Tekelec EAGLE® 5 Integrated Signaling System

Feature Manual - INP/AINPQ

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Patents

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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
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Chapter 1

Introduction

Topics:

This manual presents an overview of the following features that allow wireline and wireless operators to support service provider portability in telephone networks in locations worldwide except North America. The following features allow subscribers in ITU networks to change to a new service provider while retaining their original phone number.

Overview

This manual presents an overview of the following features that allow wireline and wireless operators to support service provider portability in telephone networks in locations worldwide except North America. The following features allow subscribers in ITU networks to change to a new service provider while retaining their original phone number.

- INP (INAP-based Number Portability)
- AINPQ (ANSI-41 Query)

These features have many functions in common. The message relay function is the same for both features. Both features support ported variable-length numbers up to 15 digits, without requiring the padding of numbers in the provisioning interfaces. The two features differ in how queries to the Number Portability Database (NPDB) are made:

- The INP feature supports INAP (Intelligent Network Application Protocol) TCAP (Transaction Capabilities Application Part) queries.
- The AINPQ feature supports ANSI-41 (American National Standards Institute) TCAP queries.

To indicate which functions are common to both features and which are unique to a given feature, the following terminology is used in this manual:

- INP/AINPQ indicates functions that apply to either or both of the INP and AINPQ features
- INP, used by itself, indicates function that applies only to the INP feature
- AINPQ, used by itself, indicates function that applies only to the AINPQ feature

The INP and AINPQ features can be enabled independent of each other or both can be enabled on one EAGLE 5 ISS node. However, both features are mutually exclusive with the North American LNP (Local Number Portability) on an EAGLE 5 ISS node. The global title translations (G TT) feature is required for operation of either the INP or AINPQ feature (or both). Both the INP and AINPQ features use feature access keys for enablement.

Scope and Audience

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

Manual Organization

This document is organized into the following chapters:

- *Introduction* on page 1 contains general information about the INP and AINPQ documentation, organization of this manual, and how to get technical assistance.

- *Feature Description* on page 9 outlines the concepts and highlights of the INP and AINPQ features. It describes the functions of INP and AINPQ, the services provided by the EPAP and PDBA programs operating in the MPS hardware, the INP and AINPQ user interfaces, and the INP and AINPQ message protocols.
- *INP/AINPQ Commands* on page 37 describes the new or updated EAGLE 5 ISS commands that support the INP and AINPQ features. It provides some sample reports and explanations of appropriate command usage.
- *INP/AINPQ Feature Activation* on page 53 describes the commands and procedures necessary to configure the INP and/or AINPQ features for the INP/AINPQ subsystem and EAGLE 5 ISS.
- *INP/AINPQ Maintenance and Measurements* on page 107 explains these functions: EPAP status and alarm reporting, DSM status reporting to the EPAP, system hardware verification, system status reporting, commands, code and application data loading, feature related alarms, and measurements.
- *Prepaid IDP Query Relay Feature* on page 133 describes functionality and behavior of the Flexible Prepaid IDP Query Relay feature.
- *IDP Screening for Prepaid Feature* on page 149 explains how this feature provides a mechanism to decide, prior to routing the calls to the prepaid engine, whether checking the credit status of prepaid subscribers is required.

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.

Documentation Admonishments

Admonishments are icons and text throughout this manual that alert the reader to assure personal safety, to minimize possible service interruptions, and to warn of the potential for equipment damage.

Table 1: Admonishments

	**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*.)

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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.

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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.

Chapter 2

Feature Description

Topics:

Throughout the world, wireline and wireless operators are receiving directives from their national regulators to support service provider number portability in their networks. The INAP-based Number Portability (INP) and ANSI-41 Query (AINPQ) features provide subscribers the ability to switch their telephone service to a new service provider while retaining their original telephone number.

Overview

Throughout the world, wireline and wireless operators are receiving directives from their national regulators to support service provider number portability in their networks. The INAP-based Number Portability (INP) and ANSI-41 Query (AINPQ) features provide subscribers the ability to switch their telephone service to a new service provider while retaining their original telephone number.

While the advent of number portability is good news for consumers, it presents many challenges for network operators. The INP and AINPQ features minimize those challenges for network operators, while enabling them to efficiently meet their regulatory obligations.

Note: Both INP and AINPQ are mutually exclusive with their North American equivalent, LNP, on an EAGLE 5 ISS node. That is, if LNP is enabled on an EAGLE 5 ISS node, neither INP nor AINPQ can be enabled on that node, and if either INP or AINPQ or both are enabled on an EAGLE 5 ISS node, LNP cannot be enabled on that node.

Tekelec uses an NPDB (number portability database) to provide fully functional support (both message relay and queries) for number portability in an ITU network. Both the INP and AINPQ features use the same NPDB. INP and AINPQ differ in the TCAP query type used.

The following functions are available for both the INP and AINPQ features:

- Support for ported number lengths up to 15 digits.
  - In addition, true variable-length numbers are supported without requiring padding of numbers in the provisioning and other input/output interfaces.
  - Number lengths vary between countries and may even vary within a country. As a result, the NPDB structure supports numbers of varying length in a flexible way without requiring software modifications. A maximum number length of 15 digits for ported numbers is supported.
- The INP and AINPQ features can be provisioned to remove automatically a special prefix (that is, an access code such as '0' or '1'). This capability allows INP/AINPQ to accommodate SSPs that do or do not include the prefix in their queries to the NPDB. Also, INP/AINPQ can be provisioned to accept queries with or without special prefixes on the DN. In this situation, INP/AINPQ can strip off the prefix, perform a database query using the international version of the DN, and return a response to the switch. These capabilities, referred to as number normalization, are options the customer can provision.

  INP/AINPQ number normalization also allows the operator to specify NAI values via configuration parameters. The configuration parameters are set to specify rules that map incoming NAI values to service NAI values for the purpose of number conditioning.
- The INP and AINPQ features can be provisioned to remove automatically the National Escape Code (NEC) that may be up to five hexadecimal digits.
- The INP and AINPQ features can be deployed either in the same node that also performs the STP function or as a stand-alone node without STP function. The INP/AINPQ executes on the same MPS platform as other Tekelec features, such as G-Flex and G-Port.

INP and AINPQ Functions and Considerations

INP and AINPQ Functions

INP and AINPQ functions minimize challenges for network operators while they plan to implement number portability for their subscribers.

INP and AINPQ can operate on the same node as Tekelec features G-Port, A-Port, and G-Flex. INP and AINPQ functions are:

- Because the number lengths can vary between countries (sometimes even within a country), INP and AINPQ support numbers of varying lengths in a flexible way, without requiring software modifications. The maximum number length of 15 digits for ported numbers is supported.
  - INP performs number portability translations based on the received Called Party Number (CDPN) in the INAP portion of the message. For call-related messages, the database query is performed by using the digits from the Called Party Number parameter and converting them to an international number, if the number is not already in international format.
  - AINPQ performs number portability translations based on the received dialed digits (DGTSDIAL).
- The INP and AINPQ features can remove automatically the National Escape Code (NEC) that may be up to five hexadecimal digits.
- The INP and AINPQ features avoid problem situations with number normalization. In certain cases, problems could occur where operators do not use NAI values that match the EAGLE 5 ISS's current number conditioning process. For example, a switch might send an NAI of a subscriber and expect the number to be treated as a National number, leading to problems.

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

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

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

INP/AINPQ Considerations

The following list contains considerations you should think over before installing and operating the INP and/or AINPQ feature:

1. The INP and the AINPQ features can co-exist on the same node if they share the same Subsystem Number (SSN).

2. INP and AINPQ responses are not routed by Global Title Translation.
3. The maximum length of the Application Context Name Object Identifier is 32 digits.
4. It is possible that PCs and/or PC + SSNs that are in the entity table of the database and are referenced by subscriber entries do not have the required data present on the EAGLE 5 ISS to route messages to them.

   For example, the PC may not have a route, or the PC+SSN may not be in the MAP table for a final GTT. In these cases, a UIM is output only when a message is discarded due to the lack of data. These data problems can be reduced by careful provisioning of the route and MAP tables.
5. For INP Message Relay messages with E.164 numbers in the SCCP CDPA, it is assumed that no truncation occurred if and when the routing number was prepended and that SCCP CDPA has the full DN of the subscriber.
6. INP Message Relay to the EAGLE 5 ISS local subsystem is not supported.
7. Only the first 21 digits of the CDPA are decoded for INP Message Relay. For example, if the CDPA contains an RN prefixed to a DN, the RN is seven digits, and the DN is 15 digits, then the total is 22 digits, and the DN used for processing will be only 14 digits (21 total digits less 7 RN digits).
8. GTT currently handles decimal digits only. Thus, if an operator/country is using hexadecimal digits 'A' through 'F' in RNs and the operator is providing GTT to messages that have RN prefixes other than its own prefixes, the operator must enter the RN+DN number ranges as DN ranges in the INP/AINPQ database. The only problem with this is that the beginning and ending DNs can only be 15 digits, which may not be enough for an RN+DN.
9. If ported-in numbers use RN entity, replacing the CDPA GT with the entity address of a Signalling Point is not supported. There is at least one case where this is required: Subsequent GTT is desired, but the STP providing subsequent GTT does not have Number Portability capability.
10. If you choose to provision number normalization, INP/AINPQ always removes the specified prefix digits from the beginning of the DN before searching the database. Take care that the digit sequence of the specified prefix never matches the initial digit sequence of a valid DN. For example, if a valid DN without any special prefix is `5551234`, then `55` should not be provisioned as a special prefix. If it were, INP/AINPQ would remove the first two digits from the DN, resulting in an invalid DN: `51234`.

    Other number normalization considerations include:

    - INP and AINPQ features support up to forty special prefixes per node.
    - Special prefixes may not exceed 15 digits. All configurations of the 15 digit prefix are valid; that is, any digit from '0' to 'F' in any sequence is valid for the prefix.
    - An INP/AINPQ option (`cdpnpfx, chg-inpopts` command) lets an operator enter the prefix digits to be deleted from the Called Party Number or dialed digits before the database lookup.
    - The operator can return either the complete Called Party Number or dialed digits in the response to the SSP including the special prefix, or the DN without the special prefix. Option `dltpfx` is provisionable on a per-prefix basis. Up to 40 prefix-response combinations are supported.
    - The operator can specify mappings from NAI to SNAI (Service NAI). Up to five mappings (for five unique NAI values) are supported. The only valid SNAI values are subscriber (

`sub`), national (`natl`), international (`intl`), and none (`none`, which is used to delete existing entries).

- INP/AINPQ searches for the specified prefix at the beginning of the DN:
  - If the beginning digits of the DN match the provisioned prefix, they are removed before conditioning the number to the international format.
- If NEC is provisioned, INP/AINPQ determines whether the NEC matches the beginning of the DN:
  - If the beginning digits of the DN match the NEC, they are removed before conditioning the number to the international format.
  - If the beginning digits of the DN do not match the provisioned prefix, the unchanged number is conditioned to the international format, which is used for the database search.
- If the Called Party Number NAI value received in the INP query matches a NAI value provisioned in the NAI to SNAI mapping table, the value of SNAI is used when conditioning the number to international format according to existing rules defined for INP.
- After the database search, the response to the SSP is constructed using either the complete number as received in the query (with special prefix), or just the DN (without a prefix). This handling of the prefix depends on the user's specification of various options during configuration, such as `dltpfx`, DRA, and Global Connect.

Receiving INP/AINPQ Data from a National Database

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

- Consider a two-step querying process where all but the recipient network uses a RN that identifies the recipient network and the recipient network itself uses a RN that identifies a particular exchange within its network. In this case, the data from the national database is the RN identifying the recipient network. If the operator is the recipient, its provisioning system must override the "national" RN with the "local" RN.
- The translation from the national database associated with an RN is to the point of interconnection (POI) for the recipient network. The recipient network operator's provisioning system must override this translation with one that directs non-circuit related messages to the correct signaling point within its network. If this is not done, the result will be either message discard or circular routing.

  This problem also occurs when the national database provides RNs and associated translations for non-ported numbers. The number range owner's provisioning system must do one of the following:

  1. Override the translations to its POI with one that directs non-circuit related messages to the correct signaling points within its network
  2. Remove the RNs and the associated translations, which activity causes the messages to use normal GTT
  3. Replace the RN entities with SP entities when G-Flex is used
- When bulk loading the national database, the OPS must not wipe out any G-Flex data nor any data change done to solve the above issues.

Signaling Point (SP) Entity ID

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

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

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

Table 2: Entity ID Examples

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

Provisioning of Routing Number Prefix of the Node (HOMERN)

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

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

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

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

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

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

Provisioning the INP/AINPQ Number Normalization

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

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

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

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

Provisioning the INP/AINPQ Service NAI

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

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

Two UIMs for One MSU

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

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

INP/AINPQ Message Protocol

Primary INP/AINPQ Functions

INP/AINPQ supports two TCAP protocols: INAP (for the INP feature) and ANSI-41 (for the AINPQ feature). The effective processing of the messages is the same for INAP and ANSI-41 protocols. INP and AINPQ provide the following main functions:

- *Message discrimination*: INP and AINPQ translate ported numbers, and consequently can differentiate between messages for INP or AINPQ or other services. Discrimination is performed via a service selector table where you can define the INP or AINPQ service for a combination of selectors. These selectors define whether INP Message Relay or INP/AINPQ Query is to be performed on an incoming message.
- *Number conditioning*: Because the subscriber database stores international DNs only, INP/AINPQ can condition incoming numbers to be international DNs by inserting a default CC and/or a default NDC for the database look up.
  - If the service is INPMR and SNAI is either a RNSDN or RNNDN or RNIDN, INP/AINPQ strips off the RN prefix if it matches the home network RN prefix and then conditions the number, if needed, before performing a database lookup.
  - If the service is INPQ and the message is destined to the INP/AINPQ subsystem, INP/AINPQ does the following:
    - Strips off CDPN or DGTSDIAL prefix if it matches the `cdpnpfx` parameters defined in the `chg-inpopts` command
    - Strips off any digits that match the NEC, if NEC is provisioned
    - Then conditions, if needed, before performing a database lookup
- INAP *Connect Response:* INP Query Services generates a Connect response for an Initial DP message if the conditioned number is found in the subscriber database lookup. INP uses the routing number (RN) associated with the DN entry to build the Destination Routing Address number. If the DLTPFX value is NO (False), the PFX digits are included in the outgoing DRA

digits. If the DLTPFX value is YES (True), the PFX digits are excluded from the outgoing DRA. The supported formats are listed in *Table 3: Supported Destination Routing Address Formats* on page 17.

Table 3: Supported Destination Routing Address Formats

Supported Formats Without the Prefix (DLTPFX=TRUE)	Supported Formats With the Prefix (DLTPFX=FALSE)
RN	RN
RN+DN	RN+PFX+DN
CC+RN+DN	PFX+CC+RN+DN
RN+NEC+DN	RN+PFX+NEC+DN
HOMERN+DN	HOMERN+PFX+DN
RN+ASD	RN+ASD
ASD+RN	ASD+RN
RN+ASD+DN	RN+ASD+PFX+DN
ASD+RN+DN	ASD+RN+PFX+DN
CC+RN+ASD+DN	PFX+CC+RN+ASD+DN
CC+ASD+RN+DN	PFX+CC+ASD+RN+DN
ASD+RN+CC+DN	ASD+RN+PFX+CC+DN
RN+ASD+CC+DN	RN+ASD+PFX+CC+DN
RN+ASD+NEC+DN	RN+ASD+PFX+NEC+DN
ASD+RN+NEC+DN	ASD+RN+PFX+NEC+DN

- ANSI-*41 Return Result with Routing Digits:* If the TCAP query is ANSI-41 protocol, AINPQ responds to the queries with Return Result message. This message has the Routing Digits encoded. If the conditioned number is found in the Database and the NE is listed in *Table 3: Supported Destination Routing Address Formats* on page 17, and the Global Connect option is Continue, Return Result with Routing Digits message will be the response. If the Global Option is Connect and the number returned from the database has an NE assigned, a Return Result with routing digits is the response.
- INAP *Continue Response:* A Continue response is generated for an InitialDP message if the conditioned number is not found in the subscriber database lookup.
- ANSI-*41 Return Result without Routing Digits:* If the query is ANSI-41 protocol and the conditioned number is not found in the database, a Return Result without Routing Digits response is generated. If the conditioned number is found and NE is not assigned and Global Connect Option is set to Connect a Return Result without Routing Digits is generated. If the conditioned number is found in the database, the NE is SP or None and the Global Connect Option is set to Continue, this message is the response.
- INP *Message Relay:* INP performs Message Relay when a combination of service selectors (like domain (ITU or ANSI), Global Title Indicator (GTI), Translation Type (TT), Numbering Plan

(NP), and Nature of Address Indicator (NAI)) indicate INP Message Relay is to be performed. If the translation data exists, INP Message Relay does one of the following:

- Provides the ability to prefix the entity ID to the CDPA digits after deleting any home RN prefix, or
- Replaces the CDPA digits with the RN prefix, or
- Performs no change to the CDPA digits.

The Stages of INP/AINPQ Execution

INP/AINPQ is performed in the following stages:

1. The message arrives at EAGLE 5 ISS *route-on-gt*. The SCCP portion is decoded; the data is used to perform the service selection, based on the CDPA GT fields other than ES and GTAI. The result of this selection identifies the set of translations to be used for INP/AINPQ and also specifies whether INP Message Relay or INP/AINPQ Query is to be performed on the message. If a selector does not match the incoming GT fields, then GTT is performed.
2. If stage 1 indicates INP/AINPQ is required and the message is not a UDTS /XUDTS (Unitdata Service message/Extended Unitdata Service message) generated by EAGLE 5 ISS, the remaining SCCP portion is decoded. If INP/AINPQ Query is required, the TCAP and INAP portions are also decoded. If the message is a UDTS/XUDTS generated by the EAGLE 5 ISS, GTT is performed on the message.
3. If the service indicator is INP Message Relay:
   a. If SNAI is RNSDN or RNNDN or RNIDN, the leading digits of the DN number from the SCCP portion of the message are checked for the Home Routing Number (HOMERN), if any are provisioned. If found, INP/AINPQ strips off the HOMERN and condition the DN to be an international number.
   b. The conditioned number's length is validated and the number is looked up in the subscriber database. First, the individual number database is searched. If the number is absent, the number range database is searched.
   c. If the number is found, the EAGLE 5 ISS uses the Message Relay GT information from the associated entity and prefixes the entity ID to the DN if specified or, based on the option, can replace the CDPA digits with the entity ID or leave the DN unchanged. If no entity is associated with the DN or if the entity does not have translation (MR) data, he GTT is performed on the message.
   d. If no match is found for the conditioned number in the subscriber database, GTT is performed on this message.
   e. If the DPC in the translation data is the EAGLE 5 ISS's Point Code or is for a different domain that the message (i.e., ANSI vs. ITU or ITU vs. ANSI), a UDTS /XUDTS is sent and the processing stops here.
4. If the service indicator is INP Query,
   a. Two types of messages are allowed: messages with InitialDP as the INAP op-code and ANSI-41 messages with NPREQ op-code. During decoding, INP/AINPQ identifies whether the tcap-type is ANSI-41 or INAP from the package type field (second byte) of the TCAP portion of the message.

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

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

b. Remove if the stop digits are present in the Dialed Digits.

c. If NEC is provisioned and NEC is present in the Dialed Digits, strip the NEC off.

d. After removing `cdpnpfx`, ST Digits, and NEC, INP maps the CDPN NAI to the Service NAI by doing a lookup in the INPOPTS table. If the CDPN NAI is entered in the INPOPTS table, its corresponding SNAI value is used for number conditioning. Otherwise, INP treats the number as national (`natl`), unless the NAI field in the CDPN is subscriber (`sub`) or international (`intl`).

c. If the ANSI-41 OPcode is NPREQ, AINPQ decodes the Dialed Digits number and performs number conditioning to convert the Dialed Digits to an international number. As in the case of INAP:

a. The leading digits of the Dialed Digits from the TCAP portion of the message are checked for the prefixes (`cdpnpfx`), if any are provisioned. If found, the `cdpnpfx` is stripped off from the Dialed Digits.

b. Remove if the stop digits are present in the Dialed digits.

c. If NEC is provisioned and NEC is present in the Dialed Digits, strip the NEC off.

d. After removing the `cdpnpfx`, ST DIGITS and NEC from the Dialed digits, NAI is mapped into Service NAI of the INPOPTS table, and corresponding SNAI value is used for number conditioning. If mapping is not found, AINPQ treats the number as National, if the NAI field of Dialed Digits is Subscriber or International.

5. The conditioned number's length is validated, and the number is looked up in the subscriber database.
6. The response depends on the implemented feature (INP or AINPQ), the Global Connect option specified in the `chg-inpopts` command (`connect` or `continue`), and on the result type of the query of the NPDB (RN or SP), as follows:

- A “Connect” message (for the INP feature) or a “Return Result with Digits” message (for the AINPQ feature) is sent in the following cases:
  - The NPDB query result type is RN (in this case, the Global Connect option does not matter)
  - The NPDB query result type is SP and the Global Connect option is specified as `connect`

    In either case, the Destination Routing Address of the message contains a format from *Table 3: Supported Destination Routing Address Formats* on page 17, depending on the value of the DRA field specified in the `chg-inpopts` command.

- A “Continue” message (for the INP feature) or a “Return Result without Digits” message (for the AINPQ feature) is sent in the following cases:
  - The NPDB query result type is SP and the Global Connect option is specified as `continue`

- The NPDB query result returns a Not Found (in this case, the Global Connect option does not matter)

MPS/EPAP Platform

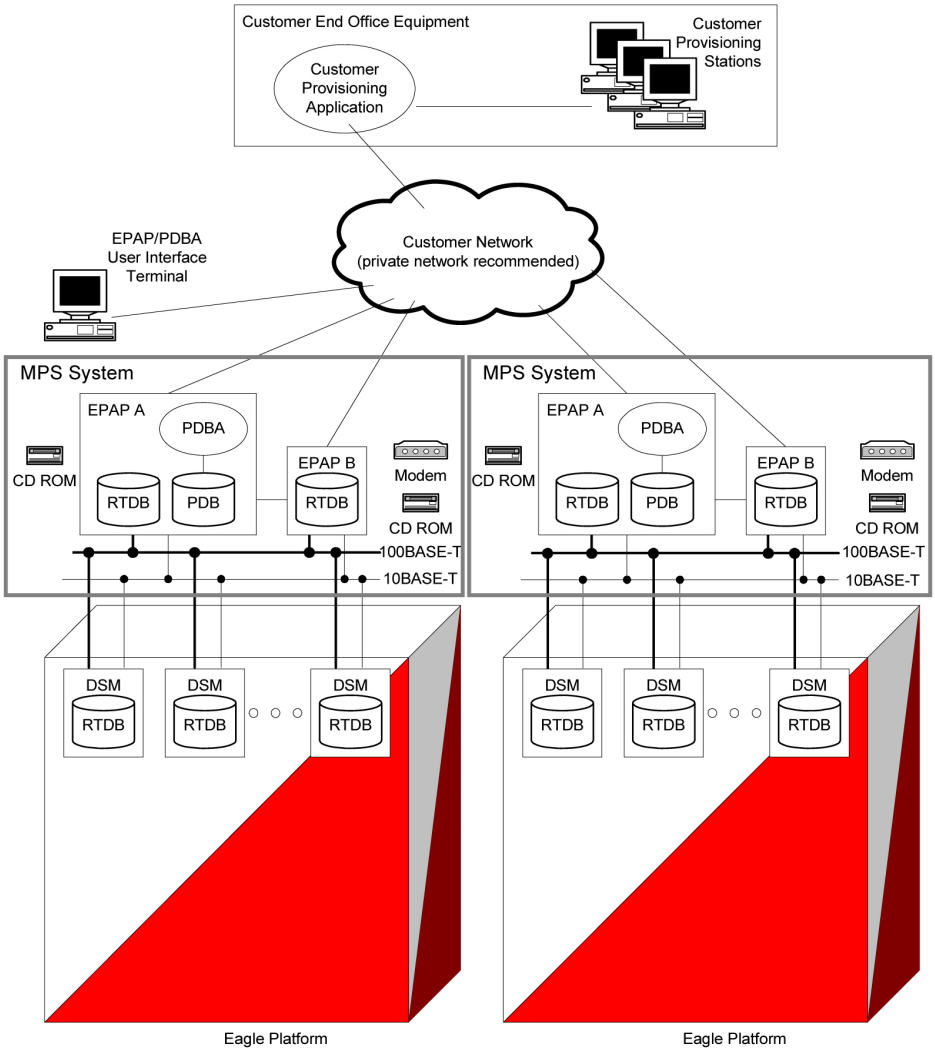
Tekelec provides the MPS (Multi-Purpose Server) platform as a subsystem of the EAGLE 5 ISS. The MPS provides support for the AINPQ, A-Port, EIR , G-Flex, G-Port, IGM, and INP features.

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 1: MPS/EPAP Platform Architecture* on page 20 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 1: MPS/EPAP Platform Architecture



Design Overview and System Layout

Figure 1: MPS/EPAP Platform Architecture on page 20 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 1: MPS/EPAP Platform Architecture* on page 20 illustrates the EPAP architecture contained in the MPS subsystem.

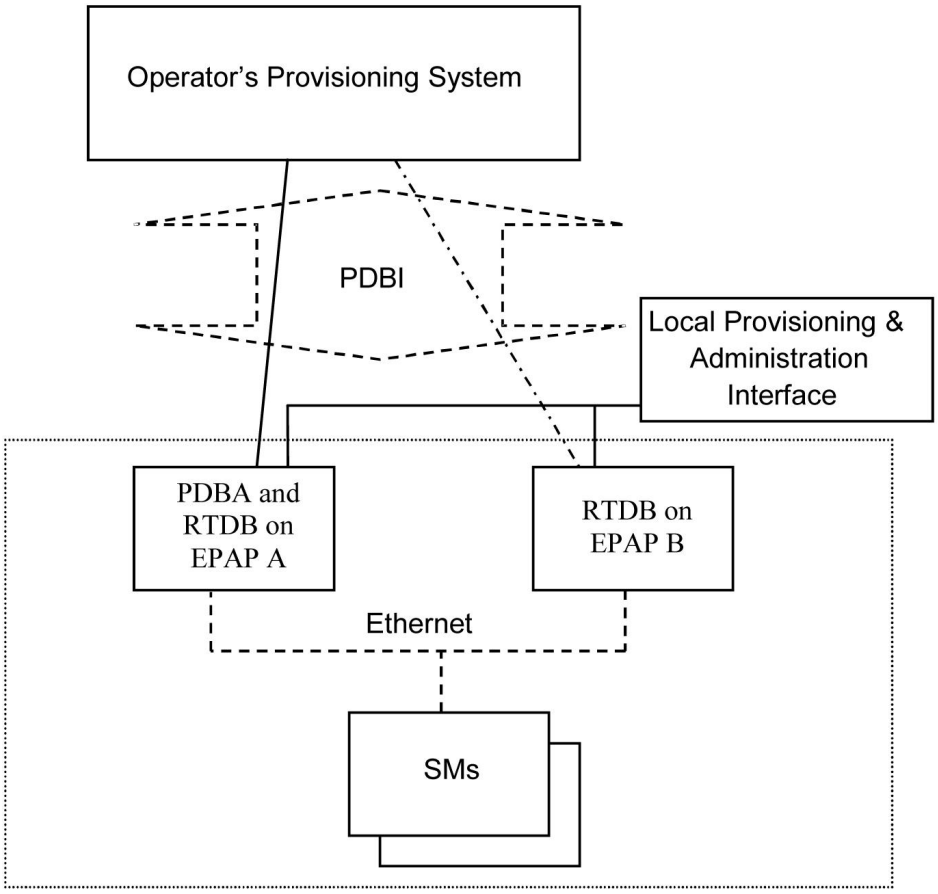
Each EPAP has a dedicated optical media drive. One EPAP per EAGLE 5 ISS platform has a modem capable of supporting remote diagnostics, configuration, and maintenance. These remote operations are performed through EPAP login sessions and are accessible across the customer network as well as through a 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: Subscriber Data Provisioning Architecture (High Level) on page 24 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: 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.

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

Databases requiring high update and retrieval rates, (compared to the rates provided by the OAM) are not administered via EAGLE 5 ISS terminals. These databases, 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 1: MPS/EPAP Platform Architecture* on page 20, 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.

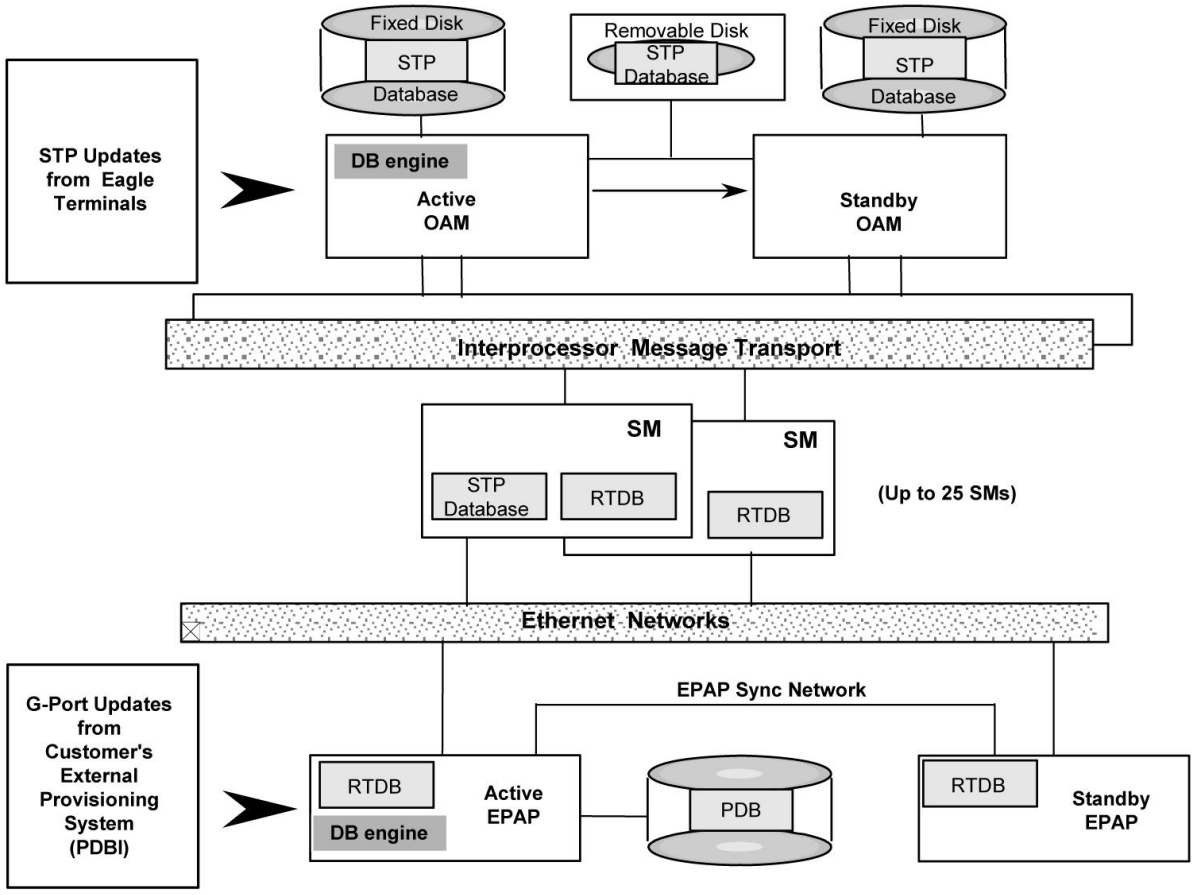
Both the active and standby EPAPs maintain copies of the RTDB. Periodically, the Service Module card polls the active EPAP RTDB for any new updates. The active EPAP downloads the updates to the Service Module for its own resident copy of the RTDB.

In a mated-pair configuration, there are two mated MPS Systems, as shown in *Figure 1: MPS/EPAP Platform Architecture* on page 20. The PDB on the active EPAP automatically updates the PDB on the mate platform. The PDB on the mate platform then updates its EPAP RTDBs, which in turn update the RTDBs on the 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 3: Database Administrative Architecture* on page 26.

Figure 3: Database Administrative Architecture



Service Module Cards

From 1 to 25 Service Module cards can be provisioned with the A-Port feature enabled. The A-Port feature requires that all Service Module cards contain 4 GB of memory. *Figure 3: Database Administrative Architecture* on page 26 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 A-Port 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 A-Port 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, A-Port uses a technique known as IP multicasting. This technique is based on Reliable Multicast Transport Protocol-II (RMTP-II), a product of Globalcast Communications. IP multicasting downloads the RTDB and database updates to 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* on page 30
- *EPAP Sync Network* on page 31
- *DSM Networks* on page 32
- *Dial-Up PPP Network* on page 33

The following discussion is an overview of these private networks. It expands on the networks in the architecture diagram shown in *Figure 4: Customer Provisioning Network* on page 30. (For details about configuring these networks, refer to the EPAP *Administration Manual*.)

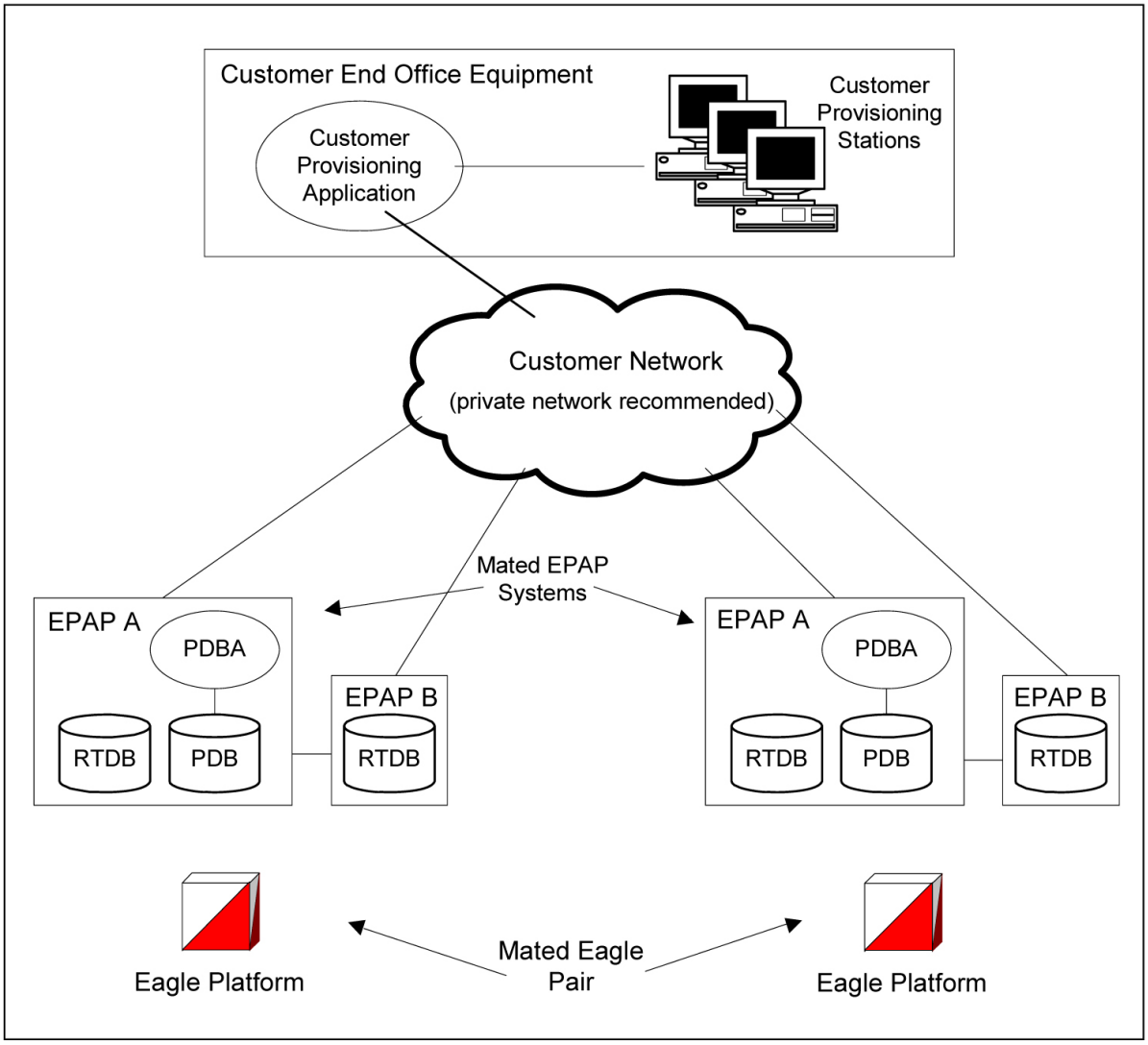
Customer Provisioning Network

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 4: Customer Provisioning Network* on page 30.

Figure 4: Customer Provisioning Network

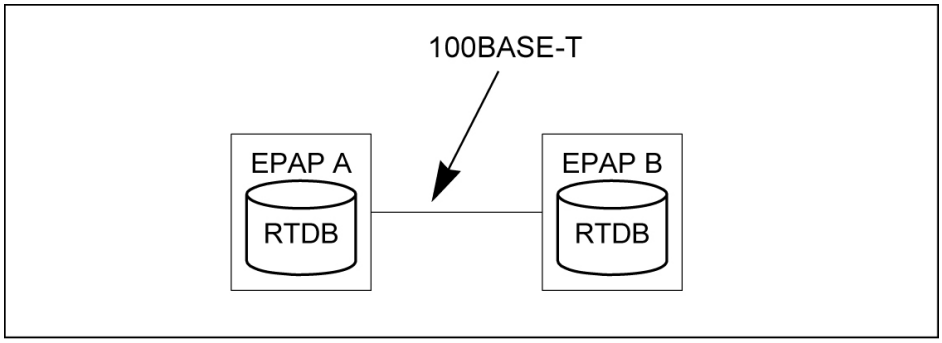


Although a dedicated network is recommended, it is possible that unrelated customer traffic can use the network as well. The determination, either to have a dedicated network or to allow other customer traffic, should be based on available external Ethernet bandwidth and network performance considerations.

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 5: EPAP Sync Network* on page 31.

Figure 5: EPAP Sync Network

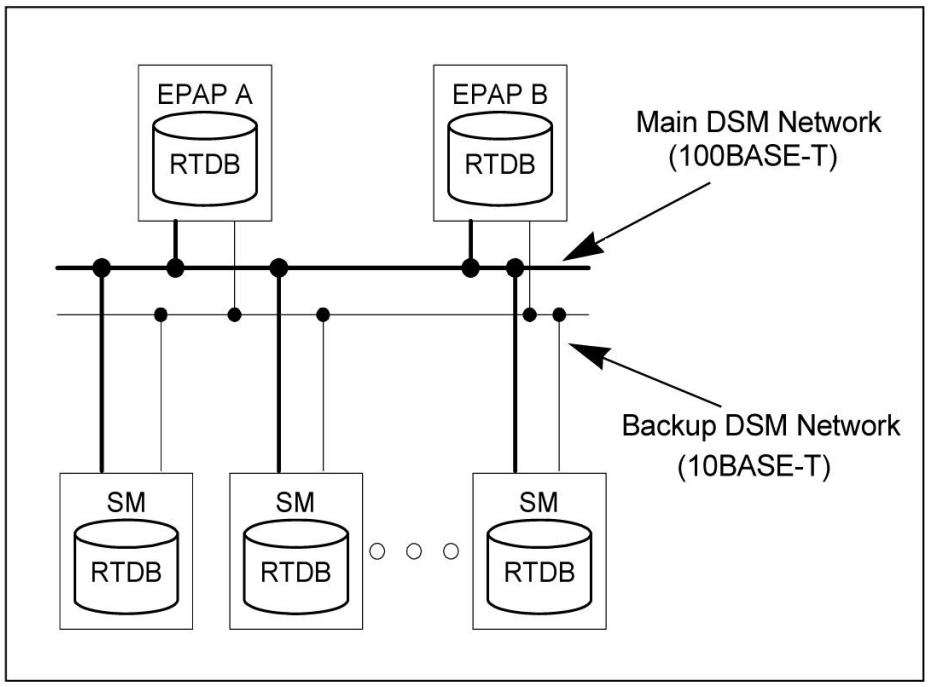


DSM Networks

The DSM networks are shown in *Figure 6: DSM Networks* on page 32. 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 6: 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 4: EPAP IP Addresses in the DSM Network on page 33 summarizes the contents of each octet.

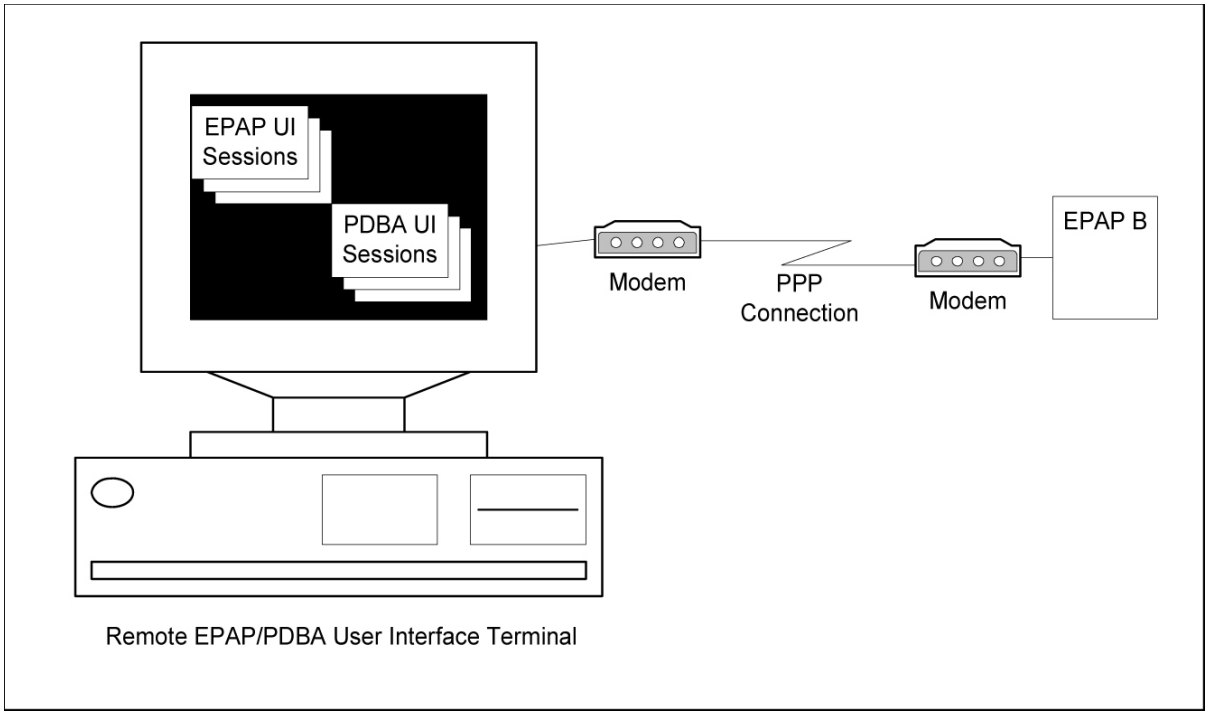
Table 4: EPAP IP Addresses in the DSM Network

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 7: Dial-Up PPP Network* on page 33.

Figure 7: Dial-Up PPP Network



Serviceability Hints

Mated Application Considerations

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

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

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

Entity Point Codes and Routes

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

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

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

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

Chapter 3

INP/AINPQ Commands

Topics:

This chapter describes the EAGLE 5 ISS Commands used for maintenance, measurement, and administration of the INP and AINPQ features. EAGLE 5 ISS INP/AINPQ commands provide for the provisioning, operations, and maintenance activities of the EAGLE 5 ISS Service Module cards and associated network connections.

Introduction

This chapter describes the EAGLE 5 ISS Commands used for maintenance, measurement, and administration of the INP and AINPQ features. EAGLE 5 ISS INP/AINPQ commands provide for the provisioning, operations, and maintenance activities of the EAGLE 5 ISS Service Module cards and associated network connections.

EAGLE 5 ISS Commands for INP/AINPQ

This section provides a description of the user interface for maintenance, operation, and measurement commands for the INP/AINPQ feature. The commands that follow allow provisioning, operations, and maintenance activities for Service Module cards.

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

Commands

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

Commands described in this section include:

chg-ctrl-feat / enable-ctrl-feat / rtrv-ctrl-feat

The `chg-ctrl-feat` command is used with the controlled features of the EAGLE 5 ISS that have been purchased and enabled with the `enable-ctrl-feat` command.

Although the `chg-ctrl-feat` command can be used for some feature types to turn those features on or off, the INP and AINPQ features are feature types that can only be permanently turned on. After the INP and AINPQ features have been turned on using the `chg-ctrl-feat` command, they are permanently on and cannot be turned off.

The `enable-ctrl-feat` command is used to enable a controlled feature of the EAGLE 5 ISS.

The `rtrv-ctrl-feat` command is used to retrieve the status of features that are controlled by feature access keys. The following example shows an example of the output from the `rtrv-ctrl-feat` command for an EAGLE 5 ISS in which both the INP and AINPQ features have been enabled.

- `rtrv-ctrl-feat`

```
    rlghncxa03w 08-04-29 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         ----
LNP Short Message Service 893006601  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         ----
15 Minute Measurements    893012101  off        ----
EIR                       893012301  on         ----
```

```
    ANSI-41 INP Query          893017801  on          ----
    INP                        893017901  on          ----
    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          ----
    Prepaid IDP Query Relay    893016001  on          ----
    Origin Based SCCP Routing  893014301  on          ----
    Lrg BICC MSU for IP Sig    893018401  off         ----
    Transaction Based GTT LS   893017101  on          ----
    Hex Digit Support for GTT  893018501  on          ----
    E5-SM4G Throughput Cap     893019101  on          ----
;
```

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

chg-stpopts / rtrv-stpopts

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

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

The `chg-stpopts` command is also used to configure the EAGLE 5 ISS to send:

- The Connect or Continue message when an IDP message is received for INP service
- The Return Result with Routing Digits or Return Result without Routing Digits message when an IDP message is received for AINPQ service

The `rtrv-stpopts` command is used to retrieve all STP options from the database. This command updates the STPOPTS table. The `defcc` and `defndc` parameters are the additional options displayed when G-Flex is ON or the G-Port, INP, or AINPQ features have been enabled.

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

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

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

ent-homern / dlt-homern / rtrv-homern

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

chg-sid / rtrv-sid

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

rept-stat-sys

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

rept-stat-sccp

This command is used to display the status of TSM cards running the SCCP application, Service Module cards running the VSCCP application, and the EAGLE 5 ISS services executing on those cards. This command also displays any cards that are denied SCCP service.

Here are two sample commands and their outputs.

- `rept-stat-sccp`

```
Command entered at terminal #3.
;
        tekelecstp 000623 13:34:22 EST  EAGLE5 36.0.0
    SCCP SUBSYSTEM REPORT IS-NR          Active
         SCCP ALARM STATUS = No Alarms
    INPQ SUBSYSTEM REPORT IS-ANR         Restricted  -----
         ASSUMING MATE'S LOAD
         INPQ: SSN STATUS = Allowed     MATE SSN STATUS  = Prohibited
         INPQ ALARM STATUS = No Alarms
    GFLEX SERVICE REPORT IS-ANR         Active
         GFLEX ALARM STATUS = No Alarms
    MNP SERVICE REPORT   IS-ANR         Active
         MNP ALARM STATUS   = No Alarms

    SCCP Cards Configured=4  Cards IS-NR=2
    System TPS Alarm Threshold = 100% Total Capacity
    System Peak SCCP Load = 3000 TPS
    System Total SCCP Capacity = 5000 TPS

    CARD   VERSION      PST          SST         AST       MSU USAGE  CPU
USAGE
    --------------------------
    1212   101-001-000  IS-NR        Active      ALMINH       45%         30%

    1301 P 101-001-000  IS-NR        Active      ------       35%         40%

    1305   -----------  OOS-MT       Isolated    ------        0%          0%

    2112   -----------  OOS-MT-DSBLD Manual      ------        0%          0%

    --------------------------
    SCCP Service Average MSU Capacity = 40%       Average CPU Capacity = 35%
```

```
    AVERAGE CPU USAGE PER SERVICE:
      GTT   = 15%  GFLEX =  5%  MNP = 10%
      INPMR =  2%  INPQ  =  3%

    TOTAL SERVICE STATISTICS:
                                       FAIL     REROUTE\      FORWARD
      SERVICE    SUCCESS    ERRORS    RATIO     WARNINGS        TO GTT
TOTAL
      GTT:          1995         5      0%            -             -     2000

      GFLEX:         500         1      0%            4            10
515
      MNP:           800         0      0%            2             3
805
      INPMR:          50         5      0%            0            15
70
      INPQ:          499         1      0%            -             -
500

    Command Completed.
;
```

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

```
Command entered at terminal #4.
;
    tekelecstp 06-11-24 13:34:22 EST  EAGLE 37.5.0
    CARD  VERSION      TYPE    PST           SST       AST
    1106  101-010-000  DSM     IS-NR         Active    -----
    CARD ALARM STATUS       = No Alarms.
    GTT:   STAT = ACT       CPU USAGE = 10%
    GFLEX: STAT = ACT       CPU USAGE = 10%
    MNP:   STAT = ACT       CPU USAGE = 10%
    INPMR: STAT = ACT       CPU USAGE = 13%
    INPQ:  STAT = ACT       CPU USAGE = 20%
                        TOTAL     = 63%

    CARD SERVICE STATISTICS:
      SERVICE    SUCCESS    ERRORS    WARNINGS    FORWARD TO GTT    TOTAL
      GTT:          1995         5           -                 -     2000
      GFLEX:         500         1           4                10      515
      MNP:           500         1           4                10      515
      INPMR:          50         2           3                15       70
      INPQ:          499         1           -                 -      500
    Command Completed.
;
```

rept-stat-mps

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

- If the LNP ELAP Configuration feature is turned on, the status of the ELAP (EAGLE LNP Application Processor) subsystem is displayed.

  Note:

  The LNP feature cannot be enabled in the same EAGLE 5 ISS where an INP or AINPQ feature is enabled.

- If the INP (INAP number portability) feature is turned on, the status of the EPAP (EAGLE Provisioning Application Processor) subsystem is displayed.
- If the AINPQ (ANSI-41 INP Query) feature is turned on, the status of the EPAP (EAGLE Provisioning Application Processor) subsystem is displayed.
- If the G-Port (GSM mobile number portability) feature or G-Flex (GSM flexible numbering) feature is turned on, the status of the GSM (Global System for Mobile Telecommunications) and the EPAP (EAGLE Provisioning Application Processor) is displayed.
- If the EIR (Equipment Identity Register) feature is enabled and turned on, the status of the EIR component on the card is displayed.

A sample command and the associated output follows:

- `rept-stat-mps`

```
       Command entered at terminal #4.

rlghncxa03w 06-11-24 10:23:93 EST  EAGLE 37.5.0

VERSION       PST            SST        AST
EPAP A             027-015-000   IS-NR          Active    -----
   CRITICAL PLATFORM    ALARM DATA = No Alarms
    MAJOR    PLATFORM    ALARM DATA = No Alarms
    MINOR    PLATFORM    ALARM DATA = No Alarms
    CRITICAL APPLICATION ALARM DATA = No Alarms
    MAJOR    APPLICATION ALARM DATA = No Alarms
    MINOR    APPLICATION ALARM DATA = No Alarms
          ALARM STATUS = No Alarms
                  VERSION       PST            SST        AST
EPAP B            027-015-000   IS-NR          Standby   -----
    CRITICAL PLATFORM    ALARM DATA = No Alarms
    MAJOR    PLATFORM    ALARM DATA = No Alarms
    MINOR    PLATFORM    ALARM DATA = No Alarms
    CRITICAL APPLICATION ALARM DATA = No Alarms
    MAJOR    APPLICATION ALARM DATA = No Alarms
    MINOR    APPLICATION ALARM DATA = No Alarms
          ALARM STATUS = No Alarms
CARD   PST          SST      INP STAT
1106 P IS-NR        Active    ACT
1201   IS-ANR       Active    SWDL
1205   OOS-MT-DSBLD Manual    -------
1302   OOS-MT       Isolated  -------
1310   IS-ANR       Standby   SWDL
CARD 1106 ALARM STATUS = No Alarms
  DSM PORT A:      ALARM STATUS       = No Alarms
  DSM PORT B:      ALARM STATUS       = No Alarms
CARD 1201 ALARM STATUS = No Alarms
  DSM PORT A:      ALARM STATUS       = **  0084 IP Connection Unavailable
  DSM PORT B:      ALARM STATUS       = **  0084 IP Connection Unavailable
CARD 1205 ALARM STATUS = No Alarms
  DSM PORT A:      ALARM STATUS       = **  0084 IP Connection Unavailable
  DSM PORT B:      ALARM STATUS       = **  0084 IP Connection Unavailable
CARD 1302 ALARM STATUS = ** 0013 Card is isolated from the system
  DSM PORT A:      ALARM STATUS       = **  0084 IP Connection Unavailable
  DSM PORT B:      ALARM STATUS       = **  0084 IP Connection Unavailable
CARD 1310 ALARM STATUS = No Alarms
  DSM PORT A:      ALARM STATUS       = **  0084 IP Connection Unavailable
  DSM PORT B:      ALARM STATUS       = **  0084 IP Connection Unavailable
Command Completed.
;
```

rept-stat-card

The `rept-stat-card` command is used to display the status of the card and maintenance activity.

The output of the `rept-stat-card` command includes the card location, GPL version being used by the card, device type, device primary state, device secondary state, and device associated state. Refer to the *Commands Manual* for details of this command.

rept-meas

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

chg-measopts

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

rept-stat-meas

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

rept-ftp-meas

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

rtrv-measopts

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

rept-stat-trbl

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

Here is an example of the command and output.

`rept-stat-trbl`

```
Command Accepted - Processing
    eagle10605 06-11-24 14:34:08 EST  EAGLE 37.5.0
    rept-stat-trbl
    Command entered at terminal #10.
;
    eagle10605 99-06-24 14:34:08 EST  EAGLE 37.5.0
    Searching devices for alarms...
;
    eagle10605 06-11-24 14:34:09 EST  EAGLE 37.5.0
    SEQN UAM  AL DEVICE   ELEMENT      TROUBLE TEXT
    0002.0143  * CARD 1113 OAM         System release GPL(s) not approved
    0011.0176  * SECULOG 1116          Stdby security log -- upload required
```

```
    3540.0203 ** SLK 1201,A lsn1       REPT-LKF: lost data
    3541.0203 ** SLK 1201,B lsn4       REPT-LKF: lost data
    3542.0203 ** SLK 1202,A lsn2       REPT-LKF: lost data
    3544.0202 ** SLK 1203,A lsn3      REPT-LKF: HWP - too many link interrupts

    0021.0318 ** LSN lsn1              REPT-LKSTO: link set prohibited
    0022.0318 ** LSN lsn2              REPT-LKSTO: link set prohibited
    0023.0318 ** LSN lsn3              REPT-LKSTO: link set prohibited
    0010.0318 ** LSN lsn4              REPT-LKSTO: link set prohibited
    3537.0084 ** DSM A   1215          IP Connection Unavailable
    3536.0084 ** EPAP B   7100         IP Connection Unavailable
    0003.0313 *C DPC 010-010-003       DPC is prohibited
    0004.0313 *C DPC 010-010-004       DPC is prohibited
    0005.0313 *C DPC 010-010-005       DPC is prohibited
    0028.0313 *C DPC 252-010-001       DPC is prohibited
    0006.0313 *C DPC 252-010-003       DPC is prohibited
    0008.0313 *C DPC 252-010-004       DPC is prohibited
    0009.0313 *C DPC 252-011-*         DPC is prohibited
    0029.0308 *C SYSTEM                Node isolated due to SLK failures
Command Completed.
;
```

rept-stat-alm

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

Here is an example of the command and output.

```
rept-stat-alm
```

```
Command Accepted - Processing
    eagle10605 06-11-24 23:59:39 EST  EAGLE 37.5.0
    rept-stat-alm
    Command entered at terminal #10.
;
    eagle10605 06-11-24 23:59:39 EST  EAGLE 37.5.0
    ALARM  TRANSFER= RMC
    ALARM  MODE      CRIT= AUDIBLE     MAJR= AUDIBLE     MINR= AUDIBLE
    ALARM  FRAME 1     CRIT=   9         MAJR=  12         MINR=   2
    ALARM  FRAME 2     CRIT=   0         MAJR=   0         MINR=   0
    ALARM  FRAME 3     CRIT=   0         MAJR=   0         MINR=   0
    ALARM  FRAME 4     CRIT=   0         MAJR=   0         MINR=   0
    ALARM  FRAME 5     CRIT=   0         MAJR=   0         MINR=   0
    ALARM  FRAME 6     CRIT=   0         MAJR=   0         MINR=   0
    ALARM  FRAME GPF   CRIT=   1         MAJR=   2         MINR=   1
    PERM. INH. ALARMS  CRIT=   0         MAJR=   0         MINR=   0
    TEMP. INH. ALARMS  CRIT=   0         MAJR=   0         MINR=   0
    ACTIVE ALARMS      CRIT=  10         MAJR=  14         MINR=   3
    TOTAL ALARMS       CRIT=  10         MAJR=  14         MINR=   3
    Command Completed.
;
```

rept-stat-db

This command displays both EAGLE 5 ISS and INP/AINPQ 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*.

inh-card / alw-card

The `inh-card` command is used to change the state of the card from in-service normal (IS-NR) to Out-of-Service Maintenance-Disabled (OOS-MT-DSBLD). A craftsperson then can test the card or physically remove it from the shelf.

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

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

ent-card / rtrv-card / dlt-card

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

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

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

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

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

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

alw-map-ss / inh-map-ss

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

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

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

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

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

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

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

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

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

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

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

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

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

Here are samples of the reports produced by these commands.

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

```
    Command entered at terminal #3.
;
    tekelecstp 06-11-24 06:54:39 EST  EAGLE 37.5.0
    VSCCP upload to 1114 completed
    VSCCP upload to 1116 completed
; act-gpl:appl=vsccp:ver=101-3-0
    Command entered at terminal #3.
;
    tekelecstp 06-11-24 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 08-04-24 07:01:08 EST  EAGLE 38.0.0
    GPL Auditing  ON
    GPL   CARD  RELEASE      APPROVED         TRIAL        REMOVE TRIAL
    VSCCP 1114  101-001-000  101-003-000      101-001-000  101-003-000
    VSCCP 1116  101-001-000  101-003-000      101-003-000  -----------
; rept-stat-gpl:appl=vsccp
    Command entered at terminal #3.
;
    tekelecstp 08-04-24 12:55:50 EST  EAGLE 38.0.0
    GPL        CARD      RUNNING            APPROVED      TRIAL
    VSCCP      1205      101-003-000 ALM    101-003-000   101-003-000
    VSCCP      1211      101-001-000 ALM+   101-003-000   -----------
    Command Completed.
;
```

ent-cspc / dlt-cspc / rtrv-cspc

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

at an adjacent signaling point and subsystem. Refer to the *Commands Manual* for details of these commands.

chg-inpopts / rtrv-inpopts

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

inh-alm / unhb-alm

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

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

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

chg-ip-card / rtrv-ip-card

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

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

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

chg-ip-lnk / rtrv-ip-lnk

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

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

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

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

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

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

pass

The `pass` command allows remote execution of a selected command by the targeted card. (These commands recognize the Service Module cards.) 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 the card location of a Service Module card running the VSCCP application. For other details of the pass command, refer to *Commands Manual*.

pass: cmd="Ping"

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

```
    eagle10506 06-12-11 08:43:45 EST  EAGLE 37.5.0
    pass:loc=1215:cmd="ping     -h"
    Command entered at terminal #2.
;
    eagle10506 06-12-11 08:43:45 EST  EAGLE 37.5.0
    PASS: Command sent to card
;
    eagle10506 06-12-11 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/DSM IP network.

The following example displays the options that can be used for the netstat command.

```
    eagle10506 06-12-11 08:43:00 EST  EAGLE 37.5.0
    pass:loc=1215:cmd="netstat  -h"

    eagle10506 06-12-11 08:43:00 EST  EAGLE 37.5.0
    PASS: Command sent to card;
    eagle10506 06-12-11 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;

;
```

Refer to the Commands Manual for examples of the output that appears for each netstat command option.

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 06-12-11 08:45:57 EST  EAGLE 37.5.0
    pass:loc=1215:cmd="nslookup"
    Command entered at terminal #2.
;
    eagle10506 06-12-11 08:45:57 EST  EAGLE 37.5.0
    PASS: Command sent to card
;
    eagle10506 06-12-11 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 06-12-11 08:43:23 EST  EAGLE 37.5.0
    pass:loc=1215:cmd="arp      -h"
    Command entered at terminal #2.
;
    eagle10506 06-12-11 08:43:23 EST  EAGLE 37.5.0
    PASS: Command sent to card
;
    eagle10506 06-12-11 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 06-12-11 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 06-12-11 08:42:18 EST  EAGLE 37.5.0
    pass:loc=1215:cmd="help"
    Command entered at terminal #2.
;
    eagle10506 06-12-11 08:42:18 EST  EAGLE 37.5.0
    PASS: Command sent to card
;
    eagle10506 06-12-11 08:42:18 EST  EAGLE 37.5.0
    List of commands supported is:
    nslookup
    netstat
```

```
    arp
    ping
    help
    END of LIST
;
```

System Debug Services (SDS) Commands

The following section describes SDS command `ent-trace` used with INP/AINPQ.

MSU Trap and Trace Command

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

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

CAUTION:

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

- **RN or SP address (Entity ID) -** Use this new criterion to trap messages immediately after performing the RTDB database lookup. If the RN or SP obtained from the database lookup matches the Entity ID provisioned in the command, the message is trapped. This parameter supports a variable number of hexadecimal digits from 1 to 15 digits, and the Entity ID specified must be the one stored in the INP/AINPQ RTDB.
- **E.164 MSISDN number (DN)** – Use this criterion to trap messages immediately before performing a INP/AINPQ search based on the MSISDN numbers defined in the INP/AINPQ RTDB. This parameter accepts a range of digits, from 5 to 15. The number specified must be an International E.164 number (MSISDN or Entity Number).
- **Global Title digits (GT)** – Use this criterion to trap messages based on CdPA Global Title Address (that is, either MSISDN (+ST) number or RN + MSISDN (+ST)) present in the SCCP part of the message.
- **Origination point code** (SSPI/SSPN) – Use this criterion to trap messages based on CgPA SPC present in the SCCP part of the message. If no point code is present in the CgPA SPC, the criteria is matched with the OPC present in the MTP part of the message.

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

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

Chapter 4

INP/AINPQ Feature Activation

Topics:

This chapter identifies prerequisites for the INP/AINPQ feature activation procedures, an overview of the activation steps, and a matching number of detailed step descriptions to turn on the INP/AINPQ features. The INP/AINPQ feature activation procedure is performed at the EAGLE 5 ISS. The INP and AINPQ features can be enabled and turned on independently.

Introduction

CAUTION: For an in-service environment, contact *Customer Care Center* on page 4 before continuing to activate either the INP feature or the AINPQ feature. For an environment that is not yet in-service, you may continue with this procedure.

Note: The INP feature cannot be enabled if any of the Service Module cards have less than 1GB of memory installed. The AINPQ feature cannot be enabled if any of the Service Module cards have less than 4GB of memory installed. 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.

This chapter identifies prerequisites for the INP/AINPQ feature activation procedures, an overview of the activation steps, and a matching number of detailed step descriptions to turn on the INP/AINPQ features. The INP/AINPQ feature activation procedure is performed at the EAGLE 5 ISS. The INP and AINPQ features can be enabled and turned on independently.

The INP and AINPQ features support numbers of varying lengths in a flexible way without requiring software modifications.

- The INP feature applies to ITU-I (international) and ITU-N (national) network environments. The INP Query Services apply to ITU-N networks only.
- The AINPQ feature applies to ITU-N networks only.

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

CAUTION: Once a feature has been enabled with the `enable-ctrl-feat` command and then 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.

Note: The INP and AINPQ features require a Service Module card running the VSCCP application. Systems with TSM cards running the SCCP application need to be upgraded to Service Module cards prior to turning on the INP or AINPQ features.

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.

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

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

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

Prerequisites

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

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

The INP/AINPQ feature activation assumes that Service Module cards (minimum of 1GB for the INP feature and 4GB for the AINPQ feature) 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: TSM cards use one card slot; Service Module cards require two card slots, odd-even.

  Note: Neither the INP feature nor the AINPQ feature can be turned on until the 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 card. This precaution keeps cards in service and precludes an interruption of SCCP services.

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

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

For in-service systems that already have the G-Port and/or G-Flex feature enabled, only perform *Step 70* on page 59 through *Step 94* on page 60 to turn on and configure the INP feature or the AINPQ feature or both features. With the G-Port and/or G-Flex 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 INP/AINPQ feature activation procedure. The procedure is described in detail in section *Feature Activation Procedure* on page 60 .

The feature activation consists of these sections:

- Configure system for HLR destinations in *Step 1* on page 56 through *Step 28* on page 57.
- Install Service Module cards in available slots and configure for VSCCP in *Step 29* on page 57 through *Step 44* on page 58.
- Replace TSM cards configured for SCCP with Service Module cards configured for VSCCP and inhibit/remove any remaining SCCP cards in *Step 45* on page 58 through *Step 69* on page 59.
- Enable, turn on and configure the INP feature or the AINPQ feature or both in *Step 71* on page 59 through *Step 94* on page 60

Step 1 on page 56 through *Step 28* on page 57 configure the system to be able to communicate with the system of the HLR database. The route to this database may already be configured. Perform these steps to verify that you have entered all HLR destinations for INP/AINPQ and make configuration changes as needed.

1. Display and note current system settings for point codes (PCs) and capability point codes (CPCs), destination point codes (DPCs), routes, and linksets using *Step 1* on page 56 through *Step 7* on page 56.
2. Use `rtrv-sid` command to display current PCs and CPCs.
3. Use `rtrv-dstn` command to display current DPCs.
4. Use `rtrv-rte` command to display current route configurations.
5. Identify PCs and CPCs; determine new PC and CPC to be entered in *Step 9* on page 56.
6. Use `rtrv-stpopts` command to display PC or CPC format if ITU-N network.
7. Use `rtrv-map` command to display PCs of mated applications in database; remove system PC from table if necessary (refer to *Database Administration Manual - Features*, Removing A Mated Application).

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

8. Change PC, CPC, DPC, route, linkset, and LIM card configurations for the HLR database using *Step 9* on page 56 through *Step 28* on page 57.
9. Use `chg-sid` command to configure PC and CPC by network type.
10. Use `init-sys` command to initialize system if changes were made in *Step 9* on page 56 to any `pca/pci/pcn` parameter.

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

CAUTION: When the `init-sys` command executes, the system does not retain the manually initiated state (for example, OOS-MT-DSBLD) for the signaling link, card, or terminal. After the command executes, the system attempts to bring all provisioned links, cards, and terminals on line, including those that were previously out of service. You will need to manually put each device back into its previous state after the system is back on line. Print or electronically capture the output of the `rept-stat-slk`, `rept-stat-card`, and `rept-stat-trm` commands for reference prior to issuing the `init-sys` command. To restore a device to its previous state, issue the appropriate inhibit/deactivate command listed in the *EAGLE 5 ISS Commands Manual* in the Related Commands section for each of the above `rept-stat` commands.

11. Use `rtrv-sid` command to display new PC and CPC.
12. Use `ent-dstn` command to enter DPC for HLR destinations.
13. Use `rtrv-dstn` command to display new HLRDPC.
14. Use `ent-ls` command to enter linkset and assign DPC for HLR destinations.
15. Use `rtrv-ls` command to display new linkset and assigned DPC for HLR destinations.
16. Use `ent-card` command to enter LIM card(s) into database.
17. Use `rtrv-card` command to display new LIM card(s) in database.
18. Use `ent-slk` command to assign signaling link(s) to LIM card(s).
19. Use `rtrv-slk` command to display new signaling link(s) assigned to LIM card(s).
20. Use `ent-rte` command to assign route to new DPC.
21. Use `rtrv-rte` command to display route assigned to new DPC.
22. Use `ent-map` command to enter mated application into database.
23. Use `rtrv-map` command to display new mated application in database.
24. Use `alw-card` command to allow LIM card(s).
25. Use `rept-stat-card` command to display status of new LIM card(s) in database.
26. Use `act-slk` command to activate new signaling link(s) for LIM card(s).
27. Use `rept-stat-slk` command to display IS-NR status of signaling link(s).
28. Use `rtrv-card` command to confirm the new LIM card(s) and identify VSCCP cards (Service Module cards running VSCCP application) and SCCP cards (TSM cards running SCCP application).

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

29. Install and configure Service Module card(s) in available odd-even slots as needed using *Step 30* on page 57 through *Step 44* on page 58.
30. Install Service Module card(s) in available odd-even slots and verify green IMT bus LEDs.

31. Use `ent-card` command to enter Service Module card(s) as VSCCP card(s) into database.
32. Use `rtrv-card` command to display new VSCCP card(s) in database.
33. Use`rtrv-ip-lnk` command to display current link parameters associated with the VSCCP card.
34. Use`chg-ip-lnk` command to set the IP address port and speed associated with the VSCCP card.
35. Use `rtrv-ip-lnk` command to display changed link parameters.
36. Use `rtrv-ip-host` command to display current IP host information in database.
37. Use `ent-ip-host` command to add host name and IP address for each VSCCP link.
38. Use `rtrv-ip-host` command to display changed IP host information.
39. Use `chg-ip-card` command to set local domain and IP router address if necessary.
40. Use `rtrv-ip-card` command to display changed VSCCP card information.
41. Use `alw-card` command to boot Service Module card in TSM emulation mode.
42. Use `rept-stat-card` command to display IS-NR status of VSCCP card.
43. Use `pass` command to test presence of EPAP hosts on network.
44. Repeat *Step 30* on page 57 through *Step 43* on page 58 to add all Service Module cards (N+1) to be installed in available slots.

    Go to the next step to start replacing TSM cards.
45. Replace TSM card(s) with Service Module cards if applicable, and add Service Module card(s) to database using *Step 46* on page 58 through *Step 68* on page 59.
46. Use `rtrv-card` command to display TSM cards running the SCCP application (SCCP cards) in database.
47. Use `rept-stat-card` command to display SCCP cards in IS-NR status.
48. Use `inh-card` command to inhibit SCCP card(s).
49. Use `rept-stat-card` command to display OOS-MT-DSBLD status of SCCP card(s).
50. Use `dlt-card` command to delete SCCP card(s) from database.
51. Use `rtrv-card` command to verify removal of SCCP cards from database.
52. Remove first TSM card from shelf.
53. Remove second TSM card from shelf.
54. Install Service Module card in shelf and verify green IMT bus LEDs.
55. Use `ent-card` command to enter Service Module card as VSCCP card into database.
56. Use `rtrv-card` command to display new VSCCP card in database.
57. Use `rtrv-ip-lnk` command to display current link parameters associated with VSCCP card.
58. Use `chg-ip-lnk` command to set the IP address port and speed associated with VSCCP card.
59. Use `rtrv-ip-lnk` command to display changed link parameters associated with the VSCCP card.
60. Use `rtrv-ip-host` command to display IP host information in database.
61. Use `ent-ip-host` command to add host name and IP address for VSCCP link.
62. Use `rtrv-ip-host` command to display changed IP host information in database.
63. Use `chg-ip-card` command to set local domain and IP router address if necessary.
64. Use `rtrv-ip-card` command to display changed VSCCP card information.
65. Use `alw-card` command to boot Service Module card in TSM emulation mode.

66. Use `rept-stat-card` command to display IS-NR status of VSCCP card.
67. Use `pass` command to test presence of EPAP hosts on network.
68. Repeat *Step 46* on page 58 through *Step 67* on page 59 to replace all adjacent TSM cards identified in the prerequisites and to be replaced with Service Module cards.
69. Repeat *Step 48* on page 58 through *Step 52* on page 58 to inhibit any remaining TSM cards running the SCCP application and remove them from database and shelf.

    Note: Neither the INP feature nor the AINPQ feature can be turned on until TSM cards running the SCCP application are removed from the system.

CAUTION: Contact Tekelec *Customer Care Center* on page 4 at this point for assistance in completing this INP/AINPQ activation procedure. Do not proceed without consulting with Tekelec Customer Care Center.

70. Enable, turn on and configure the INP feature or the AINPQ feature or both features using *Step 71* on page 59 through *Step 94* on page 60
71. Use the `enable-ctrl-feat` command to enable INP feature or the AINPQ feature or both features.
72. Use the `chg-ctrl-feat` command to turn on INP feature or the AINPQ feature or both features.
73. Use the `chg-sid` command to enter INP/AINPQ capability point codes (for INP/AINPQ Query Services).
74. Use the `rtrv-sid` command to display new INP/AINPQ capability point codes.
75. Use the `ent-cspc` command to enter the point code of the EAGLE 5 ISS mate and of any nodes that will send route-on-subsystem queries to the local INP/AINPQ subsystem (for INP/AINPQ Query Services).
76. Use the `rtrv-cspc` command to verify changes.
77. Use the `ent-map` command to enter local INP/AINPQ subsystem and its mate subsystem (on the other EAGLE 5 ISS) with the concerned point code list from the previous step (for INP/AINPQ Query Services).

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

78. Use `rtrv-map` command to display new mated applications in database.
79. Use the `ent-ss-appl` command to enter the state and subsystem number for the INP/AINPQ local subsystem (for INP/AINPQ Query Services).
80. Use the `rtrv-ss-appl` command to verify the changes.
81. Use `chg-stpopts` command to enter default country code (CC) and default network destination code (NDC) if handling non-international numbers.
82. Use `rtrv-stpopts` command to verify changes of CC and NDC.
83. Use the `chg-inpopts` command to enter various INP/AINPQ system options used for number conditioning and INP/AINPQ normalization (for INP Query Services).
84. Use the `rtrv-inpopts` command to verify changes.
85. Use the `ent-homern` command to enter any Home RNs that are prefixed to DNs for incoming INP/AINPQMR messages.
86. Use `rtrv-homern` command to verify routing number prefixes.
87. Use `ent-srvsel` command to enter INP/AINPQ service selectors.

88. Use `rtrv-srvsel` command to verify changes to INP/AINPQ service selectors.
89. Use the `alw-map-ss` command to bring the local INP/AINPQ subsystem into service (for INP/AINPQ Query Services).
90. Use the `rept-stat-sccp` command to verify activation of INP/AINPQ subsystem.

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 card. This precaution keeps cards in service and precludes an interruption of SCCP services.

91. Use `init-card :loc=<Service Module card>` command to load RTDB, OAM, GPL, and GTT data to VSCCP card.
92. Use `rept-stat-card` command to display IS-NR status of VSCCP card.
93. Repeat *Step 91* on page 60 and *Step 92* on page 60 to reboot each Service Module card.

    Note: Once the INP or AINPQ feature is turned on, always boot the Service Module cards with the `init-card:loc=<Service Module card location>` command.

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

EPAP can now administer INP/AINPQ entity objects and INP/AINPQ subscribers. For the details about performing these actions, refer to the *EPAP Administration Manual*. The detailed INP/AINPQ activation procedure is described next.

Feature Activation Procedure

Before changing a true point code (PC) and adding a capability point code (CPC) for the INP/AINPQ feature:

- Display the current values of the self-identification configuration (shown in *Step 1* on page 60)
- Display the destination point codes (DPCs) (shown in *Step 2* on page 61)
- Display the routes and linksets assigned to the DPCs (shown in *Step 3* on page 61)

The INP feature applies to ITU-I (international) and ITU-N (national) networks. The AINPQ feature applies to ANSI-41 networks.

1. 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 40.0.0
PCA           PCI           PCN           CLLI            PCTYPE
------------- 1-100-1       11111         rlghncxa03w     OTHER
CPCA
-------------
CPCI
1-101-1       1-101-2           1-101-3          1-101-4
```

```
CPCN
11121         11122             11123            11124
```

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

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

   This is an example of the possible output:

```
rlghncxa03w 01-10-10 11:43:04 GMT EAGLE 40.0.0
DPCA         CLLI         BEI ELEI  ALIASI      ALIASN   DOMAIN
----------  ----------  --- ---   -------     -------  ---
DPCI         CLLI         BEI ELEI  ALIASA       ALIASN  DOMAIN
2-100-1      rlghncxa03w no  ---   222-210-000  12001   SS7
DPCN         CLLI         BEI ELEI  ALIASA       ALIASI  DOMAIN
21111        rlghncxa03w no  ---   222-200-200  2-121-1 SS7
DESTINATION ENTRIES ALLOCATED:       2000
        FULL DPC(s):                    2
        NETWORK DPC(s):                 0
        CLUSTER DPC(s):                 0
        TOTAL DPC(s):                   2
        CAPACITY (% FULL):             1%
X-LIST ENTRIES ALLOCATED:             500
```

3. 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 40.0.0
DPCA           ALIASI      ALIASN       CLLI     LSN          RC APCA
-----------    -------     -------      -----    --------    -- -----------
DPCI         ALIASN       ALIASA       CLLI     LSN          RC APCI
2-100-1      121111       --------     idp1     ls100001     10 1-234-5
                                                ls100002     10 1-234-6
                                                ls100003     20 1-234-7
                                                ls100004     30 1-234-1
                                                ls100005     40 1-234-2
                                                ls100006     50 1-234-3
DPCN         ALIASA       ALIASI       CLLI     LSN          RC APCN
21111        --------     0-001-1      ndp1     ls200001     10 11111
                                                ls200002     10 11112
                                                ls200003     20 11113
                                                ls200004     30 11114
                                                ls200005     40 11115
                                                ls200006     50 11116
```

4. If the system's point code (`pci/pcn`) or capability point code (`cpci/cpcn`) to be configured in this procedure is shown in *Step 1* on page 60, *Step 2* on page 61, or *Step 3* on page 61, choose another point code to configure with this procedure (*Step 8* on page 62).
5. 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 6* on page 62.

   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 40.0.0
STP OPTIONS
----------------------
MTPT31CTL            1
MTPLTI             yes
MTPLTCTDPCQ          3
MTPLTST          10000
MTPXLQ             500
MTPXLET           0100
MTPXLOT            90%
MTPDPCQ           1750
TFATFRPR          1000
MTPRSI             yes
MTPRSIT           5000
MTPLPRST           yes
MTPT10ALT        30000
SLSCNV           perls
UIMRD              yes
CRITALMINH          no
DISPACTALMS         no
NPCFMTI        4-4-4-2
DEFCC                49
DEFNDC              177
DSMAUD               on
```

If you wish to change the format of the ITU-N point code, see the "ITU National Point Code Formats" section of the *EAGLE 5 ISS Database Administration Manual - SS7*. Then continue with *Step 6* on page 62.

6. 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 40.0.0
PCN           SSN  RC  MPCN           MSSN MATERC SRM MRC GRP NAME
11111           5  10  12347             5    20
rlghncxa03w 01-10-07  11:43:04  GMT EAGLE 40.0.0
PCI           SSN  RC  MPCI           MSSN MATERC SRM MRC GRP NAME
2-100-1         5  20  3-200-1        250      99 --- --- abcdefgh
```

   If the system's point code is shown in the `rtrv-map` command output (in the `PCA`, `PCI`, `PCN`, `MPCA`, `MPCI`, or `MPCN` fields), remove the system's point code from the mated application table. Refer to "Removing a Mated Application" in the *EAGLE 5 ISS Database Administration Manual - Features*. manual.

   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 3* on page 61) and not in the destination point code table (see output of the `rtrv-dstn` command in *Step 2* on page 61).

7. Change PC, CPC, DPC, route, linkset, and LIM card configurations for the HLR database using *Step 8* on page 62 through *Step 27* on page 70.
8. Configure the system's point code (`pci/pcn`) and capability point code (`cpci/cpcn`) by network type using the `chg-sid` command.

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.

For example, enter one of these commands:

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

```
chg-sid:pcn=11112:cpcn=11125
```

:pci/pcn

The point code used to uniquely identify the system

:cpci/cpcn

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

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

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 40.0.0
CHG-SID: MASP A - COMPLTD
```

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

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

9. Reinitialize the system by entering the `init-sys` command if changes were made in *Step 8* on page 62 to any `pca/pci/pcn` parameter.

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

CAUTION: When the `init-sys` command executes, the system does not retain the manually initiated state (for example, OOS-MT-DSBLD) for the signaling link, card, or terminal. After the command executes, the system attempts to bring all provisioned links, cards, and terminals on line, including those that were previously out of service. You will need to manually put each device back into its previous state after the system is back on line.

Print or electronically capture the output of the `rept-stat-slk`, `rept-stat-card`, and `rept-stat-trm` commands for reference prior to issuing the `init-sys` command. To restore a device to its previous state, issue the appropriate inhibit/deactivate command listed in the *Commands Manual* in the Related Commands section for each of the above `rept-stat` commands.

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 40.0.0
CAUTION: This command causes a complete system reload, and
will result in traffic loss.
Re-enter command within 30 seconds to confirm.
```

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

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 40.0.0
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 10* on page 64 (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.

10. 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 40.0.0
PCA              PCI             PCN           CLLI             PCTYPE
-------------    1-100-1         11111         rlghncxa03w      OTHER
CPCA
-------------
CPCI
1-101-1           1-101-2           1-101-3          1-101-4
1-102-1
CPCN
11121             11122             11123            11124
11125
```

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

For example, enter one of these commands:

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

`ent-dstn:dpcn=21112`

: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 40.0.0
Destination table is (40 of 4000) 1% full
ENT-DSTN: MASP A - COMPLTD
```

12. Verify the changes using the `rtrv-dstn` command and specifying the DPC that was entered in *Step 11* on page 64.

    For example, enter one of these commands:

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

    `rtrv-dstn:dpcn=21112`

    This is an example of the possible output for DPCIs.

```
rtrv-dstn:dpci=2-100-2
RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 40.0.0
DPCI         CLLI         BEI ELEI  ALIASA       ALIASN      DOMAIN
2-100-2      --------     no  ---   --------     21112       SS7
             SPC           NCAI
             -----------   no
Destination table is (20 of 2000) 1% full
```

    This is an example of the possible output for DPCNs.

```
rtrv-dstn:dpcn=21112
RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 40.0.0
DPCN         CLLI         BEI ELEI  ALIASA       ALIASI  DOMAIN
21112        --------     no  ---   --------     2-100-2 SS7
             SPC           NCAI
             -----------   no
Destination table is (20 of 2000) 1% full
```

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

    For example, enter one of these commands:

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

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

    :lsn

    The name of the linkset

    :apci/apcn

    The adjacent point code – 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 40.0.0
Link set table is ( 114 of 1024)  12% full
ENT-LS: MASP A - COMPLTD
```

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

    For example, enter one of these commands:

    `rtrv-ls:lsn=ls400001`

    `rtrv-ls:lsn=ls500001`

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

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

15. 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`

    :loc

    Specifies the slot number for the card

    :type

    Specifies the card type - LIMOCU card

    :appl

    Specifies that the application running on the card - CCS7ITU

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

    ```
    RLGHNCXA03W 01-10-12 09:12:36 GMT EAGLE 40.0.0
    ENT-CARD: MASP A - COMPLTD
    ```

16. 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 38.0.0
    CARD   TYPE          APPL      LINK A LSET (SLC)   LINK B LSET (SLC) 1105
       LIMOCU       CCS7ITU   --------    (--)    --------    (--)
    RLGHNCXA03W 01-10-30 09:12:36 GMT EAGLE 38.0.0
    ```

```
CARD   TYPE          APPL      LINK A LSET (SLC)   LINK B LSET (SLC) 1106
   LIMOCU       CCS7ITU   --------    (--)    --------    (--)
```

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

    For example, enter these commands:

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

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

    :loc

    The card location of the card - LIM that the SS7 signaling link will be assigned to

    :link

    The link 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 40.0.0
ENT-SLK: MASP A - COMPLTD
```

    Signaling links are the only elements in the database directly supported by a hardware device. When a link is added to a linkset, the link remains in the state OOS-MT-DSBLD (out of service maintenance disabled) until it is activated; see *Step 25* on page 70.

18. Verify the changes using the `rtrv-slk` command, specifying the card location and link of the signaling link entered in *Step 17* on page 67.

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

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

    This is an example of the possible output.

```
RLGHNCXA03W 01-10-19 21:16:37 GMT EAGLE 38.0.0
                              L2T          L1                PCR  PCR
LOC   LINK 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 38.0.0
                              L2T          L1                PCR  PCR
LOC   LINK LSN       SLC TYPE     SET  BPS    MODE TSET  ECM   N1   N2 1106
A ls500001 0 LIMOCU
   1    56000  ---  ---   BASIC ---  -----
```

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

    For example, enter one of these commands:

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

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

:dpci/dpcn

The 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 40.0.0
ENT-RTE: MASP A - COMPLTD
```

20. 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 40.0.0
DPCA         ALIASI      ALIASN      CLLI        LSN      RC APCA
-----------  -------     -------     -----       -------- -- ----------- DPCI

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

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

    For this example, enter this command:

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

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

: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 40.0.0
ENT-MAP:  MASP A - COMPLTD
```

22. Verify the changes using the `rtrv-map` command.

These are examples of possible output.

```
rlghncxa03w 01-10-07  11:43:04  GMT EAGLE 40.0.0
PCN            SSN  RC  MPCN          MSSN MATERC SRM MRC GRP NAME
11111            5  20  12347         250      99 --- --- GRP07
11112           12   0  12347         250      99 --- --- GRP07
rlghncxa03w 01-10-07  11:43:04  GMT EAGLE 40.0.0
PCI            SSN  RC  MPCI          MSSN MATERC SRM MRC GRP NAME
1-100-1          5   0  3-200-1       250      99 --- --- GRP03
2-100-1         12  20  3-200-1        50      99 --- --- GRP03
```

23. Allow the LIM cards that were entered in *Step 15* on page 66 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 40.0.0
Card has been allowed.
```

24. 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 40.0.0
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   ---
```

25. Activate the signaling links entered in *Step 17* on page 67 using the `act-slk` command.

For example, enter these commands:

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

`act-slk:loc=1106:link=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 37.0.0
Activate Link message sent to card
```

26. 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 40.0.0
SLK      LSN        CLLI       PST     SST     AST 1105,A ls400001
  ---------- IS-NR   Avail   ----
Command Completed.
RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 40.0.0
SLK      LSN        CLLI       PST     SST     AST 1106,A ls500001
  ---------- IS-NR   Avail   ----
Command Completed.
```

27. 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 38.0.0
CARD   TYPE          APPL      LINK A LSET (SLC)   LINK 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 with TSM cards running the SCCP application for replacement with Service Module cards.

28. Install and configure Service Module card(s) as needed in available odd-even slots using *Step 29* on page 71 through *Step 43* on page 76.

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

29. 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.

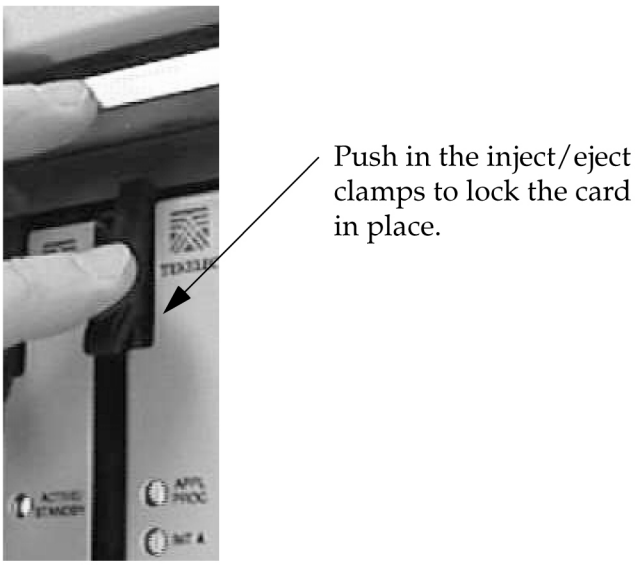
b) Press the left edge of the card's faceplate using constant pressure until you feel the card's progress cease.

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.

Figure 8: Push in Inject/Eject Clamps



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.

30. Add the Service Module card to the database and configure to run the VSCCP application using the `ent-card` command.

For this example, enter this command:

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

:loc

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

:type

Specifies the card type - Service Module card

:appl

Specifies the application running on the card - VSCCP

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

```
RLGHNCXA03W 01-10-12 09:12:36 GMT EAGLE 40.0.0
ENT-CARD: MASP A - COMPLTD
```

31. 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 38.0.0
CARD   TYPE          APPL      LINK A LSET (SLC)   LINK B LSET (SLC) 1107
DSM           VSCCP
     --------    (--)    --------    (--)
```

32. 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 40.0.0
LOC   LINK IPADDR          SUBMASK          DUPLEX SPEED MACTYPE AUTO MCAST
1107  A    -----------     -----------      HALF   10    DIX     NO   NO
1107  B    -----------     -----------      HALF   10    DIX     NO   NO
```

33. Enter the IP address port and speed associated with the VSCCP card in the database using the `chg-ip-lnk` command.

    For this example, enter these commands:

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

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

    :loc

    Specifies the slot number for the card

    :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

    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 DSM network.

    :mactype

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

    :mcast

    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 40.0.0
CHG-IP-LNK: MASP A - COMPLTD
```

34. Verify the IP address port and speed 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 40.0.0
LOC   PORT IPADDR           SUBMASK          DUPLEX SPEED MACTYPE AUTO MCAST
1107  A    192.168.122.1    255.255.255.0    HALF   100   DIX     NO   YES
1107  B    192.168.123.1    255.255.255.0    HALF   10    DIX     NO   YES
```

35. 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 40.0.0
IPADDR          HOST
192.1.1.32      KC_HLR2
192.1.1.50      DN_MSC1
192.1.1.52      DN_MSC2
```

36. 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`

    :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 40.0.0
ENT-IP-HOST: MASP A - COMPLTD
```

37. 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 40.0.0
IPADDR          HOST
192.1.1.32      KC_HLR2
192.1.1.50      DN_MSC1
192.1.1.52      DN_MSC2
192.168.122.1   VSCCP_1107_A
192.168.123.1   VSCCP_1107_B
```

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

    Note: Most INP/AINPQ 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.

For this example, enter this command:

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

:loc

Specifies the slot number for the card

: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 40.0.0
CHG-IP-CARD: MASP A - COMPLTD
```

39. 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 40.0.0
   LOC  1107
     SRCHORDR  LOCAL
     DNSA      -----------
     DNSB      -----------
     DEFROUTER  192.168.122.250
     DOMAIN     NC.TEKELEC.COM
```

40. Boot the Service Module card that was added in *Step 30* on page 72 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 40.0.0
Card has been allowed.
```

41. 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 40.0.0
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    ---
```

42. 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 40.0.0
pass: loc=1107: cmd="ping 192.168.122.100"
Command entered at terminal #1.
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 40.0.0
PASS: Command sent to card
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 40.0.0
PING command in progress
;
rlghncxa03w 00-06-27 08:30:46 GMT EAGLE 40.0.0
PING 192.168.122.100: 56 data bytes
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=0.time=5. ms
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=1.time=0. ms
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=2.time=0. ms
----192.168.100.3 PING Statistics----
3 packets transmitted, 3 packets received, 0% packet loss
round-trip (ms) min/avg/max = 0/1/5
PING command complete
```

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

43. Repeat *Step 29* on page 71 through *Step 42* on page 76 to add all Service Module cards (N+1) to be installed in available slots.

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

44. Replace TSM card(s) with Service Module cards if applicable and add Service Module card(s) to the database using *Step 45* on page 77 through *Step 67* on page 85.

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 running the VSCCP application in an available double-slot.

45. 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 38.0.0
CARD   TYPE          APPL      LINK A LSET (SLC)   LINK 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, we will remove the TSM cards running the SCCP application in card locations 1101 and 1102.

46. 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 40.0.0
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    ---
```

47. Inhibit the TSM cards running the SCCP application 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 40.0.0
Card has been inhibited.
```

48. 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 40.0.0
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    ---
```

49. Remove the TSM cards running the SCCP application 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 40.0.0
DLT-CARD: MASP A - COMPLTD
```

50. Verify that the TSM cards running the SCCP application are removed from the database using the `rtrv-card` command and specifying the cards that were removed in *Step 49* on page 78.

    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
```

51. 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 toward you until the card clears the shelf.

       Figure 9: Push Inject/Eject Clamps Outward

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

52. Repeat *Step 51* on page 79 to remove the second TSM card.

53. 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.

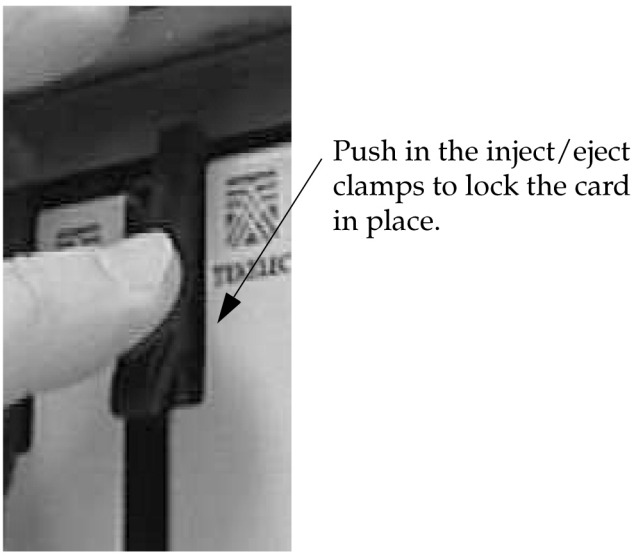
b) Press the left edge of the card's faceplate using constant pressure until you feel the card's progress cease.

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.

Figure 10: Push in Inject/Eject Clamps



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.

54. 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
```

:loc

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

:type

Specifies the card type - Service Module card

:appl

Specifies the application running on the card - VSCCP

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

```
RLGHNCXA03W 01-10-12 09:12:36 GMT EAGLE 40.0.0
ENT-CARD: MASP A - COMPLTD
```

55. 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 38.0.0
CARD   TYPE          APPL      LINK A LSET (SLC)   LINK B LSET (SLC) 1101 DSM
 VSCCP
     --------    (--)    --------    (--)
```

56. 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 40.0.0
LOC   PORT IPADDR          SUBMASK          DUPLEX SPEED MACTYPE AUTO MCAST
1101  A    -----------     -----------      HALF   10    DIX     NO   NO
1101  B    -----------     -----------      HALF   10    DIX     NO   NO
1107  A    -----------     -----------      HALF   10    DIX     NO   NO
1107  B    -----------     -----------      HALF   10    DIX     NO   NO
```

57. 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:speed=100:mcast=yes:submask=255.255.255.0`

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

    :loc

    Specifies the slot number for the card

    :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

    The mode of operation of the interface

    :speed

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

:mactype

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

:mcast

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 40.0.0
CHG-IP-LNK: MASP A - COMPLTD
```

58. 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 40.0.0
LOC   PORT IPADDR          SUBMASK          DUPLEX SPEED MACTYPE AUTO MCAST
1101  A    192.168.122.2    255.255.255.0    HALF   100   DIX     NO   YES
1101  B    192.168.123.2    255.255.255.0    HALF   10    DIX     NO   YES
1107  A    192.168.122.1    255.255.255.0    HALF   100   DIX     NO   YES
1107  B    192.168.123.1    255.255.255.0    HALF   10    DIX     NO   YES
```

59. 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 40.0.0
IPADDR          HOST
192.1.1.32      KC_HLR2
192.1.1.50      DN_MSC1
192.1.1.52      DN_MSC2
192.168.122.1   VSCCP_1107_A
192.168.123.1   VSCCP_1107_B
```

60. 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`

    :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 40.0.0
ENT-IP-HOST: MASP A - COMPLTD
```

61. 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 40.0.0
IPADDR          HOST
192.1.1.32      KC_HLR2
192.1.1.50      DN_MSC1
192.1.1.52      DN_MSC2
192.168.122.1   VSCCP_1107_A
192.168.123.1   VSCCP_1107_B
192.168.122.2   VSCCP_1101_A
192.168.123.2   VSCCP_1101_B
```

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

Note: Most INP/AINPQ 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.

For this example, enter this command:

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

:loc

Specifies the slot number for the card

: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 40.0.0
CHG-IP-CARD: MASP A - COMPLTD
```

63. 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 40.0.0
   LOC  1101
```

```
    SRCHORDR  LOCAL
    DNSA      -----------
    DNSB      -----------
    DEFROUTER  192.168.122.250
    DOMAIN     NC.TEKELEC.COM
```

64. Boot the Service Module card that was inhibited in *Step 47* on page 78 in TSM emulation mode by using the `alw-card` command.

    For example, enter this command:

    `alw-card:loc=1101`

    This message appears:

```
RLGHNCXA03W  01-10-30 21:20:37 GMT EAGLE 40.0.0
Card has been allowed.
```

65. 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 40.0.0
CARD  VERSION            TYPE    APPL      PST          SST       AST
1101  100-000-00003-000  DSM     VSCCP     IS-NR        Active    ---
1103  100-000-00002-000  ACMENET STPLAN    IS-NR        Active    ---
1104  100-000-00003-000  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    ---
```

66. 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 40.0.0
pass: loc=1101: cmd="ping 192.168.122.100"
Command entered at terminal #1.
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 40.0.0
PASS: Command sent to card
;
rlghncxa03w 00-06-27 08:30:44 GMT EAGLE 40.0.0
PING command in progress
;
rlghncxa03w 00-06-27 08:30:46 GMT EAGLE 40.0.0
PING 192.168.122.100: 56 data bytes
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=0.time=5. ms
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=1.time=0. ms
64 bytes from tekral.nc.tekelec.com (192.168.122.100):icmp_seq=2.time=0. ms
----192.168.100.3 PING Statistics----
3 packets transmitted, 3 packets received, 0% packet loss
round-trip (ms) min/avg/max = 0/1/5
PING command complete
```

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

67. Repeat *Step 45* on page 77 through *Step 66* on page 84 to replace all adjacent TSM cards identified in the prerequisites and to be replaced with Service Module cards.

68. Repeat *Step 47* on page 78 through *Step 51* on page 79 to inhibit any remaining TSM cards running the SCCP application and remove them from database and shelf.

Note: Neither the INP feature nor the AINPQ feature can be turned on until TSM cards running the SCCP application are removed from the system.

69. Turn on and configure the INP feature or the AINPQ feature or both using *Step 70* on page 85 through *Step 93* on page 94.

CAUTION: At this point in the procedure, contact the Tekelec Customer Care for assistance in completing this INP/AINPQ activation procedure. Do not proceed without consulting with Customer Care Center.

70. Enable the INP feature or the AINPQ feature or both using either or both of the following commands:

`enable-ctrl-feat:partnum=893017901:fak=<INP_FAK>`

`enable-ctrl-feat:partnum=893017801:fak=<AINPQ_FAK>`

After each command has been processed successfully, the system returns the following output:

```
rlghncxa03w 01-10-11 11:34:04 GMT EAGLE 40.0.0
ENABLE-CTRL-FEAT: MASP A - COMPLD
```

71. Turn on the INP feature or the AINPQ feature or both using either or both of the following commands (the first command is for the INP feature, and the second command is for the AINPQ feature):

`chg-ctrl-feat:partnum=893017901:status=on`

```
chg-ctrl-feat:partnum=893017801:status=on
```

After each command has been processed successfully, the system returns the following output:

```
rlghncxa03w 01-10-11 11:34:04 GMT EAGLE 40.0.0
CHG-CTRL-FEAT: MASP A - COMPLD
```

72. Configure an INP/AINPQ capability point code using the `chg-sid` command.

For example, enter these commands:

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

```
chg-sid:cpcn=11131:cpctype=inp
```

:pci/pcn

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

:cpca/:cpci/cpcn

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

:cpctype

The type of capability point code (use the value `inp` for either INP or AINPQ)

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

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 40.0.0
CHG-SID: MASP A - COMPLTD
```

73. Verify the changes using the `rtrv-sid` command.

This is an example of the possible output.

```
rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 40.0.0
PCA           PCI           PCN           CLLI            PCTYPE
------------- 1-100-1       11111         rlghncxa03w     OTHER
CPCA
-------------
CPCI
1-101-1           1-101-2          1-101-3        1-101-4
1-102-1           1-300-1
CPCN
11121             11122            11123          11124
11125
CPCN (INP)
11131
```

74. Enter the signaling points to a broadcast signaling point code group using the `ent-cspc` command (for INP/AINPQ Query Services).

You use this command to enter the point code of the EAGLE 5 ISS mate and of any nodes that will send route-on-subsystem queries to the local INP/AINPQ subsystem. These point codes are notified of the receipt by EAGLE 5 ISS of subsystem-prohibited and subsystem-allowed SS7 SCCP management messages from an application at an adjacent signaling point and subsystem and when the local subsystem experiences a status change.

```
ent-cspc:grp=cspc ent-cspc:grp=cspc:pcn=2
```

:grp

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

:pcn

The ITU national point code in the form of ITU number (nnnnn)

The system returns this message:

```
rlghncxa03w 01-10-17 15:35:05 GMT EAGLE 40.0.0
ENT-CSPC: MASP A - COMPLTD
```

75. Verify the changes using the `rtrv-cspc` command and showing the list of concerned signaling point codes that are to notified when subsystem-prohibited or subsystem-allowed messages are received for an associated mate application.

    For this example, enter these commands:

    `rtrv-cspc:grp=cspc`

    `rtrv-cspc:grp=cspc:pcn=2`

    This is an example of the possible output.

```
rtrv-cspc:grp=cspc
RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 40.0.0
CSPC GRP    PERCENT FULL
CSPC        0%
This is an example of the possible output.
rtrv-cspc:grp=cspc:pcn=2
RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 40.0.0
CSPC PC TABLE IS 15% FULL.
CSPC GRP    PC
CSPC        2
```

76. Add a mated application to the database using the `ent-map` command.

    Use this command for INP/AINPQ Query Services. Enter the local INP/AINPQ subsystem and its mate subsystem (on the other EAGLE 5 ISS) with the concerned point code list from the previous steps. For this example, enter this command:

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

    :pc/pca/pci/pcn

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

    :mpc/mpca/mpci/mpcn

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

    :ssn

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

    :mssn

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

    :grp

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

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

```
RLGHNCXA03W  01-10-07 00:28:31 GMT EAGLE 40.0.0
ENT-MAP:  MASP A - COMPLTD
```

77. Verify the changes using the `rtrv-map` command.

    This command shows the mated application relationship maintained by the EAGLE 5 ISS. This information supports the routing of SCCP management SSP/SSA messages.

    Here is an example of the possible output.

```
RLGHNCXA03W  01-10-07 00:29:31 GMT EAGLE 40.0.0
. . .
PCN          SSN   MPCN          MSSN SRM  MRC   GRP NAME
1            12    2             12   YES  YES   CSPC
. . .
```

78. Enter the `ent-ss-appl` command to reserve a subsystem number for an application and set the application to be online or offline.

    Use this command for INP/AINPQ Query Services. Enter the state and subsystem number for the INP/AINPQ local subsystem.

    For example, enter this command:

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

    :ssn

    The primary subsystem number (`range = 2-255`). This value should match the INPQSSN you define with `ent-map` in the MAP database.

    :appl

    The application type (use the value `inp` for either INP or AINPQ)

    :stat

    The status of online or offline (`online`)

    The system returns this message:

```
rlghncxa03w 01-10-17 15:35:05 GMT EAGLE 40.0.0
ENT-SS-APPL: MASP A - COMPLTD
```

79. Verify the change made in the previous step with the `rtrv-ss-appl` command retrieve all applications from the database.

    The commands displays the application type, subsystem number, and application status.

    For example, enter this command:

    `rtrv-ss-appl`

    This is an example of the possible output.

```
rtrv-cspc:grp=cspc
RLGHNCXA03W 01-10-30 21:16:37 GMT EAGLE 40.0.0
AAPL  SSN  STAT
INP   12   online
SS-APPL table is (1 of 100) 100% full
```

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

    This command can change the values of one or more of the STP node level processing option indicators kept in the STP option table. All values are assigned initially to system defaults at STP installation time, and they can be updated subsequently with this command.

    For example, enter the following command:

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

    :defcc

    The default country code

    :defndc

    The default network destination code

    :dsmaud

    The DSM audit running state (*on* or *off*)

    :npcfmt1

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

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

    ```
    rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 40.0.0
    CHG-STPOPTS: MASP A - COMPLTD
    ```

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

    This is an example of the possible output:

    ```
    rlghncxa03w 01-10-07 00:57:31 GMT EAGLE 40.0.0
    STP OPTIONS
    -----------------------
    NPCFMTI        2-9-2-1
    DEFCC               1
    DEFNDC             38
    DSMAUD             on
    ```

82. Use the `chg-inpopts` command for number conditioning and INP/AINPQ normalization.

    Use this command for INP/AINPQ Query Services.

    For example, enter the following commands to enter a series of entries for the INPOPTS:

    ```
    chg-inpopts:dra=rndn:dranp=e164:dranai=intl
    chg-inpopts:cdpnpfx=200
    chg-inpopts:cdpnpfx=fed123:dltpfx=yes
    chg-inpopts:cdpnnai=1:snai=sub
    chg-inpopts:cdpnnai=70:snai=intl
    chg-inpopts:nec=1234
    chg-inpopts:dra=rnasd:nec=0
    ```

```
chg-inpopts:dra=asdrndn:dranp=e164:dranai=intl
chg-inpopts:dra=asdrnccdn:dranp=e164:dranai=intl:cdpnpfx=fac:dltpfx=yes
chg-inpopts:dra=rnasdnecdn:nec=0
```

:cdpnnai

The called party prefix number nature of address indicator (*0 to 127)*

:cdpnpfx

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

:dltpfx

The delete prefix indicator (*yes*, *no*)

:dra

The destination routing address, where the values are:

- rn (routing number)
- rndn (routing number and dialed number)
- ccrndn (country code and routing number and dialed number)
- rnnecdn (routing number and national escape code and dialed number)
- rnasd (rn with additional subscriber data)
- asdrn
- rnasddn
- asdrndn
- ccrnasddn
- asdrnccdn
- ccasdrndn
- rnasdccdn
- rnasdnecdn
- asdrnnecdn

:dranai

The nature of address indicator (*intl, sub, natl, ntwk, unknown*)

:dranp

The numbering plan mnemonic (*e164, x121, f69*)

:nec

National Escape Code (contains 1 to 5 characters, each of which is in the range of *'0'* to *'f'*)

:snai

The service nature of address indicator (*sub*, *natl*, *intl*, *none*)

:sprestype

Indicates what type of message the EAGLE 5 ISS is to send when an IDP message is received for INP service, the DN digits match, and the HLR ID is present. If the value is set to `connect`, the EAGLE 5 ISS is to send a "Connect" message for the INP feature or a "Return Result with Digits" message for the AINPQ feature. If the value is set to `continue`, the EAGLE 5 ISS is to send a "Continue" message

for the INP feature or a "Return Result without Digits" message for the AINPQ feature. (Allowed values are `connect` and `continue`).

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

```
    tekelecstp 08-09-03 15:15:44 EST  EAGLE 40.0.0
    CHG-INPOPTS: MASP A - COMPLTD
;
```

83. Verify the changes using the `rtrv-inpopts` command.

This command retrieves INP/AINPQ-specific options.

Here is an example of the possible output.

```
    tekelecstp 08-09-03 16:02:06 EST  EAGLE 40.0.0

    INP OPTIONS
    -----------------------
    NEC         = 0
    DRANAI      = INTL
    DRANP       = E164
    DRA         = ASDRNDN
    SPRESTYPE   = CONTINUE

    CDPNPFX            DLTPFX
    ---------------    ---

    CDPNNAI            SNAI
    ---                ----

;
```

84. Add routing number prefixes for the operating network using the `ent-homern` command.

Use this command to enter any Home RNs that are prefixed to DNs for incoming INP/AINPQ MR messages. You may use this command to enter up to 100 routing number prefixes for the operating network into the HOMERN table.

For example, enter this command:

`ent-homern:rn=c222`

:rn

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

When this command has successfully completed, this message appears.

```
RLGHNCXA03W  01-10-07 00:28:31 GMT EAGLE 40.0.0
HOMERN table is (1 of 100) 1% full
ENT-HOMERN:  MASP A - COMPLTD
```

85. Verify the changes using the `rtrv-homern` command.

This command retrieves a list of routing number prefixes that belong to the operating network.

Here is an example of the possible output.

```
rlghncxa03w  01-10-28  00:29:31 GMT EAGLE 40.0.0
RN
----------------
```

```
216780909087654
76345098
c10234567
c222
cabade
abc
abc123
HOMERN table is (6 of 100) 6% full
```

86. Use the `ent-srvsel` command to enter the INP/AINPQ Service Selectors.

    You may use this command to assign the applicable service selectors required to specify the service entry for Service Module services.

    For example, you can enter this command in these formats:

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

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

    :gtii/gtin

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

    :serv

    The Service Module service. The valid ranges are *inpqs* (INP/AINPQ query) and *inpmr* (INP Message Relay).

    :tt

    The Translation Type. The range is 0-255.

    :nai

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

    :np

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

    :snai

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

    :snp

    The Service Numbering Plan. The valid mnemonic for INP/AINPQ is *e164*.

    When this command has successfully completed, this message appears.

```
rlghncxa03w  01-10-07 00:28:31 GMT EAGLE 40.0.0
Service Selector table is (114 of 1024) 11% full
ENT-SRVSEL:  MASP A - COMPLTD
```

87. Verify the changes using the `rtrv-srvsel` command.

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

    For example, enter this command:

    ```
    rtrv-srvsel:gtin=4
    ```

    :gtin

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

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

    ```
    rlghncxa03w  01-10-28  00:29:31 GMT EAGLE 40.0.0
    GTIN  TT   NP        NAI    NPV  NAIV  SNP  SNAI  SERV
    4     0    e164      intl   ---  ---   e164 rnidn inpmr
    4     1    e164      intl   ---  ---   e164 intl  inpqs
    ```

88. Use the Allow Mated Application Subsystem command (`alw-map-ss`) for INP/AINPQ Query Services to activate the INP/AINPQ subsystem and bring it online.

    You can allow and inhibit the INP/AINPQ Query Services subsystem. The command requires a parameter that identifies the SSN to be allowed. That subsystem must be out-of-service maintenance-disabled (OOS-MT-DSBLD) for the command to be accepted.

    For example, enter this command:

    ```
    alw-map-ss:ssn=12
    ```

    :ssn

    The INP/AINPQSubsystem Number. The range is *2-255*.

    When this command has successfully completed, this message appears.

    ```
    rlghncxa03w  01-10-24 00:28:31 GMT EAGLE 40.0.0
    Local Subsystem has been allowed.
    Command Completed.
    ```

89. Verify the activation of the INP/AINPQ subsystem by the previous command using the Report Status SCCP command `rept-stat-sccp`.

    This command displays the status of the Service Module cards running the SCCP application, and also displays cards that are denied SCCP service. If you issue the command without parameters, it displays the status of the Service Module cards and the GTT and INP/AINPQ services executing on those cards.

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

    ```
    rept-stat-sccp
    ```

    ```
    rlghncxa03w  01-10-28  00:29:31 GMT EAGLE 40.0.0
    SCCP  SUBSYSTEM REPORT IS-NR         Active     -----
    GSM   SUBSYSTEM REPORT IS-NR         Active     -----
    INP   SUBSYSTEM REPORT IS-NR         Restricted -----
          ASSUMING MATES'S LOAD
          INPQ: SSN STATUS = Allowed    MATE SSN STATUS = Prohibited
     ...
    ```

90. Reload a Service Module card using the `init-card` command.

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, A-Port, AINPQ, 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.

For example, enter this command:

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

The system returns the following message:

```
rlghncxa03w  01-10-07 00:28:31 GMT EAGLE 40.0.0
Command entered at terminal #3.
Init Card command issued to card 1101
```

91. Verify its return to IS-NR state with the `rept-stat-card` command.

(Wait until in-service state is restored.)

This is an example of the possible output:

```
RLGHNCXA03W 01-10-07 00:30:42 GMT EAGLE 40.0.0
CARD  VERSION            TYPE    APPL      PST          SST       AST 1101
100-000-00003-000 DSM VSCCP IS-NR
         Active    ---
1103  100-000-00002-000  ACMENET STPLAN    IS-NR        Active    ---
1104  100-000-00003-000  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    ---
```

92. After the `init-card` and the `rept-stat-card` commands show that service is successfully restored, repeat *Step 90* on page 94 and *Step 91* on page 94 for each Service Module card in your system.

93. 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 INP feature or AINPQ feature or both features are 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

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* on page 99.
   - 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* on page 97.
   - 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* on page 98.

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* on page 97.

   - 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* on page 99.

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* on page 99.
   - If the serial number is correct but not locked, go to *Step 12* on page 99.
   - 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* on page 4 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* on page 98 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* on page 98 and *Step 11* on page 99 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* on page 98 (if the serial number shown in *Step 8* on page 98 is correct) or with the serial number shown in *Step 10* on page 98 (if the serial number was changed in *Step 10* on page 98), 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* on page 100. 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* on page 99 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: 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* on page 99 or *Step 15* on page 100.
`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* on page 99and 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* on page 105 (skip *Step 2* on page 103 through *Step 8* on page 105).

If the E5-SM4G Throughput Capacity and LNP features are not enabled, go to *Step 2* on page 103.

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* on page 103

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* on page 103. If the GTT feature is turned on, go to *Step 4* on page 103. 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* on page 104 (skip *Step 4* on page 103).

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* on page 104.

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* on page 104.

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* on page 104.

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* on page 104.

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* on page 105 (skip *Step 7* on page 104, *Step 8* on page 105, and *Step 9* on page 105). If the serial number is correct but not locked, go to *Step 9* on page 105 (skip *Step 7* on page 104 and *Step 8* on page 105). 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* on page 4 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* on page 104 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* on page 104 and *Step 8* on page 105 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* on page 104, if the serial number shown in *Step 6* on page 104 is correct, or with the serial number shown in *Step 8* on page 105, if the serial number was changed in *Step 7* on page 104, 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, 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* on page 106 (and skip *Step 11* on page 105) .

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* on page 105 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* on page 105 or *Step 11* on page 105.

    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.
    ```

Chapter 5

INP/AINPQ Maintenance and Measurements

Topics:

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

Introduction

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

Maintenance Requirements

Maintenance supports the INP and AINPQ features by providing these functions.

- EPAP status and alarm reporting
- Service Module card status reporting to the EPAP
- GSM and INP/AINPQ system hardware verification
- GSM and INP/AINPQ system status reporting
- Commands
- Code and application data loading
- Feature Related Alarms
- Measurements

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

EPAP Status and Alarm Reporting

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

- EPAP maintenance blocks
- Service Module card status requests

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-sccp` commands. `rept-stat-mps` and

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

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

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

DSM Status Requests

When the EPAP needs to know the status of a Service Module card, it sends a DSM status request to that Service Module card. Because status messages are sent over UDP, the EPAP broadcasts the DSM status request (to all Service Module cards) and each Service Module card returns its status to the EPAP.

DSM Status Reporting to the EPAP

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

DSM Status Messages – When Sent

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

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

DSM Status Messages Fields

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

- **DSM Memory Size**. When the Service Module card is initialized, it determines the amount of memory present. The EPAP uses the value to determine if the Service Module card has enough memory to hold the RTDB.

  Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the Service Module card database capacity requirements.
- **Load Mode Status**. This indicator indicates whether or not 80% of the IS-NR (In-Service Normal) LIMs have access to SCCP services.

Hourly Maintenance Report

The Hourly Maintenance Report, generated automatically, includes the alarm totals of the G-Port subsystem and Service Module card /EPAP IP links. A sample follows.

```
    eagle10506 99-10-10 16:00:01 EST EAGLE 37.5.0
    5072.0000 REPT COND GSM SS
    "GSM SS :0440,MTCEINT-0,SA,99-10-10,16:00:01,,,,*C"
;
    eagle10506 99-10-10 16:00:01 EST EAGLE 37.5.0
    5073.0000 REPT COND INP SS
    "INP SS :0440,MTCEINT-0,SA,99-10-10,16:20:01,,,,*C"
;
    eagle10506 99-10-10 16:00:01 EST EAGLE 37.5.0
    5077.0000 REPT COND EPAPDSM
    "EPAPDSM :0084,MTCEINT-0,SA,99-10-10,16:00:01,,,,**"
;
    eagle10506 99-10-10 16:00:01 EST EAGLE 37.5.0
    5007.0000 REPT COND CARD
    "CARD 1102:0422,SCMMA,SA,99-10-10,16:00:01,,,,**"
;
    eagle10506 99-09-13 16:00:01 EST EAGLE 37.5.0
    3561.0000 REPT COND ALARM STATUS
    "ALARMS:PERM. INHIBITED,0,0,0"
    "ALARMS:TEMP. INHIBITED,0,0,0"
    "ALARMS:ACTIVE,10,14,3"
    "ALARMS:TOTAL,10,14,3"
;
```

GSM and INP/AINPQ System Hardware Verification

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

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

Service Module Card Main Board Verification

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

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

Service Module Card Applique Memory Verification

The VSCCP application performs two types of memory validation to determine whether a Service Module card has enough memory to run INP and/or AINPQ.

1. Local Memory Validation

   When the INP FAK is first enabled, or when the INPQ feature is enabled and the Service Module card is initializing, the VSCCP checks to see if the Service Module card has at least one D1G applique. The INP FAK cannot be enabled if any Service Module card has less than 1GB of memory installed.

   When the AINPQ FAK is first enabled, or when the AINPQ feature is enabled and the Service Module card is initializing, the VSCCP checks to see if the Service Module card has at least one D1G applique. The AINPQ FAK cannot be enabled if any Service Module card has less than 4GB of memory installed.

2. Real-time Memory Validation

   When communication is established between the Service Module card and EPAP and the Service Module card has joined the RMTP tree, the EPAP starts downloading its copy of the RTDB to the Service Module card. 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 with the amount of installed memory; it issues a minor alarm if the database exceeds 80% of the Service Module card memory. If the database completely fills the Service Module card memory, an insufficient memory alarm is issued, the Service Module card leaves the RMTP tree, and the Service Module card status changes to IS-ANR/Restricted .

Actions Taken When Hardware Determined to be Invalid

When the hardware configuration for a Service Module card is determined to be invalid for the INP and/or AINPQ application, the SCM (System Configuration Manager) automatically inhibits loading 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. See *Card Related MPS Alarms* on page 123 for information about the alarms that are generated.

When card loading is inhibited, the primary state of the card is set to OOS-MT-DSBLD and the secondary state of the card is set to MEA (Mismatch of Equipment and Attributes).

The following actions apply to a Service Module card determined to be invalid:

- The Service Module card does not download the EAGLE 5 ISS (STP) databases.
- The Service Module card does not download the Real Time Database from the EPAP.
- The Service Module card does not accept Real Time Database updates (such as *add*, *change*, *delete*) from the EPAP.

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

Unstable Loading Mode

At some point, having some number of invalid Service Module cards results in some of the LIMs being denied SCCP services. A threshold must be monitored; if the number of valid Service Module

cards is insufficient to provide service to at least 80% of the in-service (IS-NR) LIMs, the system is in an unstable loading mode. There are other reasons why an EAGLE 5 ISS might be in an unstable Loading Mode; refer to *Loading Mode Support* on page 114 for further information.

GSM System and INP/AINPQ System Status Reporting

System Status Reporting

The `rept-stat-sys` command supports the Service Module cards running the VSCCP application. Refer to *rept-stat-sys* on page 41 for more details on the `rept-stat-sys` command changes.

The `rept-stat-sccp` command supports the Service Module cards running the VSCCP application and reports INP/AINPQ statistics. Refer to *rept-stat-sccp* on page 41 for more details on the `rept-stat-sccp` command changes.

GSM Status Reporting

The `rept-stat-mps` command is a new command that supports reporting of GSM system. This command concentrates on reporting the status of the GSM and INP provisioning system. Refer to *rept-stat-mps* on page 42 for more details on the `rept-stat-mps` command.

INP/AINPQ Status Reporting

The `rept-stat-mps` command is a new command that supports reporting of INP/AINPQ system. This command concentrates on reporting the status of the GSM and INP/AINPQ provisioning system. Refer to *rept-stat-mps* on page 42 for details on the `rept-stat-mps` command. INP statistics are placed in the `rept-stat-sccp` command.

Service Module Card Memory Capacity Status Reporting

As described in *DSM Status Reporting to the EPAP* on page 109, the Service Module card sends a message to the EPAP defining the Service Module card memory size. The EPAP determines whether the Service Module card has enough memory to store the RTDB and responds to the Service Module card with and ACK or NAK, indicating whether the Service Module card memory is large enough.

When the EPAP sends database updates to the Service Module cards, the update messages include a field that contains the new memory requirements. Each Service Module card monitors the database size requirements, and issues a minor alarm if the size of the database exceeds 80% of its memory. If a database increases to the point that it occupies 100% of the Service Module card memory, an insufficient memory major alarm is issued.database

The `rept-stat-mps:loc=xxxx` command displays 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 can determine whether the system is in an unstable loading mode because 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. See *Loading Mode Support* on page 114 for additional information.

Code and Application Data Loading

In general, administrative updates can occur while a Service Module card is loading. The Service Module card should also remain in an in-transition state if the EAGLE 5 ISS portion of the database has completed loading and is waiting for the RTDB to download.

Service Module Code Loading

The EAGLE 5 ISS OAM performs code loading of the Service Module card.

EPAP Application Data Loading

The G-Port feature requires that new TDM-resident data tables be loaded in addition to those currently supported by EAGLE 5 ISS. The GPL and data loading support this additional table loading while maintaining support for loading the existing EAGLE 5 ISS tables.

In order to support both RTDB and EAGLE 5 ISS data loading, the Service Module card GPL verifies its hardware configuration during initialization to determine if it has the capacity to support the RTDB.

The Service Module card GPL application data loader registers all tables for loading, independent of the G-Port feature provisioning and main board / applique hardware configuration. As a result, load requests are always identical. During loading, multiple Service Module card load requests are combined into a single download, reducing the overall download time. The Service Module card stores or discards RTDB table data based on whether or not it has RTDB-capable hardware for features like G-Port, G-Flex, INP, and EIR.

The OAM, on the other hand, downloads or sets memory boundaries for the G-Port options, HOMERN, and service selector tables only if the G-Port feature is provisioned. When the G-Port feature is not provisioned, the OAM does not attempt to read these tables from disk. Instead, empty tables (i.e., tables without entries) are downloaded. All other tables requested for loading are read from disk and downloaded routinely.

Non G-Port Data Initialization

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

G-Port Data Initialization

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

EPAP-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 11: Obit Message for Abort of Card Loading* on page 115 shows an example.

Figure 11: 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.

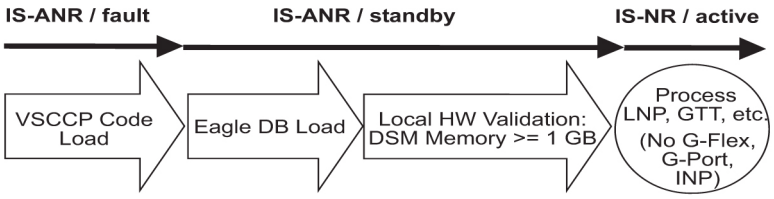
State Transitions during Start-Up

Figure 12: INP Not Enabled, Service Module Card Running in TSM Emulation on page 116 through *Figure 19: INP Activation Unsuccessful due to Insufficient Database* on page 118 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.

Note: These scenarios show the INP feature. Similar scenarios exist for the AINPQ feature, except that the minimum Service Module card memory size is 4 GB for the AINPQ feature.

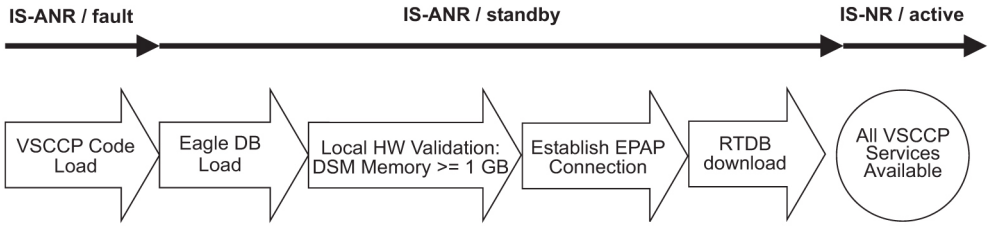
In *Figure 12: INP Not Enabled, Service Module Card Running in TSM Emulation* on page 116, the INP feature is not enabled, and the Service Module card can operate in TSM emulation mode, although it does not provide INP operation.

Figure 12: INP Not Enabled, Service Module Card Running in TSM Emulation



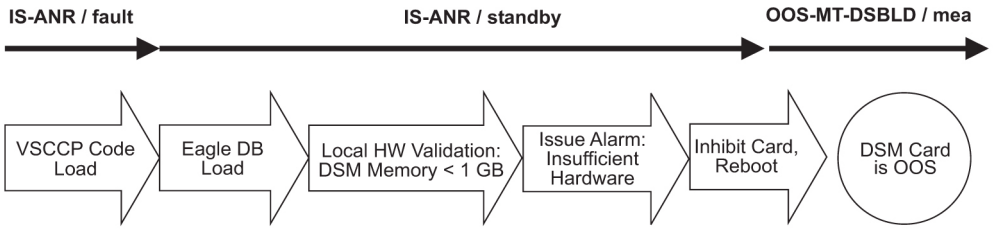
In *Figure 13: INP Enabled, Normal Operating Sequence* on page 116, the INP feature is enabled, and the Service Module card memory is at least 1GB and is connected to the EPAP. A normal Service Module card operating sequence occurs, providing INP service.

Figure 13: INP Enabled, Normal Operating Sequence



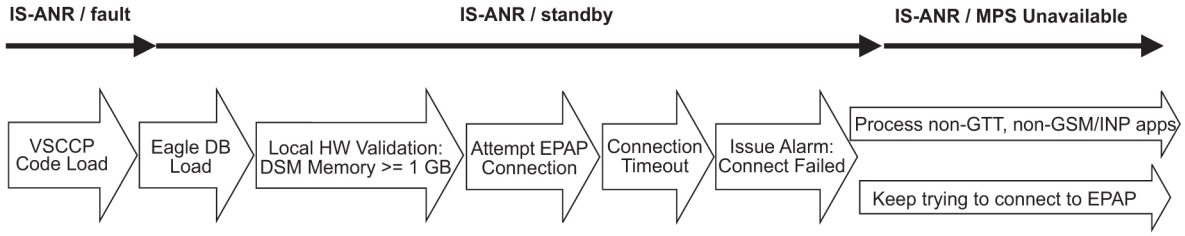
In *Figure 14: INP Enabled, but Service Module Card Memory Less Than 1GB* on page 116, the INP feature is enabled, but the Service Module card memory is less than 1GB. The INP feature cannot begin operation. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the Service Module card database capacity requirements.

Figure 14: INP Enabled, but Service Module Card Memory Less Than 1GB



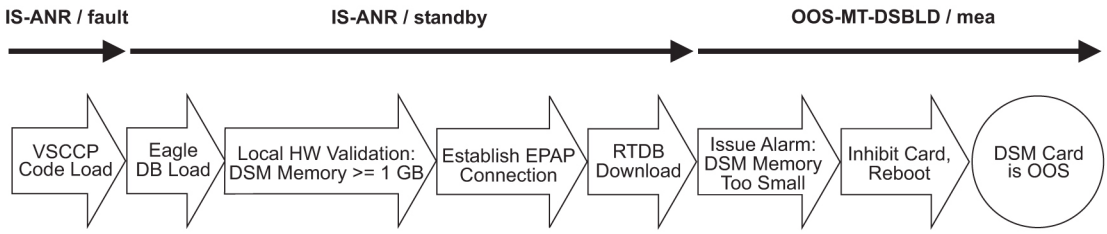
In *Figure 15: INP Enabled, but Service Module Card Not Connected to EPAP* on page 117, the INP feature is enabled, the Service Module card memory has at least 1GB, but the Service Module card is unable to connect to the EPAP. The INP feature cannot begin operation.

Figure 15: INP Enabled, but Service Module Card Not Connected to EPAP



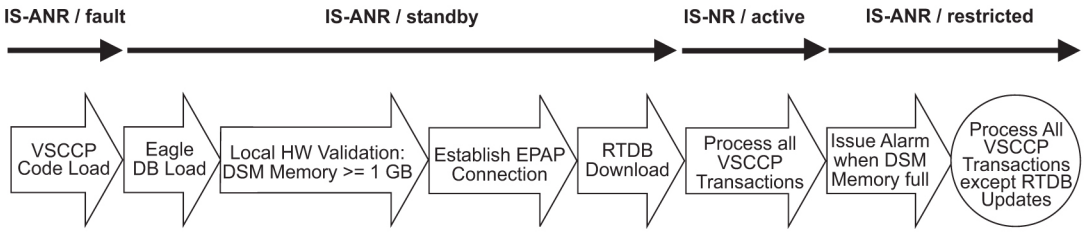
In *Figure 16: INP Enabled, but Service Module Card Memory Insufficient for Database* on page 117, the INP feature is enabled, the Service Module card has the required 1GB memory and is connected to the EPAP, but the Service Module card is too small for the required database. The INP feature cannot begin operation. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the Service Module card database capacity requirements.

Figure 16: INP Enabled, but Service Module Card Memory Insufficient for Database



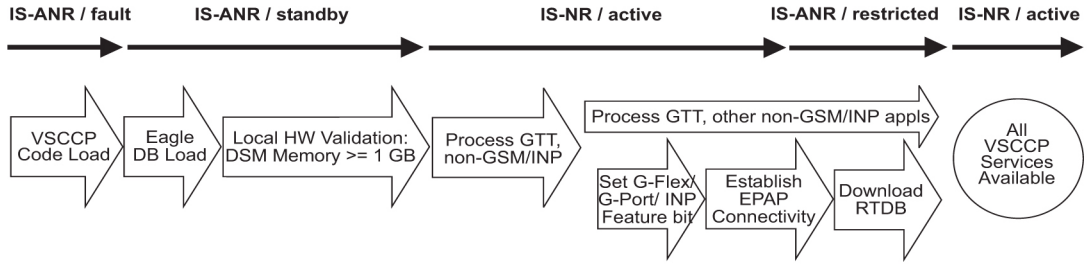
In *Figure 17: INP Enabled, but Database Exceeds Service Module Card Memory* on page 117, the INP feature is enabled, the Service Module card is connected to the EPAP, but the RTDB grows eventually to exceed the capacity of the Service Module card memory, despite its memory size of at least 1GB (an alarm is issued when the Service Module card memory becomes full from the RTDB update). The INP feature cannot begin operation. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the Service Module card database capacity requirements.

Figure 17: INP Enabled, but Database Exceeds Service Module Card Memory



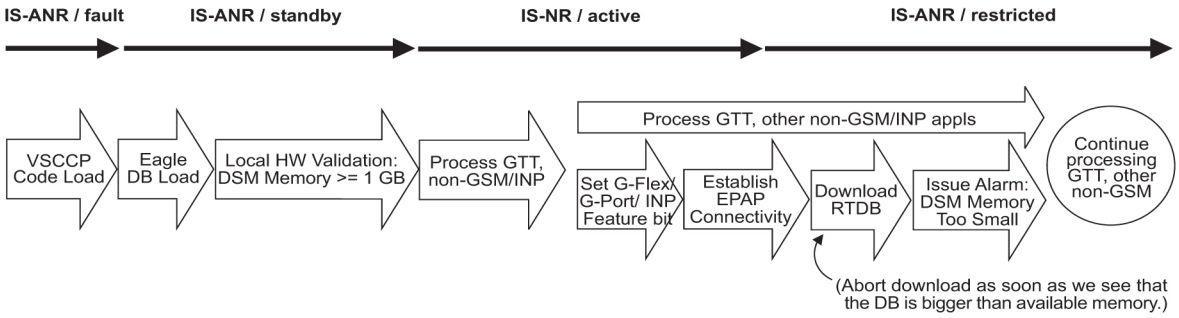
In *Figure 18: INP Not Enabled at First, but then Activated on Service Module Card* on page 118, the INP feature is not initially enabled; the Service Module card memory has at least 1GB but no EPAP connection; the Service Module card is running other applications when the INP feature is turned on. The Service Module card has sufficient memory to provide the INP feature service.

Figure 18: INP Not Enabled at First, but then Activated on Service Module Card



In *Figure 19: INP Activation Unsuccessful due to Insufficient Database* on page 118, the INP feature is not initially enabled; the Service Module card memory has at least 1GB but no EPAP connection, and is running other applications when the INP feature is turned on. However, the Service Module card memory is insufficient for the needed database, and cannot perform the INP feature operation. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the Service Module card database capacity requirements.

Figure 19: INP Activation Unsuccessful due to Insufficient Database



INP/AINPQ Subsystem Related Alarms

Refer to the *EAGLE 5 ISS Maintenance Manual* for a complete description and the associated corrective procedure for all INP/AINPQ related UAMs.

Refer to the *EAGLE 5 ISS Maintenance Manual* for more information and corrective procedures for the EAGLE 5 ISS related alarms. Refer to the *EAGLE 5 ISS-Tekelec 1000 ASMPS Platform Software and Maintenance Manual* for more information and corrective procedures for the MPS related alarms.

Table 5: INP/AINPQ Subsystem Related UAMs

UAM	Severity	Message Text	MPS or EAGLE 5 ISS
0013	Major	Card is isolated from the system	EAGLE 5 ISS
0084	Major	IP Connection Unavailable	EAGLE 5 ISS
0085	None	IP Connection Available	EAGLE 5 ISS
0099	Major	Incompatible HW for provisioned slot	EAGLE 5 ISS
0250	None	MPS available	MPS
0261	Critical	MPS unavailable	MPS
0328	None	SCCP is available	EAGLE 5 ISS
0329	None	SCCP capacity normal, card(s) abnormal	EAGLE 5 ISS
0330	Major	System SCCP TPS Threshold exceeded	EAGLE 5 ISS
0331	Critical	SCCP is not available	EAGLE 5 ISS
0335	None	SCCP is removed	EAGLE 5 ISS
0336	Major	LIM(s) have been denied SCCP service	EAGLE 5 ISS
0370	Critical	Critical Platform Failure(s)	MPS
0371	Critical	Critical Application Failure(s)	MPS
0372	Major	Major Platform Failure(s)	MPS
0373	Major	Major Application Failure(s)	MPS
0374	Minor	Minor Platform Failure(s)	MPS
0375	Minor	Minor Application Failure(s)	MPS

UAM	Severity	Message Text	MPS or EAGLE 5 ISS
0394	None	Local Subsystem is available	EAGLE 5 ISS
0395	Critical	Local Subsystem is not available	EAGLE 5 ISS
0396	Critical	Local Subsystem is disabled	EAGLE 5 ISS
0397	None	Local Subsystem is removed	EAGLE 5 ISS
0398	Minor	Local Subsystem normal, card(s) abnormal	EAGLE 5 ISS
0422	Major	Insufficient extended memory	EAGLE 5 ISS
0423	None	Card reload attempted	EAGLE 5 ISS
0441	Major	Incorrect MBD - CPU	EAGLE 5 ISS
0442	Critical	RTDB database capacity is 95% full	EAGLE 5 ISS
0443	Major	RTDB database is corrupted	EAGLE 5 ISS
0444	Minor	RTDB database is inconsistent	EAGLE 5 ISS
0445	None	RTDB database has been corrected	EAGLE 5 ISS
0446	Major	RTDB database capacity is 80% full	EAGLE 5 ISS
0447	None	RTDB database capacity alarm cleared	EAGLE 5 ISS
0448	Minor	RTDB database is incoherent	EAGLE 5 ISS
0449	Major	RTDB resynchronization in progress	EAGLE 5 ISS
0451	Major	RTDB reload is required	EAGLE 5 ISS

Service Module card-EPAP Link

Two alarms are used to indicate the Service Module card-to-EPAP link status. Refer to the EAGLE 5 ISS *Maintenance Manual*for more information and corrective procedures for the following alarms.

- **UAM 0084** - IP Connection Unavailable

This message indicates that an IP application socket is out of service due to a IP link down (Ethernet problem) or due to the Service Module card.

```
   station1234 06-09-30 16:28:08 EST EAGLE 37.5.0
**  5676.0084 ** DSM B   1101     IP Connection Unavailable
```

- **UAM 0085** - IP Connection Available

  This message indicates that a previously broken link between the EPAP and Service Module card is now functioning properly.

```
   station1234 06-09-30 16:28:08 EST EAGLE 37.5.0
   5676.0085    DSM B   1101     IP Connection Available
```

MPS (EPAP) Alarms

The following alarms are output on the EAGLE 5 ISS and include an alarm data string in the output. Refer to the *EAGLE 5 ISS -Tekelec 1000 ASMPS Platform Software and Maintenance Manual* (except where noted) for more information and corrective procedures for the following MPS related alarms. The MPS (EPAP) alarms are output to the MPS Output Group.

- **UAM 0250** - MPS available

  This indicates that a previous MPS platform association loss has been reestablished and is currently functioning properly.

  Example:

```
   station1234 06-09-30 16:28:08 EST EAGLE 37.5.0
  0259.0250    MPS   B               MPS available
```

- **UAM 0261** - MPS unavailable

  This message indicates that the EAGLE 5 ISS is unable to communicate with the MPS or the MPS has an internal failure. Refer to the `EAGLE 5 ISS` *Maintenance Manual* for the corrective action procedure.

  Example:

```
   station1234 06-09-30 16:28:08 EST EAGLE 37.5.0
*C  0259.0261 *C MPS   B                MPS unavailable
```

- **UAM 0370** - Critical Platform Failure (s)

  This message indicates the application running in the MPS server has detected a critical platform failure. The Alarm Data in the message contains a 16-character hexadecimal string in the format of h'1xxxxxxxxxxxxxx'. This alarm will be reset when UAM #250, MPS Available is issued.

  Example:

```
   station1234 06-09-30 16:28:08 EST EAGLE 37.5.0
*C  0259.0370 *C MPS   B       Critical Platform Failure(s)
                 ALARM DATA = h'1000000000000008'
```

- **UAM 0371** - Critical Application Failure (s)

  This message indicates the application running in the MPS server has detected a critical application failure. The Alarm Data in the message contains a 16-character hexadecimal string

in the format of h'2xxxxxxxxxxxxxx'. This alarm will be reset when UAM #250, MPS Available is issued.

Example:

```
   station1234 06-09-30 16:28:08 EST EAGLE 37.5.0
*C   0259.0371 *C MPS   B       Critical Application Failure(s)
                ALARM DATA = h'2000000000000001'
```

- **UAM 0372** - Major Platform Failure (s)

  This message indicates the application running in the MPS server has detected a major platform failure. The Alarm Data in the message contains a 16-character hexadecimal string in the format of h'3xxxxxxxxxxxxxx'. This alarm will be reset when UAM #250, MPS Available is issued.

  Example:

```
   station1234 06-09-30 16:28:08 EST EAGLE 37.5.0
**  0259.0372 ** MPS   B               Major Platform Failure(s)
                ALARM DATA = h'3000000000000002'
```

- **UAM 0373** - Major Application Failure (s)

  This message indicates the application running in the MPS server has detected a major application failure. The Alarm Data in the message contains a 16-character hexadecimal string in the format of h'4xxxxxxxxxxxxxx'. This alarm will be reset when UAM #250, MPS Available is issued.

  Example:

```
    station1234 06-09-30 16:28:08 EST EAGLE 37.5.0
**   0259.0373 ** MPS   B       Major Application Failure(s)
                ALARM DATA = h'4000000000000008'
```

- **UAM 0374** - Minor Platform Failure (s)

  This message indicates the application running in the MPS server has detected a minor platform failure. The Alarm Data in the message contains a 16-character hexadecimal string in the format of h'5xxxxxxxxxxxxxx'. This alarm will be reset when UAM #250, MPS Available is issued.

  Example:

```
   station1234 06-09-30 16:28:08 EST EAGLE 37.5.0
*   0259.0374 *  MPS   B       Minor Platform Failure(s)
                ALARM DATA = h'5000000000000004'
```

- **UAM 0375** - Minor Application Failure (s)

  This message indicates the application running in the MPS server has detected a minor application failure. The Alarm Data in the message contains a 16-character hexadecimal string in the format of h'6xxxxxxxxxxxxxx'. This alarm will be reset when UAM #250, MPS Available is issued.

  Example:

```
   station1234 06-09-30 16:28:08 EST  EAGLE 37.5.0
*   0259.0375 *  MPS   B               Minor Application Failure(s)
                ALARM DATA = h'6000000000000001'
```

Card Related MPS Alarms

The following alarms are output on the EAGLE 5 ISS. Refer to the *EAGLE 5 ISS Maintenance Manual*for more information and corrective procedures for the following card related MPS alarms. The Card Related MPS alarms are output to the Card Output Group.

- **UAM 0013** - Card is isolated from the system

  This indicates a card has become isolated and is unable to communicate to other cards in the system. This could be caused by a defective card, a power failure occurred on the card, or the system software has ordered a reset.

  This also appears when the card has been manually reset by a command.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
**  0012.0013 ** CARD 1101 SCCP          Card is isolated from the system
                 ASSY SN:  102199815a1234
```

- **UAM 0099** - Incompatible HW for provisioned slot

  This indicates a DCM or Service Module card does not have an extended memory. This card is automatically inhibited.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
**  0012.0099 ** CARD 1101 VSCCP  Incompatible hardware for provisioned slot
                 ASSY SN:  102199815a1234
```

- **UAM 0422** - Insufficient extended memory

  At least one SCCP card does not have enough memory for the INP and/or AINPQ application. Loading of the SCCP card is automatically inhibited.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
** 0012.0422 ** CARD 1108  SCCP   Insufficient extended memory
```

- **UAM 0423** - Card reload attempted

  Card loading is no longer inhibited. The once inhibited card is now attempting to load.

  Example:

```
station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
    0012.0423    CARD 1108  SCCP       Card reload attempted
```

- **UAM 0441** - Incorrect MBD - CPU

  A Service Module card does not have the required hardware configuration for the INP and/or AINPQ application.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
**  0012.0441 ** CARD 1108  VSCCP       Incorrect MBD - CPU
```

- **UAM 0442** - RTDB database capacity is 95% full

This 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:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
*C  0012.0442 *C CARD 1108 VSCCP         RTDB database capacity is 95% full
```

- **UAM 0443** - RTDB database is corrupted

  A RTDB database is corrupt. The calculated checksum did not match the checksum value stored for one or more records.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
** 0012.0443 ** CARD 1108 VSCCP        RTDB Database is corrupted
```

- **UAM 0444** - RTDB database is inconsistent

  One or more Service Module card real time database is not identical to the current real time database on the active EPAP fixed disks.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
*   0012.0444 *  CARD 1108  VSCCP       RTDB database is inconsistent
```

- **UAM 0445** - RTDB database has been corrected

  This message indicates that a problem with the RTDB has been corrected.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
   0012.0445    CARD 1108  VSCCP       RTDB database has been corrected
```

- **UAM 0446** - RTDB Database capacity is 80% full

  This message is displayed when a Service Module card detects that its daughterboard memory is at least 80% full.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
** 0012.0446 ** CARD 1108  VSCCP       RTDB Database capacity is 80% full
```

- **UAM 0447** - RTDB database capacity alarm cleared

  This message indicates that a problem with the RTDB memory has been corrected.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
   0012.0447    CARD 1108  VSCCP       RTDB database capacity alarm cleared
```

- **UAM 0448** - RTDB database is incoherent

This message indicates that the RTDB database download is in-process or that the update failed.

Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
*  0012.0448 *  CARD 1108  VSCCP   RTDB database is incoherent
```

- **UAM 0449** - RTDB resynchronization in progress

  This message indicates that the MPS database resynchronization is in-process.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
**  0012.0449 ** CARD 1108  VSCCP   RTDB resynchronization in progress
```

- **UAM 0451** - RTDB reload is required

  The RTDB database on the Service Module card needs to be reloaded because the resynchronization log does not contain all of the required updates.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
**  0012.0451 ** CARD 1108  VSCCP   RTDB reload is required
```

GSM Subsystem Alarms

The following alarms are output on the EAGLE 5 ISS for the GSM subsystem. The GSM Subsystem alarms are output to the GTT Output Group.

- **UAM 0328** - SCCP is available

  The SCCP subsystem has returned to service.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
   0056.0328    SCCP SYSTEM     SCCP is available
```

- **UAM 0329** - SCCP capacity normal, card(s) abnormal

  1 SCCP card has GSM status of Active and there are 1 or more cards with an GSM status other than Active.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
   0056.0329    SCCP SYSTEM   SCCP capacity normal, card(s) abnormal
```

- **UAM 0330** - System SCCP TPS Threshold exceeded

  Indicates the EAGLE 5 ISS has exceeded its TPS (Transactions Per Second) message transport rate threshold.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
** 0056.0330  **  SCCP SYSTEM    System SCCP TPS Threshold exceeded
```

- **UAM 0331** - SCCP is not available

  The SCCP subsystem is not available to any LIM(s). All Service Module-SCCP cards have failed.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
*C  0056.0331  *C  SCCP SYSTEM             SCCP is not available
```

- **UAM 0335** - SCCP is removed

  All SCCP cards have been deleted from the database; SCCP services are not available to the system.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
 0056.0335   SCCP SYSTEM          SCCP is removed
```

- **UAM 0336** - LIM(s) have been denied service

  Some LIM(s) are using the SCCP subsystem, but others have been denied service.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
** 0056.0336  **  SCCP SYSTEM     LIM(s) have been denied SCCP service
```

INP/AINPQ Subsystem Alarms

The following alarms are output on the EAGLE 5 ISS for the INP/AINPQ subsystem. The INP/AINPQ Subsystem alarms are output to the Application Subsystem Output Group.

- **UAM 0394** - Local Subsystem is available

  All SCCP cards are IS-NR and have an INP/AINPQ status of Active.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
   0056.0394   INP SYSTEM          Local Subsystem is available
```

- **UAM 0395** - Local Subsystem is not available

  Indicates no SCCP cards have an INP/AINPQ status of active. All are OOS or loading.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
*C  0056.0395  *C  INP SYSTEM             Local Subsystem is not available
```

- **UAM 0396** - Local Subsystem is disabled

  The INP/AINPQ subsystem has been manually disabled using the `inh-map-ss` command.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
*C  0056.0396  *C INP SYSTEM             Local Subsystem is disabled
```

- **UAM 0397** - Local Subsystem is removed

There are no VSCCP cards configured with this INP/AINPQ subsystem.

Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
   0056.0397   INP SYSTEM          Local Subsystem is removed
```

- **UAM 0398** - Local Subsystem normal, card(s) abnormal

  1 SCCP card has INP/AINPQ status of Active and there are 1 or more cards with an INP/AINPQ status other than Active.

  Example:

```
   station1234 06-04-30 16:28:08 EST  EAGLE 37.5.0
*  0056.0398 *  INP SYSTEM   Local Subsystem normal, card(s) abnormal
```

INP/AINPQ Subsystem Related UIMs

The UIM (Unsolicited Information Message) alarms in *Table 6: INP/AINPQ Subsystem UIM Alarms* on page 127 support the INP/AINPQ subsystem. The *EAGLE 5 ISS Maintenance Manual* contains a complete description of all UIM text and formats. The INP/AINPQ Subsystem related UIMs are output to the Application Subsystem Output Group.

Table 6: INP/AINPQ Subsystem UIM Alarms

UIM	Text	Description	Action
1174	Inh INP SS request alrdy outstanding	A second attempt to inhibit the INP subsystem has been made while the first attempt is still being processed.	No action is necessary. The second attempt will be ignored.
1175	Failure Inhibiting INP SS	The `inh-map-ss` command did not take the local subsystem off-line.	Enter the `inh-map-ss` command with the force parameter.
1242	Conv to intl num - Dflt CC not found	Conversion to international number failed because default CC was not found	Define the default CC with `chg-stpopts :defcc=xxx`
1243	Conv to intl num - Dflt NC not found	Conversion to international number failed because default NC was not found	Define the default NDC with `chg-stpopts :defndc=xxxxx`
1246	Invalid length of conditioned digits	Invalid length of conditioned digits (length of conditioned international number is less than 5 or greater than 15)	Use an international number with length in the acceptable range

UIM	Text	Description	Action
1295	Translation PC is EAGLE 5 ISSs	PC translation is invalid because it is one of the point codes of the EAGLE 5 ISS	Change the point code
1296	Translation PC type is ANSI	PC translation is invalid because it is an ANSI point code	Change the point code
1297	Invalid length of prefix/suffix digits	Attempted digit action of prefixing or suffixing the entity ID is invalid because the combined length of entity ID and GT digits is greater than 21 digits.	Change the attempted digit action or decrease the length of the entity ID and/or GT digits
1382	Too many digits for DRA parameter	Outgoing formatted digits exceeds the maximum allowed limit (32 for ITU TCAP Connect response and 21 for routing digits in ANSI-41 Return result).	Decrease the number of RN digits or modify the querying node to send fewer digits in DN.

Note:

The EPAP does not have any UIM requirements.

INP/AINPQ Measurements

Refer to the *EAGLE 5 ISS Maintenance Manual* for detailed measurement usage information.

OAM Based Measurements

INP/AINPQ measurements are available via the FTA (File Transfer Area) feature and not directly via EAGLE 5 ISS terminals. The File Transfer Area feature supports the transfer of file data between an EAGLE 5 ISS and a remote computer. It provides the capability to download files from the EAGLE 5 ISS via a data communications link. The data communications link is accessed through a dial-up modem using one of the RS-232 I/O ports of the EAGLE 5 ISS. The link is illustrated in *Figure 5: EPAP Sync Network* on page 31.

See the *Commands Manual* for details about using FTA commands, which are:

- Activate File Transfer: `act-file-trns`
- Copy to or from Transfer Area: `copy-fta`
- Delete Entry from File Transfer Area: `dlt-fta`
- Display File Transfer Area: `disp-fta-dir`

Measurements Platform

The Measurements Platform (MP) is required for an EAGLE 5 ISS with more than 700 links. It provides a dedicated processor for collecting and reporting STP, LNP, INP, AINPQ, G-Flex, A-Port, and G-Port measurements data. The interface to the customer's network supports the FTP transfer of Measurements reports to an FTP server. Following collection, scheduled reports are automatically generated and transferred to the customer's FTP server via the FTP interface.

Note: Existing FTP file server reports are overwritten by subsequent requests that produce the identical file name.

Reports can be scheduled or printed on-demand. Scheduled and on-demand reports are accessible by the following administrative commands:

- *chg-measopts* - Used to enable or disable the automatic generation and FTP transfer of scheduled measurement reports to the FTP server.
- *rept-stat-meas* - Reports the status of the measurements subsystem including card location and state, Alarm level, and Subsystem State.
- *rept-ftp-meas* - Manually initiates generation and FTP transfer of a measurements report from the MCPM to the FTP server.
- *rtrv-measopts* - Generates a user interface display showing the enabled/disabled status of all FTP scheduled reports.

The following Per System measurement peg counts of INP/AINPQ MSUs (Message Signalling Units) are supported for the INP and AINPQ features, as shown in *Table 7: Pegs for Per System INP/AINPQ Measurements* on page 129. The peg for "IDP received" is the total count of the number of the NPREQ and IDP queries received if both the NPREQ and either the INP feature or the AINPQ feature or both are turned on.

Table 7: Pegs for Per System INP/AINPQ Measurements

Event Name	Description	Type	Unit
INPQRCV	Number of total queries received by INPQS	System	Peg count
INPQDSC	Number of invalid queries that are discarded as no reply can be generated	System	Peg count
INPQTCPE	Number of error replies with TCAP error code	System	Peg count
INPSREP	Number of successful replies to INP/AINPQ non-queried queries. These replies will be: • Either INP Connect or INP Continue for the INP feature • Either Return Result with Digits or Return Result without Digits for the AINPQ feature.	System	Peg count

The following equation applies:

INPQRCV = INPQDSC + INPQTCPE + INPSREP

The following Per SSP measurement peg counts of INP/AINPQ MSUs are supported for the INP and AINPQ features. See *Table 8: Pegs for Per SSP INP/AINPQ Measurements* on page 130.

Table 8: Pegs for Per SSP INP/AINPQ Measurements

Event Name	Description	Type	Unit
INPQSCONN	Number of non-errored QS messages with QS	Point Code	Peg count
INPQSCONT	Number of non-errored QS messages with QS Continue or Return Result without Digits responses	Point Code	Peg count
INPMRTR	Number of messages sent to MR service that receive MR translation	Point Code	Peg count
INPMRGTT	Number of messages sent to MR service that fall through to GTT	Point Code	Peg count

The following equation applies:

INPSREP = INPQSCONN + INPQSCONT

The following measurement events are included on the STP Daily Maintenance (MTCD) and the STP Day-to-Hour (MTCDTH) measurement reports and include peg counts for INP/AINPQ MSUs. These reports are similar to those used for GTT. The existing GTT/SCCP measurements are used for both GTT and INP/AINPQ and appear in the same reports.

Table 9: MTCD and MTCDTH Measurements

• MSSCCPFL	MSUs discarded due to SCCP routing failure Also includes INP/AINPQ MSUs that got a match from either the INP/AINPQ 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 INP/AINPQ Message Relay MSUs that did fall through to GTT but did not match on GTT selectors
• GTTUN1NT	GTT unable to perform: no translation on this address Also includes INP/AINPQ Message Relay MSUs that fell through to GTT, obtained a GTT selector match but still did not match on the GTA.
• GTTPERFD	Number of GTT performed

	Also includes INP/AINPQ MSUs that got a match in either the INP/AINPQ or GTT database.

This implementation does not discriminate between the MSSCCPFL, GTTUN0NS, GTTUN1NT, or GTTPERFD pegs for INP/AINPQ or GTT applications. For example, a search failure could result from a problem in either the INP/AINPQ or GTT database.

Measurement Reports

Measurements are available with these report commands. Refer to the *Commands Manual* for detailed usage information.

Table 10: Measurement Report Commands

• OAM daily:	`rept-meas:type=mtcd:enttype=np`
• OAM hourly:	`rept-meas:type=mtch:enttype=np`
• MP daily:	`rept-ftp-meas:type=mtcd:enttype=np`
• MP hourly:	`rept-ftp-meas:type=mtch:enttype=np`

Chapter 6

Prepaid IDP Query Relay Feature

Topics:

The Prepaid IDP Query Relay feature (IDP Relay) provides a mechanism to insure the correct charging for calls from prepaid subscribers in a portability environment.

Introduction

The Prepaid IDP Query Relay feature (IDP Relay) provides a mechanism to insure the correct charging for calls from prepaid subscribers in a portability environment.

When Mobile Switching Centers (MSCs) in the network are configured to send IDP prepaid query messages through the EAGLE 5 ISS MPS, the EAGLE 5 ISS MPS platform intercepts the IDP query (based on a set of configurable criteria), performs a number portability lookup on the number given in the IDP CalledPartyNumber (CDPN) parameter (or CalledPartyBCDNumber in CAMEL IDPs). If an entry is found in the INP database, the CDPN is modified with the portability information (routing number or HLR address) and forwarded to the prepaid SCP (PPSCP) for processing.

When the SCP receives the IDP query, all information necessary for call processing and billing is present. The IDP Relay feature alleviates the need to launch a separate number portability database query.

Feature Description

The EAGLE 5 ISS MPS platform intercepts the IDP query based on a set of configurable criteria, performs a number portability lookup on the called number, inserts the portability information (Routing Number or HLR Address), and forwards the IDP query to a prepaid SCP for processing. When a respective entry is found in the INP database, any work performed is controlled by NPP Service Actions an provisioning in the TTROPTS table. The CDPN can be modified with the portability information (routing number or HLR address) and the CGPN. Regardless of any actions performed on the IDP query by the Flexible IDP Relay feature, the query is always forwarded to the prepaid SCP (PPSCP) for processing.

The concept of IDP Relay is to prevent the SCP from having to perform its own number portability database query. Instead of the MSC routing the prepaid IDP query directly to the prepaid SCP, the EAGLE 5 ISS intercepts the IDP query and performs a portability check on the called and calling number. It inserts the portability information (Routing Number or HLR Address) and forwards the IDP query to a prepaid SCP for processing. When the SCP receives the IDP query, all of the information needed to correctly charge for and process the call is already present, without the need to launch a separate number portability database query.

Call Flows

The scenarios that follow cover basic uses of the IDP Relay feature. The Flexible IDP Relay feature (addition of NPP capabilities) provides more complicated CdPN and CgPN functionality (not shown in these call flows).

Mobile Originated Prepaid Call to a Ported Out Subscriber

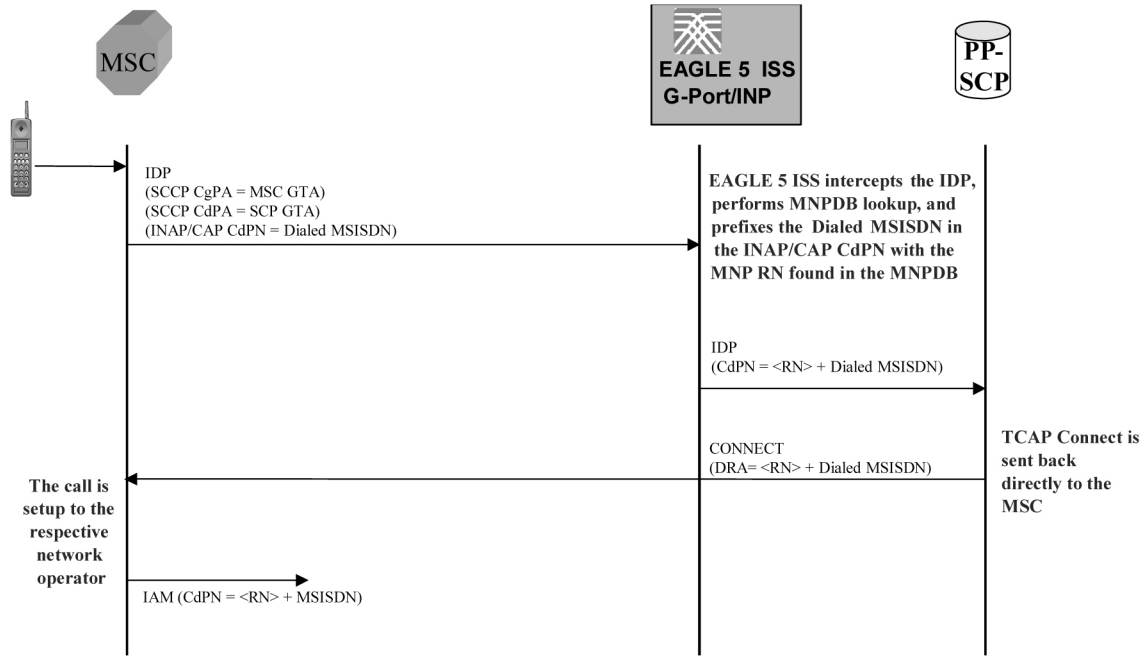
This scenario encompasses the following subscriber types:

- **Own Subscriber Ported Out** - Refers to an Own Subscriber who has ported to a Foreign Network.

- **Foreign Subscriber Ported to Foreign Network** - Refers to a Foreign Subscriber who has ported to a different Foreign Network.
- **Foreign Subscriber** (optional, dependent on how the RTDB is provisioned) - Refers to a subscriber whose number belongs to the number range of a Foreign Network, and who has not ported to another Foreign Network.
- **Foreign Subscriber Not Known to be Ported** (optional, dependent on how the RTDB is provisioned) - Refers to a Foreign Subscriber whose portability status is unknown by the querying network.

When a prepaid subscriber attempts to originate a call, the MSC/VLR must first query a prepaid SCP before attempting to complete the call in order to determine if the subscriber has enough credit to complete the call.

Figure 20: MO Prepaid Call to Ported Out Subscriber



When a prepaid subscriber originates a call, the MSC/MSC/VLR serving that subscriber formulates an INAP or CAP IDP message and routes it to the Prepaid SCP. This message is routed via GTT (SCCP CdPA = PPSCP GTA), with the EAGLE 5 ISS serving as either the Intermediate or Final GTT service provider. In either case, the EAGLE 5 ISS is either an Intermediate or Final GTT service provider for the message (message arriving at the EAGLE 5 ISS must have MTP DPC = Eagle PC, SCCP CdPA RI = route-on-GT, and SCCP CdPA GTA = PPSCP) in order for the IDP Relay service to be triggered.

Upon receipt of the IDP, the EAGLE 5 ISS first examines the SCCP CdPA TT, SSN, NP, NAI, and GTI (Service Selectors) to determine which of the EAGLE 5 ISS's SCCP services is required (IDP Relay, INP, AINPQ, G-Port, A-Port, G-Flex, GTT, etc.). If the message parameters match the provisioned Service Selector combination for IDP Relay service in general, the EAGLE 5 ISS then determines whether this specific IDP requires processing by the IDP Relay service based examination of the SCCP CdPA GTA digits (which should be the GTA of a PPSCP), the TCAP Operation Code, and the combination of Service Key and EventTypeBCSM in the INAP/CAP

layer. If the SCCP CdPA GTA matches one of the provisioned PPSCP addresses, the Operation Code signifies IDP, and the Service Key and EventTypeBCSM matches one of the provisioned service values for the IDP Relay service, then the EAGLE 5 ISS enters the IDP Relay logic. Otherwise, the EAGLE 5 ISS continues with normal SCCP processing.

If the intercepted IDP is selected for IDP Relay service, the EAGLE 5 ISS enters the IDP Relay processing routing. The EAGLE 5 ISS extracts the B-party number (the number which was dialed by the prepaid subscriber) from the INAP/CAP CalledPartyNumber parameter, or from the CAP CalledPartyBCDNumber parameter (CDPN), and performs a lookup in the EAGLE 5 ISS's G-Port/INP MNP database (after some number filtering and conditioning).

In this scenario, the EAGLE 5 ISS finds a match on the B-party DN in the RTDB with an association to a Routing Number (RN).

Note: Typically, an DN entered in the database with an association to an RN indicates that the number is either (a) an Own Number ported to another network, or (b) a Foreign Number which has been ported to another foreign network. In some cases (depending upon how the customer chooses to provision the database), this may also indicate a Foreign Number which is not known to be ported.

After finding a match on DN with an associated RN in the G-Port RTDB, the EAGLE 5 ISS modifies the INAP/CAP CDPN parameter by prefixing the RN information to the DN. The CDPN NAI parameter will be copied from the incoming value, or changed to 'Unknown', based on the provisioned value in the EAGLE 5 ISS. The IDP Relay service may be configured to either send the same NAI as was received in the incoming CDPN, or to send the value 'unknown' in all cases.

Note: The term CDPNNAI is used in this document to represent the value in the INAP/CAPCDPN parameter. In INAP, this parameter is known as "NAI", while in CAP, it is known as "Type of Number". CDPNNAI is used here to represent both for simplicity.

After performing the required modifications, the EAGLE 5 ISS then routes the modified IDP via GT translation to the PPSCP indicated by the original GTA in the SCCP CdPA, which was not altered as a result of the IDP Relay operation. The PPSCP receives the modified IDP, containing the portability information needed to correctly charge for the call. The SCP then returns the appropriate response to the MSC/VLR, either allowing or denying the call.

In order for the IDP Relay feature to provide accurate portability information for all ported numbers, it is required that all ported numbers be entered into the MNP database, including Own numbers ported out as well as Foreign numbers ported to foreign networks. If a foreign number ported to a foreign network is not entered in the database with a routing number (either in the individual or range entry tables), the IDP Relay will not find a match, and will not be able to prefix the routing number information to the CDPN in the IDP with the routing number of the current subscription network. Thus, the EAGLE 5 ISS sends the original IDP unmodified to the SCP with CDPN = dialed DN only. However, even in this case it is possible for the SCP to differentiate calls within the own network from calls to foreign networks very easily.

Mobile Originated Prepaid Call to Imported or Own Non-Ported Subscriber

This scenario encompasses the following subscriber types:

- **Own Subscriber** - Refers to a subscriber whose number belongs to the number range of the Own Network and who has not ported to another network.
- **Foreign Subscriber Ported In** - Refers to a Foreign Subscriber who has ported into the Own Network.

When a prepaid subscriber attempts to originate a call, the MSC/VLR must first query a prepaid SCP before attempting to complete the call in order to determine if the subscriber has enough credit to complete the call.

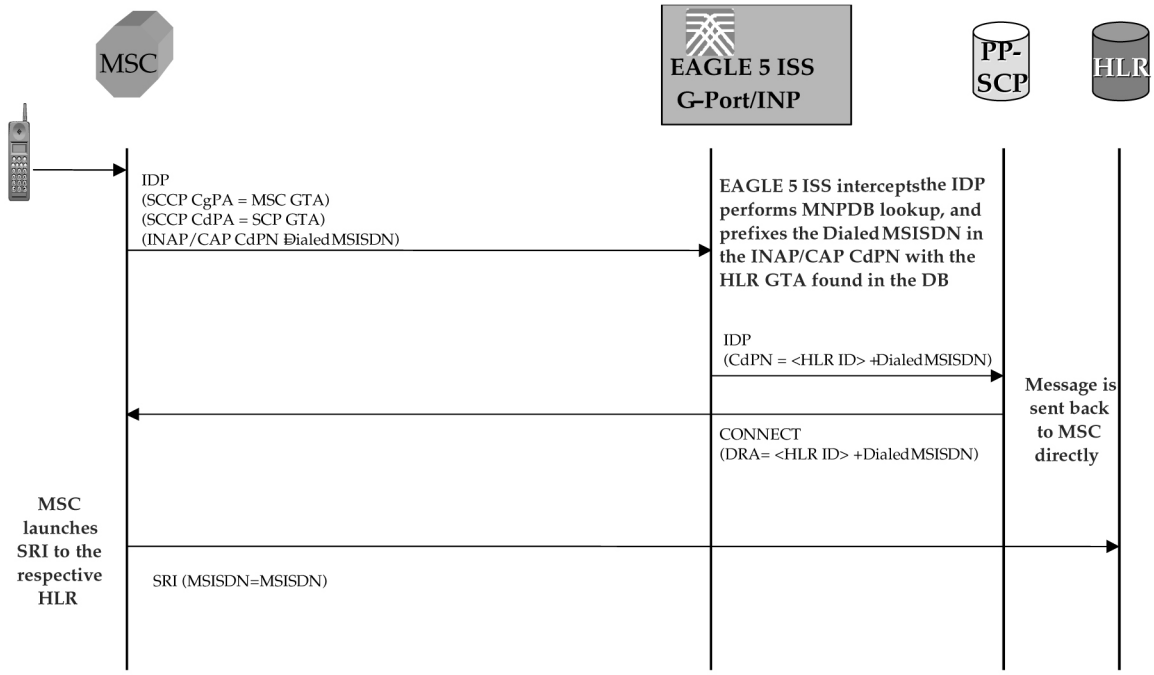
When a prepaid subscriber originates a call, the MSC/MSC/VLR serving that subscriber formulates an INAP or CAP IDP message and routes it to the Prepaid SCP. This message is routed via GTT (SCCP CdPA = PPSCP GTA), with the EAGLE 5 ISS serving as either the Intermediate or Final GTT service provider. In either case, the EAGLE 5 ISS is either an Intermediate or Final GTT service provider for the message (message arriving at the EAGLE 5 ISS must have MTP DPC = Eagle PC, SCCP CdPA RI = route-on-GT, and SCCP CdPA GTA = PPSCP) in order for the IDP Relay service to be triggered.

Upon receipt of the IDP, the EAGLE 5 ISS first examines the SCCP CdPA TT, SSN, NP, NAI, and GTI (Service Selectors) to determine which of the EAGLE 5 ISS's SCCP services is required (IDP Relay, INP, AINPQ, G-Port, A-Port, G-Flex, GTT, etc.). If the message parameters match the provisioned Service Selector combination for IDP Relay service in general, the EAGLE 5 ISS then determines whether this specific IDP requires processing by the IDP Relay service based examination of the SCCP CdPA GTA digits (which should be the GTA of a PPSCP), the TCAP Operation Code, and the combination of Service Key and EventTypeBCSM in the INAP/CAP layer. If the SCCP CdPA GTA matches one of the provisioned PPSCP addresses, the Operation Code signifies IDP, and the Service Key and EventTypeBCSM matches one of the provisioned service values for the IDP Relay service, then the EAGLE 5 ISS enters the IDP Relay logic. Otherwise, the EAGLE 5 ISS continues with normal SCCP processing.

If the intercepted IDP is selected for IDP Relay service, the EAGLE 5 ISS enters the IDP Relay processing routing. The EAGLE 5 ISS extracts the B-party number (the number which was dialed by the prepaid subscriber) from the INAP/CAP CalledPartyNumber parameter, or from the CAP CalledPartyBCDNumber parameter (CDPN), and performs a lookup in the EAGLE 5 ISS's G-Port/INP MNP database (after some number filtering and conditioning).

In this scenario, the EAGLE 5 ISS finds a match on the DN in the RTDB with an association to an SP entity ID (HLR GTA).

Figure 21: MO Prepaid Call to an Imported or Own-Non-Ported Subscriber



In this case, the PPSCP always requires an SP ID to be prefixed to the DN in the CDPN - for both Foreign Numbers Ported In as well as Own Numbers never ported. Based on this, the IDP Relay requires that all such numbers be entered in the MNP database with an association to an SP ID, either as individual numbers (which is likely the case for imported numbers), or in a number range (which is likely the case of own numbers not ported). This distinction is made because in a standard MNP node, it is often standard practice not to enter Own Subscribers never ported because for SP queries, the standard GTT translation normally suffices for these subscribers, and it is not required to enter them into the RTDB. If these numbers are not entered, IDP Relay will not find a match, and would simply transfer the IDP without modification to the PPSCP (containing DN only in CDPN).

This may not be an issue if the PPSCP correctly interprets when the PPSCP receives an IDP without any RN or SP ID, it assumes the DN is an Own Subscriber, and acts accordingly. There is also a value to enter all own subscribers with the respective HLR-ID to streamline MNP processing in networks with a high prepaid subscriber base.

Mobile Originated Prepaid Call to Foreign (Non-Ported) Subscriber

In this scenario, an IDP is received for a number which is a foreign (non-own-network) number and which has not been ported. Their are two options in this scenario, both configurable via provisioning. In one case, a number range for the foreign network is entered with a generic routing number for the network. In this case, the IDP Relay reacts in the same way as with a ported-out number, prefixing the CDPN with the RN taken from the number range entry. Although the number is technically not ported, the use of a range with an RN would still point to the correct network.

Alternatively, if the number is not provisioned in the RTDB at all, or is entered without an associated routing number/HLR ID, the IDP is not modified and the message is simply be relayed to the SCP. In this scenario, the SCP returns the IDP response to the MSC without any prefix.

Note that this method could also be used for Own Subscribers never ported - i.e. no entry in the RTDB, which would cause IDP Relay to send the unmodified IDP to the PPSCP.

Service Selection

When an IDP is sent by an MSC, it is sent to the PPSCP via the EAGLE 5 ISS for GTT processing. As such, the message will contain MTP DPC = Eagle's PC and SCCP CdPA = PPSCP GTA with RI = GT. Because the MTP destination of the message is the EAGLE 5 ISS, the message is delivered to the EAGLE 5 ISS's SCCP subsystem for processing.

The EAGLE 5 ISS's SCCP subsystem first examines the SCCP CdPA parameters to determine which service is being requested (the EAGLE 5 ISS contains a Service Selection table to inform the system of how to treat incoming messages according to basic SCCP parameters). The SCCP CdPA TT, NP, NAI, GTI, and SSN parameters are examined first for this purpose. This combination of parameters may or may not be enough to determine that the message should receive IDP Relay service, and is based on what other services are active on the EAGLE 5 ISS. (For example, if the Eagle is expected to receive other IDP messages that do not require IDP Relay, the Service Selectors would not provide a definitive decision point, as the TT, NP, NAI, GTI, and SSN would likely be identical for all IDPs.) Therefore, additional service selection criteria are required.

After examining the basic Service Selectors and determining that the combination is consistent with service selectors for the IDP Relay service, the EAGLE 5 ISS then examines the SCCP CdPA GTA digits against a provisioned list of Prepaid SCP GTAs. This list should contain all SCPs which could be the recipient of an IDP for prepaid query. If the SCCP CdPA GTA matches one of the provisioned PPSCP GTAs, the EAGLE 5 ISS then proceeds with service selection evaluation. If no match is found, the IDP is processed by standard GTT service in the EAGLE 5 ISS.

If the SCCP CdPA GTA matches one of the provisioned PPSCP GTAs, the EAGLE 5 ISS continues service selection to determine if IDP Relay is required. The TCAP Operation Code is next examined. The OpCode should be that for IDP. If it is not, the IDP is processed by standard GTT service in the EAGLE 5 ISS.

The EAGLE 5 ISS next compares the combination of INAP/CAP Service Key and EventTypeBCSM from the message with a provisioned list of Service Keys + Event Types. If the Service Key + EventTypeBCSM match one of the provisioned combinations pointing to IDP Relay service, then the message is sent for IDP Relay service. IDPs not matching these criteria fall through to standard GTT service and are routed transparently (unless the message matches the service selectors for another SCCP service hosted on the EAGLE 5 ISS, in which case the message is sent for that service).

CDPN Number Format Determination

After determining that a particular IDP requires the IDP Relay service, the EAGLE 5 ISS next determines the format of the incoming number, and the context surrounding the call. These items factor into both the conditioning of the number for the RTDB search, as well as the manner in which the message is treated as a result. The following details about the number must be known:

- Is the call terminating to a subscriber in the home country? (Calls terminating to numbers outside the home country are not subject to IDP Relay since number portability does not cross International boundaries).
- Is the calling subscriber roaming or dialing from inside the home country? (Determines if numbers dialed as national numbers are treated as in-country or out-of-country terminated).
- Was the number dialed with Escape Codes? (These must be deleted for DB lookup, but may be re-inserted for transmission).

The INAP/CAP CDPN parameter includes a CDPN NAI parameter which indicates the nature of address for the dialed digits (International, National, Subscriber, or Unknown). This parameter alone cannot always be relied upon to determine the format of the CDPN. For example, it is possible for the CDPN to contain a National number, but the CDPN NAI may be marked "Unknown".

Other conditions also factor into how a received number should be treated. For example, a National number dialed while a subscriber is roaming must be treated differently than a National number dialed while a subscriber is in his/her home country/network. The condition of whether the calling subscriber is roaming or not cannot be determined from the CDPN NAI in the CDPN.

Additional checks are required in order to determine the true nature of the CDPN. The following sections describe the additional checks applied to the received IDP in order to determine how the message is treated.

Escape Codes

Escape Codes are also considered when determining the CDPN number format.

Subscribers are normally required to enter International Escape Code (IEC) before dialing the digits an International number. For example, in some countries, the digits *00* must be dialed before dialing an International number.

Subscribers are also normally required to enter a National Escape Code (NEC) to before dialing long distance National numbers. For example, many countries require a single *0* to be dialed before dialing a National number.

Escape codes must be removed for IDP Relay to perform the database lookup, as the numbers in the RTDB are always provisioned in International format. When an Escape Code is used, the CDPN NAI will be *unknown*. Therefore, whether IEC or NEC is found will indicate whether the number is International or National.

The EAGLE 5 ISS provides a table to provision both an IEC and a NEC . If a message is received with CDPN CDPN NAI = unknown, IDP Relay first checks the leading digits of the number for a match with IEC or NEC, and treats the number accordingly. If CDPN NAI = unknown and no match is found on the IEC or NEC, the number is treated as National with no preceding NEC.

Calling Subscriber Roaming

Roaming is another factor that must be considered when determining the structure of the incoming IDP. and how it should be treated is whether or not the calling subscriber is roaming when the call is placed.

When a subscriber is roaming, all incoming IDPs generated from calls made by that subscriber are CAMEL Application Part (CAP) rather than INAP. When a roaming subscriber dials a National Number (number without a Country Code), it is treated differently that when a non-roaming subscriber dials a National Number. This is because when a subscriber dials a National number while roaming Internationally, it is assumed that the subscriber is attempting to dial a number in the country where they are currently roaming, and not in their home country (if the subscriber wishes to dial a number in their home country, it must be dialed as an International number since they are roaming).

Since MNP checks are not conducted across International boundaries, calls from a roaming subscriber to a National number should are subject to IDP Relay service. Calls from the same subscriber to a National number when the subscriber is not roaming are subjected to IDP Relay service because these numbers are assumed to be terminating in the subscriber's home country,

where portability applies. The National number digits could be identical in these two cases, although the actual destination is different.

For these reasons, it may be required that the IDP Relay function be able to distinguish between an IDP received for a call generated by a roaming subscriber versus one generated by a non-roaming subscriber. The IDP Relay service offers a configurable option to select whether IDPs generated by roaming subscribers should be subjected to IDP Relay processing, or be routed via standard GTT.

If this option (CGPA check) is activated, the calling subscriber's roaming status is determined by comparing the Country Code in the SCCP CGPA parameter of the IDP with the Default Country Code provisioned in the EAGLE 5 ISS. (There is only one Default CC provisioned in the EAGLE 5 ISS, and it corresponds to the *home* network. If a subscriber is roaming, the CC of the visited MSC will not match the Default CC provisioned in the EAGLE 5 ISS). If National roaming is allowed, the respective scenarios are treated as if the subscriber is not roaming. A roaming scenario is not detected by the CGPA check and IDP Relay processing is performed. This option is ON by default. If the operator wants the IDP Relay feature to treat IDPs generated from roaming subscribers, this option must be turned OFF.

Call Placed to Country Other than Home Country

The IDP Relay check does not apply if a subscriber dials a number in a country other than subscriber's home country. The INAP/CAP CDPN Country Code is checked against the Default CC provisioned in the EAGLE 5 ISS. If a match is not found, it means the subscriber has dialed a number outside his home country and IDP Relay is not required. The message simply falls through to GTT (or other SCCP service).

CDPN Number Conditioning

Once the format of the CDPN number has been determined as described in *CDPN Number Format Determination* on page 139, conditioning (if necessary) is performed before an RTDB lookup. The INP MNP database stores numbers in full International format only. Numbers not received in International format must first be converted (conditioned) before performing an RTDB lookup. For a summary refer to *Table 11: IDP Relay Number Conditioning Table* on page 142.

CDPN Received in International Format

There are two number format determination cases which result in a number being declared in International format.

- CDPN Received in Correct International Format (CDPN NAI = "International") In the case that the INAP/CAP Called Party Number (or Called Party BCD Number) is already in International format (as determined by CDPN NAI parameter set to "International") with no extra prefixes or suffixes, including no Escape Codes. No conditioning is required by the IDP Relay application prior to RTDB lookup.
- CDPN Received with IEC Prefixed to International Digits (CDPN NAI = "Unknown") If the CDPN NAI = Unknown, the IDP Relay first searches for an International Escape Code (IEC). If an IEC is found, the received CDPN is conditioned prior to RTDB lookup by removing the IEC, leaving only the International digits (CC+DN).

CDPN Received in National Format

There are three number format determination cases which result in a number being declared in National format.

- CDPN Received in Correct National Format (CDPN NAI = National) The INAP/CAP Called Party Number (or Called Party BCD Number) is received in correct National format (as determined by CDPN NAI parameter set to "National") with no extra prefixes or suffixes, including no Escape Codes. If the calling subscriber is not roaming, then IDP Relay conditions the CDPN by prefixing the DefCC to the DN prior to conducting the RTDB lookup.
- CDPN Received with NEC Prefixed to National Digits (CDPN NAI = Unknown) If the CDPN NAI = Unknown, IDP Relay first searches for an International Escape Code (IEC), and if no match, then searches for a National Escape Code (NEC). Since the NEC is found (in this case), the received CDPN must be conditioned prior to RTDB lookup by first removing the NEC, then prefixing the DefCC to the remaining National digits (DN), resulting in an International number for lookup.
- CDPN Received without Prefix, but CDPN NAI = "Unknown" In this case, the CDPN is in a National format without a prefixed Escape Code, but the CDPN NAI is still marked "Unknown" rather than "National". After searching first for an IEC, then for a NEC prefixed to the CDPN and finding neither, IDP Relay assumes that the number is in National format. If the subscriber is not roaming, then IDP Relay conditions the number prior to RTDB lookup by adding the DefCC to the digits received in the CDPN, which are assumed to be DN without a prefix.

Table 11: IDP Relay Number Conditioning Table

Incoming Address Format			Number Conditioning	Outgoing Address Format	
TCAP DN NAI	Perform SCCP CGPA DefCC Check?	TCAP DN Format		NAI	Format
International	No	CC DN	None. Do RTDB lookup.	If PFX3=UNKN NAI=unknown Else NAI=International	PFX1 CC RN DN
National	if PFX4=ON	DN	Add DEFCC. Do RTDB lookup.	If PFX3=UNKN NAI=unknown Else nai=National	PFX2 RN DN
Unknown	No	IEC CC DN	CSL Delete prefix found, (P1=International),	NAI=unknown	IEC CC RN DN

Incoming Address Format			Number Conditioning	Outgoing Address Format	
TCAP DN NAI	**Perform SCCP CGPA DefCC Check?**	**TCAP DN Format**		**NAI**	**Format**
			remove it, Do RTDB Lookup		
Unknown	if PFX4=ON	NEC DN	CSL Delete prefix found, (P1=National), remove it, Add DEFCC, Do RTDB Lookup	NAI=unknown	NEC RN DN
Unknown	if PFX4=ON	DN	No delete prefix found. Add DEFCC, Do RTDB Lookup	NAI=unknown	RN DN

Legend

CC Country Code

PFX Prefix Number

DN Directory Numbe

IEC International Escape Code

RTDB Real Time Database

CSL Common Screening List

CGPA Calling Party Address

UNKN Unknown

NEC National Escape Code

DEFCC Default Country Code

NAI Nature of Address Indicator

SCCP Signaling Connection Control Part

TCAP Transaction Capabilities Application Part

MNP Database Search

After service selection, number format determination, and number conditioning, the IDP Relay service searches the INP MNP database with the digits retrieved from the INAP/CAP CDPN parameter of the IDP message. This search results in one of four outcomes

Match on Digits with RN (Routing Number)

This condition indicates that the number belongs to a Foreign Network, and could be an Own Subscriber ported out, or a Foreign Subscriber. The IDP Relay then prefixes the RN to the CDPN digits and relays to the PPSCP.

Match on Digits with SP (SP Address)

This condition indicates that the number belongs to the Own Network, and could be an Own Subscriber, or a Foreign Subscriber ported in. The IDP Relay then prefixes the SP address to the CDPN digits and relays to the PPSCP.

Match on digits, but no associated RN or SP

This condition indicates a number was entered in the RTDB, but the portability status is unknown. Data might be entered in this format because it is an All Call Query solution based on SRF, but regulation does not allow prefixing of non-ported numbers. If IDP Relay finds such a match, the EAGLE 5 ISS terminates the IDP Relay function and simply routes the message via standard GTT to the PPSCP. The EAGLE 5 ISS will not modify the INAP/CAP portion of the message, and will only modify the MTP and SCCP CdPA modifications if required by standard GTT.

No Match on Digits

This condition indicates the number is not in the RTDB. Generally, this indicates that the number has never been ported (in or out), or is an unknown number. In any case, if IDP Relay encounters this scenario, the EAGLE 5 ISS will terminate the IDP Relay function and simply route the message via standard GTT to the PPSCP. The EAGLE 5 ISS will not modify the INAP/CAP portion of the message, and will only modify the MTP and SCCP CdPA modifications if required by standard GTT.

Encoding of Outgoing CDPN

If a match is found in the RTDB on the CDPN digits with either an RN or an SP/SP, the IDP Relay function then modifies the CDPN by adding the RN or SP/SP address to the CDPN. The exact placement of the RN/SP and the exact format of the CDPN in the outgoing message is dependent upon the format and context of the incoming message.

Setting of Outgoing CDPN NAI Parameter

The user has two basic options for setting the CDPN NAI parameter in the CDPN of the outgoing message. The Eagle will provide an option for setting CDPN NAI with values of either “unknown” or “incoming”. “Unknown” is the default value for this option. When “unknown” is selected, or if no option has been selected, the CDPN NAI in the outgoing CDPN will always be set to “Unknown” regardless of the CDPN NAI received in the incoming message, and regardless of the format of the outgoing digits. When “incoming” is selected, the CDPN NAI in the outgoing CDPN will be set to the same value as the CDPN NAI received in the incoming message, regardless of the format of the outgoing digits. (This means that if the incoming CDPN NAI = Unknown, the outgoing CDPN NAI will also be set to “Unknown”).

Outgoing CDPN Digits

The outgoing CDPN digits are determined based on several factors, including the CDPN NAI of the incoming CDPN and the format of the digits in the incoming CDPN. If the incoming CDPN

NAI = Unknown, then the outgoing CDPN digits will be the same as the digits received in the incoming message with the exception of the addition of RN or SP. In these cases, the RN or SP is placed between the Escape Code (if dialed) plus Country Code (if number was International) and the DN. If the incoming CDPN NAI = International or National, the outgoing digits are prefixed by the RN or SP, and also by an "Insert Prefix" which is a user-configurable parameter in the EAGLE 5 ISS. In these cases, the Insert Prefix always precedes any other digits. In the case of a National format number, the RN or SP immediately follows the Insert Prefix. In the case of an International format number, the Country Code is placed between the Insert Prefix and the RN/SP.

The inclusion of the Insert Prefix is based on the incoming CDPN NAI parameter and whether or not an Insert Prefix is provisioned. There is one Insert Prefix for International and one for National, and the two are independent. For example, if an Insert Prefix is provisioned for International but not for National, then the International prefix will be inserted in messages which were received with CDPN NAI = International in addition to the RN/SP, but no prefix will be inserted in message received with CDPN NAI = National - only the RN/SP would be inserted in these messages.

In most cases, this Insert Prefix will simply be equal to the International or National Escape Codes used in the network. The EAGLE 5 ISS allows this parameter to be provisioned so that it can be any value required by the operator.

Prepaid IDP Query Relay Commands

This section provides a description of the maintenance, operations, and measurements commands for the Prepaid IDP Query Relay feature (IDP Relay). The commands that follow allow provisioning and operations activities for Service Module cards.

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

`enable-ctrl-feat / chg-ctrl-feat / rtrv-ctrl-feat`

These commands are used to enable, turn on, and display the on/off status of the IDP Relay feature.

`chg-prefix / rtrv-prefix`

These commands are used to enter the name of a feature and relate it to a Prefix, to specify an ID value that is used to refer to the prefix from another table, and to display provisioned prefixes.

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

`ent-csl / chg-csl / dlt-csl / rtrv-csl`

Common screening list commands are used to define, change, and display screening requirements of various features. The screenings are performed on digit strings or point codes. For the IDP Relay feature, 4 screening lists are required. Each screening list is based on digit strings.

- GTA screening list - This list is used to compare the SCCP CDPA GT from the incoming message into this list. If not found, the message falls to GTT handling.
- CCNDC screening list - This screening list is used to compare the conditioned TCAP DN in international format into this list. If not found, the message falls to GTT handling.

- SKBCSM screening list - This screening list is used to compare the concatenated SK + BCSM from the incoming message into this list. If not found, the message falls to GTT handling.
- Delete prefix screening list - When performing number conditioning for incoming NAI=Unknown case, this list is checked for IEC or NEC. This is checked by searching the TCAP DN on this list.

Refer to the *Commands Manual* for details on using this command.

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

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

rept-stat-sccp

This command is used to display the status of the SCCP and Service Module cards and the GTT (Global Title Translation), G-Flex (GSM Flexible Numbering), G-Port (GSM Mobile Number Portability), A-Port (ANSI Mobile Number Portability), INP (INAP-based Number Portability), AINPQ (ANSI-41 INP Query), EIR (Equipment Identity Register), and IDP Relay (Prepaid IDP Query Relay Feature) services executing on those cards. This command also displays any cards that are denied SCCP service. Refer to the *Commands Manual* for details on using this command.

Prepaid IDP Query Relay Measurements

Four measurement registers are defined for the IDP Relay feature IDPR service. All registers added in this feature are reported in the STP System Total (SYSTOT-STP) report. The registers are as follows:

- **IDPRMSERR** The total number of MSU's selected for IDPR service which could not be processed due to errors in encoding, decoding, or formatting.
- **IDPRMSFAIL** Total number of MSU's selected for IDPR service which fell through to GTT due to (1) no match on MSISDN in MNPDB, or (2) match on MSISDN but no association to RN or SP.
- **IDPRMSRCV** Total number of MSU's received and selected for IDPR service. This register includes counts for MSU's that resulted in both successful and unsuccessful MNPDB lookups.
- **IDPRMSSUCC** Number of MSU's selected for IDPR service for which the MNPDB lookup resulted in a match on MSISDN with association to an RN or SP.

Prepaid IDP Query Relay Provisioning and Activation

The following gives the general sequence of the provisioning required to support IDP Relay on the EAGLE 5 ISS. This procedure assumes INP and GTT are provisioned and activated.

1. Use the following command to enter the NT serial number.

   ```
   ent-serial-num:serial=<System NT serial number>
   ```

   ```
   ent-serial-num:serial=<System NT serial number>:lock=yes
   ```

   If the NT serial number is already entered, then ignore this step.

2. Enter the enable-ctrl-feat command to enable the IDP Relay feature.

   ```
   enable-ctrl-feat:partnum=893016001:fak=<Feature Access Key>
   ```

3. Enter the chg-stpopts command to enter the DEFCC (if not already present/entered due to another feature).

   ```
   chg-stpopts:DEFCC=48
   ```

4. Enter the chg-ctrl-feat command to turn on the IDP Relay feature.

   ```
   chg-ctrl-feat:partnum=893016001:status=on
   ```

5. Enter the ent-srvsel command to enter IDP Relay feature Global Title Selectors. These selectors trigger INP as well as IDP Relay processing.

   ```
   ent-srvsel:gtii=4:tt=20:np=e164:nai=intl:serv=idpr:ssn=*
   ```

   *There can be multiple entries for this command. This example sets up the service selectors needed to select incoming messages with GTI=4, NP=E164, TT=20 and NAI=INTL selected for IDPR service.

6. Optional - Enter the international insert Prefix in the prefix table.

   ```
   chg-prefix:feat="Prepaid IDP Query Relay":prefixnum=1:prefix=862
   ```

7. Optional - Enter the national insert Prefix in the prefix table.

   ```
   chg-prefix:feat="Prepaid IDP Query Relay":prefixnum=2:prefix=0
   ```

8. Optional - Control for NAI in the outgoing TCAP DN (incoming or default).

   ```
   chg-prefix:feat="Prepaid IDP Query Relay":prefixnum=3:prefix=1
   ```

9. Optional - if the SCCP CGPA DEFCC check is ON or OFF.

   ```
   chg-prefix:feat="Prepaid IDP Query Relay":prefixnum=4:prefix=1
   ```

10. Use the ent-csl command to enter Digit String (DS) entries in the CC+NDC list

    ```
    ent-csl:pn=893016001:list=ccnc:ds=48
    ```

    There can be multiple entries for this command. There must be a minimum of one entry for the feature to work. The entry can be just with country code - same value as in DEFFCC parameter.

11. Use the ent-csl command to enter Digit String (DS) entries in the GT list.

    ```
    ent-csl:pn=893016001:list=gt:ds=456
    ```

    There can be multiple entries for this command. There must be a minimum of one entry for the feature to work. This digit should match the called party number in the SCCP CDPA.

12. Use the ent-csl command to enter Digit String (DS) entries in the SKBCSM list.

    ```
    ent-csl:pn=893016001:list=skbcsm:ds=h'0x1402
    ```

There can be multiple entries for this command. There must be a minimum of one entry for the feature to work. This digit should match the service key value and the event BCSM value from the IDP message.

13. Optional - Use the ent-csl command to enter Digit String (DS) entries in the DELPFX list.

```
ent-csl:pn=893016001:list=delpfx:ds=789:p1=1
```

There can be multiple entries for this command. This digit should match the IEC(p1=2) or NEC(p1=1) in the incoming TCAPDN when the NAI is unknown.

Chapter 7

IDP Screening for Prepaid Feature

Topics:

The IDP Screening for Prepaid feature provides a mechanism to decide, prior to routing the calls to the prepaid engine, whether checking the credit status of prepaid subscribers is required.

Introduction

Normally, for voice or text (short message) calls originated by prepaid subscribers, the serving MSC formulates an INAP IDP message, destined for a prepaid engine, to check subscriber credit status.

The IDP Screening for Prepaid feature provides a mechanism to decide, prior to routing the calls to the prepaid engine, whether checking the credit status of prepaid subscribers is required. In-network voice and text (short message) calls from prepaid subscribers, with specified "unlimited" call and texting plans, are not subjected to credit checks (routing to a prepaid engine) and are delivered by the MSC to the intended destination.

Feature Description

Voice Calls - Unlimited Call and Text

The EAGLE 5 ISS intercepts IDP messages and determines whether checking credit status is required prior to routing the calls to the prepaid engine. Voice calls originated by prepaid subscribers with specified "unlimited" call and text plans are identified by a predefined ServiceKey value that differs from the one used for other originating voice calls (either originated by prepaid subscriber with specified "unlimited" text plans or prepaid subscribers not subscribing to "unlimited" plans). The value assigned to the ServiceKey is set by the originating MSC when the call hits an Intelligent Network (IN) trigger.

EAGLE 5 ISS Voice Call Handling

When voice calls originate by prepaid subscriber with a specified "unlimited" call and text plans, the EAGLE 5 ISS examines whether the calls are in-network. In-network calls are calls from a subscriber to another subscriber, described by a list of prefixes. For in-network voice calls, the EAGLE 5 ISS returns an INAP Continue message to instruct the MSC to continue the calls (bypass the prepaid status check). For any other type of calls, the EAGLE 5 ISS relays the IDP message to the prepaid engine using Global Title Translation (GTT).

For voice calls that do not originated from prepaid subscribers with a specified "unlimited" call and text plan, the EAGLE 5 ISS relays the IDP message to its intended destination. If a text call has not originated from a “24/7 Call and Text Unlimited” or a “24/7 Text Unlimited” prepaid subscriber, then the EAGLE 5 ISS relays the IDP message to its intended destination.

Text Calls - Unlimited Call and Text

Text calls (short messages) originated by prepaid subscribers with a specified "unlimited" call and text plan use the same ServiceKey as voice calls.

Text Calls - Unlimited and Text

Text calls originated by prepaid subscribers with a specified "unlimited" text plan will be identified by a predefined ServiceKey value that differs from the one used for calls originated by prepaid

subscribers with a specified "unlimited" call and text plan or prepaid subscribers not subscribed to the specified " unlimited" calling plans.

EAGLE 5 ISS Text Call Handling

When text calls are originated from prepaid subscribers with a specified "unlimited" text or "unlimited" call and text plan, the EAGLE 5 ISS examines whether the call is an in-network call. If it is an in-network text call, the EAGLE 5 ISS returns an INAP Continue message to instruct the MSC to continue the call.

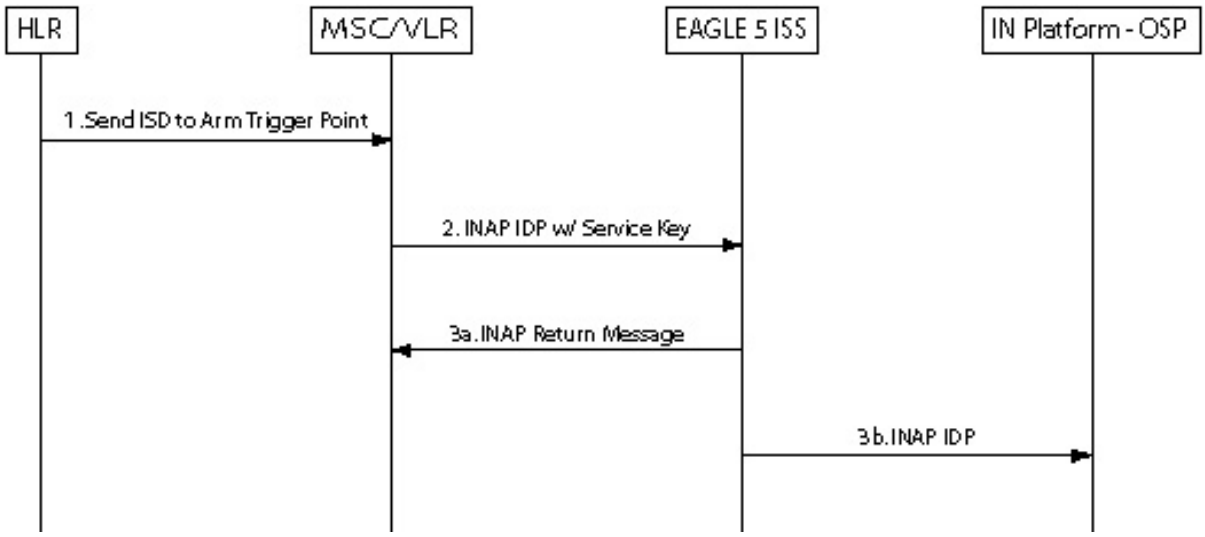
For any other types of calls, the EAGLE 5 ISS relays the IDP message to the prepaid engine.

Call Flows

IDP Message Subject to IDP Screening for Prepaid

Figure 22: IDP Message Subject to IDP Screening for Prepaid on page 151 illustrates an IDP message that is subject to IDP screening for prepaid.

Figure 22: IDP Message Subject to IDP Screening for Prepaid



1. HLR sends the MAP Insert_Subscriber_Data message to MSC to arm trigger points.
2. MSC formulates an INAP IDP message and sends it to EAGLE 5 ISS with a Service Key encoded as follows:
   - ServiceKey = xx for voice and text calls originated from prepaid subscribers with "unlimited" call and text plan
   - ServiceKey = yy for text calls originated from prepaid subscribers with "unlimited" call and text plan
   - ServiceKey = zz for all other types of prepaid calls

   EAGLE 5 ISS intercepts the INAP IDP message and determines the disposition of the call by examining the following values of the parameters encoded in the INAP IDP message:

- ServiceKey
- TeleService
- CallingPartyNumber
- CalledPartyBCDNumber

3. Based on the Service Key parameter values, the EAGLE 5 ISS performs on of the following:

   a. The EAGLE 5 ISS returns an INAP Continue Message to the MSC if any one of all the following 3 scenarios is identified:

      - Prepaid voice calls originated from prepaid subscribers with "unlimited" call and text that include:
        - ServiceKey = xx
        - TeleService = Telephony (value = 17)
        - Both Calling Party Number and CalledPartyBCDNumber are found in the In-Network Subscriber List
      - Prepaid text calls originated from prepaid subscribers with "unlimited" call and text that include:
        - ServiceKey = xx
        - TeleService = Short MessageMO-PP (value = 34)
        - Both Calling Party Number and CalledPartyBCDNumber are found in the In-Network Subscriber List
      - Prepaid text calls originated from prepaid subscribers with "unlimited" text that include:
        - ServiceKey = yy
        - TeleService = Short MessageMO-PP
        - Both Calling Party Number and CalledPartyBCDNumber are found in the In-Network Subscriber List

   b. For all other scenarios, the EAGLE 5 ISS relays the INAP IDP message to its intended destination.

IDP Screening for Prepaid Feature Commands

This section provides a description of the maintenance, operations, and measurements commands for the IDP Screening for Prepaid feature. The commands that follow allow provisioning and operations activities for Service Module cards.

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

`enable-ctrl-feat / chg-ctrl-feat / rtrv-ctrl-feat`

These commands are used to enable, turn on, and display the on/off status of the IDP Screening for Prepaid feature.

ent-csl / chg-csl / dlt-csl / rtrv-csl

Common screening list commands are used to define, change, delete, and display the screening requirements of various features. The following screening lists are required for the IDP Screening for Prepaid feature. Each screening is based on digit string.

- The In-Network Subscriber list (INSL) - used to determine whether a call is in-network.

  The INSL contains up to 50 digit string entries specifying prefixes to be compared with the CalledPartyBCDNumber and the CallingPartyNumber digits of the incoming IDP message. If the leading digits of both numbers are found in the INSL, the call is considered in-network. Otherwise, it is an off-network call. The INSL is keyed off of a string of 1-15 digits.
- Service Key + TeleService (SKTS) screening list - contains up to 25 digit string entries with digit strings that represent the service key + TeleService number in OCD format. The SKTS list is keyed off of a 4 digit string.

Refer to the *Commands Manual* for details on using this command.

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

The IDP Screening for Prepaid feature service selector (`srvsel`) commands are used to provision new selectors for the IDPS service, providing greater flexibility when provisioning the type of messages that require IDPS processing.

For further details on the IDP Screening for Prepaid feature service selector commands (such as command rules and output format), refer to the *Commands Manual*.

IDP Screening for Prepaid Feature Measurements

Two measurement registers are defined for the IDP Screening for Prepaid feature. All registers added in this feature are reported in the STP System Total (SYSTOT-STP) report. The registers are:

- `MSIDPNOMCH` - The total number of IDP messages that did not fully meet the criteria of the IDP Screening for Prepaid feature. These messages are relayed to their destination by GTT.
- `MSIDPMATCH` - The total number of IDP messages that fully met the criteria of the IDP Screening for Prepaid feature. Instead of sending the IDP message onward, a Continue message is sent to the originating MSC. The criteria involve matching the following TCAP fields with EAGLE 5 ISS Common Screening Lists:
  - CgPA and CdPA are provisioned in the In-Network Subscriber List
  - The Teleservice and Service Key values are in the Service Key/Teleservice List

IDP Screening for Prepaid Provisioning and Activation

The following gives the sequence of the provisioning required to support the IDP Screening for Prepaid feature on the EAGLE 5 ISS. This procedure assumes that the GTT feature is turned on.

1. Use the following command to enter the NT serial number.

   ```
   ent-serial-num:serial=<System NT serial number>
   ```

   ```
   ent-serial-num:serial=<System NT serial number>:lock=yes
   ```

   If the NT serial number is already entered, ignore this step.
2. Enter the enable-ctrl-feat command to enable the IDP Screening for Prepaid feature.

   ```
   enable-ctrl-feat:partnum=893015501:fak=<Feature Access Key>
   ```

3. Assign the service selector for the IDP Screening for Prepaid feature.

   ```
   ent-srvsel:gtii=4:tt=20:np=e164:nai=intl:serv=idps:ssn=*
   ```

   There can be multiple entries for this command.
4. Enter Digit String (DS) entries in the In Network Subscriber List (INSL).

   ```
   ent-csl:pn=893015501:list=insl:ds=123
   ```

   There can be multiple entries for this command.

   Note: There must be minimum of one entry for the feature to work.
5. Enter Digit String (DS) entries in the Service Key + TeleService (SKTS) List.

   ```
   ent-csl:pn=893015501:list=skts:ds=1234
   ```

   There can be multiple entries for this command.
6. Enter the chg-ctrl-feat command to turn on the IDP Screening for Prepaid feature.

   ```
   chg-ctrl-feat:partnum=893015501:status=on
   ```

Glossary

A

ADL	Application Data Loader
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
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.

B

B

BCD — Binary Coded Decimal

C

CAMEL — Customized Applications for Mobile networks Enhanced Logic

CAP — Communication & Application Processor

CC — Country Code

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

C

	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.
CPU	Central Processing Unit
CSL	Common Screening List Each entry is identified by a feature name or part number which specifies the particular feature associated with the list, a List name which identifies a screening list used by the feature, and a Digit String (DS) or Point Code (PC) which identifies the unique screening number.

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
DCB	Device Control Block
DCM	Database Communication Module The DCM provides IP connectivity for applications. Connection to a

D

	host is achieved through an ethernet LAN using the TCP/IP protocol.
DEFCC	Default Country Code
Destination	The node to which the signaling link traffic is routed. This destination is identified by a point code, either a full point code or a cluster point code.
DN	Directory number A DN can refer to any mobile or wireline subscriber number, and can include MSISDN, MDN, MIN, or the wireline Dialed Number.
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.
DRA	Destination Routing Address
DS	Digit String

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

E

	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.
ELAP	EAGLE Local Number Portability Application Processor
Enhanced Global Title Translation	See EGTT.
EPAP	EAGLE Provisioning Application Processor
ES	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

FAK	Feature Access Key

F

The feature access key allows the user to enable a controlled feature in the system by entering either a permanent feature access key or a temporary feature access key. The feature access key is supplied by Tekelec.

FTA — File Transfer Area

A special area that exists on each OAM hard disk, used as a staging area to copy files to and from the EAGLE 5 ISS using the Kermit file-transfer protocol.

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.

G

GB — Gigabyte — 1,073,741,824 bytes

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.

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

G

	the GSM subscription network within a portability cluster, while retaining their original MSISDN(s).
GSM	Global System for Mobile Communications
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.

H

HLR	Home Location Register
HOMERN	Home Network Routing Number Prefix
HRN	Home Routing Number

I

I

ID	Identity, identifier
IDP	Initial Detection Point
IDPR	Prepaid IDP Query Relay
IEC	International Escape Code
IGM	IS41 GSM Migration
IMT	Inter-Module-Transport The communication software that operates the inter-module-transport bus on all cards except the LIMATM, DCM, DSM, and HMUX.
INAP	Intelligent Network Application Protocol
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
INPQ	INAP Number Portability Query Processing Subsystem

I

INTL	FNAI class International
IP	Internet Protocol IP specifies the format of packets, also called datagrams, and the addressing scheme. The network layer for the TCP/IP protocol suite widely used on Ethernet networks, defined in STD 5, RFC 791. IP is a connectionless, best-effort packet switching protocol. It provides packet routing, fragmentation and re-assembly through the data link layer.
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

I

ITU	International Telecommunications Union
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

Key	For the ICNP feature, a unique DS value used to access a table entry, consisting of a number length and number type.
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

M

MAP	Mobile Application Part

M

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.
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.
MDAL	Maintenance Disk and Alarm
MEA	Mismatch of Equipment and Attributes
MNP	Mobile Number Portability
MP	Measurement Platform

M

	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.
MR	Message Relay
MSC	Mobile Switching Center
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.
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.

M

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

The levels 1, 2, and 3 of the SS7 protocol that control all the functions necessary to route an SS7 MSU through the network.

N

NAI

Nature of Address Indicator

Standard method of identifying users who request access to a network.

NC

Network Cluster

Network Code

N

NDC	Network destination code
NE	Network Element An independent and identifiable piece of equipment closely associated with at least one processor, and within a single location.
NEC	National Escape Code
NP	Number Plan
NPDB	Number Portability Database
NPREQ	Number Portability Request Query
Number Conditioning	Conversion of incoming digits into subscriber format prior to RTDB lookup and conversion of outgoing RTDB digits into a format matching the original incoming digits.

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.

O

OPC — Originating Point Code

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.

P

PCI	Point Code International
PCN	Point Code National
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.
PMTC	Peripheral Maintenance
POI	Point of Interconnection
PPP	Point-to-Point Protocol

Q

QS	Query Service

R

RAM	Random Access Memory A type of computer memory that can be accessed randomly; that is,

R

	any byte of memory can be accessed without touching the preceding bytes.
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
RNIDN	Routing Number - International DN
RNNDN	Routing Number - National DN
RNSDN	Routing Number - Subscriber DN

R

RS	Requirement Specification
RTDB	Real Time Database

S

SCCP	Signaling Connection Control Part
SCM	System Configuration Manager
SCP	Service Control Point Service Control Points (SCP) are network intelligence centers where databases or call processing information is stored. The primary function of SCPs is to respond to queries from other SPs by retrieving the requested information from the appropriate database, and sending it back to the originator of the request.
SDS	System Debug Services
Service Nature of Address Indicator	See SNAI.
SK	South Korea
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	Signaling Point

S

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.
SRF	Signaling Relay Function The SRF determines the HLR of the destination mobile station. If the mobile station is not ported, the original HLR is queried. If the mobile station is ported, the recipient HLR is queried.
SS	Subsystem
SS7	Signaling System #7
SSA	Subsystem Allowed
SSN	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.

S

SSP	Subsystem Prohibited network management message. Subsystem Prohibited SCCP (SCMG) management message. (CER)
STP	Signal Transfer Point STPs are ultra-reliable, high speed packet switches at the heart of SS7 networks, which terminate all link types except F-links. STPs are nearly always deployed in mated pairs for reliability reasons. Their primary functions are to provide access to SS7 networks and to provide routing of signaling messages within and among signaling networks.
Subsystem Number	See SSN.

T

TCAP	Transaction Capabilities Application Part
TCP	Transfer Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TDM	Terminal Disk Module
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).

T

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.
UDP	User Datagram Protocol
UDTS	Unitdata Service message
UI	User Interface
UIM	Unsolicited Information Message
UNKN	FNAI class Unknown

V

VGTT	Variable Length GTT A feature that provides the ability to provision global title entries of varying lengths to a single translation type or GTT set. Users are able to assign global title entries of up to 10 different lengths to a single translation type or GTT set.
VLR	Visitor Location Register
VSCCP	VxWorks Signaling Connection Control Part

V

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.

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