – The numbering plan mnemonic (*e164, x121, f69*).

:dranai – The nature of address indicator (*intl, sub, natl, ntwk, unknown*).

:cdpnpfx – The called party prefix number (contains 1 to 15 characters, each of which is in the range of '*0*' to '*f*').

:dltpfx – The delete prefix indicator (*yes*, *no*).

:cdpnnai – The called party prefix number nature of address indicator (*0 to 127)*.

:snai – The service nature of address indicator (*sub*, *natl*, *intl*, *none*).

After successful completion of this command, the system returns this output:

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 35.0.0
CHG-INPOPTS: MASP A - COMPLTD
```

---

83. Verify the changes using the **rtrv-inpopts** command. This command retrieves INP-specific options. Here is an example of the possible output.

```
rlghncxa03w 01-01-06 08:50:12 GMT EAGLE 35.0.0
rtrv-inpopts
Command Entered at terminal #1
;
rlghncxa03w 01-01-06 08:50:12 GMT EAGLE 35.0.0
DRANAI    = INTL
DRANP     = e164
DRA       = RNDN

CDPNPFX             DLTPFX
---------------     ---
200                 no
fed123              yes

CDPNNAI             SNAI
---                 ----
1                   sub
70                  intl
```

---

84. Add routing number prefixes for the operating network using the **ent-homern** command. Use this command to enter any Home RNs that are prefixed to DNs for incoming INP MR messages. You may use this command to enter up to 100 routing number prefixes for the operating network into the HOMERN table. For example, enter this command:

ent-homern:rn=c222

where:

:rn – The home routing number prefix. The range is 1 to 15 hex digits (0-F).

When this command has successfully completed, this message appears.

```
RLGHNCXA03W  01-10-07 00:28:31 GMT EAGLE 35.0.0
HOMERN table is (1 of 100) 1% full
ENT-HOMERN:  MASP A - COMPLTD
```

---

85. Verify the changes using the **rtrv-homern** command. This command retrieves a list of routing number prefixes that belong to the operating network. Here is an example of the possible output.

```
rlghncxa03w  01-10-28  00:29:31 GMT EAGLE 35.0.0.0
RN
----------------
216780909087654
76345098
c10234567
c222
cabade
abc
abc123

HOMERN table is (6 of 100) 6% full
```

---

86. Use the **ent-srvsel** command to enter the INP Service Selectors. You may use this command to assign the applicable service selectors required to specify the service entry for DSM services. For example, you can enter this command in these formats:

ent-srvsel:gtin=4:serv=inpmr:tt=0:nai=intl:np=e164:snai=rnidn :snp=e164

ent-srvsel:gtin=4:serv=inpqs:tt=1:nai=intl:np=e164:snai=intl :snp=e164

where:

:gtii/gtin – The Global Title Indicator. For all INP service selector commands, the domain is defined as **gtii** (ITU international) and **gtin** (ITU national). The supported range values for both **gtii** and **gtin** are *2* and *4*.

:serv – The DSM service. The valid ranges are *inpqs* (INP query) and *inpmr* (INP Message Relay).

:tt – The Translation Type. The range is 0-255.

:nai – The Nature of Address indicator. The valid range indicators are: *sub* (subscriber number), *rsvd* (reserved for national use), *natl* (national significant number), and *intl* (international number).

:np – The Numbering Plan. The valid range indicators are: *e164* (ISDN/telephony numbering plan), *generic* (generic numbering plan), *x121* (data numbering plan), *f69* (Telex numbering plan), *e210* (Maritime numbering plan), *e212* (land mobile numbering plan), *e214* (ISDN/mobile numbering plan), and *private* (private network-specific numbering plan).

:snai – The Service Nature of Address Indicator. Valid range indicators are:
sub (subscriber number), *natl* (national significant number),
intl (international number),
rnidn (routing number prefix and international dialed/directory number),
rnndn (routing number prefix and national dialed/directory number),
rnsdn (routing number prefix and subscriber dialed/directory number).

:snp – The Service Numbering Plan. The valid mnemonic for INP is *e164*.

When this command has successfully completed, this message appears.

```
rlghncxa03w  01-10-07 00:28:31 GMT EAGLE 35.0.0
Service Selector table is (114 of 1024) 11% full
ENT-SRVSEL:  MASP A - COMPLTD
```

87. Verify the changes using the **rtrv-srvsel** command. This command retrieves a list of administered service selector combinations. Avoid lengthy output by filtering the list using various parameter combinations. (The selector table can have over 1,000 entries.) For example, enter this command:

rtrv-srvsel:gtin=4

where:

:gtin – The Global Title Indicator for a defined domain of ITU national. The range is *2* or *4*.

This is an example of the possible output for the command:

```
rlghncxa03w  01-10-28  00:29:31 GMT EAGLE 35.0.0
GTIN  TT   NP        NAI    NPV  NAIV  SNP  SNAI  SERV
4     0    e164      intl   ---  ---   e164 rnidn inpmr
4     1    e164      intl   ---  ---   e164 intl  inpqs
```

---

88. Use the Allow Mated Application Subsystem command (**alw-map-ss**) for INP Query Services to activate the INP subsystem and bring it online. You can allow and inhibit the INPQS subsystem. The command requires a parameter that identifies the SSN to be allowed. That subsystem must be out-of-service maintenance-disabled (OOS-MT-DSBLD) for the command to be accepted. For example, enter this command:

alw-map-ss:ssn=12

where:

:ssn – The INP Subsystem Number. The range is *2-255*.

When this command has successfully completed, this message appears.

```
rlghncxa03w  01-10-24 00:28:31 GMT EAGLE 35.0.0
Local Subsystem has been allowed.
Command Completed.
```

---

89. Verify the activation of the INP subsystem by the previous command using the Report Status SCCP command **rept-stat-sccp**. This command displays the status of the DSMs running the SCCP application, and also displays cards that are denied SCCP service. If you issue the command without parameters, it displays the status of the VSCCP cards and the GTT and INP services executing on those cards.

This is an example of the possible output for the command **rept-stat-sccp:**

```
rlghncxa03w  01-10-28  00:29:31 GMT EAGLE 35.0.0
SCCP  SUBSYSTEM REPORT IS-NR         Active     -----
GSM   SUBSYSTEM REPORT IS-NR         Active     -----
INP   SUBSYSTEM REPORT IS-NR         Restricted -----
      ASSUMING MATES'S LOAD
      INPQ: SSN STATUS = Allowed    MATE SSN STATUS = Prohibited
 ...
```

CAUTION: When you have an in-service environment and you are replacing TSM cards with DSM cards, initialize one DSM card at a time. Verify its return to IS-NR state before initializing another DSM card. This precaution keeps cards in service and precludes an interruption of SCCP services.

NOTE: GTT, EGTT, and VGTT traffic are routed based on the global titles in the OAM database while G-Flex, G-Port, and INP traffic is routed based on the global title in the RTDB. Rebooting a DSM card running the VSCCP application causes both the OAM and RTDB databases on the DSM card to reload.

90. Reload a DSM card using the **init-card** command. For example, enter this command:

```
init-card:loc=1101
```

The system returns the following message:

```
rlghncxa03w  01-10-07 00:28:31 GMT EAGLE 35.0.0
Command entered at terminal #3.
Init Card command issued to card 1101
```

---

91. Verify its return to IS-NR state with the **rept-stat-card** command. (Wait until in-service state is restored.) This is an example of the possible output:

```
RLGHNCXA03W 01-10-07 00:30:42 GMT  EAGLE 35.0.0
CARD  VERSION              TYPE    APPL      PST           SST       AST
1101  100-000-00003-000    DSM     VSCCP     IS-NR         Active    ---
1103  100-000-00002-000    ACMENET STPLAN    IS-NR         Active    ---
1104  100-000-00003-000    ASM     GLS       IS-NR         Active    ---
1105  100-000-00003-000    LIMOCU  CCS7ITU   IS-NR         Active    ---
1106  100-000-00003-000    LIMOCU  CCS7ITU   IS-NR         Active    ---
1107  100-000-00003-000    DSM     VSCCP     IS-NR         Active    ---
1113  100-000-00002-000    MCAP    OAM       IS-NR         Active    ---
1114  100-000-00002-000    TDM               IS-NR         Active    ---
1115  100-000-00002-000    MCAP    OAM       IS-NR         Active    ---
1116  100-000-00002-000    TDM               IS-NR         Active    ---
1117  100-000-00002-000    MDAL              IS-NR         Active    ---
1201  100-000-00003-000    LIMDS0  SS7ANSI   IS-NR         Active    ---
1202  100-000-00002-000    LIMV35  SS7GX25   IS-NR         Active    ---
1203  100-000-00003-000    LIMV35  SS7ANSI   IS-NR         Active    ---
1204  100-000-00003-000    LIMATM  ATMANSI   IS-NR         Active    ---
1205  100-000-00001-000    DCM     IPLIM     IS-NR         Active    ---
1207  100-000-00001-000    DCM     SS7IPGW   IS-NR         Active    ---
1303  100-000-00001-000    DCM     IPLIM     IS-NR         Active    ---
1305  100-000-00001-000    DCM     SS7IPGW   IS-NR         Active    ---
```

---

92. After the **init-card** and the **rept-stat-card** commands show that service is successfully restored, repeat steps 90 and 91 for each DSM card in your system.

---

93. Confirm that essential activation procedures are successful.

- Use **rept-stat-sccp** to verify all your DSM cards are loaded and are IS-NR (in-service normal) status.
- Use **rept-stat-mps** to verify all your DSM cards and the EPAP are connected and operational.
- Use **rept-stat-db:display=all** to verify database levels are identical for the EPAP PDB and RTDB and the RTDBs on the DSM cards.

The INP feature is now installed, activated, and ready for operations.

5

Maintenance and Measurements

Introduction

This chapter describes the changes and alterations to the EAGLE 5 ISS for implementing the Maintenance and Measurements support for the INP feature. It also provides an overview of the interaction between the EPAP in the MPS subsystem and the EAGLE 5 ISS.

Maintenance Requirements

Maintenance supports the INP feature by providing these functions.

- EPAP status and alarm reporting
- DSM status reporting to the EPAP
- GSM and INP system hardware verification
- GSM and INP system status reporting

- Commands
- Code and application data loading
- Feature Related Alarms
- Measurements

These measurement and maintenance functions for INP are described in the following pages.

EPAP Status and Alarm Reporting

The EPAPs have no direct means of accepting user input or displaying output messages on EAGLE 5 ISS terminals, so Maintenance, Measurements, and Status information must be routed through a DSM card. The EPAP sends two types of messages to the DSM:

- EPAP maintenance blocks
- DSM status requests

EPAP Maintenance Blocks

The active EPAP generates and sends maintenance blocks to the primary DSM. One maintenance block is sent as soon as the IP link is established between the active EPAP and the primary DSM. Additional maintenance blocks are sent whenever the EPAP needs to report any change in status or error conditions. The information returned in maintenance blocks is included in the output of the **rept-stat-mps** and **rept-stat-sccp** commands.

The EPAP sends maintenance blocks that contain (at least) the following information.

- Status of EPAP 'A' - actual states are active, standby, and down (inoperative). Maintenance blocks include a field so this information can be forwarded to the EPAP A Device Control Block (DCB), where it is available for the output of the **rept-stat-mps** command.
- Status of EPAP 'B' - actual states are active, standby, and down (inoperative). Maintenance blocks include a field so this information can be forwarded to the EPAP B DCB, where it is available for the output of the **rept-stat-mps** command.
- Identification of active EPAP - a field to identify the active EPAP.

- Congestion indicator - an indicator showing provisioning link congestion. The link between the EPAPs and the external source of provisioning data can become congested in high provisioning traffic situations. When this occurs and subsequently as the congestion clears, the EPAP sends maintenance blocks to the DSM. The EPAP must ensure that no more than one maintenance block per second is sent to the primary DSM if the only reason is to report a change in congestion status.
- Alarm conditions - an error code field. If the EPAP needs to report an alarm condition, it puts an appropriate UAM identifier in this field.
- Current MPS database size - a field indicating the current RTDB size. The DSM uses this information to calculate the percentage of memory utilized by the RTDB.

DSM Status Requests

When the EPAP needs to know the status of a DSM, it sends a DSM status request to that DSM. Since status messages are sent over the UDP, the EPAP broadcasts the DSM status request, and each DSM returns its status to the EPAP.

Status Reporting to the EPAP

The sections that follow describe the DSM status reporting for the EPAP.

DSM Status Messages – When Sent

The EPAP needs to know the current status of various aspects of the DSMs. Accordingly, DSMs send a DSM status message to the EPAP when the following events occur in the DSM whenever:

- The DSM is booted.
- When the DSM receives a DSM Status Request message from the EPAP.
- When the DSM determines that it needs to download the entire database, for example, if the DSM determines that the RTDB needs to be downloaded (for instance, if the database is totally corrupted), or if a craftsperson requests that the database be reloaded.
- When the DSM starts receiving DB downloads or DB updates. When the DSM card(s) starts downloading the RTDB, or if the DSM starts accepting database updates, it needs to send a status message informing the EPAP of the first record received. This helps the EPAP keep track of downloads in progress.

DSM Status Messages Fields

The DSM status message provides the following information to the EPAP:

- **DSM Memory Size**. When the DSM is initialized, it determines the amount of applique memory present. The EPAP uses the value to determine if the DSM has enough memory to hold the RTDB.
  Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the DSM database capacity requirements.
- **Load Mode Status**. This indicator indicates whether 80% of the IS-NR (in service normal) LIMs have access to SCCP services.
- **Database Level Number**. The EPAP maintains a level number for the RTDB. Each time the database is updated, the level number is incremented. When the database is sent to the DSM, the DSM keeps track of the database level number. The database level number is included in all status messages that the DSM sends. Level number 0 signifies that no database has been loaded into the DSM; this occurs whenever the DSM requests a full database download.
- **Database Download Starting Record Number**. When the DSM starts downloading either an entire RTDB or just updates to the database, it identifies the starting record number. This lets the EPAP know when to wrap around the end of the file and when the DSM has finished receiving the file or updates.

Hourly Maintenance Report

The Hourly Maintenance Report, generated automatically, includes the alarm totals of the INP subsystem and DSM/EPAP IP links. A sample follows.

```
    eagle10506 99-10-10 16:00:01 EST EAGLE 35.0.0
    5072.0000 REPT COND GSM SS
    "GSM SS :0440,MTCEINT-0,SA,99-10-10,16:00:01,,,,*C"
;
    eagle10506 99-10-10 16:00:01 EST EAGLE 35.0.0
    5073.0000 REPT COND INP SS
    "INP SS :0440,MTCEINT-0,SA,99-10-10,16:20:01,,,,*C"
;
    eagle10506 99-10-10 16:00:01 EST EAGLE 35.0.0
    5077.0000 REPT COND EPAPDSM
    "EPAPDSM :0084,MTCEINT-0,SA,99-10-10,16:00:01,,,,**"
;
    eagle10506 99-10-10 16:00:01 EST EAGLE 35.0.0
    5007.0000 REPT COND CARD
    "CARD 1102:0422,SCMMA,SA,99-10-10,16:00:01,,,,**"
;
    eagle10506 99-09-13 16:00:01 EST EAGLE 35.0.0
    3561.0000 REPT COND ALARM STATUS
    "ALARMS:PERM. INHIBITED,0,0,0"
    "ALARMS:TEMP. INHIBITED,0,0,0"
    "ALARMS:ACTIVE,10,14,3"
    "ALARMS:TOTAL,10,14,3"
;
```

GSM and INP System Hardware Verification

DSM card loading also verifies the validity of the hardware configuration for DSM cards. The verification of the hardware includes:

- Validity of the main board
- Verification of applique memory size

DSM Main Board Verification

An AMD-K6 (or better) main board is required to support the INP VSCCP (VxWorks Signalling Connection Port) application on the DSM card. EAGLE 5 ISS maintenance stores the validity status of the VSCCP card's main board configuration. The EAGLE 5 ISS prevents the INP feature from being enabled if the hardware configuration is invalid.

When the VSCCP application is being initialized, it determines the main board type. The SCCP maintenance block relays the main board information to OAM. This requires the application software to be loaded to the VSCCP card; then verification of the main board information is received in the SCCP maintenance block. If the main board is determined to be invalid for the INP application, loading the VSCCP card is automatically inhibited, and the card is booted via PMTC (Peripheral Maintenance).

DSM Applique Memory Verification

The VSCCP application performs two types of memory validation to determine whether a DSM has enough memory to run INP.

1. Local Memory Validation

   When the INP feature bit is first enabled, or when the INP feature is enabled and the DSM is initializing, VSCCP checks to see if the DSM has at least one D1G applique. The INP feature bit cannot be enabled if any DSM has less than 1 GB of memory installed.

2. Real-time Memory Validation

   When communication is established between the DSM and EPAP and the DSM has joined the RMTP tree, the EPAP starts downloading its copy of the RTDB to the DSM. The EPAP includes the size of the current RTDB in all records sent to the DSM.

   The DSM compares the size required with the amount of installed memory; it issues a minor alarm if the database exceeds 80% of the DSM memory. If the database completely fills the DSM memory, an insufficient memory alarm is issued, the DSM leaves the RMTP tree, and the DSM status changes to IS-ANR/Restricted.

Actions Taken When Hardware Determined to be Invalid

When the hardware configuration for a DSM card is determined to be invalid for the INP application, the SCM (System Configuration Manager) automatically inhibits loading that specific DSM card. A major alarm is generated, indicating that card loading for that DSM card has failed and has been automatically inhibited, that is, prevented from reloading again. See "Card Related MPS Alarms" on page 5-18 for information about the alarms that are generated.

When card loading is inhibited, the primary state of the card is set to OOS-MT-DSBLD and the secondary state of the card is set to MEA (Mismatch of Equipment and Attributes).

The following actions apply to a DSM card determined to be invalid:

- The DSM does not download the EAGLE 5 ISS (STP) databases.
- The DSM does not download the Real Time Database from the EPAP.
- The DSM does not accept Real Time Database updates (such as *add*, *change*, *delete*) from the EPAP.

To activate loading of a DSM card which has been automatically inhibited, the craftsperson must enter command **`alw-card:loc=xxxx`**.

Unstable Loading Mode

At some point, having some number of invalid DSM cards results in some of the LIMs being denied SCCP services. A threshold must be monitored; if the number of valid DSMs is insufficient to provide service to at least 80% of the in-service (IS-NR) LIMs, the system is in an unstable loading mode. There are other reasons why an EAGLE 5 ISS might be in an unstable Loading Mode; refer to "Loading Mode Support" on page 5-8 for further information.

GSM System and INP System Status Reporting

System Status Reporting

The **`rept-stat-sys`** command supports the DSM cards running the VSCCP application. Refer to "rept-stat-sys" on page 3-4 for more details on the **`rept-stat-sys`** command changes.

The **`rept-stat-sccp`** command supports the DSM cards running the VSCCP application and reports INP statistics. Refer to "rept-stat-sccp" on page 3-4 for more details on the **`rept-stat-sccp`** command changes.

GSM Status Reporting

The **rept-stat-mps** command is a new command that supports reporting of GSM system. This command concentrates on reporting the status of the GSM and INP provisioning system. Refer to "rept-stat-db" on page 3-10 for more details on the **rept-stat-mps** command.

INP Status Reporting

The **rept-stat-mps** command is a new command that supports reporting of INP system. This command concentrates on reporting the status of the GSM and INP provisioning system. Refer to "rept-stat-db" on page 3-10 for details on the **rept-stat-mps** command. INP statistics are placed in the **rept-stat-sccp** command.

DSM Memory Capacity Status Reporting

As described in "Status Reporting to the EPAP" on page 5-3, the DSM sends a message to the EPAP defining the DSM board memory size. The EPAP determines whether the DSM has enough memory to store the RTDB and responds to the DSM with and Ack or Nak, indicating whether the DSM memory is large enough.

When the EPAP sends database updates to the DSMs, the update messages include a field that contains the new database memory requirements. Each DSM monitors the database size requirements, and issues a minor alarm if the size of the database exceeds 80% of its memory. If a database increases to the point that it occupies 100% of the DSM memory, an insufficient memory major alarm is issued.

The **rept-stat-mps:loc=xxxx** command displays the amount of memory used by the RTDB as a percent of available DSM memory.

Loading Mode Support Status Reporting

The OAM application can determine whether the system is in an unstable loading mode because it knows the state of all LIM, SCCP, and DSM cards in the system. When the loading mode is unstable, the **rept-stat-sys** command reports the existence of the unstable loading mode and the specific conditions that caused it. See "Loading Mode Support" on page 5-8 for additional information.

Code and Application Data Loading

In general, administrative updates can occur while a DSM card is loading. The DSM card should also remain in an in-transition state if the EAGLE 5 ISS portion of the database has completed loading and is waiting for the RTDB to download.

DSM Code Loading

The EAGLE 5 ISS OAM performs code loading of the DSM card.

DSM Application Data Loading

The INP feature requires that new TDM-resident data tables be loaded in addition to those currently supported by EAGLE 5 ISS. The GPL and data loading support this additional table loading while maintaining support for loading the existing EAGLE 5 ISS tables.

In order to support both RTDB and EAGLE 5 ISS data loading, the VSCCP GPL verifies its hardware configuration during initialization to determine if it has the capacity to support the RTDB.

The VSCCP GPL application data loader registers all tables for loading, independent of the INP feature provisioning and main board/applique hardware configuration. As a result, load requests are always identical. During loading, multiple DSM load requests are combined into a single download, reducing the overall download time. The DSM card stores or discards RTDB table data based on whether or not it has RTDB-capable hardware for features like G-Port, G-Flex, and INP.

The OAM, on the other hand, downloads the INP OPTS, HOMERN, and SERV SEL tables only if the INP feature is provisioned. When the INP feature is not provisioned, the OAM does not attempt to read these tables from disk. Instead, empty tables (i.e., tables without entries) are downloaded. All other tables requested for loading are read from disk and downloaded routinely.

Non-GSM Data Initialization

If the DSM card hardware configuration cannot support the RTDB, the GSM tables and INP tables are marked as absent during Service Management System (SMS) initialization. Memory is not reserved for the GSM table data. Also, GSM tables are registered with the application data loader (ADL) specifying a data discard function. GSM table data is discarded during loading by the ADL discard function, rather than storing it in memory.

GSM Data Initialization

If the DSM card detects INP-capable hardware, the GSM and INP tables are registered with ADL specifying a data load function. Any INP table data downloaded is stored in memory during loading.

EPAP - DSM Loading Interface

The DSM must convey to the EPAP that it needs to download the RTDB. This occurs when the DSM sends a Full Download Request message to the EPAP.

Loading Mode Support

No more than 16 LIMs can be serviced by each SCCP (or VSCCP) card.

80% Threshold of Support

Loading mode is based on the ability of the system to provide SCCP service to at least 80% of the LIMs.

VSCCP Capacity

An insufficient number of VSCCP cards that are **is-nr** or **oos-mt-dsbld** relative to 80% of the number of provisioned LIMs is called a "failure to provide adequate SCCP capacity."

Insufficient SCCP Service

It is also possible for LIMs or VSCCP cards to be inhibited or to have problems that prevent them from operating normally. If enough VSCCP cards are out of service, it may not be possible for the remaining **is-nr** VSCCP cards to service at least 80% of the number of **is-nr** LIMs. This is called "insufficient SCCP service." When this occurs, some of the LIMs are denied SCCP service. It is possible to inhibit LIMs to bring the ratio back to 16:1 (or better).

Conditions That Create an Unstable Loading Mode

Current system implementation interrupts and aborts card loading upon execution of an EAGLE 5 ISS database **chg** command. Loading mode support denies the execution of EAGLE 5 ISS database **chg** commands when the system is in an unstable loading mode. An unstable loading mode exists when any of the following conditions are true:

- The system's maintenance baseline has not been established.
- Less than 80% of the number of LIMs provisioned are **is-nr** or **oos-mt-dsbld**.
- The number of **is-nr** and **oos-mt-dsbld sccp** cards is insufficient to service at least 80% of all provisioned LIMs.
- Insufficient SCCP service occurs when an insufficient number of **is-nr** VSCCP cards are available to service at least 80% of the number of **is-nr** LIMs.
- LIM cards are being denied SCCP service and any VSCCP cards are in an abnormal state (**oos-mt**, **is-anr**).

Actions Taken When the System is in an Unstable Loading Mode

- No affect on RTDB downloads or updates.

  Unstable loading mode has no impact on RTDB downloads or the stream of RTDB updates.

- **rept-stat-sys** reports unstable loading mode.

  When the loading mode is unstable, the **rept-stat-sys** command reports the existence of the unstable loading mode and the specific trigger that caused it.

- No EAGLE 5 ISS database updates allowed.

  When in an unstable loading mode, the EAGLE 5 ISS does not accept database updates. When updates are rejected, the reason is given as: `E3112 Cmd Rej: Loading Mode unstable due to SCCP service is deficient.`

  The **inh-card** and **alw-card** commands can be used to alter SCCP service levels to achieve the 80% threshold. This can be repeated for each card until the system is able to supply SCCP services to at least 80% of the **is-nr** LIMs. The remaining 20% LIM or supporting VSCCP cards may remain out of service until the stream of EAGLE 5 ISS database updates ceases. This stream of updates can be temporarily interrupted to allow the remaining 20% of the system to come in service.

  Once the EAGLE 5 ISS database has been loaded, that database can be updated (as long as the system is not in an unstable loading mode). However, if an update comes in during EAGLE 5 ISS database loading, the DSM aborts the current loading, issues a class 01D7 obit, and reboots. Figure 5-1 shows an example.

Figure 5-1. Obit Message for Abort of Card Loading

```
tekelecstp 97-04-08 12:29:04 EST EAGLE 35.0.0.0
------------------------------------------------------------------------
     Card 1317   Module RADB_MGR.C  Line  337  Class 01d7
        Card 1317   Module RADB_MGR.C  Line  337  Class 01d7
        Register Dump :
            EFL=00000246    CS =0058        EIP=0000808d    SS =0060
            EAX=000a6ff3    ECX=000a0005    EDX=00000000    EBX=000a6fa0
            ESP=00108828    EBP=0010882c    ESI=001f1e10    EDI=00000000
            DS =0060        ES =0060        FS =0060        GS =0060

        Stack Dump :
        [SP+1E]=001f    [SP+16]=0000    [SP+0E]=000a    [SP+06]=0010
        [SP+1C]=1e10    [SP+14]=0004    [SP+0C]=6fa0    [SP+04]=8850
        [SP+1A]=0010    [SP+12]=001f    [SP+0A]=0004    [SP+02]=0001
        [SP+18]=886c    [SP+10]=4928    [SP+08]=7ec3    [SP+00]=504b

        User Data Dump :

        14 02 fa ed 01 01 1d 01 5a 01 00                    ........Z..

    Report Date:97-04-08  Time:12:29:04
```

Using the `force` Option

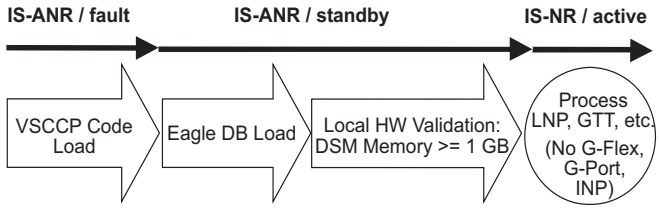
Use the **`force`** option to execute commands that would put the system in unstable loading mode. If executing the **`ent-card`** or **`inh-card`** commands would cause the system to enter an unstable loading mode, use the **`force`** option on the command.

State Transitions during Start-Up

Figures 5-2 through 5-9 show the transitions that a DSM card goes through as it boots, loads code and data, and runs various VSCCP services. These figures do not illustrate every possible situation, but they do include the most common scenarios.

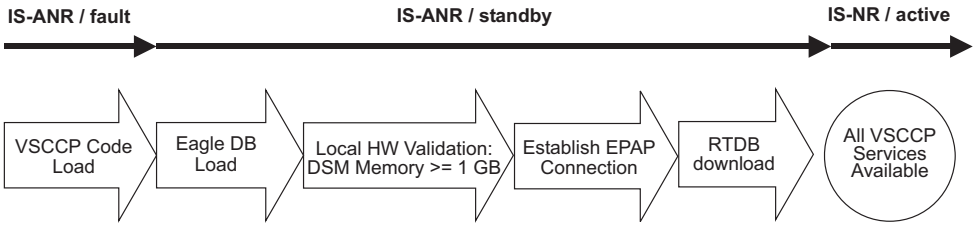
In Figure 5-2, the INP feature is not enabled, and the DSM card can operate in TSM emulation mode, although it does not provide INP operation.

Figure 5-2. INP Not Enabled, DSM Running in TSM Emulation



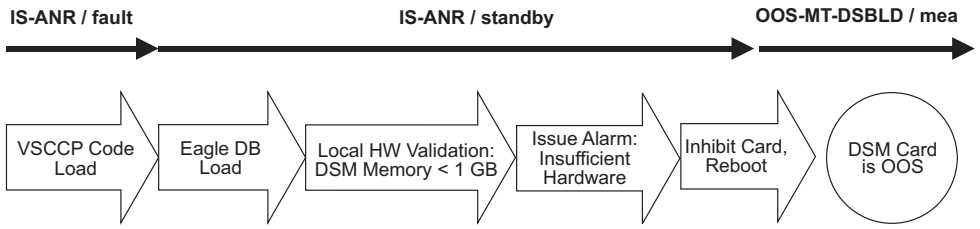
In Figure 5-3, the INP feature is enabled, and the DSM card memory is at least 1 GB and is connected the EPAP. A normal DSM card operating sequence occurs, providing INP service.

Figure 5-3. INP Enabled, Normal Operating Sequence



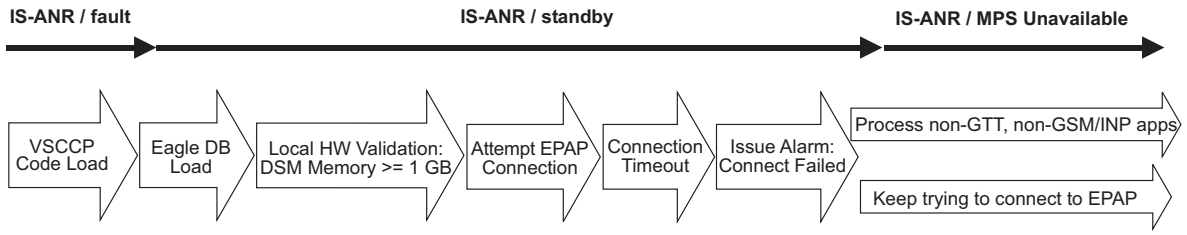
In Figure 5-4, the INP feature is enabled, but the DSM card memory is less than 1 GB. The INP feature cannot begin operation. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the DSM database capacity requirements.

Figure 5-4. INP Enabled, but DSM Memory Less Than 1 GB



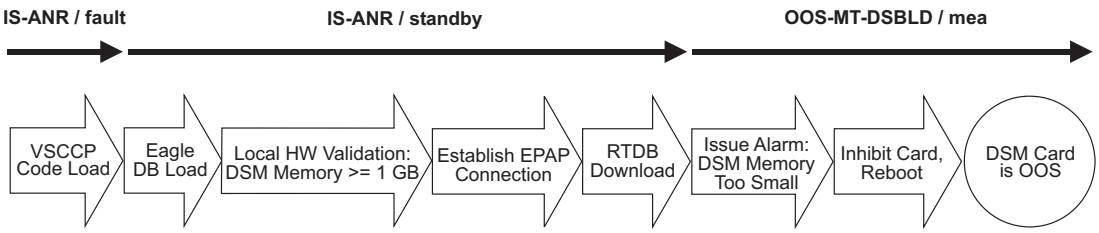
In Figure 5-5, the INP feature is enabled, the DSM card memory has at least 1 GB, but the DSM card is unable to connect EPAP. The INP feature cannot begin operation.

Figure 5-5. INP Enabled, but DSM Not Connected to EPAP



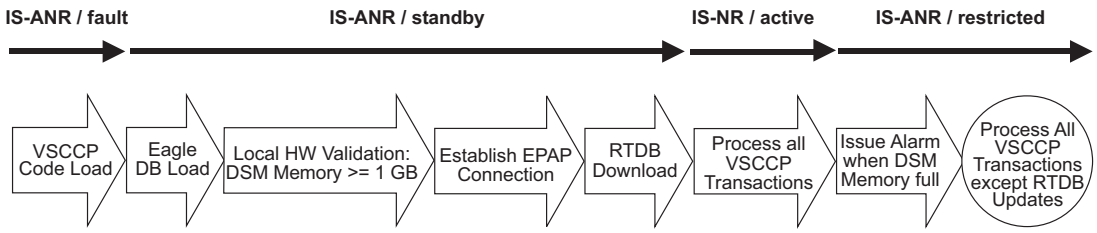
In Figure 5-6, the INP feature is enabled, the DSM card has the required 1 GB memory and is connected to the EPAP, but the DSM card is too small for the required database. The INP feature cannot begin operation. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the DSM database capacity requirements.

Figure 5-6. INP Enabled, but DSM Memory Insufficient for Database



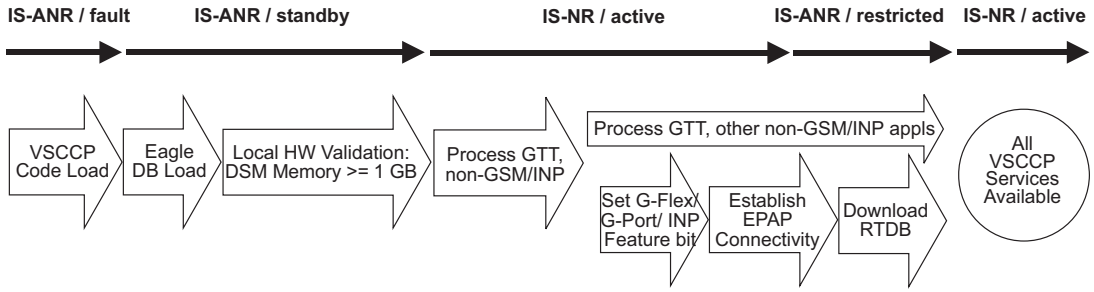
In Figure 5-7, the INP feature is enabled, the DSM card is connected to the EPAP, but the RTDB grows eventually to exceed the capacity of the DSM card memory, despite its memory size of at least 1 GB (an alarm is issued when the DSM memory becomes full from the RTDB update). The INP feature cannot begin operation. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the DSM database capacity requirements.

Figure 5-7. INP Enabled, but Database Exceeds DSM Memory



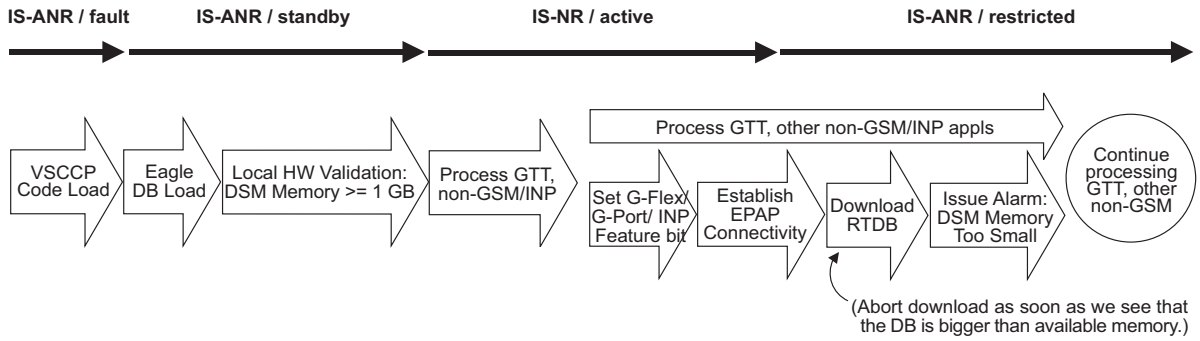
In Figure 5-8, the INP feature is not initially enabled; the DSM card memory has at least 1 GB but no EPAP connection; the DSM card is running other applications when the INP feature is turned on. The DSM has sufficient memory to provide the INP feature service.

Figure 5-8. INP Not Enabled at First, but then Activated on DSM



In Figure 5-9, the INP feature is not initially enabled; the DSM card memory has at least 1 GB but no EPAP connection, and is running other applications when the INP feature is turned on. However, the DSM card memory is insufficient for the needed database, and cannot perform the INP feature operation. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the DSM database capacity requirements.

Figure 5-9. INP Activation Unsuccessful due to Insufficient Database



INP Subsystem Related Alarms

Refer to the *EAGLE 5 ISS Maintenance Manual* for a complete description and the associated corrective procedure for all INP related UAMs.

Refer to the *EAGLE 5 ISS Maintenance Manual* for more information and corrective procedures for the EAGLE 5 ISS related alarms. Refer to the *EAGLE 5 ISS-Tekelec 1000 AS MPS Platform Software and Maintenance Manual* for more information and corrective procedures for the MPS related alarms.

Table 5-1. INP Subsystem Related UAMs

UAM	Severity	Message Text	MPS or EAGLE 5 ISS
0013	Major	Card is isolated from the system	EAGLE 5 ISS
0084	Major	IP Connection Unavailable	EAGLE 5 ISS
0085	None	IP Connection Available	EAGLE 5 ISS
0099	Major	Incompatible HW for provisioned slot	EAGLE 5 ISS
0250	None	MPS available	MPS
0261	Critical	MPS unavailable	MPS
0328	None	SCCP is available	EAGLE 5 ISS

Table 5-1. INP Subsystem Related UAMs (Continued)

UAM	Severity	Message Text	MPS or EAGLE 5 ISS
0329	None	SCCP capacity normal, card(s) abnormal	EAGLE 5 ISS
0330	Major	System SCCP TPS Threshold exceeded	EAGLE 5 ISS
0331	Critical	SCCP is not available	EAGLE 5 ISS
0335	None	SCCP is removed	EAGLE 5 ISS
0336	Major	LIM(s) have been denied SCCP service	EAGLE 5 ISS
0370	Critical	Critical Platform Failure(s)	MPS
0371	Critical	Critical Application Failure(s)	MPS
0372	Major	Major Platform Failure(s)	MPS
0373	Major	Major Application Failure(s)	MPS
0374	Minor	Minor Platform Failure(s)	MPS
0375	Minor	Minor Application Failure(s)	MPS
0394	None	Local Subsystem is available	EAGLE 5 ISS
0395	Critical	Local Subsystem is not available	EAGLE 5 ISS
0396	Critical	Local Subsystem is disabled	EAGLE 5 ISS
0397	None	Local Subsystem is removed	EAGLE 5 ISS
0398	Minor	Local Subsystem normal, card(s) abnormal	EAGLE 5 ISS
0422	Major	Insufficient extended memory	EAGLE 5 ISS
0423	None	Card reload attempted	EAGLE 5 ISS
0441	Major	Incorrect MBD - CPU	EAGLE 5 ISS
0442	Critical	RTDB database capacity is 95% full	EAGLE 5 ISS
0443	Major	RTDB database is corrupted	EAGLE 5 ISS
0444	Minor	RTDB database is inconsistent	EAGLE 5 ISS
0445	None	RTDB database has been corrected	EAGLE 5 ISS
0446	Major	RTDB Database capacity is 80% full	EAGLE 5 ISS
0447	None	RTDB database capacity alarm cleared	EAGLE 5 ISS
0448	Minor	RTDB database is incoherent	EAGLE 5 ISS
0449	Major	RTDB resynchronization in progress	EAGLE 5 ISS
0451	Major	RTDB reload is required	EAGLE 5 ISS

DSM-EPAP Link

Two alarms are used to indicate the DSM-to-EPAP link status. Refer to the *EAGLE 5 ISS Maintenance Manual* for more information and corrective procedures for the following alarms.

- **UAM 0084** - IP Connection Unavailable

  This message indicates that an IP application socket is out of service due to a IP link down (Ethernet problem) or due to the DSM card.

```
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0
**  5676.0084 ** DSM B   1101     IP Connection Unavailable
```

- **UAM 0085** - IP Connection Available

  This message indicates that a previously broken link between the EPAP and DSM card is now functioning properly.

```
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0
    5676.0085    DSM B   1101     IP Connection Available
```

MPS (EPAP) Alarms

The following alarms are output on the EAGLE 5 ISS and include an alarm data string in the output. Refer to the *EAGLE 5 ISS -Tekelec 1000 AS MPS Platform Software and Maintenance Manual* (except where noted) for more information and corrective procedures for the following MPS related alarms.The MPS (EPAP) alarms are output to the MPS Output Group.

- **UAM 0250** - MPS available

  This indicates that a previous MPS platform association loss has been reestablished and is currently functioning properly.

  Example:

```
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0
   0259.0250    MPS   B               MPS available
```

- **UAM 0261** - MPS unavailable

  This message indicates that the EAGLE 5 ISS is unable to communicate with the MPS or the MPS has an internal failure. Refer to the *EAGLE 5 ISS Maintenance Manual* for the corrective action procedure.

  Example:

```
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0
*C  0259.0261 *C MPS   B                MPS unavailable
```

- **UAM 0370** - Critical Platform Failure (s)

  This message indicates the application running in the MPS server has detected a critical platform failure. The Alarm Data in the message contains a 16-character hexadecimal string in the format of h'1xxxxxxxxxxxxxx'. This alarm will be reset when UAM #250, MPS Available is issued.

Example:

```
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0
*C  0259.0370 *C MPS   B       Critical Platform Failure(s)
                ALARM DATA = h'1000000000000008'
```

- **UAM 0371** - Critical Application Failure (s)

  This message indicates the application running in the MPS server has detected a critical application failure. The Alarm Data in the message contains a 16-character hexadecimal string in the format of h'2xxxxxxxxxxxxxx'. This alarm will be reset when UAM #250, MPS Available is issued.

  Example:

```
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0
*C   0259.0371 *C MPS   B       Critical Application Failure(s)
                ALARM DATA = h'2000000000000001'
```

- **UAM 0372** - Major Platform Failure (s)

  This message indicates the application running in the MPS server has detected a major platform failure. The Alarm Data in the message contains a 16-character hexadecimal string in the format of h'3xxxxxxxxxxxxxx'. This alarm will be reset when UAM #250, MPS Available is issued.

  Example:

```
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0
**  0259.0372 ** MPS   B               Major Platform Failure(s)
                ALARM DATA = h'3000000000000002'
```

- **UAM 0373** - Major Application Failure (s)

  This message indicates the application running in the MPS server has detected a major application failure. The Alarm Data in the message contains a 16-character hexadecimal string in the format of h'4xxxxxxxxxxxxxx'. This alarm will be reset when UAM #250, MPS Available is issued.

  Example:

```
     station1234 00-09-30 16:28:08 EST EAGLE 35.0.0
**   0259.0373 ** MPS   B       Major Application Failure(s)
                ALARM DATA = h'4000000000000008'
```

- **UAM 0374** - Minor Platform Failure (s)

  This message indicates the application running in the MPS server has detected a minor platform failure. The Alarm Data in the message contains a 16-character hexadecimal string in the format of h'5xxxxxxxxxxxxxx'. This alarm will be reset when UAM #250, MPS Available is issued.

  Example:

```
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0
*   0259.0374 *  MPS   B       Minor Platform Failure(s)
                ALARM DATA = h'5000000000000004'
```

- **UAM 0375** - Minor Application Failure (s)

This message indicates the application running in the MPS server has detected a minor application failure. The Alarm Data in the message contains a 16-character hexadecimal string in the format of h'6xxxxxxxxxxxxxx'. This alarm will be reset when UAM #250, MPS Available is issued.

Example:

```
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0
*   0259.0375 *  MPS   B               Minor Application Failure(s)
                 ALARM DATA = h'6000000000000001'
```

Card Related MPS Alarms

The following alarms are output on the EAGLE 5 ISS. Refer to the *EAGLE 5 ISS Maintenance Manual* for more information and corrective procedures for the following card related MPS alarms. The Card Related MPS alarms are output to the Card Output Group.

- **UAM 0013** - Card is isolated from the system

  This indicates a card has become isolated and is unable to communicate to other cards in the system. This could be caused by a defective card, a power failure occurred on the card, or the system software has ordered a reset.

  This also appears when the card has been manually reset by a command.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
**  0012.0013 ** CARD 1101 SCCP          Card is isolated from the system
                 ASSY SN:  102199815a1234
```

- **UAM 0099** - Incompatible HW for provisioned slot

  This indicates a DCM or DSM card does not have an extended memory. This card is automatically inhibited.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
**  0012.0099 ** CARD 1101 VSCCP  Incompatible hardware for provisioned slot
                 ASSY SN:  102199815a1234
```

- **UAM 0422** - Insufficient extended memory

  At least one SCCP card does not have enough memory for the INP application. Loading of the SCCP card is automatically inhibited.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
** 0012.0422 ** CARD 1108  SCCP   Insufficient extended memory
```

- **UAM 0423** - Card reload attempted

  Card loading is no longer inhibited. The once inhibited card is now attempting to load.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
    0012.0423    CARD 1108  SCCP       Card reload attempted
```

- **UAM 0441** - Incorrect MBD - CPU

  A DSM card does not have the required hardware configuration for the INP application.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
**  0012.0441 ** CARD 1108  VSCCP       Incorrect MBD - CPU
```

- **UAM 0442** - RTDB database capacity is 95% full

  This critical alarm is generated when a DSM card detects that its applique memory is 95% full. Loading of the DSM card is automatically inhibited when it reaches 100% of capacity. The actual memory usage can be displayed by entering the **`rept-stat-mps:loc=xxxx`** command.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
*C  0012.0442 *C CARD 1108 VSCCP         RTDB database capacity is 95% full
```

- **UAM 0443** - RTDB database is corrupted

  A RTDB database is corrupt. The calculated checksum did not match the checksum value stored for one or more records.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
** 0012.0443 ** CARD 1108 VSCCP        RTDB Database is corrupted
```

- **UAM 0444** - RTDB database is inconsistent

  One or more DSM card's real time database is not identical to the current real time database on the active EPAP fixed disks.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
*   0012.0444 *  CARD 1108  VSCCP       RTDB database is inconsistent
```

- **UAM 0445** - RTDB database has been corrected

  This message indicates that a problem with the RTDB has been corrected.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
    0012.0445    CARD 1108  VSCCP       RTDB database has been corrected
```

- **UAM 0446** - RTDB Database capacity is 80% full

  This message is displayed when a DSM card detects that its daughterboard memory is at least 80% full.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
** 0012.0446 ** CARD 1108  VSCCP       RTDB Database capacity is 80% full
```

- **UAM 0447** - RTDB database capacity alarm cleared

This message indicates that a problem with the RTDB memory has been corrected.

Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
    0012.0447    CARD 1108  VSCCP       RTDB database capacity alarm cleared
```

- **UAM 0448** - RTDB database is incoherent

  This message indicates that the RTDB database download is in-process or that the update failed.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
*   0012.0448 *  CARD 1108  VSCCP   RTDB database is incoherent
```

- **UAM 0449** - RTDB resynchronization in progress

  This message indicates that the MPS database resynchronization is in-process.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
**  0012.0449 ** CARD 1108  VSCCP   RTDB resynchronization in progress
```

- **UAM 0451** - RTDB reload is required

  The RTDB database on the DSM card needs to be reloaded because the resynch log does not contain all of the required updates.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
**  0012.0451 ** CARD 1108  VSCCP   RTDB reload is required
```

GSM Subsystem Alarms

The following alarms are output on the EAGLE 5 ISS for the GSM subsystem.The GSM Subsystem alarms are output to the GTT Output Group.

- **UAM 0328** - SCCP is available

  The SCCP subsystem has returned to service.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
    0056.0328    SCCP SYSTEM     SCCP is available
```

- **UAM 0329** - SCCP capacity normal, card(s) abnormal

  1 SCCP card has GSM status of Active and there are 1 or more cards with an GSM status other than Active.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
    0056.0329    SCCP SYSTEM   SCCP capacity normal, card(s) abnormal
```

- **UAM 0330** - System SCCP TPS Threshold exceeded

Indicates the EAGLE 5 ISS has exceeded its TPS (Transactions Per Second) message transport rate threshold.

Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
** 0056.0330  **  SCCP SYSTEM    System SCCP TPS Threshold exceeded
```

- **UAM 0331** - SCCP is not available

  The SCCP subsystem is not available to any LIM(s). All DSM-SCCP cards have failed.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
*C  0056.0331  *C  SCCP SYSTEM             SCCP is not available
```

- **UAM 0335** - SCCP is removed

  All SCCP cards have been deleted from the database; SCCP services are not available to the system.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
  0056.0335   SCCP SYSTEM           SCCP is removed
```

- **UAM 0336** - LIM(s) have been denied service

  Some LIM(s) are using the SCCP subsystem, but others have been denied service.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
** 0056.0336  **  SCCP SYSTEM     LIM(s) have been denied SCCP service
```

INP Subsystem Alarms

The following alarms are output on the EAGLE 5 ISS for the INP subsystem.The INP Subsystem alarms are output to the Application Subsystem Output Group.

- **UAM 0394** - Local Subsystem is available

  All SCCP cards are IS-NR and have an INP status of Active.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
    0056.0394   INP SYSTEM           Local Subsystem is available
```

- **UAM 0395** - Local Subsystem is not available

  Indicates no SCCP cards have an INP status of active. All are OOS or loading.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
*C  0056.0395  *C  INP SYSTEM             Local Subsystem is not available
```

- **UAM 0396** - Local Subsystem is disabled

  The INP subsystem has been manually disabled using the *inh-map-ss* command.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
*C  0056.0396  *C INP SYSTEM             Local Subsystem is disabled
```

- **UAM 0397** - Local Subsystem is removed

  There are no VSCCP cards configured with this INP subsystem.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
    0056.0397   INP SYSTEM          Local Subsystem is removed
```

- **UAM 0398** - Local Subsystem normal, card(s) abnormal

  1 SCCP card has INP status of Active and there are 1 or more cards with an INP status other than Active.

  Example:

```
    station1234 00-04-30 16:28:08 EST EAGLE 35.0.0
*   0056.0398 *  INP SYSTEM   Local Subsystem normal, card(s) abnormal
```

INP Subsystem Related UIMs

The UIM (Unsolicited Information Message) alarms in Table 5-2 support the INP subsystem. The *EAGLE 5 ISS Maintenance Manual* contains a complete description of all UIM text and formats. The INP Subsystem related UIMs are output to the Application Subsystem Output Group.

Table 5-2. INP Subsystem UIM Alarms

UIM	Text	Description	Action
1242	Conv to intl num - Dflt CC not found	Conversion to international number failed because default CC was not found	Define the default CC with **chg-stpopts :defcc=xxx**
1243	Conv to intl num - Dflt NC not found	Conversion to international number failed because default NC was not found	Define the default NDC with **chg-stpopts :defndc=xxxxx**
1246	Invalid length of conditioned digits	Invalid length of conditioned digits (length of conditioned international number is less than 5 or greater than 15)	Use an international number with length in the acceptable range
1295	Translation PC is EAGLE 5 ISS's	PC translation is invalid because it is one of the EAGLE 5 ISS's point codes	Change the point code
1296	Translation PC type is ANSI	PC translation is invalid because it is an ANSI point code	Change the point code
1297	Invalid length of prefix/suffix digits	Attempted digit action of prefixing or suffixing the entity ID is invalid because the combined length of entity ID and GT digits is greater than 21 digits.	Change the attempted digit action or decrease the length of the entity ID and/or GT digits

NOTE: The EPAP does not have any UIM requirements.

INP Measurements

Refer to the *EAGLE 5 ISS Maintenance Manual* for for detailed measurement usage information.

OAM Based Measurements

INP measurements are available via the FTA (File Transfer Area) feature and not directly via EAGLE 5 ISS terminals. The File Transfer Area feature supports the transfer of file data between an EAGLE 5 ISS and a remote computer. It provides the capability to download files from the EAGLE 5 ISS via a data communications link. The data communications link is accessed through a dial-up modem using one of the EAGLE 5 ISS's RS-232 I/O ports. The link is illustrated in Figure 2-5 "Dial-up PPP Network" on page 2-15.

See the *Commands Manual* for details about using FTA commands, which are:

- Activate File Transfer: **`act-file-trns`**
- Copy to or from Transfer Area: **`copy-fta`**
- Delete Entry from File Transfer Area: **`dlt-fta`**
- Display File Transfer Area: **`disp-fta-dir`**

Measurements Platform

The Measurements Platform (MP) is reqiured for an EAGLE 5 ISS with more than 700 links. It provides a dedicated processor for collecting and reporting STP, LNP, INP, G-Flex, and G-Port measurements data. The interface to the customer's network supports the FTP transfer of Measurements reports to an FTP server. Following collection, scheduled reports are automatically generated and transferred to the customer's FTP server via the FTP interface.

NOTE: Existing FTP file server reports are overwritten by subsequent requests that produce the identical file name.

Reports can be scheduled or printed on-demand. Scheduled and on-demand reports are accessible by the following administrative commands:

- *chg-measopts* - Used to enable or disable the automatic generation and FTP transfer of scheduled measurement reports to the FTP server.
- *rept-stat-meas* - Reports the status of the measurements subsystem including card location and state, Alarm level, and Subsystem State.
- *rept-ftp-meas* - Manually initiates generation and FTP transfer of a measurements report from the MCPM to the FTP server.
- *rtrv-measopts* - Generates a user interface display showing the enabled/disabled status of all FTP scheduled reports.

The following Per System measurement peg counts of INP MSUs (Message Signalling Units) are supported for the INP feature, as shown in Table 5-3.

Table 5-3. New Pegs for Per System INP Measurements

Event Name	Description	Type	Unit
INPQRCV	Number of total queries received by INPQS	System	Peg count
INPQDSC	Number of invalid queries that are discarded as no reply can be generated	System	Peg count
INPQTCPE	Number of error replies with TCAP error code	System	Peg count
INPSREP	Number of successful replies to INP non-queried queries. These replies will be either INP Connect or INP Continue.	System	Peg count

The following equation applies:

INPQRCV = INPQDSC + INPQTCPE + INPSREP

The following Per SSP measurement peg counts of INP MSUs are supported for the INP feature. See Table 5-4.

Table 5-4. Pegs for Per SSP INP Measurements

Event Name	Description	Type	Unit
INPQSCONN	Number of non-errored QS messages with QS	Point Code	Peg count
INPQSCONT	Number of non-errored QS messages with QS Continue responses	Point Code	Peg count
INPMRTR	Number of messages sent to MR service that receive MR translation	Point Code	Peg count
INPMRGTT	Number of messages sent to MR service that fall through to GTT	Point Code	Peg count

The following equation applies:

INPSREP = INPQSCONN + INPQSCONT

The following measurement events are included on the STP Daily Maintenance (MTCD) and the STP Day-to-Hour (MTCDTH) measurement reports and include peg counts for INP MSUs.These reports are similar to those used for GTT. The existing GTT/SCCP measurements are used for both GTT and INP and appear in the same reports.

- MSSCCPFL MSUs discarded due to SCCP routing failure

  Also includes INP MSUs that got a match from either the INP or GTT database, but cannot be routed because of PC (Point Code) or SS (SubSystem) congestion, PC or SS unavailable, SS unequipped, or an unqualified error.

- GTTUN0NS GTT unable to perform; no such type

  Also includes INPMR MSUs that did fall through to GTT but did not match on GTT selectors

- GTTUN1NT GTT unable to perform: no translation on this address

  Also includes INPMR MSUs that fell through to GTT, obtained a GTT selector match but still did not match on the GTA.

- GTTPERFD Number of GTT performed

  Also includes INP MSUs that got a match in either the INP or GTT database.

This implementation does not discriminate between the MSSCCPFL, GTTUN0NS, GTTUN1NT, or GTTPERFD pegs for INP or GTT applications. For example, a search failure could result from a problem in either the INP or GTT database.

Measurement Reports

Measurements are available with these report commands. Refer to the *Commands Manual* for detailed usage information.

- OAM daily: **`rept-meas:type=mtcd:enttype=np`**
- OAM hourly: **`rept-meas:type=mtch:enttype=np`**
- MP daily: **`rept-ftp-meas:type=mtcd:enttype=np`**
- MP hourly: **`rept-ftp-meas:type=mtch:enttype=np`**

6

Prepaid IDP Query Relay Feature

Overview

The Prepaid IDP Query Relay feature (IDP Relay) provides a mechanism to insure the correct charging for calls from prepaid subscribers in a portability environment.

Mobile Switching Centers (MSCs) in the network must be configured to send all IDP prepaid query messages through the EAGLE 5 ISS MPS. The EAGLE 5 ISS MPS platform intercepts the IDP query based on a set of configurable criteria, then performs a number portability lookup on the number given in the IDP CalledPartyNumber (CDPN) parameter (or CalledPartyBCDNumber in CAMEL IDPs, based on the call scenario). If a respective entry is found in the INP database, the CDPN is modified with the portability information (routing number or HLR address) and then forwarded to the prepaid SCP (PPSCP) for processing.

When the SCP receives the IDP query, all of the information it needed to correctly charge for and process the call is already present, without the need to launch a separate number portability database query.

Feature Description

The EAGLE 5 ISS MPS platform intercepts the IDP query based on a set of configurable criteria, then performs a number portability lookup on the called number, insert the portability information (Routing Number or HLR Address), and forward the IDP query to a prepaid SCP for processing. If a respective entry is found in the INP database, the CDPN is modified with the portability information (routing number or HLR address) and then forwarded to the prepaid SCP (PPSCP) for processing.

The concept of IDP Relay is that instead of the MSC routing the prepaid IDP query directly to the prepaid SCP, and forcing the SCP to perform its own number portability database query, the IDP query is instead intercepted by the EAGLE 5 ISS. The EAGLE 5 ISS (using the MPS) performs a portability check on the called number, inserts the portability information (Routing Number or HLR Address), and forwards the IDP query to a prepaid SCP for processing. When the SCP receives the IDP query, all of the information needed to correctly charge for and process the call is already present, without the need to launch a separate number portability database query.

Call Flows

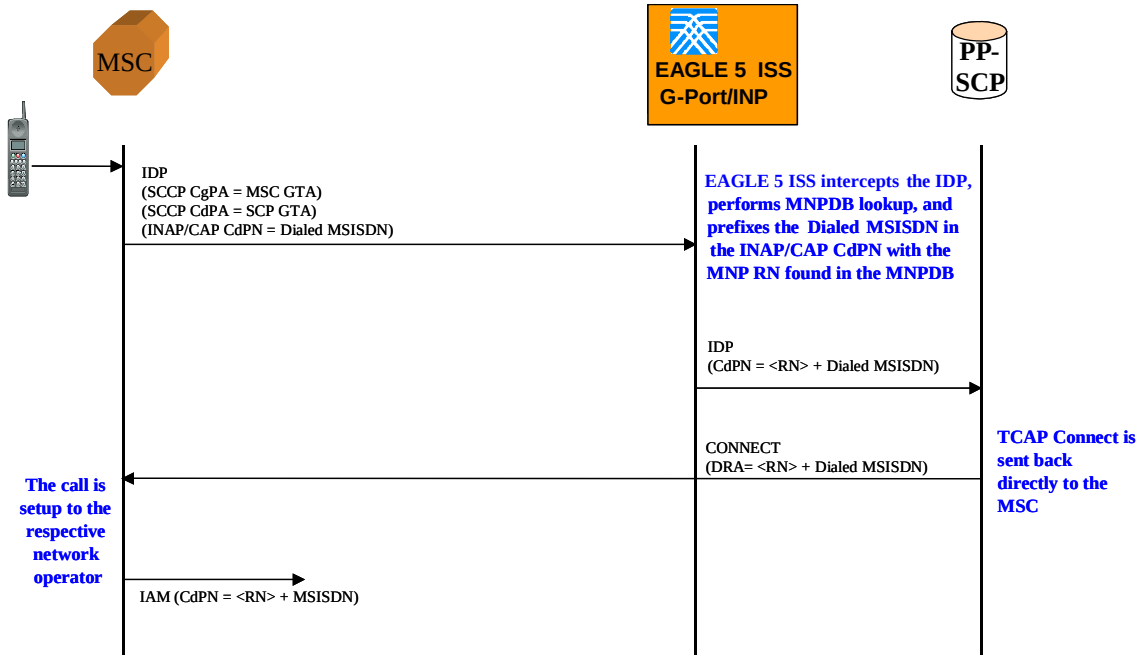
Mobile Originated Prepaid Call to a Ported Out Subscriber

This scenario encompasses the following subscriber types:

- **Own Subscriber Ported Out** - Refers to an Own Subscriber who has ported to a Foreign Network.
- **Foreign Subscriber Ported to Foreign Network** - Refers to a Foreign Subscriber who has ported to a different Foreign Network.
- **Foreign Subscriber** (optional, dependent on how the RTDB is provisioned) - Refers to a subscriber whose number belongs to the number range of a Foreign Network, and who has not ported to another Foreign Network.
- **Foreign Subscriber Not Known to be Ported** (optional, dependent on how the RTDB is provisioned) - Refers to a Foreign Subscriber whose portability status is unknown by the querying network.

When a prepaid subscriber attempts to originate a call, the MSC/VLR must first query a prepaid SCP before attempting to complete the call in order to determine if the subscriber has enough credit to complete the call.

Figure 6-1. MO Prepaid Call to Ported Out Subscriber



When a prepaid subscriber originates a call, the MSC/MSC/VLR serving that subscriber formulates an INAP or CAP IDP message and routes it to the Prepaid SCP. This message is routed via GTT (SCCP CdPA = PPSCP GTA), with the EAGLE 5 ISS serving as either the Intermediate or Final GTT service provider. In either case, the EAGLE 5 ISS is either an Intermediate or Final GTT service provider for the message (message arriving at the EAGLE 5 ISS must have MTP DPC = Eagle PC, SCCP CdPA RI = route-on-GT, and SCCP CdPA GTA = PPSCP) in order for the IDP Relay service to be triggered.

Upon receipt of the IDP, the EAGLE 5 ISS first examines the SCCP CdPA TT, SSN, NP, NAI, and GTI (Service Selectors) to determine which of the EAGLE 5 ISS's SCCP services is required (IDP Relay, INP, G-Port, G-Flex, GTT, etc.). If the message parameters match the provisioned Service Selector combination for IDP Relay service in general, the EAGLE 5 ISS then determines whether this specific IDP requires processing by the IDP Relay service based examination of the SCCP CdPA GTA digits (which should be the GTA of a PPSCP), the TCAP Operation Code, and the combination of Service Key and EventTypeBCSM in the INAP/CAP layer. If the SCCP CdPA GTA matches one of the provisioned PPSCP addresses, the Operation Code signifies IDP, and the Service Key and EventTypeBCSM matches one of the provisioned service values for the IDP Relay service, then the EAGLE 5 ISS enters the IDP Relay logic. Otherwise, the EAGLE 5 ISS continues with normal SCCP processing.

If the intercepted IDP is selected for IDP Relay service, the EAGLE 5 ISS enters the IDP Relay processing routing. The EAGLE 5 ISS extracts the B-party number (the number which was dialed by the prepaid subscriber) from the INAP/CAP

CalledPartyNumber parameter, or from the CAP CalledPartyBCDNumber parameter (CDPN), and performs a lookup in the EAGLE 5 ISS's G-Port/INP MNP database (after some number filtering and conditioning).

In this scenario, the EAGLE 5 ISS finds a match on the B-party DN in the RTDB with an association to a Routing Number (RN).

NOTE: Typically, an DN entered in the database with an association to an RN indicates that the number is either (a) an Own Number ported to another network, or (b) a Foreign Number which has been ported to another foreign network. In some cases (depending upon how the customer chooses to provision the database), this may also indicate a Foreign Number which is not known to be ported.

After finding a match on DN with an associated RN in the G-Port RTDB, the EAGLE 5 ISS modifies the INAP/CAP CDPN parameter by prefixing the RN information to the DN. The CDPN NAI parameter will be copied from the incoming value, or changed to 'Unknown', based on the provisioned value in the EAGLE 5 ISS. The IDP Relay service may be configured to either send the same NAI as was received in the incoming CDPN, or to send the value 'unknown' in all cases.

NOTE: The term CDPN NAI is used in this document to represent the value in the INAP/CAP CDPN parameter. In INAP, this parameter is known as "NADI", while in CAP, it is known as "Type of Number". CDPN NAI is used here to represent both for simplicity.

After performing the required modifications, the EAGLE 5 ISS then routes the modified IDP via GT translation to the PPSCP indicated by the original GTA in the SCCP CdPA, which was not altered as a result of the IDP Relay operation. The PPSCP receives the modified IDP, containing the portability information needed to correctly charge for the call. The SCP then returns the appropriate response to the MSC/VLR, either allowing or denying the call.

In order for the IDP Relay feature to provide accurate portability information for all ported numbers, it is required that all ported numbers be entered into the MNP database, including Own numbers ported out as well as Foreign numbers ported to foreign networks. If a foreign number ported to a foreign network is not entered in the database with a routing number (either in the individual or range entry tables), the IDP Relay will not find a match, and will not be able to prefix the routing number information to the CDPN in the IDP with the routing number of the current subscription network. Thus, the EAGLE 5 ISS sends the original IDP unmodified to the SCP with CDPN = dialed DN only. However, even in this case it is possible for the SCP to differentiate calls within the own network from calls to foreign networks very easily.

Mobile Originated Prepaid Call to Imported or Own Non-Ported Subscriber

This scenario encompasses the following subscriber types:

- **Own Subscriber** - Refers to a subscriber whose number belongs to the number range of the Own Network and who has not ported to another network.
- **Foreign Subscriber Ported In** - Refers to a Foreign Subscriber who has ported into the Own Network.

When a prepaid subscriber attempts to originate a call, the MSC/VLR must first query a prepaid SCP before attempting to complete the call in order to determine if the subscriber has enough credit to complete the call.

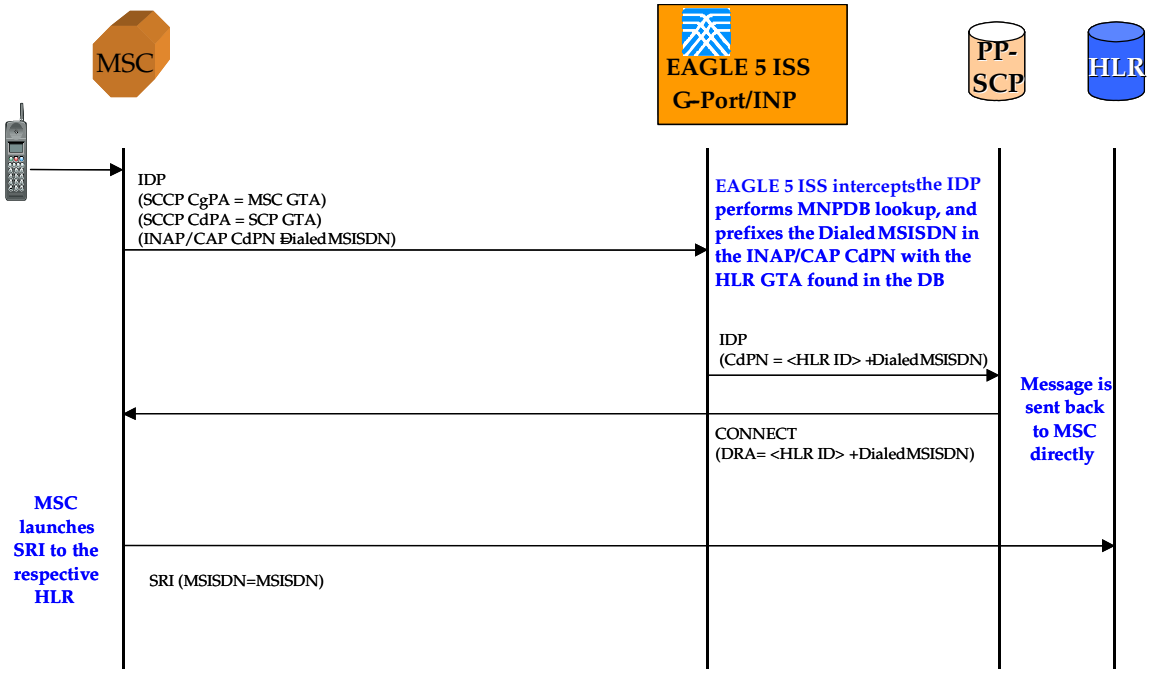
When a prepaid subscriber originates a call, the MSC/MSC/VLR serving that subscriber formulates an INAP or CAP IDP message and routes it to the Prepaid SCP. This message is routed via GTT (SCCP CdPA = PPSCP GTA), with the EAGLE 5 ISS serving as either the Intermediate or Final GTT service provider. In either case, the EAGLE 5 ISS is either an Intermediate or Final GTT service provider for the message (message arriving at the EAGLE 5 ISS must have MTP DPC = Eagle PC, SCCP CdPA RI = route-on-GT, and SCCP CdPA GTA = PPSCP) in order for the IDP Relay service to be triggered.

Upon receipt of the IDP, the EAGLE 5 ISS first examines the SCCP CdPA TT, SSN, NP, NAI, and GTI (Service Selectors) to determine which of the EAGLE 5 ISS's SCCP services is required (IDP Relay, INP, G-Port, G-Flex, GTT, etc.). If the message parameters match the provisioned Service Selector combination for IDP Relay service in general, the EAGLE 5 ISS then determines whether this specific IDP requires processing by the IDP Relay service based examination of the SCCP CdPA GTA digits (which should be the GTA of a PPSCP), the TCAP Operation Code, and the combination of Service Key and EventTypeBCSM in the INAP/CAP layer. If the SCCP CdPA GTA matches one of the provisioned PPSCP addresses, the Operation Code signifies IDP, and the Service Key and EventTypeBCSM matches one of the provisioned service values for the IDP Relay service, then the EAGLE 5 ISS enters the IDP Relay logic. Otherwise, the EAGLE 5 ISS continues with normal SCCP processing.

If the intercepted IDP is selected for IDP Relay service, the EAGLE 5 ISS enters the IDP Relay processing routing. The EAGLE 5 ISS extracts the B-party number (the number which was dialed by the prepaid subscriber) from the INAP/CAP CalledPartyNumber parameter, or from the CAP CalledPartyBCDNumber parameter (CDPN), and performs a lookup in the EAGLE 5 ISS’s G-Port/INP MNP database (after some number filtering and conditioning).

In this scenario, the EAGLE 5 ISS finds a match on the DN in the RTDB with an association to an SP entity ID (HLR GTA).

Figure 6-2. MO Prepaid Call to an Imported or Own-Non-Ported Subscriber



In this case, the PPSCP always requires an SP ID to be prefixed to the DN in the CDPN - for both Foreign Numbers Ported In as well as Own Numbers never ported. Based on this, the IDP Relay requires that all such numbers be entered in the MNP database with an association to an SP ID, either as individual numbers (which is likely the case for imported numbers), or in a number range (which is likely the case of own numbers not ported). This distinction is made because in a standard MNP node, it is often standard practice not to enter Own Subscribers never ported because for SP queries, the standard GTT translation normally suffices for these subscribers, and it is not required to enter them into the RTDB. If these numbers are not entered, IDP Relay will not find a match, and would simply transfer the IDP without modification to the PPSCP (containing DN only in CDPN).

This may not be an issue if the PPSCP correctly interprets when the PPSCP receives an IDP without any RN or SP ID, it assumes the DN is an Own Subscriber, and acts accordingly. There is also a value to enter all own subscribers with the respective HLR-ID to streamline MNP processing in networks with a high prepaid subscriber base.

Mobile Originated Prepaid Call to Foreign (Non-Ported) Subscriber

In this scenario, an IDP is received for a number which is a foreign (non-own-network) number and which has not been ported. Their are two options in this scenario, both configurable via provisioning. In one case, a number range for the foreign network is entered with a generic routing number for the network. In this case, the IDP Relay reacts in the same way as with a ported-out number, prefixing the CDPN with the RN taken from the number range entry. Although the number is technically not ported, the use of a range with an RN would still point to the correct network.

Alternatively, if the number is not provisioned in the RTDB at all, or is entered without an associated routing number/HLR ID, the IDP is not modified and the message is simply be relayed to the SCP. In this scenario, the SCP returns the IDP response to the MSC without any prefix.

Note that this method could also be used for Own Subscribers never ported - i.e. no entry in the RTDB, which would cause IDP Relay to send the unmodified IDP to the PPSCP.

Service Selection

When an IDP is sent by an MSC, it is sent to the PPSCP via the EAGLE 5 ISS for GTT processing. As such, the message will contain MTP DPC = Eagle's PC and SCCP CdPA = PPSCP GTA with RI = GT. Because the MTP destination of the message is the EAGLE 5 ISS, the message is delivered to the EAGLE 5 ISS's SCCP subsystem for processing.

The EAGLE 5 ISS's SCCP subsystem first examines the SCCP CdPA parameters to determine which service is being requested (the EAGLE 5 ISS contains a Service Selection table to inform the system of how to treat incoming messages according to basic SCCP parameters). The SCCP CdPA TT, NP, NAI, GTI, and SSN parameters are examined first for this purpose. This combination of parameters may or may not be enough to determine that the message should receive IDP Relay service, and is based on what other services are active on the EAGLE 5 ISS. (For example, if the Eagle is expected to receive other IDP messages that do not require IDP Relay, the Service Selectors would not provide a definitive decision point, as the TT, NP, NAI, GTI, and SSN would likely be identical for all IDPs.) Therefore, additional service selection criteria are required.

After examining the basic Service Selectors and determining that the combination is consistent with service selectors for the IDP Relay service, the EAGLE 5 ISS then examines the SCCP CdPA GTA digits against a provisioned list of Prepaid SCP GTAs. This list should contain all SCPs which could be the recipient of an IDP for prepaid query. If the SCCP CdPA GTA matches one of the provisioned PPSCP GTAs, the EAGLE 5 ISS then proceeds with service selection evaluation. If no match is found, the IDP is processed by standard GTT service in the EAGLE 5 ISS.

If the SCCP CdPA GTA matches one of the provisioned PPSCP GTAs, the EAGLE 5 ISS continues service selection to determine if IDP Relay is required. The TCAP Operation Code is next examined. The OpCode should be that for IDP. If it is not, the IDP is processed by standard GTT service in the EAGLE 5 ISS.

The EAGLE 5 ISS next compares the combination of INAP/CAP Service Key and EventTypeBCSM from the message with a provisioned list of Service Keys + Event Types. If the Service Key + EventTypeBCSM match one of the provisioned combinations pointing to IDP Relay service, then the message is sent for IDP Relay service. IDPs not matching these criteria fall through to standard GTT service and are routed transparently (unless the message matches the service selectors for another SCCP service hosted on the EAGLE 5 ISS, in which case the message is sent for that service).

CDPN Number Format Determination

After determining that a particular IDP requires the IDP Relay service, the EAGLE 5 ISS next determines the format of the incoming number, and the context surrounding the call. These items factor into both the conditioning of the number for the RTDB search, as well as the manner in which the message is treated as a result. The following details about the number must be known:

- Is the call terminating to a subscriber in the home country? (Calls terminating to numbers outside the home country are not subject to IDP Relay since number portability does not cross International boundaries).
- Is the calling subscriber roaming or dialing from inside the home country? (Determines if numbers dialed as national numbers are treated as in-country or out-of-country terminated).
- Was the number dialed with Escape Codes? (These must be deleted for DB lookup, but may be re-inserted for transmission).

The INAP/CAP CDPN parameter includes a CDPN NAI parameter which indicates the nature of address for the dialed digits (International, National, Subscriber, or Unknown). This parameter alone cannot always be relied upon to determine the format of the CDPN. For example, it is possible for the CDPN to contain a National number, but the CDPN NAI may be marked “Unknown”.

Other conditions also factor into how a received number should be treated. For example, a National number dialed while a subscriber is roaming must be treated differently than a National number dialed while a subscriber is in his/her home country/network. The condition of whether the calling subscriber is roaming or not cannot be determined from the CDPN NAI in the CDPN.

Additional checks are required in order to determine the true nature of the CDPN. The following sections describe the additional checks applied to the received IDP in order to determine how the message is treated.

Escape Codes

Escape Codes are also considered when determining the CDPN number format.

Subscribers are normally required to enter International Escape Code (IEC) before dialing the digits an International number. For example, in some countries, the digits *00* must be dialed before dialing an International number.

Subscribers are also normally required to enter a National Escape Code (NEC) to before dialing long distance National numbers. For example, many countries require a single *0* to be dialed before dialing a National number.

Escape codes must be removed for IDP Relay to perform the database lookup, as the numbers in the RTDB are always provisioned in International format. When an Escape Code is used, the CDPN NAI will be *unknown*. Therefore, whether *IEC* or *NEC* is found will indicate whether the number is International or National.

The EAGLE 5 ISS provides a table to provision both an *IEC* and a *NEC*. If a message is received with `CDPN CDPN NAI = unknown`, IDP Relay first checks the leading digits of the number for a match with `IEC` or `NEC`, and treats the number accordingly. If `CDPN NAI = unknown` and no match is found on the `IEC` or `NEC`, the number is treated as National with no preceding `NEC`.

Calling Subscriber Roaming

Roaming is another factor that must be considered when determining the structure of the incoming IDP. and how it should be treated is whether or not the calling subscriber is roaming when the call is placed.

When a subscriber is roaming, all incoming IDPs generated from calls made by that subscriber are CAMEL Application Part (CAP) rather than INAP. When a roaming subscriber dials a National Number (number without a Country Code), it is treated differently that when a non-roaming subscriber dials a National Number. This is because when a subscriber dials a National number while roaming Internationally, it is assumed that the subscriber is attempting to dial a number in the country where they are currently roaming, and not in their home country (if the subscriber wishes to dial a number in their home country, it must be dialed as an International number since they are roaming).

Since MNP checks are not conducted across International boundaries, calls from a roaming subscriber to a National number should are subject to IDP Relay service. Calls from the same subscriber to a National number when the subscriber is not roaming are subjected to IDP Relay service because these numbers are assumed to be terminating in the subscriber's home country, where portability applies. The National number digits could be identical in these two cases, although the actual destination is different.

For these reasons, it may be required that the IDP Relay function be able to distinguish between an IDP received for a call generated by a roaming subscriber versus one generated by a non-roaming subscriber. The IDP Relay service offers a configurable option to select whether IDPs generated by roaming subscribers should be subjected to IDP Relay processing, or be routed via standard GTT.

If this option (CGPA check) is activated, the calling subscriber's roaming status is determined by comparing the Country Code in the SCCP CGPA parameter of the IDP with the Default Country Code provisioned in the EAGLE 5 ISS. (There is only one Default CC provisioned in the EAGLE 5 ISS, and it corresponds to the *home* network. If a subscriber is roaming, the CC of the visited MSC will not match the Default CC provisioned in the EAGLE 5 ISS). If National roaming is allowed, the respective scenarios are treated as if the subscriber is not roaming. A roaming scenario is not detected by the CGPA check and IDP Relay processing is performed. This option is ON by default. If the operator wants the IDP Relay feature to treat IDPs generated from roaming subscribers, this option must be turned OFF.

Call Placed to Country Other than Home Country

The IDP Relay check does not apply if a subscriber dials a number in a country other than subscriber's home country. The INAP/CAP CDPN Country Code is checked against the Default CC provisioned in the EAGLE 5 ISS. If a match is not found, it means the subscriber has dialed a number outside his home country and IDP Relay is not required. The message simply falls through to GTT (or other SCCP service).

CDPN Number Conditioning

Once the format of the CDPN number has been determined as described in "CDPN Number Format Determination" on page 6-8, conditioning (if necessary) is performed before an RTDB lookup. The INP MNP database stores numbers in full International format only. Numbers not received in International format must first be converted (conditioned) before performing an RTDB lookup. For a summary refer to Table 6-1.

CDPN Received in International Format

There are two number format determination cases which result in a number being declared in International format.

- CDPN Received in Correct International Format (CDPN NAI = "International")
  In the case that the INAP/CAP Called Party Number (or Called Party BCD Number) is already in International format (as determined by CDPN NAI parameter set to "International") with no extra prefixes or suffixes, including no Escape Codes. No conditioning is required by the IDP Relay application prior to RTDB lookup.

- CDPN Received with IEC Prefixed to International Digits (CDPN NAI = "Unknown")
  If the CDPN NAI = Unknown, the IDP Relay first searches for an International Escape Code (IEC). If an IEC is found, the received CDPN is conditioned prior to RTDB lookup by removing the IEC, leaving only the International digits (CC+DN).

CDPN Received in National Format

There are three number format determination cases which result in a number being declared in National format.

- CDPN Received in Correct National Format (CDPN NAI = National)
  The INAP/CAP Called Party Number (or Called Party BCD Number) is received in correct National format (as determined by CDPN NAI parameter set to "National") with no extra prefixes or suffixes, including no Escape Codes. If the calling subscriber is not roaming, then IDP Relay conditions the CDPN by prefixing the DefCC to the DN prior to conducting the RTDB lookup.
- CDPN Received with NEC Prefixed to National Digits (CDPN NAI = Unknown)
  If the CDPN NAI = Unknown, IDP Relay first searches for an International Escape Code (IEC), and if no match, then searches for a National Escape Code (NEC). Since the NEC is found (in this case), the received CDPN must be conditioned prior to RTDB lookup by first removing the NEC, then prefixing the DefCC to the remaining National digits (DN), resulting in an International number for lookup.
- CDPN Received without Prefix, but CDPN NAI = "Unknown"
  In this case, the CDPN is in a National format without a prefixed Escape Code, but the CDPN NAI is still marked "Unknown" rather than "National". After searching first for an IEC, then for a NEC prefixed to the CDPN and finding neither, IDP Relay assumes that the number is in National format. If the subscriber is not roaming, then IDP Relay conditions the number prior to RTDB lookup by adding the DefCC to the digits received in the CDPN, which are assumed to be DN without a prefix.

Table 6-1. IDP Relay Number Conditioning Table

Incoming Address Format			Number Conditioning	Outgoing Address Format	
TCAP DN NAI	**Perform SCCP CGPA DefCC Check?**	**TCAP DN Format**		**NAI**	**Format**
International	No	CC DN	None. Do RTDB lookup.	If PFX3=UNKN NAI=unknown Else NAI=International	PFX1 CC RN DN
National	if PFX4=ON	DN	Add DEFCC. Do RTDB lookup.	If PFX3=UNKN NAI=unknown Else nai=National	PFX2 RN DN
Unknown	No	IEC CC DN	CSL Delete prefix found, (P1=International), remove it, Do RTDB Lookup	NAI=unknown	IEC CC RN DN
Unknown	if PFX4=ON	NEC DN	CSL Delete prefix found, (P1=National), remove it, Add DEFCC, Do RTDB Lookup	NAI=unknown	NEC RN DN
Unknown	if PFX4=ON	DN	No delete prefix found. Add DEFCC, Do RTDB Lookup	NAI=unknown	RN DN

Legend:			
CC	Country Code	UNKN	Unknown
PFX	Prefix Number	NEC	National Escape Code
DN	Directory Number	DEFCC	Default Country Code
IEC	International Escape Code	NAI	Nature of Address Indicator
RTDB	Real Time Database	SCCP	Signaling Connection Control Part
CSL	Common Screening List	TCAP	Transaction Capabilities Application Part
CGPA	Calling Party Address		

MNP Database Search

After service selection, number format determination, and number conditioning, the IDP Relay service searches the INP MNP database with the digits retrieved from the INAP/CAP CDPN parameter of the IDP message. This search results in one of four outcomes

Match on Digits with RN (Routing Number)

This condition indicates that the number belongs to a Foreign Network, and could be an Own Subscriber ported out, or a Foreign Subscriber. The IDP Relay then prefixes the RN to the CDPN digits and relays to the PPSCP.

Match on Digits with SP (SP Address)

This condition indicates that the number belongs to the Own Network, and could be an Own Subscriber, or a Foreign Subscriber ported in. The IDP Relay then prefixes the SP address to the CDPN digits and relays to the PPSCP.

Match on digits, but no associated RN or SP

This condition indicates a number was entered in the RTDB, but the portability status is unknown. Data might be entered in this format because it is an All Call Query solution based on SRF, but regulation does not allow prefixing of non-ported numbers. If IDP Relay finds such a match, the EAGLE 5 ISS terminates the IDP Relay function and simply routes the message via standard GTT to the PPSCP. The EAGLE 5 ISS will not modify the INAP/CAP portion of the message, and will only modify the MTP and SCCP CdPA modifications if required by standard GTT.

No Match on Digits

This condition indicates the number is not in the RTDB. Generally, this indicates that the number has never been ported (in or out), or is an unknown number. In any case, if IDP Relay encounters this scenario, the EAGLE 5 ISS will terminate the IDP Relay function and simply route the message via standard GTT to the PPSCP. The EAGLE 5 ISS will not modify the INAP/CAP portion of the message, and will only modify the MTP and SCCP CdPA modifications if required by standard GTT.

Encoding of Outgoing CDPN

If a match is found in the RTDB on the CDPN digits with either an RN or an SP/SP, the IDP Relay function then modifies the CDPN by adding the RN or SP/SP address to the CDPN. The exact placement of the RN/SP and the exact format of the CDPN in the outgoing message is dependent upon the format and context of the incoming message.

Setting of Outgoing CDPN NAI Parameter

The user has two basic options for setting the CDPN NAI parameter in the CDPN of the outgoing message. The Eagle will provide an option for setting CDPN NAI with values of either “unknown” or “incoming”. “Unknown” is the default value for this option. When “unknown” is selected, or if no option has been selected, the CDPN NAI in the outgoing CDPN will always be set to “Unknown” regardless of the CDPN NAI received in the incoming message, and regardless of the format of the outgoing digits. When “incoming” is selected, the CDPN NAI in the outgoing CDPN will be set to the same value as the CDPN NAI received in the incoming message, regardless of the format of the outgoing digits. (This means that if the incoming CDPN NAI = Unknown, the outgoing CDPN NAI will also be set to “Unknown”).

Outgoing CDPN Digits

The outgoing CDPN digits are determined based on several factors, including the CDPN NAI of the incoming CDPN and the format of the digits in the incoming CDPN. If the incoming CDPN NAI = Unknown, then the outgoing CDPN digits will be the same as the digits received in the incoming message with the exception of the addition of RN or SP. In these cases, the RN or SP is placed between the Escape Code (if dialed) plus Country Code (if number was International) and the DN. If the incoming CDPN NAI = International or National, the outgoing digits are prefixed by the RN or SP, and also by an "Insert Prefix" which is a user-configurable parameter in the EAGLE 5 ISS. In these cases, the Insert Prefix always precedes any other digits. In the case of a National format number, the RN or SP immediately follows the Insert Prefix. In the case of an International format number, the Country Code is placed between the Insert Prefix and the RN/SP.

The inclusion of the Insert Prefix is based on the incoming CDPN NAI parameter and whether or not an Insert Prefix is provisioned. There is one Insert Prefix for International and one for National, and the two are independent. For example, if an Insert Prefix is provisioned for International but not for National, then the International prefix will be inserted in messages which were received with CDPN NAI = International in addition to the RN/SP, but no prefix will be inserted in message received with CDPN NAI = National - only the RN/SP would be inserted in these messages.

In most cases, this Insert Prefix will simply be equal to the International or National Escape Codes used in the network. The EAGLE 5 ISS allows this parameter to be provisioned so that it can be any value required by the operator.

IDPR Commands

This section provides a description of the user interface for maintenance, operations, and measurements commands for IDPR. The commands that follow allow provisioning and operations activities for DSM cards.

Complete descriptions of these commands are shown in detail in the *Commands Manual*, including parameter names, valid values, and output examples for the commands.

chg/enable-ctrl-feat

This command is support the provisioning of the Feature Activation Key (FAK) to enable the Prepaid IDP Query Relay feature.

chg-prefix / rtrv-prefix

This command is used to enter the name of a feature and relate it to a Prefix, and to specify an ID value that is used to refer to the prefix from another table.

Refer to the *Commands Manual* for details on using these commands.

ent-csl /chg-csl /dlt-csl /rtrv-csl

Common screening commands are used for handling screening requirements of various features. The screenings are done on digit string or point codes. For IDP Relay feature, 4 such screening lists are required. Each of the four screening is based on digit string.

- GTA screening list - This list is used to compare the SCCP CDPA GT from the incoming message into this list. If not found, the message falls to GTT handling.
- CCNDC screening list - This screening list is used to compare the conditioned TCAP DN in international format into this list. If not found, the message falls to GTT handling.
- SKBCSM screening list - This screening list is used to compare the concatenated SK + BCSM from the incoming message into this list. If not found, the message falls to GTT handling.
- Delete prefix screening list - When performing number conditioning for incoming NAI=Unknown case, this list is checked for IEC or NEC. This is checked by searching the TCAP DN on this list.

Refer to the *Commands Manual* for details on using this command.

ent-srvsel / dlt-srvsel / chg-srvsel / rtrv-srvsel

The IDPR service selector (**`srvsel`**) commands are used to provision new selectors for the IDPR service, providing greater flexibility when provisioning the type of messages that require IDPR processing. There are four variants, each of which is described in the following sections: **`ent-srvsel`**, **`chg-srvsel`**, **`dlt-srvsel`**, and **`rtrv-srvsel`**. For further details on the EAGLE 5 ISS IDPR service selector commands (such as command rules and output format), refer to the *Commands Manual*.

rept-stat-sccp

This command is used to display the status of the SCCP and VSCCP cards and the GTT (Global Title Translation), G-Flex (GSM Flexible Numbering), G-Port (GSM Mobile Number Portability), INP (INAP-based Number Portability), EIR (Equipment Identity Register), and IDPR (Prepaid IDP Query Relay Feature) services executing on those cards. This command also displays any cards that are denied SCCP service. Refer to the *Commands Manual* for details on using this command.

IDPR Measurements

Four measurement registers are defined for the IDPR. All registers added in this feature are reported in the STP System Total (SYSTOT-STP) report. The registers are as follows:

- **IDPRMSERR** The total number of MSU's selected for IDPR service which could not be processed due to errors in encoding, decoding, or formatting.
- I**DPRMSFAIL** Total number of MSU's selected for IDPR service which fell through to GTT due to (1) no match on MSISDN in MNPDB, or (2) match on MSISDN but no association to RN or SP.
- **IDPRMSRCV** Total number of MSU's received and selected for IDPR service. This register includes counts for MSU's that resulted in both successful and unsuccessful MNPDB lookups.
- **IDPRMSSUCC** Number of MSU's selected for IDPR service for which the MNPDB lookup resulted in a match on MSISDN with association to an RN or SP.

Prepaid IDP Query Relay Provisioning and Activation

The following gives the general sequence of the provisioning required to support IDP Relay on the EAGLE 5 ISS. This procedure assumes INP and GTT are provisioned and activated.

Procedure

1. Use the following command to enter the NT serial number.

```
ent-serial-num:serial=<System NT serial number>:lock=yes
```

Enter NT serial number into EAGLE 5 ISS database. If the NT serial number is already entered, then ignore this step.

2. Enter the `enable-ctrl-feat` command to enable the IDPR.

   enable-ctrl-feat:partnum=893016001:fak=<Feature Access Key>

---

3. Enter the `chg-stpopts` command to enable the DEFCC (if not already present/entered due to another feature).

   chg-stpopts:DEFCC=48

---

4. Enter the `chg-ctrl-feat` command to activate the IDPR.

   chg-ctrl-feat:partnum=893016001:status=on

---

5. Enter the `ent-srvsel` command to enter IDPR Global Title Selectors These selectors trigger INP as well as IDPR processing.

   ent-srvsel:gtii=4:tt=20:np=e164:nai=intl:serv=idpr:ssn=*

   *There can be multiple entries for this command. This example sets up the service selectors needed to select incoming messages with GTI=4, NP=E164, TT=20 and NAI=INTL selected for IDPR service.

---

6. Optional - Enter the international insert Prefix in the prefix table.

   chg-prefix:feat="Prepaid IDP Query Relay":prefixnum=1:prefix=862

---

7. Optional - Enter the national insert Prefix in the prefix table.

   chg-prefix:feat="Prepaid IDP Query Relay":prefixnum=2:prefix=0

---

8. Optional - Control for NAI in the outgoing TCAP DN (incoming or default).

   chg-prefix:feat="Prepaid IDP Query Relay":prefixnum=3:prefix=1

---

9. Optional - if the SCCP CGPA DEFCC check is ON or OFF.

   chg-prefix:feat="Prepaid IDP Query Relay":prefixnum=4:prefix=1

---

10. Use the `ent-csl` command to enter Digit String (DS) entries in the CC+NDC list

    ent-csl:pn=893016001:list=ccnc:ds=48

    There can be multiple entries for this command. There should be minimum of one entry for the feature to work.
    The entry can be just with country code - same value as in DEFFCC parameter.

---

11. Use the `ent-csl` command to enter Digit String (DS) entries in the GT list.

```
ent-csl:pn=893016001:list=gt:ds=456
```

There can be multiple entries for this command. There should be minimum of one entry for the feature to work. This digit should match the called party number in the SCCP CDPA.

---

12. Use the `ent-csl` command to enter Digit String (DS) entries in the SKBCSM list.

```
ent-csl:pn=893016001:list=skbcsm:ds=h'0x1402
```

There can be multiple entries for this command. There should be minimum of one entry for the feature to work. This digit should match the service key value and the event BCSM value from the IDP message.

---

13. Optional - Use the `ent-csl` command to enter Digit String (DS) entries in the DELPFX list.

```
ent-csl:pn=893016001:list=delpfx:ds=789:p1=1
```

There can be multiple entries for this command. This digit should match the IEC(p1=2) or NEC(p1=1) in the incoming TCAP DN when the NAI is unknown.

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