

Tekelec EAGLE[®] 5

Feature Manual - G-Port

910-5914-001 Revision A
September 2010



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Chapter 1

Introduction

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This chapter provides a brief description of the G-Port feature of the EAGLE 5 Integrated Signaling System. The chapter also includes the scope, audience, and organization of the manual; how to find related publications; and how to contact Tekelec for assistance.

Overview

This manual provides an overview of the GSM Mobile Number Portability (G-Port) feature of the EAGLE 5 ISS (Integrated Signaling System). The G-Port 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 minimizes the challenges for GSM network operators while enabling them to meet regulatory obligations. G-Port supports the Signaling Relay Function (SRF) for direct and indirect routing. SRF-based Mobile Number Portability (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.

The G-Port feature allows subscribers to be moved easily from one Home Location Register (HLR) to another. The G-Port feature applies to ANSI, ITU-I (international), and ITU-N (national) networks.

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:

- *Introduction* contains general information about the G-Port documentation, the organization of this manual, and how to request technical assistance.
- *Feature Description* provides a description of the G-Port feature and related features, including network perspectives, assumptions and limitations, database overview, DSM provisioning and reloading, and G-Port protocol.
- *Commands* describes the commands that support the G-Port and related features.
- *Feature Configuration* describes how to activate the G-Port feature and related features.
- *Measurements* describes the measurements information available for G-Port.
- *Maintenance* describes G-Port maintenance information including EPAP status and alarms, hardware verification messages, system status reports and commands, code and application data loading, and alarms.

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.

Table 1: Admonishments

| | |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
|  | <p>DANGER: (This icon and text indicate the possibility of <i>personal injury</i>.)</p> |
|  | <p>WARNING: (This icon and text indicate the possibility of <i>equipment damage</i>.)</p> |
|  | <p>CAUTION: (This icon and text indicate the possibility of <i>service interruption</i>.)</p> |

Customer Care Center

The Tekelec Customer Care Center is your initial point of contact for all product support needs. A representative takes your call or email, creates a Customer Service Request (CSR) and directs your requests to the Tekelec Technical Assistance Center (TAC). Each CSR includes an individual tracking number. Together with TAC Engineers, the representative will help you resolve your request.

The Customer Care Center is available 24 hours a day, 7 days a week, 365 days a year, and is linked to TAC Engineers around the globe.

Tekelec TAC Engineers are available to provide solutions to your technical questions and issues 7 days a week, 24 hours a day. After a CSR is issued, the TAC Engineer determines the classification of the trouble. If a critical problem exists, emergency procedures are initiated. If the problem is not critical, normal support procedures apply. A primary Technical Engineer is assigned to work on the CSR and provide a solution to the problem. The CSR is closed when the problem is resolved.

Tekelec Technical Assistance Centers are located around the globe in the following locations:

Tekelec - Global

Email (All Regions): support@tekelec.com

- **USA and Canada**

Phone:

1-888-FOR-TKLC or 1-888-367-8552 (toll-free, within continental USA and Canada)

1-919-460-2150 (outside continental USA and Canada)

TAC Regional Support Office Hours:

8:00 a.m. through 5:00 p.m. (GMT minus 5 hours), Monday through Friday, excluding holidays

- **Central and Latin America (CALA)**

Phone:

USA access code +1-800-658-5454, then 1-888-FOR-TKLC or 1-888-367-8552 (toll-free)

TAC Regional Support Office Hours (except Brazil):

10:00 a.m. through 7:00 p.m. (GMT minus 6 hours), Monday through Friday, excluding holidays

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- **Colombia**

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- **Software Solutions**

Phone:

+33 3 89 33 54 00

- **Asia**

- **India**

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- **Singapore**

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+65 6796 2288

TAC Regional Support Office Hours:

9:00 a.m. through 6:00 p.m. (GMT plus 8 hours), Monday through Friday, excluding holidays

Emergency Response

In the event of a critical service situation, emergency response is offered by the Tekelec Customer Care Center 24 hours a day, 7 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 the Tekelec Customer Care Center.

Related Publications

For information about additional publications that are related to this document, refer to the *Related Publications* document. The *Related Publications* document is published as a part of the *Release Documentation* and is also published as a separate document on the Tekelec Customer Support Site.

Documentation Availability, Packaging, and Updates

Tekelec provides documentation with each system and in accordance with contractual agreements. For General Availability (GA) releases, Tekelec publishes a complete EAGLE 5 ISS documentation set. For Limited Availability (LA) releases, Tekelec may publish a documentation subset tailored to specific feature content or hardware requirements. Documentation Bulletins announce a new or updated release.

The Tekelec EAGLE 5 ISS documentation set is released on an optical disc. This format allows for easy searches through all parts of the documentation set.

The electronic file of each manual is also available from the [Tekelec Customer Support](#) site. This site allows for 24-hour access to the most up-to-date documentation, including the latest versions of Feature Notices.

Printed documentation is available for GA releases on request only and with a lead time of six weeks. The printed documentation set includes pocket guides for commands and alarms. Pocket guides may also be ordered separately. Exceptions to printed documentation are:

- Hardware or Installation manuals are printed without the linked attachments found in the electronic version of the manuals.
- The Release Notice is available only on the Customer Support site.

Note: Customers may print a reasonable number of each manual for their own use.

Documentation is updated when significant changes are made that affect system operation. Updates resulting from Severity 1 and 2 Problem Reports (PRs) are made to existing manuals. Other changes are included in the documentation for the next scheduled release. Updates are made by re-issuing an electronic file to the customer support site. Customers with printed documentation should contact their Sales Representative for an addendum. Occasionally, changes are communicated first with a Documentation Bulletin to provide customers with an advanced notice of the issue until officially released in the documentation. Documentation Bulletins are posted on the Customer Support site and can be viewed per product and release.

Locate Product Documentation on the Customer Support Site

Access to Tekelec's Customer Support site is restricted to current Tekelec customers only. This section describes how to log into the Tekelec Customer Support site and locate a document. Viewing the document requires Adobe Acrobat Reader, which can be downloaded at www.adobe.com.

1. Log into the [Tekelec Customer Support](#) site.

Note: If you have not registered for this new site, click the **Register Here** link. Have your customer number available. The response time for registration requests is 24 to 48 hours.

2. Click the **Product Support** tab.
3. Use the Search field to locate a document by its part number, release number, document name, or document type. The Search field accepts both full and partial entries.
4. Click a subject folder to browse through a list of related files.
5. To download a file to your location, right-click the file name and select **Save Target As**.

Chapter 2

Feature Description

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This chapter describes the G-Port feature and related features which include:

- MT-Based GSM SMS NP
- MT-Based GSM MMS NP
- G-Port SRI Query for Prepaid
- GSM MAP SRI Redirect to Serving HLR

Introduction

Throughout the world, an increasing number of governments are mandating that telecommunications network operators support service provider number portability. These mandates are intended to promote competition among service providers and apply to both wireline and mobile phone networks. The GSM Mobile Number Portability (G-Port) 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 the same phone number. While consumers benefit from number portability, the implementation can present challenges for network operators. G-Port minimizes the challenges for GSM network operators, while enabling them to efficiently meet their regulatory obligations.

G-Port 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 MSISDNs (Mobile Station international ISDN number). The MSISDN is the number dialed by a caller trying to reach the subscriber. The 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 feature is based on the EAGLE 5 ISS platform, and is deployed in a node that is also performing the STP function. G-Port uses the Real Time Database (RTDB) to derive the portability status of subscribers.

MNP Circular Route Prevention

The MNP Circular Route Prevention (MNPCRCP) feature detects 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. The result is a circular route. The MNPCRCP feature provides logic to prevent the circular routing from occurring.

The MNP Circular Route Prevention feature (MNPCRCP) is enhanced to allow Circular Route Prevention based on the Translation Type (TT) of the SCCP CdPA to be performed for SRI messages when a Home Routing Number (HomeRN) is not present. For the Circular Route Prevention on Translation Type processing to be performed, the `crptt` parameter of the `chg-gsmopts` command must be set to a value between 0 and 255. If the `crptt` parameter of the `chg-gsmopts` command is set to the default value of `none`, then no Circular Route Prevention on Translation Type processing is performed. The MNP Circular Route Prevention feature cannot be turned off if the `crptt` parameter is provisioned to any value other than `none`. If a message is processed for Circular Route Prevention based on HomeRN, then Circular Route Prevention on Translation Type processing does not occur.

SRI messages must meet these criteria to be eligible for Circular Route Prevention on Translation Type:

- The message is selected for G-Port or IS41 GSM Migration processing.
- The message is not identified as G-Port SRI Query for Prepaid.
- The message is not MTP-routed. (The CdPA is Route-on-GT.)

- The translation type of the SCCP CdPA matches the provisioned translation type (`crptt`).
- The ITU TCAP Package type is ITU Begin.
- The OpCode is an SRI (hexadecimal 16).
- The Optimal Routing Interrogation Parameter (Tag = 0x04) is not present.
- The MSISDN is not assigned to the subscriber's network provider.

DigitAction Expansion

The DigitAction Expansion feature provides more flexibility to formulate the SCCP Called Party Address - 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.

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.

G-Port SCCP Service Re-Route

The G-Port SCCP Service Re-Route feature is used when the G-Port subscriber 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 subscriber 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 does not 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.

Multiple Country Code

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 Mobile Station Roaming Number (MSRN) parameter in the case of a Send Routing Information acknowledgement (SRI Ack) message 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 uses 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.

MSISDN Truncation Support for G-Port

The MSISDN Truncation Support for G-Port 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 message. This feature only changes the behavior of the encoding of the MAP MSRN parameter in an SRI Ack message 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 the MSRN parameter of SRI Ack message in G-Port to maintain a maximum length of 15 digits. This feature works in conjunction with the MULTCC Support feature. The DefCC and MULTCC table are 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, 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.

Mobile-Originated Based GSM SMS Number Portability

The MO-Based GSM SMS NP feature provides network information to the Short Message Service Center (SMSC) for subscribers using the GSM network. This information allows the SMSC to select a protocol to deliver SMS messages to the called party. For more information about the MO-Based GSM SMS NP feature, refer to *Feature Manual - MO SMS*.

Mobile-Terminated Based GSM SMS Number Portability

The Mobile Terminated (MT)-Based GSM SMS NP feature allows wireless operators to route short message service (SMS) messages destined to mobile subscribers within a number portability (NP) environment. If the MT-Based GSM SMS NP feature is not enabled and turned on, then messages are processed by the G-Port feature.

In general, there are two kinds of messages of concern to number portability: call related and non-call related. The call-related messages query the HLR in real time for delivering the call to the subscriber. The G-port feature handles these.

Non-call related messaging involves the Short Message Service Center (SMSC) querying the HLR for the destination subscriber for SMS delivery. For SMS, these query messages are called SRI_SM. The HLR responds to these messages with routing information that can be used by the querying node (SMSC) to deliver the SMS message. In this feature, the Eagle 5 ISS intercepts SRI_SM messages destined to the HLR and replies with routing information for out-of-network destination subscribers.

The MT-Based GSM SMS NP feature intercepts SRI_SM messages and replies with routing information for out-of-network destination subscribers using the following process:

1. An SRI_SM message from the SMSC is intercepted by the Eagle 5 ISS before the message reaches the home location register (HLR).
2. The message destination address (SCCP Called Party GTA), is extracted, the digits are conditioned, and lookup is performed in the Real Time Database (RTDB).
3. If the destination address/subscribers belongs to a foreign network, then a reply message is sent to the SMSC with routing information. If the destination address/subscribers belongs to a local network, then the SRI_SM message is relayed to the HLR according to the options set for normal G-Port processing.

The feature provides configurable options for controlling processing of SRI_SM messages and the content of the response:

- Selecting the SMSC response message type and digit format
- Specifying when an RTDB lookup is considered to be successful
- Specifying the format of digits encoded in the response message.

Mobile-Terminated Based GSM MMS Number Portability

The MT-Based GSM MMS NP feature provides routing information to the Multimedia Message Service Center (MMSC) for subscribers using the GSM network. This information can be used by the MMSC to route the MMS messages to the called party.

Note: The MT-Based GSM MMS NP feature can be used only in conjunction with the MT-Based GSM SMS NP feature.

The MT-Based GSM MMS NP feature intercepts SRI_SM messages and replies with routing information for out-of-network destination subscribers using the following process:

1. An SRI_SM message from the MMSC is intercepted by the Eagle 5 ISS before the message reaches the home location register (HLR).
2. The message destination address (SCCP Called Party GTA), is extracted, the digits are conditioned, and lookup is performed in the RTDB.
3. If the destination address/subscribers belongs to a foreign network, then a reply message is sent to the MMSC with routing information. If the destination address/subscribers belongs to a local network, then the SRI_SM message is relayed to the HLR according to the options set for normal G-Port processing.

The feature provides the following configurable options for controlling processing of SRI_SM messages and the content of the response:

- Selecting the MMSC response message type and digit format
- Specifying when an RTDB lookup is considered to be successful
- Specifying the format of digits encoded in the response message.

Routing Options

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.

Dialed Number Lengths

Number lengths vary between countries and may even vary within a country. As a result, the G-Port subscriber 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.

SRF vs INAP Mobile Number Portability

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 intercepting existing MAP messages to check for ported numbers. For call-related messages, G-Port acts as an 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.

G-Port SRI Query for Prepaid

The G-Port SRI Query for Prepaid feature allows the EAGLE 5 ISS to provide portability information to a Service Control Point (SCP) database. This information enables the database to determine the network used by a called subscriber. The G-Port SRI Query for Prepaid feature enables the following Message Signal Unit (MSU) values to be provisioned in the EAGLE 5 ISS GSERV table:

- translation type (TT)—The TT of the called party (CdPA)
- originating point code (OPC)—The OPC from the message transfer part (MTP) layer
- global title address (GTA)—The GTA of the calling party (CgPA)

These values are used to determine whether an SRI should receive G-Port SRI Query for Prepaid service or normal G-Port SRI service.

Service Portability (S-Port) support for the G-Port SRI Query for Prepaid feature allows subscribers to retain their same subscriber numbers after moving between different network technologies (example: IS41 and GSM) within the same operator. Service Portability applies to only own-network subscribers.

GSM MAP SRI Redirect to Serving HLR

The GSM MAP SRI Redirect to Serving HLR feature provides the capability to resolve the incompatibility introduced by the proprietary implementation of the GSM MAP SRI message. This feature is an extension to the G-Port protocol. The GSM MAP SRI Redirect to Serving HLR feature is compatible with other G-Port enhancement features.

Additional Subscriber Data Support

The G-Port feature is enhanced to support new Mobile Station Routing Number (MSRN) formatting options that use Additional Subscriber Data (ASD). ASD information is inserted into the outgoing SRI Ack messages. If the GSMOPTS:MSRNDIG digit formatting option specifies the use of ASD information and a successful database lookup returns ASD, then the ASD is encoded into the outgoing message and the existing behavior for encoding messages for G-Port is followed.

ROP Support

The G-Port feature allows Small Geographic Areas (CNLs) to be grouped into Large Geographic Areas (ROPs). This grouping simplifies the routing and allows a call to be delivered as close to the interconnection destination as possible. ROP information is stored in the Generic Routing Number (GRN) field. Both CNL and ROP information can be provisioned for a single subscriber entry; however, only one of the CNL or ROP fields can be selected for the outgoing message.

The G-Port SRI Query for Prepaid, SRI Redirect, IS41 GSM Migration (IGM), AINPQ, INP, and ATINP features also support ROP.

Include Optional CUG Parameter in SRI Ack Messages

The Include Optional CUG Parameter in SRI Ack Messages functionality allows an existing Closed User Group-CheckInfo (CUG-CheckInfo) parameter in an incoming SRI message to be included in the outgoing SRI Ack message.

The Include Optional CUG Parameter in SRI Ack Messages functionality is controlled by the `encodecug` option of the `chg-gsmopts` command `off` and `on` parameters. The `encodecug` option of the `chg-gsmopts off/on` parameter can be changed only if the G-Port or IGM feature is enabled.

The CUG-CheckInfo parameter in an incoming SRI message is copied in the original sequence to the outgoing SRI Ack message when these conditions are met:

- The `encodecug` option of the `chg-gsmopts` command is set to `on`.
- The CUG-CheckInfo parameter is present in an incoming SRI message.
- The CUG-CheckInfo parameter in an incoming SRI message is encoded in definite length format that is less than or equal to 30 bytes.

If the three conditions described above are met, the original CUG-CheckInfo sequence from the incoming SRI message is copied into the SRI Ack message. If encoded in the SRI Ack message, the CUG-CheckInfo parameter is located after the MSRN (Tag = 0x04) and before the MSISDN (Tag = 0x8C) or NPS parameter (Tag = 0x8D), if either MSISDN or NPS parameter is present. The CUG-CheckInfo parameter in an SRI Ack message uses Tag = 0xA3.

If the CUG-CheckInfo parameter is greater than 30 bytes and all other conditions for encoding are met, then only the CUG-Interlock and CUG-OutgoingAccess parameters are copied from an incoming SRI message to the outgoing SRI Ack message. The ExtensionContainer is omitted.

When the `encodecug` option is set to `off`, the CUG-CheckInfo parameter is not encoded in the SRI Ack message.

If the `encodecug` option is set to `on` but the CUG-CheckInfo parameter in an incoming SRI message uses an indefinite length format, the CUG-CheckInfo parameter is not encoded in the SRI Ack message.

Route SRI_SM for Non-local or Ported-out Subscribers using GTT

The Route SRI_SM for Non-local or Ported-out Subscribers using GTT functionality modifies SRI_SM messages to allow routing of the message to an alternate network using Global Title Translation (GTT). This functionality allows processing to occur when the Directory Number (DN) in the database is associated with both the Service Point (SP) and Generic Routing Number (GRN) network elements and the GRN is not present in the EAGLE 5 ISS HomeRN table, or when the subscriber is ported out and associated with the Routing Number (RN).

The message is altered by changing the SCCP Called Party Address (CdPA) to the Country Code (CC) + GRN + DN or to CC + RN + DN. This alteration allows GTT to redirect the query to an alternate network. If a CC is not located in the DN, then the SCCP CdPA is converted to a GRN + DN or RN + DN format.

This conversion is performed only on ITU TCAP Begin SRI_SM MSUs delivered to the GPort or MNP service selector for processing. If the MT-Based GSM SMS NP or the IS41 GSM Migration (IGM) feature generates a response for the SRI_SM message then this functionality is not applicable.

The Route SRI_SM for non-local or ported-out subscribers using GTT functionality is controlled by the `srismgttrtg` option of the `chg-gsmopts` command `off` and `on` parameters. The `srismgttrtg` option of the `chg-gsmopts off/on` parameter can be changed only if the G-Port or IGM feature is enabled.

Option to Suppress NumberPortabilityStatusIndicator in SRI Ack

The Option to Suppress NumberPortabilityStatusIndicator in SRI Ack functionality allows the Number Portability Status Indicator (NPSI) to be omitted from all SRI Ack messages.

The Option to Suppress NumberPortabilityStatusIndicator in SRI Ack functionality is controlled by the `encodenps` option of the `chg-gsmopts` command `off` and `on` parameters. The `encodenps` option of the `chg-gsmopts off/on` parameter can be changed only if the G-Port or IGM feature is enabled. The default setting of the `encodenps` option is `on`.

The `NumberPortabilityStatusIndicator` parameter is encoded in an SRI Ack message when these conditions are met:

- The `encodenps` option of the `chg-gsmopts` command is set to `on`.
- SRI is considered MAP Phase 2+.
- DN Portability Type is 0, 1, 2, or 36. (Portability Type = 36 is encoded as Portability Type = 0.)

Note: MAP Phase is set based on the dialog portion, unless the dialog portion does identify. If the dialog portion does not identify, then the MAP Phase is based on `GSMOPTS:DEFMAPVR`.

The `NumberPortabilityStatusIndicator` parameter is not encoded in any SRI Ack message if the `encodenps` option of the `chg-gsmopts` command is set to `off`.

G-Port Considerations

- G-Port can be turned on, but cannot be turned off.
- The G-Port, A-Port, IGM, G-Flex C7 Relay, INP, and AINPQ features can run concurrently on an EAGLE 5 ISS node.
- When G-Port and G-Flex run on the same node, interactions between the two features must be addressed.
- G-Port and North American LNP are mutually exclusive on an EAGLE 5 ISS node.
- G-Port SCCP Service Re-Route Capability is not supported for the Prepaid Short Message Service Intercept feature.
- G-Port, A-Port, or IGM must be turned on before the MNP Circular Route Prevention feature can be turned on.

G-Port Protocol

Main Functions

G-Port and MNPCRCP provide these main functions:

Message Discrimination

Because the G-Port feature provides translation of ported numbers, the feature provides a method to identify which messages should receive G-Port or GTT. This task of identification is provided by a service selector table in which 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

When the SNAI is either RNIDN, RNNDN, or RNSDN, 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 removes 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, then no prefix deletion is performed and G-Port processing continues.
- 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 MAPMSISDN 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 MNPCRCP is OFF, RN prefix deletion is not attempted. If MNPCRCP is ON, then RN prefix deletion is attempted on all MSISDNs. If the MAPNAI 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 perform 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 an RTDB lookup using the MSISDN in international format. RTDB individual subscriber records have precedence over subscriber range records. If the MSISDN does not represent an individual subscriber in the RTDB, then the subscriber range records are searched. If the MSISDN is not represented by an individual subscriber record or by a subscriber range record in the RTDB, then the RTDB lookup fails.

If the first RTDB lookup fails but the MSISDN contains an even number of digits, ends with zero, and does not include a method for determining the exact number of digits (for example, an odd/even indicator), then the G-Port repeats the RTDB lookup using the MSISDN without the last digit.

If both RTDB lookup attempts fail, then G-Port does not process the message further; the message is passed to GTT to be routed out of the EAGLE 5 ISS.

Since a DN may be the target of the A-Port, G-Port, or IS41 GSM Migration (IGM) message processing in a hybrid network, where an operator owns both GSM and IS41 networks, message processing call disposition is based on which applications are turned on. [Table 2: G-Port Database Lookup](#) shows call dispositions for these configurations:

G-Port Only ([Table 2: G-Port Database Lookup](#))

G-Port and IGM ([Table 3: IGM and G-Port Message Processing](#))

The following notations apply to [Table 2: G-Port Database Lookup](#) and [Table 3: IGM and G-Port Message Processing](#):

PT = Portability Type for the DN values:

0 – Not known to be ported

1 – Own number ported out

2 – Foreign number ported to foreign network

3 – Prepaid1, Prepaid Short Message Service Intercept (PPSMS) subscriber on server #1

4 – Prepaid2, PPSMS subscriber on server #2

5 – IS41 GSM migrated subscriber with only GSM handset active

6 – Prepaid3, PPSMS subscriber on server #3

through

35– Prepaid32, PPSMS subscriber on server #32

36 - Not identified to be ported

FF - No status, No Portability Type

RN = Routing Number

SOR = Support for Optimal Routing

SRI = Send Routing Information

SP = Signaling Point

NE = Network Entity

[Table 2: G-Port Database Lookup](#) summarizes the actions taken based on the database result, and assumes that the IS41 GSM Migration feature is not turned on.

Table 2: G-Port Database Lookup

| Message Type | MSISDN Found | Entity Result | MNPCRPN and HomeRN deleted from DN | Action |
|--------------------|--------------|---------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SRI | Yes | RN | No | SRI Ack using RN prefix. If Portability Type = 0, 1, 2, or 36 is present with MSISDN, NPS will be encoded. For Portability Type = 36, NPS will have a value of 0. |
| 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 | Portability Type result is 0, 1, 2, 36, or no status. SRI Ack using MSISDN. Portability Type = 36 will map to NPS=0 in response. Portability Type = 0, 1, or 2 will have the values of 0, 1, or 2. |
| SRI | Yes | None | No | Portability Type result is 3 - 35. Fall through and perform GTT |
| SRI | Yes | None | Yes | Portability Type result is 0, 1, 2, 36, or no status. 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 |

| Message Type | MSISDN Found | Entity Result | MNPCRPN and HomeRN deleted from DN | Action |
|--------------------|--------------|---------------|------------------------------------|------------------------------|
| Non-SRI or SRI-SOR | No | N/A | N/A | Fall through and perform GTT |

Table 3: IGM and G-Port Message Processing

| NE/PT | SRI | SRI_SM | Other GSM |
|--------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|-----------|
| RN and PT = 0 | MIGRPFX = single: ACK (use GSM2IS41 prefix) MIGRPFX = multiple: ACK (RN from EPAP) | SRI_SM_ACK with Return Error Component | Relay |
| RN and PT ≠ 0 | ACK (RN from EPAP) | Relay | Relay |
| SP and PT = 5 | Relay | Relay | Relay |
| SP and PT ≠ 5 | Relay | Relay | Relay |
| No NE and PT = 5 | GTT | GTT | GTT |
| No NE PT= 0, 1, 2, or No PT | ACK (no NE) | GTT | GTT |
| No DN entry found | GTT | GTT | GTT |

Database lookup results in the following:

1. Fall through to GTT or
2. Relaying the message to the destination as noted in the database or
3. Returning an acknowledge message to the originating switch.

Message Relay describes how the EAGLE 5 ISS formulates a relayed message or a returned Ack.

Message Relay

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 4: DigitAction Applications](#) 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 4: 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 |
| insert | 886944000213 | 8861404944000213 | Insert entity id after country code. (CC + Entity Id + NDC + SN) |
| delccprefix | 886944000213 | 1404944000213 | Delete country code and add prefix (No action is taken if country code is not present.) |
| 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) |

Returning Acknowledgement

When an SRI Ack message is returned, the EAGLE 5 ISS follows the SRI Ack encoding rules along with these enhancements for added flexibility:

1. Allow users to specify which SRI parameter (the TCAP MSRN parameter) encodes the RN (and/or DN) information
2. Allow users to specify the value to encode the Nature of Address field of the TCAP MSRN parameter;
3. Allow users to specify the value to encode the Numbering Plan field of the TCAP MSRN parameter;

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-locInfo retrieval(s) version xx, such as '04000010005xx'), the last byte ('xx') of the ACN determines the version/phase of the MAP, as shown in [Table 5: MAP Phase Determination](#). If the ACN does not match the one defined in ETSIGSM 03.18, the MAP version/phase is assumed to be from the `defmapvr` parameter of GSMOPTS specification.

Table 5: MAP Phase Determination

| Last Byte in ACN | MAP Phase |
|------------------|-------------------------------------------------------------------|
| 00 | Specified by <code>defmapvr</code> parameter of a GSMOPTS command |
| 01 | Phase 1 |
| 02 | Phase 2 |
| 03 | Phase 2+ |
| Greater than 3 | Specified by <code>defmapvr</code> 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. If step #1 indicates that MNP SRF is required and the message is not a UDTS generated by the EAGLE 5 ISS, then the EAGLE 5 ISS performs SSN-based discrimination. If the message is a UDTS generated by the EAGLE 5 ISS, then regular GTT is performed on the message.
3. 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.
4. The decoded DN from either the MAP MSISDN or SCCP CdPA is conditioned to an international number before performing the database lookup. The conditioning which is performed depends on whether the digits are obtained from SCCP or TCAP part of the message.
 - If the digits are from the SCCP part, the number conditioning is based on SNAI value. The RN prefix deletion is performed, followed by 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 MNPCR 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.

5. 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.
6. If the number is found and an RN prefix is present for this entry, then:
 - *for SRI message:* If MNPCRCP is off or if MNPCRCP is on with CRP on Translation Type off 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 an SRI Ack message with the RN prefix in the Routing Number parameter.
 - If SRI_SM GTT Routing is on, then SRI_SM messages are not relayed. The CdPA GTA in the message is modified in CC + RN + DN format, or RN + IDN format if a CC match is not found in the leading digits. The NAI of CdPA GTA is set to International and the SRI_SM message falls through to GTT.
 - *for non-SRI message:* If MNPCRCP is off or if MNPCRCP 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.
 - *for SRI or non-SRI message:* If MNPCRCP 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 the message contains RN+DN which will cause a GTT failure. This GTT failure 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.
7. If the number is found and an 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 the MNPCRCP feature is on. However, the SRI_SM message is not relayed if SRI_SM GTT Routing on, the GRN is associated along with the SP entity with the DN, and the GRN is not present in the HomeRN table. In this case, the CdPA GTA of the SRI_SM is modified in CC + GRN + DN format, or GRN + IDN format if a CC match is not found in the leading digits. The NAI of CdPA GTA is set to International and the SRI_SM message falls through to GTT.
8. If the number is found and neither SP nor RN data is associated with it (direct routing case with number not known to be ported or not identified to be ported), these occur:
 - *for SRI message:* If MNPCRCP is off, or if MNPCRCP is on and no HomeRN is 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 other than 3 through 35, then G-Port generates an SRI Ack message with the MSISDN in the Routing Number parameter. If MNPCRCP is off, or if MNPCRCP 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 has a value of 3 through 35, then the SRI falls through to GTT and no SRI Ack message is generated.

- *for non-SRI message:* If MNPCRCP is off, or if MNPCRCP 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.
 - *for SRI or non-SRI message:* If MNPCRCP is on and a HomeRN was present in the incoming DN (a HomeRN was deleted from the SCCPCdPA/MAP MSISDN), then G-Port generates UIM #1256, and the message falls through to GTT. In most network implementations, the message contains RN+DN which will cause a GTT failure. This GTT failure 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.
9. If the number is not found in the database, then the GSMOPTS:SRIDNNOTFOUND option is queried.
 10. If the GSMOPTS:SRIDNNOTFOUND option is set to SRINACK, then a negative acknowledgement is generated in response to the message.
 11. If the GSMOPTS:SRIDNNOTFOUND option is set to GTT, then GTT is performed on the message.

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 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.

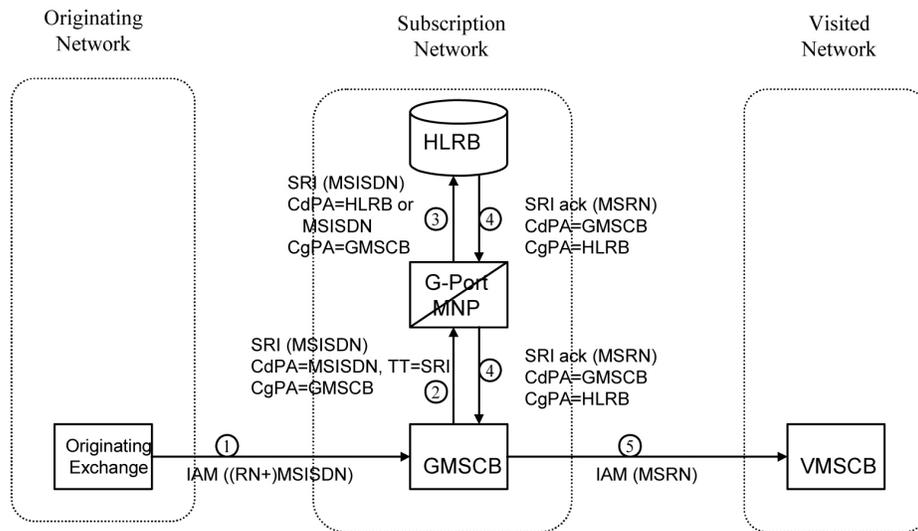
Several call flows refer to non-call related messages. Examples of non-call related messages are SRI for Short Message Service and SRI for Optimal Routing.

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 1: Mobile Terminated Call by Indirect Routing](#).

Figure 1: Mobile Terminated Call by Indirect Routing

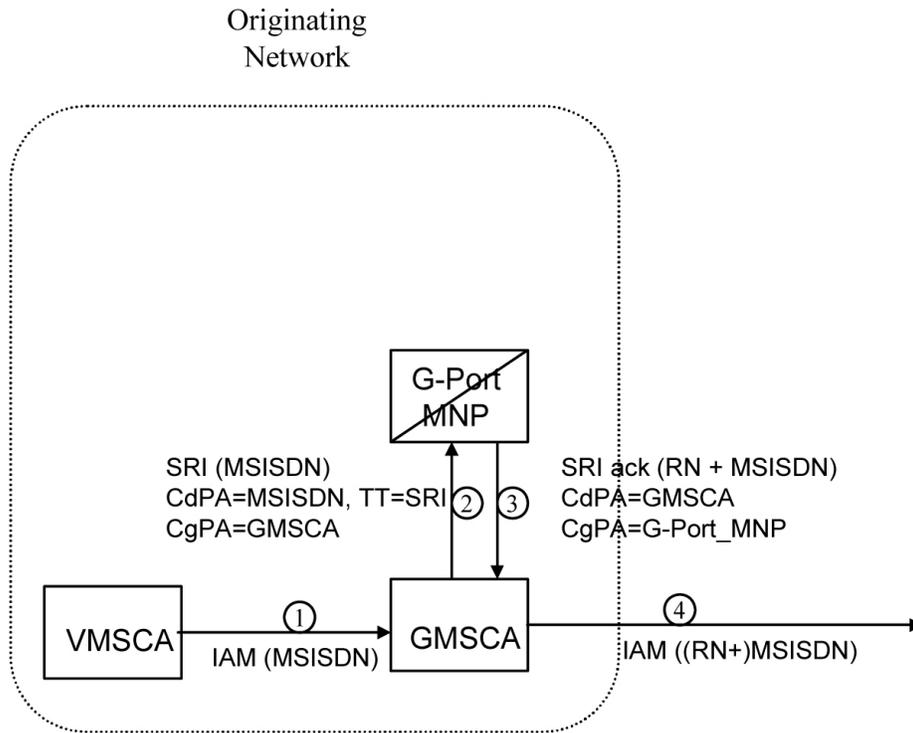


1. The originating exchange sends an IAM message to GMSCB in the subscription network. When the number is imported, the original number range owner network has already performed a database lookup and determined the new subscription network (Routing Number). As shown in the figure, this could be sent in the IAM along with the MSISDN.
2. GMSCB sends an 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 database. A match is found with no Routing Number and an HLR GT address for HLRB, or no match is found and falls through to GTT, producing a routing to HLRB. Alternatively and not illustrated in the figure, GTT could route to another node, possibly in a different network.
3. The message is routed to HLRB.
4. HLRB responds to GMSCB with an 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: Call to an Exported Number by Direct Routing](#).

Figure 2: Call to an Exported Number by Direct Routing



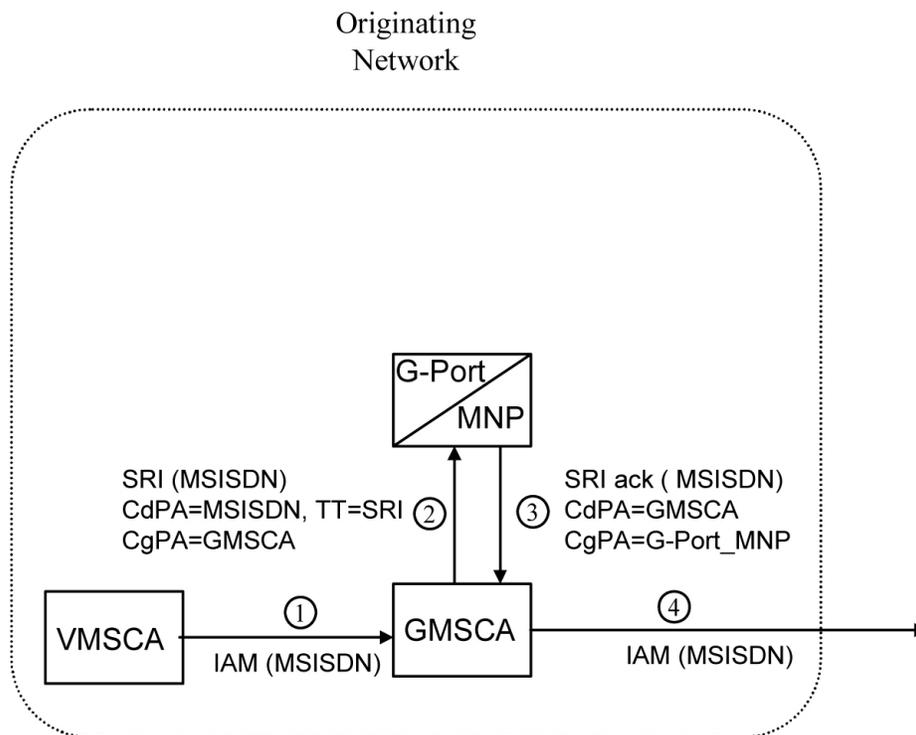
This call flow assumes the originating network is not the subscription network. If indirect routing were used in this example, the originating network would first route the call to the number range owner network, according to pre-portability rules, where the MNP-SRF and NPDB are accessed to locate the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

1. When the call is originated, VMSCA sends an IAM message to GMSCA.
2. GMSCA sends an 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 database. A match is found with the Routing Number field populated.
3. The MNP-SRF responds to GMSCA with an 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 3: MO/MT Call to Number Not Known to be Ported \(Direct Routing\)](#).

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



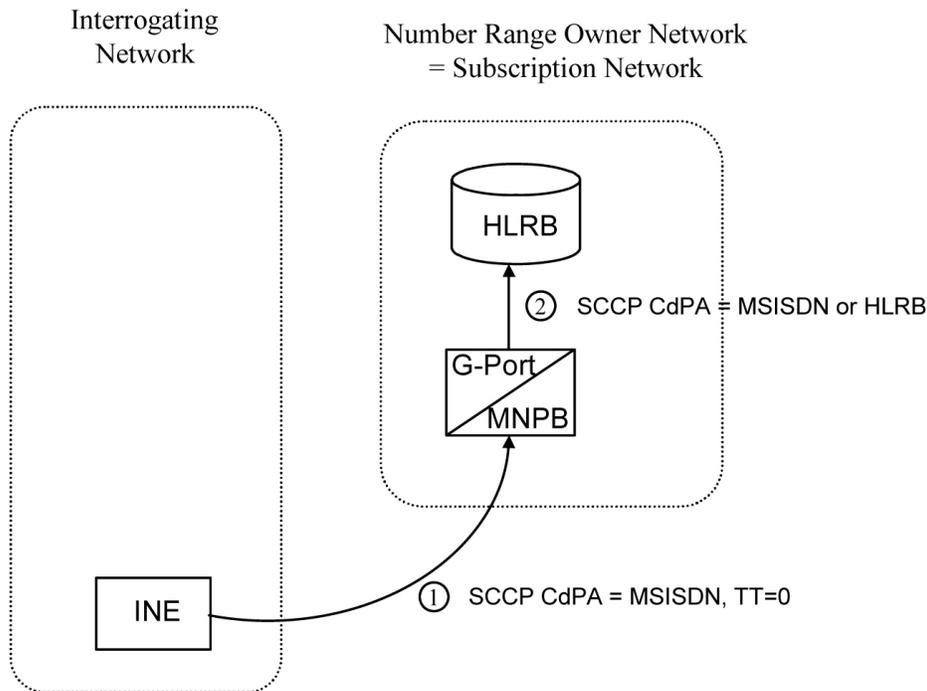
This call flow assumes the originating network is not the subscription network.

1. When the call is originated, VMSCA sends an IAM message to GMSCA.
2. GMSCA sends an 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 database. A match is found, but the Routing Number and HLR Address fields are not populated.
3. The MNP-SRF responds to GMSCA with an 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 4: Non-Call Related Message for Non-Ported Number](#).

Figure 4: Non-Call Related Message for Non-Ported Number

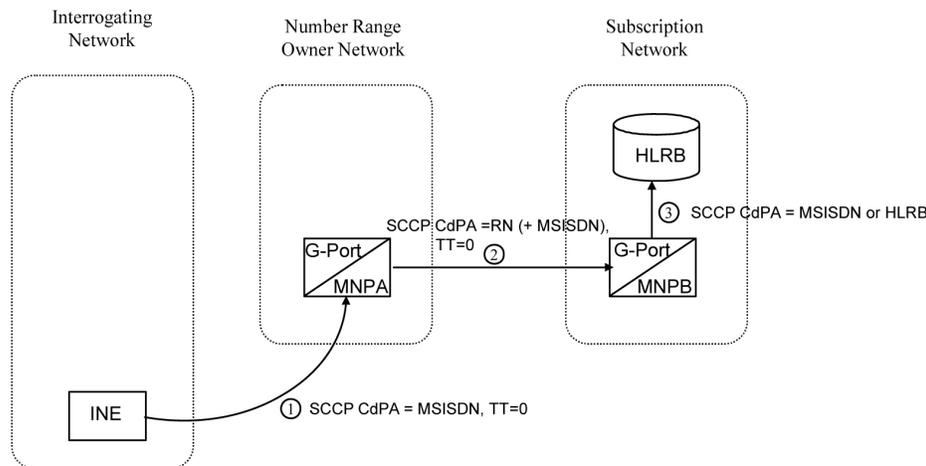


1. The Interrogating Network Entity (INE) sends the non-call related message to MNP-SRFB in the number range owner network. The SCCP CdPA contains the MSISDN number of the subscriber and the TT. The TT may be either 0 as shown in the figure, or another value depending upon the service, such as TT=17 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 database. 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 5: Non-Call Related Message for Ported Number](#).

Figure 5: Non-Call Related Message for Ported Number

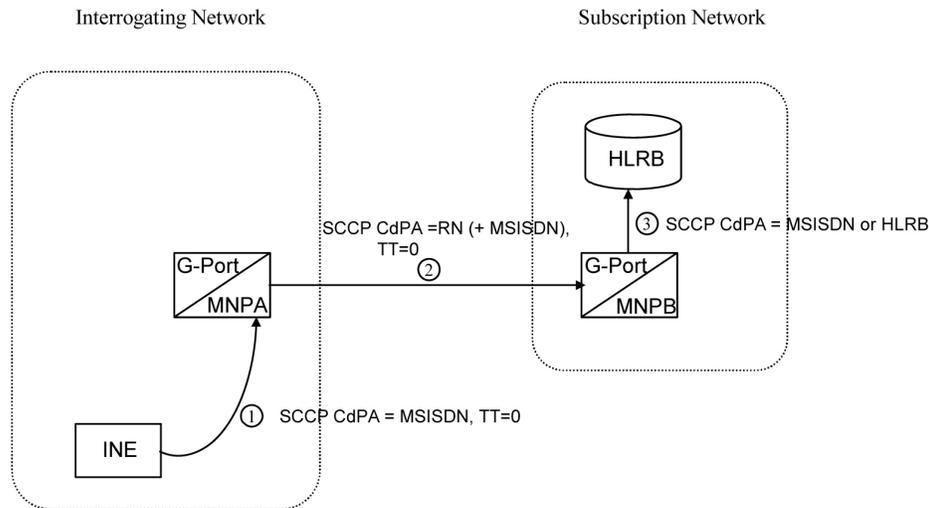


1. The Interrogating Network Entity (INE) sends a non-call related message to MNP-SRFA in the number range owner network. The SCCPCdPA contains the MSISDN number of the subscriber and the TT. The TT may be either 0 as shown in the figure, or another value depending upon the service, such as TT=17 for 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 SCCPCdPA to search the database. 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 does not require Optimal Routing). It checks if the SCCPCdPA begins with a Prefixed RN. If it does, it removes the prefix. In either case, it uses the MSISDN from the SCCPCdPA to search the database. A match is found, and MNP-SRFB uses the HLRGT 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-porting number by direct routing. Refer to [Figure 6: Non-Call Related Message for Any Number](#).

Figure 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 database.
 - 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 does not require Optimal Routing). It checks to see if the SCCP CdPA begins with a Prefixed RN. If so, it removes the prefix. In either case, it uses the MSISDN from the SCCP CdPA to search the database.
 - 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.

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 MSISDNs. 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
- 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 HLR of the recipient network or to the subscription network.

Figure 7: G-Port Node in GSM Network 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, not known to be ported, or not identified 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-porting or porting-in.

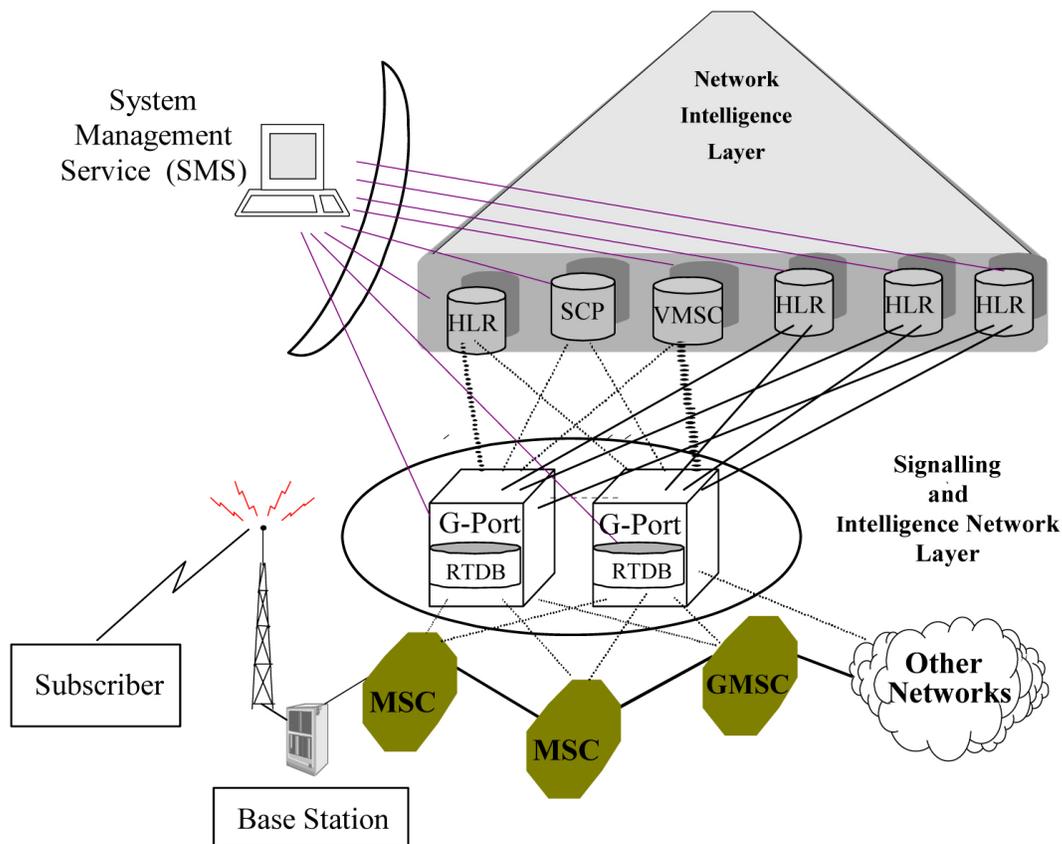
G-Port performs the following actions based on the message received and number status:

- If the message received is call-related SRI (not-SOR) and the number is ported-out, not known to be ported, or not identified to be ported, 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-porting or porting-in, G-Port performs an HLR translation and forwards the translated message to the HLR.

An additional user option allows configuration of G-Port to modify the above processing as follows:

- If the number is not found in the RTDB (individual or range), then G-Port returns a negative acknowledgement in response to an SRI.

Figure 7: G-Port Node in GSM Network



G-Port Considerations

The following items must be considered 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. With the Hex Digit Support for GTT feature enabled and turned on, Message Signaling Units (MSUs) containing either decimal or hexadecimal digits in the Called Party Address (CdPA) are processed. Unless the Hex Digit Support for GTT feature is enabled and turned on, GTT processes decimal digits only.

If the Hex Digit Support for GTT feature is not enabled and not turned on and an operator or 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, then the operator must enter the RN + DN number ranges as DN ranges in the RTDB. The beginning and ending DNs can be only 15 digits, which may not be sufficient for an RN + DN.

7. In this document, Mobile Number Portability (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 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 does not rely upon the use of this TT.
9. The routing number found in the 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.
11. All non-call related messages affected 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 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 one of these options:
 - a. If a CCNDC>MCCMNC match in GSMOPTS is found, then the MCCMNC is encoded.
 - b. If DefMCC is provisioned in GSMOPTS, then DefMCC is encoded.
 - c. Zero digits are encoded.
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 Numbering Requirements

Incoming called party numbers, from the SCCP portion, destined for G-Port processing are conditioned to fit the GDB requirements where possible. The following factors are used to condition the SCCP numbers.

- Based on provisioning: 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.
- Based on configurable options: 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.

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.

Numbers with more than fifteen 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 Hardware Configuration

Service Module card loading verifies the validity of the hardware configuration for the Service Module cards. Hardware verification includes the following.

- **Service Module Card Main Board Verification**

An AMD-K6 or better main board is required to support the VSCCP application on the Service Module card. EAGLE 5 ISS maintenance stores the validity status of the main board configuration of the Service Module card.

Note: The system does not allow the feature to be turned on if the hardware configuration is invalid.

- During initialization, the VSCCP application 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 Service Module 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 application, loading of the Service Module card is automatically inhibited.
- **Service Module Card Applique Memory Verification**

The VSCCP application performs two types of memory validation to determine whether a Service Module card has sufficient memory to run the feature:



CAUTION: The feature cannot be enabled if any of the Service Module cards have less than 4 GB of memory installed. Refer to Technical Reference *Dimensioning Guide for EPAP Advanced DB Features* for information about the dimensioning rules and the Service Module card database capacity requirements.

- **Local Memory Validation** . When the feature is enabled and the Service Module card is initializing, VSCCP checks whether the Service Module card has at least 4GB of memory installed.
- **Real-Time Memory Validation (during card initialization)**. After communications between the Service Module card and EPAP have been established and the Service Module card has joined the RMTP Tree, the EPAP starts downloading the RTDB to the Service Module card. After the Service Module card has downloaded the RTDB, the Service Module card continues to receive database updates as necessary. The EPAP includes the size of the current RTDB in all records sent to the Service Module card. The Service Module card compares the size required to the amount of memory installed and issues a minor alarm if the database exceeds 80% of the Service Module card memory. If the database completely fills the Service Module card memory, a major alarm is issued, the Service Module card leaves the RMTP tree, and the status of the Service Module card changes to IS-ANR/Restricted. The Service Module card continues to carry traffic.

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

When the hardware configuration for a Service Module card is determined to be invalid for the application, SCM automatically inhibits loading for that specific Service Module card. A major alarm is generated indicating that card loading for that Service Module card has failed and has been automatically inhibited (that is, prevented from reloading again). Refer to [G-Port Related Alarms](#) for the specific alarm that is generated. When card loading has been inhibited, the primary state of the card is set to `oos-mt-dsbl` and the secondary state of the card is set to MEA (Mismatch of Equipment and Attributes).

These actions apply to a Service Module card determined to be invalid:

- The Service Module card will not download the EAGLE 5 ISS databases.
- The Service Module card will not download the RTDB from the EPAP.
- The Service Module card will not accept RTDB updates (add, change, delete) from the EPAP, nor will it accept STP database updates.

To activate loading of a Service Module card that has been automatically inhibited, enter the `alw-card` command (`alw-card:loc=xxxx`).

- **Unstable Loading Mode**

At some point, having a number of invalid Service Module cards results in some of the Link Interface Modules (LIMs) being denied SCCP services. The threshold is monitored; if the number of valid Service Module cards is insufficient to provide service to at least 80% of the IS-NRLIMs, the system is determined to be in an unstable loading mode. For additional reasons an EAGLE 5 ISS might be in an unstable loading mode, refer to [Loading Mode Support](#).

Maintenance Commands

These commands are used for G-Port maintenance.

- The debug command `ent-trace` traps G-Port Message Signaling Units (MSUs) based on the point code of the switch that generated the MSU (SSP), a particular DN and entity ID. For MSISDN and entity ID, the comparison is based on the search key built from the CdPA Global Title Address

Information (GTAI) after any conditioning. The existing GT SCCP trigger also applies to G-Port messages.

- The command `rept-stat-sccp` reports current MNP statistics. An MSU is considered to be a G-Port MSU after SRVSEL. This command reports G-Port statistics on the basis of a specific Service Module card or on a G-Port system basis.

For more information, refer to [Maintenance](#).

G-Port Loading Mode Support

Loading mode support is not applicable for RTDB updates because Service Module cards use incremental loading from the EPAP. STP Administrative updates are allowed while a Service Module 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 General Purpose Service Module II (GPSM-II) cards destined for the Service Module cards.

Audit Requirements

The G-Port audit does not change EAGLE 5 ISS compliance to STP audit requirements. G-Port subscriber database tables residing on the EAGLE 5 ISS TDM fixed disks are audited by the existing STP audit, which verifies tables on the EAGLE 5 ISS active and standby TDMs. Additional audit mechanisms for G-Port tables residing on the EPAP platform that are downloaded to the Service Module cards are:

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

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

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](#)
- [MNP Re-Routing](#)
- [MNP 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. This feature also provides the option to mark G-Port `OFFLINE` to perform a controlled re-routing during this state.

MNP Re-Routing

MNP 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`.

MNP Capability Point Codes

Capability Point Codes (CPC) are also supported for G-Port. The use of MNP capability point code aids the adjacent nodes in knowing about G-Port outages. When G-Port is brought down through 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.

MNP 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 CPC Type.

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. After the feature is turned `online`, G-Port starts processing messages if at least one Service Module 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 Service Module cards will not change the service state. Commands must be used to change the service state.

G-Port supports up to seven alternate PCs per domain. All six domains (`ANSI`, `ITU-I`, `ITU-I Spare`, `ITU-N`, `ITU-N Spare`, and `ITU-N24`) are supported. An entire set of alternate PCs is 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 through 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 through to GTT as two possible options. Rerouting to alternate point code has priority over falling through 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-route 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:pci3=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:pci3=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-routed. 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 6: G-Port SCCP Service Re-Route Capability Summary shows the actions taken when the G-Port service is offline, a message arrives at the affected node requiring G-Port service, and Service Module cards are available.

Table 6: 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 |

| 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 | 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 |

| Result of service selector | DPC | Alternate point code defined and available | GTT to be performed as fall through | Message Handling | Network Management |
|--------------------------------------------------------------------------------|----------------------------------------|--------------------------------------------|-------------------------------------|---------------------------------|--------------------|
| Not G-Port | True or Secondary PC or non-G-Port CPC | N/A | N/A | Perform appropriate Service/GTT | None |
| * Alternate point codes are defined and unavailable (prohibited or congested). | | | | | |

Table 7: G-Port LIM Re-Route Message Handling Summary shows the actions of LIM re-route functionality when Service Module cards are unavailable or down.

Table 7: 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 |
| * A partial failure occurs if some Service Module cards are available but are overloaded. | | | | | |

MT-Based GSM SMS NP

The Mobile Terminated-Based GSM SMS NP feature allows wireless operators to route short message service (SMS) messages destined to mobile subscriber within a number portability environment. If the Mobile Terminated (MT)-Based GSM SMS NP feature is not enabled and turned on, then messages are processed by the G-Port feature.

The MT-Based GSM SMS NP feature allows database lookup to be performed on short message service (SMS) messages that are routed from a short message service center (SMSC).

The MT-Based GSM SMS NP feature intercepts SRI_SM messages and sends response messages with routing information for out-of-network destination subscribers using the following process:

1. An SRI_SM message is intercepted by the Eagle 5 ISS before the message reaches the home location register (HLR).
2. The message destination address (SCCP Called Party GTA) is extracted, the digits are conditioned, and lookup is performed in the database.
3. If the destination address/subscribers belongs to a foreign network, then a reply message is sent to the SMSC with routing information. If the destination address/subscribers belongs to a local network, then the SRI_SM message is relayed to the HLR.

Options

The MT-Based GSM SMS NP feature provides configurable options for controlling processing of SRI_SM messages and the content of the response:

- Selecting the SMSC response message type and digit format
- Specifying when a database lookup is considered to be successful
- Specifying the format of digits encoded in the response message.

Feature Control Requirements

The MT-Based GSM SMS NP feature has the following control requirements:

- The defcc parameter in the `chg-stpopts` command must be set to a value other than **none** before the feature can be turned on.
- The defmcc parameter in the `chg-gsmopts` command must be set to a value other than **none** before the feature can be turned on.
- A FAK for part number 893-0200-01
- The G-Port feature must be enabled before the MT-Based GSM SMS NP feature can be enabled.
- The G-Port feature must be turned on before the MT-Based GSM SMS NP feature can be turned on.
- The MT-Based GSM SMS NP feature cannot be enabled if the LNP feature is enabled.
- A temporary FAK cannot be used to enable the feature.
- The feature cannot be turned off after it has been turned on.

System Options for MT-Based GSM SMS NP

The system level options that control the MT-Based GSM SMS NP feature are stored in the GSMSMSOPTS database table. The MT-Based GSM SMS NP feature must be enabled before the following options in the GSMSMSOPTS table can be provisioned.

The content of the GSMSMSOPTS table is used to help perform number conditioning, response generation, and other feature-specific options. [Table 8: MT-Based GSM SMS NP Options](#) shows the options stored in the GSMSMSOPTS table, their possible values, and the action taken for each value.

Table 8: MT-Based GSM SMS NP Options

| GSMSMSOPTS Option | Value | Action in the EAGLE 5 ISS |
|-------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MTSMSIMSI | RN | This setting specifies the required format of digits which will be encoded in the "IMSI" parameter of the SRI_SM return result response (ACK). Note: The MT-Based GSM SMS NP feature will require STPOPTS:DefCC to be set before the feature can be activated. Also, DefCC will not be allowed to change to "NONE" as long as this feature is turned ON. |
| | RNDN | |
| | CCRNDN | |
| | DN | |
| | SRFIMSI | IMSI is encoded from the "SRFIMSI" parameter from the RTDB entity. |
| | MCCRNDN (default) | IMSI is encoded as MCCRNDN. The MCC will be encoded using the GSMOPTS:DefMCC setting. Note: The MT-Based GSM SMS NP feature requires GSMOPTS:DefMCC to be set before the feature can be turned on. GSMOPTS:DefMCC will not be allowed to change to "NONE" as long as this feature is turned ON. |
| MTSMSNNI | RN (default) | This setting specifies the required format of digits which will be encoded in the "Network Node Number" parameter ISDN digits field within the LocationInfoWithLMSI TCAP parameter in the of the SRI_SM response (ACK). In the response, the Nature of Number field will always be encoded as "International" (0x1) and the numbering plan will always be encoded as ISDN/Telephony Numbering (Rec ITU-T E.164) (0x1). |
| | RNDN | |
| | CCRNDN | |
| | DN | |
| | SRFIMSI | IMSI is encoded from the "SRFIMSI" parameter from the RTDB entity. |

| GSMSMSOPTS Option | Value | Action in the EAGLE 5 ISS |
|-------------------|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | MCCRNDN | IMSI is encoded as MCCRNDN. The MCC will be encoded using the GSMOPTS:DefMCC setting. Note: The MT-Based GSM SMS NP feature requires GSMOPTS:DefMCC to be set before the feature can be turned ON. GSMOPTS:DefMCC will not be allowed to change to "NONE" as long as this feature is turned ON. |
| | NONE | This parameter is not encoded in the response message. The LocationInfoWithLMSI TCAP parameter is included; the Network Node number sub-parameter is present; however the length of the parameter is 0. |
| MTSMSTYPE | SP | When the lookup in the RTDB has entitytype=SP, then the lookup is considered successful. |
| | RN (default) | When the lookup in the RTDB has entitytype=RN, then the lookup is considered successful. |
| | SPRN | When the lookup in the RTDB has entitytype=SP or RN, then the lookup is considered successful. |
| | ALL | When the lookup in the RTDB has entitytype=SP or RN or no_entity, then the lookup is considered successful. |
| | NONSP | When the lookup in the RTDB does not have an entitytype SP, then the lookup is considered successful. This could mean that no entity was found or an entity with type RN was found. |
| | Note: This option is applied to messages in which the source is considered to be a Home SMSC. | |
| MTSMSACKN | ACK (default) | This indicates that when the SRI_SM lookup is considered successful, a SRI_SM_ACK (Return Result Last) is sent back. |
| | NACK | This indicates that when SRI_SM look is considered successful, a SRI_SM_NACK (Return Error) is sent back. |
| | Note: This option is applied to messages in which the source is considered to be a Home SMSC. | |
| MTSMSDLTR | NO (default) | This option specifies if delimiter digit(s) need to be inserted in the MTSMSIMSI and MTSMSNNI digits. A value of NO means that no delimiter is inserted. |

| GSMSMSOPTS Option | Value | Action in the EAGLE 5 ISS |
|-------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | PRERN | This option specifies that a delimiter (MTSMSDLTRV) is to be inserted before the RN when the RN is used in the MTSMSIMSI and MTSMSNNI digits. (RN included in the digit format is MTSMSDLTRV + RN from RTDB) |
| | POSTRN | This option specifies that a delimiter (MTSMSDLTRV) is to be inserted after the RN when the RN is used in the MTSMSIMSI and MTSMSNNI digits. (RN included in the digit format is RN from RTDB + MTSMSDLTRV) |
| MTSMSDLTRV | 1-5 hex digits | <p>This specifies if delimiter digit(s) need to be inserted in the MTSMSIMSI and MTSMSNNI if required (per MTSMSDLTR). This value can consist of 1-5 hexadecimal digits. A value must be defined here before MTSMSDLTR can be set to PRERN or POSTRN.</p> <p>Once set, the MTSMSDLTRV can never be configured to "NONE" again.</p> |
| MTSMSNAKERR | 0-255 (default is 0x1 - Unknown Subscriber) | <p>This specifies the TCAP error choice code to be included in the SRI_SM_ACK generated by SMS_MT.</p> <p>Note: This option will affect only the Error code choice byte. Certain error code choices (e.g., systemFailure and callBarred) have additional mandatory data as per GSM specifications. However, the MT-Based GSM SMS NP feature will not encode any additional data in SRI_SM_NACK.</p> <p>Note: The MTSMSNAKERR is applicable to responses generated to both the SMSC and MMSC.</p> |
| MTSMSCHKSRC | YES | <p>This parameter value specifies that the SCCP CgPA GTA of the message will be used to determine whether the source of the message is a Home SMSC.</p> <p>If this option is set to YES and the SCCP CgPA GTA is present and there is not a match in the Home SMSC list, the source of the message is not considered to be a Home SMSC. In this case, the message is considered inapplicable for MT-SMS processing.</p> |

| GSMSMSOPTS Option | Value | Action in the EAGLE 5 ISS |
|-------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | <p>If this option is YES and SCCP CgPA GTA is not present or has a 0 length, then it is assumed that the source is a Home SMSC.</p> <p>If this option is YES and SCCP CgPA GTA is present and there is a match in the Home SMSC list, then the message source is considered to be Home SMSC.</p> <p>Note: The order of checks performed follows:</p> <ol style="list-style-type: none"> 1. Home MMSC check is performed. If a Home MMSC check is to be performed (The MT-Based GSM MMS NP Feature is turned ON and GSMSMSOPTS:MTMMSGTA is not "NONE"), the SCCP CgPA GTA will be compared against GSMSMSOPTS:MTMMSGTA for a match. A match identifies the source to be a Home MMSC. This option (MTSMSCHKSRC) does not influence this first check for Home MMSC. 2. If the Home MMSC check is not successful, AND MTSMSCHKSRC is YES, then Home SMSC check is required if SCCP CgPA GTA is present. |
| | NO (default) | <p>This parameter value specifies that Eagle will not validate the SCCP CgPA GTA for Home SMSC check. If the initial check for Home MMSC is not successful and if this option is NO, then the source is assumed to be Home SMSC.</p> <p>This option may be used by the service provider to disable SCCP CgPA-checking for Home SMSC check, if the service provider ensures that only in-network nodes will send SRI_SM and receive the response generated by this feature.</p> |

MT-Based GSM SMS and MMS NP Call Flows

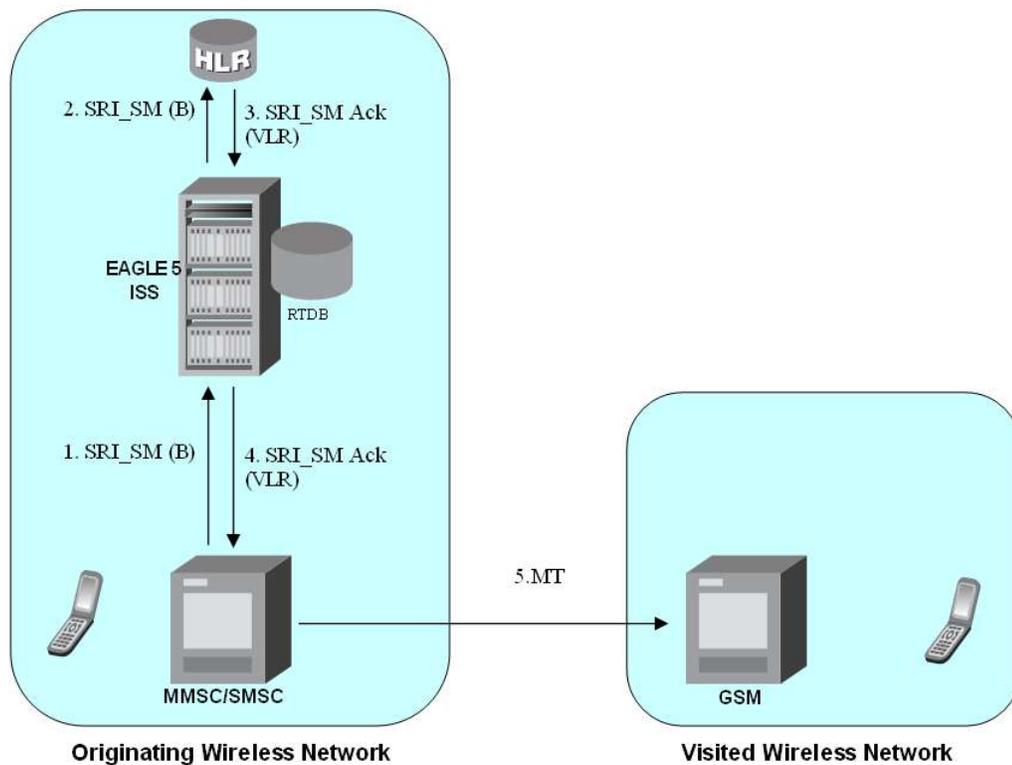
This section illustrates the sequence of messages that occur in the processing of SMS and MMS messages destined for mobile-terminated subscribers in a number portability environment. Two scenarios exist:

- The called subscriber that is in the same network as the calling subscriber
- The called subscriber that is in a different network from the calling subscriber

MT-Based GSM SMS and MMS NP Call Flow for In-Network Subscriber

Figure 8: MT-Based GSM SMS and MMS NP Call Flow for In-Network Subscriber depicts the message and control flows for a called subscriber that is in the same network as the calling subscriber.

Figure 8: MT-Based GSM SMS and MMS NP Call Flow for In-Network Subscriber



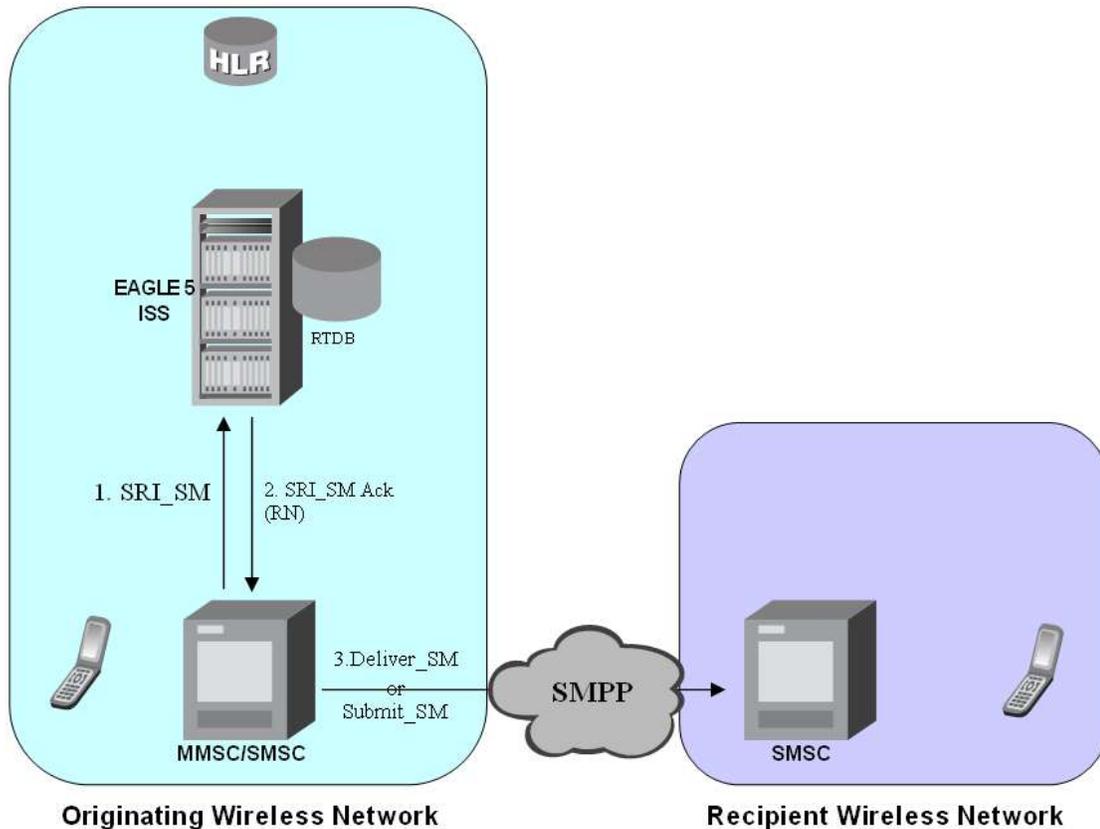
Call considerations:

- The TCAP calling party is a wireless GSM subscriber.
- The TCAP called party is a non-porting or ported-in wireless subscriber that belongs to the same carrier.
- The call type is SMS or MMS.
- SMSC has to be reconfigured to generate SRI_SM to the HLR, regardless of called subscriber number being in or out of its own numbering range.
- In case called subscriber is ported-in, it has to be provisioned individually.
- In case called subscriber is TDMA, the Eagle Migration feature ensures that the message gets delivered in the TDMA network.

MT-Based GSM SMS and MMS NP Call Flow for Other-Network Subscriber

Figure 9: MT-Based GSM SMS and MMS NP Call Flow for Other-Network Subscriber depicts the message and control flows for a called subscriber that is a different network from the calling subscriber.

Figure 9: MT-Based GSM SMS and MMS NP Call Flow for Other-Network Subscriber



Call considerations:

- The TCAP calling party is a wireless GSM subscriber.
- The TCAP called party is a non-ported or ported-out wireless subscriber that belongs to a different carrier from the TCAP calling party.
- The call type is SMS or MMS.
- The SMSC (Short Message Service Center) has to be configured to associate the RNs to their respective carriers.
- The called subscriber must be provisioned individually.

MT-Based GSM MMS NP

The Mobile Terminated (MT)-Based GSM MMS NP feature allows wireless operators to route Multimedia Message Service (MMS) messages destined to mobile subscriber within a number portability (NP) environment. If the MT-Based GSM MMS NP feature is not enabled and turned on, then messages are processed by the G-Port feature.

The Mobile Terminated (MT)-Based GSM MMS NP feature allows database lookup to be performed on MMS messages that are routed from a Multimedia Message Service Center (MMSC).

The MT-Based GSM MMS NP feature intercepts SRI_SM messages and sends response messages with routing information for out-of-network destination subscribers using the following process:

1. An SRI_SM message is intercepted by the Eagle 5 ISS before it reaches the home location register (HLR).
2. The message destination address (SCCP Called Party GTA) is extracted, the digits are conditioned, and lookup is performed in the database.
3. If the destination address/subscribers belongs to a foreign network, then a reply message is sent to the MMSC with routing information. If the destination address/subscribers belongs to a local network, then the SRI_SM message is relayed to the HLR or according to the options set for normal G-Port routing.

Options

The MT-Based GSM MMS NP feature provides the following configurable options for controlling processing of Multimedia Message Service (MMS) routing request messages and the content of the response:

- Selecting the Multimedia Message Service Center (MMSC) response message type and digit format
- Specifying when a database lookup is considered to be successful
- Specifying the format of digits encoded in the response message
- Specifying the number of digits in the SRI_SM ACK response message

Feature Control Requirements

The MT-Based GSM MMS NP feature has the following control requirements:

- The MT-Based GSM SMS NP feature must be enabled and turned on.
- A FAK for part number 893-0241-01
- The feature cannot be turned off after it has been turned on.
- A temporary FAK cannot be used to enable the feature.

System Options for MT-Based GSM MMS NP

The system level options that control the MT-Based GSM MMS NP feature are stored in the GSMSMSOPTS database table. The MT-Based GSM MMS NP feature must be enabled before the GSMSMSOPTS table can be provisioned.

The content of the GSMSMSOPTS table is used to help perform number conditioning, response generation, and other feature-specific options. [Table 9: MT-Based GSM MMS NP Options](#) shows the feature-specific options stored in the GSMSMSOPTS table, their possible values, and the action taken for each value.

Note: The options described in [Table 9: MT-Based GSM MMS NP Options](#) are accessible only when the MT-Based GSM MMS NP feature is enabled. Processing of MSUs from MMSCs will also require the use of the GSMSMSOPTS options described for the MT-Based GSM SMS feature in [Table 8: MT-Based GSM SMS NP Options](#).

Table 9: MT-Based GSM MMS NP Options

| GSMSMSOPTS | Value | Action in the EAGLE 5 ISS |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MTMMSGTA | 5-21 hex digits (default is NONE) | <p>This option pertains to Home MMSC check. When an SCCP CgPA GTA is present in the message, this option is used to compare the SCCP CgPA GTA of the incoming SRI_SM message to determine whether the originator is a Home MMSC. If a match is found, the MTMMSTYPE and MTMMSACKN options are used to determine whether SRI_SM ACK or NACK is to be sent, and the conditions when lookup is considered to be successful for MMS.</p> <p>The nature of match is a “Prefix match”. That is, the leading digits must match all the digits provisioned in MTMMSGTA.</p> <p>Note: The digits for compare can have more than the number of digits configured in MTMMSGTA</p> <p>This option can be set to NONE at any time.</p> <p>A value of NONE implies that the special processing of MMS is not required, and MT-Based SMS NP processing will follow. A setting of NONE will not match any SCCP CgPA GTA.</p> |
| MTSMSTYPE | SP | When the lookup in the RTDB has entitytype=SP, then the lookup is considered successful. |
| | RN (default) | When the lookup in the RTDB has entitytype=RN, then the lookup is considered successful. |
| | SPRN | When the lookup in the RTDB has entitytype=SP or RN, then the lookup is considered successful. |
| | ALL | When the lookup in the RTDB has entitytype=SP or RN or no_entity, then the lookup is considered successful. |
| | NONSP | When the lookup in the RTDB does not have an entitytype SP, then the lookup is considered successful. This could mean that no entity was found or an entity with type RN was found. |
| | <p>Note:</p> <p>This option is applied to messages in which the source is considered to be a Home SMSC.</p> <p>Duplicate options are provided for this parameter for MTMMS and MTSMS in order to be able to control processing of messages from the Home MMSC independently from those coming from a Home SMSC.</p> | |

| GSMSMSOPTS | Value | Action in the EAGLE 5 ISS |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MTMMSACKN | ACK (default) | This indicates that when the SRI_SM lookup is considered successful, a SRI_SM_ACK (Return Result Last) is returned. |
| | NACK | This indicates that when SRI_SM lookup is considered successful, a SRI_SM_NACK (Return Error) is returned. |
| | <p>Note:</p> <p>This option is applied to messages in which the source is considered to be a Home SMSC.</p> <p>Duplicate options are provided for this parameter for MTMMS and MTSMS in order to be able to control processing of messages from the Home MMS independently from those coming from a Home SMSC.</p> | |
| MTMMSENTYLEN | 1 - 15 (default is NONE) | This indicates the maximum number of digits used from the entity value of a returned RN, SP, or SRFIMSI entity for MMS processing. Digits that exceed the configured maximum are concatenated. numbers. The parameter value <i>NONE</i> indicates that all returned digits are used. |
| MTMMSLEN | 1 - 24 (default is NONE) | This indicates the maximum number of digits used in the returned IMSI or NNN fields for MMS processing. Digits that exceed the configured maximum are concatenated. numbers. The parameter value <i>NONE</i> indicates that all digits are used. |

MT-Based GMS MMS NP Call Flows

The MT-Based GMS MMS NP feature call flows are identical to those used by the MT-Based GMS SMS NP feature and are described in [MT-Based GSM SMS and MMS NP Call Flows](#).

G-Port SRI Query for Prepaid

When the G-Port SRI Query for Prepaid feature is enabled and turned on, incoming SRI TT, OPC, and GTA values are compared against the values in the GSERV table. If no match is found, or if no values are provisioned in the GSERV table, normal G-Port SRI processing is performed on the message. If a match is found for one or more of the values, the message is treated as a Prepaid Query. The G-Port SRI Query for Prepaid feature affects only SRI messages. All other messages, including SRI-SM and SRI-GPRS messages, are processed by normal G-Port service.

After an SRI message is identified as requiring G-Port SRI Query for Prepaid service, the EAGLE 5 ISS performs a Mobile Number Portability (MNP) database lookup on the Mobile Station Integrated

Services Digital Number (MSISDN). The results of the lookup are returned to the SCP that originated the query.

A TCAP/MAP error specifically related to a decoding error in the SRI MSISDN parameter causes an “Unsupported/Unexpected Data Value” MAP error. All other TCAP/MAP errors cause the message to be relayed to a Home Location Register (HLR), which then returns the appropriate MAP error based on the status of the subscriber (e.g. Unknown, Barred, etc.)

If a TCAP error is detected, then the message relay is based on information in the Real Time Database (RTDB). SCCP level errors cause the return on a UDTs message to the Prepaid SCP.

The G-Port SRI Query for Prepaid feature requires a Feature Access Key and cannot be turned off after it is turned on.

Service Portability support for G-Port SRI Query for Prepaid

Service Portability support for the G-Port SRI Query for Prepaid feature allows the RTDB GRN Entity digits to be used in digits formats for own-network GSM and IS41 subscribers in place of the SP entity digits or RN/PT=0 entity digits, where RN or SP is Network Entity Type and PT is Portability Type.

The Service Portability support for the G-Port SRI Query for Prepaid feature requires a Feature Access Key. The Service Portability feature can be turned off after it is turned on.

The SPORTTYPE configuration option indicates whether Service Portability will apply to SRI Query for Prepaid messages for own-network subscribers (IS41, GSM, or all). When Service Portability is applicable, GRN digits are used in place of RN digits during construction of the MSRN.

The Default RN configuration option is applicable in general to Number Portability, and can be used whether Service Portability feature is on or off. When the Service Portability feature is on, the Default RN is applicable in cases where Service Portability usage of GRN does not apply. Refer to [Table 10: RN Digits for Subscriber Type = RN/0 \(Own Subscriber - IS41\) with Service Portability On](#) and [Table 11: RN Digits for Subscriber Type = SP \(Own Subscriber - GSM\) with Service Portability On](#). When the Service Portability feature is off, Default RN digits can be used for own-network subscribers during construction of the MSRN. Refer to [Table 12: RN Digits with Service Portability Off](#).

G-Port SRI Query for Prepaid must be enabled to provision the GSMOPTS:DFLTRN option. Both G-Port SRI Query for Prepaid and Service Portability must be enabled to provision the GSMOPTS:SPORTTYPE option. RTDB DN data must be provisioned with RN or SP entity for Service Portability support for the G-Port SRI Query for Prepaid feature. Other EPAP-related features that use the GRN field are mutually exclusive with the Service Portability feature.

Table 10: RN Digits for Subscriber Type = RN/0 (Own Subscriber - IS41) with Service Portability On

| GSMOPTS:SPORTTYPE Value | GSMOPTS:DFLTRN = NONE | GSMOPTS:DFLTRN = DIGITS |
|-------------------------|-----------------------|-------------------------|
| NONE | RN=RTDB RN Entity ID | RN=DFLTRN |
| GSM | RN=RTDB RN Entity ID | RN=DFLTRN |
| IS41 | RN=GRN | |

| GSMOPTS:SPORTTYPE Value | GSMOPTS:DFLTRN = NONE | GSMOPTS:DFLTRN = DIGITS |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| | If GRN is not provisioned, DFLTRN is not used. MSISDN digits are sent. The subscriber is incorrectly provisioned and needs to have a GRN assigned. | |
| ALL | RN=GRN If GRN is not provisioned, DFLTRN is not used. MSISDN digits are sent. The subscriber is incorrectly provisioned and needs to have a GRN assigned. | |

Table 11: RN Digits for Subscriber Type = SP (Own Subscriber - GSM) with Service Portability On

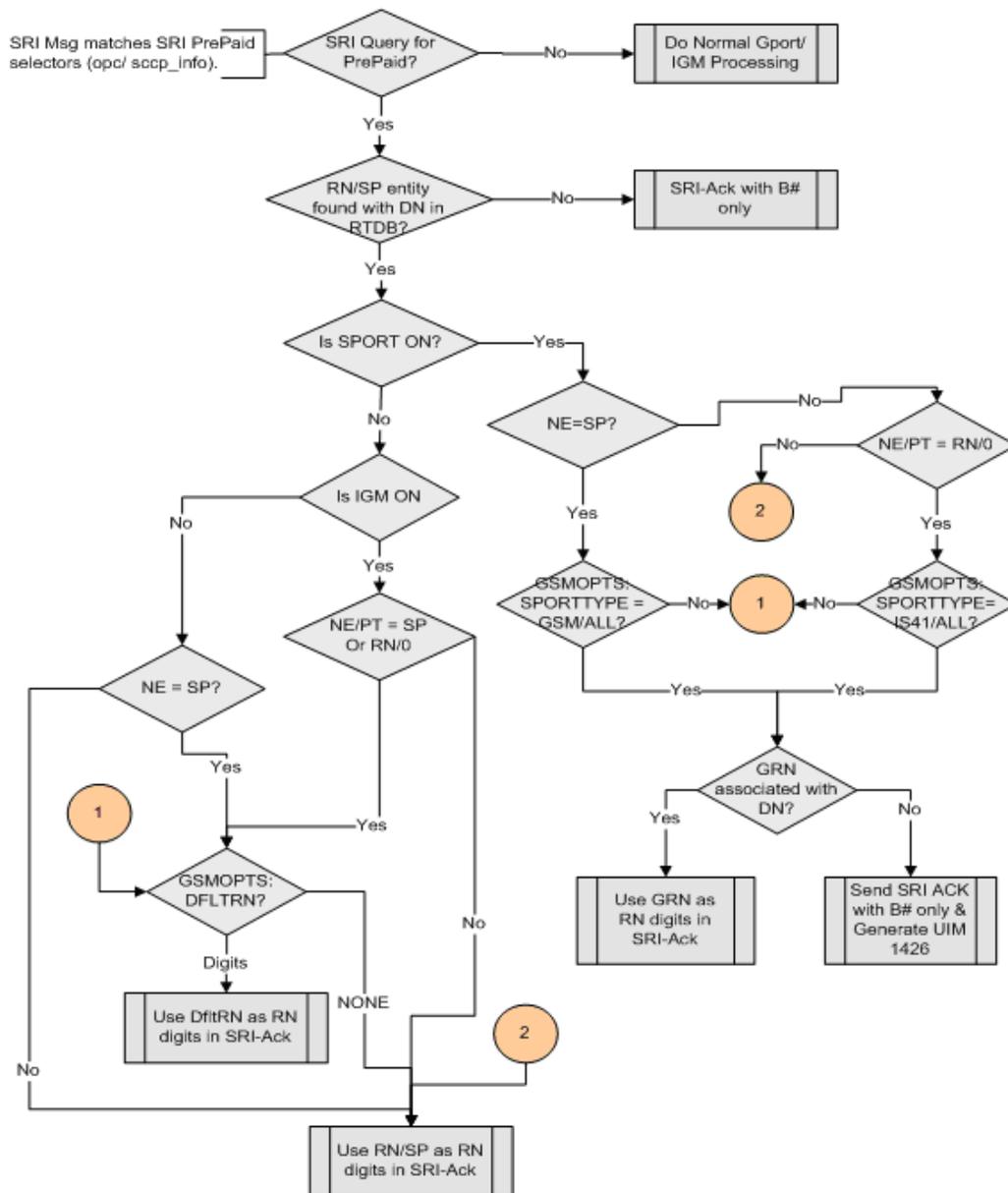
| GSMOPTS:SPORTTYPE Value | GSMOPTS:DFLTRN = NONE | GSMOPTS:DFLTRN = DIGITS |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| NONE | RN=RTDB SP Entity ID | RN=DFLTRN |
| GSM | RN=GRN If GRN is not provisioned, DFLTRN is not used. MSISDN digits are sent. The subscriber is incorrectly provisioned and needs to have a GRN assigned. | |
| IS41 | RN=RTDB SP Entity ID | RN=DFLTRN |
| ALL | RN=GRN If GRN is not provisioned, DFLTRN is not used. MSISDN digits are sent. The subscriber is incorrectly provisioned and needs to have a GRN assigned. | |

Table 12: RN Digits with Service Portability Off

| Subscriber Type returned from RTDB | GSMOPTS:DFLTRN = NONE | GSMOPTS:DFLTRN = DIGITS |
|------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------|
| RN/PT = 0 | <i>IGM feature ON or OFF:</i> RN=RTDB RN Entity ID | <i>IGM feature ON:</i> RN=DFLTRN <i>IGM feature OFF:</i> RN=RTDB RN Entity ID |
| SP (own GSM) | <i>IGM feature ON or OFF:</i> RN=RTDB SP Entity ID | <i>IGM feature ON or OFF:</i> RN=DFLTRN |

| | | |
|-------------------------------------|-------------------------------------------------------|-------------------------|
| Subscriber Type returned from RTDB | GSMOPTS:DFLTRN = NONE | GSMOPTS:DFLTRN = DIGITS |
| RN/PT ≠ 0 (Other Licensed Operator) | IGM feature ON or OFF: RN = RTDB RN Entity ID | |
| No Entity Found | IGM feature ON or OFF: RN=EMPTY (Only B-Party Number) | |

Figure 10: Message Processing - Service Portability Support for SRI Query for Prepaid



GSM MAP SRI Redirect to Serving HLR

The GSM MAP SRI Redirect to Serving HLR feature provides the capability to resolve network problems introduced by maintaining equipment from multiple manufacturers with vendor-specific proprietary implementations. Normally, the G-Port feature relays an SRI message to an operator's own HLR for a ported-in number. This feature allows the operator to route those messages based on the type of equipment at the source MSC and destination HLR. Vendor Type, Vendor Number, and Vendor Prefix are used to provision this information.

If the originating Mobile Switching Center (MSC) of the Send Route Information (SRI) message and the destination Home Location Register (HLR) are the same vendor type, the message is relayed to the HLR associated in the RTDB to the service provider. If the originating MSC of the SRI message and the destination HLR are not the same vendor type, G-Port checks whether the vendor type is deployed in more than one network; each network has its own vendor/network prefixes. MSC SRI message Home Location Register (HLR)

If the vendor types of the originating MSC and destination HLR are different and the destination HLR vendor type is deployed in more than one network, the vendor/network prefix that points to the network where the hosting HLR resides is appended. If the vendor types of the originating MSC and destination HLR are different and the vendor type of destination HLR is deployed in only one network, the vendor/network prefix that is assigned to the network is appended.

The GSM MAP SRI Redirect to Serving HLR feature supports provisioning of a Vendor Prefix List of up to three entries and a Vendor ID List of up to 200 entries. Each Vendor Prefix List entry contains the Vendor Number and associated Vendor Prefix (maximum of six digits). Each Vendor ID List entry contains the Vendor ID, Vendor Type, and Vendor (network) Number. All Vendor IDs must be the same length which is provisionable for 1 to 15 digits using the `ent-vendid` command. A Vendor ID cannot be entered into the database until the associated Vendor Prefix is defined.

Table 13: Vendor Prefix List example

| Vendor Number | Vendor Prefix |
|---------------|---------------|
| 1 | 1004 |
| 2 | 1003 |
| 3 | 1004 |

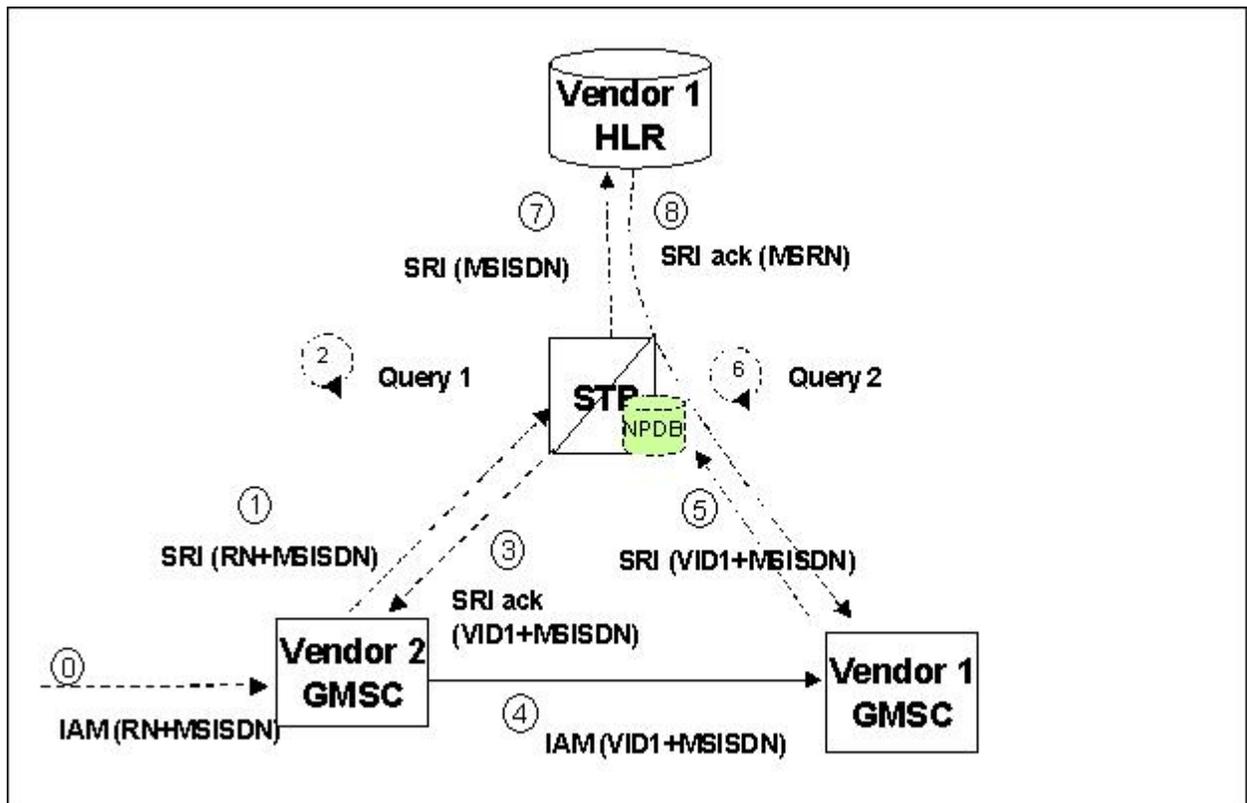
Table 14: Vendor ID List example

| Vendor/Network Type | Vendor Number | Vendor ID |
|---------------------|---------------|-----------|
| 1 | 1 | 886932 |
| 1 | 1 | 886935 |
| 1 | 3 | 886938 |
| 2 | 2 | 886936 |

GSM MAP SRI Redirect to Serving HLR Call Flows

Refer to [Figure 11: GSM MAP SRI Redirect to Serving HLR Call Flows](#) for a graphical representation of the GSM MAP SRI Redirect to Serving HLR call flow.

Figure 11: GSM MAP SRI Redirect to Serving HLR Call Flows



For a ported-in number, Gateway Mobile Switching Center (GSMC) Vendor 2 receives an Initial Address Message (IAM) with CdPN.

1. The receiving GMSC interrogates the Home Location Register (HLR) for the current location of the subscriber by issuing a Send Route Information (SRI) message.
2. When an SRI message is received that meets the G-Port service selector criteria, HomeRN deletion and number conditioning are performed on the DN. The DN database is searched. If the DN is found in the database with a service provider (HLR entity address) associated with the called party MSISDN, the Vendor ID list is searched for the service provider. If the service provider is found in the Vendor ID list, the CgPA is checked for a valid length GTA. The Vendor ID list is searched for the CgPA GTA. If the CgPA GTA is found in the Vendor ID list, the two vendor numbers associated with the CgPA GTA and the service provider are compared. If the GMSC and the HLR are the same vendor type, go to step #7. If the GMSC and the HLR are different vendor types, go to step #3.
3. If the destination network belongs to a vendor type that is deployed in more than one network, an SRI_ACK is generated using the Vendor Prefix of the destination network as the RN. The MSRN is filled using various options provisioned in the GSMOPTS table for the G-Port SRI_ACK. The SRI_ACK is sent to the originating GMSC.

4. Based on the Vendor Prefix, the originating GMSC routes the call to the GMSC of the network associated with the vendor by the IAM.
5. The subscription network GMSC formulates and sends an SRI message to the Eagle 5 ISS to interrogate the current location of the subscriber.
6. G-Port performs a database lookup based on the MSISDN in the SRI and determines that the number belongs to its network. The service provider (HLR entity address) associated with the MSISDN and the CgPA GTA (GMSC/MSC) are confirmed to be the same vendor type. .
7. The SRI is relayed to the HLR associated to the service provider.
8. The HLR returns an SRI_ACK to the GMSC through the Eagle 5 ISS.

Hardware Requirements

EPAP-related features that perform an RTDB lookup require Service Module cards (DSM cards or E5-SM4G cards) running the VSCCP application. The EAGLE 5 ISS can be equipped with:

- Up to 25 (24+1) Service Module cards when EPAP is running in a T1000 AS
- Up to 32 (31+1) Service Module cards when EPAP is running in a T1200 AS

Features that do not perform an RTDB lookup require Service Module cards only for GTT processing that might be performed for the feature. These features can coexist in systems with EPAP, but do not require an EPAP connection.

MPS/EPAP Platform

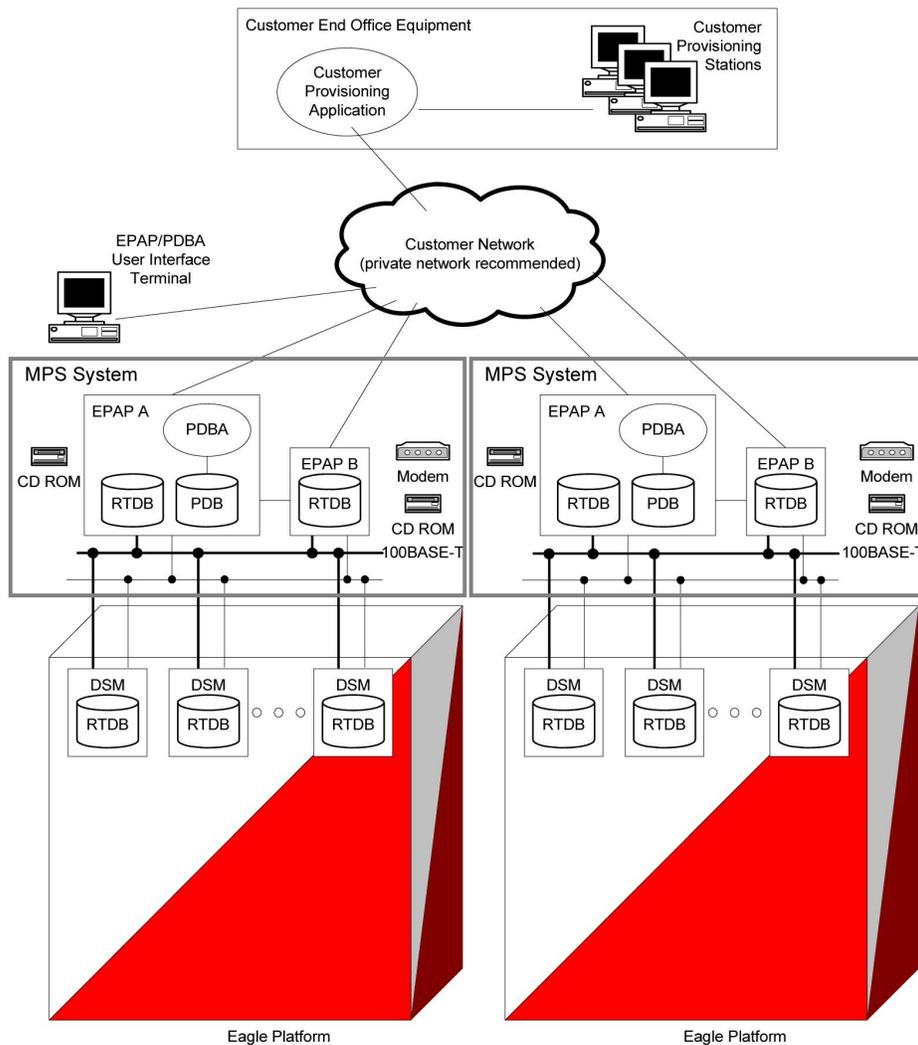
Tekelec provides the Multi-Purpose Server (MPS) platform as a subsystem of the EAGLE 5 ISS. The MPS provides support for EPAP-related features that perform Real Time Database (RTDB) lookups.

The MPS is composed of hardware and software components that interact to create a secure and reliable platform. For details about the MPS hardware, refer to *Tekelec 1000 Application Server Hardware Manual* or *Tekelec 1200 Application Server Hardware Manual*. The MPS provides the means of connecting the customer provisioning application with the EAGLE 5 ISS and accepts the customer number portability data, while accommodating numbers of varying lengths.

The EAGLE Provisioning Application Processor (EPAP) is software that runs on the MPS hardware platform. It collects and organizes customer provisioning data, and forwards the data to the EAGLE 5 ISS Service Module cards. [Figure 12: MPS/EPAP Platform Architecture](#) shows the overall system architecture from customer provisioning through the MPS subsystem to the EAGLE 5 ISS Service Module card databases.

Note: In this manual, Service Module card refers to either a DSM card or an E5-SM4G card unless a specific card is required. For more information about the supported cards, refer to *EAGLE 5 ISS Hardware Manual*.

Figure 12: MPS/EPAP Platform Architecture



Design Overview and System Layout

Figure 12: MPS/EPAP Platform Architecture identifies the tasks, databases and interfaces which constitute the overall system architecture. The system consists of two mated MPS servers. Each MPS contains two EPAP platforms - EPAP A and EPAP B with each containing a Real Time Database (RTDB) , Provisioning Database (PDB), servers, optical media, modems, and either network hubs when using a T1000 AS system or network switches when using a T1200 AS system . Each MPS and its associated EPAPs is an EPAP system ; the EPAP system and the mated EAGLE 5 ISS are the mated EPAP system . Each EPAP system is either a T1000 AS or a T1200 AS system with a total of four Ethernet interfaces: one from each EPAP to the 100BASE-T Ethernet and one from each EPAP to either a 10BASE-T or a 100BASE-T Ethernet. Refer to [Table 15: Service Module Card Provisioning and Reload Settings](#) for the link speed.

On the EAGLE 5 ISS, a set of Service Module cards, which hold the RTDB, is part of the STP. Two high-speed Ethernet links connect the Service Module cards and the EPAPs. One of the links is a 100BASE-T Ethernet bus, and the other is either a 10BASE-T or a 100BASE-T Ethernet bus. Refer to [Table 15: Service Module Card Provisioning and Reload Settings](#) for the link speed.

The RTDB is provisioned and maintained through the EPAPs. EPAP A and EPAP B act as the active EPAP and the standby EPAP. One link serves as the active link, and the other link as the standby link. Only one EPAP and one link are active at a time. The database is provisioned through the active link by the active EPAP; the other EPAP provides redundancy.

If the active EPAP fails, the standby EPAP takes over the role of active EPAP and continues to provision the subscriber database. If the active link fails, the active EPAP switches to the standby link to continue provisioning the Service Module cards. The two Ethernet links are part of the DSM network.

Another 100BASE-T Ethernet link exists between the EPAPs; that link is called the EPAP Sync Network.

The major modules on the EPAP are:

- Service Module card provisioning module
- Maintenance module
- RTDB module
- PDB module

The Service Module card provisioning module is responsible for updating subscriber databases on the EAGLE 5 ISS Service Module cards using the Reliable Multicast Transport Protocol (RMTP) multicast. The maintenance module is responsible for the proper functioning of the EPAP platform. The PDB module is responsible for preparing and maintaining the Real Time Database, which is the *golden copy* of the subscriber database. The PDB module can run on one of the EPAPs of either mated EAGLE 5 ISS.

Functional Overview

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

The RTDB on the EPAP contains a coherent, current copy of the subscriber database. If the current copy of the RTDB on the Service Module cards becomes *out-of-sync* because of missed provisioning or card rebooting, the EPAP Service Module card provisioning module sends database information through the provisioning link to the Service Module cards. The Service Module cards are reprovisioned with current subscriber information.

EPAP/PDBA Overview

The EAGLE Provisioning Application Processor (EPAP) platform and the Provisioning Database Application (PDBA), coupled with the Provisioning Database Interface (PDBI) facilitate the user database required for EAGLE 5 ISS EPAP-based features. The following functions are supported:

- Accept and store subscription data provisioned by the customer
- Update and reload subscriber databases on the Service Module cards

The PDBA operates on the master Provisioning Database (PDB). The EPAP and PDBA are both installed on the MPS hardware platform.

The EPAP platform performs the following:

- Maintains an exact copy of the real time database (RTDB) on the EPAP

- Distributes the subscription database to the Service Module cards
- Maintains a redundant copy of the RTDB database

The EPAP platform is a mated pair of processors (the upper processor, called EPAP A, and the lower processor, EPAP B) contained in one frame.

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

The primary interface to the PDBA consists of machine-to-machine messages. The interface is defined by Tekelec and is described in the Provisioning Database Interface Manual. Provisioning software compatible with the EPAP socket interface can be created or updated using the interface described in that manual.

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

The MPS/EPAP is an open-systems platform and easily accommodates the required high provisioning rates. Compared to the traditional OAM platform, the persistent database and provisioning in an open systems platform provides these benefits:

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

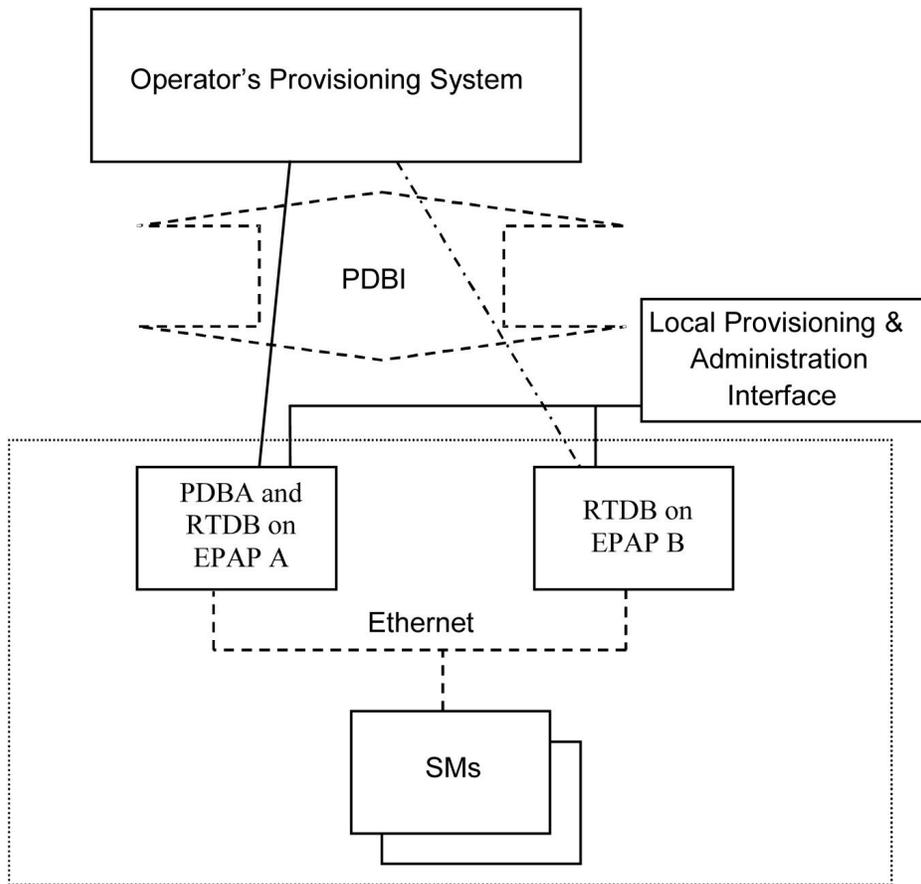
Each EPAP server maintains a copy of the Real Time Database (RTDB) in order to provision the EAGLE 5 ISS Service Module cards. The EPAP server must comply with the hardware requirements in the *MPS Hardware Manual*. [Figure 12: MPS/EPAP Platform Architecture](#) illustrates the EPAP architecture contained in the MPS subsystem.

Each EPAP has a dedicated optical media drive. One EPAP per EAGLE 5 ISS platform has a modem capable of supporting remote diagnostics, configuration, and maintenance. These remote operations are performed through EPAP login sessions and are accessible across the customer network as well as through a direct terminal connection to the EPAP using an RS232 connection. Refer to *Tekelec 1000 Application Server Hardware Manual* or *Tekelec 1200 Application Server Hardware Manual* for details about the hardware devices and network connections.

Subscriber Data Provisioning

[Figure 13: Subscriber Data Provisioning Architecture \(High Level\)](#) shows a high-level view of the subscriber data provisioning architecture. Only those parts of the EAGLE 5 ISS platform that are relevant to subscriber data provisioning are shown. This section defines requirements for the Provisioning Database Interface (PDBI) between the EPAP and the operator's provisioning system (OPS). Provisioning clients connect to the EPAPs via the PDBI. This interface contains commands that allow all of the provisioning and retrieval of subscription data. The PDBI is used for real-time provisioning of subscriber and network entity data only. Refer to *Provisioning Database Interface Manual* for more details.

Figure 13: Subscriber Data Provisioning Architecture (High Level)



A pair of active/standby EPAP servers provides the interface between the Real Time Database (RTDB) of the EAGLE 5 ISS Service Module cards and the OPS. EPAP A is equipped with both the PDB (Provisioning Database) and the RTDB, and EPAP B has only the RTDB. An EPAP with only the RTDB must be updated by the EPAP that is equipped with the PDB.

For more information about the EPAP, refer to *EPAP Administration Manual*. For more information about the MPS hardware, refer to *Tekelec 1000 Application Server Hardware Manual* or *Tekelec 1200 Application Server Hardware Manual*.

Distributed Administrative Architecture

This section describes, at a high level, the distributed administrative architecture for the EAGLE 5 ISS, including the EPAP.

Databases requiring high update and retrieval rates, such as the EPAP RTDB, are populated using redundant Ethernet connections to Service Module cards from an EPAP MPS platform.

An EPAP consists of a combined Provisioning (MySQL) and Real Time Database (RTDB). The Provisioning Database (PDB) responds to requests for updates by the active and standby RTDBs on both mated EAGLE 5 ISSs. The active EPAP RTDB is responsible for initiating multi-cast updates of changed database records to the Service Module cards after the data has been committed to the EPAP disks. Furthermore, the PDB may accept and commit more database updates while the RTDBs are completing their previous updates.

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 to be transferred from the PDB. Committing larger amounts of data at a time to the RTDB (versus a single update at a time) allows faster overall transaction rates to be achieved. 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 completed the update and sent the new subscription data to the Service Module 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 back up or restore the provisioning database. The local provisioning terminal is used to manually repair the standby EPAP RTDB or to turn the subscriber database audit on or off. For additional information, refer to *Tekelec 1000 Application Server Hardware Manual*, *Tekelec 1200 Application Server Hardware Manual*, and *EPAP Administration Manual*.

EPAP (EAGLE Provisioning Application Processor)

As shown in [Figure 12: MPS/EPAP Platform Architecture](#), a single MPS system contains two EAGLE Provisioning Application Processor (EPAP) servers. At any given time, only one EPAP actively communicates with the Service Module cards on the EAGLE 5 ISS. The other EPAP server is in standby mode. In addition, two MPS systems can be deployed in a mated pair configuration.

The primary purpose of the EPAP system is to maintain the Real Time Database (RTDB) and Provisioning Database (PDB), and to download copies of the RTDB to the Service Module cards.

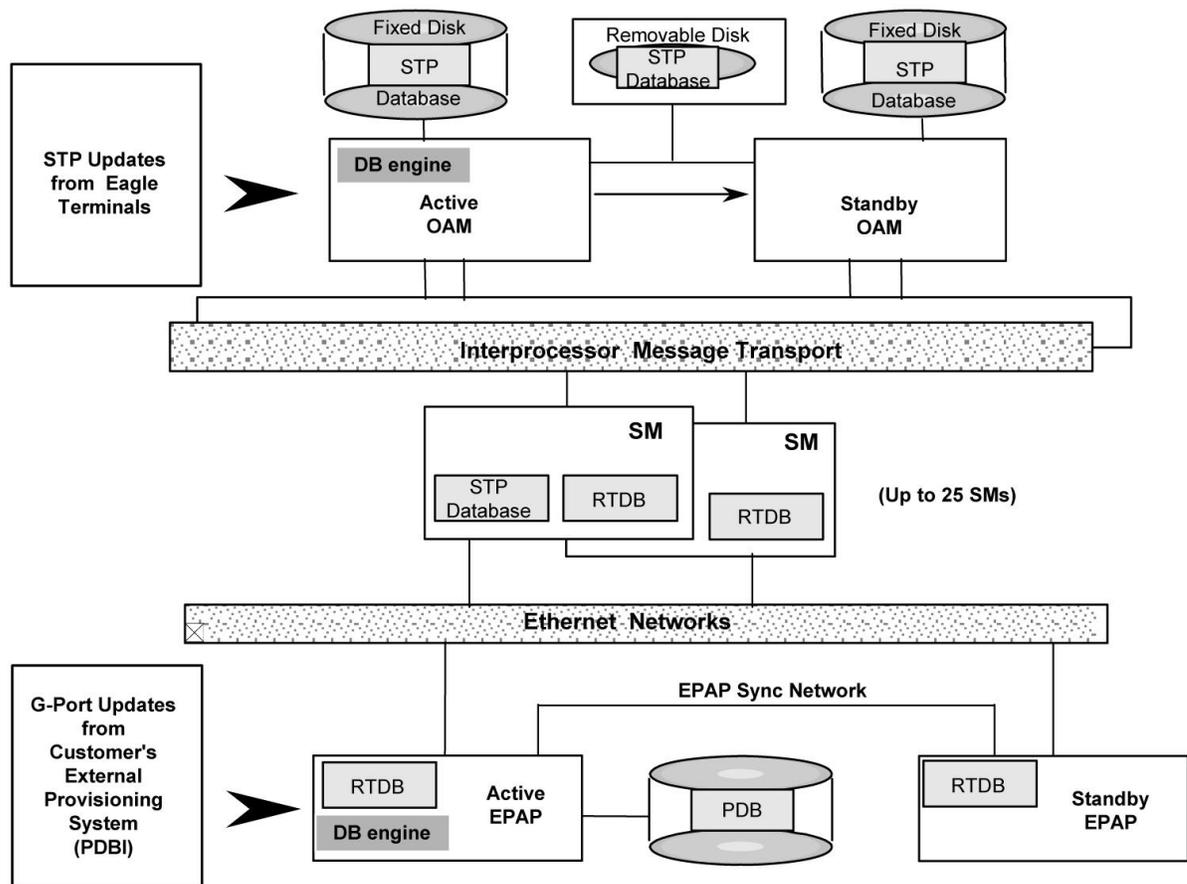
The PDB on the active EPAP receives subscription data from the customer network through the Provisioning Database Interface (PDBI), the external source of provisioning information. The Provisioning Database Application (PDBA) continually updates the PDB of the active EPAP. The PDB uses MySQL database software. After an update is applied to the active PDB, the data is sent to the RTDBs on the active and standby EPAPs.

Both the active and standby EPAPs maintain copies of the RTDB. Periodically, the Service Module card polls the active EPAP RTDB for any new updates. The active EPAP downloads the updates to the Service Module card which stores a resident copy of the RTDB.

A mated pair configuration has two mated MPS Systems, as shown in [Figure 12: MPS/EPAP Platform Architecture](#). The PDB on the active EPAP automatically updates the PDB on the mate platform. The PDB on the mate platform then updates RTDBs on its EPAPs, which in turn update the RTDBs on the associated Service Module cards.

Provisioning of the EAGLE 5 ISS Service Module 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 updates from the customer's external provisioning system. This system of dual provisioning is illustrated in [Figure 14: Database Administrative Architecture](#).

Figure 14: Database Administrative Architecture



Service Module Cards

A maximum number of Service Module cards can be provisioned with one or more EPAP-related features enabled.

- Up to 25 cards (24+1) with EPAP running on a T1000 AS
- Up to 32 cards (31+1) with EPAP running on a T1200 AS

EPAP-related features require that all Service Module cards contain 4 GB of memory. [Figure 14: Database Administrative Architecture](#) illustrates each Service Module card having two Ethernet links, the main DSM network on the 100BASE-T link and the backup DSM network. Refer to [Table 15: Service Module Card Provisioning and Reload Settings](#) for the link speed. The Service Module cards run the VSCCP software application.

The Service Module card Ethernet ports are linked to the EPAP system to receive the downloaded Real Time Database (RTDB). Multiple Service Module cards provide a means of load balancing in high-traffic situations. The RTDB on the Service Module card is in a format that facilitates rapid lookups.

Though the Service Module card copies of the RTDB are intended to be identical, the various databases may not be identical at all times for the following reasons:

- When a Service Module card is initialized, the card 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.
- Card databases can become out-of-sync with the EPAP RTDB when the EPAP receives updates from its provisioning source, but it has not yet sent the updates down to the Service Module cards. Updates are applied to the Provisioning Database (PDB) as they are received.

Two possible scenarios contribute to a condition where a Service Module card may not have enough memory to hold the entire database:

- The database is downloaded successfully to the Service Module card, but subsequent updates eventually increase the size of the database beyond the capacity of the Service Module card memory. In this situation, it is desirable for EPAP-related features to continue processing transactions, even though the database might not be up-to-date.
- When a Service Module card is booted and 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 Service Module card is responsible for recognizing and reporting its out-of-memory conditions by means of alarms.

Overview of EPAP to Service Module Card Communications

Before discussing Service Module card status reporting or EPAP status reporting, it is helpful to understand the communications between the Service Module cards and the EPAP in broad terms.

- UDP - sending Service Module card status messages

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

- IP - reporting EPAP maintenance data

The Service Module cards create a TCP 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 Service Module cards and issues a *Connect* to establish the TCP/IP connection with that Service Module card which is referred to as the primary Service Module card. The purpose of this link is to provide a path for reporting EPAP alarms and to forward maintenance blocks to the Service Module card.

- IP Multicast - downloading GSM database

Because of the large size of the database and the need to download it quickly on up to 32 Service Module cards, EPAP-related features use 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 all of the Service Module cards simultaneously.

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. Service Module cards that need to download the real time database or to receive database updates “join the tree”. Service Module cards can also “leave the tree”, typically when the database fills their available memory.

Service Module Card Provisioning and Reload

One of the core functions of the EPAP is to provision the Service Module cards with the Real Time Database (RTDB) updates. In order to provide redundancy for this feature, separate RMTP channels are created on each interface from each EPAP:

Table 15: Service Module Card Provisioning and Reload Settings

| RMTP Channel | T1000 | T1200 Running Only DSM cards | T1200 Running Only E5-SM4G cards | T1200 Running both DSM and E5-SM4G cards |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------------------|-------------------------------------------|------------------------------------------------------|
| EPAP A, Link A (on the main DSM network) | 100BASE-T | 100BASE-T | 100BASE-T | 100BASE-T |
| EPAP A, Link B (on the backup DSM network) | 10BASE-T | 10BASE-T | 100BASE-T | 10BASE-T |
| EPAP B, Link A (on the main DSM network) | 100BASE-T | 100BASE-T | 100BASE-T | 100BASE-T |
| EPAP B, Link B (on the backup DSM network) | 10BASE-T | 10BASE-T | 100BASE-T | 10BASE-T |
| Note: Full duplex mode is supported only when running all E5-SM4G cards on the T1200. In all other cases, half duplex mode is supported. | | | | |

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

The Service Module cards do the following:

- Detect the need for incremental updates and send a status message to the EPAP.
- Discriminate between the various streams according to the database level contained in each message and accept updates based on the Service Module card database level.

Service Module Card Reload Model

Service Module cards may require a complete database reload in the event of reboot or loss of connectivity for a significant amount of time. The EPAP provides a mechanism to quickly load a number of Service Module cards with the current database. The database on the EPAP is large and may be updated constantly. The database sent to the Service Module card or cards will likely be missing some of these updates making it corrupt, in addition to being "back level."

EPAP Continuous Reload

It is important to understand how the EPAP handles reloading of multiple Service Module cards from different starting points. Reload begins when the first Service Module card requires it. Records are read sequentially from the Real Time Database (RTDB) from an arbitrary starting point, wrapping back to the beginning. If another Service Module card requires reloading at this time, it uses the existing record stream and notifies the Service Module card provisioning task of the first record it read. This continues until all Service Module cards are satisfied.

Service Module Card Database Levels and Reloading

The current database level when the reload started is of special importance during reload. When a Service Module card 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 Service Module card continues to reload until it is completely caught up with the current level of the RTDB. As database records are sent to the Service Module cards 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 Service Module card.

The following terminology is used here for the stages of database reload for a given Service Module card.

- **Stage 1 loading:** The database is being copied record for record from the golden RTDB in the EPAP to the Service Module card 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, such as network outage, processor limitation, or lost communication. The database is coherent, but back-level during incremental update.
- **Current:** The database is receiving current updates from the Service Module card provisioning task.
- **Coherent:** The database is at a whole database level which means not currently updating records belonging to a database level.

EPAP Status and Error Reporting via Maintenance Blocks

The EPAP forwards all status and error messages to the Service Module cards 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 that is received when a `rept-stat-mps` command is issued.

Network Connections

Several customer and Tekelec-installed private networks are required to support the provisioning of subscription data. These networks are:

- *Customer Provisioning Network*
- *EPAP Sync Network*
- *DSM Networks*
- *Dial-Up PPP Network*

The following discussion is an overview of these private networks. It expands on the networks in the architecture diagram shown in [Figure 15: Customer Provisioning Network](#). (For details about configuring these networks, refer to the *EPAP Administration Manual*.)

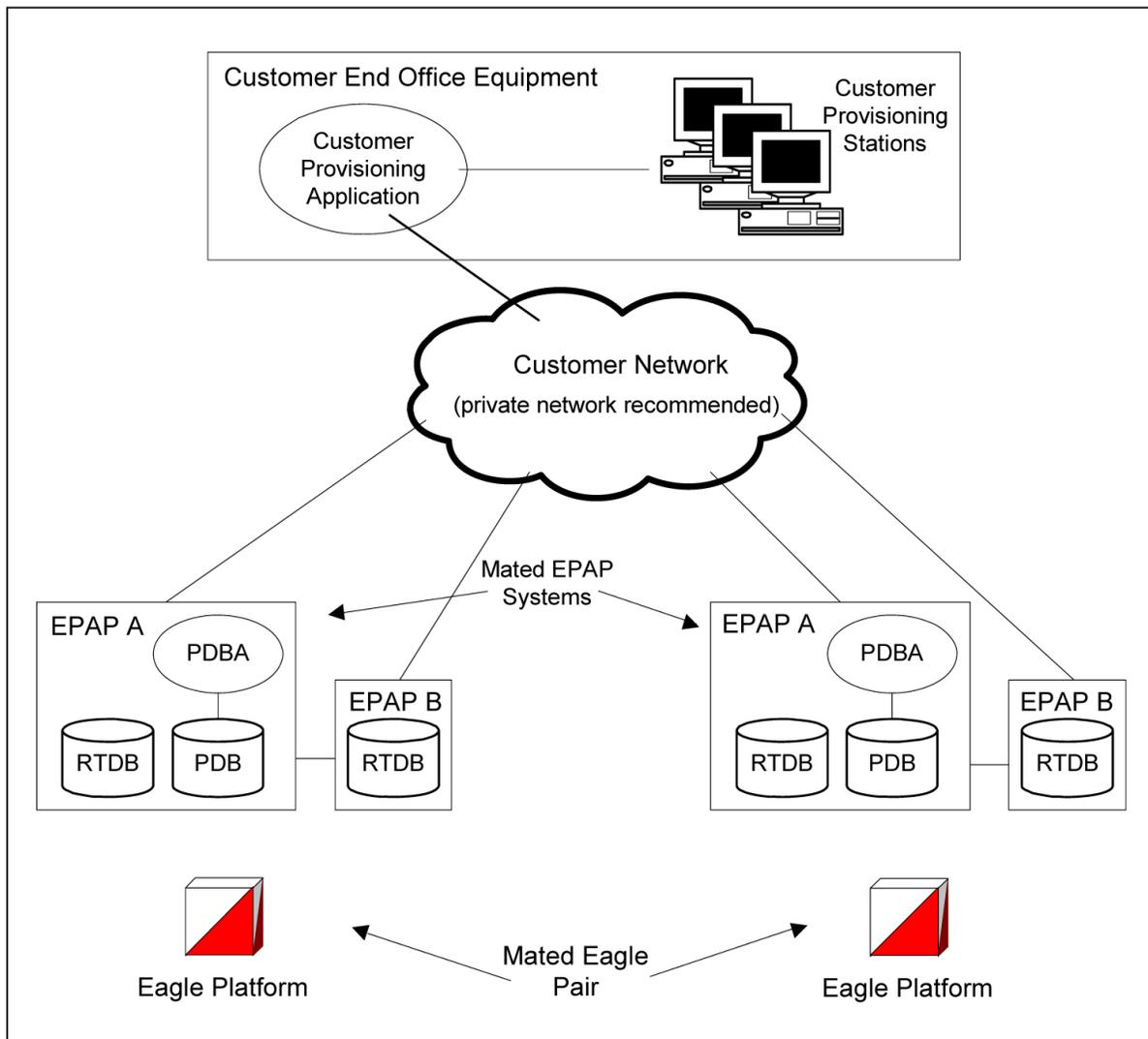
Customer Provisioning Network

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 of 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 15: Customer Provisioning Network*.

Figure 15: Customer Provisioning Network

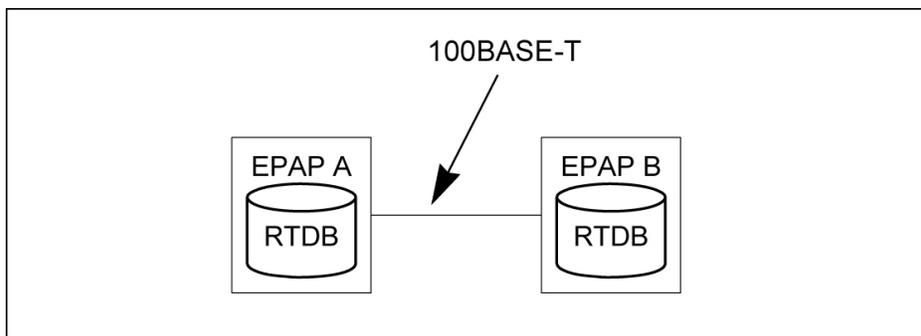


Although a dedicated network is recommended, it is possible that unrelated customer traffic can use the network as well. The determination, either to have a dedicated network or to allow other customer traffic, should be based on available external Ethernet bandwidth and network performance considerations.

EPAP Sync Network

The T1000 EPAP sync network carries RTDB and maintenance application traffic between active and standby EPAP servers on an MPS system. It synchronizes the contents of the RTDBs of both EPAP A and EPAP B. The EPAP Sync network is a single Ethernet connection between EPAP A and EPAP B running at 100BASE-T, as shown in [Figure 16: EPAP Sync Network](#). The T1200 EPAP Sync network is truncated with the EPAP back up DSM connection and communicates through the switch.

Figure 16: EPAP Sync Network

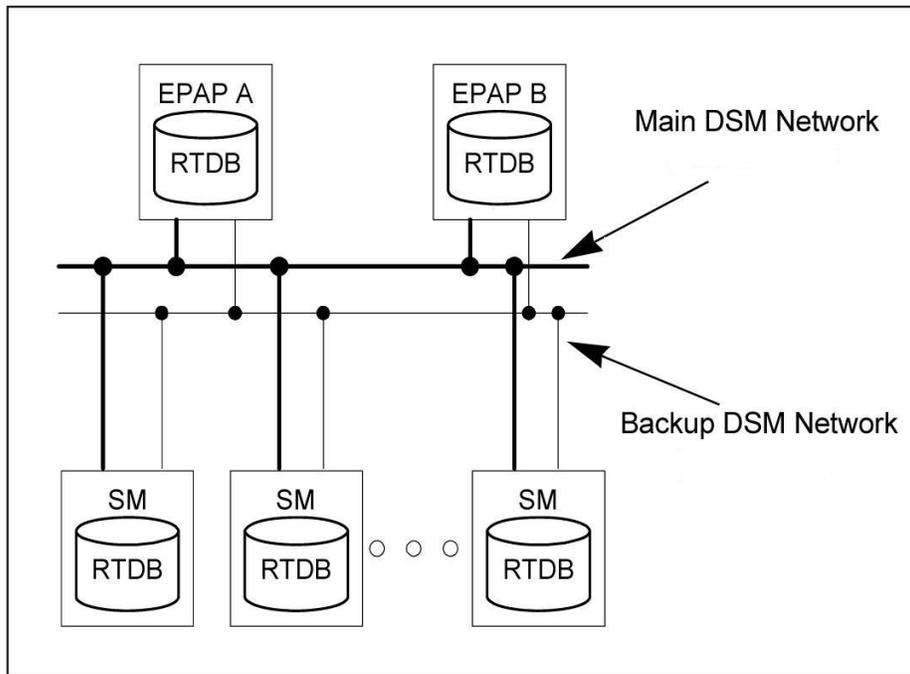


DSM Networks

The DSM networks are shown in [Figure 17: DSM Networks](#). They carry provisioning data from the active EPAP RTDB to the Service Module cards. They also carry reload and maintenance traffic to the Service Module cards.

The DSM networks consist of two Ethernet networks: the main DSM network running at 100BASE-T, and the backup DSM network running at either 10BASE-T or 100Base-T. Refer to [Table 16: EPAP IP Addresses in the DSM Network](#) for the link speed. Both Ethernet networks connect EPAP A and EPAP B with every Service Module card on a single EAGLE 5 ISS platform.

Figure 17: DSM Networks



Maintenance information is sent from the active EPAP to an arbitrarily selected Service Module card. The selected Service Module card is known as the primary Service Module card. 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 1918.)

The third octet is customer specifiable for each DSM network. It is important 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 16: EPAP IP Addresses in the DSM Network summarizes the contents of each octet.

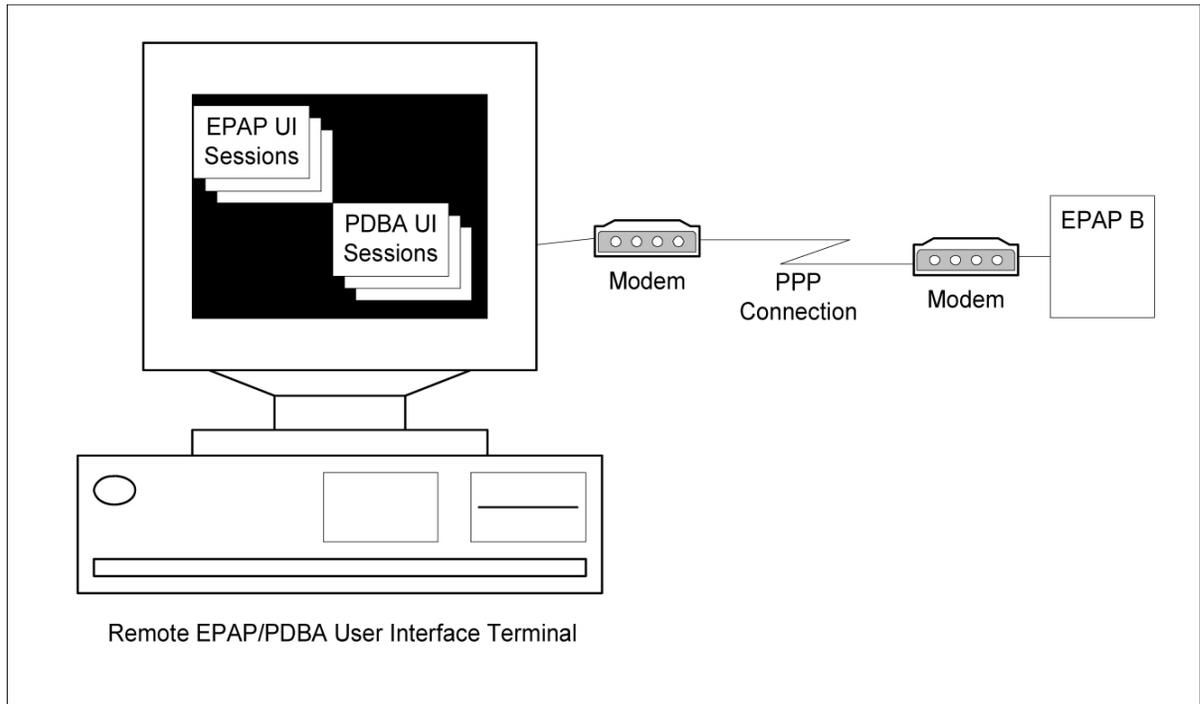
Table 16: EPAP IP Addresses in the DSM Network

| 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 and 200 for EPAP B |

Dial-Up PPP Network

The dial-up PPP network 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 18: Dial-Up PPP Network*.

Figure 18: Dial-Up PPP Network



Chapter 3

Commands

Topics:

- *Introduction.....77*
- *EAGLE 5 ISS Options Commands.....77*
- *EAGLE 5 ISS G-Port System Options Commands.....77*
- *EAGLE 5 ISS GSM SMS Options Commands.....80*
- *EAGLE 5 ISS G-Port Service Selector Commands.....82*
- *EAGLE 5 ISS SCCP Service Commands.....85*
- *EAGLE 5 ISS Feature Control Commands.....86*
- *EAGLE 5 ISS Database Commands.....87*
- *Maintenance Commands.....87*
- *Debug Commands90*

This chapter contains brief descriptions of the EAGLE 5 ISS commands that are used for the configuration, control, maintenance, and measurements of the G-Port, MT-Based GSM SMS NP, and MT-Based GSM MMS NP features.

Introduction

This chapter describes the EAGLE 5 ISS commands used to administer the G-Port feature. The command descriptions include parameters that are used with the G-Port feature. Refer to *Commands Manual* for complete command descriptions including parameter names, valid parameter values, examples, and dependencies.

EAGLE 5 ISS Options Commands

The STP system options commands (`stpopts`) change and display STP wide options in the EAGLE 5 ISS database. The following sections describe the two variations: `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 `defcc` and `defndc` parameters can be specified only if the G-Port, Prepaid IDP Query Relay (IDPR), Prepaid SMS Intercept (PPSMS), V-Flex, or ATINP feature is enabled, or if the G-Flex, INP, or AINPQ feature is turned on. A command example follows:

```
chg-stpopts: defcc=333: defndc=22345
```

Where:

`defcc`={1-3 digits, none} Default country code
`defndc`={1-5digits, none} Default network destination code

- **rtrv-stpopts: Retrieve STP System Options Command** – The `rtrv-stpopts` command is used to retrieve all STP options from the database. The options that appear in the output vary, depending on the features that are enabled or turned 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. The following sections describe the two variations: `chg-gsmopts` and `rtrv-gsmopts`. For details about these commands, refer to *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.

Table 17: chg-gsmopts Parameters - Class = DATABASE

| Parameter | Range | Description |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| crptt | 0-255, none | Circular Route Prevention Translation Type The MNP Circular Route Prevention feature must be turned on before this parameter can be provisioned to any value other than none. The MNP Circular Route Prevention feature cannot be turned off if this parameter is provisioned to any value other than none. The default value is none. |
| defmapvr | 1-3 | Default MAP version |
| defmcc | 1-3 digits, none | E212 default mobile country code |
| dftrn | 1-15 digits, none | Default Routing Number This parameter specifies the default routing number to use as the routing number portion of the msrndig parameter when an SRI is processed by the G-Port SRI Query for Prepaid feature, an RTDB match is found for an own-network subscriber, and Service Portability is not applied. The default value is none. |
| gsm2is41 | 1-15 digits, none | GSM to IS41 migration prefix |
| is412gsm | 1-15 digits, none | IS-41 to GSM migration prefix |
| migrpfx | multiple, single | Migration Prefix |
| msisdntrunc | 1 digit (0-5) | Number of MSISDN digits to delete from the MISISDN before formulating the MSRN for the SRI Ack message |
| msrndig | rn, rndn, crndn, rnccdn, rnasd, asdm, rnasddn, asdrndn, ccrnasddn, ccasdrndn, rnasdccd, asdrncdn, rngrn, grnrn, rngrndn, grnrndn, ccrngrndn, ccgrnrndn, rngrnccd, grnrncdn | RN used as-is or with MSISDN |
| msrnnai | 1-7 | NAIV for the MSRN |

| Parameter | Range | Description |
|-----------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| msrnp | 0-15 | Numbering plan for the MSRN |
| multcc | 1 to 3 digits (0-9, a-f, A-F) | Multiple Country Code |
| nmultcc | 1 to 3 digits (0-9, a-f, A-F), none | New Multiple Country Code |
| nppmsgta | digits (0-9, A-F, a-f) or none | New entity address of an IN platform for PPSMS |
| off | encodecug, encodenps, srismgttrtg | <p>This parameter turns off specified options. Up to 8 comma-separated unique options can be specified.</p> <ul style="list-style-type: none"> • encodecug - Closed User Group (CUG) option This option specifies whether the Closed User Group (CUG) Checkinfo from the SRI message is included in the SRI Ack message. The default setting is <code>off</code>. • encodenps - Number Portability Status Indicator (NPSI) option This option specifies whether the Number Portability Status Indicator (NPSI) is omitted from all SRI Ack messages. The default setting is <code>on</code>. • srismgttrtg - SRI_SM Routing option This option specifies whether the SRI_SM routing feature is on. The default setting is <code>off</code>. |
| on | encodecug, encodenps, srismgttrtg | This parameter turns on specified options. Up to 8 comma-separated unique options can be specified. Refer to <code>off</code> parameter for option descriptions. |
| serverpfx | 1-4 digits, none | Server SRI prefix |
| sporttype | gsm, is41, all, none | <p>Service Portability Type</p> <p>This parameter specifies whether Service Portability applies to G-Port SRI Query for Prepaid for own-network subscribers. Default value is <code>none</code>.</p> |

| Parameter | Range | Description |
|---------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| srfaddr | 1-15 digits, none | Entity address of MNP_SRF node |
| srfnai | 0-127 | NAIV of the MNP_SRF |
| srfnp | 0-15 | Numbering plan value of the MNP_SRF Network Code |
| sridn | tcap, sccp | SRIDN location |
| sridnnotfound | gtt, srinack | When G-Port encounters an RTDB query result that indicates that the given DN is not known, the SRIDNNOTFOUND parameter value determines further processing. The default value is gtt. |

Command examples:

- `chg-gsmopts:srfnai=4:srfnp=2:srfaddr=331111111111`
- `chg-gsmopts:srfaddr=333221234567890:msrndig=rn:srfnai=1:srfnp=1:msrnnai=4:msrnp=10`
- `chg-gsmopts:sridn=tcap`
- `chg-gsmopts:is412gsm=0123456789abcde`

rtrv-gsmopts

Retrieve G-Port System Options Command

The `rtrv-gsmopts` command displays all GSM-specific system options from the database.

EAGLE 5 ISS GSM SMS Options Commands

The GSM SMS options (`gsmsmsopts`) commands change and display specific SMS and MMS options in the EAGLE 5 ISS database for the MT-based GSM SMS NP and MT-based GSM MMS NP features. The following sections describe the two variations: `chg-gsmsmsopts` and `rtrv-gsmsmsopts`. For details about these commands, refer to *Commands Manual*.

The `mtmmsackn`, `mtmmsentyn`, `mtmmsgta`, `mtmmslen`, and `mtmmsstype` parameters apply to only messages that are modified by the MT-Based GSM MMS NP feature. The MT-Based GSM MMS NP feature must be enabled to specify these parameters.

The `mtsmsackn`, `mtsmschksrc`, `mtsmsdltr`, `mtsmsdltrv`, `mtsmsimsi`, `mtsmsnakerr`, `mtsmsnni`, and `mtsmsstype` parameters apply to only messages that are modified by the MT-Based GSM SMS NP feature. The MT-Based GSM SMS NP feature must be enabled to specify these parameters.

chg-gsmsmsopts

Change GSM SMS Options Command – The `chg-gsmsmsopts` command changes GSM SMS system options in the database. This command updates the GSMSMSOPTS table. The default parameters are always overwritten when specified.

Table 18: chg-gsmsmsopts Parameters Class = DATABASE

| Parameter | Range | Description |
|--------------|----------------------------------------------|---------------------------------------------|
| mtmmsackn | ack, nack | MT-based MMS acknowledgement |
| mtmmsentylen | 1-15, none | MT-based MMS entity length |
| mtmmsgta | 5-21 digits, none | MT-based MMS GTA |
| mtmmslen | 1-24, none | MT-based MMS length |
| mtmmstype | sp, rn, sprn, all, nonsp | MT-based MMS type |
| mtsmsackn | ack, nack | MT-based SMS acknowledgement |
| mtsmschksrc | yes, no | MT-based SMS check source |
| mtsmsdltr | no, prern, postrn | MT-based SMS delimiter |
| mtsmsdltrv | 1-5 digits | MT-based SMS delimiter value |
| mtsmsimsi | rn, rndn, ccrndn, dn, srfimsi, mccrndn | MT-based SMS IMSI |
| mtsmsnakerr | 0-255 | MT-based SMS negative acknowledgement error |
| mtsmsnni | rn, rndn, ccrndn, dn, srfimsi, mccrndn, none | MT-based SMS network node indicator |
| mtsmstype | sp, rn, sprn, all, nonsp | MT-based SMS type |

Command example:

- `chg-gsmsmsopts:mtmmsgta=51111:mtmmstype=sp:mtmmsackn=nack:mtmmsentylen=7:mtmmslen=10`

rtrv-gsmsmsopts**Retrieve GSM SMS Options Command**

The `rtrv-gsmsmsopts` command displays all GSM SMS and MMS options from the database.

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. The following sections describe the four variants: `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:

Table 19: ent-srvsel Parameters - Class = DATABASE

| Parameter | Range | Description |
|-------------------------------|----------------------------------------------------------------------|-------------------------------------|
| gti, gtia, gtii, gtin, gtin24 | 2, 4 | Global Title Indicator |
| serv | eir, gflex, gport, inpq, inpmr, smsmr, idps, idpr, mnp, vflex, atinp | GSM service |
| snai | 1sub, natl, intl, rmidn, rnndn, rnsdn, ccrrdn | Service Nature Of Address Indicator |
| snp | 1e164, e212, e214 | Service Numbering Plan |
| ssn | 0-255, * | Subsystem Number |
| tt | 0-255 | Translation Type |
| nai | sub, rsvd, natl, intl | Nature Of Address Indicator |
| naiv | 0-127 | NAI Value |
| np | e164, generic, x121, f69, e210, e212, e214, private | Numbering Plan |
| npv | 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:

Table 20: chg-srvsel Parameters - Class = DATABASE

| Parameter | Range | Description |
|-------------------------------|----------------------------------------------------------------------|-----------------------------------------|
| gti, gtia, gtii, gtin, gtin24 | 2, 4 | Global Title Indicator |
| ssn | 0-255, * | Subsystem Number |
| tt | 0-255 | Translation Type |
| nai | sub, rsvd, natl, intl | Nature Of Address Indicator |
| naiv | 0-127 | NAI Value |
| np | e164, generic, x121, f69, e210, e212, e214, private | Numbering Plan |
| npv | 0-15 | Numbering Plan Value |
| nserv | eir, gflex, gport, inpq, inpmr, smsmr, idpr, idps, mnp, vflex, atinp | New GSM service |
| nsnai | sub, natl, intl, rnidn, rncdn, rnsdn, ccrndn | New Service Nature Of Address Indicator |
| nsnp | e164, e212, e214, none | 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:

Table 21: dlt-srvsel Parameters - Class = DATABASE

| Parameter | Range | Description |
|-------------------------------|-----------------------|-----------------------------|
| gti, gtia, gtii, gtin, gtin24 | 2, 4 | Global Title Indicator |
| ssn | 0-255, * | Subsystem Number |
| tt | 0-255 | Translation Type |
| nai | sub, rsvd, natl, intl | Nature Of Address Indicator |
| naiv | 0-127 | NAI Value |

| Parameter | Range | Description |
|-----------|-----------------------------------------------------|----------------------|
| np | e164, generic, x121, f69, e210, e212, e214, private | Numbering Plan |
| npv | 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:

Table 22: rtrv-srvsel Parameters - Class = DATABASE

| Parameter | Range | Description |
|-------------------------------|----------------------------------------------------------------------|-------------------------------------|
| gti, gtia, gtii, gtin, gtin24 | 2, 4 | Global Title Indicator |
| nai | sub, rsvd, natl, intl | Nature Of Address Indicator |
| naiv | 0-127 | NAI Value |
| np | e164, generic, x121, f69, e210, e212, e214, private | Numbering Plan |
| npv | 0-15 | Numbering Plan Value |
| serv | eir, gflex, gport, inpq, inpmr, smsmr, idps, idpr, mnp, vflex, atinp | GSM service |
| snai | sub, natl, intl, rnidn, rnndn, rnsdn, ccrndn | Service Nature Of Address Indicator |
| snp | e164, e212, e214 | Service Numbering Plan |
| ssn | 0-255, * | Subsystem Number |
| tt | 0-255 | Translation Type |

EAGLE 5 ISS SCCP Service Commands

The `sccp-serv` commands allow for services to be taken online and offline and for their processing load to be shifted to other designated nodes. These commands also support the assignment of point codes to service groups used for service re-route assignment. Three variations are described in this section: `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 information on provisioning MRN tables, refer to *Database Administration Manual - Global Title Translation*.

Refer to *Commands Manual* for additional details about the EAGLE 5 ISS SCCP service commands.

chg-sccp-serv: Change 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 and point code network type (ANSI, ITU-I, ITU-I Spare, ITU-N, ITU-N Spare, or ITU-N24). Up to seven point codes may be in a network type grouping for service re-route load sharing. This command allows for additions or modifications of up to four point codes. The point code parameters support the Spare Point Code subtype prefix `s-` for ITU-I and ITU-N point codes.

Table 23: chg-sccp-serv Parameters - Class = DATABASE

| Parameter | Range | Description |
|-------------------------------|---------------------------------|--------------------------|
| serv | gport, gflex, mnp | Service |
| gtt | no, yes | Global Title Translation |
| pc1, pca1, pci1, pcn1, pcn241 | Refer to <i>Commands Manual</i> | Post GTT-translated PC |
| rc1 | 00-99 | Relative Cost |
| pc2, pca2, pci2, pcn2, pcn242 | Refer to <i>Commands Manual</i> | Post GTT-translated PC |
| rc2 | 00-99 | Relative Cost |
| pc3, pca3, pci3, pcn3, pcn243 | Refer to <i>Commands Manual</i> | Post GTT-translated PC |
| rc3 | 00-99 | Relative Cost |
| pc4, pca4, pci4, pcn4, pcn244 | Refer to <i>Commands Manual</i> | Post GTT-translated PC |
| rc4 | 00-99 | Relative Cost |

| Parameter | Range | Description |
|-----------|-----------------|---------------|
| state | offline, online | Service State |

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

Table 24: dlt-sccp-serv Parameters - Class = DATABASE

| Parameter | Range | Description |
|-------------------------------|---------------------------------|---------------------------------------------------|
| serv | gport, gflex, mnp | Service |
| pc1, pca1, pci1, pcn1, pcn241 | Refer to <i>Commands Manual</i> | Post GTT-translated PC |
| pc2, pca2, pci2, pcn2, pcn242 | Refer to <i>Commands Manual</i> | Post GTT-translated PC |
| pc3, pca3, pci3, pcn3, pcn243 | Refer to <i>Commands Manual</i> | Post GTT-translated PC |
| pc4, pca4, pci4, pcn4, pcn244 | Refer to <i>Commands Manual</i> | Post GTT-translated PC |
| all | no, yes | <i>Yes</i> deletes all point codes from a service |

rtrv-sccp-serv: Retrieve 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.

EAGLE 5 ISS Feature Control Commands

These commands are used to enable, update, view, and control the G-Port, MNPCRCP, MT-Based GSM SMS NP, and MT-Based GSM MMS NP features on the EAGLE 5 ISS. A separate Feature Access Key is required to turn on each feature. Features must be purchased to have access to the Feature Access Key, which must be used when enabling these features.

Two steps are performed to activate the G-Port feature. The first step is to enable the feature. The second step is to set the status to *on*. After the feature G-Port feature is turned on, it cannot be turned off. A temporary Feature Access Key is associated with the G-Port and MNPCRCP features.

Additional verifications are performed to ensure the correct hardware is present in the system. These checks include verifying that the GTT bit is on and that no SCCP GLP cards are provisioned. Refer to *Commands Manual* for details of these commands.

enable-ctrl-feat: EnableControl Feature Command – The `enable-ctrl-feat` command is used for temporary and permanent enabling of controlled features. An example of the command using the G-Port part number is:

```
enable-ctrl-feat:partnum=893017201:fak=<Feature Access Key>
```

chg-ctrl-feat: Change Control Feature Command—The `chg-ctrl-feat` command is used to turn on controlled features: G-Port, MNPCRCP, MT-Based GSM SMS NP, and MT-Based GSM MMS NP. The MNPCRCP, MT-Based GSM SMS NP, and MT-Based GSM MMS NP features require the G-Port feature to be enabled as a prerequisite. This command is also used to turn off ON/OFF features and to clear the critical alarm caused by an expired temporary key.

Command example using the MNPCRCP part number:

```
chg-ctrl-feat:partnum=893007001:status=on
```

rtrv-ctrl-feat: Retrieve Control Feature Command—The `rtrv-ctrl-feat` command is used display the on/off status of controlled features and the trial period remaining for temporary enabled features.

EAGLE 5 ISS Database Commands

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

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 Commands

This section describes commands used for maintenance purposes. These commands allow provisioning, operations, and maintenance activities for the Service Module cards.

Refer to *Commands Manual* for detailed descriptions of all commands, parameters, parameter values, output examples, and command dependencies.

rept-stat-sys

The `rept-stat-sys` command is used to report the status of system entities, including cards. The output display shows the number of Service Module cards 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 displays the status of the Service Module cards and the statistics of the services running on the Service Module cards. This command also displays any cards that are denied SCCP service. Statistics are displayed under MNP Service Statistics for A-Port, G-Port, and IGM features.

rept-stat-mps

Two variations of this command are:

- `rept-stat-mps` - produces a summary report showing the overall status of the provisioning system and a moderate level of information for each Service Module card.

- `rept-stat-mps:loc=xxxx` - produces a detailed report showing the status of a specific Service Module card. This version of the command displays the percent utilization of a specific Service Module card memory.

rept-stat-trbl

This command displays a summary of trouble notifications (UAMs) for local subsystems, cards, and linksets.

rept-stat-alm

This command displays alarm counts and totals.

rept-stat-db

This command displays both EAGLE 5 ISS and RTDB status and level information for each network card, and for the active and standby EPAP databases. The command reports database exception status such as corrupted, incoherent, or inconsistent, as well as providing the birthdates and levels.

rtrv-data-rtdb

This command retrieves data from the RTDB on an active Service Module card. If the `loc` parameter is specified and the target card is an active Service Module card, the RTDB data is retrieved from that Service Module card. If the `loc` parameter is not specified, the data is retrieved on the active Service Module card that has the lowest IMT address. The RTDB status on the active Service Module card can be coherent or incoherent.

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) to permit the card to be tested or physically removed from the shelf.

The `alw-card` command is used to change the card from OOS-MT-DSBLD to IS-NR if the loading is successful.

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.

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 the card 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.

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 system removable cartridge or drive to the destination active and standby system disks as a "trial" version. The system release identification file is uploaded from the system removable cartridge or drive to the active and standby fixed drives along with each GPL. This command also provides a parameter to turn GPL auditing *on* and *off*.

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 or removable cartridge or drive, 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, and 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 drive, or from the removable cartridge or drive to the fixed disk on the standby TDM.

ent-home-smsc / dlt-home-smsc / rtrv-home-smsc

The `ent-home-smsc` command is used to enter HOME SMSC specific addresses in the database.

The `dlt-home-smsc` command is used to delete HOME SMSC specific addresses currently used to identify Short Message Service Centers (SMSC) in the database.

The `rtrv-home-smsc` command is used to display HOME SMSC specific addresses currently used to identify SMSCs in the database.

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.

chg-ip-card / rtrv-ip-card

The `chg-ip-card` command is used to provision the Internet Protocol networking parameters for any given Service Module card.

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

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.

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.

Debug Commands

G-Port uses the `ent-trace` command to provide a trap-and-trace function for MSUs on the Service Module cards. G-Port also includes a trigger so the user can trigger on DN and IMSI.

The user can create a MSU trigger on the Service Module 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 is 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-PortRTDB. 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 CgPASPC, the criteria is matched with the OPC present in the MTP part of the message.

A trace must be set on all Service Module 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 Service Module cards are forwarded to OAM, and are displayed. Refer to *Commands Manual* for a complete description of the `ent-trace` command.

Chapter 4

Feature Configuration

Topics:

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- *Activating the 1100 TPS/DSM for ITU NP Feature113*
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This chapter describes the prerequisites, considerations, and steps to configure and activate the G-Port feature. This chapter also includes feature activation procedures for these features:

- MT-Based GSM SMS NP
- MT-Based GSM MMS NP
- G-Port SRI Query for Prepaid
- GSM MAP SRI Redirect to Serving HLR
- 1100 TPS/DSM for ITU NP
- E5-SM4G Throughput Capacity

Introduction

This chapter identifies prerequisites for the G-Port feature activation procedure and provides the feature activation procedures for the following features:

- G-Port
- MT-Based GSM SMS NP
- MT-Based GSM MMS NP
- G-Port SRI Query for Prepaid
- Service Portability support for G-Port SRI Query for Prepaid
- GSM MAP SRI Redirect to Serving HLR
- 1100 TPS/DSM for ITU NP
- E5-SM4G Throughput Capacity

These feature activation procedures are performed at the EAGLE 5 ISS.

The G-Port feature and other related features are optional and are purchased from Tekelec. Contact your Tekelec Sales or Account Representative to determine whether you have purchased a specific feature or for additional information. The following features are related to the G-Port feature.

- 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)

In addition, the following performance-related feature is related to G-Port:

- E5-SM4G Throughput Capacity

Note:

After a permanently-on feature has been enabled and turned on with the `enable-ctrl-feat` and `chg-ctrl-feat` commands, the feature cannot be turned off. Because this feature may affect other features or system databases, confirm that a feature license and technical support from Tekelec are available before turning on this feature. Contact your Tekelec Sales or Account Representative to verify whether the feature has been purchased.

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

Summary of Feature Activation

This table summarizes the feature activation attributes for the features in this chapter.

Table 25: Feature Activation Summary

| Feature Name | Part Number | Temporary FAK Available? | Permanently On? |
|-----------------------------------------|------------------------|--------------------------|-----------------|
| GSM Mobile Number Portability (G-Port) | 893017201 | Yes | Yes |
| MNP Circular Route Prevention (MNPCRCP) | 893007001 | Yes | No |
| MT-Based GSM SMS NP | 893020001 | No | Yes |
| MT-Based GSM MMS NP | 893024101 | No | Yes |
| G-Port SRI Query for Prepaid | 893017701 | No | Yes |
| Service Portability | 893034301 | No | No |
| GSM MAP SRI Redirect to Serving HLR | 893014001 | No | Yes |
| 1100 TPS/DSM for ITU NP | 893018001 | No | No |
| E5-SM4G Throughput Capacity | 893019101 893019102 | No | Yes |

EPAP Entity Provisioning

It is recommended that EPAP entity (SP or RN) administration not be done until after the point code and/or subsystem number has been entered into the EAGLE 5 ISS MAP table (see Step 5).

- EPAP-administered entity data can possibly become out-of-sync with the EAGLE 5 ISS MAP table when the creation of point codes and/or subsystem numbers in the MAP table is performed after EPAP database administration.
- If this mismatch is discovered in real-time operations, a UIM (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.

Prerequisites

The G-Port feature activation assumes that the feature Global Title Translation (GTT), Enhanced Global Title Translation (EGTT), or Variable-Length Global Title Translation (VGTT) is already provisioned. Refer to *Database Administration Manual - Global Title Translation* for provisioning procedures.

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

The G-Port feature activation assumes that the Service Module cards to be installed are identified.

- Note installed Service Module card locations, if any.
- Note available odd-even card slots for Service Module card installation.

- Determine Service Module card IP addresses and have the addresses available during the activation procedure.

For in-service systems, schedule Service Module card replacement during a maintenance window that allows the reboot of Service Module cards (`init-card`) one at a time.

For in-service systems with another EPAP-feature enabled, perform only [G-Port Feature Activation Procedure](#) to enable and turn on the G-Port feature. With another EPAP-feature enabled, the Service Module cards already contain the Real Time Database (RTDB).

For new systems, all Service Module cards may be rebooted at the same time using the `init-card:appl=vsccp` command. The GTT, EGTT, or VGTT feature must be turned on prior to adding the Service Module cards.

EAGLE 5 ISS HLR Configuration

This procedure configures the EAGLE 5 ISS system for Home Location Register (HLR) destinations before activating the GSM Mobile Number Portability (G-Port) feature. This procedure assumes that the EAGLE 5 ISS is an existing system in which the G-Port feature is being activated. The route to the HLR database may already be configured. Perform this procedure to verify that all HLR destinations for the feature are provisioned and to configure changes, as needed. The G-Port feature applies to ITU-I (international), ITU-N (national), and ANSI networks.

Refer to *Commands Manual* for detailed descriptions of the commands used in this procedure.

Procedure Overview

- Display current PCs, CPCs, DPCs, routes, and linksets using [Step 1](#) through [Step 6](#).
- Change current PCs, CPCs, DPCs, routes, linksets, and LIM cards using [Step 7](#) through [Step 25](#).

For detailed information about specific configuration activities in this procedure, refer to *Database Administration Manual - SS7*. Useful procedures include:

- Adding a Point Code to the Self-Identification of the EAGLE 5 ISS
- Changing the Self-Identification of the EAGLE 5 ISS
- Adding a Destination Point Code
- Adding an SS7 Linkset
- Adding an SS7 Signaling Link
- Adding a Route Containing an SS7 DPC

1. Display the current self-identification characteristics (PC and CPC) of the system using the `rtv-sid` command.

The self-identification characteristics of the system displayed by the `rtv-sid` command include the point code (PC) assigned to the system, the CLLI code of the system, the capability point code of the STP (CPC), and the type of point codes supported by the system.

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).

2. Display the current destination point codes (DPC) in the Destination point code table (dpc/dpca/dpci/dpcn) using the `rtrv-dstn` command.
3. Display the current route and linkset configuration using the `rtrv-rte` command.
4. If the system point code (pci/pcn) or capability point code (cpc/cpca/cpci/cpcn) to be configured in this procedure is shown in [Step 1](#), [Step 2](#), or [Step 3](#), choose another point code to configure with this procedure. If configuring an ITU-N network, continue to [Step 5](#). If configuring a mated application but not configuring an ITU-N network, proceed to [Step 6](#). Otherwise, proceed to [Step 7](#).
5. Use the `rtrv-stpopts` command to display the PC or CPC format when configuring the system point code or capability point code (pcn or cpcn) of an ITU-N network.

The ITU-N point code format option `npcfmti` determines the format of the ITU-N point code in the database and how it is displayed in all system outputs. The defined value is shown in the `NPCFMTI` field displayed in the output of the `rtrv-stpopts` command.

To change the format of the ITU-N point code, refer to "Point Code Formats" in *EAGLE 5 ISS Database Administration Manual - SS7*.

Continue to [Step 6](#) to display mated applications in the database. Otherwise, proceed to [Step 7](#).

6. Display the mated applications in the database using the `rtrv-map` command.
 - a) If the point code of the system is displayed in the `rtrv-map` command output (PCA, PCI, PCN, MPCA, MPCI, or MPCN fields), remove the system point code from the mated application table. Refer to procedure "Removing a Mated Application" in *EAGLE 5 ISS Database Administration Manual - Features*.
 - b) If the point code of the system or capability point code is a destination point code of a route, select a point code that is not in the destination point code table (refer to output in [Step 2](#)) and not the destination point code of a route (refer to output in [Step 3](#)).
7. Change the point code of the system and capability point code by network type using procedures "Adding a Point Code to the Self-Identification of the EAGLE 5 ISS" and "Changing the Self-Identification of the EAGLE 5 ISS" in *Database Administration Manual - SS7*.
8. Enter a destination point code for the HLR location in the Destination table by network type using the `ent-dstn` command.

Command examples:

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

```
ent-dstn:dpcn=21112
```

where:

:dpc/dpca/dpci/dpcn

Destination point code to add to the database

9. Verify the changes using the `rtrv-dstn` command and specifying the DPC entered in [Step 8](#).

Command examples:

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

```
rtrv-dstn:dpcn=21112
```

Example of possible output for the **DPCI** command example:

```
tekelecstp51 09-08-24 21:16:37 GMT EAGLE 41.0.0
```

| | | | | | | |
|---------|-------|-----|------|--------|------------|-----|
| DPCI | CLLI | BEI | ELEI | ALIASA | ALIASN/N24 | DMN |
| 2-100-2 | ----- | no | --- | ----- | ----- | SS7 |

Example of possible output for the **DPCN** command example:

tekelecstp51 09-08-24 21:16:37 GMT EAGLE 41.0.0

| | | | | | | |
|-------|-------|-----|------|--------|--------|-----|
| DPCN | CLLI | BEI | ELEI | ALIASA | ALIASI | DMN |
| 21112 | ----- | no | --- | ----- | ----- | SS7 |

10. Enter a linkset with the `ent-ls` command and assign the linkset to the destination point code by network type.

Command examples:

```
ent-ls:apci=2-200-2:lsn=ls400001:lst=a
```

```
ent-ls:apcn=21122:lsn=ls500001:lst=a
```

where:

:apc/apca/apci/apcn

Adjacent point code - the DPC of the adjacent signaling node at the far end of the linkset

:lsn

Linkset name

:lst

Linkset type

11. Verify the changes using the `rtrv-ls` command and specifying the linkset name.

Command example:

```
rtrv-ls:lsn=ls400001
```

```
rtrv-ls:lsn=ls500001
```

Example of possible output for **lsn400001** command example:

tekelecstp51 09-08-24 21:16:37 GMT EAGLE 41.0.0

| LSN | APCI | (SS7) | SCRN | L3T | SLT | BEI | LST | LNKS | ACT | MES | DIS | 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 | | | | | | | | | |
| LOC | PORT | SLC | TYPE | L2T | L1 | MODE | TSET | ECM | PCR | PCR | | | |
| | | | | SET | BPS | | | | N1 | N2 | | | |

Example of possible output for **lsn500001** command example:

tekelecstp51 09-08-24 21:16:37 GMT EAGLE 41.0.0

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

12. Add the LIM cards to the database using the `ent-card` command.

Command examples:

```
ent-card:appl=ccs7itu:loc=1105:type=lime1
```

```
ent-card:appl=ccs7itu:loc=1106:type=lime1
```

where:

:appl

Specifies that the application is CCS7ITU.

:loc

Specifies the slot number for the card.

:type

Specifies that the card is a LIME1 card.

13. Enter the E1 interface using the `ent-e1` command.

Command examples:

```
ent-e1:loc=1105:e1port=1
```

```
ent-e1:loc=1106:e1port=1
```

where:

:loc

Card location or slot as stenciled on the shelf

:e1port

E1 card port number

14. Verify the changes using the `rtrv-card` command with the card location specified.

Command examples:

```
rtrv-card:loc=1105
```

```
rtrv-card:loc=1106
```

Example of possible output for command example:

```
tekelecstp51 09-08-24 21:16:37 GMT EAGLE 41.0.0
```

| CARD | TYPE | APPL | LSET NAME | LINK | SLC | LSET NAME | LINK | SLC |
|------|-------|---------|-----------|------|-----|-----------|------|-----|
| 1105 | LIME1 | CCS7ITU | ls400001 | A | 00 | ----- | B | -- |
| 1106 | LIME1 | CCS7ITU | ls500001 | A | 00 | ----- | B | -- |

15. Assign signaling links to the LIM cards using the `ent-slk` command.

Command example:

```
ent-slk:l2tset=1:link=a:loc=1105:lsn=ls400001:slc=0:e1port=1:ts=1
```

```
ent-slk:l2tset=1:link=a:loc=1106:lsn=ls500001:slc=0:e1port=1:ts=1
```

where:

:l2tset

Level 2 timer set. A signaling link can be assigned to any of the thirty timer sets.

:link

Signaling link assigned on the card specified in the `loc` parameter

:loc

Card location to which the signaling link is assigned

:lsn

Unique linkset name

:slc

Signaling link code. The `slc` must be unique within the linkset, and must be the same at both the system location and the distant node.

e1port

Port for E1 interface on the E1 card to which the signaling link and timeslot are being assigned

ts

E1 timeslot for the assigned signaling link

Signaling links are the only elements in the database supported directly by a hardware device. When a link is added to a linkset, the link remains in Out-of-Service-Maintenance-Disabled (OOS-MT-DSBLD) state until it is activated; see [Step 23](#).

16. Verify the changes using the `rtrv-slk` command, specifying the card location and ID of the signaling link entered in [Step 15](#).

Command examples:

```
rtrv-slk:loc=1105:link=a
```

```
rtrv-slk:loc=1106:link=a
```

17. Add a route for the new DPC by network type using the `ent-rte` command.

Command examples:

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

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

where:

:dpc/dpca/dpci/dpcn

Destination point code of the node to which the traffic is bound

:lsn

Linkset name associated with this route

:rc

Relative cost or priority of this route

18. Verify the changes using the `rtrv-rte` command and specifying the destination point code of the route.

19. Add a mated application by network type to the database using the `ent-map` command.

Command examples:

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

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

where:

:grp

Concerned point code broadcast list (CSPC) group name. This parameter specifies the name of a group of point codes that should be notified of the subsystem status. A different CSPC group can be assigned to each mated PC/SSN.

:materc

Mate relative cost

:mpc/mpca/mpci/mpcn

Mate remote point code.

:mssn

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

:pci/pcn

ITU international/national point code

:rc

Relative cost

:ssn

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

20. Verify the changes using the `rtrv-map` command.
21. Allow the LIM cards that were entered in [Step 12](#) using the `alw-card` command.

Command examples:

```
alw-card:loc=1105
```

```
alw-card:loc=1106
```

This message appears:

```
tekelecstp51 09-08-24 21:16:37 GMT EAGLE 41.0.0
Card has been allowed.
```

22. Verify In-Service-Normal (IS-NR) state of the cards using the `rept-stat-card` command.
23. Activate the signaling links entered in [Step 15](#) using the `act-slk` command.

Command examples:

```
act-slk:loc=1105:link=a
```

```
act-slk:loc=1106:link=a
```

The link changes state from Out-of-Service-Maintenance-Disabled (OOS-MT-DSBLD) to In-Service-Normal (IS-NR). The output confirms the activation.

```
tekelecstp51 09-08-24 21:16:37 GMT EAGLE 41.0.0
Activate Link message sent to card
```

24. Verify In-Service-Normal (IS-NR) state of the signaling link using the `rept-stat-slk` command.

Command examples:

```
rept-stat-slk:loc=1105
```

```
rept-stat-slk:loc=1106
```

25. Display the new LIM cards in the database using the `rtrv-card` command.

Example of a possible output:

```
tekelecstp51 09-08-24 21:16:37 GMT EAGLE 41.0.0
CARD  TYPE      APPL      LSET NAME      LINK SLC  LSET NAME      LINK SLC
1105  LIME1      CCS7ITU    1s400001      A   00  -----      B   --
1106  LIME1      CCS7ITU    1s500001      A   00  -----      B   --
```

The HLR destinations are now configured and ready for G-Port feature activation.

G-Port Feature Activation Procedure

Use this procedure to enable, turn on, and configure the GSM Mobile Number Portability (G-Port) feature. Refer to *Commands Manual* for detailed descriptions of the commands that are used in this procedure.



CAUTION

CAUTION: Before starting this procedure, contact the [Customer Care Center](#) for assistance in performing the feature activation procedure. Do not proceed without consulting with Technical Services.

1. Enter the `enable-ctrl-feat` command to enable the G-Port feature:
`enable-ctrl-feat:partnum=893017201:fak=<Feature Access Key>`
2. Enter the `chg-ctrl-feat` command to turn on the G-Port feature:
`chg-ctrl-feat:partnum=893017201:status=on`
3. Enter the default country code and default network destination code to convert the nature of address indicator (NAI) of MSISDNs to the international format (`nai=intl`) with the `chg-stpopts` command.

Command example:

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

where:

:defcc

Default country code

:defndc

Default network destination code

:dsmaud

Service Module card checksum audit running state (*on* or *off*)

:npcfmti

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

4. Verify the new country code and network destination code using the `rtrv-stpopts` command.
5. Change the GSM system options in the database using the `chg-gsmopts` command.

Command example:

```
chg-gsmopts: defmapvr=2:msrndig=ccrndn:srfaddr=23448:srfnai=7:srfnp=15
```

where:

:defmapvr

Default MAP version

:msrndig

Routing number to be used as is or to be concatenated with the MSISDN

:srfaddr

Entity address of the MNP_SRF node

:srfnai

Nature of address indicator value of the MNP_SRF

:srfnp

Numbering plan value of the MNP_SRF

6. Verify the changes using the `rtrv-gsmopts` command to display all GSM system options from the database.
7. Add routing number prefixes for the operating network using the `ent-homern` command. Add Home RNs that are prefixed to DNs for incoming INP MR messages. Up to 100 routing number prefixes for the operating network can be added to the HOMERN table.

Command example:

```
ent-homern:rn=34
```

where:

:rn

Home routing number prefix. Parameter value is 1 to 15 hex digits (0-F).

8. Verify the changes using the `rtrv-homern` command to retrieve a list of routing number prefixes that belong to the operating network.
9. Display the list of administered service selector combinations using the `rtrv-srvsel` command. Avoid lengthy output by filtering the list using various parameter combinations. The service selector table can have over 1,000 entries.
10. Enter the G-Port service selectors by network type, if necessary, using the `ent-srvsel` command. This command assigns applicable service selectors required to specify the service entry for Service Module card services.

Command example:

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

where:

:gtii

Global title indicator, ITU international

:nai

Nature of address indicator

:np

Numbering plan

:serv

Service feature

:snai

International Service Nature of Address Indicator

:snp

Service numbering plan

:ssn

Subsystem number

:tt

Translation type

11. Verify the changes using the `rtrv-srvsel` command to retrieve the list of administered service selector combinations.

Avoid lengthy output by filtering the list using various parameter combinations. The service selector table can have over 1,000 entries.

Command examples:

```
rtrv-srvsel:gtii=2
```

```
rtrv-srvsel:gtii=4
```

where:

gtii

Global title indicator, ITU international



CAUTION

CAUTION:

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

12. Verify that the Service Module card returns to In-Service-Normal (IS-NR) state using the `rept-stat-card` command.



WARNING

WARNING: Do not proceed until In-Service-Normal (IS-NR) state of the Service Module card is restored.

13. After In-Service-Normal (IS-NR) state of the Service Module card is restored and verified using the `rept-stat-card` command, repeat [Step 12](#) for each Service Module card in the system.
14. Set the G-Port service state online using `chg-sccp-serv: serv=gport: state=online`.
15. Confirm that the activation steps were successful by performing the following verifications:
 - Verify that all Service Module cards are loaded and are in In-Service-Normal (IS-NR) state using the `rept-stat-sccp` command.
 - Verify that all Service Module cards and the EPAP are connected and operational using the `rept-stat-mps` command.
 - Verify that database levels are identical for the EPAP PDB and RTDB. Display the RTDBs on the Service Module cards using `rept-stat-db: display=all`.

The GSM Mobile Number Portability (G-Port) feature is now enabled, turned on, and operating in the system.

Service Module Card Installation and VSCCP Configuration

This procedure installs Service Module cards in available odd-even slots and configures the Service Module cards to run the VSCCP application. The Service Module card requires two slots and must be installed in an odd slot with an empty even slot to the right. This procedure uses card slots 1107 and 1108 as the available slots for the installation of a Service Module card. Substitute the correct card slot values for your installation in the appropriate steps.

Refer to *Commands Manual* for detailed descriptions of the commands used in this procedure.

1. Determine the available pair of odd-even card slots for the Service Module card using the `rtrv-card` command.
2. Install the Service Module card in the identified slots. This procedure uses card slots 1107 and 1108 as an example.
 - a) Open the ejector levers on the card.
 - b) Align the card edges with the top and bottom card guides and slowly slide the card into the chassis until the rear connectors of the card contact the mating connectors of the shelf backplane.
 - c) Push the left edge of the card faceplate using a constant pressure until the card connectors are securely inserted into the backplane connectors.



warning: Do not push on the card faceplate with extreme or abrupt force to insert the card connectors into the backplane connectors. Extreme or abrupt force on the card faceplate may damage the faceplate, connector pins, or connector housings.

- d) Engage (push inward) the top and bottom ejector levers to lock the card in the slot and ensure a secure connection between the card and backplane connectors.
- e) Verify that both IMT bus LEDs are illuminated green.
- f) Install the cabling required to connect the card to the MPS.

Refer to *Hardware and Installation - T1000* and *MPS Platform Software and Maintenance - T1000* for details.

3. Add the Service Module card to the database and configure the card as Service Module card running the VSCCP application using the `ent-card` command.

Command example:

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

where:

:appl

Application for the card

:loc

Card location or slot number for the card. For any Service Module card, this card location must be an odd number.

:type

Type of card

4. Verify the addition of the Service Module card to the database using the `rtrv-card` command with the card location specified.

Command example:

```
rtrv-card:loc=1107
```

Example of possible output:

```

RLGHNCXA03W 09-08-24 09:12:36 GMT EAGLE 41.0.0
CARD  TYPE      APPL      LSET NAME      LINK SLC LSET NAME      LINK SLC
1107  DSM        VSCCP      -----      A   --  -----      B   --
    
```

5. Display the current link parameters associated with the Service Module card in the database by entering the `rtrv-ip-lnk` command.

Example of possible output:

```

RLGHNCXA03W 09-08-24 21:14:37 GMT EAGLE 41.0.0
LOC PORT IPADDR  SUBMASK  DUPLEX  SPEED  MACTYPE  AUTO  MCAST
1107 A  -----  -----  HALF    10     DIX     NO    NO
1107 B  -----  -----  HALF    10     DIX     NO    NO
    
```

6. Enter the IP address and other parameter values associated with the Service Module card in the database using the `chg-ip-lnk` command.

Command examples:

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

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

where:

:loc

Card location or slot number of the Service Module card in the EAGLE 5 ISS

:port

Ethernet interface Port ID - the physical interface of the Service Module card

:ipaddr

IP address for the specified port. This is a TCP/IP address expressed in standard dot notation. IP addresses consist of the network number of the system and the unique host number.

:submask

Subnet mask of the IP interface in the form of an IP address with a restricted range of values

:duplex

Mode of operation of the interface

:speed

Interface bandwidth in megabits per second. The speed is either 100 Mbps for main Service Module network or 10 Mbps for backup Service Module network.

:mactype

Media Access Control Type of the interface. Specify `dix` for the Digital/Inter/Xerox *de facto* standard for Ethernet 2.

:mcast

Multicast Control to enable or disable multicast support for the interface. This parameter value must be `yes` to establish the connection from the Service Module card to the MPS system.

7. Verify the IP address and other parameter values associated with the Service Module card in the database by entering the `rtrv-ip-lnk` command.

Example of possible output:

```
RLGHNCXA03W 09-08-24 21:14:37 GMT EAGLE 41.0.0
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
```

8. Display the current IP host information in the database by entering the `rtrv-ip-host` command.

Example of possible output:

```
RLGHNCXA03W 09-08-24 21:17:37 GMT EAGLE 41.0.0
IPADDR          HOST
192.1.1.32      KC_HLR2
192.1.1.50      DN_MSC1
192.1.1.52      DN_MSC2
```

9. Add the host name and IP address for each VSCCP link using the `ent-ip-host` command.

Command examples:

```
ent-ip-host:host=vscpp_1107_a:ipaddr=192.168.122.1
```

```
ent-ip-host:host=vscpp_1107_b:ipaddr=192.168.123.1
```

where:

:host

Host name. Each VSCCP link must be specified separately.

:ipaddr

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 Service Module card and must have a unique octet identifier for the card IP address.

10. Verify the new IP host information in the database by entering the `rtrv-ip-host` command.

Example of possible output:

```
RLGHNCXA03W 09-08-24 21:19:37 GMT EAGLE 41.0.0
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
```

11. Enter local domain and IP router address for the Service Module card using the `chg-ip-card` command.

Note: Most customer private networks do not require setting up a default router for the Service Module card. If your network configuration requires a default router to connect the Service Module card communication to the EPAP, then only one default router is assignable to each Service Module card. Assign the default router address to each Service Module card as shown in this step.

Command example:

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

where:

:defrouter

Default router IP address. This is a TCP/IP address expressed in standard dot notation. IP addresses consist of the network number of the system and the unique host number.

:domain

Domain name of domain server

:loc

Card location or slot number of the Service Module card in the EAGLE 5 ISS

12. Verify the new TCP/IP parameters associated with the Service Module card in the database by entering the `rtrv-ip-card` command.

Example of possible output:

```
RLGHNCXA03W 09-08-24 21:21:37 GMT EAGLE 41.0.0
LOC 1107
SRCHORDR  LOCAL
DNSA      -----
DNSB      -----
DEFROUTER 192.168.122.250
DOMAIN    NC.TEKELEC.COM
```

13. Boot the Service Module card that was added in [Step 3](#) using the `alw-card` command.

Command example:

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

14. Verify the In-Service-Normal (IS-NR) status of the Service Module card using the `rept-stat-card` command.

15. 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 that is either a hostname or IP address.

Command examples:

```
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" .
```

where:

:loc

Card location or slot number in the EAGLE 5 ISS

:cmd

Command string passed to Service Module card for processing

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

```
rlghncxa03w 09-08-24 08:30:44 GMT EAGLE 41.0.0
pass: loc=1107: cmd="ping 192.168.122.100"
Command entered at terminal #1.
;
rlghncxa03w 09-08-24 08:30:44 GMT EAGLE 41.0.0
PASS: Command sent to card
;
rlghncxa03w 09-08-24 08:30:44 GMT EAGLE 41.0.0
PING command in progress
;
rlghncxa03w 09-08-24 08:30:46 GMT EAGLE 41.0.0
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 are not successful, verify the correct connection of the hardware cabling and repeat this step. If the command fails again, contact [Customer Care Center](#).

16. Repeat [Step 2](#) through [Step 15](#) to add all Service Module cards (N+1) to be installed in available slots.

The Service Module cards have been added in available slots and are configured for the VSCCP application.

MT-Based GSM SMS NP Feature Activation Procedure

This procedure is used to activate the MT-Based GSM SMS NP feature.

Before this feature can be enabled, the G-Port feature must be enabled.

Before the MT-Based GSM SMS NP feature can be turned on, the G-Port Feature must be turned on.

The MT-Based GSM SMS NP feature can be enabled before the G-Port feature is turned on.

For details about the commands used in this procedure, refer to *Commands Manual*.

1. Verify that the G-Port Feature is enabled using the `rtrv-ctrl-feat` command.
2. If the G-Port Feature is not enabled, enable it using [G-Port Feature Activation Procedure](#) before proceeding.
3. Enter the `enable-ctrl-feat` command to enable the MT-Based GSM SMS NP feature.
`enable-ctrl-feat:partnum=893020001:fak=<Feature Access Key>`
4. Enter the `chg-stpopts` command to set the default country code and, if desired, the default network destination code to convert the nature of address indicator (NAI) of MDNs to the international format (`nai=intl`).

The parameters in this command are used for number conditioning.

For example, enter this command:

```
chg-stpopts:defcc=49:defndc=177
```

where:

defcc

The default country code.

defndc

The default network destination code.

5. Verify the new country code and network destination code using the `rtrv-stpopts` command.
6. Enter the `rtrv-gsmopts` command to view the values of the GSMOPTS table options.
7. Change the value DefMCC in the GSMOPTS table using the `chg-gsmopts` command. If desired, other GSM system options may also be changed with this command.

Note: GSMOPTS:DefMCC must be set to a valid value before the MT-Based GSM SMS NP feature can be turned on.

For example, enter this command:

```
chg-gsmopts:defmcc=253
```

where:

defmcc

Specifies the E212 default mobile country code.

8. Verify the changes using the `rtrv-gsmopts` command.
This command displays GSM system options from the database.
9. Enter the `rtrv-gsmmsmsopts` command to view the values of the GSMSMSOPTS table options.
10. If desired, change the GSM SMS options in the database for the MT-Based GSM SMS NP feature using the `chg-gsmmsmsopts` command.

Note: MTSMSDLTRV must be set to a value other than "NONE" before MTSMSDLTR can be set to either PRERN or POSTRN. For details about all options that can be changed using the `chg-gsmmsmsopts` command, see the *Commands Manual*.

For example, enter this command:

```
chg-gsmsmsopts:mtsmsimsi=mccrndn:mtsmstype=rn
```

where:

mtsmsimsi

Specifies the format of the IMSI parameter of the SRI_SM ACK response.

mtsmstype

Indicates the entity type for which a database lookup is considered successful.

11. Verify the changes using the `rtrv-gsmsmsopts` command.
This command displays all GSM SMS options from the database.
12. If the value of GSMSMSOPTS:MTSMSCHKSRC=YES, then provision the home SMSC table entries using the `ent-home-smsc` command.
For example, enter this command:

```
ent-home-smsc:smc=552611646
```
13. Verify the SMSC table contents using the `rtrv-home-smsc` command.
This command retrieves the HOME SMSC specific addresses currently used to identify Short Message Service Centers in the database.
14. Verify that the G-Port Feature is turned on using the `rtrv-ctrl-feat` command.
15. If the G-Port Feature is not turned on, see [G-Port Feature Activation Procedure](#) before proceeding.
16. Enter the `chg-ctrl-feat` command to turn on the MT-Based GSM SMS NP feature.

```
chg-ctrl-feat:partnum=893020001:status=ON
```

The MT-Based GSM SMS NP feature is now enabled, turned on, and operating in the system.

MT-Based GSM MMS NP Feature Activation Procedure

This procedure is used to activate the MT-Based GSM MMS NP feature.

Before this feature can be enabled, the MT-Based GSM SMS NP feature must be enabled.

Before the MT-Based GSM MMS NP feature can be turned on, the MT-Based GSM SMS NP feature must be turned on.

The MT-Based GSM MMS NP feature can be enabled before the MT-Based GSM SMS NP feature is turned on.

For details about the commands used in this procedure, refer *Commands Manual*.

1. Verify that the MT-Based GSM SMS NP feature is enabled using the `rtrv-ctrl-feat` command.
2. If the MT-Based GSM SMS NP feature is not enabled, enable it using [MT-Based GSM SMS NP Feature Activation Procedure](#) before proceeding.
3. Enter the `enable-ctrl-feat` command to enable the MT-Based GSM MMS NP feature.

```
enable-ctrl-feat:partnum=893024101:fak=<Feature Access Key>
```
4. Enter the `rtrv-gsmsmsopts` command to view the values of the GSMSMSOPTS table option.
5. If desired, MT-Based GSM MMS NP feature options may be changed with this command.

For example, enter this command:

```
chg-gsmsmsopts:mtmsgta=12345:mtmsackn=ack:mtmmstype=rn
```

where:

mtmsgta

Specifies the GTA that is compared to the SCCP CgPA GTA of an SRI_SM message to determine whether the originator of the messages is a Home MMSC.

mtmsackn

Specifies the message that is generated in response to a successful RTDB lookup for an SRI_SM message from a Home MMSC.

mtmmstype

Specifies the value of the entity type that indicates that a successful lookup occurred in the RTDB for messages that are modified by the MT-Based GSM MMS NP feature.

Note: For details about all of the options that can be changed using the `chg-gsmsmsopts` command, see the *Commands Manual*.

6. Verify the changes using the `rtrv-gsmsmsopts` command.
This command displays the GSM SMS options from the database.
7. Verify that the MT-Based GSM SMS NP feature is turned on using the `rtrv-ctrl-feat` command.
8. If the MT-Based GSM SMS NP feature is not turned on, refer to the [MT-Based GSM SMS NP Feature Activation Procedure](#) before proceeding.
9. Enter the `chg-ctrl-feat` command to turn on the MT-Based GSM MMS NP feature.
`chg-ctrl-feat:partnum=893024101:status=ON`

The MT-Based GSM MMS NP feature is now enabled, turned on, and operating in the system.

G-Port SRI Query for Prepaid Feature Activation Procedure

This procedure is used to activate the G-Port SRI Query for Prepaid feature.

Before this feature can be enabled, the G-Port feature must be enabled and turned on.

The G-Port SRI Query for Prepaid feature cannot be enabled with a Temporary Feature Access key (FAK).

The G-Port SRI Query for Prepaid feature cannot be turned off after the feature is turned on.

The Service Portability support for G-Port SRI Query for Prepaid feature cannot be enabled with a Temporary Feature Access key (FAK).

The Service Portability support for G-Port SRI Query for Prepaid feature can be turned off after it is turned on.

For details about the commands used in this procedure, refer to *Commands Manual*.

1. Verify that the G-Port Feature is enabled and turned on using the `rtrv-ctrl-feat` command.
2. If the G-Port Feature is not enabled and turned on, enable and turn on the G-Port feature using [G-Port Feature Activation Procedure](#) before proceeding.
3. Enter the `enable-ctrl-feat` command to enable the G-Port SRI Query for Prepaid feature.

```
enable-ctrl-feat:partnum=893017701:fak=<feature access key>
```

4. Enter the `ent-gserv-data` command to provision the translation type, originating point code, or global title address data in the GSERV table.

These values are used to determine whether a Send Routing Information (SRI) request receives G-Port SRI Query for Prepaid service or normal G-Port service..

Command example:

```
ent-gserv-data:tt=77
```

where:

tt

Translation type

5. Verify the new values of the GSERV table using the `rtrv-gserv-data` command.
6. Provision the default routing number in the GSMOPTS table using the `chg-gsmopts` command, if required. The default routing number is used to determine the digits to use as the routing number portion of the `msrndig` parameter.

Command example:

```
chg-gsmopts:dfltrn=135
```

where:

dfltrn

Default routing number

7. Enable Service Portability if Service Portability support for G-Port SRI Query for Prepaid feature is required. If Service Portability support for G-Port SRI Query for Prepaid feature is not required, continue to [Step 10](#).

Command example:

```
enable-ctrl-feat:partnum=893034301:fak=<feature access key>
```

8. Provision the Service Portability Type in the GSMOPTS table using the `chg-gsmopts` command.

Command example:

```
chg-gsmopts:sporttype=all
```

where:

sporttype

Service Portability Type

9. Turn on the Service Portability feature using the `chg-ctrl-feat` command.

Command example:

```
chg-ctrl-feat:partnum=893034301:status=ON
```

10. Turn on the G-Port SRI Query for Prepaid feature using the `chg-ctrl-feat` command.

Command example:

```
chg-ctrl-feat:partnum=893017701:status=ON
```

The G-Port SRI Query for Prepaid feature is now enabled, turned on, and operating in the system. SRI messages received for G-Port SRI Query for Prepaid will receive Service Portability processing only if the optional Service Portability feature is enabled and turned on.

GSM MAP SRI Redirect to Serving HLR Feature Activation Procedure

This procedure is used to activate the GSM MAP SRI Redirect to Serving HLR feature.

Before this feature can be enabled, the G-Port feature must be enabled and turned on.

The GSM MAP SRI Redirect to Serving HLR feature cannot be enabled with a Temporary Feature Access Key.

The GSM MAP SRI Redirect to Serving HLR feature cannot be turned off after the feature is turned on.

For details about the commands used in this procedure, see the *Commands Manual*.

1. Verify that the G-Port Feature is enabled and turned on using the `rtrv-ctrl-feat` command.
2. If the G-Port Feature is not enabled and turned on, enable and turn on the G-Port feature using [G-Port Feature Activation Procedure](#) before proceeding.
3. Enter the `enable-ctrl-feat` command to enable the GSM MAP SRI Redirect to Serving HLR feature.

```
enable-ctrl-feat:partnum=893014001:fak=<Feature Access Key>
```

4. Enter the `chg-prefix-feat` command to relate the GSM MAP SRI Redirect to Serving HLR feature to vendor prefix values, and to specify the prefix numbers that associate to entries in the Vendor ID List. A maximum of three prefix values can be entered in the Vendor Prefix Table for the GSM MAP SRI Redirect to Serving HLR feature.

Command examples:

```
chg-prefix:feature="gsm map sri redirect"prefixnum=1:prefix=1004
```

```
chg-prefix:feature="gsm map sri redirect"prefixnum=2:prefix=1003
```

```
chg-prefix:feature="gsm map sri redirect"prefixnum=3:prefix=1004
```

where:

feature

Feature Name.

prefixnum

Prefix Number. GSM MAP SRI Redirect to Serving HLR feature uses 1 - 3.

prefix

Prefix Value.

5. Verify the Vendor Prefix Table entries using the `rtrv-prefix` command.
6. Enter Vendor ID Length for the Vendor ID List using the `ent-vendid` command.

Command example:

```
ent-vendid:vendidlen=6
```

where:

vendidlen

Vendor ID Length. All Vendor IDs defined for the GSM MAP SRI Redirect to Serving HLR feature must contain this number of digits.

7. Enter the Vendor IDs and Vendor Numbers using the `ent-vendid` command.

Command example:

```
ent-vendid:vendid=886932:vendnum=1:vendtype=1
```

```
ent-vendid:vendid=886936:vendnum=1:vendtype=1
```

```
ent-vendid:vendid=886935:vendnum=2:vendtype=2
```

```
ent-vendid:vendid=886938:vendnum=3:vendtype=1
```

where:

vendid

Vendor ID.

vendnum

Vendor Number, used as a reference to the Vendor prefix.

vendtype

Vendor Type.

8. Verify that all G-Port provisioning information is specified: service selector, HomeRN deletions, default GTT, and GSMOPTS values.
9. Enter the `chg-ctrl-feat` command to turn on the GSM MAP SRI Redirect to Serving HLR feature.

```
chg-ctrl-feat:partnum=893014001:status=ON
```

The GSM MAP SRI Redirect to Serving HLR feature is now enabled, turned on, and operating in the system.

Activating the 1100 TPS/DSM for ITU NP Feature

This procedure is used to enable and turn on the 1100 TPS/DSM for ITU NP feature.

The 1100 TPS/DSM for ITU NP feature increases the processing capacity of SCCP traffic for an EAGLE 5 ISS processing EPAP-based traffic to 26,400 transactions per second. To provide this increase in SCCP processing capacity, the maximum of 25 Service Module cards must be provisioned and installed in the EAGLE 5 ISS, and one or more EPAP-related features enabled and turned on. This feature can be enabled only for Service Module cards that are rated at 850 transactions per second (TPS).

Note: The increased capacity to 1100 TPS per Service Module card assumes incoming traffic consists of at least 30% of GTT routed traffic that does not require EPAP-based lookup. If more than 70% of incoming traffic requires EPAP-based lookup, Group Ticket Voucher (TVG) may shutdown and overall TVG capacity of 1100 for the card may not be met.

The 1100 TPS/DSM for ITU NP feature cannot be enabled if:

- The EAGLE 5 ISS does not contain any Service Module cards.

- The LNP feature is enabled.
- The ANSI G-Flex STP Option is enabled.
- The GTT feature is not turned on.

The feature access key for the 1100 TPS/DSM for ITU NP feature is provided by Tekelec. Contact your Tekelec Sales Representative or Account Representative before beginning the feature activation procedure if you do not have the feature access key for this feature. Based on the feature part number and the serial number of the EAGLE 5 ISS, the feature access key is site-specific. The feature access key contains thirteen alphanumeric characters and is not case sensitive. The 1100 TPS/DSM for ITU NP feature cannot be enabled with a temporary feature access key.

The `enable-ctrl-feat` command requires that the database contain a valid serial number for the EAGLE 5 ISS, and that this serial number is locked. Verify with the `rtrv-serial-num` command. The EAGLE 5 ISS is shipped with a serial number in the database, but the serial number is not locked. The serial number can be changed, if necessary, and locked after the EAGLE 5 ISS is on-site with the `ent-serial-num` command.

Note: To enter and lock the serial number of the EAGLE 5 ISS, the `ent-serial-num` command must be entered twice. The first entry of the `ent-serial-num` command adds the correct serial number to the database with the `serial` parameter. The second entry of the `ent-serial-num` command with the `serial` and `lock=yes` parameters locks the serial number. Verify that the serial number in the database is correct before locking the serial number. The serial number is on a label attached to the control shelf (shelf 1100).

Refer to *Commands Manual* for detailed descriptions of all commands used in this procedure.

1. Display the status of the 1100 TPS/DSM for ITU NP feature by entering the `rtrv-ctrl-feat` command.

Example of a possible output:

```
rlghncxa03w 09-08-24 21:15:37 EST EAGLE 40.1.0

The following features have been permanently enabled:
Feature Name          Partnum  Status  Quantity
HC-MIM SLK Capacity   893012707  on      64
Prepaid SMS Intercept Ph1 893006701  on      ----
1100 TPS/DSM for ITU NP 893018001  on      ----

The following features have been temporarily enabled:
Feature Name          Partnum  Status  Quantity  Trial Period Left
MNP Circ Route Prevent 893000140  On      ----    20 days 8 hrs 57 mins

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

2. Based on the output in [Step 1](#), perform one of the following:
 - If the `rtrv-ctrl-feat` output shows that the LNP feature is enabled, this procedure cannot be performed. The 1100 TPS/DSM for ITU NP feature cannot be enabled if the LNP feature is enabled.
 - If the 1100 TPS/DSM for ITU NP entry of the `rtrv-ctrl-feat` output shows that the 1100 TPS/DSM for ITU NP feature is enabled and the feature status is on, no further action is necessary.
 - If the feature is enabled and the feature status is off, go to [Step 13](#).

- If the 1100 TPS/DSM for ITU NP and LNP features are not enabled, continue to [Step 3](#).
3. Determine whether the G-Flex feature is turned on by entering the `rtrv-ctrl-feat` .
The status of the G-Flex feature is shown by the G-Flex entry in the `rtrv-ctrl-feat` output.
 - If the G-Flex feature is on, continue to [Step 4](#).
 - If the G-Flex feature is off, go to [Step 5](#).
 4. Verify that the ANSI G-Flex option is not enabled or turned on by entering the `rtrv-stpopts` command.
The 1100 TPS/DSM ITU NP feature cannot be enabled if the ANSI G-Flex option is turned on.
The ANSI G-Flex option is shown by the ANSIGFLEX entry in the `rtrv-stpopts` output. If the ANSIGFLEX entry is displayed in the `rtrv-stpopts` output, both the G-Flex and the GTT features are turned on.
 - If the ANSIGFLEX value is *yes* in the `rtrv-stpopts` output , the ANSI G-Flex option is enabled and the remainder of this procedure cannot be performed.
 - If the ANSIGFLEX value is *no* in the `rtrv-stpopts` output, the ANSI G-Flex option is not enabled. Proceed to [Step 6](#).
 5. Determine whether the GTT feature is turned on by examining the output of the `rtrv-feat` command.
The 1100 TPS/DSM ITU NP feature cannot be enabled unless the GTT feature is turned on. The GTT feature is shown by the GTT entry in the `rtrv-feat` output in [Step 3](#).
 - If the GTT feature is turned on, continue to [Step 6](#).
 - If the GTT feature is turned off, perform "Adding a Service Module" in *Database Administration Manual - Global Title Translation* to turn on the GTT feature and to add the required number of Service Module cards to the database. After "Adding a Service Module" has been performed, go to [Step 11](#).
 6. Verify the number of Service Module cards provisioned in the database using the `rtrv-card:appl=vsccp` command:
Example of a possible output:


```
tk1c1110501 07-04-12 17:28:02 EST EAGLE5 37.0.0
CARD  VERSION      TYPE      GPL      PST      SST      AST
1111  128-015-000  DSM      SCCPHC   IS-NR    Active   -----
1101  128-015-000  DSM      VSCCP    IS-NR    Active   -----
```

 Command Completed.
 7. Based on the output shown in [Step 6](#), perform one of the following:
 - If the required number of Service Module cards is provisioned in the database, continue to [Step 8](#).
 - If the required number of Service Module cards is not provisioned in the database, perform "Adding a Service Module" in *Database Administration Manual - Global Title Translation* to add the required number of Service Module cards to the database. After "Adding a Service Module" has been performed, continue with [Step 8](#).
 8. Display the serial number in the database with the `rtrv-serial-num` command.

Example of a possible output:

```
rlghncxa03w 09-08-24 21:15:37 EST EAGLE 40.1.0
System serial number = nt00000123
System serial number is not locked
.
rlghncxa03w 09-08-24 21:15:37 EST EAGLE 40.1.0
Command Completed
```

9. Compare the serial number located on a label affixed to the control shelf (shelf 1100) to the output shown in [Step 8](#), then perform one of the following:
 - If the serial number is not correct and is locked, this feature cannot be enabled and the remainder of this procedure cannot be performed. Contact [Customer Care Center](#) to change an incorrect and locked serial number.
 - If the serial number is not correct and is not locked, continue to [Step 10](#).
 - If the serial number is correct but is not locked, go to [Step 12](#).
 - If the serial number is correct and is locked, go to [Step 13](#).
10. Enter the correct serial number into the database using the `ent-serial-num` command with the `serial` parameter.

Command example:

```
ent-serial-num:serial=<EAGLE 5 ISS serial number>
```

After the command has completed successfully, this message is displayed:

```
rlghncxa03w 09-08-24 21:15:37 EST EAGLE 40.1.0
ENT-SERIAL-NUM: MASP A - COMPLTD
```

11. Verify with the `rtrv-serial-num` command that the serial number entered in [Step 10](#) was entered correctly. If the serial number was not entered correctly, repeat [Step 10](#) and enter the correct serial number.

Example of a possible output:

```
rlghncxa03w 09-08-24 21:15:37 EST EAGLE 40.1.0
System serial number = nt00000123
System serial number is not locked.
rlghncxa03w 09-08-24 21:15:37 EST EAGLE 40.1.0
Command Completed
```

12. Lock the serial number in the database by entering the `ent-serial-num` command with the correct serial number as shown in [Step 11](#) and with the `lock=yes` parameter value.

Command example:

```
ent-serial-num:serial=<EAGLE 5 ISS serial number>:lock=yes
```

After the command has completed successfully, this message is displayed:

```
rlghncxa03w 09-08-24 21:15:37 EST EAGLE 40.1.0
ENT-SERIAL-NUM: MASP A - COMPLTD
```

13. Enable the 1100 TPS/DSM for ITU NP feature with the feature access key using the `enable-ctrl-feat` command.

Command example:

```
enable-ctrl-feat:partnum=893018001:fak=<feature access key>
```

Note: The feature access key for the 1100 TPS/DSM for ITU NP feature is provided by Tekelec. Contact your Tekelec Sales Representative or Account Representative if you do not have the feature access key for this feature. This feature cannot be enabled with a temporary feature access key.

After the command has completed successfully, this message is displayed:

```
rlghncxa03w 09-08-24 21:15:37 EST EAGLE 40.1.0
ENABLE-CTRL-FEAT: MASP B - COMPLTD
```

14. Perform on of the following:

- To turn on the 1100 TPS/DSM for ITU NP feature, go to [Step 15](#).
- To not turn on the 1100 TPS/DSM for ITU NP feature, go to [Step 17](#). The transaction rate will remain at 850 TPS per Service Module card.

15. To turn on the 1100 TPS/DSM for ITU NP feature, enter the `chg-ctrl-feat` command, specifying the 1100 TPS/DSM for ITU NP feature part number and the `status=on` parameter value.

Command example:

```
chg-ctrl-feat:partnum=893018001:status=on
```

This message is displayed:

```
CAUTION: Rated TPS for this feature supports an engineered GTT
traffic mix of no more than 70 percent EPAP-based traffic.
Re-enter the command within 30 seconds to confirm change.
```



CAUTION

CAUTION: If the EPAP-based traffic is higher than 70% of all traffic on the EAGLE 5 ISS, the Service Module card performance may not reach 1100 TPS per Service Module card.

16. Re-enter the `chg-ctrl-feat` command to turn on the feature.

Command example:

```
chg-ctrl-feat:partnum=893018001:status=on
```

After the command has completed successfully, this message is displayed:

```
rlghncxa03w 09-08-24 21:15:37 EST EAGLE 40.1.0
CHG-CTRL-FEAT: MASP B - COMPLTD
```

17. Verify the changes by entering the `rtrv-ctrl-feat` command with the 1100 TPS/DSM for ITU NP feature part number.

Command example:

```
rtrv-ctrl-feat:partnum=893018001
```

Example of a possible output:

```
rlghncxa03w 09-08-24 21:15:37 EST EAGLE 40.1.0
The following features have been permanently enabled:
Feature Name          Partnum  Status  Quantity
1100 TPS/DSM for ITU NP  893018001  on      ----

The following features have been temporarily enabled:
Feature Name          Partnum  Status  Quantity  Trial Period Left
Zero entries found.

The following features have expired temporary keys:
```

| Feature Name | Part Num |
|---------------------|----------|
| Zero entries found. | |

18. Back up the new database changes with the chg-db command:

Command example:

```
chg-db:action=backup:dest=fixed
```

These messages are displayed. The active Maintenance and Administration Subsystem Processor (MASP) is displayed first.

```
BACKUP (FIXED) : MASP A - Backup starts on active MASP.
BACKUP (FIXED) : MASP A - Backup on active MASP to fixed disk complete. BACKUP
(FIXED) : MASP A - Backup starts on standby MASP.
BACKUP (FIXED) : MASP A - Backup on standby MASP to fixed disk complete.
```

To turn off the 1100 TPS/DSM for ITU NP feature, enter the chg-ctrl-feat command, specifying the 1100 TPS/DSM feature part number and the status=off parameter value.

```
chg-ctrl-feat:partnum=893018001:status=off
```

This message is displayed:

```
CAUTION: This command decreases the total TPS of the SCCP system from 1100 to 850
TPS for each DSM card.
```

Confirm that you wish to turn off the 1100 TPS/DSM for ITU NP feature by re-entering the command within 30 seconds.

```
chg-ctrl-feat:partnum=893018001:status=off
```

This message is displayed:

```
rlghncxa03w 09-08-24 21:15:37 EST EAGLE 40.1.0
CHG-CTRL-FEAT: MASP B - COMPLTD
```

Activating the E5-SM4G Throughput Capacity Feature

The E5-SM4G Throughput Capacity feature quantities are used to increase the processing capacity of the E5-SM4G card and of system SCCP traffic for an EAGLE 5 ISS that contains E5-SM4G cards only (no DSM cards). The achievable TPS maximums are shown in [Table 26: Maximum E5-SM4G Card and System TPS Capacity](#).

Table 26: Maximum E5-SM4G Card and System TPS Capacity

| Feature Quantity Part Number | Maximum TPS Capacity per E5-SM4G Card | Maximum System TPS Capacity |
|-----------------------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 893019101 - Feature Quantity 5000 | 3125 | <ul style="list-style-type: none"> 75,000 TPS with one or more EPAP-related features and 24+1 cards 96,875 TPS with one or more EPAP-related features and 31+1 cards (EPAP running on T1200 AS) |

| Feature Quantity Part Number | Maximum TPS Capacity per E5-SM4G Card | Maximum System TPS Capacity |
|-----------------------------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 5000 | <ul style="list-style-type: none"> • 150,000 TPS with no EPAP-related or ELAP-related feature traffic and 31+1 cards • 120,000 TPS with G-Flex and the ANSIGFLEX STP option and 24+1 cards • 155,00 TPS with G-Flex and the ANSIGFLEX STP option and 31+1 cards (EPAP running on T1200 AS) • 40,000 TPS with ELAP and 8+1 cards • 85,000 TPS with ELAP and 17+1 cards |
| 893019102 - Feature Quantity 6800 | 6800 | <ul style="list-style-type: none"> • 210,800 TPS with no EPAP-related or ELAP-related feature traffic and 31+1 cards • 163,200 TPS with one or more EPAP-related features and 24+1 cards • 210,800 TPS with one or more EPAP-related features and 31+1 cards (EPAP running on T1200 AS) • 54,400 TPS with ELAP and 8+1 cards • 115,600 TPS with ELAP and 17+1 cards |

An E5-SM4G Throughput Capacity quantity feature must be enabled using an E5-SM4G Throughput Capacity feature part number (893019101 or 893019102) and a feature access key.

The feature access key is based on the feature part number and the serial number of the EAGLE 5 ISS, making the feature access key site-specific.

Note: The E5-SM4G Throughput Capacity quantity feature must be purchased to receive the feature access key used to enable the feature. Contact your Tekelec Sales Representative or Account Representative before beginning this procedure if you have purchased the E5-SM4G Throughput Capacity quantity feature, but do not have the feature access key. A temporary feature access key is not available for this feature.

After an E5-SM4G Throughput Capacity feature is enabled and turned on, the E5-SM4G Throughput Capacity feature cannot be turned off. When the E5-SM4G Throughput Capacity feature is enabled, it is permanently enabled. The E5-SM4G Throughput Capacity feature cannot be temporarily enabled.

System Prerequisites

Before the E5-SM4G Throughput Capacity feature can be enabled, the prerequisites listed in [Table 27: System Prerequisites](#) are required in the system.

Table 27: System Prerequisites

| Prerequisite | Verification and Provisioning |
|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| For new installations, the system serial number must be verified and locked. The system is shipped with an unlocked serial number. The | Enter the <code>rtrv-serial-num</code> command to display the serial number and its lock status. |

| Prerequisite | Verification and Provisioning |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>serial number can be changed if necessary and must be locked after the system is on-site.</p> <p>For systems that are being upgraded, the serial number has already been verified and locked.</p> | <p>Verify that the displayed serial number is correct for the system. The serial number is shown on a label affixed to the control shelf (shelf 1100).</p> <p>If no serial number is displayed, or if the displayed serial number is not locked, refer to the <code>ent-serial-num</code> command description in the <i>Commands Manual</i> for instructions to enter and lock the serial number.</p> |
| <p>The GTT feature must on in the system.</p> | <p>Enter the <code>rtrv-feat</code> command.</p> <p>If the GTT feature is on, the <code>gtt=on</code> entry appears in the output.</p> <p>If the <code>gtt=off</code> entry appears in the output, use the procedures in the <i>Database Administration Manual – Global Title Translation</i> to turn on and provision the GTT feature and any related features and functions.</p> |

E5-SM4G Throughput Capacity Feature Prerequisite

Before the E5-SM4G Throughput Capacity feature can be enabled, the prerequisite shown in [Table 28: E5-SM4G Throughput Capacity Feature Prerequisite](#) is required in the system.

Table 28: E5-SM4G Throughput Capacity Feature Prerequisite

| Prerequisite | Verification and Provisioning |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>E5-SM4G cards running the VSCCP application must be equipped.</p> <p>The required number of cards depends on the desired total system TPS to be achieved by the cards. See Table 26: Maximum E5-SM4G Card and System TPS Capacity.</p> | <p>Enter the <code>rept-stat-gpl:gpl=sccphc</code> command to list the E5-SM4G cards in the system.</p> <p>If the number of cards is not sufficient, use the procedure in Adding a Service Module Card to add E5-SM4G cards.</p> |

The following procedure explains how to enable an E5-SM4G Throughput Capacity quantity feature.

Note: After a quantity feature has been enabled, a feature for a higher quantity can be enabled; a feature for a lower quantity cannot be enabled. Quantity features are automatically turned on when they are enabled.

Refer to the *Commands Manual* for descriptions of the commands used in the procedure, including parameter names and valid values, rules for using the command correctly, and output examples.

1. Display the status of the features that are controlled by feature access keys. Enter the `rtrv-ctrl-feat` command.

```
rlghncxa03w 09-07-29 16:40:40 EST EAGLE5 41.1.0
The following features have been permanently enabled:
Feature Name          Partnum      Status      Quantity
```

```

HC-MIM SLK Capacity      893012707  on        64
E5-SM4G Throughput Cap  893019101  on        5000
;

```

- If the `rtrv-ctrl-feat` output shows that the correct E5-SM4G Throughput Capacity quantity feature is enabled and its status is on, no further action is necessary.
 - If no E5-SM4G Throughput Capacity feature quantity is enabled or a higher quantity needs to be enabled, continue with step [Step 2](#).
2. Enable the E5-SM4G Throughput Capacity quantity feature by entering the `enable-ctrl-feat` command with the correct part number and FAK for the desired quantity.
 3. Verify the status of the E5-SM4G Throughput Capacity quantity feature by entering the `rtrv-ctrl-feat` command with the feature part number that was just enabled (893033501 or 893019102).

```

rtrv-ctrl-feat:partnum=893019102

rlghncxa03w 09-08-29 16:40:40 EST  EAGLE5 41.1.0
The following features have been permanently enabled:
Feature Name          Partnum  Status  Quantity
HC-MIM SLK Capacity   893012707  on      64
E5-SM4G Throughput Cap 893019102  on      6800
;

```

4. Back up the changes using the `chg-db:action=backup:dest=fixed` command. The following messages appear, the active Maintenance and Administration Subsystem Processor (MASP) appears first.

```

BACKUP (FIXED): MASP A - Backup starts on active MASP.
BACKUP (FIXED): MASP A - Backup on active MASP to fixed disk complete.
BACKUP (FIXED): MASP A - Backup starts on standby MASP.
BACKUP (FIXED): MASP A - Backup on standby MASP to fixed disk complete.

```

Adding a Service Module Card

This procedure is used to add Service Module cards to the database to support GTT-related features and EPAP-related features.

EPAP-based features require Service Module cards running the VSCCP application. The following cards can be used as Service Module cards running the VSCCP application in the system:

- DSM 4G – a DSM card with 4 gigabytes of memory
- E5-SM4G - an EPM-based card with 4 gigabytes of memory

The system can contain a maximum number of Service Module cards for EPAP-related features:

- Up to 25 (24+1) Service Module cards if EPAP is running in a T1000 AS
- Up to 32 (31+1) Service Module cards if EPAP is running in a T1200 AS
 - The following Warning appears when more than 25 Service Module cards have been provisioned in the system and the `enable-ctrl-feat` command is entered to enable the first EPAP-related feature in the system:

```
Warning: The Eagle must be connected to an EPAP T1200 or higher
```

- The following Caution appears when the `ent-card` command is entered to add the 26th Service Module card to the database and any EPAP-related feature is enabled in the system:

```
CAUTION: Please ensure EPAP Application Server is running on
          hardware supporting 32 SCCP cards e.g.: T1200.
          Re-enter command within 30 seconds to confirm change.
```

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

A Service Module card occupies two card slots. A Service Module card can be inserted only in an odd/even numbered pair of empty card slots of an EAGLE 5 ISS shelf. The even-numbered card slot to the right of the odd-numbered slot where the Service Module card is to be inserted must be empty. A Service Module card cannot be inserted in slots 09 and 10 because slots 09 and 10 of each shelf contain HMUX cards, HIPR cards, or HIPR2 cards. The Service Module card is connected to the network through the odd-numbered card slot connector.

Note: Service Module cards can be inserted only in slots 01, 03, 05, 07, and 11 of the control shelf (1100).

Table 29: Service Module Card Locations

| Location of the Service Module Card | Empty Card Location |
|-------------------------------------|---------------------|
| Slot 01 | Slot 02 |
| Slot 03 | Slot 04 |
| Slot 05 | Slot 06 |
| Slot 07 | Slot 08 |
| Slot 11 | Slot 12 |
| Slot 13 | Slot 14 |
| Slot 15 | Slot 16 |
| Slot 17 | Slot 18 |

Prerequisites

Before a Service Module card can be added, the prerequisites in [Table 30: System Prerequisites for Adding a Service Module Card](#) must be present in the system.

Table 30: System Prerequisites for Adding a Service Module Card

| Prerequisite | Verification and Actions |
|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The shelf to which the card is to be added must already be provisioned in the database. | Enter the <code>rtrv-shlf</code> command. If the shelf is not in the database, refer to the procedure for adding a shelf in the <i>Database Administration Manual – System Management</i> . |
| The odd/even slots in which the card will be inserted must not have a card already assigned in the database. | Enter the <code>rtrv-card</code> command. If a slot has a card assigned to it, use the <code>dlt-card</code> command to remove the card from the database. Refer to the <code>dlt-card</code> command description in the <i>Commands Manual</i> . |
| The GTT feature must be on. | Enter the <code>rtrv-feat</code> command to display the GTT feature status. If the GTT feature is on, the <code>gtt=on</code> entry appears in the output. If the <code>gtt=off</code> entry appears in the output, use the procedures in the <i>Database Administration Manual - GTT</i> to turn on and provision the GTT feature and any other GTT-related features and functions that will be used in the system. |
| To add more than 25 Service Module cards to the database, the EPAP that is connected to the EAGLE 5 ISS must be running on a T1200 AS. | Use visual inspection or contact the Customer Care Center for assistance to determine the EPAP hardware type. |

Before an E5-SM4G Service Module card can be added, the prerequisite in [Table 31: Prerequisite for Adding an E5-SM4G Service Module Card](#) must be present in the system.

Table 31: Prerequisite for Adding an E5-SM4G Service Module Card

| Prerequisite | Verification and Actions |
|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Slots 09 and 10 in the shelf to which the E5-SM4G card will be added must contain either HIPR cards or HIPR2 cards. | Enter the <code>rept-stat-gpl:gpl=hipr</code> command and the <code>rept-stat-gpl:gpl=hipr2</code> command to list the installed HIPR cards and HIPR2 cards in the system. If the shelf does not contain HIPR cards or HIPR2 cards, refer to procedures in the <i>Installation Manual - EAGLE 5 ISS</i> to install HIPR cards or HIPR2 cards in the shelf. |

Refer to the *Commands Manual* for complete descriptions of the commands that are used in this procedure. The complete descriptions include all valid parameter values and output examples.

1. Display the cards in the system by entering the `rtrv-card` command. Odd-even pairs of card locations that do not contain cards (are not listed in the output) and do not contain HMUX, HIPR, or HIPR2 cards can be used for Service Module cards.

```

rlghncxa03w 08-03-15 16:34:56 EST EAGLE 39.2.0
CARD   TYPE      APPL      LSET NAME      LINK SLC LSET NAME      LINK SLC
1201   LIMDS0     SS7ANSI   LS1             A    0    LS1            B
1102   DSM         VSCCP     -----       A    --   -----       B   --
1113   GPSM        OAM
1114   TDM-A
1115   GPSM        OAM
1116   TDM-B
1117   MDAL
;
    
```

2. Verify that the Service Module card to be added has been physically installed in the correct card location.



CAUTION: If the version of the BPDCM GPL on the Service Module card does not match the BPDCM GPL version in the database when the Service Module card is inserted into the card slot, UAM 0002 is generated indicating that these GPL versions do not match. If UAM 0002 has been generated, perform the alarm clearing procedure for UAM 0002 in the *Unsolicited Alarm and Information Messages* manual before proceeding with this procedure.

3. Perform this step only if the card being added will be the 26th Service Module card in the system. If the card is NOT the 26th Service Module card, continue to [Step 4](#).

Note: The same `ent-card` command must be entered twice within 30 seconds to complete the provisioning of the card.

- a) Enter the `ent-card` command the first time for the 26th card.

```
ent-card:loc=<card location>;type=dsm:appl=vsccp
```

When the command executes the first time and any EPAP-related feature is enabled, the following caution appears :

```

CAUTION: Please ensure EPAP Application Server is running on
          hardware supporting 32 SCCP cards e.g.: T1200.
          Re-enter command within 30 seconds to confirm change.
    
```

- b) Enter the same `ent-card` command the second time for the 26th card to complete the provisioning of the card.
 - c) Go to [Step 5](#).
4. Add the Service Module card to the database, using the `ent-card` command.
`ent-card:loc=<card location>;type=dsm:appl=vsccp`
 5. For an E5-SM4G card, verify the temperature threshold settings by performing the “Changing the High-Capacity Card Temperature Alarm Thresholds” procedure in *Database Administration Manual - SS7*.
 6. Verify the change by entering the `rtrv-card` command with the card location specified.

```

rlghncxa03w 08-03-15 16:34:56 EST EAGLE 39.2.0
CARD   TYPE      APPL      LSET NAME      LINK SLC LSET NAME      LINK SLC
1301   DSM         VSCCP     -----       A    --   -----       B
;
    
```

7. Change the IP Address to MPS for the added card.

```
chg-ip-lnk:port=<a/b>:submask=255.255.255.0:mcast=yes:speed=100:loc=<odd-numbered  
card location>:ipaddr=<EPAP DSM IP address>:duplex=full
```

8. Allow the added card to begin operation in the system.

```
alw-card:loc=<odd-numbered card location>
```

9. Back up the database changes, by entering the following command.

```
chg-db:action=backup:dest=fixed
```

The following messages should appear; the active Maintenance and Administration Subsystem Processor (MASP) appears first.

```
BACKUP (FIXED) : MASP A - Backup starts on active MASP.  
BACKUP (FIXED) : MASP A - Backup on active MASP to fixed disk complete.  
BACKUP (FIXED) : MASP A - Backup starts on standby MASP.  
BACKUP (FIXED) : MASP A - Backup on standby MASP to fixed disk complete.
```

10. Repeat this procedure for each Service Module card that needs to be added to the system.

Chapter 5

Measurements

Topics:

- [G-Port Measurements.....127](#)

This chapter describes the measurements information available from the EAGLE 5 ISS for the G-Port feature.

G-Port Measurements

Refer to *EAGLE 5 ISS Measurements* for information about measurement systems and reporting.

Refer to *EAGLE 5 ISS Commands Manual* for descriptions of commands used to generate, schedule, and transfer measurements reports.

Refer to *Database Administration Manual - System Management* for provisioning information and procedures for these measurement systems:

- OAM-based Measurements - G-Port measurements are available using the File Transfer Area (FTA) feature and not directly by EAGLE 5 ISS terminals.
- Measurements Platform
- E5-OAM Integrated Measurements

Table 32: Pegs for Per System G-Port Measurements describes the peg counts of Message Signalling Units (MSUs) supported per-system for the G-Port feature.

Table 32: Pegs for Per System G-Port Measurements

| Event Name | Description | Type | Unit |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----------|
| GPSRRCV | Number of call-related SRI messages received. Peg counts for register GPSRRCVPP are not included in this register. | System | Peg count |
| GPSRGTT | Number of call-related SRI messages that fell through to GTT. Peg counts for register GPSRGTTTPP are not included in this register. | System | Peg count |
| GPSRREP | Number of call-related SRI messages that received G-Port service. Peg counts for register GPSRREPPP are not included in this register. | System | Peg count |
| GPSRERR | Number of call-related messages that cause SRI negative ack messages because of G-Port service failure. Peg counts for register GPSRERRPP are not included in this register. | System | Peg count |

Table 33: Pegs for Per SSP G-Port Measurements describes the peg counts of Message Signalling Units (MSUs) supported per-SSP for the G-Port feature.

Table 33: Pegs for Per SSP G-Port Measurements

| Event Name | Description | Type | Unit |
|------------|---------------------------------------------------------------------------------------------------------------|------------|-----------|
| GPSRACK | Number of call-related SRI ack messages. Peg counts for register GPSRACKPP are not included in this register. | Point Code | Peg count |
| GPSRNACK | Number of call-related SRI negative ack messages in successful G-Port service | Point Code | Peg count |
| GPSRRLY | Number of call-related SRI messages relayed | Point Code | Peg count |

Table 34: Pegs for Per System and Per SSP G-Port Measurements describes the peg counts of Message Signalling Units (MSUs) supported both per-system and per-SSP for the G-Port feature.

Table 34: 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 |
| GPSRSMREP | Number of SRI_SM messages that result in SRI_SM_ACK or SRI_SM_NACK responses | System, Point Code | Peg count |
| GPSRSMERR | Number of SRI_SM messages that result in error | System, Point Code | Peg count |
| GPSRSMRCV | Number of SRI_SM messages received | System, Point Code | Peg Count |
| MNPCRCD | Number of times Circular Route is detected | System, Point Code | Peg Count |

Table 35: Pegs for G-Port SRI Query for Prepaid Measurements describes the peg counts of Message Signalling Units (MSUs) supported for the G-Port SRI Query for Prepaid feature.

Table 35: Pegs for G-Port SRI Query for Prepaid Measurements

| Event Name | Description | Type | Unit |
|------------|----------------------------------------------------------------------------------------------|------------|-----------|
| GPSRACKPP | Number of call-related SRI ack messages for G-Port SRI Query for Prepaid feature. Peg counts | Point Code | Peg Count |

Chapter 6

Maintenance

Topics:

- *EPAP Status and Alarms.....131*
- *G-Port System Status Reports.....133*
- *Code and Application Data Loading.....134*
- *G-Port Related Alarms.....136*
- *G-Port Related UIMs.....139*

This chapter describes the maintenance information available from the EAGLE 5 ISS for the G-Port feature. The information includes status, alarms (UAMs), and information messages (UIMs).

EPAP Status and Alarms

Because EPAP has no direct means of accepting user input or displaying output messages on EAGLE 5 ISS terminals, maintenance, measurements, and status information are routed through a Service Module card. EPAP sends two types of messages to the Service Module card: *EPAP Maintenance Blocks* and *DSM Status Requests*. Each message type is discussed in the following sections.

EPAP Maintenance Blocks

The active EPAP generates and sends maintenance blocks to the primary Service Module card. One maintenance block is sent as soon as the IP link is established between the active EPAP and the primary Service Module card. 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 for this information so that it 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 for this information so that it 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 Service Module card. The EPAP must ensure that no more than one maintenance block per second is sent to the primary Service Module card 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 Service Module card 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 Service Module card, it sends a DSM status request to that Service Module card. Because status messages are sent over UDP, the EPAP broadcasts the DSM status request (to all Service Module cards) and each Service Module card returns its 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

Service Module cards send a DSM status message to the EPAP when any the following events occur in the Service Module card:

- The Service Module card is booted.
- The Service Module card receives a DSM Status Request message from the EPAP
- The Service Module card determines that it needs to download the entire database, for example, if the Service Module card 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.
- The Service Module card starts receiving database downloads or database updates. When a Service Module card starts downloading the RTDB or accepting database updates, it sends a DSM Status Message informing the EPAP of the first record received. This helps the EPAP keep track of downloads in progress.

DSM Status Messages Fields

The DSM Status Message provides the following information to the EPAP:

- **DSM Memory Size.** When the Service Module card is initialized, it determines the amount of memory present. The EPAP uses the value to determine if the Service Module card 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 Service Module card database capacity requirements.

- **Load Mode Status.** This indicator indicates whether or not 80% of the IS-NR (In-Service Normal) 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 Service Module card /EPAP IP links. A sample follows.

```
eagle10506 99-10-10 16:00:01 EST EAGLE 37.5.0
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 37.5.0
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 37.5.0
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 37.5.0
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 37.5.0
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
- Service Module card memory capacity status
- Loading mode support status

System Status Reporting

The `rept-stat-sys` command supports the Service Module cards running the VSCCP application.

The `rept-stat-sccp` command supports the Service Module 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 provisioning system. See "Maintenance and Measurements User Interface Commands", for more details. G-Port statistics are placed in the `rept-stat-sccp` command.

Service Module card Memory Capacity Status Reporting

As described in the [DSM Status Messages Fields](#), the Service Module card sends a message to the EPAP containing the amount of memory on the Service Module card. The EPAP determines whether the Service Module card has enough memory to store the RTDB and sends an ack or nak back to the Service Module card indicating whether or not the Service Module card 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 Service Module card database capacity requirements.

When the EPAP sends database updates to the Service Module cards, the update messages include a field that contains the new database memory requirements. Each Service Module card 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 Service Module card 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 Service Module card 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 and Service Module 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 [Loading Mode Support](#), for more details.

Code and Application Data Loading

Service Module Code Loading

The EAGLE 5 ISS OAM code loads the Service Module 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 Service Module card GPL verifies its hardware configuration during initialization to determine if it has the capacity to support the RTDB.

The Service Module card 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 Service Module card load requests are combined into a single download, reducing the overall download time. The Service Module card stores or discards RTDB table data based on whether or not it has RTDB-capable hardware for features like G-Port, G-Flex, INP, and EIR.

The OAM, on the other hand, downloads or sets memory boundaries for the G-Port options, HOMERN, 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 Service Module 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. 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.

EPAP-Service Module Card Loading Interface

The Service Module card must convey to the EPAP that it needs to download the RTDB. This occurs when the Service Module card sends a Full Download Request message to the EPAP.

Loading Mode Support

No more than 16 LIMs can be serviced by each Service Module 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.

Service Module Card Capacity

An insufficient number of Service Module cards that are in the IS-NR (In Service - Normal) or OOS-MT-DSBLD (Out of Service - Maintenance Disabled) 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 Service Module cards to be inhibited or to have problems that prevent them from operating normally. If enough Service Module cards are out of service, it may not be possible for the remaining is-nr Service Module 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

The current system implementation interrupts and aborts card loading upon execution of an STP database `chg` command. Loading mode support denies the execution of EAGLE 5 ISS database `chg` commands when the system is in an unstable loading mode. An unstable loading mode exists when any of the following conditions are true:

- The system's maintenance baseline has not been established.
- Less than 80% of the number of LIMs provisioned are IS-NR or OOS-MT-DSBLD.
- The number of IS-NR and OOS-MT-DSBLD Service Module cards running the VSCCP application is insufficient to service at least 80% of all provisioned LIMs.
- Insufficient SCCP service occurs when an insufficient number of is-nr Service Module cards are available to service at least 80% of the number of is-nr LIMs.
- LIM cards are being denied SCCP service and any Service Module cards are in an abnormal state (oos-mt or IS-ANR).

Effects of System 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 response reports the existence of the unstable loading mode and the specific trigger that caused it.

- No STP database updates allowed.

After an STP database has been loaded, that database can be updated (as long as the system is not in an unstable loading mode). However, if an STP update arrives during STP database loading, the Service Module card aborts the current loading, issues a class 01D7 obit, and reboots.

Using the force Option

Use the force option to force the execution of commands that would put the system in unstable loading mode (such as the `ent-card` and `inh-card` commands).

G-Port Related Alarms

Refer to *Unsolicited Alarm and Information Messages* for a complete description and the associated corrective procedure for all G-Port related UAMs.

EPAP - Service Module card Connection Status

The EPAP and the Service Module are connected over a 100-Mbit Ethernet link and use TCP/IP. If this connection is inoperative, the Service Module 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 Service Module processes the incoming maintenance blocks and generates the requested UAM. The actual EPAP UAMs are defined in *Unsolicited Alarm and Information Messages*; the Service Module acts only as a delivery agent.

Service Module card Failure

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

Service Module card-EPAP Link

Two alarms are used to indicate the Service Module card-to-EPAP link status:

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

The Service Module-EPAP Link alarms are output to the Link Maintenance Output Group. See *Unsolicited Alarm and Information Messages* 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 37.0.0-35.10.0
** 3582.0084 ** VSCCP PORT B 1217 IP Connection Unavailable

```

Service Module card Hardware-Related Alarms

A major alarm appears when a Service Module card does not have the hardware configuration required for the G-Port application. Loading the Service Module 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 Service Module 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
1234567890123456789012345678901234567890123456789012345678901234567890
      station1234 99-09-30 16:28:08 EST EAGLE 37.0.0-31.7.0
** 0012.0446 ** CARD 1108 VSCCP           RTDB database capacity is 80% full

```

A critical alarm is generated when a Service Module card detects that its applique memory is 95% full. Loading of the Service Module 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
1234567890123456789012345678901234567890123456789012345678901234567890
      station1234 99-09-30 16:28:08 EST EAGLE 37.0.0-31.7.0
*C 0012.0442 *C CARD 1108 VSCCP           RTDB database capacity is 95% full

```

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

Example:

```

      1           2           3           4           5           6           7           8
1234567890123456789012345678901234567890123456789012345678901234567890
      station1234 00-09-30 16:28:08 EST EAGLE 37.0.0-35.10.0
0012.0423      CARD 1108 VSCCP           Card reload attempted

```

DSM Database Audit Alarm

During an audit of the Service Module 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
1234567890123456789012345678901234567890123456789012345678901234567890
      station1234 00-09-30 16:28:08 EST EAGLE 37.0.0-35.10.0
** 0012.0443 ** CARD 1108 VSCCP           RTDB Database is corrupted

```

DSM Database Alarms

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

When the RTDB of a Service Module card is inconsistent (that is, the Service Module card 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
1234567890123456789012345678901234567890123456789012345678901234567890
      station1234 00-09-30 16:28:08 EST EAGLE 37.0.0-35.10.0
* 0012.0444 * CARD 1108 VSCCP           RTDB Database is inconsistent

```

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

Example:

```

      1           2           3           4           5           6           7           8
1234567890123456789012345678901234567890123456789012345678901234567890
      station1234 00-09-30 16:28:08 EST EAGLE 37.0.0-35.10.0
*    0012.0448 * CARD 1108 VSCCP           RTDB Database is incoherent
    
```

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

Example:

```

      1           2           3           4           5           6           7           8
1234567890123456789012345678901234567890123456789012345678901234567890
      station1234 00-09-30 16:28:08 EST EAGLE 37.0.0-35.10.0
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.

Table 36: 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 |
| 0528* | Critical | Service is not available | sys_maint |
| 0529* | Critical | Service is disabled | sys_maint |

| UAM # | Severity | Message Text | Output Group (UI Output Direction) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------|---------------------------------------|
| 0530* | None | Service is removed | sys_maint |
| *GPORT will display in the text of the message if the G-Port feature is enabled without the additional features of A-Port or IGM being enabled. If the A-Port and/or IGM features are enabled, the text GPORT will be replaced with the text MNP. | | | |

G-Port Related UIMs

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

Unsolicited Alarm and Information Messages contains a complete description of all UIM text and formats. [Table 37: G-Port UIMs](#) lists UIMs used to support the G-Port feature.

Table 37: G-Port UIMs

| UIM | Text | Description | Action |
|------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| 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. |
| 1036 | SCCP rsp did not route - invalid TT. | The SCCP response did not route due to an invalid TT. | Provision the CGPATT in the GTT TT table. |
| 1037 | SCCP rsp did not route - bad Xlation | The SCCP response did not route due to a bad translation | Provision the CGPAGTA address in the GTT database. |
| 1038 | SCCP rsp did not route - SSP not True PC. | The SCCP response did not route because SSP is not true point code. | Use the true point code in the CGPA point code or OPC of the query. |
| 1039 | SCCP rsp did not route - bad Selectors | The SCCP response did not route due to invalid selectors. | Provision the CGPAGTI, TT, NP, and NAI in the EGTT selector table. |
| 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. |

| UIM | Text | Description | Action |
|------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| 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. |
| 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. |
| 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 <code>chg-stpopts :defcc=xxx</code> . |
| 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 <code>chg-stpopts :defndc=xxxxxx</code> . |
| 1246 | Invalid length of conditioned digits | Length of conditioned international number is less than 5 or greater than 15 (invalid length of conditioned digits). | Use an international number with length in the acceptable range. |
| 1256 | MNP Circular Route Detected | This message indicates the network has incorrect number portability data for a subscriber. | Verify and update number portability data. |
| 1294 | Invalid digits in MAP MSISDN parameter | No digits are found in MAP MSISDN parameter. | Specify valid digits in the MSISDN. |
| 1295 | Translation PC is Eagle's | PC translation is invalid because it is one of EAGLE 5 ISS PCs. | Change the point code. |
| 1296 | Translation PC type is ANSI | PC translation is invalid because it is an ANSI point code. | Change the point code. |
| 1297 | Invalid length of prefix/suffix digits | Attempted digit action of prefixing 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. |

| UIM | Text | Description | Action |
|------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1374 | SMS NP destination address decode failed | An error was detected during decode of SMS message destination address. | The message should be analyzed to determine the error, and the originating node should be contacted to send corrected message. |
| 1375 | SMS NP failed to modify TCAP message | The formatted outbound digit string length generated by SMS NP for encoding the TCAP message exceeded system limits. | The message and outbound digits formatting options should be analyzed to determine the error and the originating node or the requested outbound digit formatting option should be modified to correct the encoding error. |
| 1376 | SMS NP outbound digits leng exceed limit | During processing of SMS message, the formatted outbound digit string length exceeded limit for number of digits. | The message and the digit format provisioning should be analyzed to determine the error and the originating node or the requested outbound digit formatting option should be modified to correct the encoding error. |
| 1426 | S-Port: Missing GRN for srvc prtcd subs | Service Portability is to be applied; GRN is required, but is not provisioned for the DN. | Provision the GRN for the DN. |

Glossary

A

| | |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACK | Data Acknowledgement |
| ADL | Application Data Loader |
| ANSI | American National Standards Institute An organization that administers and coordinates the U.S. voluntary standardization and conformity assessment system. ANSI develops and publishes standards. ANSI is a non-commercial, non-government organization which is funded by more than 1000 corporations, professional bodies, and enterprises. |
| ASD | Additional Subscriber Data Additional data that is associated with a subscriber (DN) or a range of subscribers. |

C

| | |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CC | Country Code |
| CCS7ITU | The application for the ITU SS7 signaling links that is used with card types <code>linds0</code> , <code>limch</code> , <code>lime1</code> , and <code>limt1</code> . |
| CdPA | Called Party Address The field in the SCCP portion of the MSU that contains the additional addressing information of the destination of the MSU. Gateway screening uses this additional |

C

information to determine if MSUs that contain the DPC in the routing label and the subsystem number in the called party address portion of the MSU are allowed in the network where the EAGLE 5 ISS is located.

CgPA

Calling Party Address

The point code and subsystem number that originated the MSU. This point code and subsystem number are contained in the calling party address in the SCCP portion of the signaling information field of the MSU. Gateway screening uses this information to determine if MSUs that contain this point code and subsystem number area allowed in the network where the EAGLE 5 ISS is located.

Circular Route Prevention

See CRP.

CLLI

Common Language Location Identifier

The CLLI uniquely identifies the STP in terms of its physical location. It is usually comprised of a combination of identifiers for the STP's city (or locality), state (or province), building, and traffic unit identity. The format of the CLLI is:

The first four characters identify the city, town, or locality.

The first character of the CLLI must be an alphabetical character.

The fifth and sixth characters identify state or province.

The seventh and eighth characters identify the building.

The last three characters identify the traffic unit.

C

CNL Small Geographic Area

CPC Capability Point Code
A capability point code used by the SS7 protocol to identify a group of functionally related STPs in the signaling network.

D

Database All data that can be administered by the user, including cards, destination point codes, gateway screening tables, global title translation tables, links, LNP services, LNP service providers, location routing numbers, routes, shelves, subsystem applications, and 10 digit telephone numbers.

DB Database
Daughter Board
Documentation Bulletin

DCB Device Control Block

DEFCC Default Country Code

Destination The node to which the signaling link traffic is routed. This destination is identified by a point code, either a full point code or a cluster point code.

DN Directory number
A DN can refer to any mobile or wireline subscriber number, and can include MSISDN, MDN, MIN, or the wireline Dialed Number.

D

| | |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DPC | <p>Destination Point Code</p> <p>DPC refers to the scheme in SS7 signaling to identify the receiving signaling point. In the SS7 network, the point codes are numeric addresses which uniquely identify each signaling point. This point code can be adjacent to the EAGLE 5 ISS, but does not have to be.</p> |
| DPCI | <p>Destination Point Code International</p> |
| DPCN | <p>Destination Point Code National</p> |
| DSM | <p>Database Service Module.</p> <p>The DSM provides large capacity SCCP/database functionality. The DSM is an application card that supports network specific functions such as EAGLE Provisioning Application Processor (EPAP), Global System for Mobile Communications (GSM), EAGLE Local Number Portability (ELAP), and interface to Local Service Management System (LSMS).</p> |

E

| | |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EGTT | <p>Enhanced Global Title Translation</p> <p>A feature that is designed for the signaling connection control part (SCCP) of the SS7 protocol. The EAGLE 5 ISS uses this feature to determine to which service database to send the query message when a Message Signaling Unit (MSU) enters the system.</p> |
| EIR | <p>Equipment Identity Register</p> <p>A network entity used in GSM networks, as defined in the 3GPP</p> |

E

Specifications for mobile networks. The entity stores lists of International Mobile Equipment Identity (IMEI) numbers, which correspond to physical handsets (not subscribers). Use of the EIR can prevent the use of stolen handsets because the network operator can enter the IMEI of these handsets into a 'blacklist' and prevent them from being registered on the network, thus making them useless.

Enhanced Global Title Translation

See EGTT.

EPAP

EAGLE Provisioning Application Processor

EPAP-related features

Features that require EPAP connection and use the Real Time Database (RTDB) for lookup of subscriber information.

- ANSI Number Portability Query (AINPQ)
- ANSI-41 AnalyzedInformation Query – no EPAP/ELAP (ANSI41 AIQ)
- Anytime Interrogation Number Portability (ATI Number Portability, ATINP)
- AINPQ, INP, G-Port SRI Query for Prepaid, GSM MAP SRI Redirect, IGM, and ATINP Support for ROP
- A-Port Circular Route Prevention (A-Port CRP)
- Equipment Identity Register (EIR)
- G-Flex C7 Relay (G-Flex)
- G-Flex MAP Layer Routing (G-Flex MLR)
- G-Port SRI Query for Prepaid

E

- GSM MAP SRI Redirect to Serving HLR (GSM MAP SRI Redirect)
- GSM Number Portability (G-Port)
- IDP A-Party Blacklist
- IDP A-Party Routing
- IDP Relay Additional Subscriber Data (IDPR ASD)
- IDP Relay Generic Routing Number (IDPR GRN)
- IDP Service Key Routing (IDP SK Routing)
- IDP Screening for Prepaid
- INAP-based Number Portability (INP)
- Info Analyzed Relay Additional Subscriber Data (IAR ASD)
- Info Analyzed Relay Base (IAR Base)
- Info Analyzed Relay Generic Routing Number (IAR GRN)
- Info Analyzed Relay Number Portability (IAR NP)
- INP Circular Route Prevention (INP CRP)
- IS41 Mobile Number Portability (A-Port)
- IS41 GSM Migration (IGM)
- MNP Circular Route Prevention (MNPCRCP)
- MO-based GSM SMS NP
- MO-based IS41 SMS NP
- MO SMS Generic Routing Number (MO SMS GRN)
- MO- SMS B-Party Routing
- MO SMS IS41-to-GSM Migration
- MT-based GSM SMS NP
- MT-based GSM MMS NP
- MT-based IS41 SMS NP
- MTP Routed Messages for SCCP Applications (MTP Msgs for SCCP Apps)

E

- MTP Routed Gateway Screening Stop Action (MTPRTD GWS Stop Action)
- Portability Check for MO SMS
- Prepaid IDP Query Relay (IDP Relay, IDPR)
- Prepaid SMS Intercept Phase 1 (PPSMS)
- Service Portability (S-Port)
- S-Port Subscriber Differentiation
- Triggerless ISUP Framework Additional Subscriber Data (TIF ASD)
- Triggerless ISUP Framework Generic Routing Number (TIF GRN)
- Triggerless ISUP Number Portability (TIF NP)
- Triggerless ISUP Framework Number Substitution (TIF NS)
- Triggerless ISUP Framework SCS Forwarding (TIF SCS Forwarding)
- Triggerless ISUP Framework Simple Number Substitution (TIF SNS)
- Voice Mail Router (V-Flex)

ES

The shelves in the EAGLE 5 ISS that contain cards other than control cards (E5-OAM, GPSM-II for OAM, TDM, and MDAL cards). This shelf can be added to and removed from the database. These shelves are numbered from 1200 to 6100.

ETSI

European Technical Standards Institute

F

FTA

File Transfer Area

A special area that exists on each OAM hard disk, used as a staging area to copy files to and from the

F

EAGLE 5 ISS using the Kermit file-transfer protocol.

G

| | |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| G-Flex | <p>GSM Flexible numbering</p> <p>A feature that allows the operator to flexibly assign individual subscribers across multiple HLRs and route signaling messages, based on subscriber numbering, accordingly.</p> |
| GPL | <p>Generic Program Load</p> <p>Software that allows the various features in the system to work. GPLs and applications are not the same software.</p> |
| G-Port | <p>GSM Mobile Number Portability</p> <p>A feature that provides mobile subscribers the ability to change the GSM subscription network within a portability cluster, while retaining their original MSISDN(s).</p> |
| GRN | <p>Generic Routing Number</p> |
| GSM | <p>Global System for Mobile Communications</p> |
| GT | <p>Global Title Routing Indicator</p> |
| GTA | <p>Global Title Address</p> |
| GTAI | <p>Global Title Address Information</p> |
| GTI | <p>Global Title Indicator</p> |

G

GTT Global Title Translation

A feature of the signaling connection control part (SCCP) of the SS7 protocol that the EAGLE 5 ISS uses to determine which service database to send the query message when an MSU enters the EAGLE 5 ISS and more information is needed to route the MSU. These service databases also verify calling card numbers and credit card numbers. The service databases are identified in the SS7 network by a point code and a subsystem number.

GUI Graphical User Interface

The term given to that set of items and facilities which provide the user with a graphic means for manipulating screen data rather than being limited to character based commands.

H

HLR Home Location Register

HOMERN Home Network Routing Number Prefix

I

IAM Initial Address Message

ID Identity, identifier

IGM See IS41 GSM Migration

IMSI International Mobile Subscriber Identity

IMT Inter-Module-Transport

I

The communication software that operates the inter-module-transport bus on all cards except the LIMATM, DCM, DSM, and HMUX.

IN

Intelligent Network

A network design that provides an open platform for developing, providing and managing services.

INAP

Intelligent Network Application Part

INE

Intelligent Network Entity

Interrogating Network Entity

INP

INAP-based Number Portability

Tekelec's INP can be deployed as a stand-alone or an integrated signal transfer point/number portability solution. With Tekelec's stand-alone NP server, no network reconfiguration is required to implement number portability. The NP server delivers a much greater signaling capability than the conventional SCP-based approach.

Intelligent Network (IN) Portability

IP

Internet Protocol

IP specifies the format of packets, also called datagrams, and the addressing scheme. The network layer for the TCP/IP protocol suite widely used on Ethernet networks, defined in STD 5, RFC 791. IP is a connectionless, best-effort packet switching protocol. It provides packet routing, fragmentation and re-assembly through the data link layer.

I

| | |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IS-41 | Interim Standard 41 Same as and interchangeable with ANSI-41. A standard for identifying and authenticating users, and routing calls on mobile phone networks. The standard also defines how users are identified and calls are routed when roaming across different networks. |
| IS-ANR | In Service - Abnormal The entity is in service but only able to perform a limited subset of its normal service functions. |
| ISDN | Integrated Services Digital Network |
| IS-NR | In Service - Normal |
| ISDN | Integrated Services Digital Network Integrates a number of services to form a transmission network. For example, the ISDN network integrates, telephony, facsimile, teletext, Datex-J, video telephony and data transfer services, providing users with various digital service over a single interface: voice, text, images, and other data. |
| ISS | Integrated Signaling System |
| ITU | International Telecommunications Union |
| ITU-I | ITU-International |

I

| | |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU-N | ITU-National |
| ITUDUPPC | ITU National Duplicate Point Code This feature applies only to 14-bit ITU national point codes. This feature allows an EAGLE 5 ISS mated pair to route traffic for two or more countries that may have overlapping point code values. |

L

| | |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LED | Light Emitting Diode An electrical device that glows a particular color when a specified voltage is applied to it. |
| LIM | Link Interface Module Provides access to remote SS7, IP and other network elements, such as a Signaling Control Point (SCP) through a variety of signaling interfaces (DS0, MPL, E1/T1 MIM, LIM-ATM, E1-ATM, IPLIMx, IPGWx). The LIMs consist of a main assembly and possibly, an interface appliqué board. These appliqués provide level one and some level two functionality on SS7 signaling links. |
| Link | Signaling Link Signaling Link Carries signaling within a Link Set using a specific Association. A Link can belong to only one Link Set and one Association. There is generally one Link per Association in a Link Set. |
| LNP | Local Number Portability |

M

M

| | |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MAP | Mobile Application Part |
| MNP | Mobile Number Portability |
| MNP Circular Route Prevention | A G-Port MNP feature that detects instances of circular routing caused by incorrect information in one or more of the network number portability databases. If a circular route has been detected, a message will be generated by the EAGLE 5 ISS and returned to the originator. |
| MO | Magneto Optical Managed Object Mobile Originated Refers to a connection established by a mobile communication subscriber. Everything initiated by the mobile station is known as mobile originated. |
| MPS | Multi-Purpose Server The Multi-Purpose Server provides database/reload functionality and a variety of high capacity/high speed offboard database functions for applications. The MPS resides in the General Purpose Frame. |
| MR | Message Relay |
| MRN | Message Reference Number An unsolicited numbered message (alarm or information) that is displayed in response to an alarm condition detected by the system or in response to an event that has occurred in the system. Mated Relay Node |

M

A mated relay node (MRN) group is provisioned in the database to identify the nodes that the traffic is load shared with, and the type of routing, either dominant, load sharing, or combined dominant/load sharing.

MSISDN

Mobile Station International Subscriber Directory Number

The MSISDN is the network specific subscriber number of a mobile communications subscriber. This is normally the phone number that is used to reach the subscriber.

MSRN

Mobile Station Roaming Number

MSU

Message Signal Unit

The SS7 message that is sent between signaling points in the SS7 network with the necessary information to get the message to its destination and allow the signaling points in the network to set up either a voice or data connection between themselves. The message contains the following information:

- The forward and backward sequence numbers assigned to the message which indicate the position of the message in the traffic stream in relation to the other messages.
- The length indicator which indicates the number of bytes the message contains.
- The type of message and the priority of the message in the signaling information octet of the message.
- The routing information for the message, shown in the routing

M

label of the message, with the identification of the node that sent message (originating point code), the identification of the node receiving the message (destination point code), and the signaling link selector which the EAGLE 5 ISS uses to pick which link set and signaling link to use to route the message.

MT

Mobile Terminated

All transmissions that reach the mobile station and are accepted by it, such as calls or short messages.

MTP

The levels 1, 2, and 3 of the SS7 protocol that control all the functions necessary to route an SS7 MSU through the network.

N

NAI

Nature of Address Indicator

Standard method of identifying users who request access to a network.

NC

Network Cluster

Network Code

Not Compliant

NDC

Network destination code

NE

Network Element

An independent and identifiable piece of equipment closely associated with at least one processor, and within a single location.

N

Network Entity

NP

Number Plan

O

OAM

Operations, Administration, and Maintenance

The application that operates the Maintenance and Administration Subsystem which controls the operation of the EAGLE 5 ISS.

OOS-MT

Out of Service - Maintenance

The entity is out of service and is not available to perform its normal service function. The maintenance system is actively working to restore the entity to service.

OOS-MT-DSBLD

Out of Service - Maintenance Disabled

The entity is out of service and the maintenance system is preventing the entity from performing its normal service function.

OPC

Originating Point Code

OPS

Operator Provisioning System

own-network

Belonging to or assigned to this operator.

P

PC

Point Code

The identifier of a signaling point or service control point in a network. The format of the point code can be one of the following types:

P

- ANSI point codes in the format network indicator-network cluster-network cluster member (**ni-nc-ncm**).
- Non-ANSI domestic point codes in the format network indicator-network cluster-network cluster member (**ni-nc-ncm**).
- Cluster point codes in the format network indicator-network cluster-* or network indicator-*-*.
- ITU international point codes in the format **zone-area-id**.
- ITU national point codes in the format of a 5-digit number (**nnnnn**), or 2, 3, or 4 numbers (members) separated by dashes (**m1-m2-m3-m4**) as defined by the Flexible Point Code system option. A group code is required (**m1-m2-m3-m4-gc**) when the ITUDUPPC feature is turned on.
- 24-bit ITU national point codes in the format main signaling area-subsignaling area-service point (**msa-ssa-sp**).

PDB

Provisioning Database

PDBA

Provisioning Database Application

There are two Provisioning Database Applications (PDBAs), one in EPAP A on each EAGLE 5 ISS. They follow an Active/Standby model. These processes are responsible for updating and maintaining the Provisioning Database (PDB).

PDBI

Provisioning Database Interface

The interface consists of the definition of provisioning messages

P

only. The customer must write a client application that uses the PDBI request/response messages to communicate with the PDBA.

PLMN Public Land Mobile Network

PPP Point-to-Point Protocol

PPSMS Prepaid Short Message Service
Prepaid Short Message Service Intercept

PT Portability Type

R

RC Relative Cost

RFC Request for Comment
RFCs are standards-track documents, which are official specifications of the Internet protocol suite defined by the Internet Engineering Task Force (IETF) and its steering group the IESG.

RMTP Reliable Multicast Transport Protocol

RN Routing Number

RNIDN Routing Number - International DN

ROP Large Geographic Area (Groups of CNLs)

R

Route A signaling path from an LSP to an RSP using a specified Link Set

RTDB Real Time Database

S

SCCP Signaling Connection Control Part

SCM System Configuration Manager
System Configuration Matrix.

Service Module card DSM card or E5-SM4G card that contains the Real Time Database (RTDB) downloaded from an EPAP or ELAP system.

Service Nature of Address Indicator See SNAI.

Service Portability See S-Port.

SIM Subscriber Identity Module
An ID card the size of a credit card for GSM network subscribers, and is typically referred to as a chip card or smartcard.

SMS Short Message Service

SMSC Short Message Service Center

SNAI Service Nature of Address Indicator
An internal G-Port parameter that allows a user to specify how to interpret the signaling connection control part (SCCP) called party address (CdPA) GTA of a LOCREQ/SMSREQ message.

S

| | |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SN | service node |
| SOR | Support of Optimal Routing System Out of Service Request |
| S-Port | Service Portability A number portability extension which allows a subscriber to retain the same subscriber number when moving from one network type or service technology to another within the network of a single operator. Service Portability provides different routing number digits for formats that require routing numbers. Service Portability does not affect message flows. |
| SP | Signaling Point A set of signaling equipment represented by a unique point code within an SS7 domain. |
| Spare Point Code | The EAGLE ITU International/National Spare Point Code feature allows a network operator to use the same Point Codes across two networks (either ITU-I or ITU-N). The feature also enables National and National Spare traffic to be routed over the same linkset. The EAGLE uses the MSU Network Indicator (NI) to differentiate the same point code of one network from the other. In accordance with the SS7 standard, unique Network Indicator values are defined for Point Code types ITU-I, ITU-N, ITU-I Spare, and ITU-N Spare. |
| SPC | Secondary Point Code |

S

The SPC enables the EAGLE 5 ISS to assume more than one point code for SS7 routing. The EAGLE 5 ISS uses the SPC for routing and provisioning as if the SPC were an actual point code of the EAGLE 5 ISS. The EAGLE 5 ISS supports one ANSI true point code and up to seven secondary point codes.

Spare Point Code

SRF

Service Resource Function

Provide resources to a call, such as announcements, voice prompting, and voice recognition. An example of a SRF is a Voice Recognition Unit (VRU).

SRI

Send_Route_Information Message

SSP

Subsystem Prohibited network management message.

Subsystem Prohibited SCCP (SCMG) management message. (CER)

STP

Signal Transfer Point

STPs are ultra-reliable, high speed packet switches at the heart of SS7 networks, which terminate all link types except F-links. STPs are nearly always deployed in mated pairs for reliability reasons. Their primary functions are to provide access to SS7 networks and to provide routing of signaling messages within and among signaling networks.

Subsystem Number

See SSN.

T

T

| | |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TCAP | Transaction Capabilities Application Part |
| TCP | Transfer Control Protocol |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| TDM | Terminal Disk Module Time Division Multiplexing |
| TFA | TransFer Allowed (Msg) |
| TFP | TransFer Prohibited (Msg) A procedure included in the signaling route management (functionality) used to inform a signaling point of the unavailability of a signaling route. |

U

| | |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAM | Unsolicited Alarm Message A message sent to a user interface whenever there is a fault that is service-affecting or when a previous problem is corrected. Each message has a trouble code and text associated with the trouble condition. |
| UDP | User Datagram Protocol |
| UDTS | Unitdata Transfer Service An error response to a UDT message. |
| UI | User Interface |

U

UIM

Unsolicited Information Message

A message sent to a user interface whenever there is a fault that is not service-affecting or when a previous problem is corrected. Each message has a trouble code and text associated with the trouble condition.

UPU

User Part Unavailable

An MTP3 management message.

V

VGTT

Variable Length GTT

A feature that provides the ability to provision global title entries of varying lengths to a single translation type or GTT set. Users are able to assign global title entries of up to 10 different lengths to a single translation type or GTT set.

VSCCP

VxWorks Signaling Connection Control Part

The application used by the Service Module card to support EPAP-related features and LNP features. If an EPAP-related or LNP feature is not turned on, and a Service Module card is present, the VSCCP application processes normal GTT traffic.