Tekelec EAGLE® 5
Integrated Signaling System

Feature Manual - G-Flex® C7 Relay

910-5678-001 Revision A
April 2009

Notice

Information in this documentation is subject to change without notice. Unauthorized use, copying, or translation of this documentation can result in civil or criminal penalties.

Any export of Tekelec products is subject to the export controls of the United States and the other countries where Tekelec has operations.

No part of this documentation may be reproduced, translated, or transmitted in any form or by any means, electronic or mechanical, including photocopying or recording, for any purpose without the express written permission of an authorized representative of Tekelec.

Other product names used herein are for identification purposes only, and may be trademarks of their respective companies.

RoHS 5/6 - As of July 1, 2006, all products that comprise new installations shipped to European Union member countries will comply with the EU Directive 2002/95/EC "RoHS" (Restriction of Hazardous Substances). The exemption for lead-based solder described in the Annex will be exercised. RoHS 5/6 compliant components will have unique part numbers as reflected in the associated hardware and installation manuals.

WEEE - All products shipped to European Union member countries comply with the EU Directive 2002/96/EC, Waste Electronic and Electrical Equipment. All components that are WEEE compliant will be appropriately marked. For more information regarding Tekelec's WEEE program, contact your sales representative.

Trademarks

The Tekelec logo, EAGLE, G-Flex, G-Port, IP7, IP7 Edge, and IP7 Secure Gateway are registered trademarks of Tekelec. TekServer, A-Port, EAGLE 5 ISS, and V-FLEX are trademarks of Tekelec. All other trademarks are the property of their respective owners.

Patents

This product is covered by one or more of the following U.S. and foreign patents:

U.S. Patent Numbers:

5,732,213; 5,953,404; 6,115,746; 6,167,129; 6,324,183; 6,327,350; 6,456,845; 6,606,379; 6,639,981; 6,647,113; 6,662,017; 6,735,441; 6,745,041; 6,765,990; 6,795,546; 6,819,932; 6,836,477; 6,839,423; 6,885,872; 6,901,262; 6,914,973; 6,940,866; 6,944,184; 6,954,526;6,954,794; 6,959,076; 6,965,592; 6,967,956; 6,968,048; 6,970,542; 6,987,781; 6,987,849; 6,990,089; 6,990,347; 6,993,038; 7,002,988; 7,020,707; 7,031,340; 7,035,239; 7,035,387; 7,043,000; 7,043,001; 7,043,002; 7,046,667; 7,050,456; 7,050,562; 7,054,422; 7,068,773; 7,072,678; 7,075,331; 7,079,524; 7,088,728; 7,092,505; 7,108,468; 7,110,780; 7,113,581; 7,113,781; 7,117,411; 7,123,710; 7,127,057; 7,133,420; 7,136,477; 7,139,388; 7,145,875; 7,146,181; 7,155,206; 7,155,243; 7,155,505; 7,155,512; 7,181,194; 7,190,702; 7,190,772; 7,190,959; 7,197,036; 7,206,394; 7,215,748; 7,219,264; 7,222,192; 7,227,927; 7,231,024; 7,242,695; 7,254,391; 7,260,086; 7,260,207; 7,283,969; 7,286,516; 7,286,647; 7,286,839; 7,295,579; 7,299,050; 7,301,910; 7,304,957; 7,318,091; 7,319,857; 7,327,670

Foreign Patent Numbers:

EP1062792; EP1308054; EP1247378; EP1303994; EP1252788; EP1161819; EP1177660; EP1169829; EP1135905; EP1364520; EP1192758; EP1240772; EP1173969; CA2352246

Ordering Information

Your Tekelec Sales Representative can provide you with information about how to order additional discs.

Table of Contents

List of Figures

List of Tables

1

Introduction

Overview

This manual provides an overview of the G-Flex® C7 Relay feature of the EAGLE 5 ISS (Integrated Signaling System). The G-Flex feature enables efficient Home Location Register (HLR) management in International Telecommunications Union (ITU) networks, American National Standards Institute (ANSI) networks, Global System for Mobile communications (GSM) networks, and IS-41 networks. The G-Flex C7 Relay node is located in the operator's C7/SS7 network between the Mobile Switching Centers (MSCs) and HLRs. G-Flex optimizes the use of subscriber numbers and number ranges by providing a logical link between any MSISDN number and any IMSI. This arrangement allows subscribers to be moved easily from one HLR to another.

The G-Flex feature is optional on the EAGLE 5 ISS, and can be turned on, but not off, via a feature access key. Note that G-Flex and North American LNP (Local Number Portability) are mutually exclusive on an EAGLE 5 ISS node. The Global Title Translations (GTT) feature is required for operation of the G-Flex feature.

Scope and Audience

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

Manual Organization

This document is organized into the following chapters:

- Chapter 1 Introduction , contains general information about the G-Flex documentation, the organization of this manual, and how to get technical assistance.
- Chapter 2 Feature Description , provides a functional description of G-Flex, including network perspectives, assumptions and limitations, a database overview, DSM provisioning and reloading, G-Flex user interface, SDS commands, and the G-Flex relay function.
- Chapter 3 EAGLE 5 ISS G-Flex Commands , describes the user interface in detail.
- Chapter 4 G-Flex Feature Activation , describes how to activate the G-Flex feature.
- Chapter 5 Maintenance and Measurements , describes maintenance and measurements in detail, including EPAP status and alarms, hardware verification messages, TSM emulation mode, G-Flex 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 1-1. Admonishments

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

Customer 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

  — **Argentina**

    Phone:

    0-800-555-5246 (toll-free)

  — **Brazil**

    Phone:

    0-800-891-4341 (toll-free)

    TAC Regional Support Office Hours:

    8:30 a.m. through 6:30 p.m. (GMT minus 3 hours), Monday through Friday, excluding holidays

  — **Chile**

    Phone:

    1230-020-555-5468

  — **Columbia**

    Phone:

    01-800-912-0537

  — **Dominican Republic**

    Phone:

1-888-367-8552

— **Mexico**

Phone:

001-888-367-8552

— **Peru**

Phone:

0800-53-087

— **Puerto Rico**

Phone:

1-888-367-8552 (1-888-FOR-TKLC)

— **Venezuela**

Phone:

0800-176-6497

- **Europe, Middle East, and Africa**

— **Signaling**

Phone:

+44 1784 467 804 (within UK)

TAC Regional Support Office Hours:

8:00 a.m. through 7:00 p.m. (GMT), Monday through Friday, excluding holidays

— **Software Solutions**

Phone:

+33 3 89 33 54 00

TAC Regional Support Office Hours:

8:00 a.m. through 7:00 p.m. (GMT), Monday through Friday, excluding holidays

- **Asia**

— **India**

Phone:

+91 124 436 8552 or +91 124 436 8553

TAC Regional Support Office Hours:

10:00 a.m. through 7:00 p.m. (GMT plus 5 1/2 hours), Monday through Saturday, excluding holidays

— **Singapore**

Phone:

+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 (support.tekelec.com). 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 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 **new** Customer Support site at support.tekelec.com .

   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**.

2

Feature Description

G-Flex C7 Relay Overview

In today's mobile networks, subscribers are assigned to Home Location Registers (HLRs) and AuCs (Authentication Centers) via blocks or ranges of subscriber numbers. These ranges are used by MSCs (Mobile Switching Centers) to route many types of signalling messages to HLRs/AuCs. There are several types of numbers that identify subscribers, both of which are assigned by MSCs to HLR/AuCs via this range mechanism.

- MSISDN (Mobile Station International Integrated Services Digital Network) numbers, which use numbering plan E.164
- IMSI (International Mobile Subscriber Identity) numbers, which use numbering plan E.212
- MIN (Mobile Identification Number), which uses the E.164 numbering plan
- MDN (Mobile Directory Number), which uses the E.164 numbering plan

Problems arose in areas such as network load balancing and efficient use of HLR capacity. G-Flex is a feature designed to alleviate some of these problems by allowing the operator to flexibly assign individual subscribers to HLRs and route signaling messages, based on subscriber numbering, accordingly. The current phase of development applies to routing to HLRs only. In the future, this capability may be expanded to include routing to other intelligent devices such as SCPs (Service Control Points) and VMSCs (Voice Mail Service Centers), depending on market needs.

NOTE: In this document, the term HLR is used to include AuC, as applicable.

Today's rigid scheme for assigning subscribers to HLRs leads to several inefficiencies for network operators. Below are a few examples:

- When IMSI numbers, which identify the SIM (Subscriber Identity Module), get lost or are otherwise out of service, “holes” sometimes open in the IMSI ranges. These holes result in HLR capacity that cannot be used because switches will not be routing messages using those lost numbers anymore.
- In many cases, subscribers are “split” across multiple HLRs, as their IMSI range can point to a different HLR than their MSISDN range. Operators must take special steps to ensure that calls are not mishandled.
- With the advent of MNP (Mobile Number Portability), the MSISDN no longer indicates the subscription network. This leads to holes in the MSISDN ranges that address HLRs. As in the case with IMSIs, these MSISDN holes result in HLR capacity that cannot be used by existing MSC routing schemes.
- With the advent of MNP, operators need to handle message routing based on MSISDNs that are imported to the network from another operator, and so do not fit into the existing range mechanism at all.
- Prepaid service may result in the allocation of a large block of IMSIs to an HLR, many of which may not be put in service for a while.
- Corporate clients may reserve a large block of numbers that must be assigned to an HLR. Many of these may not be used for a while, if ever.

Product Description

The G-Flex C7 Relay node is located in the operator's C7/SS7 network between the MSCs and HLRs. It can also serve as the direct interface to other networks. G-Flex can be deployed as an integrated part of the STP (Signal Transfer Point) function or as a stand-alone node.

G-Flex optimizes the use of subscriber numbers and number ranges by providing a logical link between any MSISDN number or IMSI, and an HLR. This allows subscribers to easily be moved from one HLR to another.

It also allows each HLR to be filled to 100% of its capacity by allowing subscriber number ranges to be split over different HLRs and individual subscriber numbers to be assigned to any HLR. Another benefit is that subscriber number routing data is not required to be maintained in all MSCs in the network.

G-Flex is optional on the EAGLE 5 ISS, and can be turned on (but not turned off) via a feature access key. G-Flex and North American LNP (Local Number Portability) are mutually exclusive on an EAGLE 5 ISS node.

Call Flows

As stated in the preceding sections, several types of subscriber numbers can be used as a basis for routing messages to HLRs: IMSI, MSISDN, MIN, and MDN. In actuality, there are two flavors of IMSI routing: one that uses the actual IMSI, which is an E.212 number, and one that uses the Mobile Global Title (MGT), which is an E.214 number derived from the IMSI. G-Flex handles both of these cases in addition to the MSISDN/MIN/MDN cases, which use the E.164 numbering plan. The following subsections address these three cases.

In GSM networks, each network entity (for example, MSC, HLR, VLR [Visitor Location Register]) is identified by an E.164 entity address. Note that GSM networks also route messages based on E.164 entity addresses when those addresses are known by the sender. While the routing of these messages must also be handled by the G-Flex C7 Relay, this functionality is not considered to be a core part of the G-Flex functionality. These numbers are not expected to be populated in the G-Flex database and so messages routed using these addresses should fall through to normal (or enhanced) GTT (Global Title Translation). Therefore, call flows for this type of routing are not described here.

The call flows in this section show only one possible scenario for how messages are routed in the network and where various stages of GTT are performed. The G-Flex C7 Relay may perform intermediate or final GTT and/or replace the SCCP (Signaling Connection Control Part) CdPA (Called Party Address) with the HLR entity address, depending on the message received and provisioned data. All call flows here assume the G-Flex C7 Relay is integrated with the EAGLE 5 ISS.

MGT (E.214) Routing

The partial Update Location procedure, detailed in **Figure 2-1** , is an example of E.214 mobile global title routing. This routing is employed in situations where the E.164 address of the receiving node (HLRB) is not yet known by the sending node (VLRA).

In order to update information about the subscriber's location, VLRA sends a MAP (Mobile Application Part) Update_Location message to the G-Flex Relay (possibly via a Gateway MSC [Mobile Switching Center]).

The steps in **Figure 2-1** are cross-referenced in the following procedure.

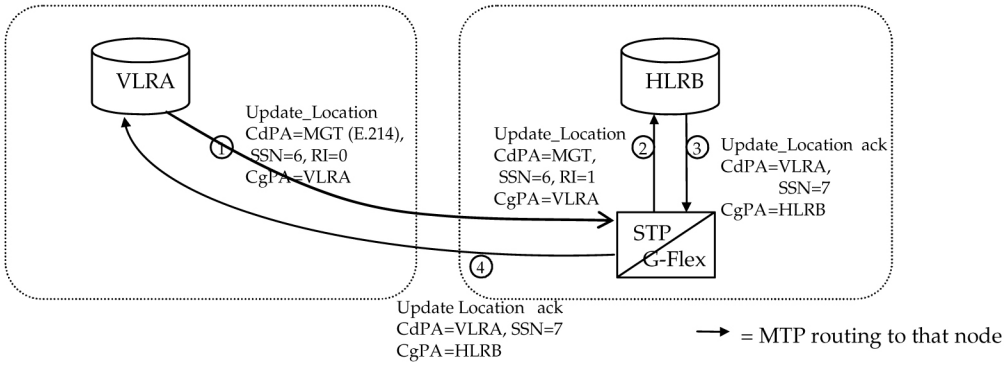
1. The message is received at the G-Flex Relay. Global title information triggers G-Flex processing. Since the SCCP CdPA contains an E.214 number, G-Flex first converts the E.214 number to an international E.212 number before searching the G-Flex database (GFDB) with the E.212 number (Step 1). G-Flex also handles the case where an E.212 number is received in the SCCP CdPA. In this case, the database is searched directly using the E.212 number.

2. G-Flex finds a match with HLR GT information and routes the message to the designated DPC (HLRB) (Step 2).

3. HLRB responds to VLRA with an Update_Location **ack**. This message has the E.164 address of VLRA in the SCCP CdPA and is routed by normal (or enhanced) GTT, not G-Flex (Step 3).

4. The message is relayed to VLRA (Step 4).

Figure 2-1. E.214 (E.212) Routing Example - Location Updating



There are other MAP messages from VLR (Visitor Location Register) to HLR that also fall into this category of requiring E.214 global title routing. All of these messages are handled the same way by G-Flex, using the process described above.

IMSI (E.212) Routing

G-Flex processing, when it receives a message routed with an E.212 number in the SCCP CdPA GTA (Global Title Address), is essentially the same as when an E.214 number is received. The only difference is that the number does not have to be converted to E.212 (since it is already E.212) before doing the database lookup. Therefore, those call flows are not shown here.

MSISDN/MIN/MDN (E.164) Routing

A mobile terminated call results in the GMSC (Gateway Mobile Switching Center) querying the HLR through the use of the called number as a GTA. G-Flex is used to locate the appropriate HLR. The partial mobile terminated call procedure detailed in **Figure 2-2** is an example of MSISDN global title SCCP addressing. This applies to MIN and MDN routing numbers as well.

The steps in **Figure 2-2** are cross-referenced in the following procedure.

1. A call is originated and an IAM (Initial Address Message) is sent from the originating network to the subscription network (Step 1).

2. Digit analysis at GMSCB detects a mobile terminated call to a mobile station and generates a MAP Send_Routing_Info (SRI) message to the G-Flex Relay (Step 2).

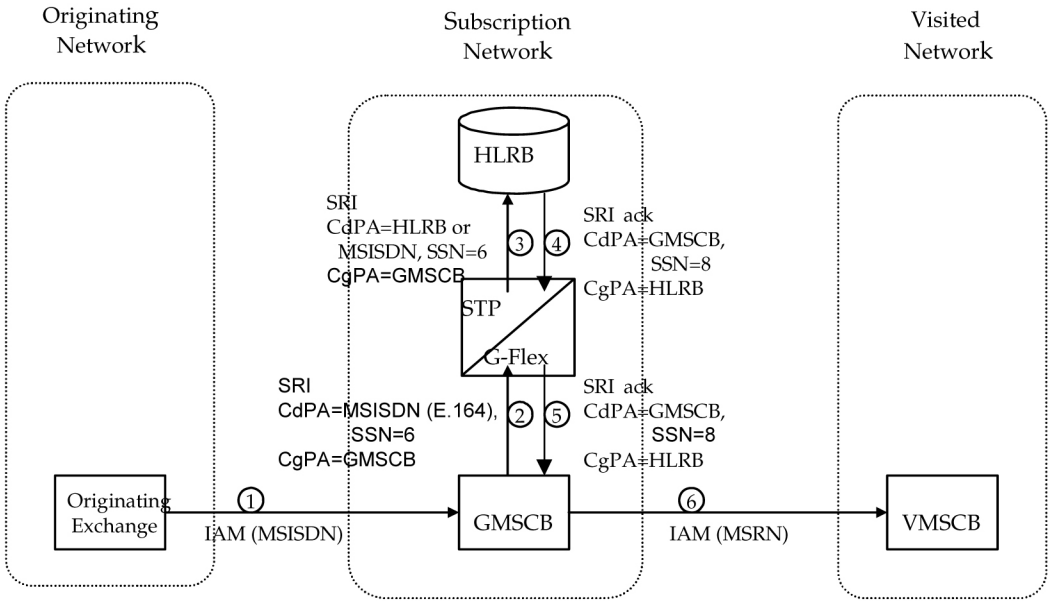
3. The EAGLE 5 ISS receives the message. Global title information triggers G-Flex processing. Since the SCCP CdPA contains an E.164 number, G-Flex searches the GFDB with the E.164 number, which must be converted to an international number if it is not one already. The G-Flex finds a match with HLR GT information and routes the message to the designated DPC (HLRB) (Step 3).

4. HLRB responds to GMSCB with an SRI **`ack`**. This message has the E.164 address of GMSCB in the SCCP CdPA, and is routed by normal (or enhanced) GTT, not G-Flex (Step 4).

5. The message is relayed to GMSCB (Step 5).

6. GMSCB sends an IAM containing the MSRN (Mobile Station Roaming Number) to the visited network (Step 6).

Figure 2-2. Mobile Terminated Call



Other MAP messages that are routed using MSISDN/MIN/MDN global title routing to an HLR are handled the same way by G-Flex. This includes mobile terminated short messages, for example.

EPAP Provisioning Blacklist

This feature provides checks to prevent the inadvertent provisioning of protected address strings into the EPAP database. If a protected address string is provisioned into the PDB as a DN, DN Block or IMSI, the EAGLE 5 ISS may incorrectly route messages. This feature allows the user to define a list of prohibited address strings that are not allowed as DN, DN Block, or IMSI address strings. The E.164 addresses of all HLRs should be provisioned in the provisioning blacklist.

DigitAction Expansion

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

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

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

Table 2-1. DigitAction Applications

DigitAction	Value in Incoming CdPA GTA	Value in Outgoing CdPA GTA	Meaning
none	886944000213	886944000213	No change to the Called Party GTA (default)
prefix	886944000213	1404886944000213	Prefix Called Party GTA with the entity id
replace	886944000213	1404	Replace Called Party GTA with the entity id
insert	886944000213	8861404944000213	Insert entity id after country code. (CC + Entity Id + NDC + SN)
delccprefix	886944000213	1404944000213	Delete country code and add prefix
delcc	886944000213	944000213	Delete country code
spare1	886944000213	treated as none	No change to the Called Party GTA (default)
spare2	886944000213	treated as none	No change to the Called Party GTA (default)

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

G-Flex SCCP Service Re-Route Capability

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

This feature is designed to handle and control re-routing of G-Flex 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-Flex functionality. This feature also provides the option to mark G-Flex *OFFLINE* to perform a controlled re-routing during this state.

G-Flex MAP Layer Routing

This feature allows subscriber digits to be obtained from either the SCCP layer or the MAP layer of a message during G-Flex database lookup. This ability resolves the issue of truncation of digits by the mobile switching center (MSC) that may occur in the SCCP layer.

This feature applies only to MAP Update_Location, Update_GPRS_Location, Send_Parameters, and MAP Send_Authentication_Information operations within GSM messages. These four MAP operations commonly encode the SCCP CdPA GTA in the E.214 format (MGT) where trailing IMSI digits may be truncated from MGT, and these messages always include IMSI in the MAP layer. CdPA digits from the SCCP layer are always used to route all other MAP messages.

Commands

This section lists the maintenance and measurements user interface commands for the G-Flex feature. These commands allow provisioning, operations, and maintenance activities for Service Module cards. For details, refer to Chapter 3, Maintenance and Measurements Commands .

Commands listed here include:

- **rept-stat-sys**
- **rept-stat-sccp**
- **rept-stat-mps**
- **rept-meas**
- r**ept-stat-trbl**
- **rept-stat-alm**
- **rept-stat-db**
- **inh-card** / **alw-card**
- **ent-card** / **rtrv-card** / **dlt-card**
- **chg-gpl** / **act-gpl** / **rtrv-gpl** / **rept-stat-gpl** / **copy-gpl**
- **ent-bp** / **dlt-bp** / **disp-bp** / **disp-mem** / **set-mem**
- **inh-alm** / **unhb-alm**
- **pass**, including the following commands:
  - **pass:cmd='ping'**
  - **pass:cmd='netstat'**
  - **pass:cmd='nslookup'**
  - **pass:cmd='arp'**
  - **pass:cmd='help'**

The complete functionality of the commands is described in detail in the *Commands Manual.* That document also provides the actual parameter names, valid values, and output for the commands.

Assumptions/Limitations

The following assumptions and limitations are present.

1. The EAGLE 5 ISS does not perform any conversion in the SCCP portion of the message to support message routing across the domain boundary (ANSI to ITU and visa versa).

2. The EAGLE 5 ISS supports message routing across network boundaries (ITU-N to ITU-I) and visa versa. However, GTT and/or enhanced GTT (EGTT) neither modify the National Indicator bit in the CdPA AI nor convert the CdPA PC (Point Code) to match the network type.

3. For messages with E.214 numbers in the SCCP CdPA, a simple conversion can form an E.212 number. The E.212 number formed in this way is the full IMSI of the subscriber, that is, it is assumed that no

truncation occurs when the E.214 number is originally formed from the E.212 number. Such truncation is allowed by the E.214 recommendation.

4. This feature allows for up to eight MSISDN numbers per subscriber (that is, per IMSI) to be related. It is assumed that operators do not need to support more than eight MSISDN numbers per subscriber. (Expansion to eight MSISDN numbers is anticipated in the near future.)

5. No overload controls are required beyond the existing EAGLE 5 ISS lower level mechanisms (for example, for MTP congestion, etc.)

6. Using combinations of GTT selectors (GTI [Global Title Indicator], TT [Translation Type], NP [Number Portability], and NAI) as triggers for G-Flex processing plus SSN discrimination will provide the ability to limit G-Flex processing to only the messages for which it is appropriate.

7. G-Flex C7 Relay supports message routing to a single network node for a particular subscriber. For example, an individual subscriber cannot have some messages routed to his HLR and other messages routed to a separate AuC. In this example, G-Flex does not support the AuC being collocated with the HLR. The G-Flex design allows for expansion to include routing to multiple network elements (corresponding to multiple services) for the same subscriber.

8. For performance estimates, EAGLE 5 ISS-generated UDTS messages will count as two processed messages.

General Requirements

Numbering

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

    - If the GTT selectors available in the incoming message match an entry in the G-Flex selector table, then the service numbering plan from the selector table entry uses that number's numbering plan. Further conditioning is applied based on this new numbering plan.

    - If the GTT selectors available in the incoming message match an entry in the G-Flex 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 National (Significant), the default CC (country code for E.164 or E.214) or default MCC (for E.212) is prepended to the number for GDB look up. The default code to be used by the EAGLE 5 ISS must be previously provisioned by the EAGLE 5 ISS operator. If not, a UIM (Unsolicited Information Message) is issued, and the message falls through to GTT.

    - If the nature of address is Subscriber, the default CC + default NC (network code for E.164 or E.214) or default MCC + default MNC (for E.212) 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.

- If the numbering plan is E.214, the CC + NC part of the number is replaced with its corresponding MCC + MNC from the provisioned conversion data. If no matching CC + NC has been provisioned, a UIM is issued, and the message falls through to GTT.

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

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

Maintenance

Validation of G-Flex Hardware Configuration

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

- Service Module Main Board Verification

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

  NOTE: The system does not allow the G-Flex feature to be turned on if the hardware configuration is invalid.

  When the VSCCP application is initializing, it determines the main board type. The SCCP maintenance block is the mechanism used to relay the main board information to OAM. This requires that the application software be loaded to the 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 G-Flex 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 or not a Service Module card has sufficient memory to run G-Flex:

  — *Local Memory Validation*. When the G-Flex feature access key is first enabled, or any time the G-Flex feature is enabled and the Service Module card is initializing, the Service Module card checks to see if the Service Module card has at least one D1G applique.

  — *Real-Time Memory Validation (during card initialization)*. Once 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, it 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 once 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 Service Module card's status 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 G-Flex 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 Chapter 5, G-Flex 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-dsbld ,** and the secondary state of the card is set to **MEA** (Mismatch of Equipment and Attributes).

The following 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 real-time RTDB from the EPAP.

— The Service Module card will not accept RTDB updates (that is, add, change, delete) from the EPAP, nor will it accept EAGLE 5 ISS database updates.

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

- Unstable Loading Mode

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

Maintenance Commands

The following commands are used for G-Flex maintenance.

- The debug command **ent-trace** traps G-Flex MSUs (Message Signaling Unit) based on the point code of the switch that generated the MSU (SSP), a particular DN, or IMSI. Note that an MSU is considered to be a G-Flex MSU after its CdPA SSN is determined to be a HLR SSN. For MSISDN and IMSI, the comparison is based on the search key built from the CdPA GTAI (Global Title Address Information) after any conditioning. The existing GT SCCP trigger also applies to G-Flex messages.

- The command **rept-stat-mps** reports current G-Flex statistics. An MSU is considered to be a G-Flex MSU after its CdPA SSN is determined to be a HLR SSN. This command reports G-Flex statistics on a single SCCP card basis or on a G-Flex system basis.

For more information, refer to Chapter 5, Maintenance and Measurements Commands .

G-Flex Loading Mode Support

Loading mode support is not applicable for RTDB updates, since Service Module cards use incremental loading from the EPAP. EAGLE 5 ISS 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 EAGLE 5 ISS administrative updates to be rejected while cards finish loading and cross the 80% or better threshold.

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

Audit Requirements

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

- On each Service Module card and on the standby EPAP, a background audit calculates checksums for each G-Flex RTDB table record and compares the calculated checksum against the checksum value stored in each record. If they are not the same, then a *database corrupt* alarm is issued.

- A process that runs periodically on the active EPAP (approximately every five seconds or less) sends the latest RTDB database level to all the 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 new audit mechanisms, refer to the *EPAP Administration Manual*.

G-Flex MAP Layer Routing

When the SCCP CdPA in a message receiving G-Flex service is truncated by the MSC, G-Flex needs to use the subscriber number from the MAP layer for routing.

The G-Flex MAP Layer Routing feature allows subscriber digits to be obtained from either the SCCP layer or the MAP layer of a message during G-Flex database lookup. This ability resolves the issue of truncation of digits by the mobile switching center (MSC) that may occur in the SCCP layer.

The G-Flex MAP Layer Routing feature allows the user to specify whether the subscriber digits are obtained from the SCCP or MAP layer when performing G-Flex database lookup. This is a user-configurable G-Flex option.

This feature applies only to MAP Update_Location, Update_GPRS_Location, Send_Parameters, and MAP Send_Authentication_Information operations within GSM messages. These four MAP operations commonly encode the SCCP CdPA GTA in the E.214 format (MGT) where trailing IMSI digits may be truncated from MGT, and these messages always include IMSI in the MAP layer. CdPA digits from the SCCP layer are always used to route all other MAP messages.

NOTE: As part of this feature, the G-Flex feature is converted from a feature bit to a FAK and part number.

Feature Control Requirements

The G-Flex MAP Layer Routing feature has the following feature control requirements:

- The G-Flex feature must be enabled and turned on (FAK for part number 893-0219-01) before the G-Flex MLR feature can be enabled.
- The G-Flex MLR feature requires a FAK for part number 893-0217-01
- If the **ansigflex** option in **`chg-stpopts`** command is turned on, then the feature cannot be enabled.
- A temporary FAK cannot be used to enable the G-Flex or the G-Flex MLR features.
- If the G-Flex feature is turned on with the feature bit before upgrade occurs, then the feature is automatically enabled and turned on with the FAK after upgrade.

- The G-Flex and G-Flex MLR features cannot be turned off after being turned on.

Limitations

ANSI G-Flex traffic at 1700 TPS per Service Module card and 5000 TPS per E5-SM4G card is not supported by the G-Flex MLR feature. ANSI traffic operates at standard G-Flex TPS rates if the G-Flex MLR feature is turned on.

EPAP Provisioning Blacklist

This feature provides blacklist functionality for protected E.164 addresses of network elements, such as HLRs. All G-Flex provisioning data is checked against this blacklist to prevent inadvertent population of protected E. 164 addresses into the G-Flex database as MSISDNs.

The G-Flex blacklist ranges are stored in the PDB database. G-Flex blacklist ranges are not sent to or stored in the RTDB.

The customer is responsible for determining the ranges of address strings that should be considered, protected, and entered into the blacklist. Reliability of this feature depends on the completeness of the blacklist.

CAUTION: If the G-Flex blacklist does not include all protected address strings in the customer network and one of those protected address strings is provisioned as a DN, DN Block, or IMSI, there will be unintended message routing, possibly causing network outages.

Provisioning of the E.164 addresses for this feature is only made via the EPAP GUI. The EPAP GUI is used to retrieve, view, and delete entries in the blacklist. EPAP GUI menus to add and delete G-Flex blacklist ranges are only accessible to PDBA group and the User Administration (uiadmin) user.

A maximum of 150 blacklist ranges are supported by the EPAP. A valid G-Flex blacklist range is defined by two address strings of 5-15 hexadecimal digits, where the ending address is greater than or equal to the beginning address. Address strings must be of the same length. G-Flex blacklist ranges cannot overlap. A valid G-Flex blacklist range cannot conflict with DN, DN block, or IMSI values in the PDB. If a conflict is determined, the blacklist range will be rejected.

When provisioning a valid G-Flex blacklist range, this feature also verifies that Network Entity address strings do not conflict with DN, DN Block or IMSI address strings within the same EPAP PDB.

This feature also verifies that Network Entity address strings do not conflict with DN, DN Block or IMSI address strings within the same EPAP PDB. The command is rejected if a conflict is found.

This feature also provides for PDBI checks against the blacklist ranges when the PDBI is used for the provisioning of DNs, DN blocks, and IMSIs. The command is rejected if a conflict is found.

This feature also provides for PDBI checks against the Network Entity table in memory when the PDBI is used for the provisioning of DNs, DN blocks, and IMSIs. The command is rejected if a conflict is found.

The provisioning of blacklist ranges do not cause PDB database levels to increment.

G-Flex Relay Function

G-Flex Relay Function (GFRF) is, in a way, an enhancement to GTT functionality. GFRF involves the following main enhancements to EAGLE 5 ISS's GTT.

- **Increased number of translations** – The GTT limit is 270,000 total translations. With GFRF, the number is millions. However, the GFRF translations are only from international MSISDNs and IMSIs to HLRs.

- **Number conditioning** – Since the GDB stores MSISDNs and IMSIs as international numbers and does not store MGTs, G-Flex provides the capability to condition incoming numbers to be international MSISDNs or IMSIs for the database look up.

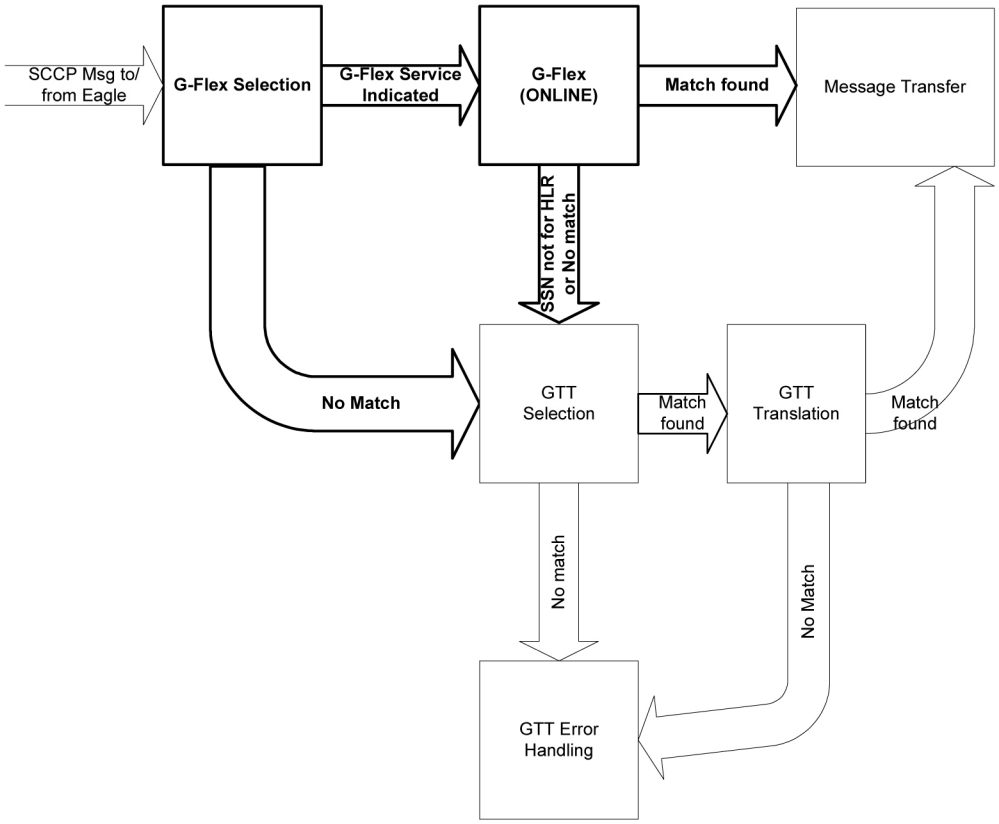
- **Provides discrimination of messages that need its functionality** – Since G-Flex is currently only used for translating to HLRs, it provides a method to identify which messages should receive G-Flex Relay *vs*. GTT. This is provided via a G-Flex service selector table that defaults back to the GTT Selector table if a match is not found, and by providing SSN-based discrimination.

- **Variable number of digits** – There is no fixed number of digits for MSISDNs or IMSIs. For example, a 12-digit MSISDN can coexist with a 15-digit one. However, the number of digits of the stored numbers must be between 5 and 15.

- **Replacement of GT with entity address** – The ability to set the outgoing CdPA GT (NP, NAI, ES, GTAI) to the HLR's international entity number is provided.

Figure 2-3 shows the basic functional diagram for SCCP, with the new parts for G-Flex in bold.

Figure 2-3. Functional Diagram – G-Flex in SCCP



In order to keep the diagram simple, the only error conditions shown are the no-match cases for G-Flex and GTT selectors and translations. G-Flex has its own error handling for some cases that issues UIMs and peg

measurements appropriately before letting the MSU fall through to GTT translation. Also, there are error conditions in GTT selection, GTT translation, and message transfer that are handled by GTT error handling.

G-Flex Relay is performed in the following stages.

1. The message arrives at EAGLE 5 ISS **`route-on-gt.`** The EAGLE 5 ISS decodes the SCCP portion and uses the data to perform G-Flex selection based on the CdPA GT fields other than the ES and GTAI. The result of this selection provides two pieces of data, identification of the **`np`** and **`nai`** for G-Flex and a G-Flex service indicator. The service indicator is G-Flex if GFRF is required. If a G-Flex selector does not match the incoming GT fields, then GTT selection is attempted. It is possible that G-Flex and GTT selectors will not match the incoming GT fields. In this case, GTT error handling is used.

2. If stage 1 indicates that G-Flex Relay is required and if the message is not a UDTS-generated by the EAGLE 5 ISS, the EAGLE 5 ISS performs SSN-based discrimination. If the G-Flex state is ONLINE, then step Item 3 is performed. Otherwise, G-Flex SCCP Service Re-Route is performed.

3. The conditioned number is looked up in the GDB.

4. If the number is found, the translation data for the number is used to alter and route the message.

5. If G-Flex Relay is not required, or the number is not found in the GDB, the set of GTT translations is used for translation.

Table 2-2 lists possible combinations for G-Flex selector and G-Flex data provisioning, and the resulting action of G-Flex relay.

Table 2-2. G-Flex Relay Data Combinations

G-Flex Selector Matches Incoming GT	Number in GDB	EAGLE 5 ISS Action
No	N/A	GTT used
Yes	No	Fall-through to GTT
Yes	Yes	G-Flex translation

GFRF is divided into the following subtasks. Each is described in the sections that follow.

- Conversion of national/local numbers to international numbers
- Conversion of E.214 MGT to E.212 international IMSI
- Database lookup
- Message forwarding
- Error handling

Conversion of National/Local Numbers to International Numbers

G-Flex stores international DNs and IMSIs in its database. SCCP CdPA numbers may need to be converted to international numbers in order to do a database lookup. When a message needs GFRF and has either a national (significant) number or *Subscriber Number* as the Service NAI, then the national/local to international number

conversion is triggered. G-Flex uses the SCCP CdPA GTAI number and its SNAI to convert to an international number based on the numbering plan. Refer to **Table 2-3** .

Table 2-3. National/Local Numbers to International Numbers Conversion Logic

Service Numbering Plan	Service Nature of Address	Action
E.164	National (Significant) number	Prepend GTAI digits with the default E.164 country code (CC).
E.164	Subscriber number	Prepend GTAI digits with the default E.164 country code (CC) and network code (NC).
E.212	National (Significant) number	Prepend GTAI digits with the default mobile country code (MCC).
E.212	Subscriber number	Prepend GTAI digits with the default mobile country code (MCC) and mobile network code (MNC).
E.214	National (Significant) number	Prepend GTAI digits with the default E.164 country code (CC).
E.214	Subscriber number	Prepend GTAI digits with the default E.164 country code (CC) and network code (NC).
Other	N/A	Assume the default to be E.164 International number

Notes:

- If any of the default CC, NC, MCC, or MNC are required for conversion and are not provisioned in the database, GFRF issues a UIM and falls through to GTT.
- If the converted number is fewer than five digits, GFRF falls through and performs GTT on the message. GFRF issues a UIM when a converted number is fewer than five digits.
- If the converted number is more than 15 digits, then GFRF issues a UIM when the number exceeds 15 digits and falls through to GTT.
- GFRF uses the conditioned number for database lookup purposes only and does not modify the CdPA GTAI in the message unless **`rcgta=yes`** or **`ccgt=yes`**.
- For the G-Flex selector-specified service numbering plan (IMSI, DN, or MGT), the numbering plan in the incoming message is replaced with the G-Flex Selector service numbering plan (E.164, E.212, or E. 214, respectively). This is for G-Flex database lookup purposes only.

Conversion of E.214 MGT to E.212 IMSI

Since the GDB does not store MGTs, the messages with E.214 MGT in the CdPA GTAI are converted to an E. 212 International IMSI in order to perform the GDB lookup. G-Flex maintains a logical MGT2IMSI conversion table to perform this conversion. The MGT2IMSI conversion table contains up to ten entries of E.164 part (CC + NC digits) and its corresponding E.212 part (MCC + MNC). If a G-Flex message has E.214 as the CdPA numbering plan, GFRF performs the following steps to derive the E.212 International IMSI:

1. GFRF uses MGT as the key and does a lookup in the MGT2IMSI conversion table to find a match on E.164 part (CC + NC digits).

2. If a match is found, GFRF replaces the matched digits of the MGT with the corresponding E.212 part (MCC + MNC digits). If a match is not found, a UIM is issued and the GFRF falls through to GTT.

3. GFRF uses this complete E.212 International IMSI number to do the database lookup.

NOTE: If the IMSI for a particular country/network is the complete 15 digits and the E.164 CC + NC for that country is more than five digits, the MGT generated could contain a truncated MSIN. This is possible because the converted MGT is more than 15 digits and the maximum number of digits allowed in the MGT is 15 digits. (Refer to E.214 for more details on conversion.) Under these circumstances, the MGT is truncated at 15 digits. Therefore, the MGT-to-IMSI reconversion would not regenerate a complete IMSI and would lead to incorrect results and errors.

Database Lookup

GFRF performs the G-Flex database lookup using either the complete international DN or IMSI. If the DN or IMSI number is found in the database and it has an HLR translation, GFRF extracts the HLR translation data and generates a forwarding message. GFRF falls through and performs GTT for the following error cases:

- The DN number is not present in the database.
- The IMSI number is not present in the database.

The preceding error cases do not generate any UIM or UAM (Unsolicited Alarm Message), but fall through to GTT processing.

If the G-Flex database lookup is for GTI=2 and is an even number of digits ending in 0, then the G-Flex database performs a less than or equal to lookup for the odd number of digits (digit length minus 1). If a match is found, G-Flex saves the record and record index. It then tries to continue to find an exact match on the even number of digits. If the exact match is found in the G-Flex database, then the HLR translation data corresponding to the even number of digits record is used. Otherwise the HLR translation data corresponding to the found odd number of digits record is used. If the even and odd translation is not found, then the GFRF falls through and performs GTT.

The important issue is that the less than or equal to search re-enters the search where the comparison left off. This minimizes any impact on performance for this special case.

Message Forwarding

GFRF Forwarding Message: MTP Portion

G-Flex modifies the MTP routing label to include HLR PC as the DPC and EAGLE 5 ISS's own PC as the OPC. G-Flex modifies the MTP Level 2 length based on the size of the forwarding message. **Table 2-4** lists the fields modified by GFRF.

Table 2-4. GREF Forwarding Message: MTP Portion

Fields	Values
MTP Level 2 length	Number of octets in response MSU starting from MTP3 SIO field. If number of octets is greater than 63, Level 2 length is set to 63
MTP Level 3 DPC	Point code obtained from the HLR GT information in G-Flex database
MTP Level 3 OPC	EAGLE 5 ISS's true PC

GFRF Forwarding Message: SCCP Portion

Replacing the CdPA GTAI digits with the HLR entity number

When a MSISDN or IMSI number is found in the database and the Replace GT flag is set for this entry, GFRF replaces the CdPA GTAI digits with the provisioned HLR entity number. G-Flex also modifies the numbering plan (E.164), nature of address (international), and encoding scheme to match the HLR entity number.

GFRF does not replace the Global Title Indicator format (GTI) element of the GT.

Replacing of SSN in the CdPA

When the HLR translation data includes a SSN, GFRF replaces the SSN in the called party address of the message with the new SSN. If the SSN is not present in the incoming message, then GFRF updates the Subsystem Number Indicator and includes the new SSN in the called party address of the message before it forwards the message to the next node.

Inclusion of OPC in the CgPA

When the routing indicator of the calling party address is set to *Route on SSN* , and no SPC is present in it, the OPC from the received message is taken and inserted into the CgPA before the message is forwarded to the next node.

Deleting the CdPA GT Digits

When G-Flex performs Final-GTT, the routing indicator of the called party address is set to **`Route on SSN`**. G-Flex provides an option to delete the global title present in the called party address. If the **`Delete GT`** option is set, G-Flex modifies the GTI to zero and deletes the GT information from the SCCP CdPA before the message is forwarded to the end node. **Table 2-5** summarizes the possible changes by GFRF to the SCCP fields.

Table 2-5. GFRF Forwarding Message: SCCP Portion

Field	Value
SCCP CdPA Length	New CdPA length after the possible modifications
SCCP CdPA Routing indicator	Routing indicator obtained from the G-Flex database. (GT or DPCSSN)
SCCP CdPA Global Title Indicator	Same as incoming message or zero

Field	Value
SCCP CdPA Subsystem Number Indicator	Same as incoming message or replaced/inserted with the subsystem number indicator based on the existence of the SSN provisioned in the HLR translation
SCCP CdPA SSN	Same as incoming message or replaced/inserted with the SSN provisioned in the HLR translation
SCCP CdPA GT	Same as incoming message or replaced or deleted with HLR entity address provisioned in the database
SCCP CgPA Length	New CgPA length after the possible modifications
SCCP CgPA Point Code Indicator	Same as incoming message *or* if CgPA RI is “Route on SSN” and PCI is not 1, then set PCI to 1
SCCP CgPA SPC	If the CgPA RI is “Route on SSN” and no point code is present in the CgPA SPC, then the OCP is included as the SPC (Secondary Point Code)
SCCP CdPA Subsystem Number Indicator	Same as incoming message or replaced/inserted with the Subsystem Number indicator based on the existence of the SSN provisioned in the HLR translation

Error handling

The purpose of the Error handling is to discard or return messages that encounter routing and database failures and cannot be delivered to the HLR. When GFRF is unable to transfer a message and the return on error is *set*, then GFRF follows the same error handle procedures followed by GTT. The *data* field of the UDT message and the reason cause for return are included in UDTS message.

GFRF follows the same error handling procedures as GTT for the following error cases:

- Routing failures
- Network Congestion

Forwarding message after replace GT and/or Insertion of OPC or SSN is greater than the CCS7 message limit (272 bytes).

An exception to GTT error handling is when the GFRF database entry cannot be found. In this case, it is not considered an error and the GFRF capability will forward the message to GTT processing.

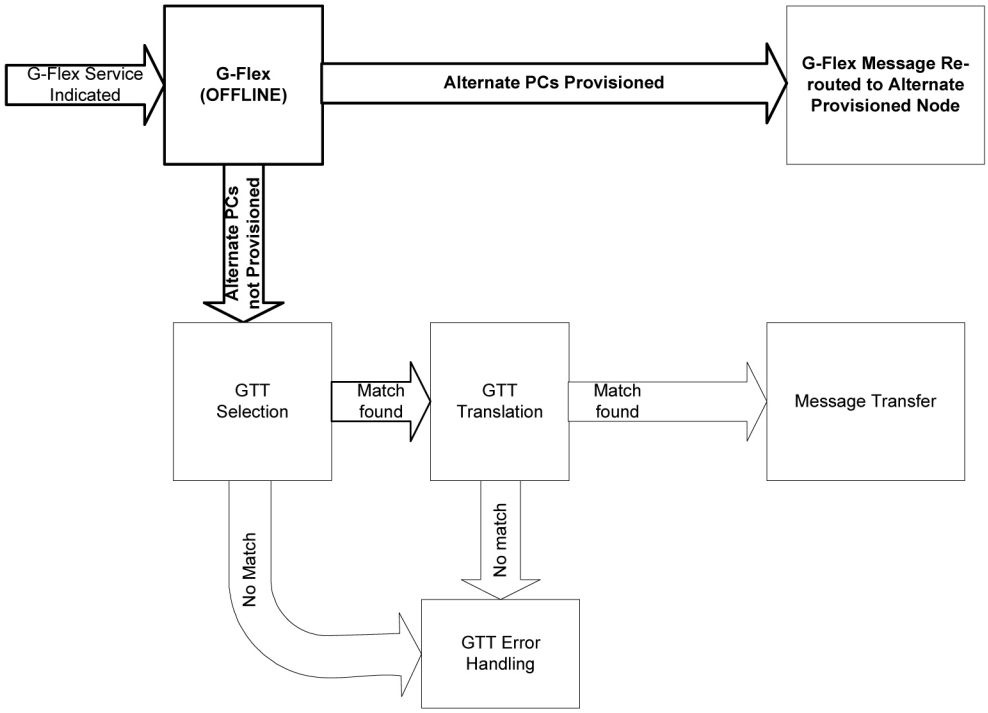
G-Flex SCCP Service Re-Route Capability

This feature is designed to handle and control re-routing of G-Flex 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-Flex functionality. This feature consists of the following main functions:

- Service State
- G-Flex Re-routing
- G-Flex Capability Point Codes

Figure 2-4 shows the basic functional diagram for the G-Flex SCCP Service Re-Route feature, with the new parts for specific for this feature in bold.

Figure 2-4. Functional Diagram – G-Flex SCCP Service Re-Route (OFFLINE)



Service State

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

G-Flex Re-routing

G-Flex re-routing is an optional feature and is enabled by defining a list of alternate PCs or by defining the GTT option. G-Flex re-routing is activated by marking G-Flex *OFFLINE* . When G-Flex is *OFFLINE* and alternate PCs are provisioned, any messages destined for G-Flex are re-routed to the available alternate PCs that are defined for G-Flex. 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-Flex will fall through to GTT as part of the re-routing procedure.

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

G-Flex Capability Point Codes

Capability Point Codes (CPC) are also supported for G-Flex. The use of G-Flex capability point code aids the adjacent nodes in knowing about G-Flex outages. When G-Flex is brought down though administrative commands, all traffic destined to this G-Flex node will generate a Transfer Prohibited (TFP) message to the adjacent node

about the G-Flex CPC. The TFP response to the adjacent node causes the traffic originating nodes to stop sending G-Flex traffic to this node. All G-Flex traffic coming into this node is sent to the alternate G-Flex 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-Flex service is OFFLINE. The originator would not be aware of the outage.

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

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

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

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

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

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

G-Flex SCCP Service Re-Route Summary

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

Before changing G-Flex 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. Re-routing to alternate point codes has priority over falling though to GTT. Examples of the two options follow:

Option 1

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

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

Option 2

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

`chg-sccp-serv:serv=GFLEX:GTT=YES` (it is YES by default)

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

Table 2-6 shows the actions taken when the G-Flex service is offline, a message arrives at the affected node requiring G-Flex service, and SCCP cards are available.

Table 2-6. G-Flex SCCP Re-route Summary

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

Table 2-7 shows the actions of LIM re-route functionality when SCCP cards are unavailable or down.

Table 2-7. G-Flex LIM Re-route Message Handling Summary

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

MPS/EPAP Platform

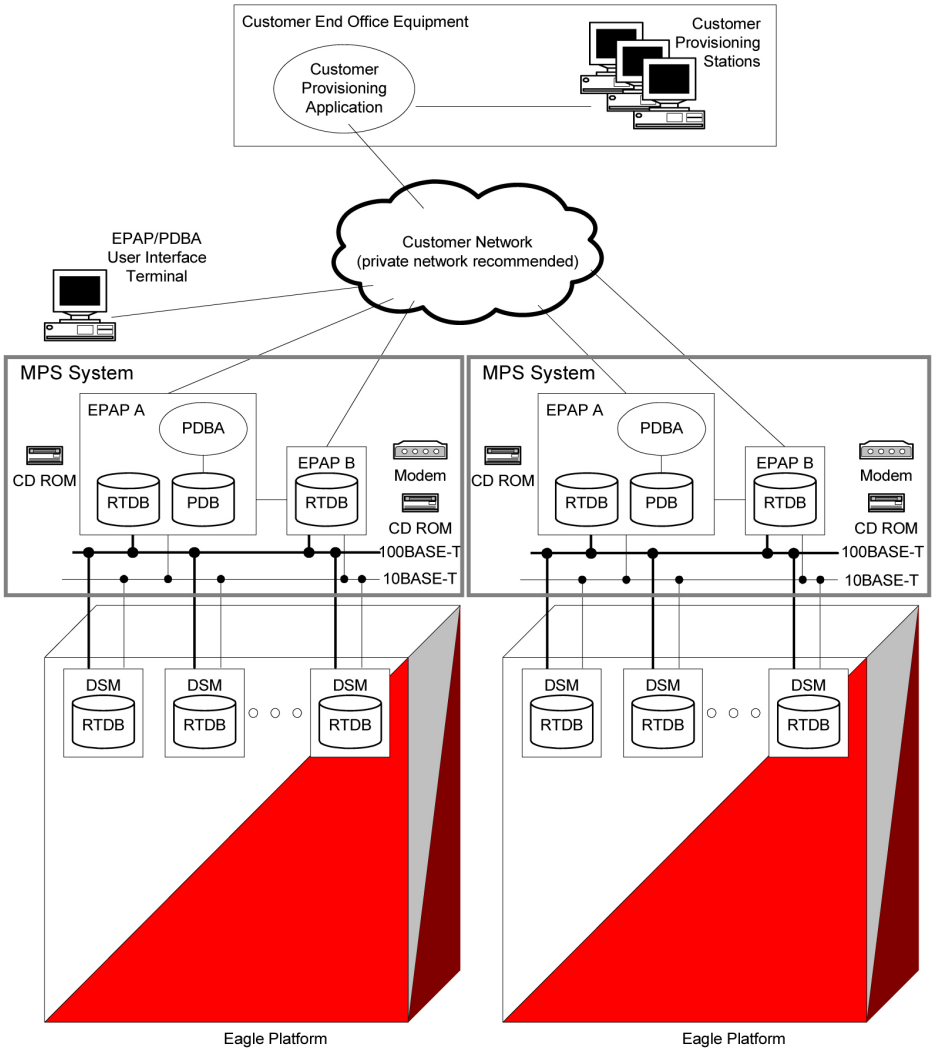
Tekelec provides the MPS (Multi-Purpose Server) platform as a subsystem of the EAGLE 5 ISS. The MPS provides support for the AINPQ, A-Port, EIR , G-Flex, G-Port, IGM, V-Flex, and INP features.

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

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

Figure 2-5. MPS/EPAP Platform Architecture



Design Overview and System Layout

Figure 2-5 illustrates the overall system architecture and identifies the different tasks, databases and interfaces involved. The system consists of two mated MPS servers. Each MPS contains two EPAP platforms, EPAP A and EPAP B, each containing a RealTime Database (RTDB), a Provisioning Database (PDB), servers, optical media, modems, and network hubs. Each MPS and its EPAPs may be thought of as an ‘EPAP system’; the EPAP system and the mated EAGLE 5 ISS is referred to as the ‘mated EPAP system’. Each EPAP system is a T1000 AS system with a total of four Ethernet interfaces: one from each EPAP to the 100Base-T Ethernet and one from each EPAP to the 10Base-T Ethernet.

On the EAGLE 5 ISS platform side, a set of Service Module cards, which hold the RTDB database, 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 a 10BASE-T Ethernet bus.

The RTDB database is provisioned and maintained through the EPAPs. EPAP A and EPAP B act as the active EPAP and the standby EPAP. One link serves as the active link, and the other as the standby link. At any given

time, there is only one active EPAP and one active link. The database is provisioned through the active link by the active EPAP; the other EPAP provides redundancy.

In case of failure of the active EPAP, the standby EPAP takes over the role of active EPAP and continues to provision the subscriber database. In the case where 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 of the mated EAGLE 5 ISSs.

Functional Overview

The main function of the MPS / EPAP platform is to provision the 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.

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

EPAP/PDBA Overview

The EAGLE Provisioning Application Processor (EPAP) platform and the Provisioning Database Application (PDBA), coupled with the Provisioning Database Interface (PDBI) facilitate the 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

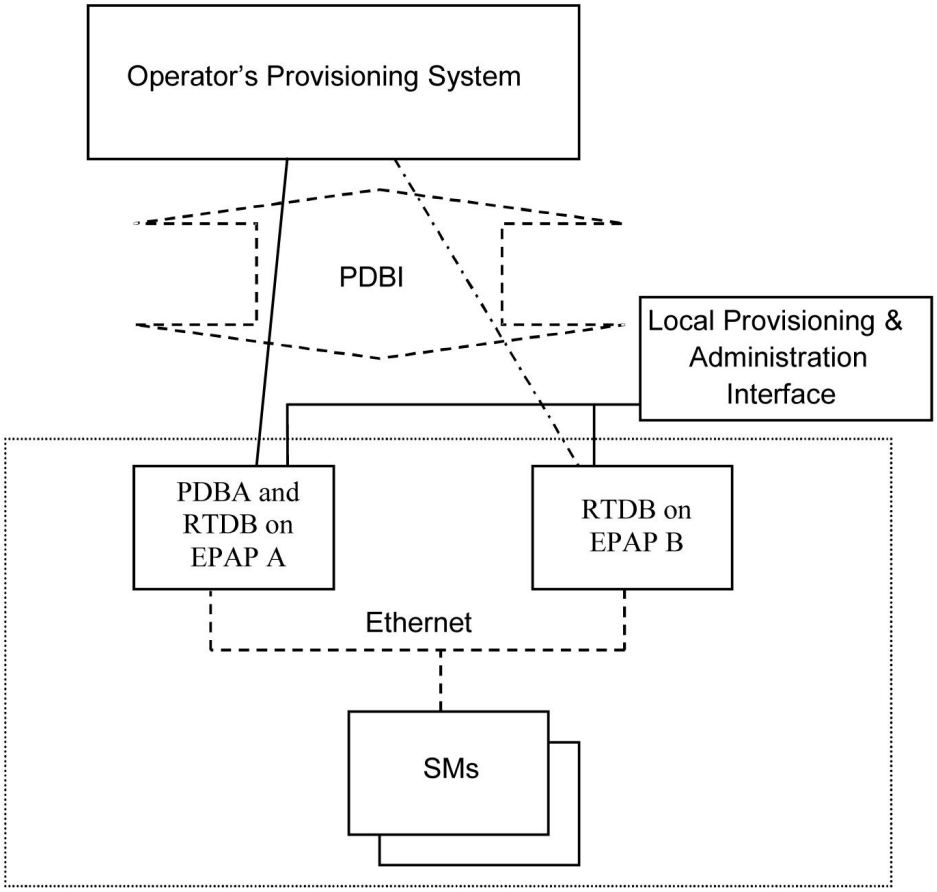
Each EPAP server maintains a copy of the Real Time Database (RTDB) in order to provision the EAGLE 5 ISS Service Module cards. The EPAP server must comply with the hardware requirements in the *MPS Hardware Manual*. **Figure 2-5** illustrates the EPAP architecture contained in the MPS subsystem.

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 the *Tekelec T1000 Application Server Hardware Manual* for details about the hardware devices and network connections.

Subscriber Data Provisioning

Figure 2-6 shows the current 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 retrieving of subscription data. The PDBI is used for real-time provisioning of subscriber and network entity data only. Refer to the *Provisioning Database Interface Manual* for more details.

Figure 2-6. 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 just the RTDB. An EPAP with just the RTDB must be updated by the EPAP that has the PDB.

For more information about the EPAP, refer to the *EPAP Administration Manual*. For more information about the MPS hardware, refer to the *Tekelec 1000 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 the *Tekelec T1000 Application Server Hardware Manual* and *EPAP Administration Manual*.

EPAP (EAGLE Provisioning Application Processor)

As shown in **Figure 2-5** , a single MPS system contains two EPAP (EAGLE Provisioning Application Processor) servers. At any given time, only one actively communicates with the Service Module cards. 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 systems is to maintain the RTDB and PDB and to download copies of the RTDB to the Service Module cards on the EAGLE 5 ISS.

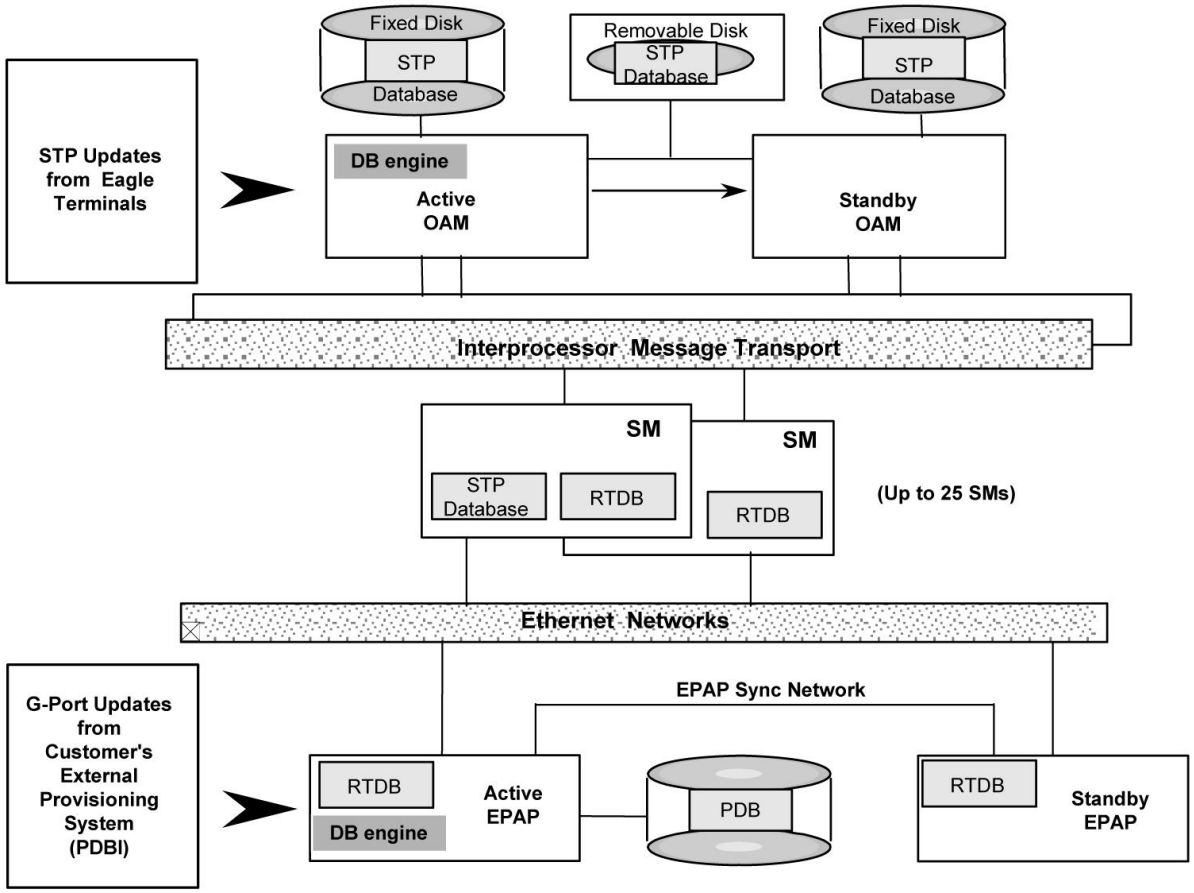
The PDB on the active EPAP receives subscription data from the customer network through the PDBI, the external source of provisioning information. The PDBA continually updates the active EPAP's PDB. The PDB uses MySQL database software. Once an update is applied to the active PDB, it is sent to the RTDBs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

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

In a mated-pair configuration, there are two mated MPS Systems, as shown in **Figure 2-5** . The PDB on the active EPAP automatically updates the PDB on the mate platform. The PDB on the mate platform then updates its EPAP RTDBs, which in turn update the RTDBs on the associated Service Module cards.

Provisioning of the EAGLE 5 ISS's 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 2-7** .

Figure 2-7. Database Administrative Architecture



Service Module Cards

From 1 to 25 Service Module cards can be provisioned with the G-Flex feature enabled. The G-Flex feature requires that all Service Module cards contain 4 GB of memory. **Figure 2-7** illustrates each Service Module card having two Ethernet links, the main Service Module network on the 100BASE-T link and the backup Service Module network on the 10BASE-T link.

The extra memory holds a copy of the RTDB. The Service Module Ethernet ports are linked to the EPAP systems to receive the downloaded RTDBs. The Service Module cards run a version of the SCCP software application that has been ported to the VxWorks operating system. To differentiate the Service Module-VxWorks-SCCP application from the SCCP that runs on Translation Services Module (TSM) cards, the Service Module version is named ‘VSCCP’.

Multiple Service Module cards provide a means of load balancing in high-traffic situations. The Service Module card database is in a format that facilitates rapid lookups. Each Service Module card contains an identical database. Furthermore, all Service Module G-Flex subscriber databases are identical to the RTDB maintained by the EPAPs.

However, the various databases may not be identical at all times for several reasons. First of all, when a Service Module card is initialized, it downloads the current copy of the database from the EPAP. While that card is being loaded, it cannot receive new updates that have arrived at the EPAP since reload began. Another condition that can result in databases being out-of-sync occurs when the EPAP receives updates from its provisioning source,

but it has not yet sent them down to the 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. In the first case, 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 to continue processing G-Flex transactions, even though the database may not be as up-to-date as it could be.

The other case occurs when a Service Module card is booted. If it is determined then that the card does not have enough memory for the entire database, the database is not loaded on that card. Each 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 an 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 (referred to as the primary Service Module). 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 25 Service Module cards, G-Flex uses a technique known as IP multicasting. This technique is based on Reliable Multicast Transport Protocol-II (RMTP-II), a product of Globalcast Communications. IP multicasting downloads the RTDB and database updates to 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:

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

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

Provisioning and other data is broadcast on one of these channels to all of the 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 (e.g., network outage, processor limitation, lost communication, etc.). The database is coherent, but back-level during incremental update.
- **Current**: The database is receiving current updates from the Service Module card provisioning task.

- **Coherent:** The database is at a whole database level, that is, not currently updating records belonging to a database level.

Service Module Card Reload Requirements

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

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

Service Module cards do the following:

- Detect the need for stage 1 loading and send a status message to the EPAP.
- Identify the first record that the Service Module card was able to read in the above status message if a record stream is already in progress.
- Handle the record stream regardless of the starting point (that is, accommodate records starting with the middle record of the middle table).
- Expect tables to be sent in a particular order and therefore detect any gap in the record stream.
- Send a status message if a gap is detected. Stage1 loading is essentially reset to the last update received.
- Handle wrapping from the last record from the last table to the first record of the first table.
- Know when they have received all the required records to proceed to stage 2 loading.
- Send a status message when stage 1 loading is complete, indicating the database level at the beginning of stage 1.
- Detect when the master RTDB crosses a memory boundary during stage 1 loading; the card automatically reboots and then auto-inhibits.

EPAP Status and Error Reporting via Maintenance Blocks

The EPAPs forward 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 2-8** . (For details about configuring these networks, refer to the *EPAP Administration Manual*.)

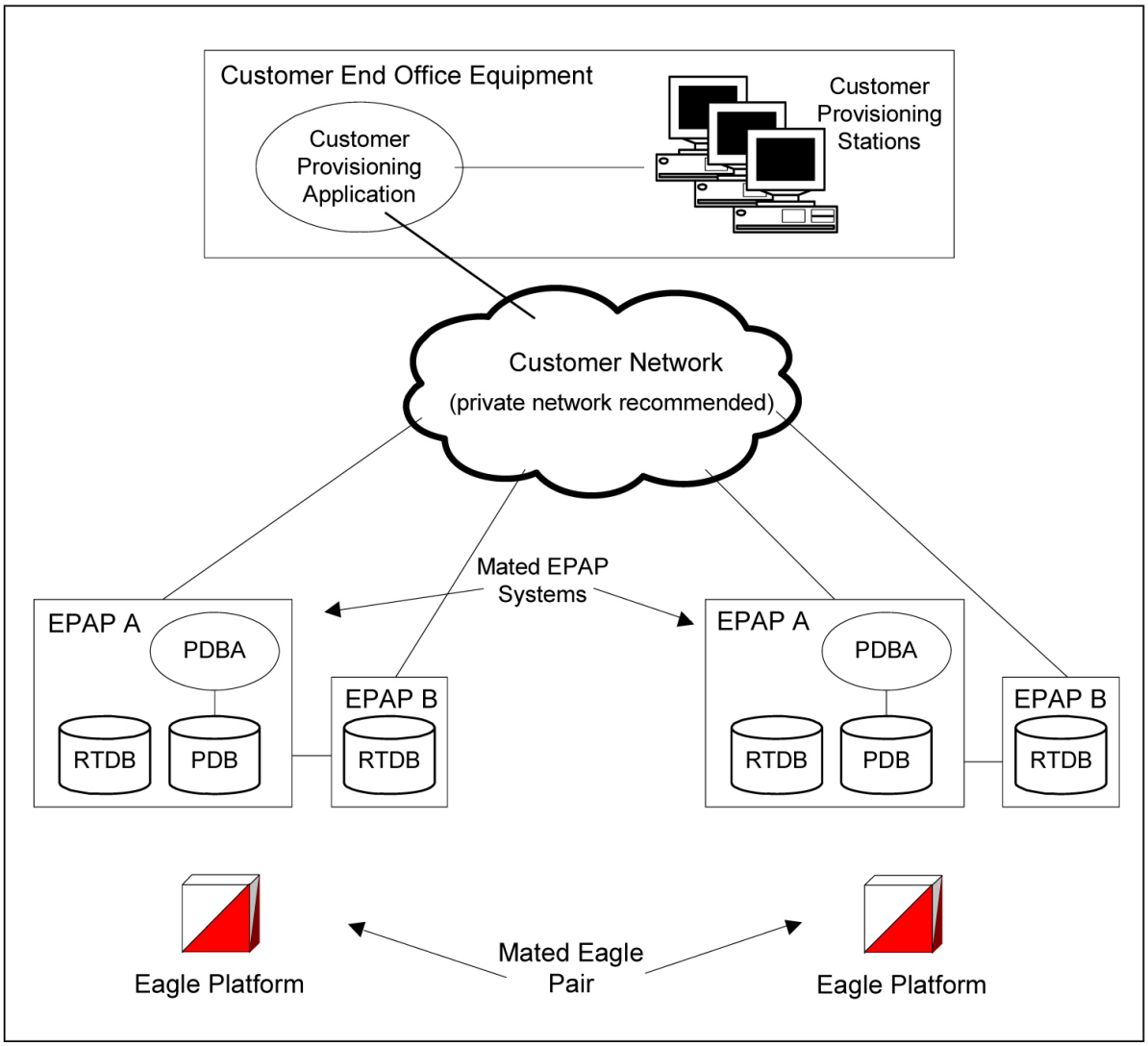
Customer Provisioning Network

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 2-8** .

Figure 2-8. Customer Provisioning Network

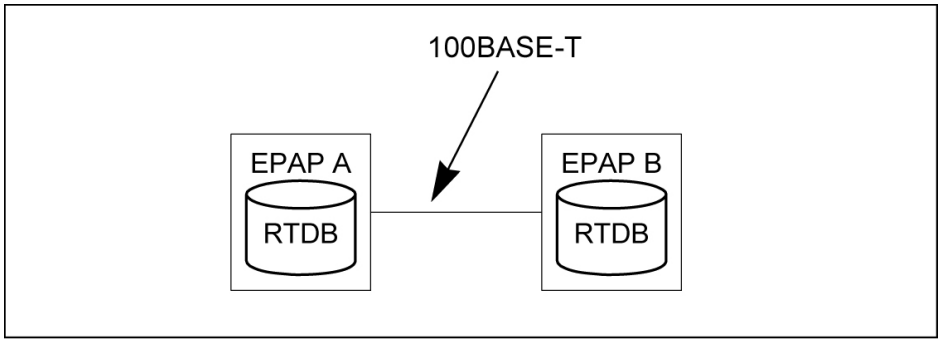


Although a dedicated network is recommended, it is possible that unrelated customer traffic can use the network as well. The determination, either to have a dedicated network or to allow other customer traffic, should be based on available external Ethernet bandwidth and network performance considerations.

EPAP Sync Network

The EPAP sync network carries RTDB and maintenance application traffic between active and standby EPAP servers on an MPS system. It synchronizes the contents of the RTDBs of both EPAP A and B. The EPAP Sync network is a single Ethernet connection between EPAP A and EPAP B running at 100BASE-T, as shown in **Figure 2-9** .

Figure 2-9. EPAP Sync Network

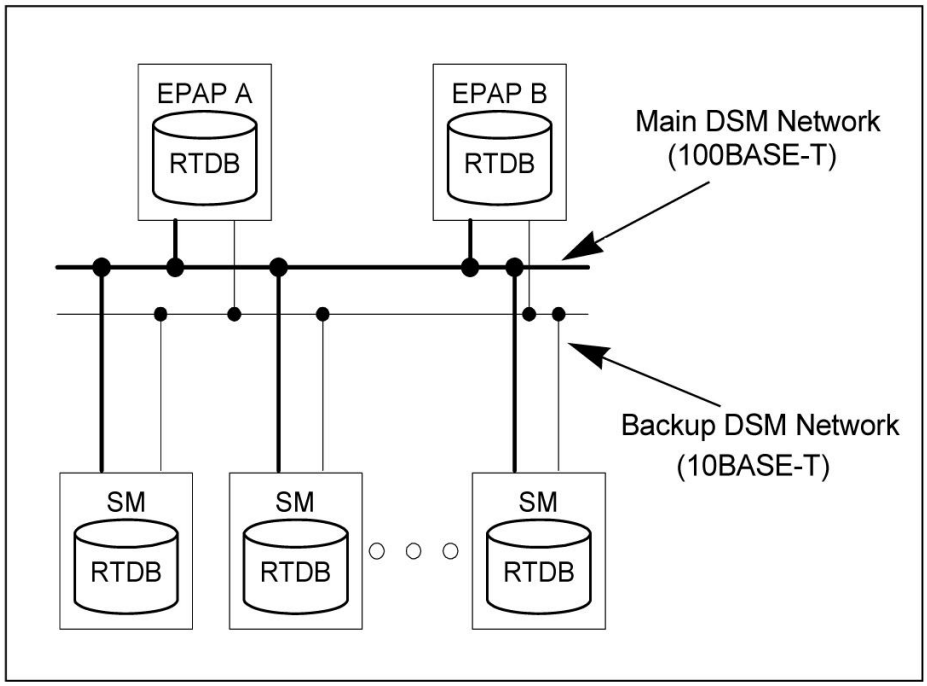


DSM Networks

The DSM networks are shown in Figure 2-10 . 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 10BASE-T. Both Ethernet networks connect EPAP A and EPAP B with every Service Module card on a single EAGLE 5 ISS platform.

Figure 2-10. 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 2-8 summarizes the contents of each octet.

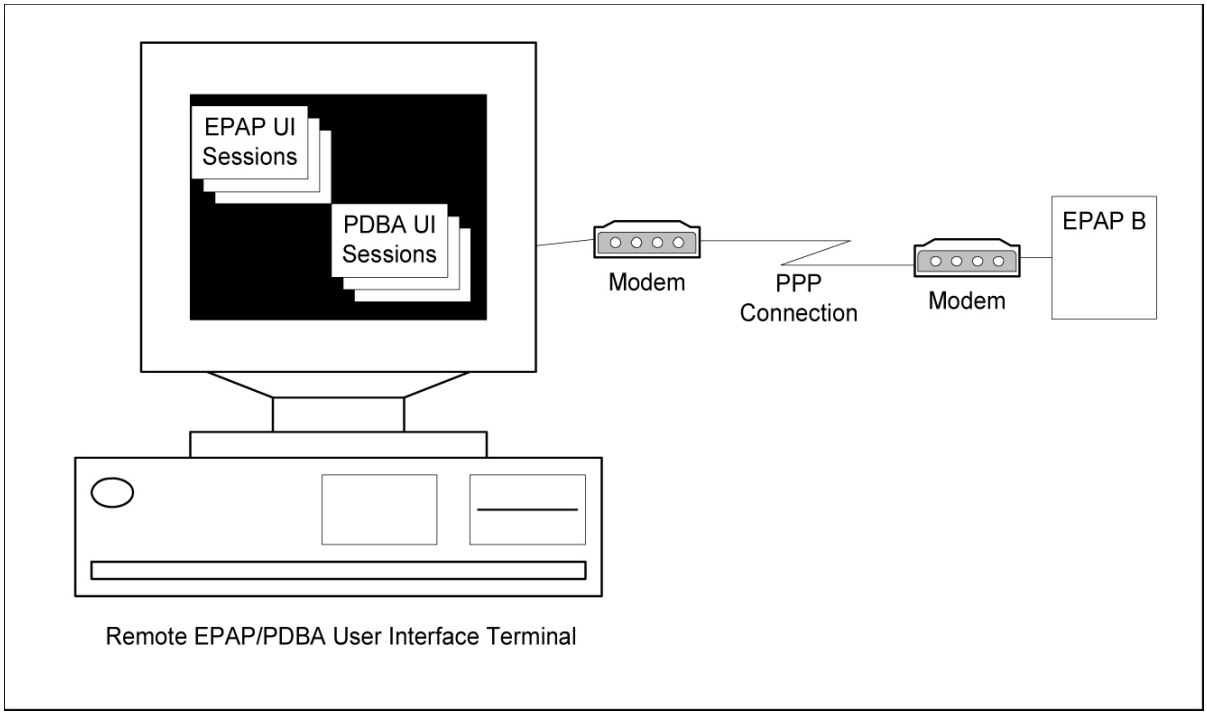
Table 2-8. EPAP IP Addresses in the DSM Network

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

Dial-Up PPP Network

The dial-up PPP network allows multiple user-interface sessions to be established with the EPAP. The network connects a remote EPAP/PDBA user interface terminal with the EPAP in the EAGLE 5 ISS’s MPS subsystem. The dial-up PPP network is illustrated in Figure 2-11 .

Figure 2-11. Dial-Up PPP Network



Network Perspectives

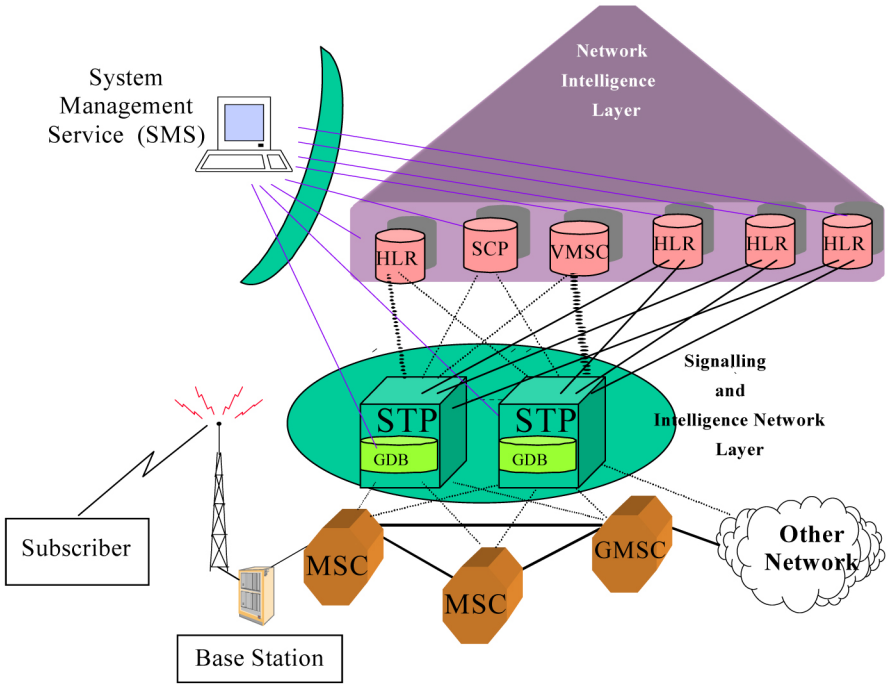
The EAGLE 5 ISS solution for G-Flex can be deployed in the network in two ways:

- As an integrated EAGLE 5 ISS G-Flex node
- As a stand-alone EAGLE 5 ISS G-Flex relay function

Integrated EAGLE 5 ISS/G-Flex Node

Figure 2-12 shows the location of the Integrated EAGLE 5 ISS/G-Flex in a mobile network. This uses the Integrated EAGLE 5 ISS/G-Flex relay function solution to do HLR translations along with final GTT and routing functions.

Figure 2-12. Location of an Integrated EAGLE 5 ISS/G-Flex Node in Wireless Network

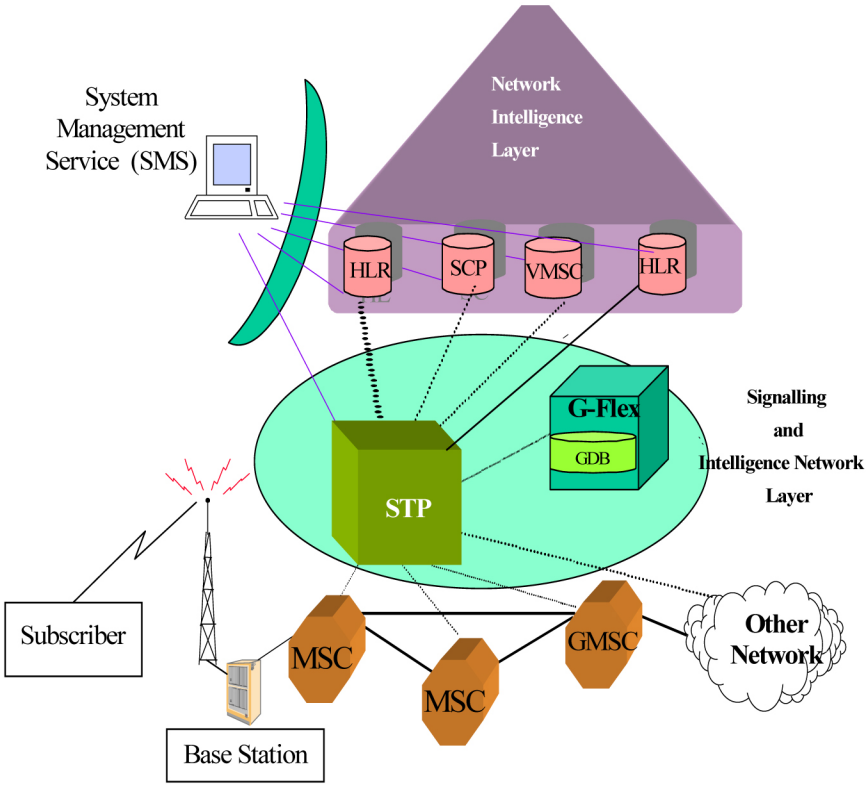


Stand-Alone EAGLE 5 ISS G-Flex Relay Function

Figure 2-13 shows the location of G-Flex in a wireless network. This performs only the G-Flex relay function, while the EAGLE 5 ISS performs the STP functions. One advantage of such a setup is that the impact on the network due to the introduction of this new node is minimal. The originating nodes continue to route messages to the same EAGLE 5 ISS. The existing EAGLE 5 ISS forwards only HLR-destined (or AuC-destined messages if the HLR is integrated) to the G-Flex relay function based on the DN and IMSI/MGT number ranges. All HLR-provisioned subscriber numbers must be provisioned in the GDB (G-Flex database) before the G-Flex relay function is brought into service.

Once in service, the G-Flex relay function performs the HLR translations on incoming messages and then either MTP routes the message through the EAGLE 5 ISS directly to the end node or forwards the translated message back to the EAGLE 5 ISS. If the EAGLE 5 ISS is capable of broadcasting SCCP subsystem management messages (that is, SSPs and SSAs) to the G-Flex node, then G-Flex could directly route the messages to the HLR entity numbers. It could then forward the message to the EAGLE 5 ISS so that the forwarded messages could be easily translated to derive a HLR address. Note that the GTT (global title translation) data must be carefully set up to prevent looping between EAGLE 5 ISS and the G-Flex node.

Figure 2-13. Location of a G-Flex Node in Wireless Network



Serviceability Hints

The following hints are offered to aid in the serviceability of G-Flex databases:

- Mated Application Considerations
- Entity Point Codes and Routes

Mated Application Considerations

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

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

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

Entity Point Codes and Routes

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

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

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

3

EAGLE 5 ISS G-Flex Commands

Introduction

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

System Debug Services (SDS) Commands

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

MSU Trap and Trace Command

The G-Flex Relay Function uses the existing **`ent-trace`** command functionality to provide a trap-and-trace feature for MSUs on the TSM card running the SCCP application. The G-Flex Relay Function introduces two new triggers so the user can trigger on DN and IMSI.

The user can create a MSU trigger on the TSM card on any one or more of the 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 of the criteria are satisfied.

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

- **E.164 MSISDN number (MSISDN)** – Use this criterion to trap messages immediately before performing a G-Flex search based on the MSISDN numbers defined in the G-Flex database. This parameter allows

a variable number of digits (from 5 to 15). The number specified must be an International E.164 number (MSISDN or Entity Number).

- **E.212 IMSI number (IMSI)** – Use this criterion to trap messages immediately before performing a G-Flex search based on the IMSI numbers defined in the G-Flex database. This parameter allows a variable number of digits (from 5 to 15). The number specified must be an international E.212 IMSI. This parameter cannot be used to trap on E.214 MGT.

- **Global Title digits (GT)** – Use this criterion to trap messages based on CdPA Global Title Address (that is, either E.164, E.214 MGT, or E.212 number) present in the SCCP part of the message.

- **SSP point code** (MSC or VLR PC, for example) – After the SSN has been determined to belong to a G-Flex entity object, use this criterion to trap messages based on CgPA (Calling Party Address) SPC present in the SCCP part of the message. If no point code is present in CgPA SPC, the criteria is matched with the OPC present in the MTP part of the message.

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

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

Provisioning Hierarchy for the G-Flex Database

Part of the database is administered from the EPAP to the Service Module cards, and part is administered from the EAGLE 5 ISS GPSM-IIs to the Service Module cards. In general, the EAGLE 5 ISS terminal interfaces use the **`ent`** commands to enter new data into the database, **`chg`** commands to change existing data in the database, and **`dlt`** commands to delete data in the database.

EAGLE 5 ISS Terminal Database Commands

EAGLE 5 ISS chg-ctrl-feat Commands

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

- **`enable-ctrl-feat:`** **Enable Control Feature Command** – The **`enable-ctrl-feat`** command enables the G-Flex and G-Flex Map Layer Routing features available for the system. A command example follows.

```
enable-ctrl-feat:partnum=893xxxxxx:fak=xxxxxxxxxxxxxx
    rlghncxa03w 06-06-01 16:40:40 EST  EAGLE 35.0.0
    ENABLE-CTRL-FEAT:  MASP A - COMPLTD
;
```

- **`chg-ctrl-feat:`** **Change Control Feature Status Command** – The **`chg-ctrl-feat`** command activates optional features available for the system. Features can only be turned on. Once the feature is turned on, it cannot be turned off. The **`chg-ctrl-feat`** command turns on the G-Flex numbering capability and provides mutual exclusion between LNP and G-Flex. The GTT feature is a prerequisite for G-Flex. The **`chg-ctrl-feat`** command also provides the processor, DRAM, and disk

capacity validation required to support the G-Flex feature. This command updates the MAS configuration table. A command example follows.

```
 tekelecstp 06-07-26 14:47:58 EST EAGLE 36.0.0 chg-ctrl-feat :partnum=893018001:status=on
Command entered at terminal #4. CHG-CTRL-FEAT: MASP A - COMPLTD
```

- **`rtrv-ctrl-feat:` Retrieve Control Feature Status Command** – The **`rtrv-ctrl-feat`** command displays the feature status for the G-Flex feature. An example of command output follows.

```
rlghncxa03w 08-01-30 16:40:40 EST  EAGLE5 38.0.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    Command Class Management  893005801  on          ----
    Prepaid SMS Intercept Ph1 893006701  on          ----
    Intermed GTT Load Sharing 893006901  on          ----
    MNP Circ Route Prevent    893007001  on          ----
    XGTT Table Expansion      893006101  on        400000
    XMAP Table Expansion      893007710  on          3000
    Large System # Links      893005910  on          2000
    Routesets                 893006403  on          8000
    EAGLE5 Product            893007101  on          ----
    EAGLE Product             893007201  off         ----
    IP7 Product               893007301  off         ----
    Network Security Enhance  893009101  off         ----
    Telnet                    893005701  on          ----
    Port Chk for MO SMS       893009301  on          ----
    LNP ELAP Configuration    893010901  on          ----
    15 Minute Measurements    893012101  off         ----
    EAGLE OA&M IP Security    893400001  off         ----
    SCCP Conversion           893012001  on          ----
    SE-HSL SLK Capacity       893013005  on            64
    GSM Map Screening (GMS)   893013201  on          ----
    Enhanced GMS (EGMS)       893012401  on          ----
    MTP MAP Screening         893013501  on          ----
    Spare Point Code Support  893013601  on          ----
    GSM MAP SRI Redirect      893014001  on          ----
    ISUP NP with EPAP         893013801  on          ----
    Origin-Based MTP Routing  893014201  on          ----
    ITUN-ANSI SMS Conversion  893015301  on          ----
    Flexible GTT Load-Sharing 893015401  on          ----
    IDP Screening for Prepaid 893015501  on          ----
    Origin Based SCCP Routing 893014301  on          ----
    Lrg BICC MSU for IP Sig   893018401  off         ----
    VFLEX                     893016701  on          ----
    Transaction Based GTT LS  893017101  on          ----
    Hex Digit Support for GTT 893018501  on          ----
    E5-SM4G Throughput Cap    893019101  on          ----
    G-Flex MAP Layer Routing  893021701  on          ----
    G-Flex                    893021901  on          ----

;
```

EAGLE 5 ISS G-Flex System Options Commands

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

- **chg-gsmopts: Change G-Flex System Options Command** – The **`chg-gsmopts`** command changes G-Flex-specific system options in the database. This command updates the GSMOPTS table. Up to 10

CCNC/MCCMNC numbering plan conversion parameter combinations can be created. If “none” is specified for MCCMNC, then the CCNC combination is deleted. The default parameters are always overwritten when specified. The **chg-gsmopts** command determines whether the G-Flex feature uses digits from the SCCP or MAP layer for database lookup.

```
Command : chg-gsmopts            Class = DATABASE
```

Parameter	Optional/ Mandatory	Range	Description
CCNC	Optional	2-8 digits	Country Code and Network Code
DEFMAPVR	Optional	1-3 digits	Default MAP version
DEFMCC	Optional	3 digits, none	E212 Default Mobile Country Code
DEFMNC	Optional	1-4 digits, none	E212 Default Mobile Network Code
GFLEXMAPLAYERRTG	Optional	on, off	G-Flex MAP layer routing status
GSM21S41	Optional	1-15 digits, none	GSM to IS41 migration prefix
IS412GSM	Optional	1-15 digits, none	IS41 to GSM migration prefix
MIGRPFX	Optional	single, multiple	Migration Prefix
MCCMNC	Optional	4-7 digits, none	Numbering plan for the MSRN
MSISDNTRUNC	Optional	0-5 digits	MS ISDN truncation digits
MSRNDIG	Optional	rn, rndn, ccrndn	Routing number
SRFADDR	Optional	1-15 digits, none	Entity address of the MNP_SRF node
SRIDN	Optional	tcap, sccp	SRIDN location
SRIDNNOTFOUND	optional	gtt, srinack	When G-Port encounters an RTDB query result that indicates that the given DN is not known, the SRIDNNOFOUND parameter value determines further procesing. The default value is gtt.

Command examples follow.

```
chg-gsmopts:defmcc=214:defmnc=34

chg-gsmopts:ccnc=33322123:mccmnc=21434

chg-gsmopts:ccnc=334:mccmnc=22435

chg-gsmopts:ccnc=334:mccmnc=none

chg-gsmopts:gflexmaplayerrtg=on
```

- **rtrv-gsmopts: Retrieve G-Flex System Options Command** – The **rtrv-gsmopts** command retrieves all G-Flex-specific system options from the database. The **rtrv-gsmopts** command displays the G-Flex MAP Layer Routing status.

The following example displays output for the **rtrv-gsmopts** command when the G-Flex MAP Layer Routing feature is enabled and turned on.

```
tekelecstp 08-01-04 20:34:22 EST  EAGLE 38.0.0
    GSM OPTIONS
    -----------------------
    DEFMCC            = NONE
    DEFMNC            = NONE
    SRFADDR           = NONE
    MSRNDIG           = RN
    DEFMAPVR          = 1
    IS412GSM          = NONE
    MSISDNTRUNC       = 0
    MIGRPFX           = SINGLE
    GSM2IS41          = NONE
    GFLEXMAPLAYERRTG = ON

    SRIDNNOTFOUND = GTT
```

- **chg-stpopts**: **Change STP Options Command** – Use the **chg-stpopts** command to change the values of one or more of the STP node level processing option indicators maintained in the STP's options table. The **chg-stpopts** command prevents the **ansigflex** option from being enabled when the G-Flex MAP Layer Routing feature is enabled.

EAGLE 5 ISS G-Flex Service Selector Commands

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

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

```
Command : ent-srvsel            Class = DATABASE
```

Parameter	Optional/ Mandatory	Range	Description
GTI, GTIA, GTII, GTIN, GTIN24	Mandatory	1-4	Global Title Indicator
SERV	Mandatory	gport, gflex, inpq, inpmr	GSM service
SSN	Mandatory	0-255, *	Subsystem Number
TT	Mandatory	0-255	Translation Type
NAI	Optional	sub, rsvd, natl, intl	Nature Of Address Indicator
NAIV	Optional	0-127	NAI Value
NP	Optional	e164, generic, x121, f69, e210, e212, e214, private	Numbering Plan

Parameter	Optional/ Mandatory	Range	Description
NPV	Optional	0-15	Numbering Plan Value
SNAI	Optional	sub, natl, intl	Service Nature Of Address Indicator
SNP	Optional	e164, e212, e214	Service Numbering Plan

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

```
Command : chg-srvsel            Class = DATABASE
```

Parameter	Optional/ Mandatory	Range	Description
GTI, GTIA, GTII, GTIN,GTIN24	Mandatory	1-4	Global Title Indicator
SSN	Mandatory	0-255, *	Subsystem Number
TT	Mandatory	0-255	Translation Type
NAI	Optional	sub, rsvd, natl, intl	Nature Of Address Indicator
NAIV	Optional	0-127	NAI Value
NP	Optional	e164, generic, x121, f69, e210, e212, e214, private	Numbering Plan
NPV	Optional	0-15	Numbering Plan Value
NSERV	Optional	gport, gflex, inpq, inpmr, smsmr, mnpsms, eir	New GSM service
NSNAI	Optional	sub, natl, intl, rnidn, none	New Service Nature Of Address Indicator
NSNP	Optional	e164, e212, e214, none	New Service Numbering Plan

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

```
Command : dlt-srvsel            Class = DATABASE
```

Parameter	Optional/ Mandatory	Range	Description
GTI, GTIA, GTII, GTIN,GTIN24	Mandatory	1-4	Global Title Indicator
SSN	Mandatory	0-255, *	Subsystem Number
TT	Mandatory	0-255	Translation Type
NAI	Optional	sub, rsvd, natl, intl	Nature Of Address Indicator

Parameter	Optional/ Mandatory	Range	Description
NAIV	Optional	0-127	NAI Value
NP	Optional	e164, generic, x121, f69, e210, e212, e214, private	Numbering Plan
NPV	Optional	0-15	Numbering Plan Value

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

```
Command : rtrv-srvsel            Class = DATABASE
```

Parameter	Optional/ Mandatory	Range	Description
GTI, GTIA, GTII, GTIN,GTIN24	Optional	1-4	Global Title Indicator
NAI	Optional	sub, rsvd, natl, intl	Nature Of Address Indicator
NAIV	Optional	0-127	NAI Value
NP	Optional	e164, generic, x121, f69, e210, e212, e214, private	Numbering Plan
NPV	Optional	0-15	Numbering Plan Value
SERV	Optional	gport, gflex, inpq, inpmr	GSM service
SNAI	Optional	sub, natl, intl, rnidn, rnndn, rnsdn,ccrndn	Service Nature Of Address Indicator
SNP	Optional	e164, e212, e214	Service Numbering Plan
TT	Optional	0-255	Translation Type

EAGLE 5 ISS G-FLEX SCCP Service Commands

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

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

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

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

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

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

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

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

Parameter	Optional/ Mandatory	Range	Description
SERV	Mandatory	gport, gflex	Service
PC1, PCA1, PCI1, PCN1, PCN241	Optional	Refer to *Commands Manual*	Post GTT-translated PC
PC2, PCA2, PCI2, PCN2, PCN242	Optional	Refer to *Commands Manual*	Post GTT-translated PC
PC3, PCA3, PCI3, PCN3, PCN243	Optional	Refer to *Commands Manual*	Post GTT-translated PC

Parameter	Optional/ Mandatory	Range	Description
PC4, PCA4, PCI4, PCN4, PCN244	Optional	Refer to *Commands Manual*	Post GTT-translated PC
ALL	Optional	No, Yes	Yes will delete the entire group

- **rtrv-sccp-serv: Retrieve G-Flex SCCP Service Command** – The **rtrv-sccp-serv** command is used to display the SCCP Service application relationship information maintained by the EAGLE 5 ISS. Point codes are grouped by service. The sample output that follows indicates that the G-Port and G-Flex features are turned on and the SCCP Service table is empty.

```
    tekelecstp 05-12-20 08:32:58 EST  37.5.0
    rtrv-sccp-serv
    Command entered at terminal #4.
       -------------------------------------
       Service     : GFLEX
       State       : Offline
       GTT Option  : Yes
       -------------------------------------
       -------------------------------------
       Service     : GPORT
       State       : Offline
       GTT Option  : Yes
       -------------------------------------
;
```

EAGLE 5 ISS Feature Key Control Commands

These commands are used to enable, update, view, and control the G-Flex features on the EAGLE 5 ISS. A separate Feature Access Key is required to turn on each feature. Features must be purchased in order to have access to the Feature Access Key, which must be used when enabling these features.

There is no temporary key associated with the G-Flex feature and once it is turned on, it cannot be turned off. There are two steps that will be taken to turn the G-Flex feature on. The first step is to enable the feature. The second step is to turn the status to on.

Part number 893021901 is used to enable the G-Flex feature on the EAGLE 5 ISS. Once the FAK is enabled and turned on, it cannot be turned off.

Part number 893021701 is used to enable the G-Flex MAP Layer Routing feature on the EAGLE 5 ISS.

EAGLE 5 ISS chg-db: Change Database Commands

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

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

The **rept-stat-db** command displays both the EAGLE 5 ISS and the G-Flex database status and level information for each DSM network card, and for the active and standby EPAP databases.

Maintenance and Measurements Commands

This section provides a description of the maintenance and measurements commands for the G-Flex features. The commands that follow allow provisioning, operations, and maintenance activities for Service Module cards.

Commands

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

Commands described here include:

- rept-stat-sys
- rept-stat-sccp
- rept-stat-mps
- rept-meas
- rept-stat-trbl
- rept-stat-alm
- rept-stat-db
- inh-card / alw-card
- ent-card / rtrv-card / dlt-card
- chg-gpl / act-gpl / rtrv-gpl / rept-stat-gpl / copy-gpl
- chg-gpl / act-gpl / rtrv-gpl / rept-stat-gpl / copy-gpl
- ent-bp / dlt-bp / disp-bp / disp-mem / set-mem
- inh-alm / unhb-alm
- pass

rept-stat-sys

The **`rept-stat-sys`** command syntax is not modified, but the report output now displays the status of the Service Module cards. The remainder of the report is unchanged.

rept-stat-sccp

The command handling and scroll area output for the **`rept-stat-sccp`** command includes the Service Module card. The **`loc`** parameter displays detailed card traffic statistics.

Samples of the reports produced by these commands are shown in the following two examples.

- **rept-stat-sccp**

```
    Command entered at terminal #3.
;
    tekelecstp 00-06-23 13:34:22 EST EAGLE  37.5.0
    SCCP SUBSYSTEM REPORT IS-NR          Active      -----
    GSM  SUBSYSTEM REPORT IS-NR          Active      -----
    SCCP Cards Configured= 4  Cards IS-NR= 2  Capacity Threshold = 100%
    CARD   VERSION      PST          SST          AST       MSU USAGE  CPU USAGE
    ------------------------------------------------------------------------------
    1212   101-001-000  IS-NR        Active       ALMINH       45%         30%
    1301   101-001-000  IS-NR        Active       ------       35%         20%
    1305   -----------  OOS-MT       Isolated     ------        0%          0%
    2112   -----------  OOS-MT-DSBLD Manual       ------        0%          0%
    ------------------------------------------------------------------------------
    SCCP Service Average MSU Capacity = 40%       Average CPU Capacity = 25%
    AVERAGE MSU USAGE PER SERVICE:
      GTT   = 15%  GFLEX =  5%
    TOTAL SERVICE STATISTICS:
      SERVICE    SUCCESS    ERRORS    WARNINGS    FORWARD TO GTT    TOTAL
      GTT:          1995         5           -                 -     2000
      GFLEX:         500         1           4                10      515
    Command Completed.
;
```

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

```
Command entered at terminal #4.
;
    tekelecstp 00-06-23 13:34:22 EST EAGLE 37.5.0
    CARD  VERSION      TYPE    PST           SST       AST
    1106  101-010-000  DSM     IS-NR         Active    -----
      ALARM STATUS       = No Alarms.
      GTT:   STATUS = ACT       MSU USAGE = 10%
      GFLEX: STATUS = ACT       MSU USAGE = 10%
CPU USAGE = 15%

    CARD SERVICE STATISTICS:
      SERVICE    SUCCESS    ERRORS    WARNINGS    FORWARD TO GTT    TOTAL
      GTT:          1995         5           -                 -     2000
      GFLEX:         500         1           4                10      515
   Command Completed.
;
```

rept-stat-mps

There are two variants of this new command.

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

- **rept-stat-mps:loc=xxxx -** produces a more detailed report showing the G-Flex status of a specific Service Module card. Note that this version of the command displays the percent utilization of a particular Service Module card memory.

Samples of the reports produced by these commands are shown in the following two examples.

- **rept-stat-mps**

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

```
;
    Integrat40 00-06-24 10:37:22 EST EAGLE 37.5.0
                       VERSION       PST            SST        AST
    EPAP A             026-015-000   IS-NR          Active    -----
              ALARM STATUS = No Alarms
    EPAP B             026-015-000   IS-NR          Active    -----
              ALARM STATUS = No Alarms
    CARD   PST          SST       GSM STAT   G-Flex STAT
    1106   IS-NR        Active    ACT        ACT
    1201   IS-ANR       Active    SWDL       SWDL
    1205   OOS-MT-DSBLD Manual    -------    -------
    1302   OOS-MT       Fault     -------    -------
    1310   IS-ANR       Standby   SWDL       SWDL
    CARD 1106 ALARM STATUS = No Alarms
    CARD 1201 ALARM STATUS = No Alarms
    CARD 1205 ALARM STATUS = No Alarms
    CARD 1302 ALARM STATUS = No Alarms
    CARD 1310 ALARM STATUS = No Alarms
    Command Completed.
;
```

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

```
    Command entered at terminal #4.
;
    integrat40 99-09-24 10:37:22 EST EAGLE 37.5.0
    CARD  VERSION         TYPE    PST           SST        AST
    1106  101-9-000       DSM     IS-NR         Active     -----
      DSM PORT A                  IS-NR         Active     -----
      DSM PORT B                  IS-NR         Active     -----
      GTT STATUS          = ACT
      GSM STATUS          = ACT
      ALARM STATUS        = No Alarms.
      DSM MEMORY USAGE    = xxx%
    Command Completed.
;
```

rept-meas

This command includes G-Flex measurements in the output sent to the EAGLE 5 ISS Terminal. Refer to the *Commands Manual* for details of the command.

rept-stat-trbl

This command includes the G-Flex subsystem and Service Module/EPAP IP link alarms. Refer to the *Commands Manual* for details of this command.

rept-stat-alm

This command includes the alarm totals of the G-Flex subsystem and Service Module/EPAP IP links. Refer to the *Commands Manual* for details of this command.

rept-stat-db

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

Hourly Maintenance Report

The Hourly Maintenance Report, generated automatically, includes the alarm totals of the G-Flex subsystem and Service Module/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
    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"
;
```

inh-card / alw-card

The command-handling and scroll area output for these commands includes the Service Module card. Refer to the *Commands Manual* for details of these commands.

- **`inh-card`** is not inhibited unless it is a TSM, DCM, Service Module, ACM, or LIM card.
- If the specified card is the only in-service Service Module card, the **`force=yes`** parameter is required.
- If inhibiting this Service Module card would cause less than 80% of the IS-NR LIMs to have VSCCP service (that is, cause the system to enter an unstable loading mode), the **`force=yes`** parameter is required.

ent-card / rtrv-card / dlt-card

The command-handling and scroll area output for these commands includes the Service Module card. For the **`ent-card`** command, the **`APPL=VSCCP`** is supported. Refer to the *Commands Manual* for details of this command.

- If the addition of a LIM card exceeds the system's VSCCP service capabilities, the **`force=yes`** parameter is required.

A sample of the reports produced by these commands is shown in the following example.

```
    ent-card:loc=1201:type=dsm:appl=VSCCP
    Command entered at terminal #3.
;


  Command Completed.
;
```

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

The command-handling and scroll area output for these commands include the VSCCP GPL. Refer to the *Commands Manual* for details of these commands.

Samples of the reports produced by these commands are shown in this example.

```
    act-gpl:appl=VSCCP:ver=26-1-0
    Command entered at terminal #3.
;
    tekelecstp 99-10-24 06:54:39 EST EAGLE 37.5.0
    VSCCP activate on 1114 completed
    VSCCP activate on 1116 completed
;
    rtrv-gpl:appl= VSCCP
    Command entered at terminal #3.
;
    tekelecstp 99-10-04 07:01:08 EST EAGLE 37.5.0
    GPL Auditing  ON
    APPL  CARD  RELEASE      APPROVED         TRIAL        REMOVE TRIAL
    VSCCP 1114  026-001-000  026-001-000      026-001-000  026-001-000
    VSCCP 1116  026-001-000  026-001-000      026-001-000  -----------
    rept-stat-gpl:appl= VSCCP
    Command entered at terminal #3.
;
    tekelecstp 99-10-04 12:55:50 EST EAGLE 37.5.0
    APPL  CARD      RUNNING            APPROVED      TRIAL
    VSCCP 1205      026-001-000 ALM    026-001-000   026-001-000
    VSCCP 1211      026-001-000 ALM+   026-001-000   -----------
    Command Completed.
;
```

ent-bp / dlt-bp / disp-bp / disp-mem / set-mem

The command-handling and scroll area output for these commands includes the Service Module card. (These commands recognize the Service Module boards.)

- The **CARD=<GPL><Subsystem>** is supported for the VSCCP GPL.

A sample of the reports produced by these commands is shown in the following example.

```
disp-bp:card=vsccp-all:
Command Accepted - Processing
    tekelecstp 99-01-20 19:21:10 EST EAGLE 37.5.0
    disp-bp:card=vsccp-all
    Command entered at terminal #1.
;
    tekelecstp 99-12-04 01:38:29 EST EAGLE 37.5.0
    SDS Installed Breakpoint Report from IMT Address H'0005
    BP Address  Memory-Dump Address        Conditions               Rpt Ct  Ind
    ----------  -------------------------  -----------------------  ------  ---
    H'0000a974                             1- ANY                     1      0
        Code Breakpoint                    2- ANY
;
```

chg-sid / dlt-sid

These commands are used to change and report on the self-identification of the EAGLE 5 ISS. The self-identification identifies the EAGLE 5 ISS to other signaling points in the network. This command includes a CPC type for G-Flex.

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

inh-alm / unhb-alm

These commands allow both Port A and Port B to be specified for the **dev=dlk**. This allows alarms to be inhibited on the Service Module ports. Refer to the *Commands Manual* for details of these commands.

chg-ip-card / rtrv-ip-card

These commands allow you to provision and report on the Internet Protocol networking parameters for any given Service Module card. Use the **loc** parameter to specify a Service Module card, and the **dnsa** and **dnsb** parameters to specify a default router. Refer to the *Commands Manual* for details of these commands.

chg-ip-lnk / rtrv-ip-lnk

These commands allow you to provision and report on the Internet Protocol link table. Use the **loc** parameter to specify a Service Module card. Refer to the *Commands Manual* for details of these commands.

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

These commands allow you 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. Use the **host** parameter to specify the logical name for the device associated with the IP address in the **ipaddr** parameter. Refer to the *Commands Manual* for details of these commands.

pass

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

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

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

pass: cmd="Ping"

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

```
    eagle10506 99-08-11 08:43:45 EST EAGLE 37.5.0
    pass:loc=1215:cmd="ping     -h"
    Command entered at terminal #2.
;
    eagle10506 99-08-11 08:43:45 EST EAGLE 37.5.0
    PASS: Command sent to card
;
    eagle10506 99-08-11 08:43:45 EST EAGLE 37.5.0
    Usage: ping <hostname | ipaddr> [-h] [-i size] [-n count]
    Options:
    -h        Displays this message
    -i count  Number of pings to send. Range=1..5. Default=3.
    -n size   Sets size of ICMP echo packet. Range=12..2048. Default=64.
    hostname  Name of machine to ping
    ipaddr    IP Address of machine to ping (d.d.d.d)
;
```

pass:cmd="netstat"

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

The following examples demonstrate typical usage.

```
eagle10506 99-08-11 08:43:00 EST EAGLE 37.5.0
    pass:loc=1215:cmd="netstat  -h"
    Command entered at terminal #2.
;
    eagle10506 99-08-11 08:43:00 EST EAGLE 37.5.0
    PASS: Command sent to card
;
    eagle10506 99-08-11 08:43:00 EST EAGLE 37.5.0
    Usage: netstat [-a] [-i] [-h] [-m data|sys|dd] [-p icmp|ip|tcp|udp] [-r]
    Options:
        -a        display socket information for all protocols
        -h        Displays this message
        -i        display interface information for all interfaces
        -m        display buffer pool information for 1 of the system pools
        -p        display socket information for 1 of the protocols
        -r        display the route table information
;
```

pass:cmd="nslookup"

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

The following examples demonstrate typical usage.

```
    eagle10506 99-08-11 08:45:57 EST EAGLE 37.5.0
    pass:loc=1215:cmd="nslookup"
    Command entered at terminal #2.
;
    eagle10506 99-08-11 08:45:57 EST EAGLE 37.5.0
    PASS: Command sent to card
;
    eagle10506 99-08-11 08:45:57 EST EAGLE 37.5.0
    Usage: nslookup [hostname|ipaddr]
    Options:
        hostname  String name
        ipaddr    d.d.d.d
;
```

pass:cmd="arp"

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

The following examples demonstrates typical usage.

```
    eagle10506 99-08-11 08:43:23 EST EAGLE 37.5.0
    pass:loc=1215:cmd="arp      -h"
    Command entered at terminal #2.
;
    eagle10506 99-08-11 08:43:23 EST EAGLE 37.5.0
    PASS: Command sent to card
;
    eagle10506 99-08-11 08:43:23 EST EAGLE 37.5.0
    Usage: arp [-a] [-d ipaddr] [-f] [-h] [-s ipaddr enetaddr]
    Options:
        -a        Display All entries in ARP table
        -d        Delete specified entry (ipaddr) from ARP table
        -f        Flush all entries from ARP table
        -h        Displays this message
        -s        Set ARP table entry to associate ipaddr with enetaddr
        enetaddr  x:x:x:x:x:x
        ipaddr    d.d.d.d
;
    eagle10506 99-08-11 08:43:25 EST EAGLE 37.5.0
    ARP command complete
;
```

pass:cmd="help"

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

The following examples demonstrates typical usage.

```
    eagle10506 99-08-11 08:42:18 EST EAGLE 37.5.0
    pass:loc=1215:cmd="help"
    Command entered at terminal #2.
;
    eagle10506 99-08-11 08:42:18 EST EAGLE 37.5.0
    PASS: Command sent to card
;
    eagle10506 99-08-11 08:42:18 EST EAGLE 37.5.0
    List of commands supported is:
    nslookup
    netstat
    arp
    ping
    help
    END of LIST
;
```

4

G-Flex Feature Activation

Introduction

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

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

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

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

The G-Flex feature requires Service Module cards running the VSCCP application. TSM cards running the SCCP application need to be upgraded to Service Module cards prior to turning on the G-Flex feature.

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

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

The following features are related to the G-Flex feature (see your Tekelec Sales or Account Representative for additional information):

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

Prerequisites

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

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

The G-Flex feature activation assumes that Service Module cards to be installed and TSM cards to be removed are identified:

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

NOTE 1: TSM cards use one card slot; Service Module cards require two card slots, odd-even.

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

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

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

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

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

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

For in-service systems that already have the G-Port and/or INP feature enabled, only perform the Enable and Turn on the G-Flex Feature procedures to turn on the G-Flex feature. With the G-Port and/or INP feature enabled, the Service Module cards already contain the RTDB database.

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

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

Feature Activation Overview

This section provides an overview of the G-Flex feature activation procedure.

The feature activation consists of these sections:

- Configure system for HLR destinations. See Feature Activation Procedure .
- Install Service Module cards in available slots and configure for VSCCP. See Install and Configure Service Module Cards .
- Replace TSM cards configured for the SCCP application with Service Module cards configured for VSCCP. See Replace TSM Cards with Service Module Cards .
- Enable and turn on the G-Flex feature. See Enable and Turn on the G-Flex Feature .

Feature Activation Procedure

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

1. Before changing a true point code (PC) and adding a capability point code (CPC) for the G-Flex feature, display the current values of the self-identification configuration (shown in Step 2), the destination point codes (DPCs) (shown in Step 3), and the routes and linksets assigned to the DPCs (shown in Step 4).

The G-Flex feature applies to ANSI, ITU-I (international), and ITU-N (national) networks.

2. Display the current self identification of the system (PC and CPC) using the **rtrv-sid** command.

This is an example of the possible output:

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE  37.5.0
PCA           PCI           PCN           CLLI            PCTYPE
001-001-001   1-100-1       11111         rlghncxa03w     OTHER
```

```
CPCA
001-002-001   001-002-002       001-002-003      001-002-004
CPCI
1-101-1       1-101-2           1-101-3          1-101-4
CPCN
11121         11122             11123            11124
```

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

3. Display the current destination point codes in the destination point code table (**dpca/dpci/dpcn**) using the **rtrv-dstn** command.

This is an example of the possible output:

```
rlghncxa03w 01-10-10 11:43:04 GMT EAGLE 37.5.0
DPCA        CLLI        BEI ELEI  ALIASI   ALIASN      DOMAIN
201-001-001 rlghncxa03w no  ---   -------  ----------  SS7
DPCI        CLLI        BEI ELEI  ALIASA       ALIASN  DOMAIN
2-100-1     rlghncxa03w no  ---   222-210-000  12001   SS7
DPCN        CLLI        BEI ELEI  ALIASA       ALIASI  DOMAIN
21111       rlghncxa03w no  ---   222-200-200  2-121-1 SS7
DESTINATION ENTRIES ALLOCATED:       2000
       FULL DPC(s):                     3
       NETWORK DPC(s):                  0
       CLUSTER DPC(s):                  0
       TOTAL DPC(s):                    3
       CAPACITY (% FULL):              1%
X-LIST ENTRIES ALLOCATED:             500
```

4. Display the current route configuration using the **rtrv-rte** command.

This is an example of the possible output:

```
rlghncxa03w 01-10-07 11:43:04 GMT  EAGLE 37.5.0
DPCA          ALIASI     ALIASN      CLLI     LSN         RC APCA
201-001-001   1-111-1    11121       adp1     ls000001    10 240-012-002
                                              ls000002    10 240-012-002
                                              ls000003    20 240-012-002
                                              ls000004    30 240-012-002
                                              ls000005    40 240-012-002
                                              ls000006    50 240-012-002
DPCI        ALIASN      ALIASA      CLLI     LSN         RC APCI
2-100-1     121111      240-111-111 idp1     ls100001    10 1-234-5
                                             ls100002    10 1-234-6
                                             ls100003    20 1-234-7
                                             ls100004    30 1-234-1
                                             ls100005    40 1-234-2
                                             ls100006    50 1-234-3
DPCN        ALIASA      ALIASI      CLLI     LSN         RC APCN
21111       011-222-111 0-001-1     ndp1     ls200001    10 11111
                                             ls200002    10 11112
                                             ls200003    20 11113
                                             ls200004    30 11114
                                             ls200005    40 11115
                                             ls200006    50 11116
```

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

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

Otherwise continue with Step 7 . Enter the **rtrv-stpopts** command and specify the ITU-N point code format option **npcfmti**. The **npcfmti** option identifies how the ITU-N point code is entered into the database and how it is displayed in any outputs. The value is shown in the **NPCFMTI** field.

This is an example of the possible output:

```
rlghncxa03w  01-10-17 16:02:05 GMT  EAGLE 37.5.0
STP OPTIONS
-----------------------
MTPT31CTL            1
MTPLTI             yes
MTPLTCTDPCQ          3
MTPLTST          10000
MTPXLQ             500
MTPXLET           0100
MTPXLOT            90%
MTPDPCQ           1750
TFATFRPR          1000
MTPRSI             yes
MTPRSIT           5000
MTPLPRST           yes
MTPT10ALT        30000
SLSCNV           perls
UIMRD              yes
CRITALMINH          no
DISPACTALMS         no
NPCFMTI        4-4-4-2
DEFCC                49
DEFNDC              177
DSMAUD               on
```

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

7. Display the mated applications in the database using the **rtrv-map** command.

These are examples of possible output:

```
rlghncxa03w 01-10-07  11:43:04  GMT  EAGLE 37.5.0
PCA           SSN  RC  MPCA           MSSN MATERC SRM MRC GRP NAME
001-001-001     5  10                      --- ---
rlghncxa03w 01-10-07  11:43:04  GMT  EAGLE 37.5.0
PCN           SSN  RC  MPCN           MSSN MATERC SRM MRC GRP NAME
11111           5  10  12347             5    20
rlghncxa03w 01-10-07  11:43:04  GMT  EAGLE 37.5.0
PCI           SSN  RC  MPCI           MSSN MATERC SRM MRC GRP NAME
2-100-1         5  20  3-200-1        250      99 --- --- abcdefgh
```

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

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

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

CAUTION

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

9. Configure the system's point code (**pca/pci/pcn**) and capability point code (**cpca/cpci/cpcn**) by network type using the **chg-sid** command.

For example, enter one of these commands:

```
chg-sid:pca=003-001-001:cpca=003-002-001
chg-sid:pci=1-100-2:cpci=1-102-1
chg-sid:pcn=11112:cpcn=11125
```

where:

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

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

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 37.5.0
CHG-SID: MASP A - COMPLTD
```

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

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

CAUTION: The `init-sys` command causes a complete system reload and should be used only in an environment that is not in service. Using this command ensures the updated self identification information is loaded onto all cards, but does interrupt service. When the `init-sys` command executes, the system does not retain the manually initiated state (for example, OOS-MT-DSBLD) for the signaling link, card, or terminal. After the command executes, the system attempts to bring all provisioned links, cards, and terminals on line, including those that were previously out of service. You will need to manually put each device back into its previous state after the system is back on line. Print or electronically capture the output of the `rept-stat-slk`, `rept-stat-card`, and`rept-stat-trm` commands for reference prior to issuing the `init-sys` command. To restore a device to its previous state, issue the appropriate inhibit/deactivate command listed in the *Commands Manual* in the Related Commands section for each of the above `rept-stat` commands.

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

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

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

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 37.5.0
CAUTION: This command causes a complete system reload, and
will result in traffic loss.
Re-enter command within 30 seconds to confirm.
```

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

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

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

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

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

11. Verify the SID changes using the **rtrv-sid** command.

This is an example of the possible output:

```
durhncxa03w 01-10-07 00:57:31 GMT EAGLE 37.5.0
PCA             PCI             PCN           CLLI            PCTYPE
001-001-001     1-100-2         11112         rlghncxa03w     OTHER
003-001-001
CPCA
001-002-001      001-002-002      001-002-003     001-002-004
003-002-001
CPCI
1-101-1          1-101-2          1-101-3         1-101-4
1-102-1
CPCN
11121            11122            11123           11124
11125
```

12. Enter a destination point code for the HLR location in the Destination Point Code table by network type using the **ent-dstn** command.

For example, enter one of these commands:

```
ent-dstn:dpca=301-100-100
ent-dstn:dpci=2-100-2
ent-dstn:dpcn=21112
```

where:

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

The system returns this message:

```
rlghncxa03w 01-10-17 15:35:05 GMT EAGLE 37.5.0
Destination table is (40 of 4000) 1% full
ENT-DSTN: MASP A - COMPLTD
```

13. Verify the changes using the **rtrv-dstn** command and specifying the DPC that was entered in Step 12 .

For example, enter one of these commands:

```
rtrv-dstn:dpca=301-100-100
rtrv-dstn:dpci=2-100-2
rtrv-dstn:dpcn=21112
```

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

```
rtrv-dstn:dpca=301-100-100
RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 37.5.0
DPCA        CLLI        BEI ELEI  ALIASI       ALIASN      DOMAIN
301-100-100 --------    no  ---   2-100-2      21112       SS7
            SPC          NCAI
            -----------  no
Destination table is (20 of 2000) 1% full
```

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

```
rtrv-dstn:dpci=2-100-2
RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 37.5.0
DPCI        CLLI        BEI ELEI  ALIASA       ALIASN      DOMAIN
2-100-2     --------    no  ---   301-100-100  21112       SS7
            SPC          NCAI
```

```
            -----------  no
Destination table is (20 of 2000) 1% full
```

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

```
rtrv-dstn:dpcn=21112
RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 37.5.0
DPCN        CLLI        BEI ELEI  ALIASA       ALIASI  DOMAIN
21112       --------    no  ---   301-100-100  2-100-2 SS7
            SPC          NCAI
            -----------  no
Destination table is (20 of 2000) 1% full
```

14. Enter a linkset with the **ent-ls** command, and assign it to the destination point code by network type.

For example, enter one of these commands:

```
ent-ls:lsn=ls300001:apca=240-020-001:lst=c


ent-ls:lsn=ls400001:apci=2-200-2:lst=c
ent-ls:lsn=ls500001:apcn=21122:lst=c
```

where:

:lsn

The name of the linkset

:apc/apca/apci/apcn

Adjacent point code – the point code identifying the node that is next to the system

:lst

The linkset type of the specified linkset

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

```
RLGHNCXA03W 01-10-17 16:23:21 GMT  EAGLE 37.5.0
Link set table is ( 114 of 1024)  12% full
ENT-LS: MASP A - COMPLTD
```

15. Verify the changes using the **rtrv-ls** command and specifying the linkset name.

For example, enter one of these commands:

```
rtrv-ls:lsn=ls300001
rtrv-ls:lsn=ls400001
rtrv-ls:lsn=ls500001
```

For lsn300001, the system returns output similar to the following:

```
                              L3T  SLT
LSN         APCA (SS7)   SCRN SET  SET BEI LST LNKS GWSA GWSM GWSD SLSCI NIS ls300001
240-020-001
 scr1  1    2   no  a   0
    on   off  off  no    on
CLLI         TFATCABMLQ  MTPRSE  ASL8
RLGHNCXA03W  1           no      no
                      L2T       L1              PCR PCR
LOC  PORT SLC TYPE    SET BPS   MODE TSET ECM   N1  N2
Link set table is (114 of 1024) 12% full
```

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

```
                              L3T  SLT
LSN          APCI (SS7)  SCRN  SET  SET BEI LST LNKS GWSA GWSM GWSD SLSCI NIS ls400001 2-200-2
     scr1  1    2   no  a   0
    on   off  off  no    on
CLLI         TFATCABMLQ  MTPRSE  ASL8
RLGHNCXA03W  1           no      no
                      L2T       L1              PCR PCR
LOC  PORT SLC TYPE    SET BPS   MODE TSET ECM   N1  N2
Link set table is (114 of 1024) 12% full
```

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

```
                              L3T  SLT
LSN          APCN (SS7)  SCRN  SET  SET BEI LST LNKS GWSA GWSM GWSD SLSCI NIS ls500001 21122
       scr3  1    2   no  a   0
    on   off  off  no    on
CLLI         TFATCABMLQ  MTPRSE  ASL8
RLGHNCXA03W  1           no      no
                     L2T       L1              PCR PCR
LOC  PORT SLC TYPE   SET BPS   MODE TSET ECM   N1  N2
Link set table is (114 of 1024) 12% full
```

16. Add the LIM cards to the database using the **ent-card** command.

For this example, enter these commands:

```
ent-card:loc=1105:type=limocu:appl=ccs7itu
ent-card:loc=1106:type=limocu:appl=ccs7itu
```

where:

:loc
Specifies the slot number for the card.
:type
Specifies that the card is a LIMOCU card.
:appl
Specifies that the application is CCS7ITU.

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

```
RLGHNCXA03W 01-10-12 09:12:36 GMT  EAGLE 37.5.0
ENT-CARD: MASP A - COMPLTD
```

17. Verify the changes using the **rtrv-card** command with the card location specified.

For this example, enter these commands:

```
rtrv-card:loc=1105
 rtrv-card:loc=1106
```

These are examples of the possible output:

```
RLGHNCXA03W 01-10-30 09:12:36 GMT EAGLE 37.5.0
CARD   TYPE          APPL      PORT A LSET (SLC)   PORT B LSET (SLC) 1105
   LIMOCU       CCS7ITU   --------    (--)    --------    (--)

RLGHNCXA03W 01-10-30 09:12:36 GMT EAGLE 37.5.0
CARD   TYPE          APPL      PORT A LSET (SLC)   PORT B LSET (SLC) 1106
   LIMOCU       CCS7ITU   --------    (--)    --------    (--)
```

18. Assign signaling links to the LIM cards using the **ent-slk** command.

For example, enter these commands:

```
ent-slk:loc=1105:port=a:lsn=ls400001:slc=0:l2tset=1
ent-slk:loc=1106:port=a:lsn=ls500001:slc=0:l2tset=1
```

where:

:loc
The card location of the LIM that the SS7 signaling link will be assigned to.
:port
The port on the card specified in the **loc** parameter.
:lsn
The name of the linkset that will contain the signaling link.
:slc

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

:l2tset

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

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

```
RLGHNCXA03W 01-10-07 08:29:03 GMT  EAGLE 37.5.0
ENT-SLK: MASP A - COMPLTD
```

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

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

```
rtrv-slk:loc=1105:port=a
rtrv-slk:loc=1106:port=a
```

This is an example of the possible output.

```
RLGHNCXA03W 01-10-19 21:16:37 GMT EAGLE 37.5.0
                                  L2T         L1               PCR  PCR
LOC   PORT LSN       SLC TYPE     SET  BPS    MODE TSET  ECM   N1   N2 1105 A ls400001 0
LIMOCU
   1    56000  ---  ---   BASIC ---  -----
RLGHNCXA03W 01-10-19 21:16:37 GMT EAGLE 37.5.0
                                  L2T         L1               PCR  PCR
LOC   PORT LSN       SLC TYPE     SET  BPS    MODE TSET  ECM   N1   N2 1106 A ls500001 0
LIMOCU
   1    56000  ---  ---   BASIC ---  -----
```

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

For example, enter one of these commands:

```
ent-rte:dpca=301-100-100:lsn=ls300001:rc=10
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 that the traffic is bound for

:lsn

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

:rc

The relative cost (priority) for this route.

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

```
RLGHNCXA03W 01-10-07 08:28:30 GMT  EAGLE 37.5.0
ENT-RTE: MASP A - COMPLTD
```

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

This is an example of the possible output:

```
rlghncxa03w 01-10-07 11:43:04 GMT  EAGLE 37.5.0
DPCA         ALIASI         ALIASN    CLLI       LSN      RC APCA
201-001-001  1-111-1        11121     adp1       ls000001 10 240-012-002
                                                 ls000002 10 240-012-002
                                                 ls000003 20 240-012-002
                                                 ls000004 30 240-012-002
                                                 ls000005 40 240-012-002
                                                 ls000006 50 240-012-002 301-001-001
  1-111-1        11121     adp1        ls300001
```

```
 10 240-020-001 DPCI
         ALIASN      ALIASA       CLLI       LSN      RC APCI
2-100-1      121111      240-111-111  idp1       ls100001 10 1-234-5
                                                ls100002 10 1-234-6
                                                ls100003 20 1-234-7
                                                ls100004 30 1-234-1
                                                ls100005 40 1-234-2
                                                ls100006 50 1-234-3 2-100-2
    121111      240-111-111   idp1        ls400001
 10 1-200-2 DPCN
        ALIASA      ALIASI        CLLI       LSN      RC APCN
21111       011-222-111 0-001-1       ndp1       ls200001 10 11111
                                                ls200002 10 11112
                                                ls200003 20 11113
                                                ls200004 30 11114
                                                ls200005 40 11115
                                                ls200006 50 11116 21112
      011-222-111 0-001-1       ndp1        ls500001
 10 11122
```

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

For this example, enter this command:

```
ent-map:pca=003-001-001:ssn=12:rc=0:mpca=004-004-004:mssn=250 :materc=99 :grp=grp10
ent-map:pci=2-100-1:ssn=12:rc=20:mpci=3-200-1:mssn=50 :materc=99:grp=grp03
ent-map:pcn=11112:ssn=12:rc=10:mpcn=11114:mssn=250:materc=99 :grp=grp07
```

where:

:pc/pca/pci/pcn

The point code of the primary signaling point that is to receive the message.

:ssn

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

:rc

The relative cost

:mpc/mpca/mpci/mpcn

The point code of the backup signaling point that is to receive the message.

:mssn

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

:materc

Mate relative cost.

:grp

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

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

```
RLGHNCXA03W  01-10-07 00:28:31 GMT EAGLE 37.5.0
ENT-MAP:  MASP A - COMPLTD
```

23. Verify the changes using the **rtrv-map** command.

These are examples of possible output.

```
rlghncxa03w 01-10-07  11:43:04  GMT  EAGLE 37.5.0
PCA            SSN  RC MPCA           MSSN MATERC SRM MRC GRP NAME
001-001-001      5  20 004-004-004    250      99 --- --- GRP10
003-001-001     12   0 004-004-004    250      99 --- --- GRP10
rlghncxa03w 01-10-07  11:43:04  GMT  EAGLE 37.5.0
PCN            SSN  RC  MPCN          MSSN MATERC SRM MRC GRP NAME
11111            5  20  12347         250      99 --- --- GRP07
11112           12   0  12347         250      99 --- --- GRP07
rlghncxa03w 01-10-07  11:43:04  GMT  EAGLE 37.5.0
PCI            SSN  RC  MPCI          MSSN MATERC SRM MRC GRP NAME
1-100-1          5   0  3-200-1       250      99 --- --- GRP03
2-100-1         12  20  3-200-1        50      99 --- --- GRP03
```

24. Allow the LIM cards that were entered in Step 16 by using the **alw-card** command.

For example, enter these commands:

```
alw-card:loc=1105
alw-card:loc=1106
```

This message appears:

```
RLGHNCXA03W  01-10-30 21:20:37 GMT EAGLE 37.5.0
Card has been allowed.
```

25. Verify the in-service normal (IS-NR) status of the cards using the **rept-stat-card** command.

This is an example of the possible output:

```
RLGHNCXA03W 01-10-27 16:43:42 GMT  EAGLE 37.5.0
CARD  VERSION           TYPE    APPL      PST           SST       AST 1101 100-000-00003-000
TSM SCCP IS-NR
 Active    --- 1102 100-000-00003-000 TSM SCCP IS-NR
  Active    ---
1103  100-000-00003-000  ACMENET STPLAN    IS-NR         Active    ---
1104  100-000-00003-000  ACMENET GLS       IS-NR         Active    --- 1105 100-000-00003-000
LIMOCU CCS7ITU IS-NR
 Active    --- 1106 100-000-00003-000 LIMOCU CCS7ITU IS-NR
 Active    ---
1113  100-000-00002-000  MCAP    OAM       IS-NR         Active    ---
1114  100-000-00002-000  TDM               IS-NR         Active    ---
1115  100-000-00002-000  MCAP    OAM       IS-NR         Active    ---
1116  100-000-00002-000  TDM               IS-NR         Active    ---
1117  100-000-00002-000  MDAL              IS-NR         Active    ---
1201  100-000-00003-000  LIMDS0  SS7ANSI   IS-NR         Active    ---
1202  100-000-00002-000  LIMV35  SS7GX25   IS-NR         Active    ---
1203  100-000-00003-000  LIMV35  SS7ANSI   IS-NR         Active    ---
1204  100-000-00003-000  LIMATM  ATMANSI   IS-NR         Active    ---
1205  100-000-00001-000  DCM     IPLIM     IS-NR         Active    ---
1207  100-000-00001-000  DCM     SS7IPGW   IS-NR         Active    ---
1303  100-000-00001-000  DCM     IPLIM     IS-NR         Active    ---
1305  100-000-00001-000  DCM     SS7IPGW   IS-NR         Active    ---
```

26. Activate the signaling links entered in Step 18 using the **act-slk** command.

For example, enter these commands

```
act-slk:loc=1105:port=a
act-slk:loc=1106:port=a
```

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

```
RLGHNCXA03W 01-10-07 11:11:28 GMT EAGLE 37.5.0
Activate Link message sent to card
```

27. Verify the in-service normal (IS-NR) status of the signaling link using the **rept-stat-slk** command.

For example, enter these commands:

```
rept-stat-slk:loc=1105
rept-stat-slk:loc=1106
```

This message should appear.

```
RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 37.5.0
SLK      LSN        CLLI       PST     SST     AST 1105,A ls400001
  ---------- IS-NR   Avail   ----
Command Completed.
RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 37.5.0
SLK      LSN        CLLI       PST     SST     AST 1106,A ls500001
```

```
  ---------- IS-NR   Avail   ----
Command Completed.
```

28. Display the new LIM cards in the database using the **rtrv-card** command.

This is an example of the possible output:

```
RLGHNCXA03W 01-10-15 16:34:56 GMT EAGLE 37.5.0
CARD   TYPE          APPL      PORT A LSET (SLC)   PORT B LSET (SLC)
1101   TSM           SCCP      --------    (--)    --------    (--)
1102   TSM           SCCP      --------    (--)    --------    (--)
1103   ACMENET       STPLAN    --------    (--)    --------    (--)
1104   ACMENET       GLS       --------    (--)    --------    (--) 1105 LIMOCU CCS7ITU
ls400001
     ( 00
)    --------    (--) 1106 LIMOCU CCS7ITU ls500001
    ( 00
)    --------    (--)
1113   MCAP          OAM
1114   TDM
1115   MCAP          OAM
1116   TDM
1117   MDAL
1201   LIMDS0        SS7ANSI   lsn1        (00)    lsn2        (01)
1202   LIMV35        SS7GX25   lsngwy      (00)    --------    (--)
1203   LIMV35        SS7ANSI   lsn2        (00)    lsn1        (01)
1204   LIMATM        ATMANSI   atmgwy      (00)    --------    (--)
1205   DCM           IPLIM     ipgwy1      (00)    ipgwy3      (01)
1207   DCM           SS7IPGW   ipgwy2      (00)    --------    (--)
1303   DCM           IPLIM     ipgwy1      (00)    ipgwy3      (01)
1305   DCM           SS7IPGW   ipgwy4      (00)    --------    (--)
```

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

Install and Configure Service Module Cards

1. Install and configure Service Module cards as needed in available odd-even slots using Step 2 through Step 16 .

For our example, install a Service Module card in slots 1107 and 1108.

2. Install the Service Module card in slots 1107 and 1108.

The Service Module card requires two slots and must be installed in an odd slot with an adjacent empty even slot on its right side.

a. Open the ejector levers on the Service Module card.

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

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

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

c. Push in the top and bottom inject/eject clamps.

This locks the card in place and ensures a strong connection with the pins on the target shelf backplane.

d. Verify that both IMT bus LEDs are green.

e. Install the cabling required to connect the Service Module card to the MPS.

Refer to the *Installation Manual* for details.

3. Add the Service Module card to the database and configure it with the VSCCPapplication using the **ent-card** command.

For this example, enter this command.

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

where:

:loc

Specifies the slot number for the card. The slot number must be an odd number.

:type

Specifies that the card is a Service Module card.

:appl

Specifies that the application is VSCCP.

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

```
RLGHNCXA03W 01-10-12 09:12:36 GMT  EAGLE 37.5.0
ENT-CARD: MASP A - COMPLTD
```

4. Verify the Service Module card using the **rtrv-card** command with the card location specified.

For this example, enter this command:

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

This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 09:12:36 GMT EAGLE 37.5.0
CARD   TYPE          APPL      PORT A LSET (SLC)   PORT B LSET (SLC) 1107 DSM VSCCP
     --------    (--)    --------    (--)
```

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

This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:14:37 GMT EAGLE 37.5.0
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 port and speed associated with the Service Module card in the database using the chg-ip-lnk command.

For this example, enter these commands:

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

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

where:

:loc

The card location of the Service Module card within the EAGLE 5 ISS.

:port

The port ID. The port parameter of the chg-ip-lnk command specifies the physical interface of the Service Module card.

:ipaddr

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

:duplex

This is the mode of operation of the interface.

:speed

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

:mactype

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

:mcast

This is the Multicast Control of the interface.

:submask

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

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

```
RLGHNCXA03W 01-10-30 21:18:37 GMT EAGLE 37.5.0
CHG-IP-LNK: MASP A - COMPLTD
```

7. Verify the new link parameters associated with the Service Module card in the database by entering the **rtrv-ip-lnk** command.

This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:14:37 GMT EAGLE 37.5.0
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.

This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:17:37 GMT EAGLE 37.5.0
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.

For example, enter these commands:

```
ent-ip-host:host=vsccp_1107_a:ipaddr=192.168.122.1
ent-ip-host:host=vsccp_1107_b:ipaddr=192.168.123.1
```

where:

:host

Specifies the host name. Each VSCCP link must be specified separately.

:ipaddr

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

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

```
RLGHNCXA03W 01-10-30 21:18:37 GMT EAGLE 37.5.0
ENT-IP-HOST: MASP A - COMPLTD
```

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

The following is an example of the possible output.

```
RLGHNCXA03W 01-10-30 21:19:37 GMT EAGLE 37.5.0
```

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

NOTE: Most G-Flex customer private networks do not require setting up a default router for the Service Module card. However, if your network configuration does require 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.

11. Change the TCP/IP information for the Service Module card in the database using the **chg-ip-card** command.

For this example, enter this command:

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

where:

:loc

The location of the Service Module card within the EAGLE 5 ISS.

:domain

The domain name of domain server.

:defrouter

Default router address. The IP address for default router. This is a TCP/IP address expressed in standard “dot notation”. IP addresses consist of the system’s network number and the machine’s unique host number.

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

```
RLGHNCXA03W 01-10-30 21:20:37 GMT EAGLE 37.5.0
CHG-IP-CARD: MASP A - COMPLTD
```

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

This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:21:37 GMT EAGLE 37.5.0
   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 in TSM emulation mode by using the **alw-card** command.

For example, enter this command:

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

This message appears:

```
RLGHNCXA03W  01-10-30 21:20:37 GMT EAGLE 37.5.0
Card has been allowed.
```

14. Verify the in-service normal (IS-NR) status of the Service Module card using the **rept-stat-card** command.

This is an example of the possible output.

```
tklc1090203 08-05-10 13:59:10 EST  EAGLE5 39.0.0
CARD   VERSION      TYPE      GPL        PST          SST        AST
1101   126-026-000  LIMT1     SS7HC      IS-NR        Active     -----
```

```
1103   126-026-000  LIMT1     SS7ML      IS-NR        Active     -----
1104   126-026-000  TSM       GLS        IS-NR        Active     -----
1105   126-026-000  LIME1     SS7HC      IS-NR        Active     -----
1106   126-026-000  LIME1     SS7HC      IS-NR        Active     -----
1107   126-026-000  LIME1     SS7HC      IS-NR        Active     -----
1109   126-020-000  HIPR      HIPR       IS-NR        Active     -----
1110   126-020-000  HIPR      HIPR       IS-NR        Active     -----
1111   126-026-000  LIME1     SS7HC      IS-NR        Active     -----
1112   -----------  LIMT1     CCS7ITU    OOS-MT       Isolated   -----
1113   126-026-000  GPSM      EOAM       IS-NR        Active     -----
1114   -----------  TDM                  IS-NR        Active     -----
1115   126-026-000  GPSM      EOAM       IS-NR        Standby    -----
1116   -----------  TDM                  IS-NR        Active     -----
1117   -----------  MDAL                 IS-NR        Active     -----

Command Completed.
```

```
RLGHNCXA03W 01-10-27 16:43:42 GMT  EAGLE 37.5.0
CARD  VERSION              TYPE   APPL      PST            SST      AST
1101    100-000-00003-000  TSM     SCCP      IS-NR         Active    ---
1102    100-000-00003-000  TSM     SCCP      IS-NR         Active    ---
1103    100-000-00002-000  ACMENET STPLAN        IS-NR         Active    ---
1104    100-000-00003-000  TSM     GLS       IS-NR         Active    ---
1105    100-000-00003-000  LIMOCU  CCS7ITU       IS-NR         Active    ---
1106    100-000-00003-000  LIMOCU  CCS7ITU       IS-NR         Active    ---
1107    100-000-00003-000  DSM     VSCCP         IS-NR         Active    ---
1113    100-000-00002-000  MCAP    OAM       IS-NR         Active    ---
1114    100-000-00002-000  TDM                IS-NR         Active    ---
1115    100-000-00002-000  MCAP    OAM       IS-NR         Active    ---
1116    100-000-00002-000  TDM                IS-NR         Active    ---
1117    100-000-00002-000  MDAL               IS-NR         Active    ---
1201    100-000-00003-000  LIMDS0  SS7ANSI       IS-NR         Active    ---
1202    100-000-00002-000  LIMV35  SS7GX25       IS-NR         Active    ---
1203    100-000-00003-000  LIMV35  SS7ANSI       IS-NR         Active    ---
1204    100-000-00003-000  LIMATM  ATMANSI       IS-NR         Active    ---
1205    100-000-00001-000  DCM     IPLIM     IS-NR         Active    ---
1207    100-000-00001-000  DCM     SS7IPGW       IS-NR         Active    ---
1303    100-000-00001-000  DCM     IPLIM     IS-NR         Active    ---
1305    100-000-00001-000  DCM     SS7IPGW       IS-NR         Active    ---
```

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 (either a hostname or IP address). For example, enter the following command:

```
pass:loc=1107:cmd=”ping 192.168.122.100”.
pass:loc=1107:cmd=”ping 192.168.122.200”.
pass:loc=1107:cmd=”ping 192.168.123.100”.
pass:loc=1107:cmd=”ping 192.168.123.200”.
```

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

```
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 37.5.0
pass: loc=1107: cmd="ping 192.168.122.100"
Command entered at terminal #1.
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 37.5.0
PASS: Command sent to card
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 37.5.0
PING command in progress
;
rlghncxa03w 00-06-27 08:30:46 GMT EAGLE 37.5.0
PING 192.168.122.100: 56 data bytes
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=0.time=5. ms
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=1.time=0. ms
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=2.time=0. ms
----192.168.100.3 PING Statistics----
3 packets transmitted, 3 packets received, 0% packet loss
```

```
round-trip (ms) min/avg/max = 0/1/5
PING command complete
```

If the **pass** commands with the **ping** parameter is not successful, verify the the correct connection of the hardware cabling and try again. If the command fails again, contact the Customer Care Center .

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

Go to the next procedure to start replacing TSM cards with Service Module cards.

Replace TSM Cards with Service Module Cards

1. Replace TSM cards with Service Module cards if applicable and add Service Module cards to the database using Step 2 through Step 25 .

In this procedure, you are removing two existing adjacent TSM cards and replace them with a double-slot Service Module card in slots 1101 and 1102.

> **NOTE: When adding Service Module cards in an in-service environment, you must take care not to interrupt traffic. Before replacing TSM cards running the SCCP application with Service Module cards, first install a Service Module card in an available double-slot.**

2. Display the TSM cards running the SCCP application in the database using the **rtrv-card command.**

This is an example of the possible output:

```
RLGHNCXA03W 01-10-15 16:34:56 GMT EAGLE 37.5.0
CARD   TYPE             APPL             PORT A LSET  (SLC)  PORT B LSET  (SLC) 1101 TSM SCCP
      --------         (--)    --------             (--) 1102 TSM SCCP
      --------         (--)    --------               (--)
1103   ACMENET       STPLAN          --------        (--)    --------               (--)
1104   ACMENET       GLS                --------         (--)    --------               (--)
1105   LIMOCU          CCS7ITU        ls300001        (00)    --------               (--)
1106   LIMOCU          CCS7ITU        ls400001        (00)    --------               (--)
1107   DSM                VSCCP           ls300001           (00)       --------
(--)
1113   MCAP              OAM
1114   TDM
1115   MCAP              OAM
1116   TDM
1117   MDAL
1201   LIMDS0          SS7ANSI         lsn1               (00)      lsn2               (01)
1202   LIMV35          SS7GX25         lsngwy                (00)     --------
(--)
1203   LIMV35         SS7ANSI         lsn2                    (00)     lsn1
(01)
1204   LIMATM        ATMANSI       atmgwy               (00)     --------                (--)
1205   DCM              IPLIM             ipgwy1                (00)     ipgwy3
(01)
1207   DCM              SS7IPGW        ipgwy2               (00)     --------
(--)
1303   DCM             IPLIM              ipgwy1                (00)    ipgwy3
(01)
1305   DCM             SS7IPGW         ipgwy4                (00)    --------
(--)
```

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

3. Display the TSM cards running the SCCP application that are in service with the **rept-stat-card:stat=nr** command.

For this example, enter the following command:

```
rept-stat-card:stat=nr
```

This is an example of the possible output:

```
RLGHNCXA03W 01-10-27 16:43:42 GMT  EAGLE 37.5.0
CARD  VERSION           TYPE        APPL        PST        SST      AST 1101 100-000-00003-000
TSM SCCP
    IS-NR      Active    --- 1102 100-000-00003-000 TSM SCCP
     IS-NR      Active    ---
1103  100-000-00003-000  ACMENET STPLAN           IS-NR      Active    ---
1104  100-000-00003-000  ACMENET GLS          IS-NR      Active    ---
1105  100-000-00003-000  LIMOCU  CCS7ITU          IS-NR      Active    ---
1106  100-000-00003-000  LIMOCU  CCS7ITU          IS-NR      Active    ---
1107  100-000-00003-000  DSM     VSCCP            IS-NR      Active    ---
1113  100-000-00002-000  MCAP    OAM          IS-NR      Active    ---
1114  100-000-00002-000  TDM                  IS-NR      Active    ---
1115  100-000-00002-000  MCAP    OAM          IS-NR      Active    ---
1116  100-000-00002-000  TDM                  IS-NR      Active    ---
1117  100-000-00002-000  MDAL                     IS-NR      Active    ---
1201  100-000-00003-000  LIMDS0  SS7ANSI          IS-NR      Active    ---
1202  100-000-00002-000  LIMV35  SS7GX25          IS-NR      Active    ---
1203  100-000-00003-000  LIMV35  SS7ANSI          IS-NR      Active    ---
1204  100-000-00003-000  LIMATM  ATMANSI          IS-NR      Active    ---
1205  100-000-00001-000  DCM     IPLIM        IS-NR      Active    ---
1207  100-000-00001-000  DCM     SS7IPGW          IS-NR      Active    ---
1303  100-000-00001-000  DCM     IPLIM        IS-NR      Active    ---
1305  100-000-00001-000  DCM     SS7IPGW          IS-NR      Active    ---
```

4. Inhibit the TSM cards using the **inh-card** command and specifying the card locations.

inh-card:loc=1101

inh-card:loc=1102

When each command has successfully completed, this message appears:

```
RLGHNCXA03W 01-10-12 09:12:36 GMT  EAGLE 37.5.0
Card has been inhibited.
```

5. Verify that the TSM cards running the SCCP application are in the Out-of-Service Maintenance-Disabled (OOS-MT-DSBLD) state with the **rept-stat-card** command.

This is an example of the possible output:

```
RLGHNCXA03W 01-10-27 16:43:42 GMT  EAGLE 37.5.0
CARD  VERSION           TYPE           APPL      PST          SST       AST
1101  100-000-00003-000  TSM            SCCP      OOS-MT-DSBLD    Isolated  ---
1102  100-000-00003-000  TSM            SCCP      OOS-MT-DSBLD    Isolated  ---
1103  100-000-00002-000  ACMENET        STPLAN  IS-NR         Active    ---
1104  100-000-00002-000  ACMENET        STPLAN  IS-NR         Active    ---
1105  100-000-00003-000  LIMOCU         CCS7ITU IS-NR         Active    ---
1106  100-000-00003-000  LIMOCU         CCS7ITU IS-NR         Active    ---
1107  100-000-00003-000  DSM            VSCCP    IS-NR         Active    ---
1113  100-000-00002-000  MCAP           OAM       IS-NR         Active    ---
1114  100-000-00002-000  TDM               IS-NR         Active    ---
1115  100-000-00002-000  MCAP           OAM        IS-NR           Active    ---
1116  100-000-00002-000  TDM                  IS-NR         Active    ---
1117  100-000-00002-000  MDAL                     IS-NR         Active    ---
1201  100-000-00003-000  LIMDS0         SS7ANSI   IS-NR         Active    ---
1202  100-000-00002-000  LIMV35         SS7GX25   IS-NR         Active    ---
1203  100-000-00003-000  LIMV35         SS7ANSI   IS-NR         Active    ---
1204  100-000-00003-000  LIMATM         ATMANSI    IS-NR        Active    ---
1205  100-000-00001-000  DCM            IPLIM     IS-NR         Active    ---
1207  100-000-00001-000  DCM            SS7IPGW   IS-NR         Active    ---
1303  100-000-00001-000  DCM            IPLIM     IS-NR         Active    ---
1305  100-000-00001-000  DCM            SS7IPGW   IS-NR         Active    ---
```

6. Remove the TSM cards from the database using the **dlt-card** command.

The **dlt-card** command has only one parameter, **loc**, which is the location of the card.

For this example, enter these commands:

```
dlt-card:loc=1101
dlt-card:loc=1102
```

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

```
RLGHNCXA03W 01-10-12 09:12:36 GMT  EAGLE 37.5.0
DLT-CARD: MASP A - COMPLTD
```

7. Verify that the TSM cards are removed from the database using the **rtrv-card** command and specifying the cards that were removed in Step 6 .

For this example, enter these commands:

```
rtrv-card:loc=1101
rtrv-card:loc=1102
```

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

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

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

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

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

Gently pull the card towards you until the card clears the shelf.

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

9. Repeat Step 8 to remove the second TSM card.

10. Install the Service Module card in slots 1101 and 1102.

a. Open the ejector levers on the Service Module card.

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

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

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

c. Push in the top and bottom inject/eject clamps.

This locks the card in place and ensures a strong connection with the pins on the target shelf backplane.

d. Verify that both IMT bus LEDs are green.

e. Install the cabling required to connect the Service Module card to the MPS.

Refer to the *Installation Manual* for details.

11. Add the Service Module card to the database and assign the VSCCP application using the **ent-card** command.

For this example, enter this command:

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

where:

:loc
Specifies the slot number for the card. The slot number must be an odd number.
:type
Specifies that the card is a Service Module card.
:appl
Specifies that the application is VSCCP.

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

```
RLGHNCXA03W 01-10-12 09:12:36 GMT  EAGLE 37.5.0
ENT-CARD: MASP A - COMPLTD
```

12. Display the new Service Module card using the **rtrv-card** command with the card location specified.

For this example, enter this command:

```
rtrv-card:loc=1101
```

This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 09:12:36 GMT EAGLE 37.5.0
CARD   TYPE          APPL      PORT A LSET (SLC)   PORT B LSET (SLC) 1101 DSM VSCCP
     --------    (--)    --------    (--)
```

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

This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:14:37 GMT EAGLE 37.5.0
LOC PORT IPADDR          SUBMASK    DUPLEX SPEED MACTYPE AUTO MCAST
1101 A   ------------    ---------- HALF   10    DIX     NO   NO
1101 B   ------------    ---------- HALF   10    DIX     NO   NO
1107 A   ------------    ---------- HALF   10    DIX     NO   NO
1107 B   ------------    ---------- HALF   10    DIX     NO   NO
```

14. Change the link parameters associated with the Service Module card in the database using the chg-ip-lnk command.

For this example, enter these commands:

```
chg-ip-
lnk:loc=1101:port=a:duplex=half:ipaddrr=192.168.122.2 :mactype=dix:spee
d=100:mcast=yes:submask=255.255.255.0
```

```
chg-ip-
lnk:loc=1101:port=b:duplex=half:ipaddrr=192.168.123.2 :mactype=dix:spee
d=10:mcast=yes:submask=255.255.255.0
```

where:

:loc
The card location of the card within the EAGLE 5 ISS.
:port
The port ID. The port parameter of the chg-ip-lnk command specifies the physical interface of the Service Module card.
:ipaddr
IP address assigned to the port. This is a TCP/IP address expressed in standard "dot notation." IP addresses consist of the system's network number and the machine's unique host number.
:duplex
This is the mode of operation of the interface.
:speed
This is interface bandwidth in megabits per second. The speed is either 100 Mbps for main Service Module network or 10 Mbps for backup Service Module network.

:mactype

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

:mcast

This is the Multicast Control of the interface.

:submask

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

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

```
RLGHNCXA03W 01-10-30 21:18:37 GMT EAGLE 37.5.0
CHG-IP-LNK: MASP A - COMPLTD
```

15. Verify the new link parameters associated with the Service Module card in the database by entering the **rtrv-ip-lnk** command.

The following is an example of the possible output.

```
RLGHNCXA03W 01-10-30 21:14:37 GMT EAGLE 37.5.0
LOC  PORT IPADDR        SUBMASK       DUPLEX SPEED MACTYPE AUTO MCAST 1101 A    192.168.122.2
255.255.255.0 HALF   100   DIX     NO   YES
1101 B    192.168.123.2 255.255.255.0 HALF   10    DIX     NO   YES
1107 A    192.168.122.1 255.255.255.0 HALF   100   DIX     NO   YES
1107 B    192.168.123.1 255.255.255.0 HALF   10    DIX     NO   YES
```

16. Display the current IP host information in the database by entering the **rtrv-ip-host** command.

The following is an example of the possible output.

```
RLGHNCXA03W 01-10-30 21:17:37 GMT EAGLE 37.5.0
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
```

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

For example, enter these commands:

```
ent-ip-host:host=vsccp_1101_a:ipaddr=192.168.122.2
ent-ip-host:host=vsccp_1101_b:ipaddr=192.168.123.2
```

where:

:host

Specifies the host name. Each VSCCP link must be specified separately.

:ipaddr

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

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

```
RLGHNCXA03W 01-10-30 21:18:37 GMT EAGLE 37.5.0
ENT-IP-HOST: MASP A - COMPLTD
```

18. Verify the new IP host information in the database by entering the **rtrv-ip-host** command.

This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:19:37 GMT EAGLE 37.5.0
IPADDR          HOST
192.1.1.32        KC_HLR2
192.1.1.50        DN_MSC1
192.1.1.52        DN_MSC2
192.168.122.1   VSCCP_1107_A
```

```
192.168.123.1   VSCCP_1107_B
192.168.122.2   VSCCP_1101_A
192.168.123.2   VSCCP_1101_B
```

NOTE: Most G-Flex customer private networks do not require setting up a default router for the Service Module card. However, if your network configuration does require 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.

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

For this example, enter this command:

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

where:

:loc

The card location of the card within the EAGLE 5 ISS.

:domain

The domain name of domain server.

:defrouter

Default router address. The IP address for default router. This is a TCP/IP address expressed in standard “dot notation”. IP addresses consist of the system’s network number and the machine’s unique host number.

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

```
RLGHNCXA03W 01-10-30 21:20:37 GMT EAGLE 37.5.0
CHG-IP-CARD: MASP A - COMPLTD
```

20. Verify the local domain and IP router address associated with the Service Module card in the database by entering the **rtrv-ip-card** command.

This is an example of the possible output:

```
RLGHNCXA03W 01-10-30 21:21:37 GMT EAGLE 37.5.0
LOC  1101
     SRCHORDR  LOCAL
     DNSA      -----------
     DNSB      -----------
     DEFROUTER  192.168.122.250
          DOMAIN     NC.TEKELEC.COM
```

21. Boot the Service Module card that was inhibited in Step 4 in TSM emulation mode by using the **alw-card** command.

This message appears:

```
RLGHNCXA03W  01-10-30 21:20:37 GMT EAGLE 37.5.0
Card has been allowed.
```

22. Verify the in-service normal (IS-NR) status of the Service Module card using the **rept-stat-card** command.

This is an example of the possible output:

```
RLGHNCXA03W 01-10-27 16:43:42 GMT  EAGLE 37.5.0
CARD  VERSION            TYPE    APPL           PST          SST       AST
1101  100-000-00003-000  DSM     VSCCP           IS-NR       Active    ---
1103  100-000-00002-000  ACMENET STPLAN          IS-NR       Active    ---
1104  100-000-00003-000  TSM     GLS             IS-NR       Active    ---
1105  100-000-00003-000  LIMOCU  CCS7ITU         IS-NR       Active    ---
1106  100-000-00003-000  LIMOCU  CCS7ITU         IS-NR       Active    ---
1107  100-000-00003-000  DSM     VSCCP           IS-NR       Active    ---
```

```
1113  100-000-00002-000  MCAP    OAM            IS-NR       Active    ---
1114  100-000-00002-000  TDM                  IS-NR       Active    ---
1115  100-000-00002-000  MCAP    OAM          IS-NR       Active    ---
1116  100-000-00002-000  TDM                  IS-NR       Active    ---
1117  100-000-00002-000  MDAL                     IS-NR       Active    ---
1201  100-000-00003-000  LIMDS0  SS7ANSI        IS-NR       Active    ---
1202  100-000-00002-000  LIMV35  SS7GX25        IS-NR       Active    ---
1203  100-000-00003-000  LIMV35  SS7ANSI        IS-NR       Active    ---
1204  100-000-00003-000  LIMATM  ATMANSI        IS-NR       Active    ---
1205  100-000-00001-000  DCM     IPLIM        IS-NR       Active    ---
1207  100-000-00001-000  DCM     SS7IPGW        IS-NR       Active    ---
1303  100-000-00001-000  DCM     IPLIM          IS-NR       Active    ---
1305  100-000-00001-000  DCM     SS7IPGW        IS-NR       Active    ---
```

23. Test the presence of the EPAP hosts on the network using the **pass** command with the **ping** parameter. This command is invoked with a destination (either a hostname or IP address).

For example, enter the following command:

```
pass:loc=1101:cmd=”ping 192.168.122.100”.
pass:loc=1101:cmd=”ping 192.168.122.200”.
pass:loc=1101:cmd=”ping 192.168.123.100”.
pass:loc=1101:cmd=”ping 192.168.123.200”.
```

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

```
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 37.5.0
pass: loc=1101: cmd="ping 192.168.122.100"
Command entered at terminal #1.
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 37.5.0
PASS: Command sent to card
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 37.5.0
PING command in progress
;
rlghncxa03w 00-06-27 08:30:46 GMT EAGLE 37.5.0
PING 192.168.122.100: 56 data bytes
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=0.time=5. ms
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=1.time=0. ms
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=2.time=0. ms
----192.168.100.3 PING Statistics----
3 packets transmitted, 3 packets received, 0% packet loss
round-trip (ms) min/avg/max = 0/1/5
PING command complete
```

If the **pass** command with the **ping** parameter is not successful, verify the the correct connection of the hardware cabling and try again. If the command fails again, contact the Customer Care Center .

24. Repeat Step 2 through Step 23 to replace all adjacent TSM cards identified in the prerequisites and to be replaced with Service Module cards.

25. Repeat Step 2 through Step 8 to inhibit any remaining TSM cards running the SCCP application and remove them from database and shelf.

NOTE 1: The G-Flex feature cannot be turned on until TSM cards running the SCCP application are removed from the system.

CAUTION

CAUTION: At this point in the procedure, contact the Customer Care Center for assistance in completing this G-Flex activation procedure). Do not proceed without consulting with the Customer Care Center .

Enable and Turn on the G-Flex Feature

1. Enable the G-Flex feature using the following command:

```
enable-ctrl-feat:partnum=893021901:fak=<fak>
```

2. Turn on the G-Flex feature using the following command:

```
chg-ctrl-feat:partnum=893021901:status=on
```

The system returns the following output:

```
rlghncxa03w 01-10-11 11:34:04 GMT EAGLE 37.5.0
chg-ctrl-feat: MASP A - COMPLD
```

3. Enable the G-Flex MAP Layer Routing feature using the following command:

```
enable-ctrl-feat:partnum=893021701:fak=<fak>
```

4. Turn the G-Flex MAP Layer Routing Feature ON by entering the following command:

```
chg-ctrl-feat:partnum=893021701:status=on
```

5. Turn the G-Flex MAP Layer Routing option ON by entering the following command:

```
chg-gsmopts:gflexmaplayerrtg=on
```

6. Enter the default country code (CC) and default network destination code (NDC) to convert the nature of address indicator (NAI) of MSISDNs to the international format (**`nai=intl`**) with the **`chg-stpopts`** command.

Enter the command by network type. For an ANSI network, for example, enter the following command:

```
chg-stpopts:defcc=1:defndc=972
```

For an ITU-I or ITU-N network, for example, enter the following command:

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

where:

:defcc
The default country code.

:defndc
The default network destination code.

:dsmaud
The Service Module card audit running state (*on* or *off*).

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

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

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 37.5.0
CHG-STPOPTS: MASP A - COMPLTD
```

7. Verify the new country code and network destination code using the **`rtrv-stpopts`** command.

This is an example of the possible output in an ANSI network:

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 37.5.0
STP OPTIONS
----------------------
DEFCC                1
DEFNDC             972
```

This is an example of the possible output in an ITU-I or ITU-N network:

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 37.5.0
STP OPTIONS
----------------------
NPCFMTI          2-9-2-1
DEFCC                1
```

```
DEFNDC              38
DSMAUD              on
```

8. Change the default mobile country code (MCC) and default mobile network destination code (MNDC) to convert the nature of address indicator (NAI) of IMSIs to the international format (**nai=intl**).

Enter the **chg-gsmopts** command by network type. For an ANSI network, for example, enter the following command:

```
chg-gsmopts:ccnc=1972:defmcc=919:defmnc=6666:mccmnc=9196666
```

For an ITU/N network, for example, enter the following command:

```
chg-gsmopts:defmcc=214:defmnc=34:ccnc=334:mccmnc=22435
```

where:

:ccnc
Defines the E214 country code and network code.
:defmcc
Defines the default GSM mobile country code.
:defmnc
Defines the default GSM mobile network code.
:mccmnc
Defines the E212 mobile country code and mobile network code.

The system returns the following message:

```
rlghncxa03w 00-08-20 09:04:14 GMT EAGLE 37.5.0
CHG-GSMOPTS: MASP A - COMPLTD
```

9. Verify the changes using the **rtrv-gsmopts** command.

This command displays all GSM (Global System for Mobile Telecommunication) system options from the database.

This is an example of the possible output in an ANSI network:

```
rlghncxa03w 00-08-20 09:04:14 GMT EAGLE 37.5.0
GSMOPT OPTIONS
----------------------
DEFMCC=919
DEFMNC=6666
CCNC=1977
MCCMNC=9196666
```

This is an example of the possible output in an ITU-I or ITU-N network:

```
rlghncxa03w 00-08-20 09:04:14 GMT EAGLE 37.5.0
GSMOPT OPTIONS
----------------------
DEFMCC=214
DEFMNC=34
CCNC=334
MCCMNC=22435
```

10. Use the **ent-srvsel** command to enter the G-Flex service selectors by network type.

This command assigns applicable service selectors required to specify the service entry for Service Module services.

For an ANSI network, for example, the following commands show how to set up service selector combinations for G-Flex services:

```
ent-srvsel:gtia=2:tt=10:snp=e164:snai=intl:serv:gflex
ent-srvsel:gtia=2:tt=11:snp=e164:snai=natl:serv:gflex
ent-srvsel:gtia=2:tt=12:snp=e164:snai=sub:serv:gflex
```

For an ITU-I network, for example, enter the following command:

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

where:

:gti/gtia/gtii/gtin
Specifies the global title translation indicator (2 = ANSI, ITU; 4 = ITU). **`:tt`** - specifies the translation type.
:snp
Defines the service numbering plan (e164, e212, or e214).
:snai
Specifies the international Service Nature of Address Indicator.
:serv
Specifies the service feature.
:nai
Specifies the nature of address indicator.
:np
Specifies the numbering plan.

The system returns the following message:

```
rlghncxa03w  01-10-07 00:28:31 GMT EAGLE 37.5.0
Service Selector table is (114 of 1024) 11% full
ENT-SRVSEL:  MASP A - COMPLTD
```

11. Verify the changes using the **`rtrv-srvsel`** command.

This command retrieves a list of administered service selector combinations. Avoid lengthy output by filtering the list using various parameter combinations. (The selector table can have over 1,000 entries.)

For example, enter this command:

```
rtrv-srvsel:gtia=2
rtrv-srvsel:gtii=2
rtrv-srvsel:gtii=4
```

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

```
rlghncxa03w  01-10-28  00:29:31 GMT EAGLE 37.5.0
GTIA  TT  NP     NAI   NPV  NAIV  SNP   SNAI   SERV
2     10  ---    ---   ---  ---   e164  intl   gflex
2     11  ---    ---   ---  ---   e164  natl   gflex
2     12  ---    ---   ---  ---   e164  sub    gflex

rlghncxa03w  01-10-28  00:29:31 GMT EAGLE 37.5.0
GTII  TT  NP     NAI   NPV  NAIV  SNP   SNAI   SERV
2     0   e164   intl  ---  ---   e164  intl   gflex
2     1   e164   intl  ---  ---   e164  intl   gflex

rlghncxa03w  01-10-28  00:29:31 GMT EAGLE 37.5.0
GTII  TT  NP     NAI   NPV  NAIV  SNP   SNAI   SERV
4     1   e164   intl  ---  ---   e164  intl   gflex
4     2   e164   intl  ---  ---   e164  intl   gflex
```

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

NOTE: GTT, EGTT, and VGTT traffic are routed based on the global titles in the OAM database while G-Flex, G-Port, and INP traffic is routed based on the global title

in the RTDB. Rebooting a Service Module card running the VSCCP application causes both the OAM and RTDB databases on the Service Module card to reload.

12. Reload a Service Module card using the **init-card** command.

For example, enter this command:

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

The system returns the following message:

```
rlghncxa03w  01-10-07 00:28:31 GMT EAGLE 37.5.0
Command entered at terminal #3.
Init Card command issued to card 1101
```

13. Verify its return to IS-NR state with the **rept-stat-card** command.

(Wait until in-service state is restored.)

This is an example of the possible output:

```
RLGHNCXA03W 01-10-07 00:30:42 GMT  EAGLE 37.5.0
CARD  VERSION              TYPE     APPL     PST      SST     AST 1101 100-000-00003-000 DSM
VSCCP IS-NR   Active  ---
1103  100-000-00002-000    ACMENET  STPLAN   IS-NR    Active  ---
1104  100-000-00003-000    TSM      GLS      IS-NR    Active  ---
1105  100-000-00003-000    LIMOCU   CCS7ITU  IS-NR    Active  ---
1106  100-000-00003-000    LIMOCU   CCS7ITU  IS-NR    Active  ---
1107  100-000-00003-000    DSM      VSCCP    IS-NR    Active  ---
1113  100-000-00002-000    MCAP     OAM      IS-NR    Active  ---
1114  100-000-00002-000    TDM               IS-NR    Active  ---
1115  100-000-00002-000    MCAP     OAM      IS-NR    Active  ---
1116  100-000-00002-000    TDM               IS-NR    Active  ---
1117  100-000-00002-000    MDAL              IS-NR    Active  ---
1201  100-000-00003-000    LIMDS0   SS7ANSI  IS-NR    Active  ---
1202  100-000-00002-000    LIMV35   SS7GX25  IS-NR    Active  ---
1203  100-000-00003-000    LIMV35   SS7ANSI  IS-NR    Active  ---
1204  100-000-00003-000    LIMATM   ATMANSI  IS-NR    Active  ---
1205  100-000-00001-000    DCM      IPLIM    IS-NR    Active  ---
1207  100-000-00001-000    DCM      SS7IPGW  IS-NR    Active  ---
1303  100-000-00001-000    DCM      IPLIM    IS-NR    Active  ---
1305  100-000-00001-000    DCM      SS7IPGW  IS-NR    Active  ---
```

14. After the **init-card** and the **rept-stat-card** commands show that service is successfully restored, repeat Step 12 and Step 13 for each Service Module card in your system.

15. Enter the **chg-sccp-serv:serv=gflex:state=online** command to set the G-Flex service state online.

16. Confirm that essential activation procedures are successful.

a. Use **rept-stat-sccp** to verify all your Service Module cards are loaded and are IS-NR (in-service normal) status.

b. Use **rept-stat-mps** to verify all your Service Module cards and the EPAP are connected and operational.

c. Use **rept-stat-db:display=all** to verify database levels are identical for the EPAP PDB and RTDB and the RTDBs on the Service Module cards.

The G-Flex feature is now installed, activated, and ready for operations.

The 1100 TPS/Service Module Card for ITU NP Feature

This procedure is used to enable and turn on the 1100 TPS/Service Module card for ITU NP feature. This feature provides up to 26,400 transactions per second when the maximum number of Service Module cards are installed

in the EAGLE 5 ISS and one or more EPAP-related features (such as G-Port, G-Flex, A-Port, INP, EIR, Migration) are enabled and turned on.

This feature can be enabled only for Service Module cards that are rated at 850 transactions per second (TPS).

CAUTION: The increase of the Service Module card capacity, 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 feature access key is based on the feature's part number and the serial number of the EAGLE 5 ISS, making the feature access key site-specific.

The **enable-ctrl-feat** command enables the 1100 TPS/Service Module card for ITU NP feature by inputting the feature's access key and the feature's part number with these parameters:

:fak
The feature access key provided by Tekelec. The feature access key contains 13 alphanumeric characters and is not case sensitive.

:partnum
The Tekelec-issued part number of the 1100 TPS/Service Module card for ITU NP feature, 893018001.

After the 1100 TPS/Service Module card for ITU NP feature has been enabled, the feature must be turned on with the **chg-ctrl-feat** command. The **chg-ctrl-feat** command uses these parameters:

:partnum
The Tekelec-issued part number of the 1100 TPS/Service Module card for ITU NP feature, 893018001.

:status=on
Used to turn the 1100 TPS/Service Module card for ITU NP feature on.

Activating the 1100 TPS/Service Module Card for ITU NP Feature

Before you start:

The 1100 TPS/Service Module card for ITU NP feature cannot be enabled with a temporary feature access key.

The 1100 TPS/Service Module card 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 status of the LNP feature is shown with the **rtrv-ctrl-feat** command output.

- The ANSI G-Flex STP Option is enabled.

  The status of the ANSI G-Flex STP Option is shown in the **rtrv-stpopts** command output.

- The GTT feature is not turned on.

  The status of the GTT feature is shown in the **rtrv-feat** command output.

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. This can be verified 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 once the EAGLE 5 ISS is on-site, with the **ent-serial-num** command. The **ent-serial-num** command uses these parameters:

:serial

The serial number assigned to the EAGLE 5 ISS. The serial number is not case sensitive.

:lock

Specifies whether or not the serial number is locked. This parameter has only one value, yes, which locks the serial number. Once the serial number is locked, it cannot be changed.

NOTE: To enter and lock the serial number of the EAGLE 5 ISS, the `ent-serial-num` command must be entered twice, once to add the correct serial number to the database with the `serial` parameter, then again with the `serial` and the `lock=yes` parameters to lock the serial number. Verify that the serial number in the database is correct before locking the serial number. The serial number can be found on a label affixed to the control shelf (shelf 1100).

The 1100 TPS/Service Module card 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 achieve this increase in SCCP processing capacity, a maximum of 25 Service Module cards must be provisioned and installed in the EAGLE 5 ISS.

1. Display the status of the 1100 TPS/Service Module card feature by entering the **`rtrv-ctrl-feat`** command.

The following is an example of the possible output:

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.5.0

The following features have been permanently enabled:
   Feature Name              Partnum    Status  Quantity
   TPS                       893000110  on      1000
   ISUP Normalization        893000201  on      ----
   Prepaid SMS Intercept Ph1 893006701  on      ----
   MNP Circ Route Prevent    893007001  on      ----
   1100 TPS/DSM for ITU NP   893018001  on      ----

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

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

2. Based on the output from the previous step, do one of the following:

- If the **`rtrv-ctrl-feat`** output shows that the 1100 TPS/Service Module card for ITU NP feature is enabled, shown by the entry 1100 TPS/Service Module card for ITU NP, and its status is **on**, no further action is necessary.
- If the feature is enabled and its status is **off**, go to Step 13 .
- If the rtrv-ctrl-feat output shows that the LNP feature is enabled, this procedure cannot be performed. The 1100 TPS/Service Module card for ITU NP feature cannot be enabled if the LNP feature is enabled.
- If the 1100 TPS/Service Module card for ITU NP and LNP features are not enabled, go to the next step.

3. Determine whether the G-Flex feature is turned on by entering the **`rtrv-ctrl-feat`** .

(If the G-Flex feature is off, then the ANSIGFLEX option is not displayed in the **`rtrv-stpopts`** output in the next step.)

The status of the G-Flex feature is shown by the entry **G-Flex** in the **`rtrv-ctrl-feat`** output.

- If the G-Flex feature is turned off, skip to Step 5 .

- If the G-Flex feature is turned on, go to the next step.

4. Verify that the ANSI G-Flex option is not enabled or turned on by entering the **rtrv-stpopts** command.

The 1100 TPS/Service Module card ITU NP feature cannot be enabled if the ANSI G-Flex option is turned on.

The ANSI G-Flex option is shown by the entry **ANSIGFLEX** 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. Go to Step 6 .

5. Determine whether the GTT feature is turned on by examining the output of the **rtrv-feat** command.

The 1100 TPS/Service Module card ITU NP feature cannot be enabled unless the GTT feature is turned on. The GTT feature is shown by the entry **GTT** in the **rtrv-feat** output executed in Step 3 .

- If the GTT feature is turned on, go to the next step.
- If the GTT feature is turned off, perform ”Adding a Service Module” in the *Database Administration Manual - Global Title Translation* manual to turn the GTT feature on 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 that are provisioned in the database using the **rept-stat-gpl:gpl=sccphc** command:

This is an example of the possible output:

```
rlghncxa03w 07-05-01 11:40:26 GMT EAGLE5 37.5.0
GPL    CARD   RUNNING      APPROVED     TRIAL
VSCCCP 1201  126-002-000  126-002-000  126-003-000
VSCCCP 1203  126-002-000  126-002-000  126-003-000
VSCCCP 1207  126-002-000  126-002-000  126-003-000
VSCCCP 1213  126-002-000  126-002-000  126-003-000
VSCCCP 1215  126-002-000  126-002-000  126-003-000
VSCCCP 1305  126-002-000  126-002-000  126-003-000
VSCCCP 1313  126-002-000  126-002-000  126-003-000
VSCCCP 2103  126-002-000  126-002-000  126-003-000
Command Completed
```

7. Based on the output shown in the previous step, do one of the following:

- If the required number of Service Module cards are provisioned in the database, go to the next step.
- If the required number of Service Module cards are not provisioned in the database, perform ”Adding a Service Module” in the *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, go to the next step.

8. Display the serial number in the database with the **rtrv-serial-num** command.

This is an example of the possible output:

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.5.0

System serial number = nt00001231

System serial number is not locked
```

```
.
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.5.0 Command Completed
```

9. Compare the actual serial number (located on a label affixed to the control shelf, shelf 1100) to the output shown in the previous step, and do one of the following:
   - If the serial number is correct and locked, go to Step 13 .
   - If the serial number is correct but not locked, go to Step 12 .
   - If the serial number is not correct, but is locked, this feature cannot be enabled and the remainder of this procedure cannot be performed. Contact the Customer Care Center to get an incorrect and locked serial number changed.
10. Enter the correct serial number into the database using the **ent-serial-num** command with the serial parameter.

    For this example, enter this command:

    ent-serial-num:serial=<EAGLE 5 ISS's correct serial number>

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

    ```
    rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.5.0
    ENT-SERIAL-NUM: MASP A - COMPLTD
    ```

11. Verify that the serial number entered into Step 7 was entered correctly:
    a. Enter the **rtrv-serial-num** command.

       This is an example of the possible output:

       ```
       rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.5.0
       System serial number = nt00001231

       System serial number is not locked.

       rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.5.0
       Command Completed
       ```

    b. If the serial number was not entered correctly, repeat Step 10 and Step 11 and re-enter the correct serial number.
12. Lock the serial number in the database by entering the **ent-serial-num** command with the serial number shown in Step 8 (if the serial number shown in Step 8 is correct) or with the serial number shown in Step 10 (if the serial number was changed in Step 10), and with the **lock=yes** parameter.

    For this example, enter this command:

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

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

    ```
    rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.5.0
    ENT-SERIAL-NUM: MASP A - COMPLTD
    ```

13. Enable the 1100 TPS/Service Module card for ITU NP feature with the permanent key by entering the **enable-ctrl-feat** command.

    For this example, enter this command:

    enable-ctrl-feat:partnum=893018001:fak=<1100 TPS/Service Module card for ITU NP feature access key>

NOTE: The values for the feature access key (the fak parameter) are provided by Tekelec. If you do not have the feature access key for the 1100 TPS/Service Module card for ITU NP feature, contact your Tekelec Sales Representative or Account Representative.

When the **enable-crtl-feat** command has successfully completed, a message similar to the following should appear.

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.5.0
ENABLE-CTRL-FEAT: MASP B - COMPLTD
```

14. Do one of the following:

- If you do not wish to turn the 1100 TPS/Service Module card for ITU NP feature on, skip this step and go to Step 16 . If you do not turn this feature on, the transaction rate will remain at 850 TPS/ Service Module card.
- If you do wish to turn on the 1100 TPS/Service Module card for ITU NP feature, enter the **chg-ctrl-feat** command, specifying the 1100 TPS/Service Module card for ITU NP feature part number used in Step 13 and the **status=on** parameter and enter the command again as shown in the next step.

For this example, enter this command:

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

The following output message appears:

```
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's performance may not reach 1100 TPS per Service Module card.

15. Re-enter the chg-ctrl-feat command to turn the feature ON.

For example **chg-ctrl-feat:partnum=893018001:status=on**

When this command has successfully completed, a message similar to the following should appear:

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.5.0
CHG-CTRL-FEAT: MASP B - COMPLTD
```

16. Verify the changes by entering the **rtrv-ctrl-feat** command with the 1100 TPS/Service Module card for ITU NP feature part number specified in Step 14 or Step 15 .

rtrv-ctrl-feat:partnum=893018001

The following is an example of the possible output:

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.5.0
The following features have been permanently enabled:
 Feature Name              Partnum   Status Quantity
 TPS                       893000110 on     1000
 ISUP Normalization        893000201 on     ----
 Prepaid SMS Intercept Ph1 893006701 on     ----
 MNP Circ Route Prevent    893007001 on     ----
 1100 TPS/DSM for ITU NP   893018001 on     ----

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

 The following features have expired temporary keys:
```

```
Feature Name              Part Num
OnOffFeatV                893492401
```

17. Backup the new changes by entering:

chg-db:action=backup:dest=fixed

These 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.
```

18. If you wish to turn off TPS/Service Module card for ITU NP feature, enter the **chg-ctrl-feat** command, specifying the 1100 TPS/Service Module card feature part number used in Step 14 and the **status=off** parameter.

For this example, enter this command:

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

The following output message appears:

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

19. Confirm that you wish to turn off TPS/Service Module card for ITU NP feature by re-entering the command, as shown below, within 30 seconds:

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

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

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.5.0
CHG-CTRL-FEAT: MASP B - COMPLTD
```

Activating the E5-SM4G Throughput Capacity Feature

This procedure is used to enable and turn on the E5-SM4G Throughput Capacity feature. This feature provides up to 75,000 transactions per second when the maximum number of Service Module cards are installed in the EAGLE 5 ISS and one or more EPAP-related features (such as G-Port, A-Port, G-Flex) are enabled and turned on.

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

The **enable-ctrl-feat** command enables the E5-SM4G Throughput Capacity feature by inputting the feature's access key and the feature's part number with these parameters:

:fak
The feature access key provided by Tekelec. The feature access key contains 13 alphanumeric characters and is not case sensitive.

:partnum
The Tekelec-issued part number of the E5-SM4G Throughput Capacity feature, 893019101.

This feature cannot be enabled with a temporary feature access key.

The E5-SM4G Throughput Capacity feature cannot be enabled if:

- The LNP feature is enabled.
- The STPLAN feature is turned on.
- The GTT feature is not turned on.

The E5-SM4G Throughput Capacity feature cannot be enabled unless the EAGLE 5 ISS contains Service Module cards, and Service Module cards cannot be installed in the EAGLE 5 ISS unless HIPR cards are installed in all shelves containing Service Module cards. Enter the **rept-stat-gpl:gpl=hipr** command to verify if HIPR cards are installed in all shelves containing Service Module cards.

The status of the LNP feature is shown with the **rtrv-ctrl-feat** command output.

The status of the GTT is shown in the **rtrv-feat** command output.

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. This can be verified 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 once the EAGLE 5 ISS is on-site, with the **ent-serial-num** command. The **ent-serial-num** command uses these parameters.

:serial
The serial number assigned to the EAGLE 5 ISS. The serial number is not case sensitive.

:lock
Specifies whether or not the serial number is locked. This parameter has only one value, yes, which locks the serial number. Once the serial number is locked, it cannot be changed.

NOTE: To enter and lock the serial number of the EAGLE 5 ISS, the ent-serial-num command must be entered twice, first to add the correct serial number to the database with the serial parameter, then again with the serial and the lock=yes parameters to lock the serial number. Before locking the serial number, insure that the serial number in the database is correct. The serial number can be found on a label affixed to the control shelf (shelf 1100).

Once the E5-SM4G Throughput Capacity feature has been enabled, the feature must be turned on with the **chg-ctrl-feat** command. The **chg-ctrl-feat** command uses these parameters:

:partnum
The Tekelec-issued part number of the E5-SM4G Throughput Capacity feature, 893019101

:status=on
used to turn the E5-SM4G Throughput Capacity feature on.

This feature increases the processing capacity of SCCP traffic for an EAGLE 5 ISS processing EPAP-based traffic to 75,000 transactions per second. To achieve this increase in SCCP processing capacity, a maximum of 25 Service Module cards must be provisioned and installed in the EAGLE 5 ISS.

1. Display the status of the E5-SM4G Throughput Capacity feature by entering the **rtrv-ctrl-feat** command.

   Possible output of this command follows:

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.0.0
The following features have been permanently enabled:

Feature Name              Partnum    Status  Quantity
IPGWx Signaling TPS       893012814   on      20000
ISUP Normalization        893000201   on      ----
Command Class Management  893005801   on      ----
Intermed GTT Load Sharing 893006901   off     ----
XGTT Table Expansion      893006101   off     ----
XMAP Table Expansion      893007710   on      3000
```

```
Large System # Links      893005910   on      2000
Routesets                 893006401   on      6000
HC-MIM SLK Capacity       893012707   on      64

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              Partnum
Zero entries found.
MNP Circ Route Prevent    893007001 On        ----  20 days 8 hrs 57 mins
```

If the **rtrv-ctrl-feat** output shows that the E5-SM4G Throughput Capacity feature is enabled, shown by the entry E5-SM4G Throughput Cap, and its status is on, no further action is necessary.

If the **rtrv-ctrl-feat** output shows that the LNP feature is enabled, this procedure cannot be performed. The E5-SM4G Throughput Capacity feature cannot be enabled if the LNP feature is enabled.

If the feature is enabled, and its status is off, go to Step 9 (skip Step 2 through Step 8).

If the E5-SM4G Throughput Capacity and LNP features are not enabled, go to Step 2 .

2. Enter the **rtrv-feat** command to verify the status of the STPLAN feature.

To enable the E5-SM4G Throughput Capacity feature, the STPLAN feature cannot be turned on.

The STPLAN feature is shown by the entry LAN in the **rtrv-feat** output.

If the STPLAN feature is turned on, this procedure cannot be performed.

If the STPLAN feature is turned off, go to Step 3

3. Verify that the GTT feature is turned on.

To enable the E5-SM4G Throughput Capacity feature, the GTT feature must be turned on. The GTT feature is shown by the entry GTT in the rtrv-feat output executed in Step 2 . If the GTT feature is turned on, go to Step 4 . If the GTT feature is turned off, perform "Adding a Service Module" in the *Database Administration Manual* - Global Title Translation in order to:

- Turn the GTT feature
- add the required number of Service Module cards to the database

After "Adding a Service Module" has been performed, go to Step 5 (skip Step 4).

4. Verify the number of Service Module cards that are provisioned in the database using the **rept-stat-gpl:gpl=sccphc** command.

This is an example of the possible output:

```
rlghncxa03w 07-05-01 11:40:26 GMT EAGLE5 37.0.0
GPL     CARD   RUNNING       APPROVED      TRIAL
SCCPHC  1201   126-002-000   126-002-000   126-003-000
SCCPHC  1203   126-002-000   126-002-000   126-003-000
SCCPHC  1207   126-002-000   126-002-000   126-003-000
SCCPHC  1213   126-002-000   126-002-000   126-003-000
SCCPHC  1215   126-002-000   126-002-000   126-003-000
SCCPHC  1305   126-002-000   126-002-000   126-003-000
SCCPHC  1313   126-002-000   126-002-000   126-003-000
SCCPHC  2103   126-002-000   126-002-000   126-003-000
Command Completed
```

If the required number of Service Module cards are provisioned in the database, go to Step 5 .

If the required number of Service Module cards are not provisioned in the database, perform "Adding a Service Module" in the *Database Administration Manual* - Global Title Translation to add the required

number of Service Module cards to the database. After the required number of Service Module cards are provisioned in the database, go to Step 5 .

5. Verify whether HIPR cards are installed on all the EAGLE 5 ISS shelves containing Service Module card using the **rept-stat-gpl:gpl=hipr** command.

```
the rept-stat-gpl:gpl=hipr command.
rlghncxa03w 07-05-01 11:40:26 GMT EAGLE5 37.0.0
GPL     CARD   RUNNING       APPROVED      TRIAL
HIPR    1109   126-002-000   126-002-000   126-003-000
HIPR    1110   126-002-000   126-002-000   126-003-000
HIPR    1209   126-002-000   126-002-000   126-003-000
HIPR    1210   126-002-000   126-002-000   126-003-000
HIPR    1309   126-002-000   126-002-000   126-003-000
HIPR    1310   126-002-000   126-002-000   126-003-000
HIPR    2109   126-002-000   126-002-000   126-003-000
HIPR    2110   126-002-000   126-002-000   126-003-000
Command Completed
```

If HIPR cards are installed in all shelves containing Service Module cards , go to Step 6 .

If HIPR cards are not installed on all shelves containing E5-SM4G cards, refer to the *Installation Manual - EAGLE 5 ISS* and install the HIPR cards on each of the shelves. Once the HIPR cards have been installed, go to Step 6 .

6. Display the serial number in the database with the **rtrv-serial-num** command.

An example of output from this command follows:

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.0.0
System serial number = nt00001231

System serial number is not locked.

rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.0.0
Command Completed
```

If the serial number is correct and locked, go to Step 10 (skip Step 7 , Step 8 , and Step 9). If the serial number is correct but not locked, go to Step 9 (skip Step 7 and Step 8). If the serial number is not correct, but is locked, this feature cannot be enabled and the remainder of this procedure cannot be performed. Contact the Customer Care Center to get an incorrect and locked serial number changed. The serial number can be found on a label affixed to the control shelf (shelf 1100).

7. Enter the correct serial number into the database using the **ent-serial-num** command with the serial parameter .

For this example, enter this command:

ent-serial-num:serial=<EAGLE 5 ISS's correct serial number>

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

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.0.0
ENT-SERIAL-NUM:  MASP A - COMPLTD
```

8. Verify that the serial number entered into Step 7 was entered correctly using the **rtrv-serial-num** command.

An example of output from this command follows:

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.0.0
System serial number = nt00001231

System serial number is not locked.

rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.0.0
Command Completed
```

If the serial number was not entered correctly, repeat Step 7 and Step 8 and re-enter the correct serial number.

9. Lock the serial number in the database by entering the **ent-serial-num** command with the serial number shown in Step 6 , if the serial number shown in Step 6 is correct, or with the serial number shown in Step 8 , if the serial number was changed in Step 7 , and with the l**ock=yes** parameter.

For this example, enter this command:

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

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

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.0.0
ENT-SERIAL-NUM:  MASP A - COMPLTD
```

10. Enable the E5-SM4G Throughput Capacity feature with the permanent key by entering the **enable-ctrl-feat** command.

For this example, enter the following command:

```
enable-ctrl-feat:partnum=893019101:fak=<E5-SM4G Throughput Capacity
feature access key>
```

NOTE: The values for the feature access key (the fak parameter) are provided by Tekelec. If the feature access key for the E5-SM4G Throughput Capacity feature is not known, contact your Tekelec Sales Representative or Account Representative.

When the **enable-crtl-feat** command has successfully completed, this message appears:

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.0.0
ENABLE-CTRL-FEAT: MASP B - COMPLTD
```

Note: If you do not wish to turn the E5-SM4G Throughput Capacity feature on, go to Step 12 (and skip Step 11) .

11. Turn the E5-SM4G Throughput Capacity feature using the **chg-ctrl-feat** command, specifying the E5-SM4G Throughput Capacity feature part number used in Step 10 and the **status=on** parameter.

For example, enter the following command:

```
chg-ctrl-feat:partnum=893019101:status=on
```

NOTE: Once this feature is turned on, it cannot be turned off.

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

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.0.0
CHG-CTRL-FEAT: MASP B - COMPLTD
```

12. Verify the changes by entering the rtrv-ctrl-feat command with the E5-SM4G Throughput Capacity feature part number specified in Step 10 or Step 11 .

For example, enter the following command:

```
rtrv-ctrl-feat:partnum=893019101
```

An example of output from this command follows:

```
rlghncxa03w 07-05-28 21:15:37 GMT EAGLE5 37.0.0
The following features have been permanently enabled:

Feature Name             Partnum   Status Quantity
E5-SM4G Throughput Cap   893019101   on      ----

The following features have been temporarily enabled:
```

```
Feature Name              Partnum    Status  Quantity     Trial Period Left
Zero entries found.
G-Port Circ Route Prevent 893007001 On        ----  20 days 8 hrs 57 mins

The following features have expired temporary keys:
Feature Name              Partnum
Zero entries found.
```

13. Backup the new changes using the **chg-db:action=backup:dest=fixed** command.

The following messages appear, with the active Maintenance and Administration Subsystem Processor (MASP) appearing first, as shown.

```
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.
```

5

Maintenance and Measurements

Hardware Requirements

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

CAUTION: Having a mix of TSM cards running the SCCP application and Service Module card types is not permitted with the G-Flex feature enabled. That is, Service Module cards and TSM cards running the SCCP application cannot coexist in a system operating the G-Flex feature. 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.

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-Flex 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-Flex System Status Reports

Status reporting described here includes the following:

- System status
- G-Flex 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-Flex statistics.

G-Flex Status Reporting

The **rept-stat-mps** command supports G-Flex 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-Flex 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 d atabase 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, SCCP, 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-Flex 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-Flex 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-Flex options, HOMERN, and service selector tables only if the G-Flex feature is provisioned. When the G-Flex 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-Flex Data Initialization

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

G-Flex Data Initialization

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

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 TSM card running the SCCP application (or Service Module card).

80% Threshold of Support

Loading mode is based on the ability of the system to provide TSM card running the SCCP application 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 TSM card running the SCCP application capacity.”

Insufficient TSM Card Running the SCCP Application 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 TSM card running the SCCP application service.” When this occurs, some of the LIMs are denied TSM card running the SCCP application 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 TSM card running the SCCP application is insufficient to service at least 80% of all provisioned LIMs.
- Insufficient TSM card running the SCCP application 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 TSM card running the SCCP application 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.

  When in an unstable loading mode, the EAGLE 5 ISS does not accept STP database updates. When updates are rejected, the reason is given as:

  > E3112 Cmd Rej: Loading Mode unstable due to TSM card running the SCCP application service is deficient.

  The **`inh-card`** and **`alw-card`** commands can be used to alter TSM card running the SCCP application service levels to achieve the 80% threshold. This can be repeated for each card until the system is able to supply TSM card running the SCCP application services to at least 80% of the is-nr LIMs. The remaining 20% LIM or supporting Service Module cards may remain out of service until the stream of database updates ceases. This stream of updates can be temporarily interrupted to allow the remaining 20% of the system to come in service.

  Once 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. **Figure 5-1** shows an example.

Figure 5-1. Obit Message for Abort of Card Loading

```
tekelecstp 97-04-08 12:29:04 EAGLE 35.0.0
------------------------------------------------------------------------
     Card 1317   Module RADB_MGR.C  Line  337  Class 01d7
        Card 1317   Module RADB_MGR.C  Line  337  Class 01d7
        Register Dump :
            EFL=00000246    CS =0058        EIP=0000808d    SS =0060
            EAX=000a6ff3    ECX=000a0005    EDX=00000000    EBX=000a6fa0
            ESP=00108828    EBP=0010882c    ESI=001f1e10    EDI=00000000
            DS =0060        ES =0060        FS =0060        GS =0060

        Stack Dump :
        [SP+1E]=001f    [SP+16]=0000    [SP+0E]=000a    [SP+06]=0010
        [SP+1C]=1e10    [SP+14]=0004    [SP+0C]=6fa0    [SP+04]=8850
        [SP+1A]=0010    [SP+12]=001f    [SP+0A]=0004    [SP+02]=0001
        [SP+18]=886c    [SP+10]=4928    [SP+08]=7ec3    [SP+00]=504b

        User Data Dump :

        14 02 fa ed 01 01 1d 01 5a 01 00                    ........Z..

    Report Date:97-04-08  Time:12:29:04
```

Using the force Option

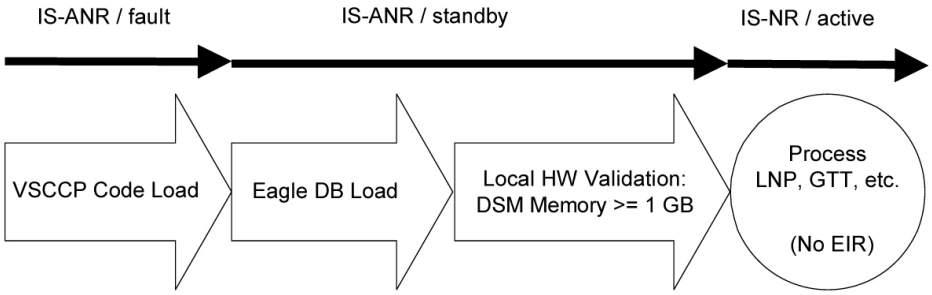
Use the force option to force the execution of commands that would put the system in unstable loading mode. If executing the **`ent-card`** or **`inh-card`** commands would cause the system to enter an unstable loading mode, use the force option on the command.

State Transitions During Start-Up

Figure 5-2 through Figure 5-9 show the transitions that a Service Module card goes through as it boots, loads code and data, and runs various VSCCP services. These figures do not illustrate every possible situation, but they do include the most common scenarios involving the G-Flex feature.

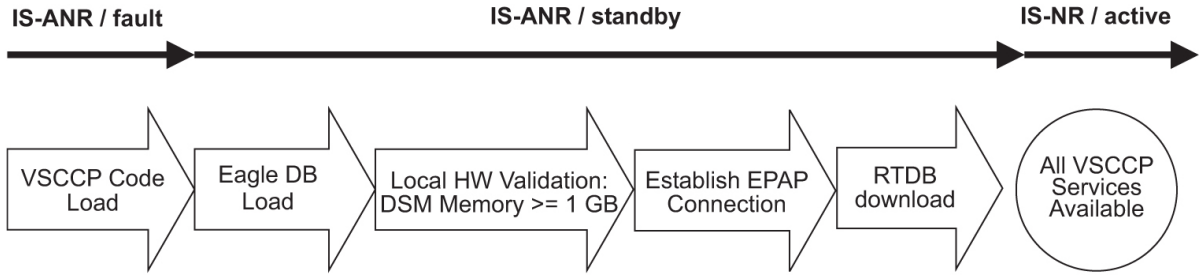
In Figure 5-2 , the G-Flex feature is not enabled, and the Service Module card can operate in TSM emulation mode, although it does not provide G-Flex operation.

Figure 5-2. G-Flex Not Enabled, Service Module card Running in TSM Emulation



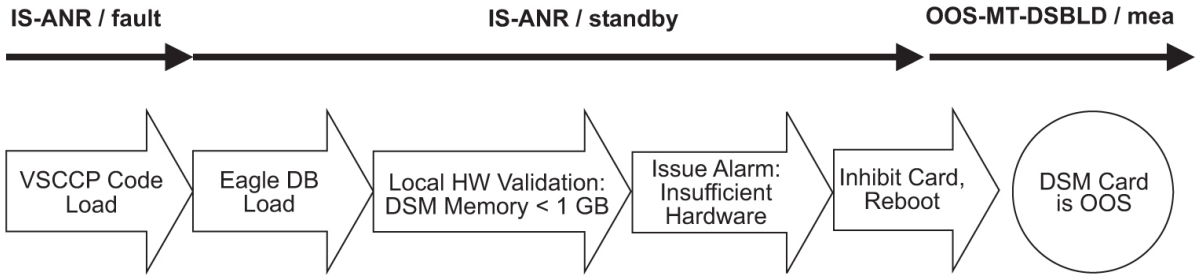
In Figure 5-3 , the G-Flex feature is enabled, and the Service Module card memory is at least 1 GB and is connected to the EPAP. A normal Service Module card operating sequence occurs, providing G-Flex service.

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



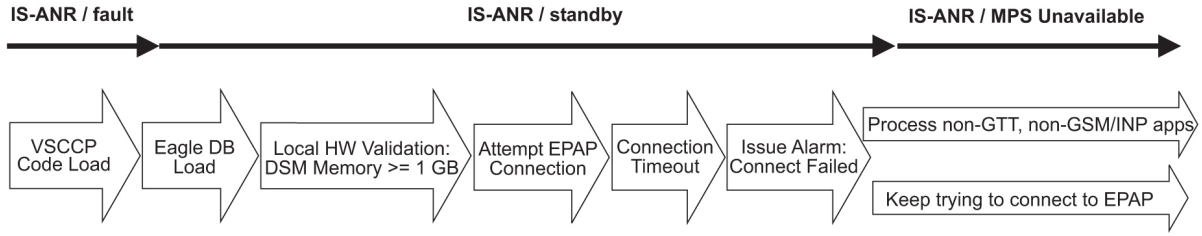
In Figure 5-4 , the G-Flex feature is enabled, but the Service Module card memory is less than 1 GB. The G-Flex feature cannot begin operation. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the Service Module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

Figure 5-4. G-Flex Enabled, but Service Module card Memory Less Than 1 GB



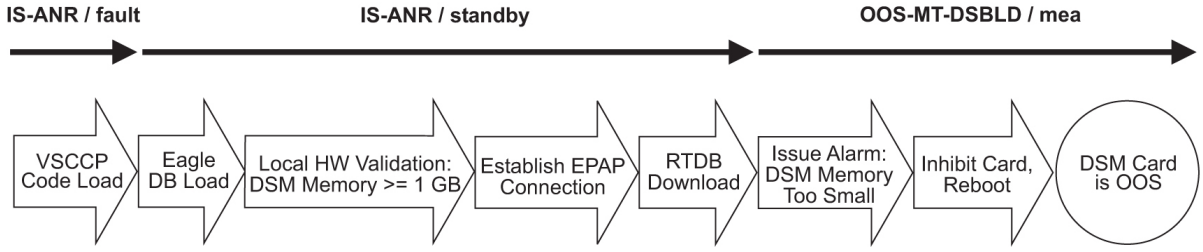
In Figure 5-5 , the G-Flex feature is enabled, the Service Module card memory has at least 1 GB, but the Service Module card is unable to connect EPAP; the G-Flex cannot begin operation.

Figure 5-5. G-Flex Enabled, but Service Module card Not Connected to EPAP



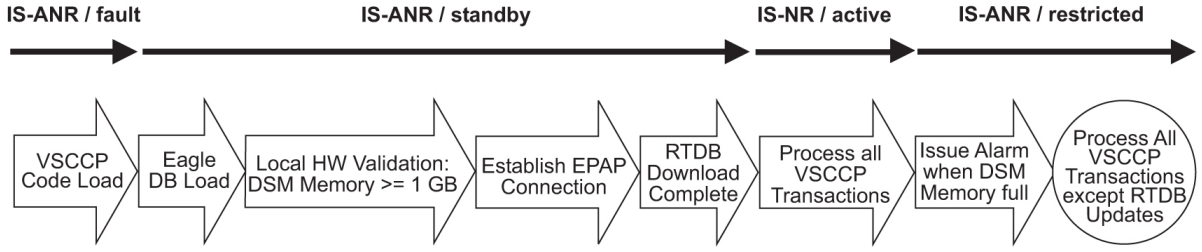
In **Figure 5-6** , the G-Flex feature is enabled, the Service Module card has the required 1 GB memory and is connected to the EPAP, but the Service Module card is too small for the required database; the G-Flex cannot begin operation. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical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

Figure 5-6. G-Flex Enabled, but Service Module card Memory Insufficient for Database



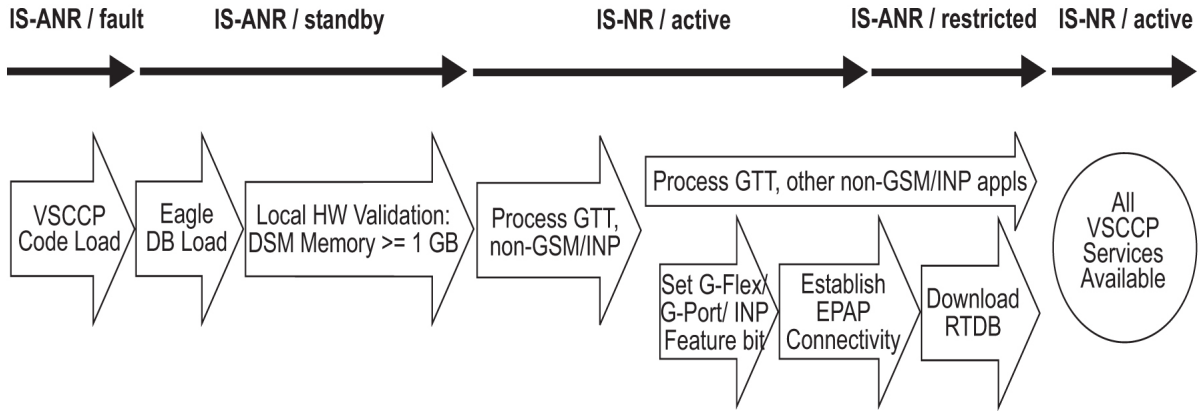
In **Figure 5-7** , the G-Flex feature is enabled, the Service Module card is connected to the EPAP, but the RTDB grows eventually to exceed the capacity of the Service Module card memory, despite its memory size of at least 1 GB (an alarm is issued when the Service Module card memory becomes full from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

Figure 5-7. G-Flex Enabled, but Database Exceeds Service Module card Memory



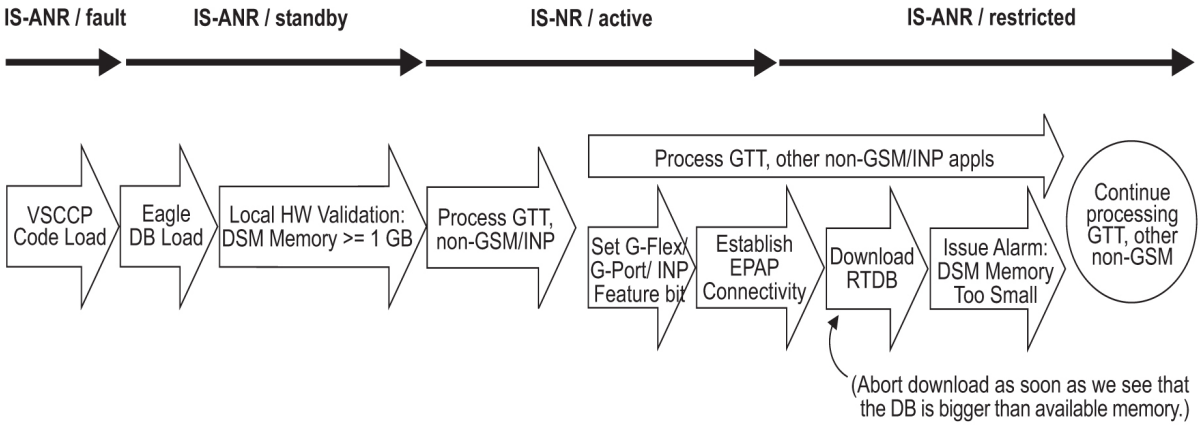
In **Figure 5-8** , the G-Flex feature is not initially enabled; the Service Module card memory has at least 1 GB but no EPAP connection; the Service Module card is running other applications when the G-Flex feature is turned on; the Service Module card has sufficient memory to provide G-Flex service.

Figure 5-8. G-Flex Not Enabled at First, but then Activated on Service Module card



In **Figure 5-9** , the G-Flex feature is not initially enabled; the Service Module card memory has at least 1 GB but no EPAP connection, and is running other applications when the G-Flex feature is turned on. However, the Service Module card memory is insufficient for the needed database, and the cannot provide G-Flex operation. 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**.**

Figure 5-9. G-Flex Activation Unsuccessful due to Insufficient Database



G-Flex Related Alarms

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

EPAP - Service Module Card Connection Status

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

Service Module Card Failure

No new alarms have been created to report Service Module card failure. The existing card alarm UAM 013, *Card is isolated from the system*, indicates a Service Module card failure. The Service Module card 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 card-EPAP Link alarms are output to the Link Maintenance Output Group. See the *Unsolicited Alarm and Information Messages Manual* for details on these UAM formats.

Example:

```
  1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
station1234 00-04-30 16:28:08 EST EAGLE 37.5.0
**  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-Flex 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 Service Module card Hardware-Related alarms are output to the Card Output Group.

Example:

```
  1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
   station1234 00-04-30 16:28:08 EST EAGLE 37.5.0
** 0012.0441 ** CARD 1108 VSCCP          Incorrect main board - CPU
```

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
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 00-04-30 16:28:08 EST EAGLE 37.5.0
**  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
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 00-04-30 16:28:08 EST EAGLE 37.5.0
*C  0012.0442 *C CARD 1108 VSCCP         RTDB database capacity is 95% full
```

A major alarm is displayed when a Service Module card does not have an applique with at least 1 GB of memory or does not have enough capacity for the RTDB. This alarm is generated whenever the Service Module card detects that its memory cannot contain the RTDB.

Example:

```
  1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
                   station1234 00-04-30 16:28:08 EST EAGLE 37.5.0
**  0012.0422 ** CARD 1108 VSCCP         Insufficient extended memory
```

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
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 00-04-30 16:28:08 EST EAGLE 37.5.0
    0012.0423    CARD 1108 VSCCP         Card reload attempted
```

Service Module Card 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 Service Module card Database Audit alarm is output to the Card Output Group.

Example:

```
  1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 00-04-30 16:28:08 EST EAGLE 37.5.0
** 0012.0443 ** CARD 1108 VSCCP        RTDB Database is corrupted
```

Service Module Card Database Alarms

During the operation of Service Module cards, the status of databases is examined and alarms can be raised. When a Service Module card's RTDB is inconsistent (that is, Service Module card’s birthdate and level do not match the active EPAP RTDB birthdate and level), a minor alarm is raised. The Service Module Database alarms are output to the Card Output Group.

Example:

```
  1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
```

```
    station1234 00-04-30 16:28:08 EST EAGLE 37.5.0
*   0012.0444 * CARD 1108 VSCCP        RTDB Database is inconsistent
```

While the EPAP RTDB database is being downloaded to a Service Module card, it is in an incoherent state. An alarm is raised.

Example:

```
  1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 99-09-30 16:28:08 EST EAGLE 37.5.0
*   0012.0448 * CARD 1108 VSCCP        RTDB Database is incoherent
```

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

Example:

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
    station1234 00-04-30 16:28:08 EST EAGLE 37.5.0
    0012.0445 CARD 1108 VSCCP          RTDB Database has been corrected
```

G-Flex Subsystem Alarms

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

Table 5-1. G-Flex 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
0530	None	Service is removed	sys_maint

G-Flex Related UIMs

UIM formats for the EGTT feature support the new GTT requirements. The *Unsolicited Alarm and Information Messages Manual* contains a complete description of all UIM text and formats. See **Table 5-2** for the G-Flex UIMs. All of the the G-Flex related UIMs are output to the Application Subsystem Output Group.

Table 5-2. G-Flex UIMs

UIM #	Text	Description	Action
1242	**Conv to intl num - Dflt CC not found**	Default CC is not defined	Define the default CC by **chg-stpopts:defcc=xxxx**
1243	**Conv to intl num - Dflt NC not found**	Conversion to international number failed because default NC was not found	Define the default NDC by **chg-stpopts:defndc=xxxx**
1244	**Conv to intl num – Dflt MCC not found**	Default MCC is not defined	Define the default MCC by **chg-gsmopts:defmcc=xxxx**
1245	**Conv to intl num – Dflt MNC not found**	Default MNC is not defined	Define the default MNC by **chg-gsmopts:defmnc=xxxx**
1246	**Invalid length of conditioned digits**	Length of the conditioned international number is <5 or >15	Use an international number with length within this range.
1247	**Conversion of MGT to IMSI not possible**	The E.212 part for the E.214 MGT digit not found in the database	Enter the E.212 part (MCC + MNC) for the E.214 MGT part (CC + NDC) in the database using **chg-gsmopts:ccndc=xxxxxx:mccmnc=yyyyyy**
1384	G-Flex MLR: Op without IMSI erroneous	The G-Flex MLR Function encountered an updateLocation , updateGPRSLocation, or sendAuthenticationInfo operation that did not contain an IMSI parameter	No action necessary
1385	**G-Flex MLR: Op without IMSI skipped**	The G-Flex MLR Function encountered a operation that did not contain an IMSI parameter	No action necessary
1386	**G-Flex MLR: Op with bad TCAP skipped**	The G-Flex MLR Function encountered problems decoding the TCAP and MAP layers of a message prior to attempting to identify an IMSI parameter	No action necessary
1387	**G-Flex MLR: Op with bad IMSI skipped**	The G-Flex MLR Function encountered an IMSI parameter that contains fewer than 5 digits or more than 15 digits	No action necessary

G-Flex Measurements

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

OAM Based Measurements

The collection of measurements is a separate task from reporting. Measurements collection is activated automatically upon system power-up, or through administrative commands. Collection is organized by ENTTYPE and reporting period. Collection occurs per link every 5 minutes, and separately every 30 minutes. Measurements are generated on the application cards and periodically collected by the OAM and stored for later retrieval on the TDMs. The command related to measurements collection is *chg-meas*.

Reports can be scheduled or printed on-demand. Scheduled and on-demand reports are accessible by the following administrative commands:

- *chg-meas* -Turns collection on/off and schedules automatic report generation.
- *rtrv-meas-sched* -Verifies collection state and automatic report schedules.
- *rept-meas* - Generates individual measurement reports for schedule-enttype-entid combinations.

Before a report is printed, measurement collection must be activated. Refer to the *Commands Manual* for more information on how to use measurement commands.

Measurements Platform

The Measurements Platform (MP) is required for an EAGLE 5 ISS with more than 700 links. It provides a dedicated processor for collecting and reporting STP, LNP, INP, G-FLEX, and G-PORT measurements data. The interface to the customer's network supports the FTP transfer of Measurements reports to an FTP server. Following collection, scheduled reports are automatically generated and transferred to the customer's FTP server via the FTP interface.

NOTE: Existing FTP file server reports are overwritten by subsequent requests that produce the identical file name.

Reports can be scheduled or printed on-demand. Scheduled and on-demand reports are accessible by the following administrative commands:

- *chg-measopts* - Used to enable or disable the automatic generation and FTP transfer of scheduled measurement reports to the FTP server.
- *rept-stat-meas* - Reports the status of the measurements subsystem including card location and state, Alarm level, and Subsystem State.
- *rept-ftp-meas* - Manually initiates generation and FTP transfer of a measurements report from the MCPM to the FTP server.
- *rtrv-measopts* - Generates a user interface display showing the enabled/disabled status of all FTP scheduled reports.

The following G-Flex MSU measurements are supported for the G-Flex feature.

Table 5-3. Pegs for G-Flex

Event Name	Description	Unit
gfgtmatch	G-Flex GTTs with Match – The total number of G-Flex Global Title Translation successfully completed.	Peg count
gfgtnomch	G-Flex GTTs No Match – The total number of G-Flex Global Title Translations completed that did not match an entry in the G-Flex database.	Peg count
gfgtnolkup	G-Flex GTTs No Look-up – The total number of G-Flex Global Title Translations that could not be looked up in the G-Flex database because of some error. **NOTE: This counter is not available via `rept-meas` by TT.**	Peg count

The following measurement events are included on the STP Daily Maintenance (MTCD) and STP Day-to-Hour (MTCDTH) measurement reports and include peg counts for G-FLEX MSUs. These reports are similar to those used for GTT. The existing GTT/SCCP measurements are used for both GTT and G-Flex and appear in the same reports.

• MSSCCPFL	MSUs discarded due to SCCP routing failure Also includes G-Flex MSUs that got a match from either the G-Flex or GTT database, but cannot be routed because of PC (Point Code) or SS (SubSystem) congestion, PC or SS unavailable, SS unequipped, or an unqualified error.
• GTTUN0NS	GTT unable to perform; no such type. Also includes G-Flex GTT MSUs that did not match on new selectors (GTI, NP, NAI) in addition to ones not matching on TT.
• GTTUN1NT	GTT unable to perform: no translation on this address Also includes G-Flex MSUs that fell through to GTT, obtained a selector match but still did not get a match on the GTA.
• GTTPERFD	Number of GTT performed Also includes G-Flex MSUs that got a match in either the G-Flex or GTT database. These measurements can also be used to determine the following: • Total number of G-Flex MSUs: **`X = gfgtmatch + gfgtnomch + gfgtnolkup`** • Number of non-G-Flex GTT MSUs: **`(gttperfd + gttun1nt + gttun0ns) - (X)`**

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

Measurement Reports

Measurements are available with these report commands. Refer to the *Commands Manual* for detailed usage information.

OAM Based	
• Per STP system, 24-hour total	**rept-meas:type=systot:enttype=stp**
• Per STP system, by TT	**rept-meas:type=systot:enttype=tt:tt=xxx**
• Per system, daily	**rept-meas:type=mtcd:enttype=stp**
• Per system, day-to-hour	**rept-meas:type=mtcdth:enttype=stp**
MP Based	
• Per STP system, 24-hour total	**rept-ftp-meas:type=systot:enttype=stp**
• Per STP system, by TT	**rept-ftp-meas:type=systot:enttype=tt**
• Per system, daily	**rept-ftp-meas:type=mtcd:enttype=stp**
• Per system, day-to-hour	**rept-ftp-meas:type=mtcdth:enttype=stp**

Glossary

A

ACM	Address Complete Message
	Application Communications Module
	A card in the EAGLE 5 ISS that provides a communications interface to a remote host across an Ethernet LAN.
ADL	Application Data Loader
AI	Address Indicator
	Application Initializer
AINPQ	ANSI-41 INP Query
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.
A-Port	ANSI-41 Mobile Number Portability
ARP	Address Resolution Protocol
	ARP monitoring uses the Address Resolution Protocol to determine whether a remote interface is reachable.
AS	Application Server
	A logical entity serving a specific Routing Key. An example of an Application Server is a virtual switch element handling all call processing for a unique range of PSTN trunks, identified by an SS7 DPC/OPC/CIC_range. Another example is a virtual database element, handling all HLR transactions for a particular SS7 DPC/OPC/SCCP_SSN combination. The AS contains a set of one or more unique Application Server Processes, of which one or more normally is actively processing traffic.
	Action Set
	Authentication Server
	Authentification servers provide public access to certificates, and are integrated with electronic information retrieval systems to this end. Free access to certificates is necessary to support authentication in open systems.

C

CC	Connection Confirmed
	Country Code
CCS7	Common Channel Signaling System #7
	Offers all of the call setup advantages of CCS and also enables network elements to share more than just basic SS7 call-control information. It provides the services of the Integrated Services Digital Network-User Part (ISUP), the Transaction Capabilities Application Part (TCAP), and the Operation Maintenance and Administration Part (OMAP).
	See also SS7.

CCS7ITU — The generic program load and application for the ITU SS7 signaling links that is used with card types **limds0, limch, limocu, limv35, lime1, and limt1**.

CdPA — Called Party Address

The portion of the MSU that contains the additional addressing information of the destination of the MSU. Gateway screening uses this additional 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 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.

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

DCM — Database Communication Module

The DCM provides IP connectivity for applications. Connection to a host is achieved through an ethernet LAN using the TCP/IP protocol.

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.

DNS — Domain Name Services

DPC — Destination Point Code

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.

DPCA — Destination Point Code ANSI

DPCI — Destination Point Code International

DRAM — Dynamic Random Access Memory

A type of memory chip that has to be refreshed periodically.

DSM — Database Service Module.

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).

E

EGTT — Enhanced Global Title Translation

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.

EIR — Equipment Identity Register

A network entity used in GSM networks, as defined in the 3GPP 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

ES — Encoding Scheme

Extension Shelf

The shelves in the EAGLE 5 ISS that contain the LIM, ASM, and ACM cards. This shelf cannot contain the CAM, TDM, or the MDAL card. This shelf can be added to and removed from the database. These shelves are numbered from 1200 to 6100.

ESD — Electro-Static Discharge

F

FTP — File Transfer Protocol

A client-server protocol that allows a user on one computer to transfer files to and from another computer over a TCP/IP network.

Feature Test Plan

G

GB — Gigabyte — 1,073,741,824 bytes

GDB — GSM Real-time Database

GFDB — G-Flex Database

G-Flex — GSM Flexible numbering

A feature that allows the operator to flexibly assign individual subscribers across multiple HLRs and route signaling messages, based on subscriber numbering, accordingly.

GMSC — Gateway MSC

GPL — Generic Program Load

Software that allows the various features in the system to work. GPLs and applications are not the same software.

G-Port — GSM Mobile Number Portability

A feature that provides mobile subscribers the ability to change the GSM subscription network within a portability cluster, while retaining their original MSISDN(s).

GSM	Global System for Mobile Communications A second generation digital PCS mobile phone standard used in many parts of the world.
GT	Global Title Routing Indicator
GTA	Global Title Address
GTAI	Global Title Address Information
GTI	Global Title Indicator
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 A component within the Switching Subsystem of a GSM network. The HLR database is the central database within the GSM architecture. This is where information about the mobile communications subscribers who are assigned to a specific location area is stored. The subscriber data is used to establish connections and control services. Depending on the network size, the number of subscribers and the network organization, a number of HLRs can exist within a GSM network.
HOMERN	Home Network Routing Number Prefix

I

IAM	Initial Address Message Ensures that the services offered are compatible with the reception devices, and can be used. For example, IAM prevents a phone being connected to a facsimile.
ID	Identity, identifier
IGM	IS41 GSM Migration
IMSI	International Mobile Subscriber Identity An internal network ID stored on the SIM card that protects the mobile communications user's identity.
IMT	Inter-Module-Transport The communication software that operates the inter-module-transport bus on all cards except the LIMATM, DCM, DSM, and HMUX.
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
Integrated Services Digital Network	The network services that provide end-to-end digital connections to which users have access to a wide range of services through a limited set of standard user to network interfaces.

IP	Intelligent Peripheral 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.
IP^7	Tekelec's Internet Protocol to SS7 Interface
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 An organization that operates worldwide to allow governments and the private telecommunications sector to coordinate the deployment and operating of telecommunications networks and services. The ITU is responsible for regulating, coordinating and developing international telecommunications, and for harmonizing national political interests.
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.

K

KSR	Keyboard Send/Receive Mode

L

LIM	Link Interface Module Provides access to remote SS7, X.25, IP and other network elements, such as a Signaling Control Point (SCP) through a variety of signaling interfaces (V.35, OCU, 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
LNP	Local Number Portability The ability of subscribers to switch local or wireless carriers and still retain the same phone number.

M

MAP	Mated Application Part

	Mobile Application Part
	An application part in SS7 signaling for mobile communications systems.
MAS	Maintenance and Administration Subsystem
	A set of cards located in the Control Shelf, used to provide a central management point for the EAGLE 5 ISS. The MAS provides user interface, maintenance communication, peripheral services, alarm processing, system disk interface, and measurements using the following three subassemblies: GPSM-II, TDM, and MDAL.
MASP	Maintenance and Administration Subsystem Processor
	The Maintenance and Administration Subsystem Processor (MASP) function is a logical pairing of the GPSM-II card and the TDM card. The GPSM-II card is connected to the TDM card by means of an Extended Bus Interface (EBI) local bus. The MDAL card contains the removable cartridge drive and alarm logic. There is only one MDAL card in the Maintenance and Administration Subsystem (MAS) and it is shared between the two MASPs.
Mated Application	The point codes and subsystem numbers of the service databases that messages are routed to for global title translation.
MCC	Mobile Country Code
MCPM	Measurement Collection and Polling Module
	The Measurement Collection and Polling Module (MCPM) provides comma delimited core STP measurement data to a remote server for processing. The MCPM is an EDSM with 2 GB of memory running the MCP application.
MDN	Mobile Dialed Number
	Mobile Directory Number
MGT	Mobile Global Title
MIN	Mobile Identification Number
MNP	Mobile Number Portability
	Allows a user to keep his or her mobile phone number despite changing provider. The subscriber also keeps the network carrier code.
MP	Measurement Platform
	Message Processor
	The role of the Message Processor is to provide the application messaging protocol interfaces and processing. However, these servers also have OAM&P components. All Message Processors replicate from their System OAM's database and generate faults to a Fault Management System.
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.
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
	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.
MSC	Mobile Switching Center

An intelligent switching system in GSM networks. This system establishes connections between mobile communications subscribers.

MSISDN — Mobile Station International Subscriber Directory Number

The MSISDN is thenetwork 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 Signaling 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 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.

MTP — Message Transfer Part

The levels 1, 2, and 3 of the SS7 protocol that control all the functions necessary to route an SS7 MSU through the network.

Module Test Plan

N

NAI — Nature of Address Indicator

Standard method of identifying users who request access to a network.

NAIV — NAI Value

NC — Network Cluster

Network Code

NDC — Network destination code

Network Data Collection

NE — Network Element

An independent and identifiable piece of equipment closely associated with at least one processor, and within a single location.

NP — Number Plan

Numbering Plan

Number Portability

A capability that permits telecommunications users to maintain the same telephone access number as they change telecommunication suppliers.

NPV — Numbering Plan Value

O

OAM — Operations, Administration, and Maintenance

The generic load program (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.

OPC — Originating Point Code

Within an SS7 network, the point codes are numeric addresses which uniquely identify each signaling point. The OPC identifies the sending signaling point.

OPS — Operator Provisioning System

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:

- 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**).

The EAGLE 5 ISS LNP uses only the ANSI point codes and Non-ANSI domestic point codes.

PCI — Peripheral Component Interface

Point Code International

Protocol Control Information

Peripheral Component Interconnect

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 only. The customer must write a client application that uses the PDBI request/response messages to communicate with the PDBA.
PPP	Point-to-Point Protocol

R

RC	Relative Cost Restriction Criteria
Restricted	The network management state of a route, link set, or signaling link that is not operating properly and cannot carry all of its traffic. This condition only allows the highest priority messages to sent to the database entity first, and if space allows, followed by the other traffic. Traffic that cannot be sent on the restricted database entity must be rerouted or the traffic is discarded.
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.
RI	Routing Indicator
RMTP	Reliable Multicast Transport Protocol
RN	Routing Number The number provided by the Freephone Service Provider (FSP) to the Access Service Provider (ASP) to enable a pre-determined routing of traffic to a specific network/carrier/ customer.
Route	A path to another signaling point.
RTDB	Real Time Database

S

SCCP	Signaling Connection Control Part The signaling connection control part with additional functions for the Message Transfer Part (MTP) in SS7 signaling. Messages can be transmitted between arbitrary nodes in the signaling network using a connection-oriented or connectionless approach.
SCM	System Configuration Manager System Configuration Matrix.
SDS	System Debug Services
Service Nature of Address Indicator	See SNAI.
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.
SIO	Service Information Octet. The network indicator code (NIC), priority (PRI), and service indicator (SI) in the SIO field in the message signaling unit (MSU). This information identifies the type of MSU (ISUP, TCAP, and so forth) that is allowed in the network where the EAGLE 5 ISS is located.
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.
SP	Service Provider Signaling Point
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 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. Signaling Point Code Spare Point Code Stored Program Control
SRI	Send Routing Information Send_Route_Information Message
SS	Subsystem
SS7	Signaling System #7 A communications protocol that allows signaling points in a network to send messages to each other so that voice and data connections can be set up between these signaling points. These messages are sent over its own network and not over the revenue producing voice and data paths. The EAGLE 5 ISS is an STP, which is a device that routes these messages through the network.
SSN	SS7 Subsystem Number Subsystem Number The subsystem number of a given point code. The subsystem number identifies the SCP application that should receive the message or the subsystem number of the destination point code to be assigned to an X.25 address or the LNP subsystem of the EAGLE 5 ISS. A value of the routing indicator portion of the global title translation data commands indicating that no further global title translation is required for the specified entry.
SSP	Subsystem Prohibited network management message. Subsystem Prohibited SCCP (SCMG) management message. (CER) Service Switching Point (SS7 Network) Signal Switching Point Signal Switching Points are switches that originate, terminate, or tandem calls. An SSP sends signaling messages to other SSPs to setup, manage, and release voice circuits required to complete a call.
STP	Signal Transfer Point The STP is a special high-speed switch for signaling messages in SS7 networks. The STP routes core INAP communication between the Service Switching Point (SSP) and the Service Control Point (SCP) over the network. 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.
	Spanning Tree Protocol
Subsystem Number	See SSN.

T

TCP	Transfer-Cluster-Prohibited
	Transfer Control Protocol
	Transmission Control Protocol
	A connection-oriented protocol used by applications on networked hosts to connect to one another and to exchange streams of data in a reliable and in-order manner.
TCP/IP	Transmission Control Protocol/Internet Protocol
TDM	Terminal Disk Module
	Time Division Multiplexing
	Data transmissions within individual connections follow a pre-defined multiplex scheme where a fixed time slot is available for each channel.
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.
TPS	Transactions Per Second
	A method of measuring how quickly a network can transmit and receive data. Capacities listed with “TPS” units involve the maximum of the receive rate and the transmit rate, and the worst-case assumption is that the transmit and receive rates are the same. Under the TU model, transaction units per second are calculated with the total transaction unit value and the advertised card capacity.
TSM	Translation Services Module
	Provides SCCP functionality or GLS functionality for Local Number Portability (LNP)/ SCCP (GTT). The SCCP software allows the TSM to be used as a memory board for Global Title Translation (GTT).
TT	Translation Type.
	Resides in the Called Party Address (CdPA) field of the MSU and determines which service database is to receive query messages. The translation type indicates which Global Title Translation table determines the routing to a particular service database.

U

UAM	Unsolicited Alarm Message.
	A message sent to a user interface whenever there is a fault that is service-affecting. Each message has a trouble code and text associated with the trouble condition.
UDP	User Datagram Protocol
UDT	Unit Data Transfer
UDTS	Unitdata Service message
UI	User Interface
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

V

V-Flex — Voicemail Flexible Routing

An advanced database application based on the industry proven EAGLE 5 ISS. Deployed as a local subsystem on the EAGLE platform, V-Flex centralizes voicemail routing.

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.

VLR — Visitor Location Register

A component of the switching subsystem, within a GSM network. The switching subsystem includes various databases which store individual subscriber data. One of these databases is the HLR database or Home Location Register; and the VLR is another.

VSCCP — VxWorks Signaling Connection Control Part

The application used by the Service Module card to support the G-Flex, G-Port, INP, AINPQ, EIR, A-Port, IGM, V-Flex, and LNP features. If the G-Flex, G-Port, INP, AINPQ, EIR, A-Port, IGM, V-Flex, or LNP feature is not turned on, and a Service Module card is present, the VSCCP GPL processes normal GTT traffic.

Index

D

E

F

G

R

S

T

U

V

W