Tekelec EAGLE® 5
Integrated Signaling System

Feature Manual - G-Port®

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TEKELEC

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Introduction

Overview

This manual provides an overview of the G-Port MNP feature of the EAGLE 5 ISS (Integrated Signaling System). The G-Port MNP feature implements Mobile Number Portability for GSM networks according to ETSI GSM 03.66. In response to governmental mandates for telecommunication networks, this feature focuses on service provider number portability on GSM networks.

G-Port MNP minimizes the challenges for GSM network operators while enabling them to meet their regulatory obligations. G-Port supports the Signaling Relay Function (SRF) for direct and indirect routing. SRF-based MNP processing examines MAP messages for ported numbers. For call-related messages, G-Port acts as an "NP HLR" for exported number by responding with a MAP SRI message; G-Port performs a message relay function for calls to imported numbers and non-call related messages.

G-Port is an optional feature on the EAGLE 5 ISS, and can be turned on, but not off, via a feature bit. Note that G-Port requires the Global Title Translation (GTT) feature and that G-Port and North American LNP (Local Number Portability) are mutually exclusive on an EAGLE 5 ISS node.

Scope and Audience

This manual is intended for anyone responsible for installing, maintaining, and using the G-Port 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 G-Port documentation, the organization of this manual, and how to get technical assistance.
- Chapter 2, *Feature Description*, provides a functional description of G-Port, including network perspectives, assumptions and limitations, a database overview, DSM provisioning and reloading, G-Port user interface, SDS commands, and the G-Port relay function.
- Chapter 3, *EAGLE 5 ISS G-Port Commands*, describes the user interface in detail.
- Chapter 4, *G-Port Feature Activation*, describes how to activate the G-Port feature.
- Chapter 5, *Maintenance and Measurements*, describes maintenance and measurements in detail, including EPAP status and alarms, hardware verification messages, TSM emulation mode, G-Port system status reports and commands, code and application data loading, and alarms.

Related Publications

The *Feature Manual – G-Port* is part of the EAGLE 5 ISS documentation and may refer to one or more of 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 throughout this manual that alert the reader to assure personal safety, to minimize possible service interruptions, and to warn of the potential for equipment damage. This manual has three admonishments, listed in descending order 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 Care Center offers a point of contact through which customers can receive support for problems. The Tekelec Customer Care 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 Care Center to maximize the performance of Tekelec products that meet and exceed customer needs.

Customer Care Center

To receive technical assistance, call the Tekelec Customer Care 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

ACN .....Application Context Name

ADL.....Application Data Loader

ARP .....Address Resolution Protocol

AuC .....Authentication Center

CC.....E.164 Country Code

CCRNDN .....Country Code + Routing Number + National Directory Number

CdPA .....Called Party Address

CgPA .....Calling Party Address

CRP .....Circular Route Prevention

DCB.....Device Control Block

DCM.....Data Communications Module

DN.....Destinantion Number, called party telephone number

DRAM.....Dynamic Random Access Memory

DSM .....Database Services Module

EPAP .....Eagle Provisioning Application Processor

ES.....Encoding Scheme

ETSI.....European Telecommunications Standards Institution

FAK .....Feature Access Key

FTR .....File Transfer Region

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

GFDB .....G-Flex Database

G-Flex.....GSM Flexible Numbering

GMSC ..... Gateway Mobile Switching Center

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

GPL ..... Generic Program Load

GPSM-II ..... General Purpose Service Module II (Hardware)

GSM ..... Global System for Mobile communications

GTA ..... Global Title Address

GTAI ..... Global Title Address Information

GTI ..... Global Title Indicator

GTT ..... Global Title Translation

HLR ..... Home Location Register

HOMERN ..... Home Network Routing Number Prefix

IAM ..... Initial Address Message

IMSI ..... International Mobile Station Identifier

IN ..... Intelligent Network

INAP ..... Intelligent Network Application Protocol

INP ..... INAP-Based Number Portability

IP ..... Internet Protocol

IS-41 ..... International Standard 41, same as ANSI-41

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

MDN ..... Mobile Directory Number

MGT.....Mobile Global Title

MIN.....Mobile Identification Number

MMI .....Man-Machine Interface

MNP.....Mobile Number Portability

MPS.....Multi-Purpose Server (Multi-Platform Server)

MSRN .....Mobile Station Roaming Number

MSC.....Mobile Switching Center

MSISDN.....Mobile Station international ISDN number

MSU .....Message Signaling Unit

MT SMS .....Mobile Terminated Short Message Service

MTP.....Message Transfer Part

NAI .....Nature of Address Indicator

NC .....E.214 Network Code

NDC .....E.164 National Destination Code

NP.....(1) Number Portability
(2) Numbering Plan

NPA.....Numbering Plan Area

NPDB.....Number Portability Database

NPV.....Numbering Plan Value

NSD.....Network Systems Division, Tekelec

OAI.....Object Access Interface

OAM .....Operation Administration & Maintenance

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

OPS.....Operator Provisioning System

PDB .....Provisioning Database

PDBA .....Provisioning Database Application

PDBI.....Provisioning Database Interface

PFS.....Product Functional Specification

PLMN .....Public Land Mobile Network

PMTC.....Peripheral Maintenance Control

RMTP.....Reliable Multicast Transport Protocol

RN.....Routing Number

RNIDN.....Routing Number prefix + International dialed / Directory Number

RNNDN.....Routing Number prefix + National dialed / Directory Number

RNSDN.....Routing Number prefix + Subscriber dialed / Directory Number

RN*x*DN.....Routing Number prefix + International dialed or National dialed or Subscriber dialed / Directory Number

RTDB.....Real-Time Database

SCCP.....Signaling Connection Control Part

SCP.....Service Control Point

SDS.....System Debug Services

SIM.....Subscriber Identity Module

SMS.....(1) Service Management System, or (2) Short Message Service

SN.....Service Node

SNAI.....Service Nature of Address Indicator

SNP.....Service Numbering Plan

SP.....Signaling Point

SPC.....Secondary Point Code

SRF.....Signaling Relay Function

SRI.....Send Routing Information

SS7.....Signaling System 7

SSN.....Subsystem Number

SSP.....Service Switching Point

STP.....Signal Transfer Point

TCAP.....Transaction Capabilities Application Part

TCP.....Transmission Control Protocol

TFA.....Transfer Allowed

TFC.....Transfer Congested

TFP .....Transfer Prohibited

TLNP.....Tiggerless Local Number Portability

TSM.....Translation Service Module

TT .....Translation Type

UAM .....Unsolicited Alarm Message

UDP.....User Datagram Protocol

UDTS.....Unit Data Transfer Service

UIM .....Unsolicited Information Message

VLR .....Visitor Location Register

VMSC.....Voice Mail Service Center

VSCCP .....VxWorks Signaling Connection Control Part

2

Feature Description

G-Port MNP Overview

Throughout the world, an increasing number of governments are mandating that telecommunications network operators support service provider number portability. It is primarily intended to promote competition among service providers. It applies to both wireline and mobile phone networks. In particular, the G-Port MNP (Mobile Number Portability) feature is focused on service provider portability in GSM (Global System for Mobile communications) networks.

Service provider portability allows a consumer to change service providers while retaining his phone number. While the advent of number portability is good news for consumers, its implementation can present many challenges for network operators. G-Port MNP minimizes those challenges for GSM network operators, while enabling them to efficiently meet their regulatory obligations.

Feature Description

G-Port MNP implements Mobile Number Portability for GSM networks according to the ETSI GSM 03.66 standard. The focus is on service provider portability among GSM networks in a defined portability cluster, usually a country. With service provider portability, subscribers can change operators while retaining their MSISDN (Mobile Station international ISDN number) number. The MSISDN is the number dialed by someone trying to reach the subscriber. Their IMSI (International Mobile Station Identifier) number is not portable. The IMSI identifies the SIM (Subscriber Identity Module) card, which modularly plugs into the GSM handset.

The G-Port Circular Route Prevention (G-Port CRP) feature is an extension of the G-Port MNP feature which helps in cases of circular routing caused by incorrect information in one or more of the network number portability databases. For example, a subscriber may have ported from network A to network B. Network A has the correct routing information, indicating the subscriber now belongs to network B. However, network B may have incorrect routing information, indicating that the subscriber still belongs to network A. In this case, network A routes the call to network B, based on its portability data, but network B routes the call back to network A, based on its incorrect data. This results in a circular route. The G-Port CRP feature provides logic to prevent this scenario.

The Prepaid Short Message Service (PPSMS) Intercept feature is based on the G-Port MNP feature and applies only to mobile originated SMS, those messages sent from a mobile handset through an Mobile Switching Center (MSC) to the Short Message Service Center (SMSC). PPSMS Intercept screens incoming messages from MSC based on the MAP operation code. Message Discrimination determines whether the sender's MSISDN is retrieved and a database lookup performed. Database lookup determines if the MSISDN belongs to a contract subscriber, and the message routed to the SMSC, or if the MSISDN belongs to a prepaid subscriber, and the message diverted to a third-party IN platform for a credit check before allowing the message to be delivered to the SMSC.

The MNP Check for Mobile Originated (MO) SMS feature is a fraud prevention enhancement to the PPSMS feature. With this feature enabled, the EAGLE 5 ISS filters incoming messages based on the MAP Operation Code. If the message is a MO Forward Short Message (MO FSM), the originating subscriber's MSISDN number is used to search the G-Port Mobile Number Portability database. If a match is found indicating the subscriber has been ported-out, the EAGLE 5 ISS then uses the destination SMSC address obtained from the SCCP CdPA to search a list of "home network" SMSC addresses. If a match is found, indicating the ported-out subscriber is fraudulently attempting to send SMS using the old network's SMSC, the message is discarded and an error message is generated and returned to the originating MSC.

The Multiple Country Code (MULTCC) feature supports up to 10 MULTCCs for customers having one MNP node servicing several countries, or areas with differing country codes. The MULTCCs are not used for conditioning of non-International numbers to International format for database lookup. The MULTCCs are used for the construction of the MSRN parameter in the case of a Send Routing Information acknowledgement (SRI-ack) response from G-Port, and in certain cases for the formulation of the SCCP CdPA. The DEFCC parameter in STPOPTS is used for conditioning of numbers to International format when necessary, and also for constructing the MSRN and SCCP CdPA parameters in addition to a MULTCC list. The MULTCC list is optional. If no values are provisioned, G-Port uses the DEFCC to process messages. If values are provisioned, G-Port automatically utilizes both the DEFCC and the MULTCC to process messages. The `chg-gsmopts` command along with the `MULTCC` and `NMULTCC` parameters are used to provision Multiple Country Code list entries.

The MSISDN Truncation Support for G-Port MNP feature, is an optional feature that allows an operator to specify a certain number of digits to be deleted from the beginning of the National MSISDN (MSISDN without Country Code prior to formulating the MSRN parameter of the SRI-ack response. This feature only changes the behavior of the encoding of the MAP MSRN parameter in a SRI-ack formulated by the EAGLE 5 ISS. It does not affect the encoding of any other parameters or any other messages processed by G-Port. The International MSISDN is 12 digits long, and the RN is 5 digits long. So when the RN is added to form the MSRN parameter, it will exceed 15 digits in length. Some carriers require MSISDN digits to be truncated when formulating MSRN parameter of SRI-ack response in G-Port in order to maintain max 15 digits length. This feature works

in conjunction with the MULTCC Support feature. The MULTCC table is used to determine which digits are the CC and which digits are the National MSISDN. If a match is not found on the leading digits of the International MSISDN when searched against the MULTCC list, then the truncation is not performed, and standard G-Port processing is followed. The `chg-gsmopts` command along with the MISDNTRUNC parameter is used to set-up the MSISDN Truncation Support feature.

The ISUP NP with EPAP feature enables the EAGLE 5 ISS to intercept ISUP Initial Address Message (IAM) and to perform the NP Database (NPDB) lookup based on the Called Party Number (CdPN) of the IAM. The EAGLE 5 ISS prepends a Routing Number (RN) to the CdPN if the CdPN is a ported out number or prepends a SubNet prefix if the CdPN is ported-in or never been ported number before relaying the IAM message to its destination.

The purpose of the ISUP NP with EPAP feature is to prepend a prefix (a SubNet prefix or RN) to the CdPN of an IAM message if the CdPN is a ported in (including never been ported) or a ported out DN before relaying the message to its destination. The prefix provides the recipient switch a means to differentiate a call so that different billing rates or routing can be applied to the call.

The ISUP NP with EPAP feature is enabled and turned-on with a Feature Activation Key.

The DigitAction Expansion feature provides more flexibility to formulate the SCCP Called Party Address (SCCP) Global Title Address (GTA) field of the MAP messages relayed by G-Port.

Without DigitAction Expansion, G-Port supports four options (none, insert, prefix, and replace) to overwrite the SCCP CdPA GTA field. With DigitAction Expansion, four additional options (delcc, delccprefix, spare1, and spare2) are included to overwrite the SCCP CdPA GTA field.

The rules for formatting the SCCP CdPA GTA field are based on the value specified in the DigitAction field. If DigitAction = none, the EAGLE 5 ISS does not overwrite the SCCP CdPA GTA. For all other values, the EAGLE 5 ISS formats the SCCP CdPA GTA according to the value assigned to DigitAction. Refer to Table 2-1 for examples of DigitAction Expansion on the SCCP CdPA GTA of an outgoing message when the Entity ID = 1404 and the default country code = 886...

Table 2-1. DigitAction Applications

DigitAction	Value in Incoming CdPA GTA	Value in Outgoing CdPA GTA	Meaning
none	886944000213	886944000213	No change to the Called Party GTA (default)
prefix	886944000213	1404886944000213	Prefix Called Party GTA with the entity id
replace	886944000213	1404	Replace Called Party GTA with the entity id

Table 2-1. DigitAction Applications (Continued)

DigitAction	Value in Incoming CdPA GTA	Value in Outgoing CdPA GTA	Meaning
insert	886944000213	8861404944000213	Insert entity id after country code. (CC + Entity Id + NDC + SN)
delccprefix	886944000213	1404944000213	Delete country code and add prefix
delcc	886944000213	944000213	Delete country code
spare1	886944000213	treated as none	No change to the Called Party GTA (default)
spare2	886944000213	treated as none	No change to the Called Party GTA (default)

DigitAction Expansion is provisioned via the PDBI Enter Network Entity or Update Network Entity commands. DigitAction Expansion can also be modified via the Add an NE and Update an NE GUI screens.

The G-Port SCCP Service Re-Route feature is used when the G-Port database is incoherent with MPS data and the GTT data is valid. The G-Port SCCP Service Re-Route feature provides the capability to re-route the traffic from the EAGLE 5 ISS to other G-Port database nodes and inform the originating nodes to re-route the G-Port service related traffic to other G-Port service nodes.

The G-Port SCCP Service Re-Route feature is designed to handle and control re-routing of G-Port traffic from an affected node to alternate nodes within an operators network. This feature is an optional feature and doesn't affect the normal G-Port functionality. This feature also provides the option to mark G-Port *OFFLINE* to perform a controlled re-routing during this state.

The IS-41 to GSM Migration Feature supports call termination for customers in migration from IS-41 to GSM wireless technology. This is referred to as Portability Type = 5 (PT = 5). This feature provides the wireless service provider a way to begin the migration of mobile subscribers from IS-41 to GSM. Once the subscriber is marked as migrated, the GSM handset is fully functional, and the migrated subscriber has the option whether to continue to receive calls on the IS-41 handset.

The ETSI standards are defined so that GSM carriers can choose to implement either Signaling Relay Function (SRF)-based (using MAP protocol) MNP or IN-based (using INAP protocol) MNP. G-Port supports only the SRF-based solution for MNP. (INAP-based MNP processing is similar to wireline networks; this function is supported by the INP feature.)

SRF-based MNP processing involves the “intercepting” of existing MAP messages to check for ported numbers. For call-related messages, G-Port acts as a “NP HLR,” in the case where the number has been exported, by responding to the switch with a MAP SRI ack message. For calls to imported numbers and non-call related messages, G-Port performs message relay.

The ETSI standards for SRF-based MNP define two routing options, direct routing and indirect routing. G-Port supports both options:

- With direct routing, the network where the call is originated is responsible for determining whether the called party has ported and routing the call to the new subscription network.
- With indirect routing, this is the responsibility of the network that originally owned the number.

G-Port MNP is based on the EAGLE 5 ISS platform. It is deployed in a node that is also performing the STP function.

Number lengths vary between countries and may even vary within a country. As a result, the G-Port MNP database structure supports numbers of varying length in a flexible way without necessitating software modifications. A maximum number length of 15 digits for ported numbers is supported. This length is based on the maximum length for MSISDN numbers as defined in the ETSI GSM 03.03 standard.

NOTES:

1. **G-Port is turned on, but not off, via a feature bit.**
2. **The G-Port MNP, G-Flex C7 Relay, and INP features can run concurrently on an EAGLE 5 ISS node.**
3. **When G-Port and G-Flex are run on the same node, interactions between the two features must be addressed.**
4. **G-Port MNP and North American LNP are mutually exclusive on an EAGLE 5 ISS node.**
5. **G-Port SCCP Service Re-Route Capability is not supported for the Prepaid SMS Intercept feature.**
6. **G-Port SCCP Service Re-Route Capability is supported for the IS-41 to GSM Migration feature.**

G-Port Call Flows

This section contains several illustrative sample call flows: G-Port supports all call flows identified in GSM 03.66 other than noted exceptions. This section contains a mix of call flows using both indirect and direct routing.

These call flows, including calls to imported or non-ported numbers, show only one possible scenario regarding how messages are routed in the network and where various stages of GTT are performed. G-Port may perform intermediate or final GTT depending on the message received and provisioned data.

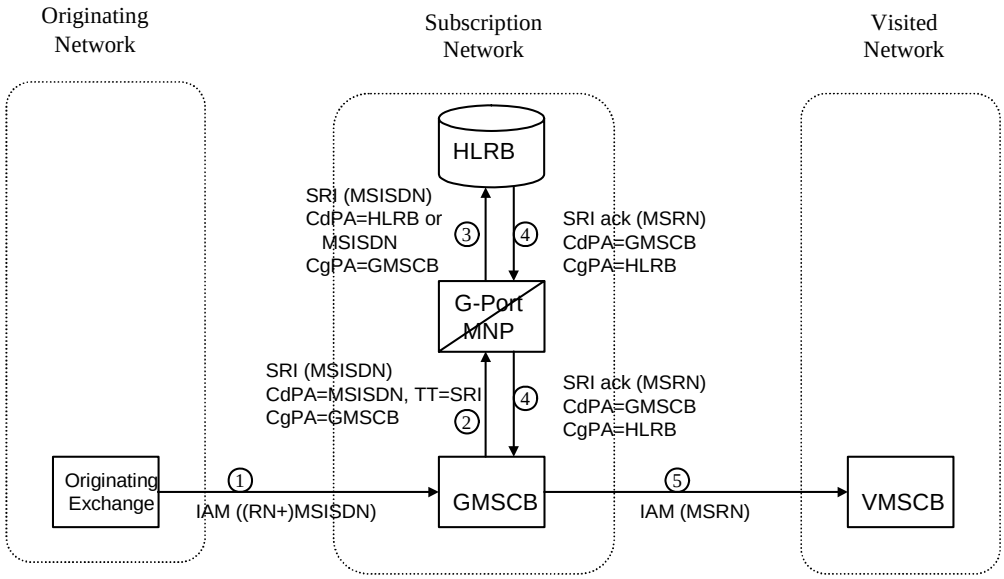
Several call flows refer to non-call related messages. Examples of non-call related messages are SRI for Short Message Service and SRI for Optimal Routing.

In all G-Port call flows, the MSISDN used for the database search is converted to an international number, if necessary, prior to the database search.

Mobile Terminated Call to Non-ported or Imported Number (Indirect Routing)

The first call flow example is for a mobile terminated call to a non-ported or imported number by indirect routing. Refer to Figure 2-1 and see the steps in the flow for this call.

Figure 2-1. Mobile Terminated Call by Indirect Routing



1. The originating exchange sends an IAM message to GMSCB in the subscription network. When the number is imported, the original number range owner network has already performed a NP database lookup and determined the new subscription network (Routing Number). As shown in the figure, this could be sent in the IAM along with the MSISDN.

2. GMSCB sends a SRI request to the MNP-SRF. This request may or may not contain the new TT = SRI. Global title information triggers G-Port processing. The MNP-SRF determines the message is an SRI and uses the MSISDN from the MAP message to search the G-Port Database (GPDB). A match is found with no Routing Number and a HLR GT address for HLRB, or no match is found and falls through to GTT, producing a routing to HLRB. Alternatively,

GTT could route to another node, possibly in a different network, but that is not illustrated here.

3. The message is routed to HLRB.

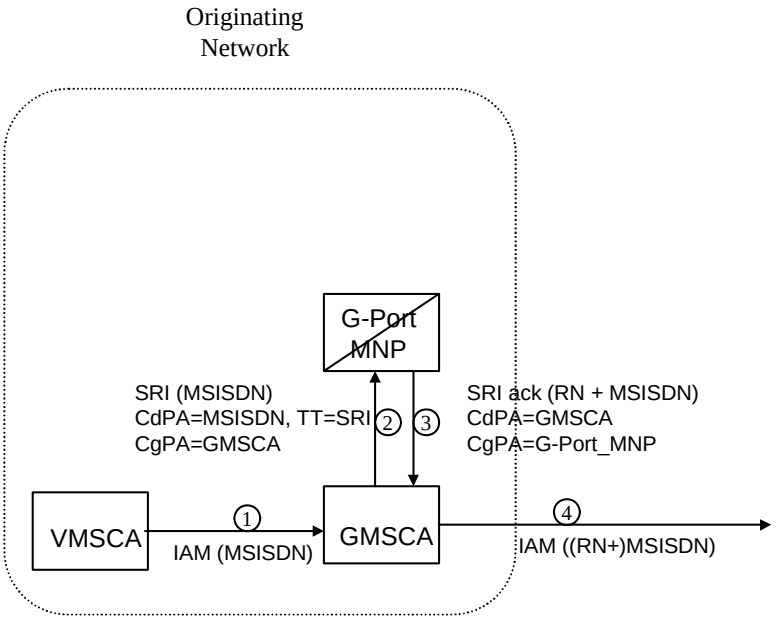
4. HLRB responds to GMSCB with a SRI ack. This message can be GT routed through the STP or MTP routed.

5. GMSCB sends an IAM with the roaming number to the visited network.

Mobile Originated/Terminated Call to an Exported Number (Direct Routing)

This call flow example is for a call that is mobile originated or terminated to an exported number by direct routing. Refer to Figure 2-2 and see the steps in the flow for this call.

Figure 2-2. Call to an Exported Number by Direct Routing



This call flow assumes the originating network is not the subscription network. If indirect routing were used in this example, the originating network would first route the call to the number range owner network, according to pre-portability rules, where the MNP-SRF and NPDB are accessed to locate the Routing Number.

1. When the call is originated, VMSCA sends an IAM message to GMSCA.

2. GMSCA sends a SRI request to the MNP-SRF. This may or may not contain the new TT = SRI. Global title information triggers G-Port processing. The MNP-SRF determines the message is an SRI and uses the MSISDN from the

MAP message to search the GPDB. A match is found with the Routing Number field populated.

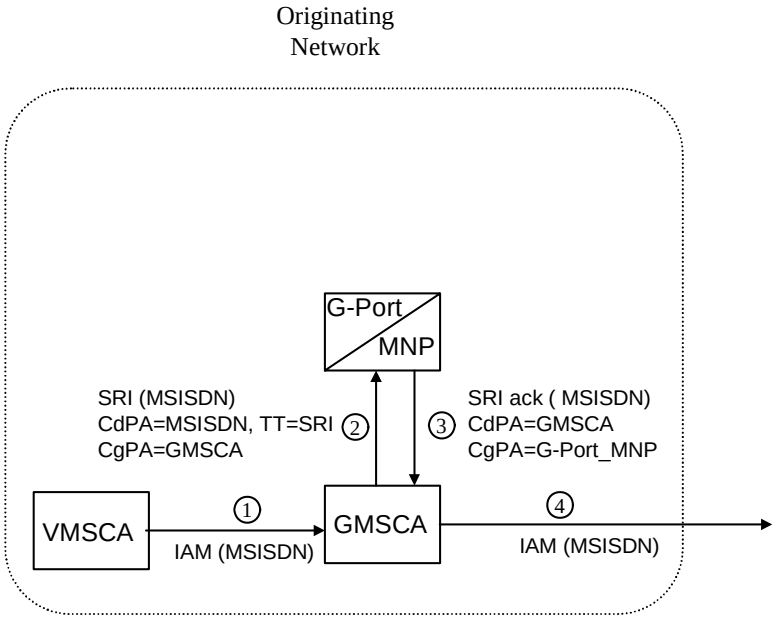
3. The MNP-SRF responds to GMSCA with a SRI ack containing the Routing Number prefixed to the MSISDN number as the Roaming Number.

4. GMSCA sends an IAM with the roaming number to the subscription network. The Routing Number is used by GMSCA and possibly by transit exchanges to route the call to the subscription network.

MO/MT Call to a Number Not Known to be Ported (Direct Routing)

This call flow example is for a call that is mobile originated (MO) or mobile terminated (MT) to a foreign number that is not known to be ported by direct routing. Refer to Figure 2-3 and see the steps in the flow for this call.

Figure 2-3. MO/MT Call to Number Not Known to be Ported (Direct Routing)



This call flow assumes the originating network is not the subscription network.

1. When the call is originated, VMSCA sends an IAM message to GMSCA.

2. GMSCA sends a SRI request to the MNP-SRF. This request may or may not contain the new TT = SRI. Global title information triggers G-Port processing. The MNP-SRF determines the message is an SRI and uses the MSISDN from the MAP message to search the GPDB. A match is found, but the Routing Number and HLR Address fields are not populated.

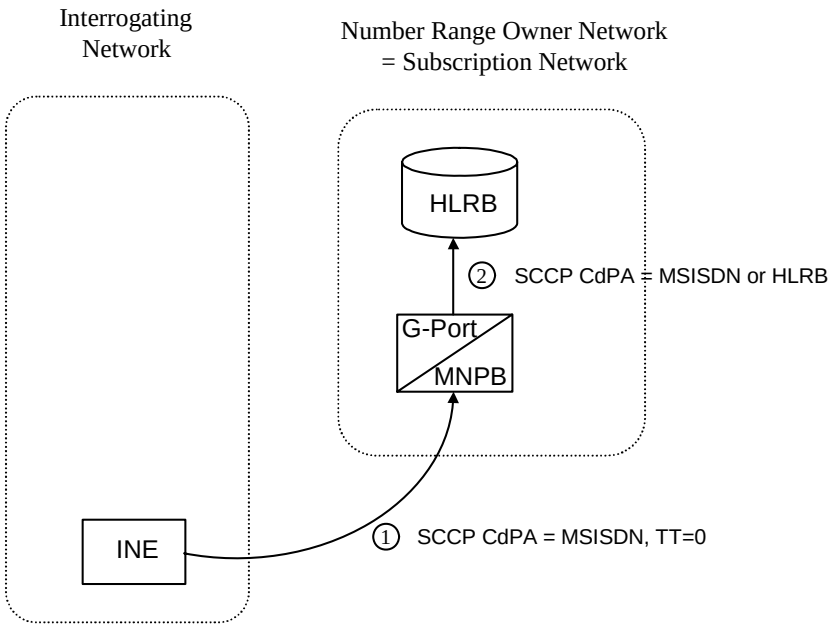
3. The MNP-SRF responds to GMSCA with a SRI ACK containing the MSISDN number.

4. GMSCA sends an IAM with the roaming number to the subscription network.

Non-Call Related Message for Non-Ported Number (Indirect Routing)

This call flow example is for a non-call related message for a non-ported number by indirect routing. Refer to Figure 2-4 and see the steps in the flow for this call.

Figure 2-4. Non-Call Related Message for Non-Ported Number



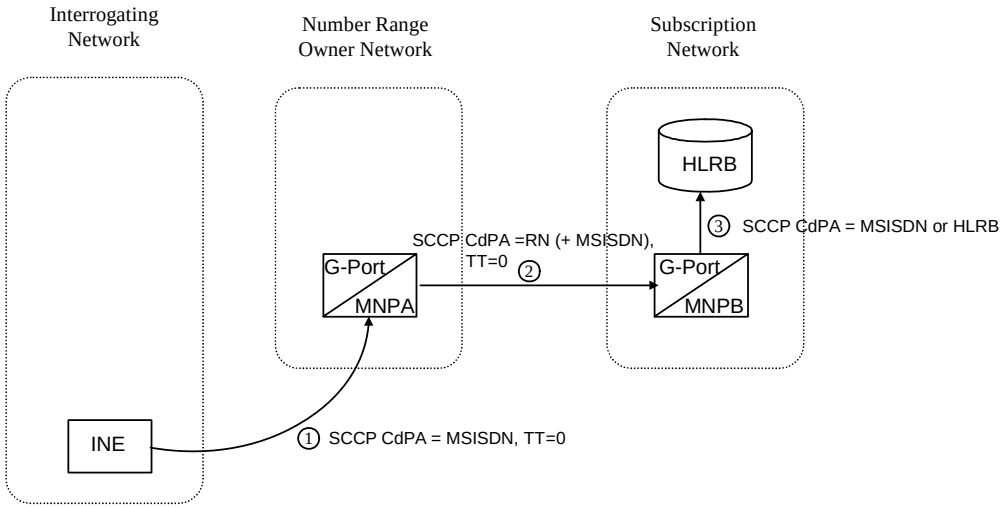
1. The Interrogating Network Entity (INE) sends the non-call related message to MNP-SRFB in the number range owner network. The SCCP CdPA contains the MSISDN number of the subscriber and the TT. The TT may be either 0 as shown in the figure, or another value depending upon the service, such as TT=17 for CCBS service.

2. Global title information triggers G-Port processing. MNP-SRFB determines the message is non-call related (i.e. not an SRI that doesn't require Optimal Routing) and uses the MSISDN from the SCCP CdPA to search the GPDB. No match is found, so MNP-SRFB uses GTT to locate the GT address associated with the MSISDN to route the message to HLRB.

Non-Call Related Message for Ported Number (Indirect Routing)

This call flow example is for a non-call related message for a ported number by indirect routing. Refer to Figure 2-5 and see the steps in the flow for this call.

Figure 2-5. Non-Call Related Message for Ported Number



1. The Interrogating Network Entity (INE) sends a non-call related message to MNP-SRFA in the number range owner network. The SCCP CdPA contains the MSISDN number of the subscriber and the TT. The TT may be either 0 as shown in the figure, or another value depending upon the service, such as TT=17 for CCBS service.

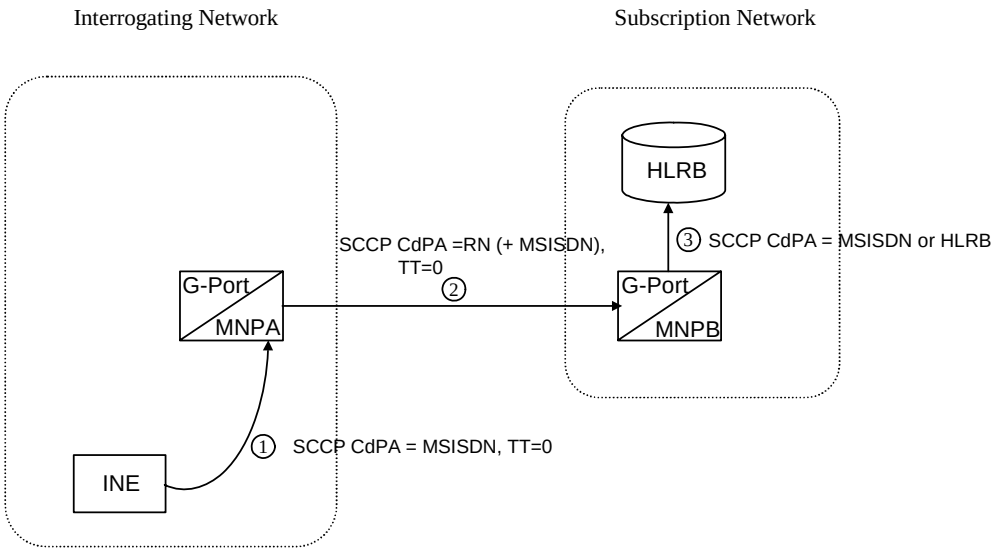
2. Global title information triggers G-Port processing. MNP-SRFA determines the message is one requiring message relay (that is, not an SRI that doesn't require Optimal Routing) and uses the MSISDN from the SCCP CdPA to search the GPDB. A match is found, and MNP-SRFA uses the Message Relay GT address associated with the match to route the message to the subscription network.

3. MNP-SRFB receives the message and determines the message is one requiring message relay (that is, not an SRI that doesn't require Optimal Routing). It checks to see if the SCCP CdPA begins with a Prefixed RN. If so, it removes the prefix. Either way, it uses the MSISDN from the SCCP CdPA to search the GPDB. A match is found, and MNP-SRFB uses the HLR GT address associated with the match to route the message to HLRB.

Non-Call Related Message for Ported or Non-Ported Number (Direct Routing)

This call flow example is for a non-call related message for either a ported or non-ported number by direct routing. Refer to Figure 2-6 and see the steps in the flow for this call.

Figure 2-6. Non-Call Related Message for Any Number



This call flow assumes the originating network is not the subscription network.

1. The Interrogating Network Entity (INE) sends the non-call related message to MNP-SRFA in the interrogating network. The SCCP CdPA contains the MSISDN number of the subscriber and the TT. The TT may be either 0 as shown in the figure, or another value depending upon the service, such as TT=17 for CCBS service.

2. Global title information triggers G-Port processing. MNP-SRFA determines the message is one requiring message relay (that is, not an SRI that doesn't require Optimal Routing) and uses the MSISDN from the SCCP CdPA to search the GPDB.

   - If a match is found (ported case), MNP-SRFA uses the Message Relay GT address associated with the match to route the message to the subscription network.
   - If a match is not found (non-ported case), MNP-SRFA uses GTT to route the message to MNP-SRFB.

3. MNP-SRFB receives the message and determines the message requires message relay (that is, not an SRI that doesn't require Optimal Routing). It checks to see if the SCCP CdPA begins with a Prefixed RN. If so, it removes the prefix. Either way, it uses the MSISDN from the SCCP CdPA to search the GPDB.

   - If a match is found (imported case), MNP-SRFB uses the HLR GT address associated with the match to route the message to HLRB.
   - If a match is not found, MNP-SRFB uses GTT to route the message to HLRB.

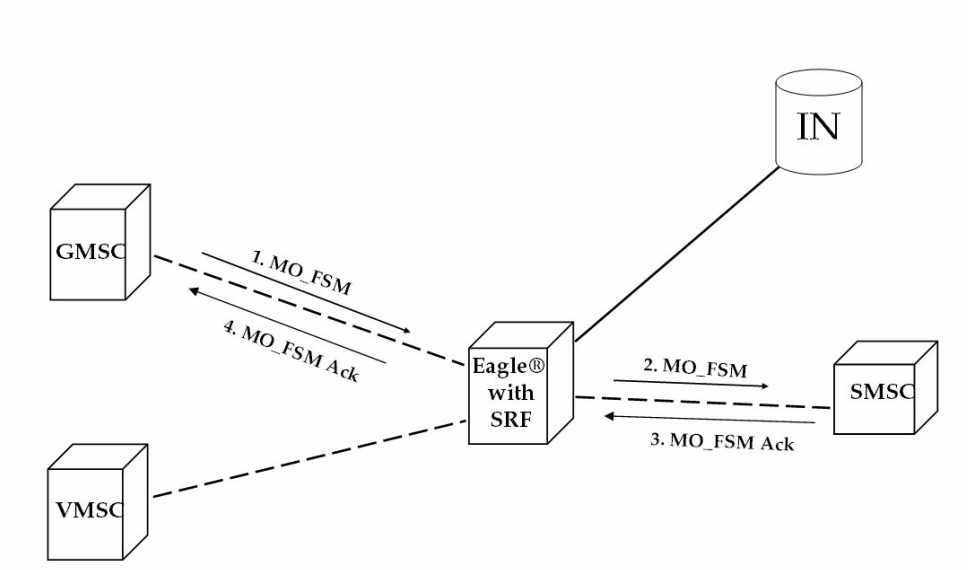
PPSMS Call Flows

The MAP_FORWARD_SHORT_MESSAGE (FSM), in the following Call Flow examples is used to carry a text message (short message) being transmitted from the mobile handset of one subscriber to the mobile handset of another subscriber. In practice, the short message is delivered first to the Short Message Service Center (SMSC) of the sending subscriber. The SMSC is then responsible for sending the short message to the intended recipient.

Successful Delivery of Mobile Originated FSM from Contract/Postpaid Subscriber

Refer to Figure 2-7 for the steps in the flow for this call.

Figure 2-7. Successful Delivery of MO_FSM from Contract Subscriber



1. The Gateway Mobile Switching Center (GMSC) sends the Mobile Originated Forward Short Message (MO_FSM) to the EAGLE 5 ISS with PPSMS (TC BEGIN).

   Based on MTP DPC = EAGLE 5 ISS's point code and SCCP CdPA TT, NP, NAI, SSN, and GTI, the message is pre-selected for PPSMS service. If service is not PPSMS, the message falls through to GTT.)

   Next, the MAP OpCode and SCCP CgPA GTA are examined. The OpCode is MO_FSM and the CgPA GTA is not from one of the IN platforms, therefore, PPSMS processing continues. (If the OpCode is not MO_FSM, or if CgPA GTA is for one of the IN platforms, the message falls through to GTT.)

   The EAGLE 5 ISS queries the DB using the sender's MSISDN from the OA field in the MAP portion of message.

   MSISDN is present in the database, but "Portability Type" is neither *prepaid1* nor *prepaid2*, meaning the sender is not a prepaid subscriber.

2. The EAGLE 5 ISS therefore GTT-routes the MO_FSM to the SMSC (TC BEGIN).

3. The SMSC returns the MO_FSM_ack (TC END).

4. One of two possibilities:

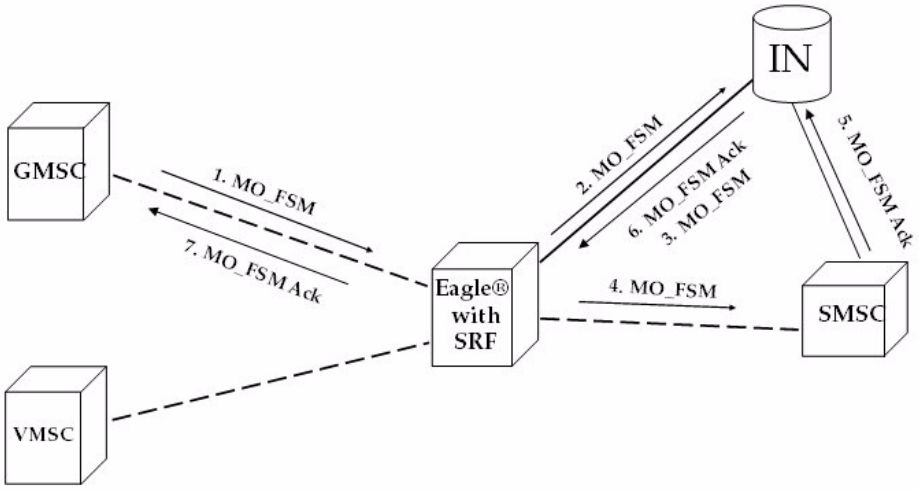
   a. The SMSC sends the MO_FSM_ack route-on-SSN to the GMSC, then the SRF will simply MTP route the MO_FSM_ack to the GMSC. G-Port is not involved.

   b. The SMSC sends the MO_FSM_ack route-on-GT, and the service selectors indicate G-Port/PPSMS. CdPA SSN = GMSC, which is same as SMSC, so PPSMS is selected. As PPSMS decodes message, it discovers it is a TC END. Therefore, the message falls through to normal GTT and is routed to the GMSC.

Successful Delivery of Mobile Originated FSM from Prepaid Subscriber

Refer to Figure 2-8 for the steps in the flow for this call.

Figure 2-8. Successful Delivery of Mobile Originated FSM from Prepaid Subscriber



1. The Gateway Mobile Switching Center (GMSC) sends the Mobile Originated Forward Short Message (MO_FSM) to the EAGLE 5 ISS with PPSMS (TC BEGIN).

   Based on MTP DPC = EAGLE 5 ISS's point code and SCCP CdPA TT, NP, NAI, SSN, and GTI, the message is pre-selected for PPSMS service. If service is not PPSMS, the message falls through to GTT).

   Next, the MAP OpCode and SCCP CgPA GTA are examined. The OpCode is MO_FSM and the CgPA GTA is not from one of the IN platforms, therefore, PPSMS processing continues. (If OpCode is not MO_FSM, or if CgPA GTA is for one of the IN platforms, the message falls through to GTT).

   The EAGLE 5 ISS queries the DB using sender's MSISDN from SM RP OA field in MAP portion of message.

   MSISDN is present in the database, and the "Portability Type" is *prepaid1*, meaning the sender is a prepaid subscriber.

2. The EAGLE 5 ISS forwards the MO_FSM to the IN Platform (TC BEGIN) associated with "prepaid1", after checking mated application or mated relay node table.

   NOTE: The Portability Types *prepaid1* and *prepaid2* are used to select which of the two IN platforms the message should be sent. *prepaid1* indicates one and *prepaid2* the other.

3. The IN Platform checks the account, finds there is enough credit to send the message, opens a new TCAP dialogue, and returns the MO_FSM to the SRF (TC BEGIN-2).

4. The message arrives at EAGLE 5 ISS and is again selected for PPSMS service based on CdPA TT, NP, NAI, GTI, and CdPA SSN = SMSC. The OpCode is MO_FSM but the SCCP CgPA GTA is IN platform, therefore, PPSMS service is not indicated and the message falls through to GTT and is routed to the SMSC.

5. The SMSC returns the MO_FSM_ack to the IN platform (TC END-2). There are two possibilities:

   a. The SMSC sends the MO_FSM_ack route-on-SSN to the IN platform, then the SRF will simply MTP route the MO_FSM_ack to the IN platform. G-Port is not involved.

   b. The SMSC sends the MO_FSM_ack route-on-GT, and the service selectors indicate G-Port/PPSMS. CdPA SSN = GMSC, which is same as SMSC, so PPSMS is selected. As PPSMS decodes the message, it discovers it is a TC END. Therefore, the message falls through to normal GTT and is routed to the GMSC.

6. The IN Platform transfers the MO_FSM_ack to the first transaction and returns the MO_FSM_ack to the SRF (TC END).

7. One of two possibilities:

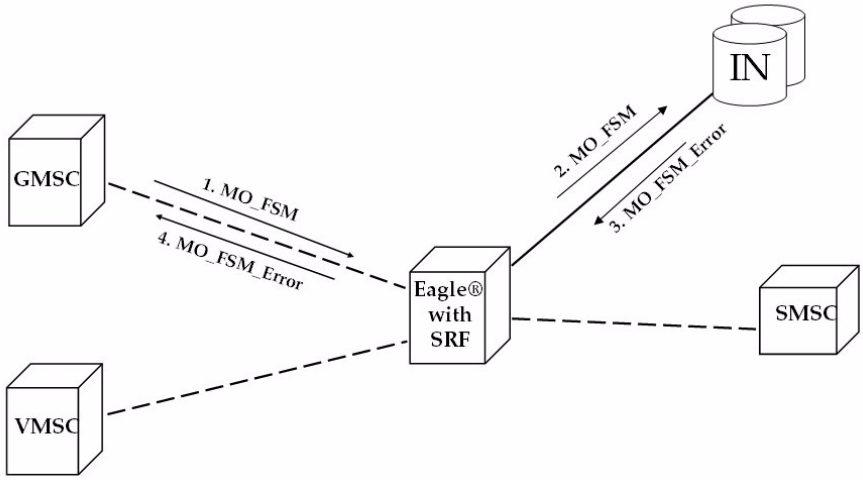
   a. The IN platform sends the MO_FSM_ack route-on-SSN to the GMSC, then the SRF will simply MTP route the MO_FSM_ack to the GMSC. G-Port is not involved.

   b. The IN platform sends the MO_FSM_ack route-on-GT, and the service selectors indicate G-Port/PPSMS. CdPA SSN = GMSC, which is same as SMSC, so PPSMS is selected. PPSMS decodes message, discovers it is a TC END, and the message falls through to normal GTT and is routed to the GMSC.

Unsuccessful Delivery of Mobile Originated FSM from Prepaid Subscriber - Credit Check Failure

Refer to Figure 2-9 for the steps in the flow for this call.

Figure 2-9. Unsuccessful Delivery of Mobile Originated FSM from Prepaid Subscriber at SCP



1. The Gateway Mobile Switching Center (GMSC) sends the Mobile Originated Forward Short Message (MO_FSM) to the EAGLE 5 ISS with PPSMS (TC BEGIN).

   Based on MTP DPC = EAGLE 5 ISS's point code and SCCP CdPA TT, NP, NAI, and GTI, the message is pre-selected for PPSMS service. If service is not PPSMS, the message falls through to GTT).

   Next, the MAP OpCode and SCCP CgPA GTA are examined. The OpCode is MO_FSM and the CgPA GTA is not from one of the IN platforms, therefore, PPSMS processing continues. (If the OpCode is not MO_FSM, or if CgPA GTA is for one of the IN platforms, the message falls through to GTT).

   The EAGLE 5 ISS queries the DB using sender's MSISDN from the SM RP OA field in the MAP portion of message.

   MSISDN is present in the database, and the "Portability Type" is *prepaid1*, meaning the sender is a prepaid subscriber.

2. The EAGLE 5 ISS forwards the MO_FSM to the IN Platform (TC BEGIN) associated with *prepaid1*.

   NOTE: The Portability Types *prepaid1* and *prepaid2* are used to select which of the two IN platforms the message should be sent to. *prepaid1* indicates one and *prepaid2* the other.

3. The IN Platform checks the account, finds there is not enough credit to send the message, and rejects the message by returning a MO_FSM_Neg_Response to the SRF (TC END).

4. One of two possibilities:

   a. The IN platform sends the MO_FSM_Neg_Response route-on-SSN, then the SRF will simply MTP route the MO_FSM_Neg_Response to the GMSC. G-Port is not involved.

   b. The IN platform sends the MO_FSM_Neg_Response route-on-GT, and the service selectors indicate G-Port/PPSMS. CdPA SSN = GMSC, which is same as SMSC, so PPSMS service is selected. PPSMS decodes message, discovers it is a TC END, and the message falls through to normal GTT and is routed to the GMSC.

Portability Check for Mobile Originated SMS

Refer to the following steps in the flow for this call.

The EAGLE 5 ISS will perform following with respect to MNP SMS Feature functionality.

1. The EAGLE 5 ISS receives an UDT message and checks if the service selector matches G-Port, if so continue on to Step 2, If the service selector is not G-Port, the message falls through to GTT.

2. The EAGLE 5 ISS performs CdPA SSN discrimination. CdPA SSN = SMSC, PPSMS service is selected. (If CdPA SSN is HLR, G-Port MNP service is selected. If SSN is neither SMSC nor HLR, the message falls through to GTT.)

3. Next the MAP OpCode is examined. If the OpCode is MO_FSM, PPSMS processing continues. (If the OpCode is not MO_FSM, the message falls through to GTT.)

4. If The PPSMS feature is ON and the message is from one of the IN Platforms (PPSMS Servers), the message exists from MNP SMS feature functionality and falls through to PPSMS processing. If not, MNP SMS processing continues with Step 5.

5. If the MNP SMS feature is ON, the MSISDN number is used to search the G-Port Mobile Number Portability database. If the MNP SMS feature is not ON, the message falls through to GTT.

6. If the MSISDN Number is found in the PDB/DN table, then the portability type of the subscriber is checked for *Ported-out/ Not Known/ FNPTFN* and processing continues. If the MSISDN Number is not found in the PDB/DN table, the message falls through to GTT. If the portability type is *Prepaid-1/Prepaid-2* the message falls through to GTT.

7. The SCCP CdPA Addressis used to search the list of "home network" SMSC addresses. If a match is found, the ported-out subscriber is fraudulently attempting to send SMS using the old network's SMSC. The message is discarded, UIM #1129 is issued, and an error message is generated and returned to the originating MSC. If the message is not on the list, the message falls through to GTT.

8. The message will be discarded, Print an UIM #1129 and an error message is generated and returned to the originating MSC. The message exists from MNP SMS feature functionality.

9. It's a fall through case. Exit from MNP SMS feature functionality and continue with Normal GTT processing.

10. If the message is from one of the IN Platforms (PPSMS Servers), The message exists from MNP SMS feature functionality and falls through to PPSMS processing. If the message is not from one of the PPSMS Servers processing continues with step 13

11. The originating subscriber's Mobile Subscriber Integrated Services Digital Network (MSISDN) number (i.e. phone number) will be used to search the G-Port Mobile Number Portability database. If MSISDN Number is found in the PDB / DN table, then continue on to Step 12. Otherwise, exit from MNP SMS feature functionality and continue with Normal GTT processing..

12. Check the portability type of the subscriber, If it matches "Prepaid1/Prepaid2" go on to Step 16 else continue with Step 13.

13. If the subscriber portability type is "Ported out / FNPTFN/ Not Known" and MNP SMS feature is also ON, then go to Step 7. Otherwise, exit from MNP SMS feature functionality and continue with Normal GTT processing.

14. Exit from MNP SMS feature functionality and Continue with existing processing for other services or GTT.

15. Exit from MNP SMS feature functionality and Continue with existing processing for GPORT.

16. Exit from MNP SMS feature functionality and Continue with existing processing for PPSMS.

17. Exit from MNP SMS feature functionality.

IS-41 to GSM Migration Call Flows

For GSM Migration in general, the following types of subscribers are identified:

- **Non-Migrated** (PT = none) - These are IS-41 subscribers who have not yet migrated to GSM.
- **Migrated with One Handset** (PT = 5) - These subscriber have migrated from IS-41 to GSM, but maintain only a single GSM handset. This category also includes new subscribers who sign up for GSM service only and have only one handset, but are given a number from the existing IS-41 number range.
- **GSM Only** (PT = none) - These are new subscribers who sign up for GSM service only, have only one handset, and are given a number from a new "GSM only" number range.

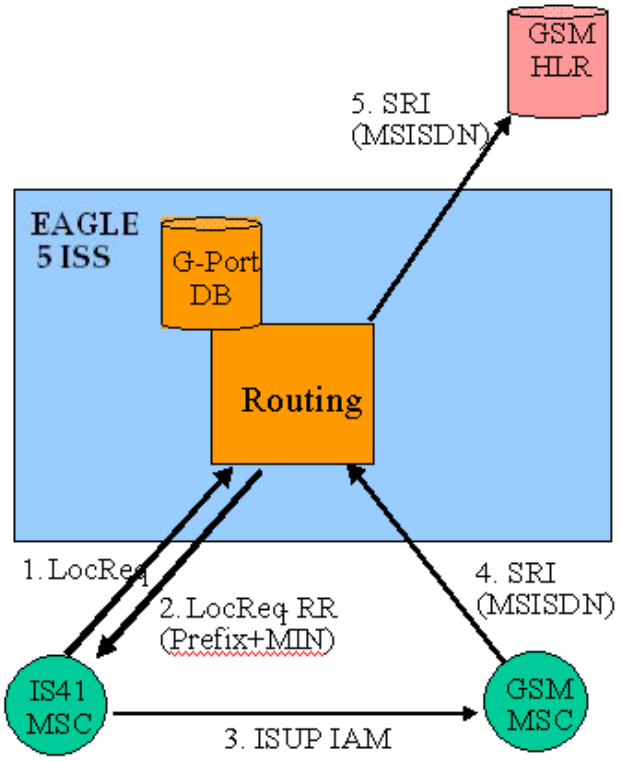
This feature is only applicable to those that have migrated from IS-41 to GSM and retained an *IS-41 number*, or those who are GSM only, but were given an *IS-41 number*. Calls received for Non-Migrated subscribers result in no-match in the GSM Migration database, then fall through to GTT, and routed via normal SCCP routing procedures. It is possible to provision Non-Migrated subscribers in the GSM Migration database using standard G-Flex functionality to route messages for these subscribers instead of GTT.

Call Originated from IS-41 MSC for Migrated Subscriber

A call is received in the IS-41 network for a PT = 5 subscriber that has migrated to GSM and retained their IS-41 phone number (or is a new GSM subscriber with a number from the IS-41 range).

Refer to Figure 2-10 for the steps in the flow for this call.

Figure 2-10. Call From IS-41 MSC for Migrated or GSM-Only Subscriber



1. When the IS-41 MSC receives the ISUP IAM, it sends a LocationRequest to the IS-41 HLR via the EAGLE 5 ISS. The EAGLE 5 ISS then selects the message for G-Port service. The EAGLE 5 ISS Service Selectors are provisioned such that SNP for this message is E.164. Thus, G-Port uses the MIN number in the SCCP CdPA as an MSISDN to search the G-Port DB. This search indicates that this is a migrated subscriber with only a GSM handset.

2. Since the message is an IS-41 message, and the sub is GSM only, the EAGLE 5 ISS forms a LocationRequest - Return Result message and sends it to the IS-41 MSC using a special prefix added to the DN as the routing number. This prefix will be provisioned by the customer. The EAGLE 5 ISS switches the SCCP CdPA and CgPA information before sending the message so that the message appears to have come from the IS-41 HLR, not the EAGLE 5 ISS.

3. The special prefix causes the IS-41 MSC to route the ISUP IAM to a GSM MSC, after removing the prefix from the SCCP CdPA.

4. The GSM MSC sends a SendRoutingInformation message to the GSM HLR via the EAGLE 5 ISS.

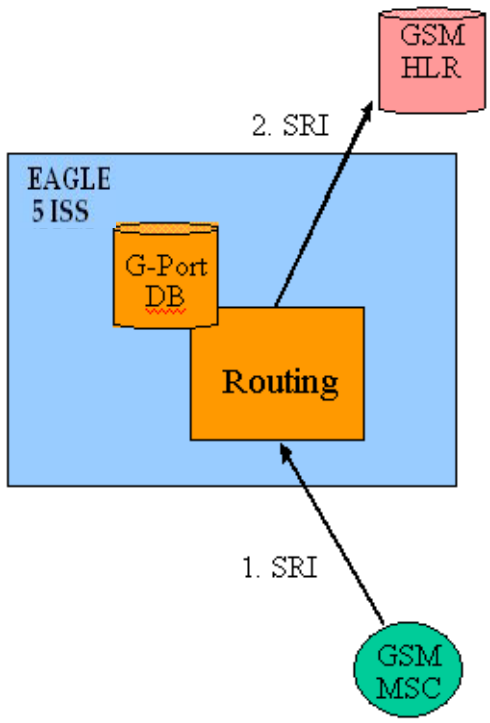
5. EAGLE 5 ISS receives SRI message and selects it for G-Port service. EAGLE 5 ISS's Service Selectors are provisioned such that SNP for this message is E.164. Thus, G-Port uses the MSISDN number in the SCCP CdPA as an MSISDN to search the G-Port DB. This search indicates that this is a migrated subscriber with only a GSM handset. Since this is a GSM message and the subscriber has only a GSM handset, the EAGLE 5 ISS relays message to the GSM HLR using the translation data in the G-Port DB.

Call Originated from GSM MSC for Migrated Subscriber

A call is received in the GSM network for a PT = 5 subscriber that has migrated to GSM (or is a new GSM subscriber with an IS-41 number).

Refer to Figure 2-11 for the steps in the flow for this call.

Figure 2-11. Call from GSM MSC for Migrated or GSM-only Subscriber



1. When the GSM MSC receives the ISUP IAM, it sends a SendRoutingInfo message to the GSM HLR via the EAGLE 5 ISS. EAGLE 5 ISS selects message for G-Port service. EAGLE 5 ISS's Service Selectors are provisioned such that SNP for this message is E.164. Thus, G-Port uses the MSISDN number in the SCCP CdPA as an MSISDN to search the G-Port DB. This search indicates that this is a migrated subscriber with only a GSM handset.

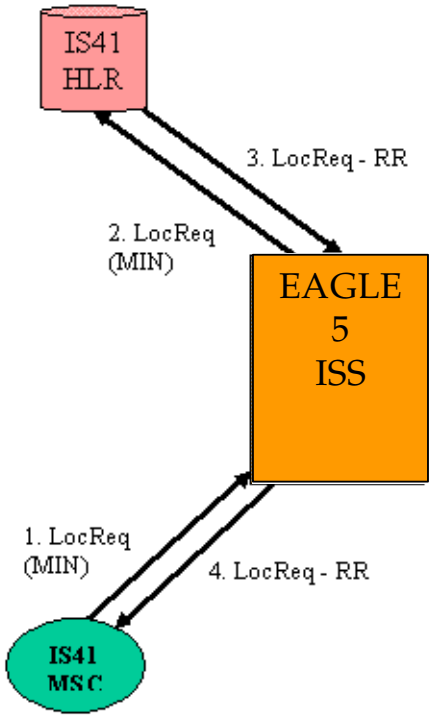
2. Since the message is a GSM message, and the subscriber is GSM-only, the EAGLE 5 ISS routes the message to the GSM HLR, using the translation information from G-Port DB.

Call Originated from IS-41 MSC for Non-Migrated Subscriber

In this description, a call is received in the IS-41 network for a subscriber that has not migrated to GSM.

Refer to Figure 2-12 for the steps in the flow for this call.

Figure 2-12. Call from IS-41 MSC for Non-Migrated Subscriber



1. When the IS-41 MSC receives the ISUP IAM, it sends a LocationRequest message to the IS-41 HLR via the EAGLE 5 ISS. EAGLE 5 ISS uses the MIN number in the SCCP CdPA as an MSISDN to search the G-Port DB. This search results in either: (1) A match in DB with migration type (portability type) of "none", and a translation to the IS-41 HLR, or (2) No match in DB, which will cause message to fall through to GTT.

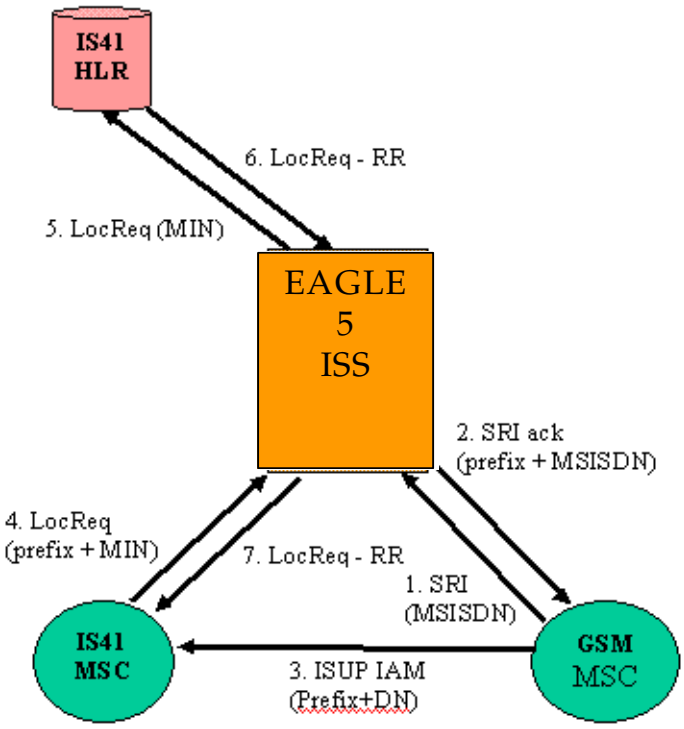
2. In either case, since the message is an IS-41 message, and the subscriber is IS-41-only, the EAGLE 5 ISS routes the message to the IS-41HLR, using either the IS-41HLR translation information from G-Port DB, or the standard GTT translation.

Call Originated from GSM MSC for Non-Migrated (IS-41 only) Subscriber

In this case, a call is received in the GSM network for a IS-41only subscriber that is not migrated to GSM.

Refer to Figure 2-13 for the steps in the flow for this call.

Figure 2-13. Call from GSM MSC for Non-Migrated IS-41-only Subscriber



NOTE: This call flow requires non-migrated subscribers to be provisioned in the GSM Migration/G-Port DB with an association to an RN which corresponds to the IS-41HLR):

1. When the GSM MSC receives the ISUP IAM, it sends a SendRoutingInfo message to the GSM HLR via the EAGLE 5 ISS. The EAGLE 5 ISS selects message for G-Port service. The EAGLE 5 ISS's Service Selectors are provisioned such that SNP for this message is E.164. Thus, G-Port uses the MSISDN number in the SCCP CdPA as an MSISDN to search the G-Port DB. This search results in a match that indicates this is a non-migrated subscriber (portability type = "none") with only an IS-41 handset.

2. Since the message is SRI, and the IS-41 number is stored in the DB with an RN translation containing the Migration Prefix digits, the EAGLE 5 ISS returns an SRI-ack with the Migration Prefix as the routing number (this is standard G-Port operation).

3. The GSM MSC uses the routing prefix information returned in the SRI-ack to route the ISUP to the IS-41 network.

4. When the IS-41 MSC receives the ISUP IAM, it sends a LocationRequest message to the IS-41HLR via the EAGLE 5 ISS. EAGLE 5 ISS uses the MIN number in the SCCP CdPA as an MSISDN to search the G-Port DB. This search results a match in DB with migration type (portability type) of "none", and a RN translation to the IS-41HLR.

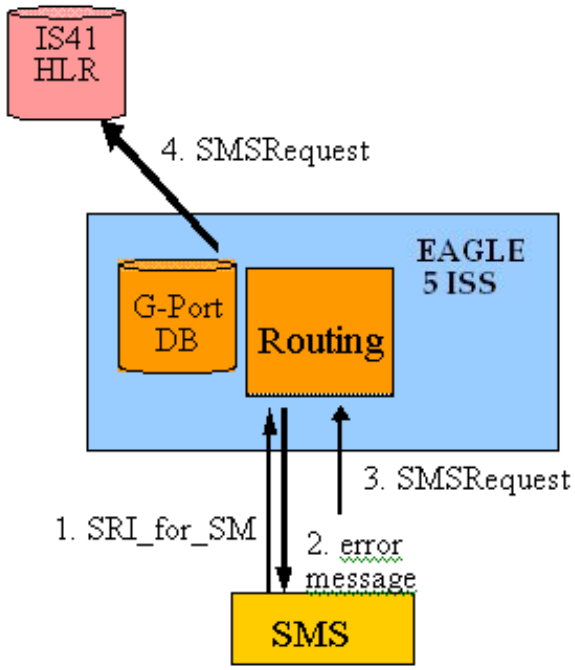
5. Therefore, EAGLE 5 ISS message relays the LocReq to the IS-41HLR based on the PC/SSN information contained in the DB. This is also standard G-Port operation.

MT SMS Delivery for Non-Migrated IS-41 Subscriber: SRI-for-SM First

This case involves delivery of an SMS for a subscriber that has not migrated to the GSM network.

Refer to Figure 2-14 for the steps in the flow for this call.

Figure 2-14. SMS for Non-Migrated IS-41 Subscriber



1. The SMSC sends a SRI_SM to the GSM HLR via the EAGLE 5 ISS. EAGLE 5 ISS selects the message for G-Port service. EAGLE 5 ISS's Service Selectors are provisioned such that SNP for this message is E.164. Thus, G-Port uses the MSISDN number in the SCCP CdPA as an MSISDN to search the G-Port DB. This search results in either 1 of 2 possibilities: The first possibility is a no match in the DB (if non-migrated subs are not provisioned in DB). In this case, the message falls through to GTT. The GTT DB search would result in no match for this case (GTT tables for GSM TTs do not contain IS-41 only subs). The second possibility is a match is found in the DB (if both migrated and non-migrated subs are provisioned) with an RN translation to an ANSI Point Code for the IS-41HLR, and a portability type of 0: "not known to be ported".

2. In the case of no match in G-Port DB, and no match in GTT DB, the EAGLE 5 ISS returns a UDTS error message to the SMSC per normal SCCP error handling. In the case a match is found with RN translation to the IS-41 HLR and portability type = 0, the EAGLE 5 ISS returns a GSM SRI-for-SM error response with User Error = localValue 1 - "Unknown Subscriber".

3. The SMSC is programmed to formulate an IS-41 SMSRequest and send it to the IS-41 HLR via the EAGLE 5 ISS upon receiving the error message in 2.

4. EAGLE 5 ISS checks the migration DB. Since this is an IS-41 SMSRequest, and subscriber is not migrated, EAGLE 5 ISS relays the message to the IS-41 HLR, either by using an RN translation in the DB (if non-migrated subs are provisioned), or otherwise by GTT (if they are not provisioned).

MT SMS Delivery for Non-Migrated IS-41 Subscriber: SMSRequest First

This case is the same as *MT SMS Delivery for Non-Migrated IS-41 Subscriber: SRI-for-SM First* except the IS-41 SMSRequest is sent first instead of the GSM SRI-for-SM. Therefore, only steps 3 and 4 in the call flow of Figure 2-14 are performed: SMSRequest is received, the EAGLE 5 ISS checks migration DB, and, since subscriber is not migrated, relays the message to the IS-41 HLR based on G-Port translation data (if present) or GTT otherwise.

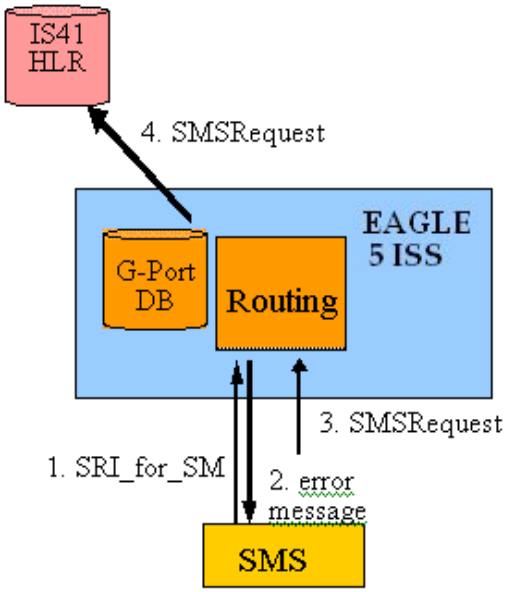
Refer to Figure 2-14 for the steps in the flow for this call.

MT SMS Delivery for Migrated or New GSM only Subscriber: SRI-for-SM First

This case involves delivery of an SMS for a subscriber that has migrated to the GSM network and retained their IS-41 phone number, or is a new GSM subscriber with a number from the IS-41 range, or is a new GSM subscriber with a number from the GSM-only range.

Refer to Figure 2-15 for the steps in the flow for this call.

Figure 2-15. SMS for Migrated/New GSM Subscriber



1. The SMSC sends a SRI_SM to the GSM HLR via the EAGLE 5 ISS. The EAGLE 5 ISS selects the message for G-Port service. The EAGLE 5 ISS's Service Selectors provisioned such that SNP for this message is E.164. Thus, G-Port uses the MSISDN number in the SCCP CdPA as an MSISDN to search the G-Port DB. Either this search results in a G-Port DB match (migrated/new sub with IS-41 number), or a no match in G-Port (new sub with GSM number). If the G-Port DB results in no match, the GTT DB is searched, and a match will be found here (since the message contains a GSM TT and the sub is GSM).

2. In either case, since this is a GSM message and a GSM-only sub, the EAGLE 5 ISS relays the SRI_SM to the GSM HLR. If the match was found in G-Port, the G-Port translation data is used. Otherwise, GTT translation data is used.

MT SMS Delivery for Migrated or New GSM only Subscriber: SMSRequest First

This call flow is similar to that shown in Figure 2-15, except the SMSRequest is delivered first. Steps are as follows:

1. IS-41 SMSRequest is received by EAGLE 5 ISS. The EAGLE 5 ISS searched migration DB, and finds a match with subscriber type = 5: "migrated".

2. Since this is an IS-41 message, and the subscriber is migrated, the EAGLE 5 ISS returns a SMSRequest Return Result error response to the SMSC with SMS_Access Denied Reason = local value 5 - "Reserved value, treat as Denied"

3. The SMSC is programmed to formulate a GSM SRI-for-SM and send it to the GSM HLR via the EAGLE 5 ISS upon receiving the error message.

4. The EAGLE 5 ISS checks the migration DB. Since this is an GSM SRI-for-SM, and the subscriber is migrated, the EAGLE 5 ISS relays the message to the GSM HLR, based on the translation data in the G-Port DB.

ISUP NP with EPAP Call Flows

In a service provider network, the calls from certain subscribers (prepaid subscribers) are routed to the Service Node(s) that provide the rating engine or routing functionality. To apply charges, besides other factors (rate plan, date and time of call etc.), the rating engine needs to know if the calling and the called number are associated with the service provider's own network or they have been ported out.

The EAGLE 5 ISS provides the "ISUP NP With EPAP" treatments to the ISUP IAM messages that meet certain gateway screening criteria using the existing Gateway Screening feature. The Gateway Screening feature allows SS7 messages to be selected for the ISUP NP With EPAP treatments, minimally, based on

- OPC

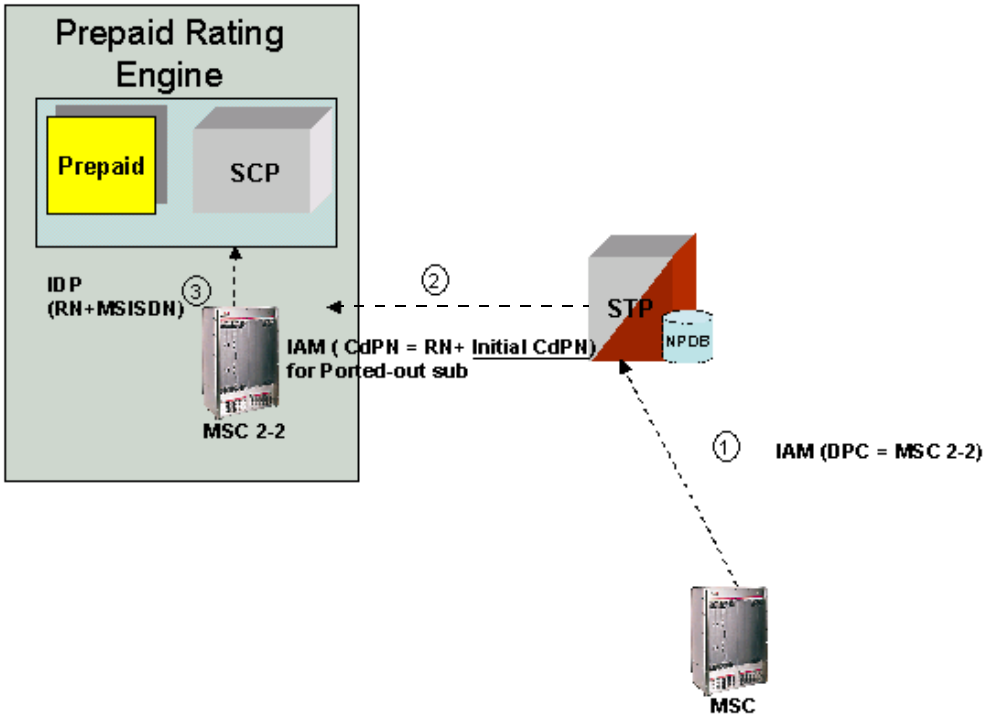
- DPC
- SIO
- ISUP message type

For the selected ISUP messages, the EAGLE 5 ISS performs NPDB lookup based on ISUP IAM CdPN (the B-number). If CdPN is a ported out number, the EAGLE 5 ISS relays the IAM message with CdPN=RN + Initial CdPN. If the CdPN is a ported-in or never been ported subscriber, the EAGLE 5 ISS prepends a SubNet prefix that identifies the SubNet to which the CdPN belongs within the operator network, to the CdPN of the IAM message before relaying the message to its destination. For any other types of CdPN, the EAGLE 5 ISS relays the IAM message without modifications. The descriptions of the detail call flows for these three different call scenarios are included in the following paragraphs.

For Ported out Subscribers

Refer to Figure 2-16 for a pictorial description of this call flow.

Figure 2-16. ISUP NP With EPAP Call Flow for Ported Out CdPN



1. MSC sends the IAM message to its destination via the EAGLE 5 ISS.

2. The EAGLE 5 ISS intercepts the IAM message and determines if a NPDB look-up is required. The NPDB lookup is performed if the IAM message passes the Gateway Screening and the prefix specified for number deletion (as part of number conditioning) is found in the CdPN. If a lookup is required,

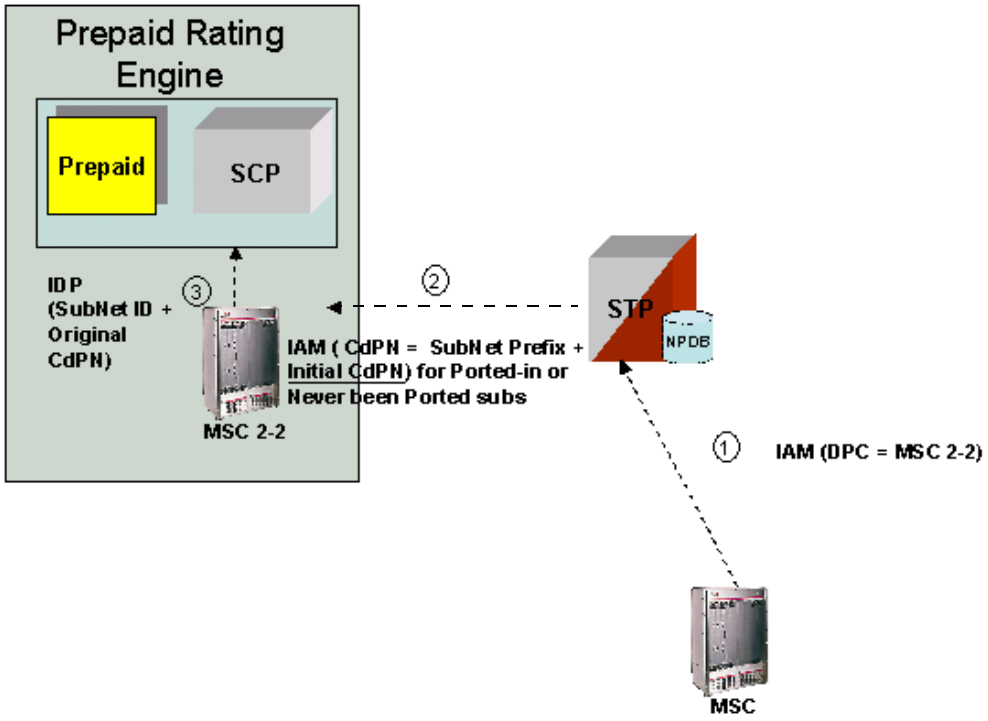
the EAGLE 5 ISS then performs Number Conditioning by stripping the prefix defined for number deletion and appending the country code, if specified, to the CdPN. The NPDB lookup is based on the country code + CdPN (without the prefix specified for number deletion). If the DN is identified in the NPDB as a ported out number the EAGLE 5 ISS routes IAM (CdPN = RN + Initial CdPN).

3. MSC2-2 forwards an IDP (RN + Initial CdPN) to its destination.

For Ported-In and Never Ported Subscribers

Refer to Figure 2-17 for a pictorial description of this call flow.

Figure 2-17. ISUP NP With EPAP Call Flow for Ported-in/Never Ported CdPN



1. MSC sends the IAM message to its destination via the EAGLE 5 ISS.

2. The EAGLE 5 ISS intercepts the IAM message and determines if a NPDB look-up is required. The NPDB lookup is performed if the IAM message passes the Gateway Screening and the prefix specified for number deletion (as part of number conditioning) is found in the CdPN. If a lookup is required, the EAGLE 5 ISS then performs Number Conditioning by stripping the prefix defined for number deletion and appending the country code, if specified, to the CdPN. The NPDB lookup is based on the country code + CdPN (without the prefix specified for number deletion). The NPDB lookup identifies the CdPN as a ported-in number or never been ported DN (the DN is within the

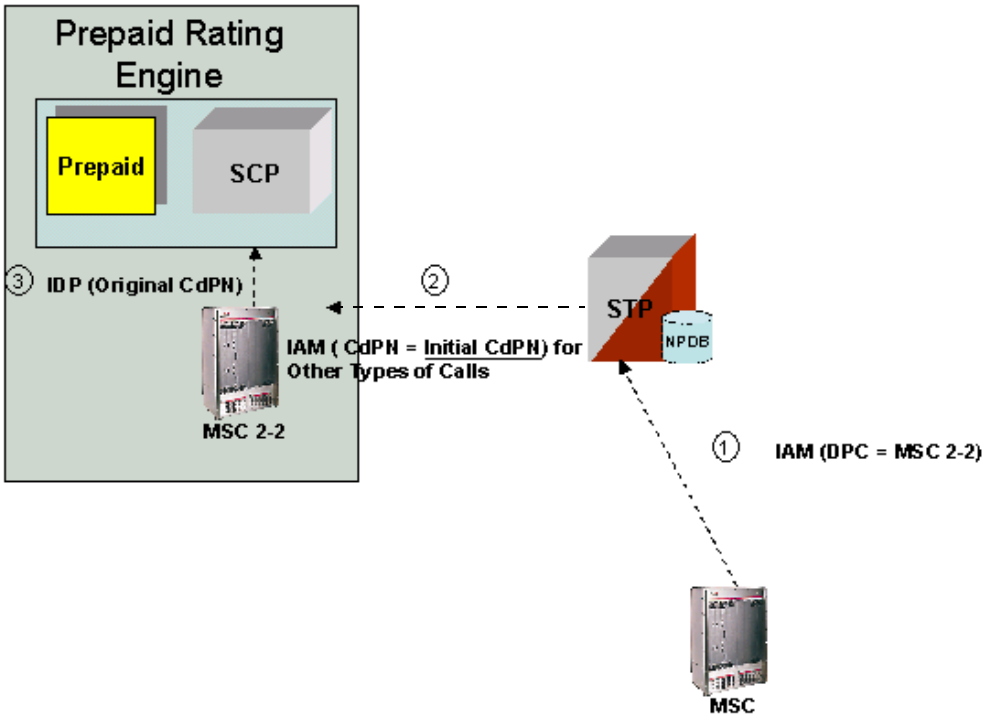
operator's DN ranges and the DN has never been ported). The EAGLE 5 ISS performs SubNet ID Lookup to locate the SubNet Number. The SubNet ID lookup is based on the entity address pointed to by the SP that is associated with the DN (where DN=CdPN) or associated with a range of DNs (this assumes that all range DNs for each HLR are provisioned with an SP in the NPDB). Once the SubNet Number is identified, the EAGLE 5 ISS looks up the SubNet Prefix table to identify the prefix for the SubNet. The EAGLE 5 ISS prepends the SubNet prefix, associated with the SubNet No, to CdPN. The EAGLE 5 ISS routes IAM (CdPN = SubNet prefix + Initial CdPN).

3. MSC2-2 forwards an IDP (SubNet ID + Initial CdPN) to its destination.

For all other scenarios (including non-FET subscribers, international calls and short code calls)

Please refer to Figure 2-18 for a pictorial description of this call flow.

Figure 2-18. ISUP NP With EPAP for All Other Cases



1. The MSC sends the IAM message to its destination via the EAGLE 5 ISS.

2. The EAGLE 5 ISS performs the NPDB lookup and the CdPN is not found in the NPDB. The EAGLE 5 ISS routes IAM (CdPN = Initial CdPN).

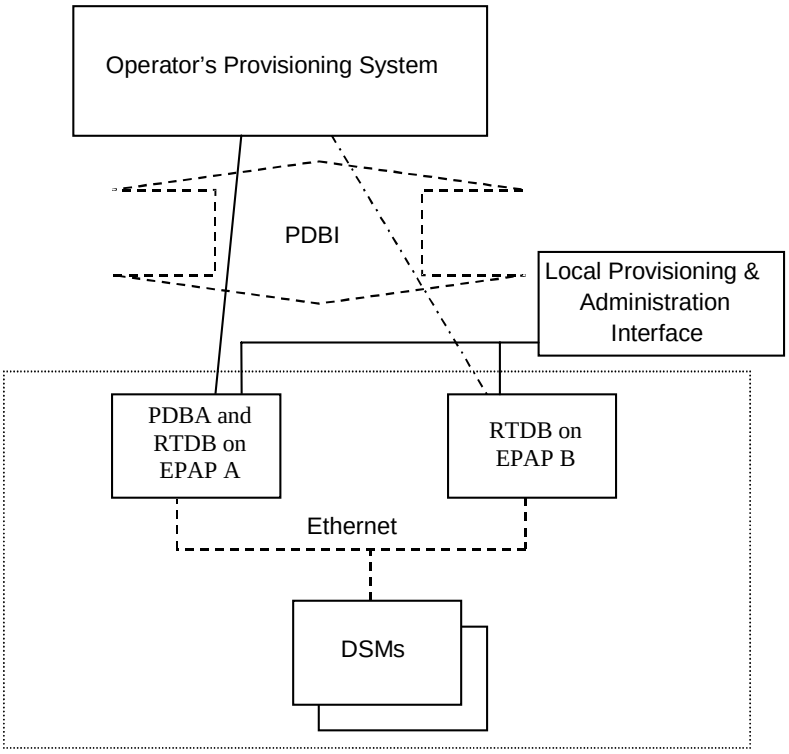
3. MSC2-2 forwards an IDP (Initial CdPN) to its destination.

Subscriber Data Provisioning

Figure 2-19 shows the current high-level view of the subscriber data provisioning architecture that used for G-Port. Only those parts of the EAGLE 5 ISS platform that are relevant to subscriber data provisioning are shown. This section defines requirements for the PDBI (Provisioning Database Interface) between the G-Port and the operator's provisioning system (OPS).

The PDBI is used only for real-time provisioning of subscriber and network entity data. Refer to the *Provisioning Database Interface Manual* for more details about the G-Port PDBI.

Figure 2-19. Subscriber Data Provisioning Architecture (High Level)



A pair of active/standby EPAP (Eagle Provisioning Application Processors) servers provides the interface between the Realtime Database (RTDB) of the EAGLE 5 ISS DSM (Database Service Modules) cards and the OPS (Operator Provisioning System). EPAP A is equipped with both the PDB (Provisioning Database) and the RTDB database, and EPAP B has just the RTDB. An EPAP with just the RTDB must be updated by the EPAP that has the PDB. The EPAP uses the Multi-Purpose Server (MPS) hardware.

For more information about the EPAP, refer to the *EPAP Administration Manual*. For more information about the MPS hardware, refer to the *MPS Hardware Manual*.

Database Overview

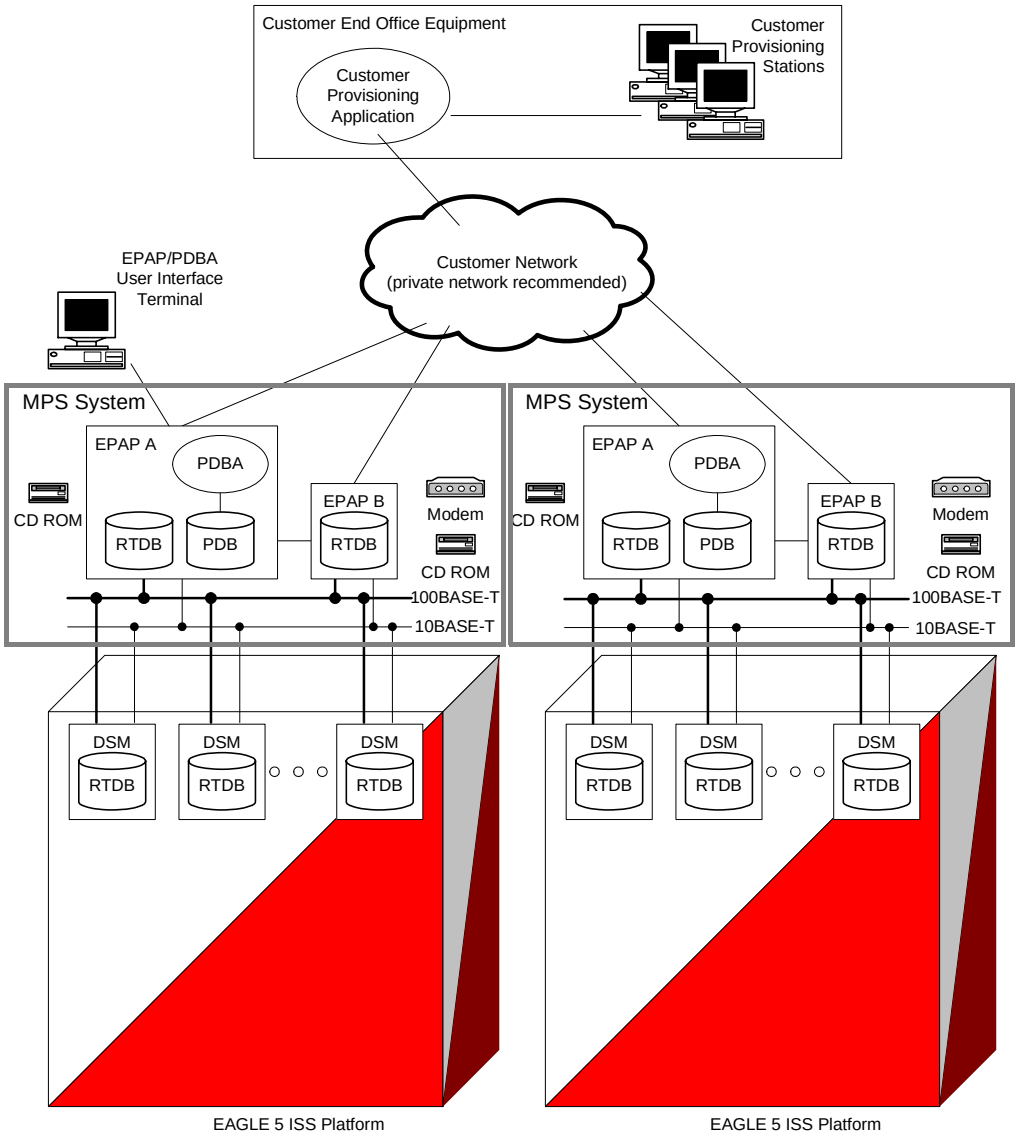
This section describes, at a high level, the distributed administrative architecture for the EAGLE 5 ISS, which includes the G-Port administrative solution.

In general, STP database updates are sent via an EAGLE 5 ISS terminal across an RS232 serial port to the active OAM (Operation Administration and Maintenance). The active OAM commits the update to TDM fixed disk and then sends the update control information to the standby OAM and to the rest of the network cards. When all databases are updated, the active OAM responds with a *Command Completed* indication to the user terminal. STP database updates are generally considered to be EAGLE 5 ISS link, linkset, route, destination, mated application, gateway screening, and global title types of information.

Typically, large databases requiring much faster update and retrieval rates (compared to the rates provided by the OAM) are not administered via EAGLE 5 ISS terminals. These databases, such as G-Port, are populated using redundant Ethernet connections to DSM cards from an EPAP MPS platform.

An EPAP consists of a combined Provisioning database (Versant) and RTDB database, as shown in Figure 2-20. The PDB responds to requests for updates by the active and standby RTDB databases on both mated EAGLE 5 ISSs. The active EPAP RTDB database is responsible for initiating multicast updates of changed database records to the DSM cards after the data has been committed to the EPAP disks. Furthermore, the PDB may accept and commit to more database updates while the RTDB databases are completing their previous updates.

Figure 2-20. MPS/EPAP Platforms for Provisioning G-Port



It is this overlapping of database updates, coupled with an RTDB transactional database engine and fast download time, that allows larger amounts of data at a time from the PDB. Committing larger amounts of data at a time to be committed in the RTDB (versus a single update at a time) results in achieving faster overall transaction rates. The boundaries of the transaction rates become more closely related to cache size and disk cache flush time than the disk access time of a single update. Thus, successful completion of EPAP database updates only guarantees that the PDB has been updated, but it does *not* mean the RTDB has already completed the update and sent it to the DSM card.

The EPAP architecture contains a local provisioning terminal and a modem for remote access, as well as other functions. A backup device can be used to backup or restore the Provisioning database. The local provisioning terminal is used to manually repair the standby EPAP RTDB database or to turn the G-Port database audit on or off. For additional information, refer to the *MPS Hardware Manual* and the *EPAP Administration Manual*.

EPAP (EAGLE Provisioning Application Processor)

As shown in Figure 2-20, a single G-Port system contains two EPAP (EAGLE Provisioning Application Processors) servers. At any given time, only one actively communicates with the DSM (Database Service Module) boards. The other EPAP server is in standby mode. In addition, two G-Port systems can be deployed in a mated pair configuration.

The primary purpose of the EPAP systems is to maintain the RTDB and PDB and to download copies of the RTDB to the DSM cards on the EAGLE 5 ISS.

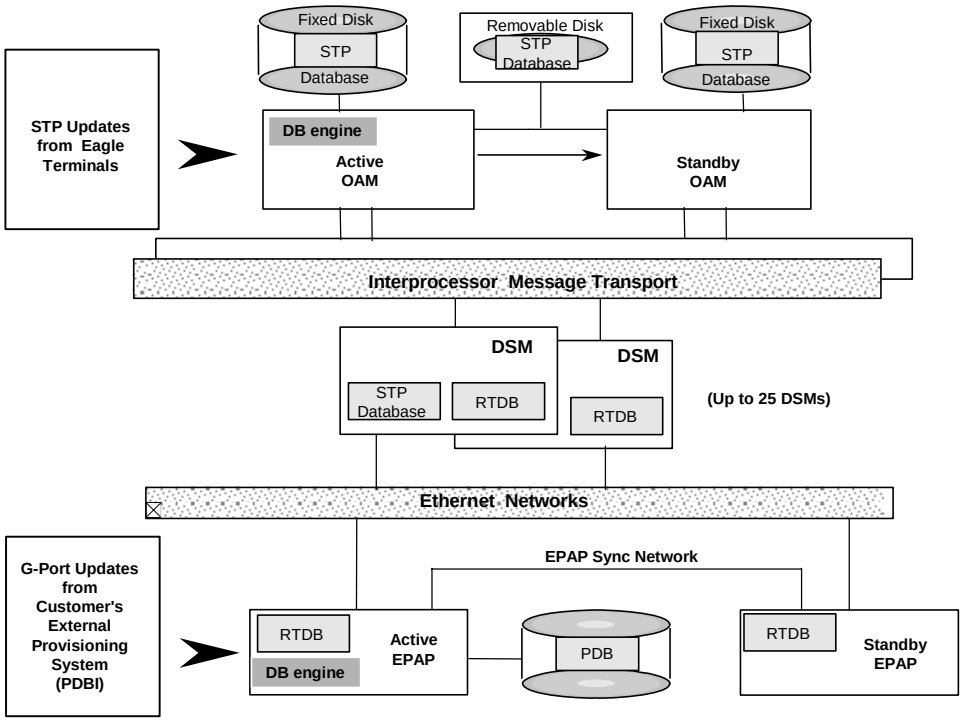
The PDB on the active EPAP receives G-Port data from the customer network through the PDBI, the external source of G-Port provisioning information. The PDBA continually updates the active EPAP's PDB. (The PDB uses Versant database software.) Once an update is applied to the active PDB, it is sent to the RTDBs on the active and standby EPAPs.

Both the active and standby EPAPs maintain copies of the RTDB. Periodically, the DSM card polls the active EPAP RTDB for any new updates. The active EPAP downloads the updates to the DSM for its own resident copy of the RTDB database.

In a mated pair configuration, there are mated EPAP servers that provide two G-Port platforms, as shown in Figure 2-20. The PDB on the active EPAP automatically updates the PDB on the mate platform. The PDB on the mate platform then updates its EPAP RTDBs, which in turn update the RTDBs on the DSM cards.

Provisioning of the EAGLE 5 ISS's DSM cards is performed through two interfaces, using two different sets of commands. Provisioning is accomplished by the STP updates from EAGLE 5 ISS terminals and by the G-Port updates from the customer's external provisioning system. This system of dual provisioning is illustrated in Figure 2-21.

Figure 2-21. Administrative Architecture



DSM (Database Service Module) Cards

The G-Port feature can provision from 1 to 25 DSM cards. DSM cards are related to the TSM family, but differ by having an AMD K-6 processor, from 1 to 4 GB of memory on an applique board, and two Ethernet ports. (Figure 2-20 illustrates each DSM card having two Ethernet links, the main DSM network on the 100BASE-T link and the backup DSM network on the 10BASE-T link.)

The extra memory holds a copy of the RTDB. The DSM Ethernet ports are linked to the EPAP systems to receive the downloaded RTDBs. The DSMs run a version of the SCCP software application that has been ported to the VxWorks OS. To differentiate the DSM-VxWorks-SCCP application from the SCCP that runs on TSM cards, the DSM version is named 'VSCCP'.

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 G-Port 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 loaded, it cannot receive new updates that have arrived at the EPAP since reload began. 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 G-Port 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, G-Port 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.

DSM Provisioning and Reload

One of the core functions of the EPAP is to provision the DSM cards with the G-Port database updates. In order to provide redundancy for this feature, separate RMTP channels are created on each interface from each EPAP:

- EPAP A, Link A (on the main DSM network, 100BASE-T)
- EPAP A, Link B (on the backup DSM network, 10BASE-T)
- EPAP B, Link A (on the main DSM network, 100BASE-T)
- EPAP B, Link B (on the backup DSM network, 10BASE-T)

Provisioning and other data is broadcast on one of these channels to all of the DSM cards. Provisioning is done by database level in order to leave DSM tables coherent between updates.

The DSM cards do the following:

- Detect the need for incremental updates and send a status message to the EPAP.
- Discriminate between the various streams by the database level contained in each message and accept updates according to the DSMs current database level.

DSM Reloading Model

EPAP Continuous Reload

It is important to understand how the EPAP handles reloading of multiple DSMs from different starting points. Reload begins when the first DSM requires it. Records are read sequentially from the real-time database from an arbitrary starting point, wrapping back to the beginning. If another DSM requires reloading at this time, it uses the existing record stream and notifies the DSM provisioning task of the first record it read. This continues until all DSMs are satisfied.

DSM Database Levels and Reloading

The current database level when the reload started is of special importance during reload. When a DSM detects that the last record has been received, it sends a status message back to the EPAP indicating the database level at the start of reload. This action starts incremental loading. The DSM continues to reload until it is completely caught up with the current level of the RTDB. As database records are sent to the DSMs during reload, normal provisioning can *change* those records. All records changed between the start and end of reloading must be incrementally loaded before the database is coherent and usable by the DSM.

The following terminology is used here for the stages of database reload for a given DSM.

- **Stage 1 loading**: The database is being copied record for record from the golden RTDB to the DSM RTDB. The database is incoherent during stage 1 loading.
- **Incremental update**: The database is receiving all of the updates missed during stage 1 loading or some other reason (e.g., network outage, processor limitation, lost communication, etc.). The database is coherent but back level during incremental update.
- **Current**: The database is receiving current updates from the DSM provisioning task.
- **Coherent:** The database is at a whole database level, that is, not currently updating records belonging to a database level.

DSM Reload Requirements

DSM cards may require a complete database reload if there is a reboot or loss of connectivity for a significant amount of time. The EPAP provides a mechanism to quickly load a number of DSM cards with the current database. The RTDB on the EPAP is large and can be updated constantly from the customer's provisioning network. As the RTDB is sent to the DSM cards, it can possibly miss some updates, making it inconsistent as well as back level.

The upload process is divided into two stages, one to sequentially send the initial database records and another to send any updates missed since the beginning of the first stage. The DSM reload stream uses a separate RMTP channel from the provisioning and incremental update streams. This allows DSM multicast hardware to filter out the high volume of reload traffic from DSM cards that do not require it.

DSM cards do the following:

- Detect the need for stage 1 loading and send a status message to the EPAP.
- Identify the first record DSM was able to read in the above status message if a record stream is already in progress.

- Handle the record stream regardless of the starting point (that is, records starting with the middle record of the middle table).
- Expect tables to be sent in a particular order and therefore detect any gap in the record stream.
- Send a status message if a gap is detected. Stage 1 loading is essentially reset to the last update received.
- Handle wrapping from the last record from the last table to the first record of the first table.
- Know when they have received all the required records to proceed to stage 2 loading.
- Send a status message when stage 1 loading is complete, indicating the database level at the beginning of stage 1.
- Detect when the master RTDB crosses a memory boundary during stage 1 loading; the card automatically reboots and then auto-inhibits.

Provisioning Database Interface

Provisioning clients connect to the EPAPs via the Provisioning Database Interface (PDBI). This interface contains commands that allow all of the provisioning and retrieving of G-Port data. For more information, refer to the *Provisioning Database Interface Manual*.

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 device control blocks (DCBs) located on the EAGLE 5 ISS. The DCBs provide the status information you receive when you issue a **`rept-stat-mps`** command.

Network Connections

Several customer- and Tekelec-installed private networks are required to support the G-Port 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 G-Port architecture diagram shown in Figure 2-20, on page 2-34. (For details about configuring these networks, refer to the *EPAP Administration Manual*.)

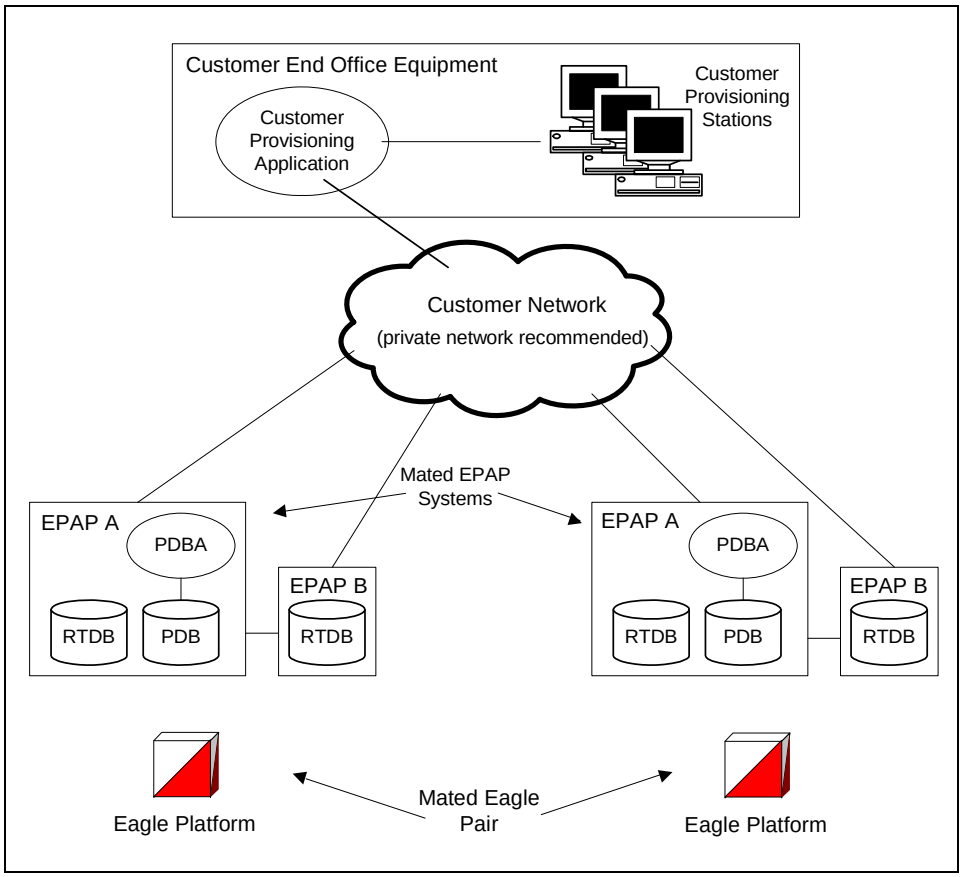
Customer Provisioning Network

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 if a mated EAGLE 5 ISS pair
- Updates between a PDB on one EAGLE 5 ISS and RTDBs on a mated EAGLE 5 ISS
- 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 2-22.

Figure 2-22. Customer Provisioning Network

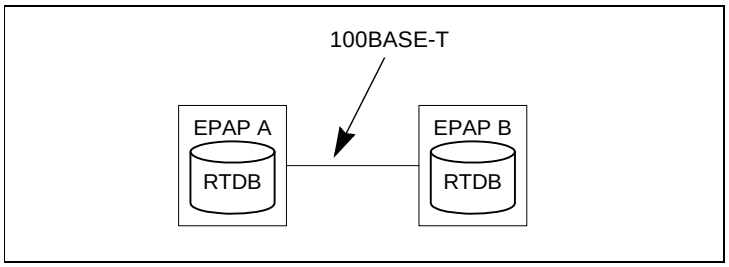


Although a dedicated network is recommended, it is possible that unrelated customer traffic can use the network as well. The determination, either to have a dedicated network or to allow other customer traffic, should be based on available external Ethernet bandwidth and network performance considerations.

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 2-23.

Figure 2-23. EPAP Sync Network

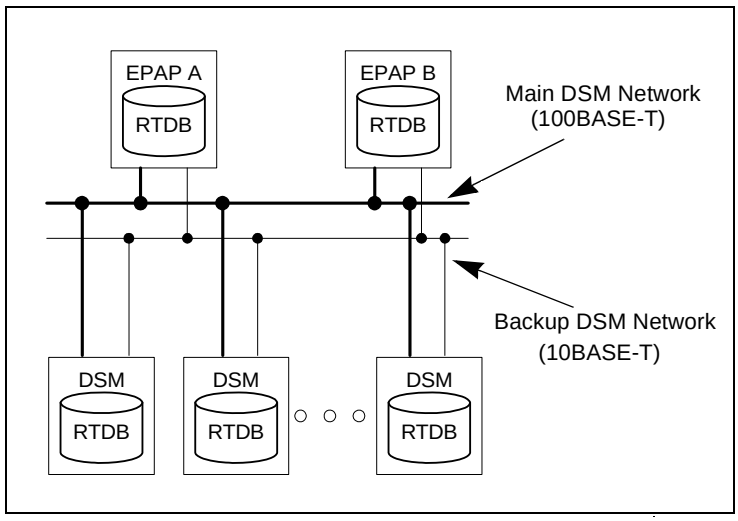


DSM Networks

The DSM networks are shown in Figure 2-24. 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 2-24. 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 2-2 summarizes the contents of each octet.

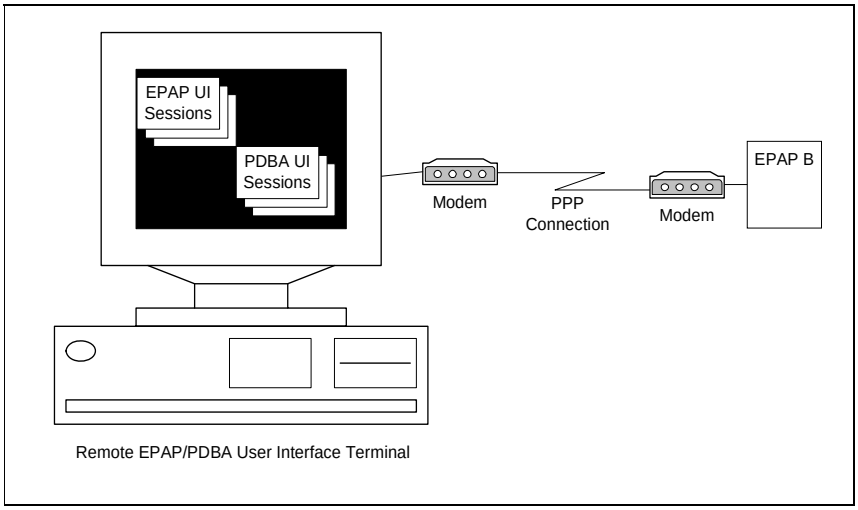
Table 2-2. EPAP IP Addresses in the DSM Network

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 2-20 on page 2-34, 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 2-25.

Figure 2-25. Dial-up PPP Network



Network Perspectives

GSM Mobile Number Portability (G-Port) provides the capability for a mobile subscriber to change the GSM subscription network within a portability cluster while retaining the original MSISDN(s). Because the IMSI is not ported, the recipient network of the porting process issues a new IMSI for the ported subscriber.

In a Public Land Mobile Network (PLMN) that supports G-Port, SCCP messages that are sent to an HLR can be relayed by either:

- An MNP-SRF, or
- An EAGLE 5 ISS with G-Port depending on the type of message (call-related or non-call-related) and on the porting status of the called subscriber.

For call-related messages, MNP-SRF either generates an SRI_ACK response with the routing number if the number is ported, or relays the message to an appropriate HLR if the number is not ported.

For non-call related messages, MNP-SRF can modify the SCCP called party address and route the message to the recipient networks's HLR or to the subscription network.

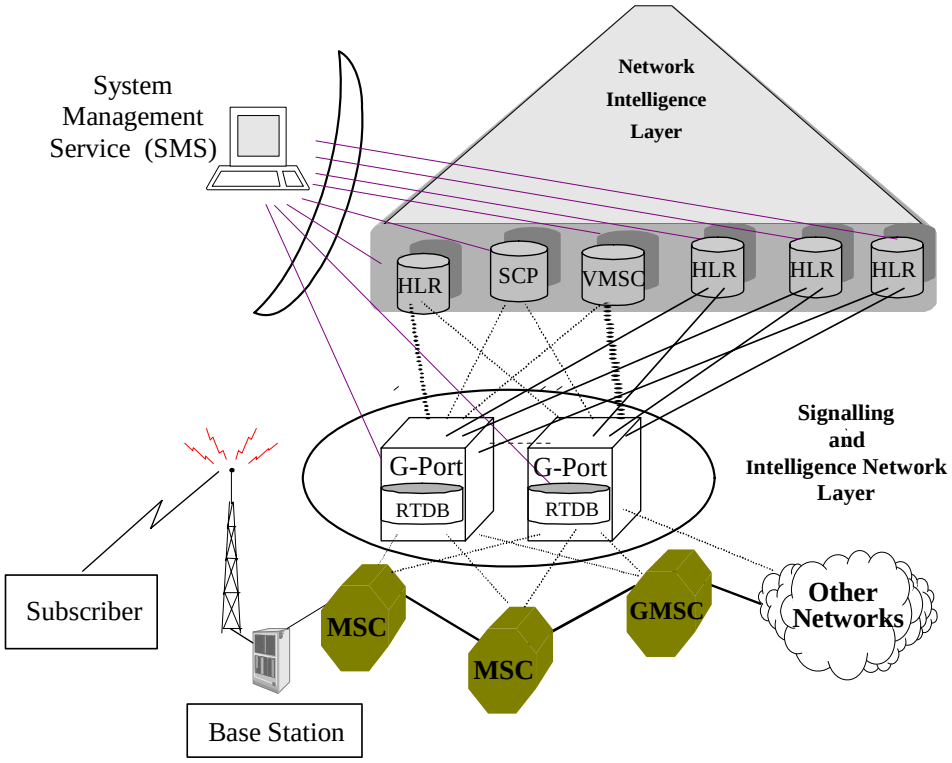
Figure 2-26 shows the location of the G-Port in a GSM network. Note the basic functions G-Port performs:

- G-Port performs a query/response for call-related SRI messages when the number is ported-out or not known to be ported.
- G-Port performs a message relay function for non-call-related messages and, for call-related messages when the number is non-ported or ported-in.

G-Port performs the following actions based on the message received and number status:

- If the number is ported-out or not known to be ported and the message received is call-related SRI (not-SOR), G-Port sends the SRI ack to the MSC with the Routing Number information in the MAP portion of the message.
- If the number is ported-out and the message received is non-call related (non-SRI), G-Port performs a message relay function and forwards the translated message based on the Routing Number information.
- If the number is non-ported or ported-in and the message received, G-Port performs an HLR translation and forwards the translated message to the HLR.

Figure 2-26. G-Port Node in GSM Network



Serviceability Hints

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 database 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.

G-Port Considerations

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

1. SRI responses are routed by both MTP and Global Title Translation.
2. The maximum length of the Application Context Name Object Identifier is 32 digits.
3. For G-Port 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.
4. G-Port Message Relay to the EAGLE 5 ISS local subsystem is not supported.

5. Only the first 21 digits of the CDPA are decoded for G-Port 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).

6. 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 G-Port 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.

7. As discussed in this document, MNP applies within a single portability cluster. This is defined as a set of networks in a country or multi-country region having a common numbering plan and across which a subscriber, who is already inside the cluster, can port. Any individual G-Port node is required to support only an MNP within such a portability cluster.

8. The EAGLE 5 ISS examines the TCAP portion of the MAP message to determine the message type. Although GSM 03.66 defines a new translation type for SRI-MNP messages, G-Port MNP does not rely upon the use of this TT.

9. The routing number found in the NP database is either prefixed to the dialed number to form a new concatenated roaming number that is returned to the switch, or is sent on its own as the roaming number.

10. No MAP overload procedures, as defined in GSM 09.02, need to be supported by G-Port MNP.

11. All non-call related messages impacted by MNP contain the MSISDN number in the SCCP CdPA. In the case of the SRI message, G-Port may get the number from the MAP level.

12. TCAP operation codes uniquely distinguish MAP SRI messages and do not change from one phase (or version) of MAP to another.

13. PCs and/or PC + SSNs that are in the entity table of the database and referenced by subscriber entries do not necessarily have the required data present on the EAGLE 5 ISS to route messages to them. For example, the point code may not have a route or the PC + SSN may not be in the MAP table for a final GTT. In this event, a UIM is output only when a message is discarded because of the lack of data.

14. The parameters of the SRI ACK message generated by G-Port are solely based on the provisioned data/options; they are not based on the MAP phase of the SRI message. For example, if the message received is phase 1 or 2, “MSRNDIG=RN”, and the portability status is “NotKnowntobePorted”, G-Port generates an SRI ACK contains IMSI, MSRN, MSISDN, and NPS parameters, despite the MSISDN and NPS parameters not being defined for phase 1 or 2.

15. If SRFIMSI is not provisioned with an RN entity and an incoming message is an SRI message, G-Port sets IMSI parameter as zero digits when the MAP phase is 1 or 2.

16. G-Port uses the MTP route for the SRI ACK response, even when the final GTT is performed on the response.

17. When the concatenated number (RN + MSISDN) option is selected for encoding the Routing Info (MSRN) in SRI ACK, G-Port encodes the complete concatenated number, because the concatenated number length may otherwise exceed 16 digits, which is the maximum allowed in MSRN.

General Requirements

Numbering

1. Incoming called party numbers (from the SCCP portion) destined for G-Port processing are conditioned to fit the GDB requirements where possible:

   - If the GTT selectors available in the incoming message match an entry in the G-Port selector table, then the service numbering plan from the selector table entry uses that number's numbering plan. Further conditioning is applied based on this new numbering plan.
   - If the GTT selectors available in the incoming message match an entry in the G-Port selector table, then the service nature of address from the selector table entry uses that number's nature of address. Further conditioning is applied based on this new nature of address.
   - If the nature of address is Subscriber, the default CC + default NC (network code for E.164) are prepended to the number. The default codes to be used by the EAGLE 5 ISS must be previously provisioned by the EAGLE 5 ISS operator. If not, a UIM is issued, and the message falls through to GTT.

2. Numbers with fewer than five digits after the above conditioning are not used for G-Port. In this case, a UIM is issued, and the message falls through to GTT.

3. Numbers with more than 15 digits after the above conditioning are not used for G-Port. In this case, a UIM is issued, and the message falls through to GTT.

Maintenance

Validation of G-Port Hardware Configuration

DSM card loading has been modified to verify the validity of the hardware configuration for the DSM cards. Hardware verification includes the following.

- **DSM Main Board Verification**

  An AMD-K6 (or better) main board is required to support the G-Port VSCCP application on the DSM card. EAGLE 5 ISS maintenance stores the validity status of the VSCCP card's main board configuration.
  NOTE: The system does not allow the G-Port feature to be enabled if the hardware configuration is invalid.

  When the VSCCP application is initializing, it determines the main board type. The SCCP maintenance block is the mechanism used to relay the main board information to OAM. This requires that the application software be loaded to the VSCCP card and then the main board information received in the SCCP maintenance block must be verified. If the main board is determined to be invalid for the G-Port application, loading of the VSCCP card is automatically inhibited.

- **DSM Applique Memory Verification**

  The VSCCP application performs two types of memory validation to determine whether or not a DSM has sufficient memory to run G-Port:

  CAUTION: The G-Port 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.

  - *Local Memory Validation*. When the G-Port feature bit is first enabled, or any time the G-Port feature is enabled and the DSM is initializing, VSCCP checks to see if the DSM has at least one D1G applique.
  - *Real-Time Memory Validation (during card initialization)*. Once communications between the DSM and EPAP have been established, and the DSM has joined the RMTP Tree, the EPAP starts downloading the RTDB to the DSM card. After the DSM card has downloaded the RTDB, it continues to receive database updates as necessary. The EPAP includes the size of the current RTDB in all records sent to the DSM. The DSM card compares the size required to the amount of memory installed, and issues a minor alarm once the database exceeds 80% of the DSM memory. If the database completely fills the DSM memory, a major alarm is issued, the DSM leaves the RMTP tree, and the DSM's status changes to IS-ANR/Restricted. The DSM continues to carry traffic.

- **Actions Taken When Hardware Determined to be Invalid**

  When the hardware configuration for a DSM card is determined to be invalid for the G-Port application, SCM automatically inhibits loading for 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). Refer to Chapter 5, *G-Port Related Alarms*, page 5-11, for the specific alarm that is generated. When card loading has been 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 will not download the EAGLE 5 ISS databases.
  - The DSM will not download the real-time RTDB from the EPAP.
  - The DSM will not accept RTDB updates (that is, add, change, delete) from the EPAP, nor will it accept STP database updates.

  To activate loading of a DSM card that has been automatically inhibited, the craftsperson must enter the **alw-card** command (**alw-card:loc=xxxx**).

- **Unstable Loading Mode**

  At some point, having a number of invalid DSM cards results in some of the LIMs (Link Interface Module) being denied SCCP services. There is a threshold that needs to be monitored: if the number of valid DSMs is insufficient to provide service to at least 80% of the IS-NR LIMs, the system is said to be in an unstable loading mode. For other reasons why an EAGLE 5 ISS might be in an unstable loading mode, refer to Chapter 5, *Loading Mode Support Status Reporting*, page 5-5.

Maintenance Commands

The following commands are used for G-Port maintenance.

- The debug command **ent-trace** traps G-Port MSUs (Message Signaling Unit) based on the point code of the switch that generated the MSU (SSP), a particular DN and entity ID. Note that a MSU is considered to be a G-Port MSU after its CdPA SSN is determined to be a HLR SSN. For MSISDN and entity ID, the comparison is based on the search key built from the CdPA GTAI (Global Title Address Information) after any conditioning. The existing GT SCCP trigger also applies to G-Port messages.
- The command **rept-stat-mps** reports current G-Port statistics. A MSU is considered to be a G-Port MSU after its CdPA SSN is determined to be a HLR SSN. This command reports G-Port statistics on a single SCCP card basis or on a G-Port system basis.

For more information, refer to Chapter 5, *Maintenance and Measurements*, page 5-1.

G-Port Loading Mode Support

Loading mode support is not applicable for RTDB updates, since DSM cards use incremental loading from the EPAP. STP Administrative updates are allowed while a DSM card is loading and the system is above the 80% card stability threshold. If it is below the 80% threshold, loading mode support allows STP administrative updates to be rejected while cards finish loading and cross the 80% or better threshold.

For G-Port, loading mode support is applicable for database updates originating from the EAGLE 5 ISS GPSM-II's (General Purpose Service Module II cards) destined for the DSM cards.

Audit Requirements

The G-Port audit does not change EAGLE 5 ISS's compliance to STP audit requirements, to which it currently adheres. New G-Port database tables residing on the EAGLE 5 ISS TDM fixed disks are audited by the existing STP audit, which only verifies tables on the EAGLE 5 ISS active and standby TDMs. There are new audit mechanisms for new G-Port tables residing on the EPAP platform that are downloaded to the DSM cards. The new audit mechanisms consist of the following.

- On each DSM card and on the standby EPAP, a background audit calculates checksums for each G-Port RTDB table record and compares the calculated checksum against the checksum value stored in each record. If they are not the same, then a *database corrupt* alarm is issued.
- A process that runs periodically on the active EPAP (approximately every five seconds or less) sends the latest RTDB database level to all the DSM cards and the standby EPAP. If the database levels do not match, the standby EPAP or DSM card issues a *diff level* alarm.

For more information on the audit mechanisms, refer to the *EPAP Administration Manual*.

G-Port Protocol

Main Functions

G-Port and G-Port CRP provide the following main functions:

Message Discrimination

Because G-Port provides translation of ported numbers, it provides a method to identify which messages should receive G-Port vs. GTT. This task of identification is provided via a service selector table where the user can define G-Port service for a combination of selectors. If a selector match is not found then, G-Port falls through to GTT.

RN Prefix Deletion - SCCP

The decoded SCCP CDPA digits can have a RN concatenated with the MSISDN number in two forms:

- RN + DN
- CC+RN+DN

Consequently when the SNAI is either RNIDN, RNNDN, or RNLDN, G-Port compares the decoded MSISDN number with the list of provisioned home RN prefixes defined in the RTDB. If a match is found, G-Port strips off the RN digits from the number.

Number conditioning, if required, is performed after deleting the RN.

When the SNAI is CCRNDN, G-Port first compares the CC to the DEFCC/MULTCC list:

- If CC is not equal to the DEFCC/MULTCC, G-Port falls through to GTT.
- If CC=DEFCC/MULTCC then, G-Port compares the digits after CC with the list of provisioned Home RN prefixes that are defined in the RTDB. If a match is found, then G-Port strips off the RN digits from the number. If no match is found, the no-prefix deletion is performed and G-Port processing continues.

RN Prefix Deletion - TCAP

The decoded MAP MSISDN digits can have a RN concatenated with the MSISDN number in two forms:

- RN + DN
- CC+RN+DN

The MAP NAI is used to determine the type: International, National or Subscriber. If G-Port CRP is OFF, RN prefix deletion is not attempted. If G-Port CRP is ON, then RN prefix deletion is attempted on all MSISDNs. If the MAP NAI indicates International, then a check is performed for the DEFCC/MULTCC prefix on the MSISDN. If DEFCC/MULTCC is detected, then HomeRN deletion is attempted using the CC+RN+DN format. All other MSISDNs will use the RN+DN format. G-Port compares the decoded MSISDN number with the list of provisioned home RN prefixes defined in the RTDB. If a match is found, the G-Port strips off the RN digits from the number.

Number conditioning (if required) is performed after deleting the RN.

If CC+RN+DN search is performed, G-Port compare the digits after CC with the list of provisioned home RN prefixes defined in the RTDB. If a match is found, G-Port strips off the RN digits from the number. If no match is found, then no prefix deletion is performed and G-Port processing continues.

Number Conditioning

The RTDB stores international MSISDNs only. The received MSISDN number or SCCP CDPA digits may need to be converted to an international number to do a database lookup.

When G-Port is required to be performed on a message and the number is not international (that is, the NAI of MSISDN number is “National (Significant) Number” or “Subscriber Number”, or the SNAI is NATL or SUB or RNNDN or RNLDN), the National/Local to International number is triggered.

For a National (Significant) Number, the received CDPA/MAP MSISDN digits are prepended with the default country code; for a Subscriber number, the CDPA/MAP MSISDN digits are prepended with the default country code and the default network code.

Database Lookup

G-Port performs the RTDB database lookup using the international MSISDN.

The individual number database is searched first:

- If the number is not found, the number range database is searched.
- If a match is not found in the individual and range-based database, the GTT is performed on the message.

In the event of the MSISDN numbers in the RTDB database being odd and CDPA GTI of the incoming message being ‘2’, and the last digit of the number is 'zero':

- G-Port first performs database lookup one time using the even number.
- If no match is found, G-Port again performs the database lookup, using the odd number (without last digit).

Table 2-3 summarizes the actions taken based on the database result:

Table 2-3. Database Lookup

Message Type	MSISDN Found	Result	G-Port CRP ON and HomeRN deleted from DN	Action
SRI	Yes	RN	No	SRI ACK using RN prefix
SRI	Yes	RN	Yes	Issue UIM 1256 and fall through to GTT
SRI	Yes	SP	N/A	Forward SRI message to the destination using SP data
SRI	Yes	None	No	SRI ACK using MSISDN
SRI	Yes	None	No	Fall through and perform GTT
SRI	Yes	None	Yes	Issue UIM 1256 and fall through to GTT
SRI	No	N/A	N/A	Fall through and perform GTT
Non-SRI or SRI-SOR	Yes	RN	No	Forward the message to the next node using RN data
Non-SRI or SRI-SOR	Yes	RN	Yes	Issue UIM 1256 and fall through to GTT
Non-SRI or SRI-SOR	Yes	SP	N/A	Forward the message to the next node using SP data
Non-SRI or SRI-SOR	Yes	None	No	Fall through and perform GTT
Non-SRI or SRI-SOR	Yes	None	Yes	Issue UIM 1256 and fall through to GTT
Non-SRI or SRI-SOR	No	N/A	N/A	Fall through and perform GTT

Determination of MAP Phase

The phase or version of the MAP protocol is determined from the ACN.

If ACN received is found to be from SRI (in the form: map-ac-locInforetrieval(s) version xx, such as '04000010005xx'), the last byte ('xx') of the ACN determines the version/phase of the MAP, as shown in Table 2-4. (If the ACN does not match the one defined in ETSI GSM 03.18, the MAP version/phase is assumed to from the **`defmapvr`** parameter of GSMOPTS specification.)

Table 2-4. MAP Phase Determination

Last Byte in ACN	MAP Phase
00	Specified by **`defmapvr`** parameter of a GSMOPTS command
01	Phase 1

Table 2-4. MAP Phase Determination

Last Byte in ACN	MAP Phase
02	Phase 2
03	Phase 2+
Greater than 3	Specified by **`defmapvr`** parameter of a GSMOPTS command

G-Port Message Handling

G-Port performs message handling in the following steps.

1. The message arrives at the EAGLE 5 ISS *route-on-gt*. The EAGLE 5 ISS decodes the SCCP portion and uses the data to perform the G-Port selection based on the CDPA GT fields other than the ES and GTAI. The result of the selection provides a service indicator. The service indicator is G-Port if it is determined that MNP-SRF is required. If a G-Port selector does not match the incoming GT fields, the message is passed on for GTT selection.

2. MNP-SRF first decodes the Operation Code of the MAP message to distinguish the SRI message from the rest. If the Operation Code is SRI and the OR Interrogation indicator is absent, and the GSMOPTS parameter SRIDN=TCAP, the MSISDN parameter is decoded from the MAP message. If the GSMOPTS parameter SRIDN=SCCP, or the message is not SRI, the digits available in the CDPA GTAI are used for database lookup.

3. The decoded DN is conditioned to an international number before performing the RTDB lookup. The conditioning performed depends on whether the digits are obtained from TCAP or MAP part of the message.

   - If the digits are from the SCCP part, the number conditioning is based on SNAI value. First, RN prefix deletion is performed, and conversion to an international number, based on its value. Conversion to international format is based on DEFCC and DEFNDC, as required. If the incoming number is CCRNDN, DEFCC and MULTCC are used to determine the Best Match CC to locate the RN digits for RN prefix deletion
   - If the digits are from the MAP part, the number conditioning is based on NAI of MSISDN parameter. Prefix deletion is performed if G-Port CRP is ON. The number is converted to an international number, if necessary. Conversion to international format is based on DEFCC and DEFNDC, as required. If the incoming number is international, DEFCC and MULTCC are used to determine if the format is CCRNDN or RNIDN. If a Best Match CC is located, then it is used to locate the RN digits for RN prefix deletion.

4. The RTDB database lookup is performed in two parts:

   - The exception or individual number database is searched for a match. If the match is found, the data associated with this entry is considered.
   - If the conditioned number is absent in the exception database, the number range database is searched. If the match is found, the data associated with this range entry is considered. If the search is unsuccessful, the result is no match.

5. If the number is found and a RN prefix is present for this entry, the following is performed:

   - If the message is SRI, and G-Port CRP is OFF, or if G-Port CRP is ON and a HomeRN was not present in the incoming DN (a HomeRN was not deleted from the SCCP CdPA/MAP MSISDN), then G-Port generates a SRI ACK response with the RN prefix in the Routing Number parameter.
   - If the message is non-SRI, and G-Port CRP is OFF, or if G-Port CRP is ON and a HomeRN was not present in the incoming DN a HomeRN was not deleted from the SCCP CdPA), then G-Port uses the translation data for the number to alter the CdPA digits and route the message to the destination.
   - If the message is SRI or non-SRI, and G-Port CRP is ON, and a HomeRN was present in the incoming DN (a HomeRN was deleted from the SCCP CdPA/MAP MSISDN), then G-Port generates UIM #1256, and the message shall fall through to GTT. In most network implementations, since the message contains RN+DN, this should cause a GTT failure, which will result in the EAGLE 5 ISS sending a UDTS to the originator if the Return Message on Error flag was set in the incoming UDT.

6. If the number is found and a SP entity is present for this entry, G-Port uses the SP translation data as the number to route the message to the destination. This is true whether or not G-Port CRP feature is ON.

7. If the number is found and neither SP nor RN data is associated with it (this is a direct routing case with number not known to be ported), the following occurs:

   - If the message is SRI, and G-Port CRP is OFF, or if G-Port CRP is ON and no HomeRN is present in the incoming DN (a HomeRN was not deleted from the SCCP CdPA/MAP MSISDN), and if the portability type associated with the DN entry is other than 3 or 4 (including "no status"), then G-Port generates a SRI ACK response with the MSISDN in the Routing Number parameter. If the message is SRI, and G-Port CRP is OFF, or if G-Port CRP is ON and no HomeRN was present in the incoming DN (a HomeRN was not deleted from the SCCP CdPA/MAP MSISDN), and the portability type associated with the DN entry is either 3 or 4, then the SRI falls through to GTT (i.e. no SRI Ack response is generated).

- If the message is non-SRI, and G-Port CRP is OFF, or if G-Port CRP is ON and no HomeRN is present in the incoming DN (a HomeRN was not deleted from the SCCP CdPA), then the message falls through to GTT.
- If the message is SRI or non-SRI, and G-Port CRP is ON, and a HomeRN was present in the incoming DN (a HomeRN was deleted from the SCCP CdPA/MAP MSISDN), then G-Port generates UIM #1256, and the message falls through to GTT. In most network implementations, since the message contains RN+DN, this should cause a GTT failure, which results in the EAGLE 5 ISS sending a UDTS to the originator if the Return Message on Error flag was set in the incoming UDT.

8. GTT is performed on the message for any of these conditions:

- If G-Port is not required, or
- If the number is not found in the RTDB (both range and exception database).

G-Port SCCP Service Re-Route Capability

This feature is designed to handle and control re-routing of G-Port traffic from an affected node to alternate nodes within an operators network. This feature is an optional feature and doesn't affect the normal G-Port functionality. This feature consists to the following main functions:

- Service State
- G-Port Re-Routing
- G-Port Capability Point Codes

G-Port SCCP Service Re-Route Capability is not supported for the Prepaid SMS Intercept feature. G-Port SCCP Service Re-Route Capability is supported for the IS-41 to GSM Migration feature.

Service State

Service state is part of the G-Port SCCP Service Re-Route Capability. Service state is used to indicate the current state of G-Port, either *ONLINE* or *OFFLINE*. Service state also gives the user the option to mark G-Port as *OFFLINE* or *ONLINE* based on the current behavior. If a G-Port problem is identified, G-Port can be marked *OFFLINE* to initiate the re-routing procedure. In the case when SCCP cards need to be reloaded for some reason, G-Port can be marked *OFFLINE* until enough cards are in-service and then bring G-Port *ONLINE* in a controlled fashion. This feature also provides the option to mark G-Port *OFFLINE* to perform a controlled re-routing during this state.

G-Port Re-Routing

G-Port Re-Routing is an optional feature and is enabled by defining a list of alternate PCs or by defining the GTT option. G-Port re-routing is activated by marking G-Port *OFFLINE*. When G-Port is *OFFLINE* and alternate PCs are provisioned, any messages destined for G-Port are re-routed to the available alternate PCs that are defined for G-Port. If alternate PCs are not provisioned or none are available, then the GTT option is used. If the GTT option is set to YES, then messages destined for G-Port will fall through to GTT as part of the re-routing procedure.

Re-Routing is applied to all G-Port messages (based on SRVSEL). There is no distinction of DPC of the messages. The DPC of the message can be either True, Secondary, or Capability Point code.

G-Port Capability Point Codes

Capability Point Codes (CPC) are also supported for G-Port. The use of G-Port capability point code aids the adjacent nodes in knowing about G-Port outages. When G-Port is brought down though administrative commands, all traffic destined to this G-Port node will generate a Transfer Prohibited (TFP) message to the adjacent node about the G-Port CPC. The TFP response to the adjacent node causes the traffic originating nodes to stop sending G-Port traffic to this node. All G-Port traffic coming into this node is sent to the alternate G-Port nodes. Adjacent nodes will initiate `route-set-test` procedures after receipt of the TFP response.

If the messages are destined to the EAGLE 5 ISS true point code, then TFP messages are not generated when the G-Port service is OFFLINE. The originator would not be aware of the outage.

Once G-Port is back in service on the EAGLE 5 ISS, a Transfer Allowed (TFA) message is sent to the traffic adjacent nodes in response to `route-set-test` message. The traffic originating nodes will then start sending G-Port traffic to the original G-Port node.

G-Port Capability point codes can be provisioned when the G-Port feature is ON. There can be more than one Capability Point Code assigned to G-Port CPCType.

When the G-Port feature is turned ON and the G-Port service state is set to *OFFLINE*, the user can change the service to *ONLINE* at any point. Once the feature is turned *ONLINE*, G-Port will start processing messages if at least one SCCP card is IS-NR.

The G-Port service can be set to *OFFLINE* at any point. This causes the EAGLE 5 ISS to stop processing G-Port traffic and re-routing is performed.

The G-Port service state is persistent. Booting the OAM or all the SCCP cards will not change the service state. Commands must be used to change the service state.

G-Port supports up to 7 alternate PCs per domain. All 6 domains (ANSI, ITU-I, ITUN14, ITUN14 spare , ITU-I spare and ITUN24) are supported. An entire set of alternate PCs are considered as a re-route set. A GTT option is supported for G-Port re-route. When the G-Port service is *OFFLINE*, G-Port messages fall though to GTT based on the GTT option. This option is set to *YES* by default.

G-Port SCCP Service Re-Route Capability Summary

If the G-Port service is not normal (because the RTDB is not in sync with MPS or if cards are misrouting G-Port messages) then the G-Port service state should be changed to *OFFLINE*.

Before changing G-Port service to *OFFLINE*, it should be decided what kind of re-routing will be used during the outage. The EAGLE 5 ISS supports re-routing data to alternate point codes or falling thru to GTT as two possible options. Rereouting to alternate point code has priority over falling though to GTT. Examples of the two options follow:

Option 1

Define alternate point codes to re-route G-Port traffic. This is the recommended option. Up to 7 alternate G-Port nodes can be provisioned to re-reoute all the incoming G-Port traffic. Once provisioned, the G-Port service can be changed to *OFFLINE*.This example has any incoming being G-Port traffic being load-shared to point codes based on the relative cost.

```
chg-sccp-serv:serv=gport:pci1=1-1-1:rc1=10:pci2=2-2-2:rc2=10:p
ci3=3-3-3:rc3=10:pci4=4-4-4:rc4=10

chg-sccp-serv:serv=gport:pci1=5-5-5:rc1=10:pci2=6-6-6:rc2=10:p
ci3=7-7-7:rc3=10:pci4=8-8-8:rc4=10

chg-sccp-serv:serv=gport:state=offline
```

Option 2

With this option default GTT translations are provisioned for G-Port service. Then the **chg-sccp-serv** command is used to provision GTT=YES. All G-Port messages will fall through to GTT. An example command follows:

chg-sccp-serv:serv=gport:gtt=yes (it is yes by default)

Once the G-Port re-routing data is provisioned, G-Port service can be changed to *OFFLINE*. At this point all G-Port traffic will be re-reouted. The use can take necessary steps to correct the G-Port service on the node. Until all the cards or enough cards are in active state with valid G-Port database, G-Port service should not be changed to *ONLINE*.

Table 2-5 shows the actions taken when the G-Port service is offline, a message arrives at the affected node requiring G-Port service, and SCCP cards are available..

Table 2-5. G-Port SCCP Service Re-Route Capability Summary

Result of service selector	DPC	Alternate point code defined and available	GTT to be performed as fall through	Message Handling	Network Management
G-Port	G-Port Capability PC	Yes	N/A	Re-Route to alternate point code based on relative cost	TFP concerning CPC
G-Port	G-Port Capability PC	No*	Yes	Fall through to GTT and perform GTT	TFP concerning CPC
G-Port	G-Port Capability PC	No*	No	Generate UDTS (return cause = network failure)	TFP concerning CPC
G-Port	G-Port Capability PC	Not Defined	Yes	Fall through to GTT and perform GTT	TFP concerning CPC
G-Port	G-Port Capability PC	Not Defined	No	Generate UDTS (return cause = no xlation for this addr)	TFP concerning CPC
Not G-Port	G-Port Capability PC	N/A	N/A	Perform appropriate Service/GTT	None
G-Port	True or Secondary PC or non-G-Port CPC	Yes	N/A	Re-Route to alternate point code based on relative cost	None
G-Port	True or Secondary PC or non-G-Port CPC	No*	No	Generate UDTS (return cause = network failure)	None
G-Port	True or Secondary PC or non-G-Port CPC	No*	Yes	Fall through to GTT and perform GTT	None
G-Port	True or Secondary PC or non-G-Port CPC	Not Defined	Yes	Fall through to GTT and perform GTT	None
G-Port	True or Secondary PC or non-G-Port CPC	Not Defined	No	Generate UDTS (return cause = no xlation for this addr)	None
Not G-Port	True or Secondary PC or non-G-Port CPC	N/A	N/A	Perform appropriate Service/GTT	None

Table 2-5. G-Port SCCP Service Re-Route Capability Summary

Result of service selector	DPC	Alternate point code defined and available	GTT to be performed as fall through	Message Handling	Network Management
* Alternate point codes are defined and unavailable (prohibited or congested).					

Table 2-6 shows the actions of LIM re-route functionality when SCCP cards are unavailable or down..

Table 2-6. G-Port LIM Re-Route Message Handling Summary

Routing Indicator in Incoming Message	DPC	Full or Partial Failure	G-Port Service Status	Message Handling	Network Management
rt-on-gt	G-Port Capability PC	Full	N/A	Generate UDTS	TFP concerning CPC, UPU
rt-on-gt	Non G-Port Capability PC	Full	N/A	Generate UDTS	TFP concerning CPC, UPU
rt-on-gt	True PC	Full	N/A	Generate UDTS	UPU
rt-on-gt	G-Port Capability PC	Partial*	ONLINE	Generate UDTS	None
rt-on-gt	True PC or non G-Port Capability PC	Partial*	ONLINE	Generate UDTS	None
rt-on-gt	G-Port CPC	Partial*	OFFLINE	Generate UDTS	TFP concerning CPC, UPU
rt-on-gt	True PC or non-G-Port CPC	Partial*	OFFLINE	Generate UDTS	None
* It is considered a partial failure if some SCCP cards are available but overloaded.					

Prepaid SMS Intercept Protocol

Main Functions

Prepaid SMS Intercept performs the following main functions:

Message Discrimination

Prepaid SMS Intercept uses the G-Port message selection methods to determine whether the message should receive PPSMS/G-Port service versus GTT.

If the incmoning selectors match a SRVSEL entry and the entry has SERV=SMSMR PPSMS is performed, and if no match is found in SRVSEL table then GTT is performed. If the SSN is for HLR, G-Port is performed. If the SSN is for MSC, PPSMS is performed, and if the SSN is for neither, GTT is performed. Next, the MAP Operation Code received in the message is examined. Only Mobile originated forward short message calls receive PPSMS service. Other messages fall through to GTT. After MAP operation code discrimination, PPSMS provides discrimination based on SCCP CGPA GTA digits. This allows the operator to decide whether messages from certain CGPAs will receive PPSMS service or fall through to GTT, even if they meet all of the previous service selection criteria.

Number Conditioning

The RTDB stores international MSISDNs only. The received MSISDN number or SCCP CDPA digits may need to be converted to an international number to do a database lookup.

When PPSMS is required to be performed on a message and the number is not international (that is, the NAI of MSISDN number is “National (Significant) Number” or “Subscriber Number)”, the National/Local to International number is triggered.

For a National (Significant) Number, the received MSISDN digits are prepended with the default country code and for a Subscriber number, the MSISDN digits are prepended with the default country code and the default network code. If the NAI is neither International or Subscriber, the message is treated as National.

Prepaid Screening

Once the number is conditioned, the PPSMS feature performs a database search to determine if the MSISDN belongs to a prepaid subscriber. This is determined by the `pt` field associated with the database entry for the MSISDN. PPSMS performs the database lookup using the international MSISDN. The individual number database is searched first, and if the number is not found, then the number range database is searched. If a match is not found in individual nor range-based database, then GTT is performed on the message. In case of MSISDN numbers in the PPSMS database being odd and the last digit of the decoded MSISDN from the FSM being 'zero', PPSMS first performs a database lookup once using the even number. If no match is found, then PPSMS performs the database lookup again, now using the odd number (without last digit).

Message Relay to IN Platform

If the database search determines that the subscriber is prepaid, the message is redirected to one of the two IN platforms using the translation data in the GSM options table. If the routing indicator in the IN platform translation data is route-on-SSN, the mated application table is accessed to determine the point code/subsystem status for the IN platform, and if it has a mate. The SCCP CDPA GTA should not be changed as a result of this operation. If the RI in the translation data indicates route-on-GT, and if the Intermediate GTT Load Sharing feature is turned on, the mated relay node table is accessed to determine the point code status and if the IN platform has a mate. Subsystem status is not maintained in the mated relay node.

SMS Prepaid Intercept Message Handling

PPSMS performs message handling in the following steps.

1. The message arrives at the EAGLE 5 ISS *route-on-gt*. The EAGLE 5 ISS decodes the SCCP portion and uses the data to perform the G-Port selection based on the CDPA NP, NAI, TT, SSN, and GTI. The result of the selection provides a service indicator. The service indicator is SMSMR if PPSMS is required. If a SMSMR selector does not match the incoming GT fields, the message is passed on for GTT selection.

2. If Step 1 indicates PPSMS is required, and the message is not a UDTS generated by EAGLE 5 ISS, the EAGLE 5 ISS performs PPSMS service.

3. If the message is a UDTS generated by the EAGLE 5 ISS, then regular GTT is performed on the message.

4. If the EAGLE 5 ISS receives a UDTS message from another node, it is treated in the same manner as any other message. If GTT is indicated, then the UDTS translation is based on the CDPA GTA, and the message is routed to the translated address. If GTT is not indicated, the UDTS is through switched via MTP routing. The one exception is that if translation fails on the UDTS, the EAGLE 5 ISS will not generate another UDTS to send to the originator of the UDTS that failed.

5. The TCAP/MAP portion of the message is decoded by PPSMS. If the message is not a TC_BEGIN, the message falls through to GTT.

6. If the message is a TC_BEGIN, PPSMS decodes the Operation Code of the MAP message to distinguish MO_FSMs from the rest. If the OpCode is not FSM (MAP version 1 or 2) or MO_FSM (MAP version 3), the message falls through to GTT.

7. If the OpCode is FSM (MAP version 1 or 2) or MO_FSM (MAP version 3), the MAP portion of the message is decoded and searched for a MSISDN tag. If a MSISDN tag is not found, the message falls through to GTT. For version 3 MO_FSMs, the SM RP OA parameter would contain the MSISDN tag. For version 1 or 2 FSMs, a MSISDN tag is found if the message is mobile originated. If it is mobile terminated, a MSISDN tag is not found and the message falls through to GTT .

8. If the MSISDN is found in Step 7, the SCCP CGPA GTA is compared to the IN platform GTAs provisioned in the GSMOPTS table. If the decoded GTA matches one of the IN platform GTAs, the message falls through to GTT.

9. If the SCCP CGPA GTA in Step 8 does not match any of the IN platform GTAs, the MSISDN from the MAP portion is decoded and conditioned to an international number before performing the lookup. The number conditioning is based on NAI of MSISDN parameter. The number is converted to an international number, if necessary.

10. The database lookup is performed in two parts:

    - The exception or individual number database is searched for a match. If the match is found, the data associated with this entry is considered.
    - If the conditioned number is absent in the exception database, the number range database is searched. If the match is found, the data associated with this range entry is considered. If the search is unsuccessful, the result is no match.

    In case of MSISDN numbers in the PPSMS database being odd and the last digit of the decoded MSISDN from the FSM being 'zero', PPSMS first performs database lookup once using the even number. If no match is found then PPSMS performs the database lookup again, using the odd number (without last digit).

11. If a number match is found as a result of the search, the Portability Type (pt) field associated with the entry is examined.

    - If the pt is prepaid1 or prepaid2, the IN platform translation information (PC and RI) associated with that type is retrieved from the GSM options. If the RI is SSN, the information is used to access the mated application (MAP) table for point code status and to see if the selected IN platform is in a load sharing relationship with another. If the RI is GT, and if the IGTT Load Sharing feature is on, the mated relay node table is used for this purpose. If the point code is available, the message is routed the IN platform. If the point code is in a load sharing relationship with other point codes, messages are equally divided between them.
    - If the pt is not prepaid1 nor prepaid2, the message falls through to GTT.

12. If a number match is not found as a result of the search in 10., the message falls through to GTT.

PPSMS Without G-Port MNP

The G-Port feature bit must be turned on in order to activate the PPSMS feature. PPSMS can be used without using G-Port MNP. The PPSMS service and GPORT service and mutually exclusive for a particular subsystem.

Service selector commands are used to provision PPSMS service. **`serv=smsmr`** is sued for PPSMS Service. This service can be assigned to ITU selectors only. SNP must be set to E.164 and all values of SNAI are supported. Refer to "EAGLE 5 ISS G-Port Service Selector Commands" on page 3-6 for more information.

IS-41 to GSM Migration Protocol

Main Functions

IS-41 to GSM Migration performs the following main functions:

Message Discrimination

Because G-Port provides translation of migrated and non-migrated numbers, it provides a method to identify which messages should receive G-Port vs. GTT. This task of identification is provided via a service selector table where the user can define G-Port service for a combination of selectors.

Operation Code Discrimination

G-Port handles ANSI Loc_Req, GSM SRI, and SRI_SM differently than other ANSI/GSM operation codes. The Portability type field is considered for these operation codes only. Message relay is performed for all other operation codes based on G-Port Translation data.

Number Conditioning

The RTDB stores International MSISDN only. G-Port provides the capability to condition incoming numbers to be international MSISDN (Insert CC or/and NDC) for the database look up. G-Port removes the GSM prefix from GSM SRI messages and then conditions the non-international numbers to international numbers, if needed, before performing any database lookup.

G-Port generates a Loc_Req Return Result Response, when the MIN in the Loc_Req is a "Migrated with one handset" subscriber. When formulating a Loc_Req response, G-Port uses the IS412GSM prefix in GSMOPTS to build the Routing Digits. If the IS412GSM prefix is not provisioned, G-Port prints a UIM 1130 “LOCREQ rcvd - IS412GSM not provisioned” and falls through to GTT.

Database Lookup

G-Port performs the RTDB database lookup using the international MSISDN.

The individual number database is searched first:

- If the number is not found, the number range database is searched.
- If a match is not found in the individual and range-based database, the GTT is performed on the message.

In the event of the MSISDN numbers in the RTDB database being odd and CDPA GTI of the incoming message being ‘2’, and the last digit of the number is 'zero':

- G-Port first performs database lookup one time using the even number.
- If no match is found, G-Port again performs the database lookup, using the odd number (without last digit).

Migrated Subscribers: G-Port decodes the SCCP CDPA address and performs the RTDB lookup after any number conditioning is performed. If a match is found and the portability type is PT = 5, then G-Port sends a SMS_Request Error Response with SMS Access Denied reason = 5 to the originator subscriber if the incoming message is an IS-41 SMS_Request message. If the incoming IS-41 message is any other OpCode (not SMS_Request or Loc_Req), G-Port falls through to GTT. If the incoming message is any GSM message then, G-Port uses the Translation data for message relay. However, SP entity should be defined for this entry. If a match is not found, G-Port falls through to GTT for both GSM and IS-41 messages.

Non- Migrated Numbers: G-Port automatically performs SCCP relay on GSM and IS-41 messages when the numbers are provisioned in G-Port database (a SP is associated with the DN in the database). However, the DN or MIN entries should be present in the RTDB and the SP entity should be defined for this entry and the portability type should not be set as a PT = 5 subscriber.

SRI-SM Message Handling: G-Port decodes the SCCP CDPA digits of SRI-SM message and performs RTDB lookup after any number conditioning. If a match is found with portability type = NOT KNOWN TO BE PORTED and a RN entity then G-Port sends a SRI-SM RETURN ERROR with error reason = UNKNOWN SUB.

Table 2-7 summarizes the actions taken based on the database result:

Table 2-7. IS-41 to GSM Migration Database Lookup

Message Type	MSISDN Found	Result	Portability Type Result	Action
Any IS-41 message	No	N/A	N/A	Fall through and perform GTT
Any IS-41 message	Yes	None	Not Migrated (1 5)	Fall through and perform GTT
LOC_REQ	Yes	N/A	Migrated (= 5)	LOC_REQ Return result using IS412GSM prefix
LOC_REQ	Yes	SP/RN	Not Migrated (1 5)	Foward LOC_REQ message to the destination usin SP/RN data
SMS_Request	Yes	N/A	Migrated (= 5)	SMS Request Response with SMS Access Denied Reason = 5
SMS_Request	Yes	SP/RN	Not Migrated (1 5)	Foward SMS_Request message to the destination usin SP/RN data
Any other IS-41	Yes	SP/RN	Not Migrated (1 5)	Forward the message to the destination using SP/RN data.
Any other IS-41	Yes	SP/RN	Migrated (= 5)	Fall through and perform GTT
SRI	Yes	SP	Migrated (= 5)	If ServerPfx deleted from DN, generate SRI ACK using IS412GSM as RN for MSRN parameter If ServerPfx not deleted from DN, forward SRI message to the destination using SP data.
SRI	Yes	SP	Not Migrated (1 5)	Forward SRI message to the destination using SP data
SRI	Yes	None	Migrated (= 5)	If ServerPfx deleted from DN, generate SRI ACK using IS412GSM as RN for MSRN parameter If ServerPfx not deleted from DN, fall through and perform GTT
SRI	Yes	None	Not Migrated (1 5)	Generate SRI ACK. MSRN data is incoming TCAP MSISDN

Table 2-7. IS-41 to GSM Migration Database Lookup (Continued)

Message Type	MSISDN Found	Result	Portability Type Result	Action
SRI	No	N/A	N/A	Fall through and perform GTT
SRI	Yes	RN	Migrated (= 5)	If ServerPfx deleted from DN, generate SRI ACK using IS412GSM as RN for MSRN parameter If ServerPfx not deleted from DN, generate SRI ACK using RN data
SRI	Yes	RN	Not Migrated (¹ 5)	SRI ACK using RN prefix
SRI-SM	Yes	RN	Not Known to be Ported (= 0)	Generate SRI-SM RETURN ERROR with Error Code = "Unknown Subscriber"
SRI-SM	Yes	RN	Not Known to be Ported (= 0)	Relay the message based on RN data
SRI-SM	Yes	SP	Any	Relay the message based on SP data
Any other GSM message	Yes	SP/RN	Any	Relay the message based on SP/RN data
Any other GSM message	No	N/A	N/A	Fall through and perform GTT

IS-41 to GSM Migration Message Handling

IS-41 to GSM Migration performs message handling in the following steps.

1. The message arrives at the EAGLE 5 ISS *route-on-gt*. The EAGLE 5 ISS decodes the SCCP portion and uses the data to perform the G-Port selection based on the CDPA SSN, and GT fields other than the ES and GTAI. The result of the selection provides a service indicator. The service indicator is G-Port if it is determined that IS-41 to GSM Migration is required. If a G-Port selector does not match the incoming GT fields, the message is passed on for GTT selection.

2. G-Port first decodes the TCAP part of the message to distinguish ANSI TCAP from ITU TCAP.

   - If the message is ANSI TCAP, G-Port first decodes the Operation Code of the TCAP part to be used in Step 5. G-Port decodes the digits from the SCCP CDPA portion of the message. The SCCP CDPA digits are used for further processing. Prefix deletion is also performed on ANSI IS-41 messages.

   – If the SNAI is RNxDN, then G-Port compares the SCCP CDPA digits with the prefix provisioned in HOMERN table. If the SNAI is any other value or the prefix does not match, SCCP CDPA digits are used as is for further processing.

- If the message is ITU TCAP, G-Port first decodes the Operation Code to identify whether the message is SRI or NON-SRI. If SRI, the incoming digits are SCCP CDPA (if SRIDN=SCCP) or TCAP MSISDN (if SRIDN=TCAP). If NON-SRI, the incoming digits are SCCP CDPA.

– If the message is SRI and the SERVERPFX is defined in the GSMOPTS table, the incoming DN digits are compared to the SERVERPFX digits. If all of the SERVERPFX digits match the beginning digits of the DN, then they are stripped from the incoming DN.

– If the message is SRI, G-Port takes the decoded DN and performs number conditioning. If SRIDN=SCCP and SNAI is RN + DN, then G-Port compares the digits with prefix provisioned in the HOMERN table. If the digits match the prefix, G-Port strips the digits and uses the stripped digits for further processing. If the prefix does not match or if SRIDN=TCAP, SCCP CDPA digits or MAP MSISDN digits are used as is for further processing.

– If the message is NON-SRI and SNAI is RNxDN, G-Port compares the SCCP CDPA digits with the prefix provisioned in the HOMERN table. If SNAI is any other value or prefix does not match, SCCP CDPA digits digits are used as is for further processing.

3. The decoded DN is conditioned to an international number before performing the RTDB lookup. The conditioning performed depends on whether the digits are obtained from TCAP or SCCP part of the message.

- If the digits are from the SCCP part, the number conditioning is based on SNAI value.
- If the digits are from the TCAP part, the number conditioning is based on NAI of MSISDN parameter.

4. The RTDB database lookup is performed in two parts:

- The exception or individual number database is searched for a match. If the match is found, the data associated with this entry is considered.
- If the conditioned number is absent in the exception database, the number range database is searched. If the match is found, the data associated with this range entry is considered. If the search is unsuccessful, the result is no match.

5. This step is only performed if the number is found and PT = 5 for this entry:

   - If the message is IS-41 LOC_REQ, then G-Port generates a LOC_REQ Response with the IS412GSM prefix + DN in the Routing Number parameter. If the IS412GSM prefix is not provisioned, G-Port prints UIM 1130 "LOCREQ rcvd - IS412GSM not provisioned" and falls through to GTT.
   - If the message is a GSM message, then G-Port applies existing G-Port handling for this message except if the SERVERPFX digits were deleted from the incoming DN, then an SRI ack is generated. The IS412GSM digits in the GSMOPTS table are used as the RN digits in the MSRN field of the SRI ack.
   - If the message is IS-41 SMS_Request, then G-Port sends a SMS_Request Response with SMS Access Denied Reason = 5 back to the originator.
   - If the message is any other IS-41 message, then the message falls through to GTT.

6. This step is only performed if the number is found and PT ≠ 5 for this entry:

   - If the message is an IS-41 message and a SP/RN entity is present for this entry, then G-Port uses the translation data to route the message to the destination. If SP/RN entity is not present for this entry, then the message falls through to GTT.
   - If the message is an GSM message, then G-Port applies existing G-Port handling for this message.

7. If the message is a GSM SRI-SM message and the SCCP digits are found in the RTDB and is associated with RN entity type and has the portability type as *not known to be ported*, then G-Port generates a SRI-SM RETURN ERROR response with error code as *unknown subscriber*.

8. GTT is performed on the message for any of these conditions:

   - If G-Port is not required, or
   - If the number is not found in the RTDB (both range and exception database).

3

EAGLE 5 ISS G-Port Commands

Introduction

This section describes the user interface and provides command examples needed to administer the G-Port feature. The exact command syntax, specifications, and command classes are provided in the *Commands Manual*. The command examples are provided to convey the intention of the user interface requirements.

System Debug Services (SDS) Commands

The following section describes SDS command **`ent-trace`** used with G-Port.

MSU Trap and Trace Command

G-Port uses the existing **`ent-trace`** command to provide a trap-and-trace function for MSUs on the SCCP card. G-Port also introduces a new trigger so the user can trigger on DN and IMSI.

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 G-Port RTDB.
- **E.164 MSISDN number (DN)** – Use this criterion to trap messages immediately before performing a G-Port search based on the MSISDN numbers defined in the G-Port 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.

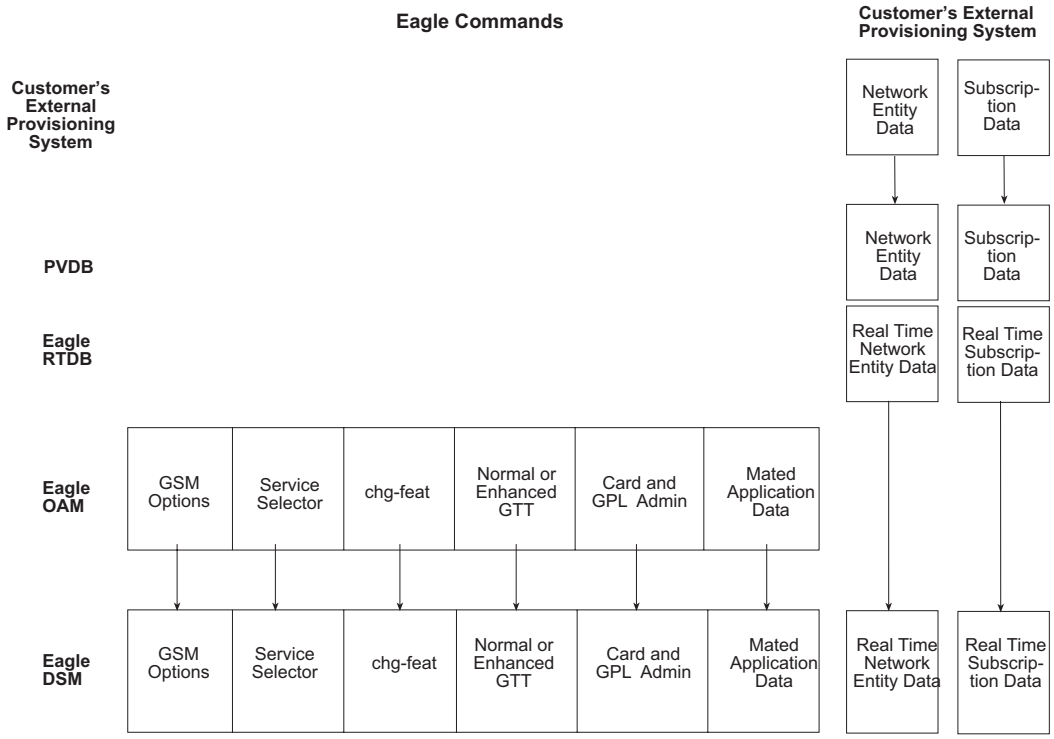
A trace must still be set on all SCCP cards; specify **card=sccp-all**. Use a repetition parameter (**rep**) to control the number of MSUs that are trapped.

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.

Provisioning Hierarchy for the G-Port Database

Part of the database is administered from the EPAP to the DSM cards, and part is administered from the EAGLE 5 ISS GPSM-II's to the DSM cards. In general, the EAGLE 5 ISS terminal interfaces use the **ent** commands to enter new data into the database, **chg** commands to change existing data in the database, and **dlt** commands to delete data in the database. The provisioning hierarchy in Figure 3-1 indicates where each subset of the G-Port database is provisioned and stored.

Figure 3-1. Provisioning Hierarchy



EAGLE 5 ISS Terminal Database Commands

EAGLE 5 ISS chg-feat Commands

The **chg-feat** command administers the G-Port feature. It has two variations, each of which is described in the following: **chg-feat** and **rtrv-feat**. For further details on these commands, please refer to the *Commands Manual*.

- **chg-feat: Change Feature Status Command** – The **chg-feat** command activates 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 turns on the G-Port numbering capability and provides mutual exclusion between LNP and G-Port. The GTT feature is a prerequisite for G-Port. G-Port is a prerequisite for the MNPCRP and PPSMS features. The **chg-feat** command also provides the processor, Dynamic Random Access Memory (DRAM), and disk capacity validation required to support the G-Port feature. This command updates the MAS configuration table. A command example follows.

```
chg-feat: gport=on
gport= {on,off}
```

- **rtrv-feat: Retrieve Feature Status Command** – The **rtrv-feat** command displays the feature status for the G-Port 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
;
```

EAGLE 5 ISS Options Commands

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

- **chg-stpopts: Change STP System Options Command** – 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. A command example follows:

  chg-stpopts:defcc=333: defndc=22345

  Where:

  DEFCC={1-3 digits, none} E164 Default Country Code

  DEFNDC={1-5digits, none} E164 Default National Destination Code

- **rtrv-stpopts: Retrieve STP System Options Command** – 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.

EAGLE 5 ISS G-Port System Options Commands

The G-Port system options (**gsmopts**) commands change and display G-Port-specific system options in the EAGLE 5 ISS database. It has two variations, each of which is described in the following: **chg-gsmopts** and **rtrv-gsmopts**. For further details on these commands, refer to the *Commands Manual*.

- **chg-gsmopts: Change G-Port System Options Command** – The **chg-gsmopts** command changes G-Port-specific system options in the database. This command updates the GSMOPTS table. The default parameters are always overwritten when specified.

Command : chg-gsmopts Class = DATABASE

Parameter	Optional/ Mandatory	Range	Description
DEFMAPVR	Optional	1-3	Default MAP version
IS412GSM	Optional	1-15 digits, none	IS-41 to GSM migration prefix
MSISDNTRUNC	Optional	1 digit (0-5)	MS ISDN Truncation digits
MSRNDIG	Optional	rn, rnidn, ccrndn	RN used as-is or with MSISDN
MSRNNAI	Optional	1-7	NAIV for the MSRN
MSRNNP	Optional	0-15	Numbering plan for the MSRN
MULTCC	Optional	1 to 3 digits (0-9, a-f, or A-F)	Multiple Country Code
NMULTCC	Optional	1 to 3 digits (0-9, a-f, A-F, or NONE)	New Multiple Country Code
NNPSMSGTA	Optional	1-15 digits, none	New entity address of PPSMS Phase 1
PPSMSGTA	Optional	1-15 digits	Entity address of PPSMS Phase 1
PPSMSPCI1	Optional	zone, area, id, none	ITU PC of IN platform 1 for PPSMS Phase 1
PPSMSPCI2	Optional	zone, area, id, none	ITU PC of IN platform 2 for PPSMS Phase 1
PPSMSPCN1	Optional	nnnn, gc, m1, m2, m3, m4, none	ITU PC of IN platform 1 for PPSMS Phase 1
PPSMSPCN2	Optional	nnnn, gc, m1, m2, m3, m4, none	ITU PC of IN platform 2 for PPSMS Phase 1
PPSMSRI1	Optional	gt, ssn	RI of IN platform 1 for PPSMS Phase 1
PPSMSRI2	Optional	gt, ssn	RI of IN platform 2 for PPSMS Phase 1
SRFADDR	Optional	1-15 digits, none	Entity address of MNP_SRF node

Parameter	Optional/ Mandatory	Range	Description
SRFNAI	Optional	0-127	NAIV of the MNP_SRF
SRFNP	Optional	0-15	Numbering plan value of the MNP_SRF Network Code
SRIDN	Optional	tcap, sccp	SRIDN location

Command examples follow.

```
chg-gsmopts:srfnai=4:srfnp=2:srfaddr=331111111111
chg-gsmopts:srfaddr=333221234567890:msrndig=rn:srfnai=1:srfnp=1:msrnnai=4
            :msrnnp=10
chg-gsmopts:ppsmspcn2=234:ppsmsri2=ssn
chg-gsmopts:sridn=tcap
chg-gsmopts:is412gsm=0123456789abcde
```

- **rtrv-gsmopts: Retrieve G-Port System Options Command** – The **rtrv-gsmopts** command displays all G-Port-specific system options from the database.

  The following G-Port options are displayed.

```
GSM OPTIONS
-----------------------
MSRNDIG     = 7
DEFMAPVR    = 2
SRIDN       = TCAP
IS412GSM    = 0123456789abcde
PPSMSRI1    = SSN
PPSMSRI2    = GT
PPSMSPCI1   = 1-1-1
PPSMSPCN2   = ------------
PPSMSGTA    = 1112223333,
              2223334444,
              ABCDEF123456ABC
```

EAGLE 5 ISS G-Port Service Selector Commands

The G-Port service selector (**srvsel**) commands are used to provision new selectors for the G-Port service, providing greater flexibility when provisioning the type of messages that require G-Port 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 G-Port service selector commands (such as command rules and output format), refer to the *Commands Manual*.

- **ent-srvsel: Enter G-Port Service Selectors Command** – The **ent-srvsel** command specifies that the applicable G-Port service selectors indicating G-Port processing are required. The available parameters follow:

Command : ent-srvsel Class = DATABASE

Parameter	Optional/ Mandatory	Range	Description
GTI, GTIA, GTII, GTIN	Mandatory	2, 4	Global Title Indicator
SERV	Mandatory	gport, gflex, inpq, inpmr, eir, smsmr, mnpsms	GSM service
SNAI	Mandatory	sub, natl, intl, rnidn, rnndn, rnsdn,ccrndn	Service Nature Of Address Indicator
SNP	Mandatory	e164, e212, e214	Service Numbering Plan
TT	Mandatory	0-255	Translation Type
NAI	Optional	sub, rsvd, natl, intl	Nature Of Address Indicator
NAIV	Optional	0-127	NAI Value
NP	Optional	e164, generic, x121, f69, e210, e212, e214, private	Numbering Plan
NPV	Optional	0-15	Numbering Plan Value

- **chg-srvsel: Change G-Port Service Selector Command** – The **chg-srvsel** command specifies the applicable G-Port selectors required to change an existing G-Port selector entry. The available parameters follow:

Command : chg-srvsel Class = DATABASE

Parameter	Optional/ Mandatory	Range	Description
GTI, GTIA, GTII, GTIN	Mandatory	2, 4	Global Title Indicator
TT	Mandatory	0-255	Translation Type
NAI	Optional	sub, rsvd, natl, intl	Nature Of Address Indicator
NAIV	Optional	0-127	NAI Value
NP	Optional	e164, generic, x121, f69, e210, e212, e214, private	Numbering Plan
NPV	Optional	0-15	Numbering Plan Value
NSERV	Mandatory	gport, gflex, inpq, inpmr, eir, smsmr, mnpsms	New GSM service
NSNAI	Mandatory	sub, natl, intl, rnidn, rnndn, rnsdn,ccrndn	New Service Nature Of Address Indicator
NSNP	Mandatory	e164, e212, e214	New Service Numbering Plan

- **dlt-srvsel: Delete G-Port Service Selector Command** – The **dlt-srvsel** command deletes a G-Port service selector. The available parameters follow:

Command : dlt-srvsel Class = DATABASE

Parameter	Optional/ Mandatory	Range	Description
GTI, GTIA, GTII, GTIN	Mandatory	2, 4	Global Title Indicator
TT	Mandatory	0-255	Translation Type
NAI	Optional	sub, rsvd, natl, intl	Nature Of Address Indicator
NAIV	Optional	0-127	NAI Value
NP	Optional	e164, generic, x121, f69, e210, e212, e214, private	Numbering Plan
NPV	Optional	0-15	Numbering Plan Value

- **rtrv-srvsel: Retrieve G-Port Service Selector Command** – The **rtrv-srvsel** command displays a list of administered G-Port service selector combinations. All output is sorted first by service, then by global title domain (ANSI first, followed by ITU), GTI, translation type, numbering plan, and by the nature of address indicator. The output can be filtered by specifying any optional parameter. The available parameters follow:

Command : rtrv-srvsel Class = DATABASE

Parameter	Optional/ Mandatory	Range	Description
GTI, GTIA, GTII, GTIN	Optional	2, 4	Global Title Indicator
NAI	Optional	sub, rsvd, natl, intl	Nature Of Address Indicator
NAIV	Optional	0-127	NAI Value
NP	Optional	e164, generic, x121, f69, e210, e212, e214, private	Numbering Plan
NPV	Optional	0-15	Numbering Plan Value
SERV	Optional	gport, gflex, inpq, inpmr, eir, smsmr, mnpsms	GSM service
SNAI	Optional	sub, natl, intl, rnidn, rnndn, rnsdn,ccrndn	Service Nature Of Address Indicator
SNP	Optional	e164, e212, e214	Service Numbering Plan
TT	Optional	0-255	Translation Type

EAGLE 5 ISS G-Port SCCP Service Commands

The **sccp-serv** commands allow for services to be taken ON and OFF line and their processing load to be shifted to other designated nodes. These commands also support the assignment of PCs to PC groups used for G-Port re-route assignment. There are three variants, each of which is described in the following sections: **chg-sccp-serv**, **dlt-sccp-serv**, and **rtrv-sccp-serv**.

Entries (using the **chg-sccp-serv** command) are provisioned in the SCCP-SERV table, and are shown by the **rtrv-sccp-serv** command output. This reduces the maximum number of entries that the MRN table can contain by the number of entries shown in the **rtrv-sccp-serv** command output. For more information on provisioning MRN tables, refer to the *Database Administration Manual - Gobal Title Transaltions* manual.

For further details on the EAGLE 5 ISS G-Port SCCP service commands (such as command rules and output format), refer to the *Commands Manual*.

- **chg-sccp-serv: Change G-Port SCCP Service Command** – The **chg-sccp-serv** command is used to add point codes to an existing service group, or to change the Relative Cost (RC) of existing point codes in a group. SCCP Service groups are organized by service (G-Flex or G-Port) and point code network type (ANSI, ITU-I, Spare ITU-I, ITU-N, Spare ITU-N, or ITUN-24). Up to seven PCs may be in a network type grouping for service re-route load sharing. This command allows for additions/modifications of up to 4 PCs at once. The point code parameters support the Spare Point Code subtype prefix **s-** for ITU-I and ITU-N point codes. The available parameters follow:

```
Command : chg-sccp-serv Class = DATABASE
```

Parameter	Optional/ Mandatory	Range	Description
SERV	Mandatory	gport, gflex	Service
STATE	Optional	offline, online	Status
GTT	Optional	no, yes	Global Title Translation
PC1, PCA1, PCI1, PCN1, PCN241	Optional	Refer to Commands Manual	Post GTT-translated PC
RC1	Optional	00-99	Relative Cost
PC2, PCA2, PCI2, PCN2, PCN242	Optional	Refer to Commands Manual	Post GTT-translated PC
RC2	Optional	00-99	Relative Cost
PC3, PCA3, PCI3, PCN3, PCN243	Optional	Refer to Commands Manual	Post GTT-translated PC
RC3	Optional	00-99	Relative Cost
PC4, PCA4, PCI4, PCN4, PCN244	Optional	Refer to Commands Manual	Post GTT-translated PC
RC4	Optional	00-99	Relative Cost

- **dlt-sccp-serv: Delete G-Port SCCP Service Command** – The **dlt-sccp-serv** command is used remove entries from the SCCP Service table. A single command may either remove a PC from a group, or remove the entire group. The available parameters follow:

Command : dlt-sccp-serv Class = DATABASE

Parameter	Optional/ Mandatory	Range	Description
SERV	Mandatory	gport, gflex	Service
PC1, PCA1, PCI1, PCN1, PCN241	Optional	Refer to Commands Manual	Post GTT-translated PC
PC2, PCA2, PCI2, PCN2, PCN242	Optional	Refer to Commands Manual	Post GTT-translated PC
PC3, PCA3, PCI3, PCN3, PCN243	Optional	Refer to Commands Manual	Post GTT-translated PC
PC4, PCA4, PCI4, PCN4, PCN244	Optional	Refer to Commands Manual	Post GTT-translated PC
ALL	Optional	No, Yes	Yes will delete the entire group

- **rtrv-sccp-serv: Retrieve G-Port SCCP Service Command** – The **rtrv-sccp-serv** command is used to display the SCCP Service application relationship information maintained by the EAGLE 5 ISS. Point codes are grouped by service. The sample output that follows indicates that the G-Port service is Online and there are ANSI and ITU-I point codes in the service set.

```
tekelecstp 05-12-20 08:51:53 EST  35.0.0-55.43.0
rtrv-sccp-serv
Command entered at terminal #4.

   --------------------------------------
   Service     : GFLEX
   State       : Offline
   GTT Option  : Yes
   --------------------------------------

   --------------------------------------
   Service     : GPORT
   State       : Online
   GTT Option  : Yes
   --------------------------------------
   ANSI PC         RC
   001-001-001    10
   002-002-002    20
   003-003-003    30
   004-004-004    40

   ITUI PC         RC
   2-002-2        10
   3-003-3        10

;
```

EAGLE 5 ISS Feature Key Control Commands

These commands are used to enable, update, view, and control the PPSMS and MNPCRP features. These features must be purchased in order to have access to the Feature Access Key, which must be used when enabling these features.

The part number 893007001 is used to enable MNPCRP feature on the EAGLE 5 ISS.

The part number 893006701 is used to enable PPSMS feature on the EAGLE 5 ISS.

- **enable-ctrl-feat: Enable Control Feature Command** – The **`enable-ctrl-feat`** command is used for temporary and permanent enabling of the MNPCRPand PPSMS features. An example of the command using the MNPCRP part number follows: **`enable-ctrl-feat:partnum=893007001:fak=`**<Feature Access Key>

- **chg-ctrl-feat: Change Control Feature Command** – The **`chg-ctrl-feat`** command is used to activate or deactivate the MNPCRP and PPSMS features. Both features require the G-Port feature bit to be turned on as a prerequisite. Since activation of G-Port feature bit performs processor, hardware, DRAM and disk capacity validation, it is not required that the activation of the MNPCRP and PPSMS features perform a separate validation. This command is also used to clear the temporary key expired critical alarm for the PPSMS and MNPCRP features. An example of the command using the MNPCRP part number follows: **`chg-ctrl-feat:partnum=893007001:status=on`**

- **rtrv-ctrl-feat: Retrieve Control Feature Command** – The **`rtrv-ctrl-feat`** command is used display the status of the MNPCRP and PPSMS features (on/off) and to show the trial period remaining if temporarily enabled. An example output follows :

```
The following features have been permanently enabled:
Feature Name              Partnum    Status  Quantity
TPS                       893000110  on      1000
ISUP Normalization        893000201  on      ----
Command Class Management  893xxxxxx  on      ----
LNP Short Message Service 893006601  on      ----
Prepaid SMS Intercept Ph1 893006701  on      ----
Intermed GTT Load Sharing 893006901  on      ----
G-Port Circ Route Prevent 893007001  on      ----

The following features have been temporarily enabled:
Feature Name              Partnum    Status  Quantity     Trial Period Left
TPS                       893000140  on      4000         20 days 8 hrs 57 mins

The following features have expired temporary keys:
Feature Name              Part Num
OnOffFeatV                893492401
```

EAGLE 5 ISS chg-db: Change Database Commands

The **chg-db** commands copies the EAGLE 5 ISS TDM resident G-Port database tables during database backup, restore, and repair.

EAGLE 5 ISS rept-stat-db: Report Database Status

The **rept-stat-db** command displays both the STP and the G-Port database status and level information for each DSM network card, and for the active and standby EPAP databases.

Maintenance and Measurements User Interface

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

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 here include:

- rept-stat-sys
- rept-stat-sccp
- rept-stat-mps
- rept-meas
- rept-measopt
- rept-stat-meas
- rept-ftp-meas
- rtrv-measopt
- rept-stat-trbl
- rept-stat-alm
- rept-stat-db
- inh-card / alw-card
- chg-sid / dlt-sid
- ent-card / rtrv-card / dlt-card

- chg-gpl / act-gpl / rtrv-gpl / rept-stat-gpl / copy-gpl
- inh-alm / unhb-alm
- pass, including ping, netstat, nslookup, arp, and help commands

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

There are two variants of this new command.

- **rept-stat-mps** - produces a summary report showing the overall status of the G-Port provisioning system and a moderate level of information for each DSM card.
- **rept-stat-mps:loc=xxxx** - produces a more detailed report showing the G-Port status of a specific DSM card. Note that this version of the command displays the percent utilization of a particular DSM memory.

Here are two sample commands and their outputs.

- **rept-stat-mps**

```
        Command entered at terminal #4.
;

    Integrat40 00-06-24 10:37:22 EST EAGLE 35.0-30.10.0

                       VERSION       PST            SST        AST
    EPAP A             026-015-000   IS-NR          Active    -----
              ALARM STATUS = No Alarms
    EPAP B             026-015-000   IS-NR          Standby   -----
              ALARM STATUS = No Alarms
```

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

    CARD 1106 ALARM STATUS = No Alarms
    CARD 1201 ALARM STATUS = No Alarms
    CARD 1205 ALARM STATUS = No Alarms
    CARD 1302 ALARM STATUS = ** 0013 Card is isolated from the system
    CARD 1310 ALARM STATUS = No Alarms

    Command Completed.
;

rept-stat-mps:loc=1106

    Command entered at terminal #4.
;

    integrat40 99-09-24 10:37:22 EST EAGLE 35.0.0
    CARD  VERSION         TYPE    PST           SST        AST
    1106  101-9-000       DSM     IS-NR         Active     -----
      DSM PORT A                  IS-NR         Active     -----
      DSM PORT B                  IS-NR         Active     -----
      GTT STATUS          = ACT
      GSM STATUS          = ACT
      ALARM STATUS        = No Alarms.
      DSM MEMORY USAGE    = xxx%

    Command Completed.
;
```

rept-meas

This command includes G-Port measurements in the output sent to the EAGLE 5 ISS Terminal. 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 includes the G-Port 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 includes the alarm totals of the G-Port 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 G-Port 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.

chg-sid / dlt-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. This command includes a CPC type for G-Port.

The CPC parameter is used to support incoming messages routed via Intermediate GTT (rt-gt) to the EAGLE 5 ISS (with DPC = CPC) for G-Port. Refer to the *Commands Manual* for details of this command.

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.

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.
;
```

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
;
```

4

G-Port Feature Activation

CAUTION: For an in-service environment, contact Tekelec Technical Services (see "Customer Assistance" on page 1-8) before continuing to activate G-Port. For an environment that is not yet in-service, you may continue with this procedure.
The G-Port 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 G-Port feature activation procedure, an overview of the activation steps, and a matching number of detailed step descriptions to turn on the G-Port feature. The G-Port feature activation is performed at the EAGLE 5 ISS.

The G-Port features optimizes the use of subscriber numbers and number ranges in a GSM Mobile Network by providing a logical link between any Mobile Station international ISDN (MSISDN) number and any International Mobile Station Identifier (IMSI). This feature allows subscribers to be moved easily from one Home Location Register (HLR) to another. The G-Port feature applies to ITU-I (international) and ITU-N (national) networks.

The G-Port 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.

The G-Port 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 G-Port 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 section apply only to the G-Port feature and can only be performed if the G-Port feature is turned on.

The following features are related to the G-Port 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)
- Mobile Number Portability Circular Route Prevention (MNPCRP)
- Prepaid Short Message Service (PPSMS)

Prerequisites

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

The G-Port 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.
  The G-Port 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 DSM 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-Flex and/or INP feature enabled, only perform steps 70 through 85 to turn on the G-Port feature. With the G-Flex and/or INP 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 G-Port 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 G-Port feature in steps 70 through 85.

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 G-Port 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.

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 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 G-Port 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 G-Port activation procedure (see "Customer Assistance" on page 1-8). Do not proceed without consulting with Tekelec Technical Services.

70. Turn on G-Port feature and configure it using steps 71 through 85.

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

NOTE: Steps 72 through 80 describe the commands that administer the G-Port protocol flow to support:

- **G-Port SRI ACK (Ported-out MSISDNs)**
- **G-Port SRI ACK (Foreign MSISDNs not known to be ported)**
- **G-Port Message Relay (Ported-in, non-ported MSISDNs)**

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

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

74. Use **chg-gsmopts** command to change GSM options.

75. Use **rtrv-gsmopts** command to verify changes to GSM options.

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

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

78. Use **ent-srvsel** command to enter G-Port service selectors.

79. Use **rtrv-srvsel** command to verify changes to G-Port service selectors.

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.

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

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

82. Repeat steps 81 and 82 to reboot each DSM card.

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

83. Use **chg-sccp-serv:serv=gport:state=online** to set the G-Port service to online.

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

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

The detailed G-Port 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 G-Port 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 G-Port 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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 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 34.0.0
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 34.0.0
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 *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 34.0.0
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.

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 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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 12. 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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
CARD   TYPE          APPL      PORT A LSET (SLC)   PORT B LSET (SLC)
1105   LIMOCU       CCS7ITU   --------    (--)    --------    (--)


RLGHNCXA03W 01-10-30 09:12:36 GMT EAGLE 34.0.0
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 34.0.0
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 34.0.0
                                  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 34.0.0
                                  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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
SLK      LSN        CLLI       PST     SST     AST
1105,A  ls400001  ---------- IS-NR   Avail   ----
Command Completed.

RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 34.0.0
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 34.0.0
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.

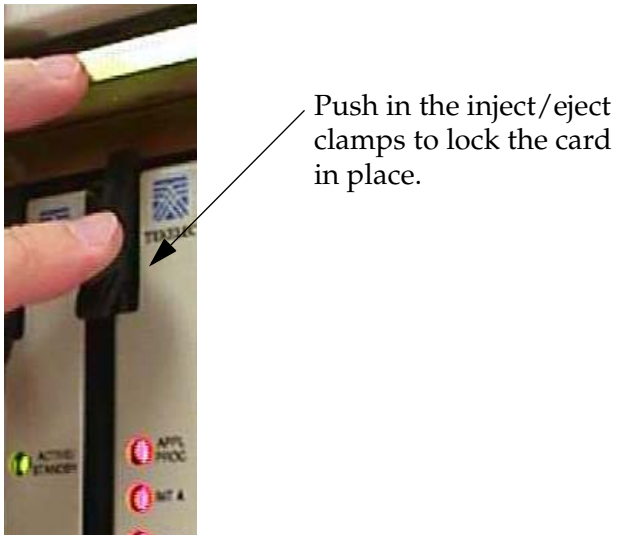
a. Open the ejector levers on the DSM card. Carefully align the card's edges with the top and bottom card guides. Then push the card along the length of the card guides until the rear connectors on the card engage the mating connectors on the target shelf backplane.

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 34.0.0
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 34.0.0
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 34.0.0

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 34.0.0
```

```
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 34.0.0

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 G-Port 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 34.0.0
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 34.0.0
   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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
pass: loc=1107: cmd="ping 192.168.122.100"
Command entered at terminal #1.
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 34.0.0
PASS: Command sent to card
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 34.0.0
PING command in progress
;
rlghncxa03w 00-06-27 08:30:46 GMT EAGLE 34.0.0
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 1-8**).

---

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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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.

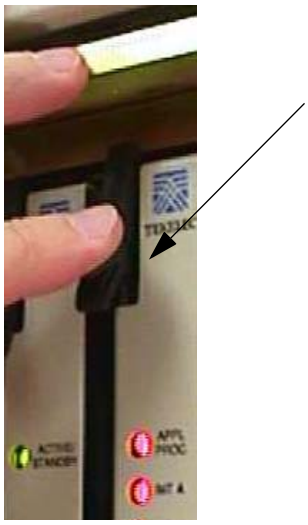
a. Open the ejector levers on the DSM card. Carefully align the card's edges with the top and bottom card guides. Then push the card along the length of the card guides until the rear connectors on the card engage the mating connectors on the target shelf backplane.

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 34.0.0
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 34.0.0
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 34.0.0

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 34.0.0
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 34.0.0

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 G-Port 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 34.0.0
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 34.0.0
   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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
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 34.0.0
pass: loc=1101: cmd="ping 192.168.122.100"
Command entered at terminal #1.
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 34.0.0
PASS: Command sent to card
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 34.0.0
PING command in progress
;
rlghncxa03w 00-06-27 08:30:46 GMT EAGLE 34.0.0
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 1-8**).

---

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 G-Port 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 G-Port activation procedure (see "Customer Assistance" on page 1-8).
Do not proceed without consulting with Technical Services.

70. Turn on and configure the G-Port feature using steps 71 through 84.

---

71. Enable the G-Port feature using the following command:

chg-feat:gport=on

The system returns the following output:

```
rlghncxa03w 01-10-11 11:34:04 GMT EAGLE 34.0.0
CHG-FEAT: MASP A - COMPLD
```

---

72. 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. For example, enter this 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 34.0.0
CHG-STPOPTS: MASP A - COMPLTD
```

---

73. 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 34.0.0
STP OPTIONS
-----------------------
NPCFMTI        2-9-2-1
DEFCC                1
DEFNDC              38
DSMAUD              on
```

---

74. Change the GSM system options in the database. For example, enter this command:

chg-gsmopts:srfnai=7:srfaddr=23448:srfnp=15:is412gsm=34 :msrsndig=ccrndn:defmapvr=2

where:

:srfnai defines the nature of address indicator value of the MNP_SRF.

:srfaddr defines the entity address of the MNP_SRF node.

:srfnp defines the numbering plan value of the MNP_SRF.

:is412gsm defines the IS-41 to GSM migration prefix

:msrsndig defines the routing number to be used or to be concatenated with the MSISDN.

:defmapvr defines the default MAP version.

The system returns the following message:

```
rlghncxa03w 00-08-20 09:04:14 GMT EAGLE 34.0.0
```

```
CHG-GSMOPTS: MASP A - COMPLTD
```

75. Verify the changes using the **rtrv-gsmopts** command. This command displays all GSM system options from the database. This is an example of the possible output:

```
rlghncxa03w 00-08-20 09:04:14 GMT EAGLE 34.0.0
GSMOPT OPTIONS
----------------------
SRFADDR=23448     SRFNAI=7   SRFNP=15
MSRNDIG=CCRNDN
MSRNNAI=7         MSRNNP=15  DEFMAPVR=2
```

76. 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=34

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 34.0.0
HOMERN table is (1 of 100) 1% full
ENT-HOMERN:  MASP A - COMPLTD
```

77. 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 34.0.0.0
RN
----------------
216780909087654
76345098
c10234567
c222
cabade
abc
abc123

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

78. Verify the changes using the **rtrv-srvsel** command. This command retrieves the object associated with the GSM (Global System for Mobile Telecommunication) subsystem number from the database. This command reads the GSMSSN table. This is an example of the possible output:

```
rlghncxa03w 00-06-20 09:09:14 GMT EAGLE 34.0.0
GTII  TT   NP       NAI   NPV  NAIV  SSN  SNP   SNAI   SERV
4     1    e214     intl  ---  ---   3    ---    ---              gport
```

79. Use the **ent-srvsel** command to enter the G-Port service selectors by network type. This command assigns applicable service selectors required to specify the service entry for DSM services. For example, enter the following command:

ent-srvsel:gtii=4:tt=1:snp=e164:snai=intl:serv:gport:nai=intl :np=e164:ssn=9

where:

:gtii - specifies the global title translation indicator (2 = ANSI, ITU; 4 = ITU).

:tt - specifies the translation type.

:snp - defines the service numbering plan (e164, e212, or e214).

:snai - specifies the international Service Nature of Address Indicator.

:serv - specifies the service feature.

:nai - specifies the nature of address indicator.

:np - specifies the numbering plan.

:ssn - defines the subsystem number

The system returns the following message:

```
rlghncxa03w  01-10-07 00:28:31 GMT EAGLE 34.0.0
Service Selector table is (114 of 1024) 11% full
ENT-SRVSEL:  MASP A - COMPLTD
```

---

80. 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:gtii=2

rtrv-srvsel:gtii=4

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

```
rlghncxa03w  01-10-28  00:29:31 GMT EAGLE 34.0.0
GTII  TT   NP        NAI    NPV  NAIV  SNP  SNAI  SERV
2     0    e164      intl   ---  ---   e164 intl  gport
2     1    e164      intl   ---  ---   e164 intl  gport


rlghncxa03w  01-10-28  00:29:31 GMT EAGLE 34.0.0
GTII  TT   NP        NAI    NPV  NAIV  SNP  SNAI  SERV
4     0    e164      intl   ---  ---   e164 intl  gport
4     1    e164      intl   ---  ---   e164 intl  gport
```

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.

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.

81. 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 34.0.0
Command entered at terminal #3.
Init Card command issued to card 1101
```

---

82. 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 34.0.0
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    ---
```

---

83. After the **init-card** and the **rept-stat-card** commands show that service is successfully restored, repeat steps 81 and 82 for each DSM card in your system.

---

84. Enter the **chg-sccp-serv:serv=gport:state=online** command to set the G-Port service state online.

---

85. 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 G-Port feature is now installed, activated, and ready for operations.

PPSMS Provisioning and Activation

The following gives the general sequence of the provisioning required to support PPSMS on the EAGLE 5 ISS. This procedure assumes G-Port 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 PPSMS feature.

enable-ctrl-feat:partnum=893006701:fak=`<Feature Access Key>`

---

3. Enter the `chg-ctrl-feat` command to activate the PPSMS feature.

chg-ctrl-feat:partnum=893006701:status=on

---

4. Enter the `ent-srvsel` command to enter GSM G-Port Global Title Selectors These selectors trigger G-Port as well as PPSMS processing.

ent-srvsel:gtii=4:tt=0:np=e164:nai=intl:serv=smsmr

This example sets up the service selectors needed to select incoming messages with GTI=4, NP=E164, TT=0 and NAI=INTL selected for G-Port/PPSMS service.

---

5. Use the `chg-gsmopts` command to enter various GSM system options, including PPSMS options.

   chg-gsmopts:ppsmspci1=1-1-1:ppsmsri1=gt:ppsmspci2=2-2-2: ppsmsri2=gt

   This example enters PC and RI for two PPSMS nodes.

---

6. Use the `chg-gsmopts` command to enter various PPSMS options.

   chg-gsmopts:ppsmsgta=123543235

   This command defines one PPSMS global title for filtering.

---

7. Use the `chg-gsmopts` command to enter various PPSMS options.

   chg-gsmopts: ppsmsgta=555648309

   This command defines a second PPSMS global title for filtering.

---

8. Use the `ent-map` command to enter mated applications for use with SCCP network management and routing to mated nodes when outgoing RI = route-on-SSN.

   ent-map: pci=1-1-1:ssn=8:rc=10:mpci=3-3-3:mssn=8:materc=10: grp=smsc

   Enters PPSMS PC 1-1-1 and node PC 3-3-3 as load shared mates. This entry is only used if the PPSMS RI is equal to the SSN in the GSMOPTS table. This is not the case for PPSMS PC1 in this example.

---

9. Use the `ent-mrn` command to enter mated relay nodes for routing to mated node when outgoing RI=route-on-GT.

   ent-mrn:pci=2-2-2:rc=10:pci1=3-3-3:rc1=10

   Enters PPSMS PC 2-2-2 and node PC 3-3-3 as load shared mates. This entry is only used if the PPSMS RI is equal to the GT in the GSMOPTS table, which it is in this case for PPSMSPC2.

ISUP NP with EPAP Provisioning and Activation

The following gives the general sequence of the provisioning required to support ISUP NP with EPAP on the EAGLE 5 ISS. This procedure assumes G-Port and GTT are provisioned and activated. Table 4-1 and Table 4-2 are included with example provisioning data used in the provisioning and activation procedure.

Table 4-1. SubNet Prefix Table Example

SubNet No.	SubNet Prefix
1	1001
2	1002
3	1003
4	1004
5	1005

Table 4-2. SubNet ID List Example

SubNet ID	SubNet No.
886932	1
886935	2
886936	3
886938	4
886939	5
886940	5
886941	1

SubNet No. - A subset of an the network. The network may consist of 1 or more Subnets in the network.

SubNet ID - The SubNet Id refers to the network entity address of the HLR within the operator's network.

SubNet Prefix - The SubNet Prefix is defined as a provisionable number that is prepended to the Called Party Number of an IAM message.

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 ISUP NP with EPAP feature.

   enable-ctrl-feat:partnum=893013801:fak=`<Feature Access Key>`

3. Enter the `chg-prefix-feat` command to relate the ISUP NP with EPAP feature to a prefix, and to specify an prefix ID number that is used to refer to the prefix value from another table. Examples follow:

   chg-prefix:feature="isup np with epap"prefixnum=1:prefix=1001

   chg-prefix:feature="isup np with epap"prefixnum=2:prefix=1002

   chg-prefix:feature="isup np with epap"prefixnum=3:prefix=1003

   chg-prefix:feature="isup np with epap"prefixnum=4:prefix=1004

   chg-prefix:feature="isup np with epap"prefixnum=5:prefix=1005

---

4. Enter the following command to determine the allowed length for the `subnetid` values.

   ent-subnetid:subnetidlen=6

---

5. Enter the following command to associate the subnetid with a subnet number.

   ent-subnetid:subnetid=886932:subnetnum=1

   ent-subnetid:subnetid=886935:subnetnum=2

   ent-subnetid:subnetid=886936:subnetnum=3

   ent-subnetid:subnetid=886938:subnetnum=4

   ent-subnetid:subnetid=886940:subnetnum=5

---

6. The EPAP database must be populated for the ported suscribers. Refer to the *Provisioning Database Interface Manual* to add and update the Network Entity and Dialed Number data for ported subscribers and subscribers belonging to the subnet.

---

7. Enter the commands related to Gateway Screening to add the STOP ACTION TLNP for the required combination of the screening rules for the OPC, DPC, SIO , ISUP, and message type=IAM. The gateway screening commands include the following.

   a. Command(s) to configure the gateway screening stop action sets in the system database.

      chg-gws-actset:actid=4:actname=fet:act1=tlnp

   b. Command(s) to add an allowed ISUP screening reference to the Allowed ISUP entity set. One or more message types can be associated with the allowed ISUP screening reference. The ISUP message types listed in this entity set are accepted from another network.

      ent-scr-isup:sr=is1:isupmt=1:nsfi=STOP:actname=fet

c. Command(s) to allow all other types of ISUP messages for normal processing.

```
ent-scr-dpc:sr=dpc1:zone=2:area=102:id=1:nsfi=isup:nsr=is1
```

d. Command(s) to allow all other DPCs of the route table for normal processing. As a rule, every DPC in the Route table must be explicitly provisioned.

```
ent-scr-sio:sr=sio1:nic=0:pri=0:si=5:NSFI=DPC:nsr=dpc1
```

e. Command(s) to allow all other SIO for the normal processing.

```
ent-scr-opc:sr=opc1:zone=2:area=101:id=1:nsfi=sio :nsr=sio1
```

f. Command(s) to allow all other OPC for normal processing

```
ent-scrset:scrn=f1:NSFI=OPC:nsr=opc1
chg-ls:lsn=srcmgt:scrn=f1:gwsa=on
```

---

8. Enter the `chg-ctrl-feat` command to activate the ISUP NP with EPAP feature.

```
chg-ctrl-feat:partnum=893013801:status=ON
```

5

Maintenance and Measurements

Hardware Requirements

The G-Port feature requires DSM-based boards to run the VSCCP GPL. The EAGLE 5 ISS may be equipped with from 1 to 25 DSM boards to support G-Port.

CAUTION: Having a mix of SCCP and VSCCP card types is not permitted with the G-Port feature enabled, that is, VSCCP cards and SCCP cards cannot coexist in a system operating the G-Port 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.

EPAP Status and Alarms

EPAP has no direct means of accepting user input or displaying output messages on EAGLE 5 ISS terminals, so maintenance, measurements, and status information are routed through a DSM. EPAP sends two types of messages to the DSM: EPAP maintenance blocks and DSM status requests. Each is discussed in the following sections.

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 can send a DSM Status Request to that DSM. Since status messages are sent over UDP, the EPAP broadcasts the DSM Status Request and all DSMs return their status to the EPAP.

DSM 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, the DSM sends a DSM status message to the EPAP when the following events occur:

- When 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 Message 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 this 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 is a flag indicating whether or not 80% of the IS-NR LIMs have access to SCCP services.

Hourly Maintenance Report

The Hourly Maintenance Report, generated automatically, includes the alarm totals of the G-Port 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"
;
```

G-Port System Status Reports

Status reporting described here includes the following:

- System status
- G-Port status
- DSM memory capacity status
- Loading mode support status

System Status Reporting

The **rept-stat-sys** command supports the DSM cards running the VSCCP application.

The **rept-stat-sccp** command supports the DSM cards running the VSCCP application and reports G-Port statistics.

G-Port Status Reporting

The **rept-stat-mps** command supports G-Port system reporting. **rept-stat-mps** concentrates on reporting the status of the G-Port provisioning system. See "Maintenance and Measurements User Interface" on page 3-12, for more details. G-Port statistics are placed in the **rept-stat-sccp** command.

DSM Memory Capacity Status Reporting

As mentioned in the "DSM Status Reporting to the EPAP"section, page 5-3, the DSM sends a message to the EPAP containing the amount of memory on the DSM board. The EPAP determines whether the DSM has enough memory to store the RTDB and sends an **ack** or **nak** back to the DSM indicating whether or not the DSM has an adequate amount of memory. 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.

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 DB size requirements, and issues a minor alarm if the size of the DB exceeds 80% of its memory. If a database increases to the point that there is insufficient DSM memory, a major alarm is issued.

The **rept-stat-mps:loc=xxxx** command shows the amount of memory used by the RTDB as a percent of available DSM memory.

Loading Mode Support Status Reporting

The OAM application determines whether or not the system is in an unstable loading mode since 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. Refer to the "Loading Mode Support"section, page 5-6, for more details.

Code and Application Data Loading

DSM Code Loading

The EAGLE 5 ISS OAM code loads the DSM card.

EPAP Application Data Loading

The G-Port 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 G-Port feature provisioning and main board / applique hardware configuration. As a result, load requests are always identical. During loading, multiple DSM load requests can then be 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, EIR, and INP.

The OAM, on the other hand, downloads or sets memory boundaries for the G-Port options, entity, and service selector tables only if the G-Port feature is provisioned. When the G-Port 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-G-Port Data Initialization

If the DSM card's hardware configuration cannot support the RTDB, the G-Port tables are marked as absent during Service Management System initialization. Memory is not reserved for the G-Port table data. Additionally, the G-Port tables are registered with the application data loader (ADL) specifying a data discard function. G-Port table data is discarded during loading by the ADL discard function, rather than storing it in memory.

G-Port Data Initialization

If the DSM card detects G-Port-capable hardware, the G-Port tables are registered with ADL specifying a data load function. Any G-Port table data downloaded are stored in memory during loading.

EPAP-DSM Loading Interface

The DSM must convey to the EPAP that it needs to download the RTDB. This is done 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 database **chg** commands. Loading mode support denies the execution of 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 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 database updates ceases. This stream of updates can be temporarily interrupted to allow the remaining 20% of the system to come in service.

  Once a 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 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 Card Loading Abort

```
tekelecstp 97-04-08 12:29:04 EST EAGLE 35.0.0.0
   ------------------------------------------------------------------------
    STH: Received a BOOT Appl-obituary reply for restart
        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

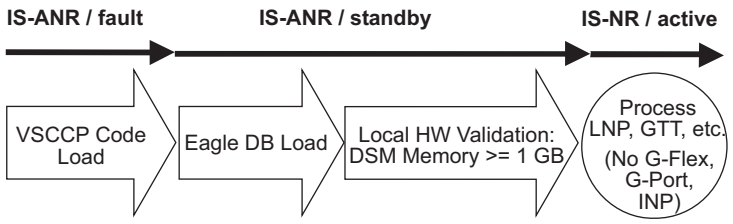
Use the **`force`** option to execute commands that would put the system in unstable loading mode. If executing the **`ent-card`** or **`inh-card`** commands would cause the system to enter an unstable loading mode, use the **`force`** option on the command.

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 involving the G-Port feature.

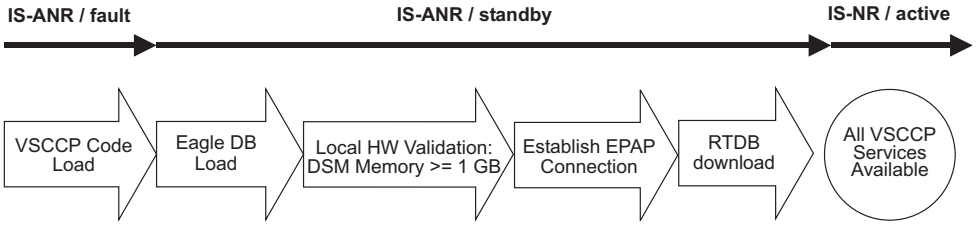
In Figure 5-2, the G-Port feature is not enabled, and the DSM card can operate in TSM emulation mode, although it does not provide G-Port operation.

Figure 5-2. G-Port Not Enabled, DSM Running in TSM Emulation



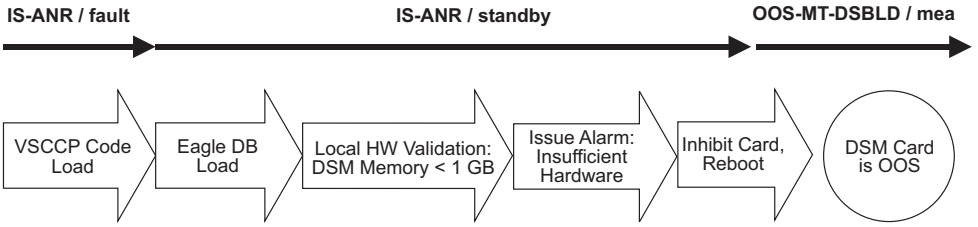
In Figure 5-3, the G-Port feature is enabled, and the DSM card memory is at least 1 GB and is connected to the EPAP. A normal DSM card operating sequence occurs, providing G-Port service.

Figure 5-3. G-Port Enabled, Normal Operating Sequence



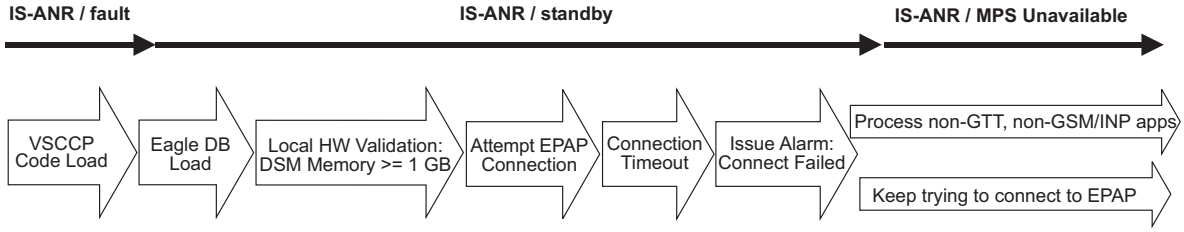
In Figure 5-4, the G-Port feature is enabled, but the DSM card memory is less than 1 GB. The G-Port feature cannot begin operation. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the DSM database capacity requirements.

Figure 5-4. G-Port Enabled, but DSM Memory Less Than 1 GB



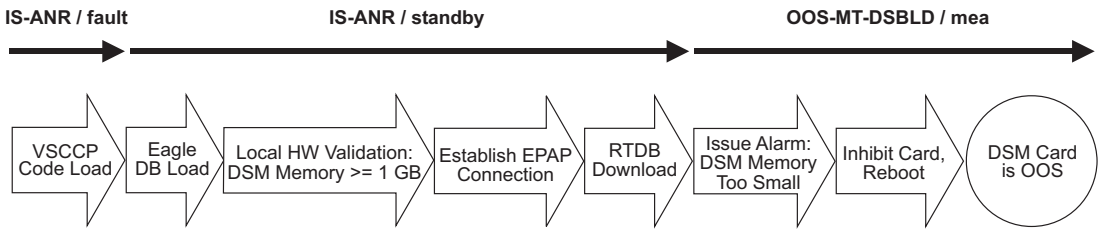
In Figure 5-5, the G-Port feature is enabled, the DSM card memory has at least 1 GB, but the DSM card is unable to connect EPAP; the G-Port cannot begin operation.

Figure 5-5. G-Port Enabled, but DSM Not Connected to EPAP



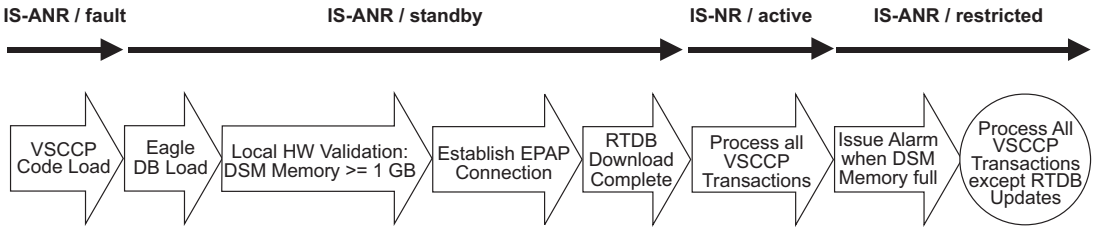
In Figure 5-6, the G-Port feature is enabled, the DSM card has the required 1 GB memory and is connected to the EPAP, but the DSM card is too small for the required database; the G-Port cannot begin operation. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the DSM database capacity requirements.

Figure 5-6. G-Port Enabled, but DSM Memory Insufficient for Database



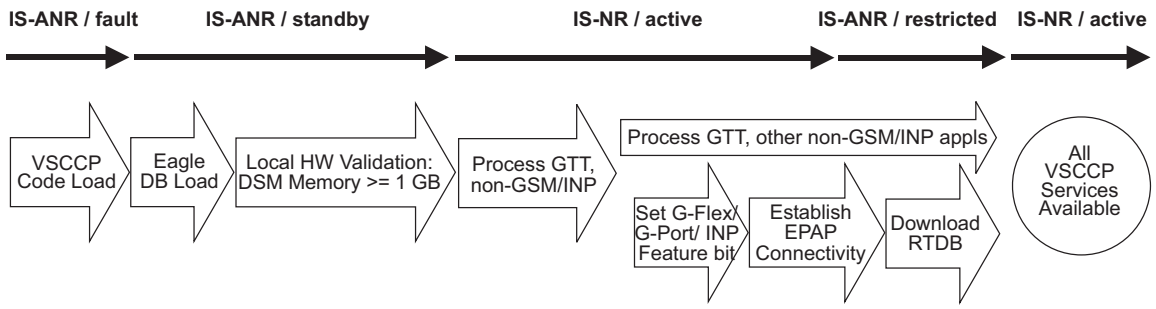
In Figure 5-7, the G-Port feature is enabled, the DSM card is connected to the EPAP, but the RTDB grows eventually to exceed the capacity of the DSM card memory, despite its memory size of at least 1 GB (an alarm is issued when the DSM memory becomes full from the RTDB update). The G-Port cannot begin 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. G-Port Enabled, but Database Exceeds DSM Memory



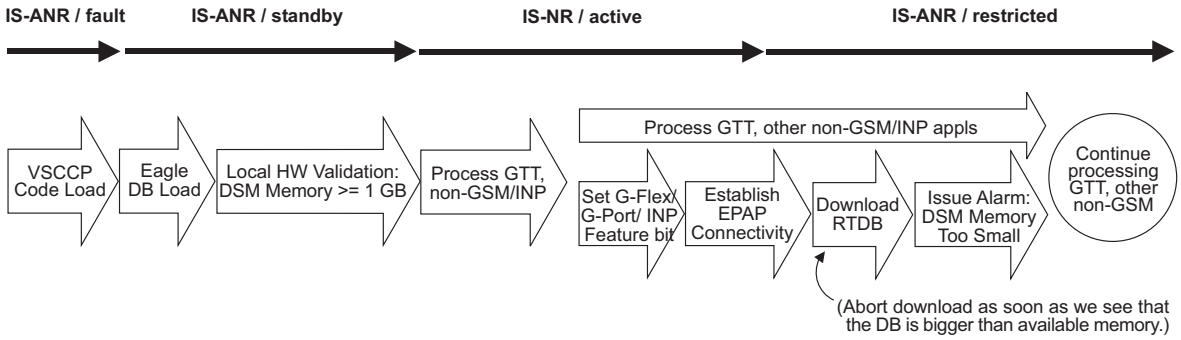
In Figure 5-8, the G-Port feature is not initially enabled; the DSM card memory has at least 1 GB but no EPAP connection; the DSM card is running other applications when the G-Port feature is turned on; the DSM has sufficient memory to provide G-Port service.

Figure 5-8. G-Port Not Enabled at First, but then Activated on DSM



In Figure 5-9, the G-Port 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 G-Port feature is turned on. However, the DSM card memory is insufficient for the needed database, and the cannot provide G-Port 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. G-Port Activation Unsuccessful due to Insufficient Database



G-Port Related Alarms

Refer to the *Maintenance Manual* for a complete description and the associated corrective procedure for all G-Port related UAMs.

EPAP - DSM Connection Status

The EPAP and the DSM are connected over a 100-Mbit Ethernet link and use TCP/IP. If this connection is inoperative, the DSM generates an appropriate UAM. Loss of connectivity or inability of the EPAP to communicate (for example, hardware or software failure) is detected and reported within 10 seconds.

EPAP UAMs

The maintenance blocks from the EPAP have a field used to identify error message requests. The DSM processes the incoming maintenance blocks and generates the requested UAM. The actual EPAP UAMs are defined in the *Maintenance Manual*; the DSM only acts as a delivery agent.

DSM Failure

No new alarms have been created to report DSM failure. The existing card alarm UAM 013, *Card is isolated from the system*, indicates a DSM card failure. The DSM failure alarm is output to the Card Output Group.

DSM-EPAP Link

Two alarms are used to indicate the DSM-to-EPAP link status:

- 0084, *IP Connection Unavailable* (Major)
- 0085, *IP Connection Available* (Normal/Clearing)

The DSM-EPAP Link alarms are output to the Link Maintenance Output Group. See the *Maintenance Manual* for details on these UAM formats.

Example:

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0-35.10.0
**  3582.0084 ** VSCCP PORT B   1217          IP Connection Unavailable
```

DSM Hardware-Related Alarms

A major alarm appears when a DSM card does not have the hardware configuration required for the G-Port application. Loading the DSM card is automatically inhibited. Card alarms can be inhibited and uninhibited with the **inh-alm** and **unhb-alm** commands. The DSM Hardware-Related alarms are output to the Card Output Group.

A major alarm is displayed when a DSM card detects that its applique memory is at least 80% full. The actual memory usage can be displayed by entering the **rept-stat-mps:loc=xxxx** command.

Example:

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 99-09-30 16:28:08 EST EAGLE 35.0.0-31.7.0
**  0012.0446 ** CARD 1108 VSCCP         RTDB database capacity is 80% full
```

A 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:

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 99-09-30 16:28:08 EST EAGLE 35.0.0-31.7.0
*C  0012.0442 *C CARD 1108 VSCCP         RTDB database capacity is 95% full
```

When the **alw-card** command is executed, loading of the DSM card is attempted. The following message appears, indicating that card loading is no longer inhibited.

Example:

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0-35.10.0
0012.0423    CARD 1108 VSCCP         Card reload attempted
```

DSM Database Audit Alarm

During an audit of the DSM cards, the status of the RTDB is examined and an alarm is raised when a corrupted database is found. When any RTDB database becomes corrupted, a major alarm is raised. The DSM Database Audit alarm is output to the Card Output Group.

Example:

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0-35.10.0
** 0012.0443 ** CARD 1108 VSCCP        RTDB Database is corrupted
```

DSM Database Alarms

During the operation of DSM cards, the status of databases is examined and alarms can be raised.

When a DSM card's RTDB is inconsistent (that is, DSM card’s birthdate and level do not match the active EPAP RTDB birthdate and level), a minor alarm is raised. The DSM Database alarms are output to the Card Output Group.

Example:

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0-35.10.0
*   0012.0444 * CARD 1108 VSCCP        RTDB Database is inconsistent
```

When the RTDB database download is in-process or after an update faileds, the database is in an incoherent state. A alarm is raised.

Example:

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0-35.10.0
*   0012.0448 * CARD 1108 VSCCP        RTDB Database is incoherent
```

When an inconsistent, incoherent, or corrupted DSM RTDB has been fixed when the DSM card is in an **`is-nr`** condition, an alarm is raised.

Example:

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 00-09-30 16:28:08 EST EAGLE 35.0.0-35.10.0
0012.0445 CARD 1108 VSCCP          RTDB Database has been corrected
```

G-Port Subsystem Alarms

The same alarms that are output for an SCCP subsystem are output for the G-Port functions (including G-Port traffic). See Table 5-1.

Table 5-1. G-Port Subsystem Alarms

UAM #	Severity	Message Text	Output Group (UI Output Direction)
0328	None	SCCP is available	`gtt`
0329	None	SCCP capacity normal, card(s) abnormal	`gtt`
0330	Major	SCCP TPS Threshold exceeded	`gtt`
0331	Critical	SCCP is not available	`gtt`
0335	None	SCCP is removed	`gtt`
0336	Major	LIM(s) have been denied SCCP service	`gtt`
0526	None	Service is available	`sys_maint`
0527	Minor	Service abnormal	`sys_maint`

Table 5-1. G-Port Subsystem Alarms

UAM #	Severity	Message Text	Output Group (UI Output Direction)
0528	Critical	Service is not available	sys_maint
0529	Critical	Service is disabled	sys_maint
0530	None	Service is removed	sys_maint

G-Port Related UIMs

G-Port UIM formats for the EGTT feature support GTT requirements.

The *EAGLE 5 ISS Maintenance Manual* contains a complete description of all UIM text and formats. If the G-Port is provisioned, then the following UIMs (Table 5-2) are used.

Table 5-2. G-Port UIMs

UIM	Text	Description	Action	Output Group (UI Output Direction)
1035	SCCP rsp did not route - invalid GTI	The SCCP response did not route due to an invalid GTI	Use a valid GTI in the CGPA part of the query	gtt
1036	SCCP rsp did not route - invalid TT	The SCCP response did not route due to an invalid TT	Provision the CGPA TT in the GTT TT table	gtt
1037	SCCP rsp did not route - bad Xlation	The SCCP response did not route due to a bad translation	Provision the CGPA GTA address in the GTT database	gtt
1038	SCCP rsp did not route - SSP not True PC	The SCCP response did not route due to SSP is not true point code	Use the true point code in the CGPA point code or OPC of the query	gtt
1039	SCCP rsp did not route - bad Selectors	The SCCP response did not route due to invalid selectors	Provision the CGPA GTI, TT, NP, and NAI in the EGTT selector table	gtt
1130	LOCREQ rcvd - IS412GSM not provisioned	IS-41 Migration Prefix is not provisioned	Provision IS412GSM prefix	sys-maint

Table 5-2. G-Port UIMs (Continued)

UIM	Text	Description	Action	Output Group (UI Output Direction)
1131	Invalid digits in IS41 MAP Digits parms	The EAGLE 5 ISS encountered an error in decoding the digits parameter in the LocationRequest message.	Correct the digits parameter	`sys-maint`
1169	SCCP rcvd inv TCAP portion	This indicates that SCCP discarded a message because the TCAP provided in the called party address is invalid in the EAGLE 5 ISS.	No action is necessary.	`application subsystem`
1227	SCCP did not route - DPC not in MAP tbl	This message indicates that SCCP did not route a message because the destination point code was not in the mated application (MAP) table. The message was discarded.	If the DPC indicated in the message should not be routed to, no further action is necessary.	`gtt`
1230	SCCP did not route - SS not in MAP tbl	This message indicates that SCCP did not route a message because the destination subsystem was not in the Mated Application (MAP) table. The message was discarded.	No action is necessary.	`gtt`
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`**	`application subsystem`
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`**	`application subsystem`
1246	Invalid length of conditioned digits	Invalid length of condition- ed digits (length of conditioned international number is less than 5 or greater than 15)	Use an international number with length in the acceptable range	`application subsystem`

Table 5-2. G-Port UIMs (Continued)

UIM	Text	Description	Action	Output Group (UI Output Direction)
1256	MNP Circular Route Detected	This message indicates the network has incorrect number portability data for a subscriber.	Verify and update number portability data.	`application subsystem`
1294	Invalid digits in MAP MSISDN parameter	No digits found in MAP MSISDN parameter	Specify valid digits in the MSISDN	`application subsystem`
1295	Translation PC is Eagle's	PC translation is invalid because it is one of EAGLE 5 ISS's PCs	Change the point code	`application subsystem`
1296	Translation PC type is ANSI	PC translation is invalid because it is an ANSI point code	Change the point code	`application subsystem`
1297	Invalid length of prefix/suffix digits	Attempted digit action of prefixing entity ID is invalid because combined length of entity ID and GT digits was greater than 21 digits	Change the attempted digit action or decrease the length of the entity ID and/or GT digits	`application subsystem`

G-Port Measurements

Refer to the *Maintenance Manual* for for detailed measurement usage information.

OAM Based Measurements

G-Port 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 2-25 "Dial-up PPP Network" on page 2-45.

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 EAGLE 5 ISS, LNP, INP, G-FLEX, EIR, 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 Pegs per System measurement peg counts of G-Port MSUs (Message Signaling Units) are supported for the G-Port feature (Table 5-3).

Table 5-3. Pegs for Per System G-Port Measurements

Event Name	Description	Type	Unit
GPSRRCV	Number of call-related SRI messages received	System	Peg count
GPSRGTT	Number of call-related SRI messages that fell through to GTT	System	Peg count
GPSRREP	Number of call-related SRI messages that received G-Port service	System	Peg count
GPSRERR	Number of call-related messages that cause errors and SRI Negative ACK	System	Peg count
IS41LRERR	Number of IS-41 Location Request - Error response messages sent.	System	Peg count
IS41LRMRCV	Number of IS-41 Location Request messages received.	System	Peg count
IS41LRRTRN	Number of IS-41 Location Request - Return Result messages sent	System	Peg count

The following Pegs per SSP measurement peg counts of G-Port MSUs are supported for the G-Port feature (Table 5-4).

Table 5-4. Pegs for Per SSP G-Port Measurements

Event Name	Description	Type	Unit
GPSRACK	Number of call-related SRI responses	Point Code	Peg count
GPSRRLY	Number of call-related SRI messages relayed	Point Code	Peg count

The following Pegs for both Per System and Per SSP G-Port measurement peg counts of G-Port MSUs are supported for the G-Port feature (Table 5-5).

Table 5-5. Pegs for Per System and Per SSP G-Port Measurements

Event Name	Description	Type	Unit
GPNOCL	Number of non-call-related messages relayed by G-Port	System, Point Code	Peg count
GPNOCLGT	Number of non-call-related messages that fell through to GTT	System, Point Code	Peg count

The following equations apply:

$$\sum GPSRRCV = GPSRGTT + GPSRREP + GPSRERR$$

$$\sum GPSRREP = GPSRACK + GPSRRLY$$

The following measurement events are included on the STP Daily Maintenance (MTCD) and STP Day-to-Hour (MTCDTH) measurement reports and include peg counts for G-Port MSUs..

- MSSCCPFL MSUs discarded due to SCCP routing failure.
- GTTUN0NS GTT unable to perform; no such type
- GTTUN1NT GTT unable to perform: no translation on this address
- GTTPERFD Total number of GTT performed

This implementation does not discriminate between the MSSCCPFL, GTTUN0NS, GTTUN1NT, or GTTPERFD pegs for G-Port or GTT applications. For example, a search failure could result from a problem in either the G-Port 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`**

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