Tekelec EAGLE® 5 Integrated Signaling System

Release 41.1

Feature Manual - TIF

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Chapter 1

Introduction

Topics:

This chapter contains a brief descripton of the Triggerless ISUP Framework (TIF) and the features that use TIF. The contents include sections about the manual scope, audience, and organization; how to find related publications; and how to contact Tekelec for assistance.

Introduction

The Triggerless ISUP Framework (TIF) and the EAGLE 5 ISS features that use TIF (see *TIF Features*), along with the Numbering Plan Processor (NPP), provide the following capabilities to support ISUP number portability:

- Complex prefix usage, where prefixes can be used to customize actions
- Non-NAI-compliant digit handling
- Complex outgoing digit formats
- Called Number Portability
- Calling number portability
- Concurrent Release and Relay support
- Circular route prevention
- Calling Party Number Substitution
- Called Party Number Substitution
- Simple Called Number Substitution
- Message Forwarding to SCS

The Service Portability feature also extends number portability to allow a subscriber to move from one technology to another within the same provider.

Most of the TIF features require EPAP provisioning data from the Real Time Database (RTDB). Subscriber data is transferred from customer databases to the EPAP. The EPAP formats the RTDB and loads it to each Service Module card on the EAGLE 5 ISS. The RTDB data is used in obtaining number portability information and in determining how to correctly format the outgoing message. See *MPS/EPAP Platform* in this manual for more information about EPAP.

Scope and Audience

This manual is intended for anyone responsible for installing, maintaining, and using the features in the EAGLE 5 ISS that use the Triggerless ISUP Framework (TIF). Users of this manual and the others in the EAGLE 5 ISS family of documents must have a working knowledge of telecommunications and network installations.

Manual Organization

This document is organized into the following chapters:

- *Introduction* contains general information about the TIF documentation, the organization of this manual, and how to get technical assistance.
- *Triggerless ISUP Framework (TIF)* provides a functional description of the Triggerless ISUP Framework, including configuration options, protocol handling, ISUP IAM message decoding and encoding, IAM/SAM splitting, and NPP Services.
- *TIF Features* describes the functions and use of the EAGLE 5 ISS features that use TIF.

- *EAGLE 5 ISS Commands for TIF Features* describes the EAGLE 5 ISS configuration, maintenance, debug, and test commands that are used for the TIF features.
- *TIF Feature Configuration* describes Eagle 5 ISS provisioning for the TIF features, and the TIF Test Tool that is used to verify provisioning without affecting live traffic.
- *Maintenance* describes maintenance information for TIF and EPAP, including status and alarms, hardware verification messages, EPAP-based system status reports and commands, and code and application data loading.

Related Publications

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

Documentation Availability, Packaging, and Updates

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

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

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

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

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

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

Documentation is updated when significant changes are made that affect system operation. Updates resulting from Severity 1 and 2 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*.)

Customer Care Center

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

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

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

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

Tekelec - Global

Email (All Regions): support@tekelec.com

- **USA and Canada**

  Phone:

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

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

TAC Regional Support Office Hours:

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

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

  Phone:

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

  TAC Regional Support Office Hours (except Brazil):

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

  - **Argentina**

    Phone:

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

    Phone:

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

    TAC Regional Support Office Hours:

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

    Phone:

    1230-020-555-5468
  - **Columbia**

    Phone:

    01-800-912-0537
  - **Dominican Republic**

    Phone:

    1-888-367-8552
  - **Mexico**

    Phone:

    001-888-367-8552
  - **Peru**

    Phone:

    0800-53-087
  - **Puerto Rico**

    Phone:

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

    Phone:

0800-176-6497

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

  Regional Office Hours:

  8:30 a.m. through 5:00 p.m. (GMT), Monday through Friday, excluding holidays

  - **Signaling**

    Phone:

    +44 1784 467 804 (within UK)

  - **Software Solutions**

    Phone:

    +33 3 89 33 54 00

- **Asia**

  - **India**

    Phone:

    +91 124 436 8552 or +91 124 436 8553

    TAC Regional Support Office Hours:

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

  - **Singapore**

    Phone:

    +65 6796 2288

    TAC Regional Support Office Hours:

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

Emergency Response

In the event of a critical service situation, emergency response is offered by the Tekelec Customer Care Center 24 hours a day, 7 days a week. The emergency response provides immediate coverage, automatic escalation, and other features to ensure that the critical situation is resolved as rapidly as possible.

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

- A total system failure that results in loss of all transaction processing capability
- Significant reduction in system capacity or traffic handling capability
- Loss of the system's ability to perform automatic system reconfiguration
- Inability to restart a processor or the system

- Corruption of system databases that requires service affecting corrective actions
- Loss of access for maintenance or recovery operations
- Loss of the system ability to provide any required critical or major trouble notification

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

Locate Product Documentation on the Customer Support Site

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

1. Log into the *Tekelec Customer Support* site.

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

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

Chapter 2

Triggerless ISUP Framework (TIF)

Topics:

This chapter describes the functions provided by the Trigglerless ISUP Framework, including ISUP IAM protocol handling, NPP processing for TIF, Service Portability, and response message formatting.

The chapter includes an overview of the EAGLE Provisioning Application Processor (EPAP). EPAP provides the Real Time Database (RTDB) that is used in the database lookup functions.

TIF Description

For TIF features, TIF provides an overall structure that allows the EAGLE 5 ISS to intercept ISUP messages that would normally be through-switched and apply special processing to them. For example, an IAM message could be intercepted and have the called number prefix replaced based on portability information.

At least one TIF feature must be enabled and turned on before TIF functions are available in the system.

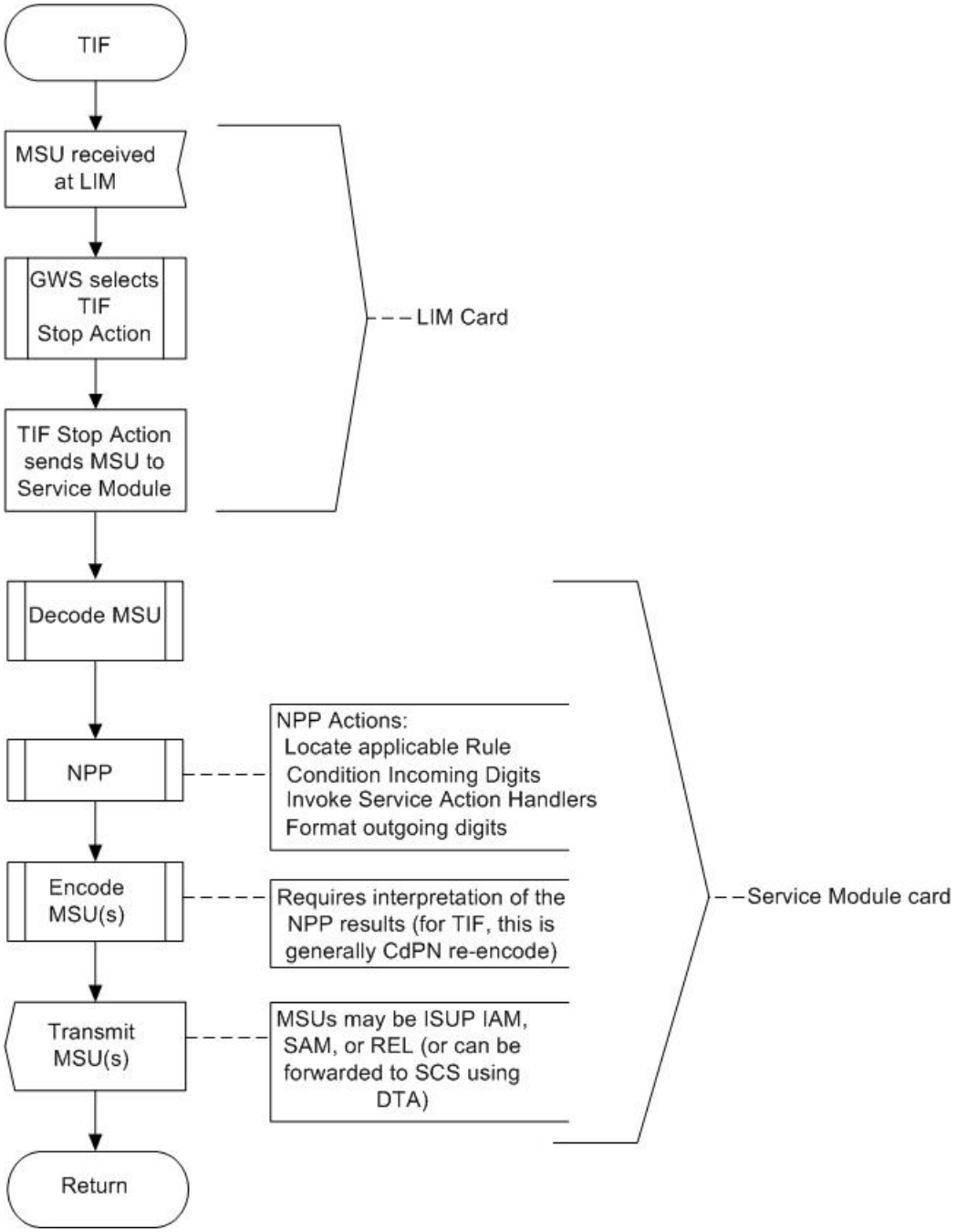
TIF processing consists of two main sections:

- On the LIM cards, TIF uses Gateway Screening (GWS) to select an ISUP MSU for processing, and forwards the MSU to Service Module cards for processing.
- On the Service Module cards, TIF decodes the MSU, invokes the Numbering Plan Processor (NPP), and encodes the results.

  TIF features provide NPP with Service Action Handlers to perform database access, data evaluation, and any feature-specific handling for the MSU.

A high-level overview of TIF processing is shown in *Figure 1: TIF Overview* .

Figure 1: TIF Overview



TIF Features

All of the features that are listed in *Table 2: TIF Features* use TIF ("TIF features"). Chapter 3 in this manual describes each TIF feature.

The GTT feature and the Gateway Screening feature (GWS) must be turned on before a TIF feature can be enabled in the system.

Table 2: TIF Features

Part Number	Description	Other Dependencies/Notes
893-0189-01	TIF Number Portability (TIF NP)	Requires EPAP for RTDB lookup. Mutually exclusive with ELAP.
893-0222-01	TIF SCS Forwarding (TIF SCS)	Does not require RTDB for lookup - Can be enabled with EPAP or ELAP in the system.
893-0225-01	TIF Number Substitution (TIF NS)	Requires EPAP for RTDB lookup. Mutually exclusive with ELAP.
893-0240-01	TIF Simple Number Substitution (TIF SNS)	Does not require RTDB for lookup - Can be enabled with EPAP or ELAP in the system.
893-0245-01	TIF Additional Subscriber Data (TIF ASD)	Requires EPAP for RTDB lookup. Mutually exclusive with ELAP.
893-0255-01	TIF Generic Routing Number (TIF GRN)	Requires EPAP for RTDB lookup. Mutually exclusive with ELAP.

TIF Configuration Options

The TIFOPTS table contains configuration option values, associated with the TIF, TIF2, and TIF3 Gateway Screening Stop Actions. The TIF option data is loaded to the LIM cards and to Service Module cards that contain the RTDB database. The TIF option values influence number conditioning, response message formatting and generation, and Service Portability processing

The SCCPOPTS table contains the ACLEN option value that can be used to indicate the length of the Area Code in the Calling Party Number.

See *EAGLE 5 ISS TIF and SCCP Options Commands* for a description of the TIF options and the EAGLE 5 ISS commands that are used to configure the options.

Destination-based Configuration Options for TIF

The Destination table can contain TIF-related option values for destination point codes, for the following functions:

- Setting of NM bits value—DPC-based lookup on relay of ITU IAM message with non-zero NM bits when TIFOPTS NPFLAG=NM
- Specifying the Release Cause for ported and not-ported release cases—OPC-based lookup on each incoming message to extract Release Cause values
- Splitting of ITU IAM messages—DPC-based lookup on relay of ITU IAM message to determine when and how to split the IAM message into 1 IAM message and 1 SAM message

See *EAGLE 5 ISS Commands for Destination-based Options* for a description of the destination-based options for TIF and the EAGLE 5 ISS commands that are used to configure the options.

TIF Services That Call NPP

For the following TIF services, NPP processes traffic filtered by the corresponding Gateway Screening Stop Action. Three services for TIF features allow NPP Rules to be defined for handling different types of traffic, such as inter-carrier traffic and local traffic.

Table 3: NPP Service Name to GWS Stop Action Mapping

TIF Service Name	GWS Stop Action Name
TIF	TIF
TIF2	TIF2
TIF3	TIF3

See the *Numbering Plan Processor (NPP) Overview* manual for more information about NPP components and processing.

NPP Service Actions

The NPP Service Actions listed in *Table 4: Service Actions used by TIF Features* are used by the indicated TIF features. Before an NPP Rule can be provisioned with an Action Set containing a Service Action for a TIF feature, the TIF feature must be enabled. The precedence indicates the sequence of execution if more than one Service Action is used by a service.

Table 4: Service Actions used by TIF Features

Service Action	Description	Required Feature	Precedence
CRP	Circular Route Prevention	893018901 TIF Number Portability	92

Service Action	Description	Required Feature	Precedence
NPNRLS	Number Portability Release on No Match	893018901 TIF Number Portability	91
ASDLKUP	Use of CdPN Additional Subscriber Data when formatting CdPN	89302450 TIF Additional Subscriber Data	90
CgPNASDRqd	Use of CgPN Additional Subscriber Data when formatting CdPN	89302450 TIF Additional Subscriber Data	90
GRNLKUP	Use of CdPN Generic Routing Number when formatting CdPN	89302550 TIF Generic Routing Number	90
CgPNGRNRqd	Use of CgPN Generic Routing Number when formatting CdPN	89302550 TIF Generic Routing Number	90
CGPNSVCRQD	Calling Number Lookup	893018901 TIF Number Portability	80
NPRELAY	Number Portability Relay	893018901 TIF Number Portability	80
NPRLS	Number Portability Release on Match	893018901 TIF Number Portability	80
NSCdPN	Called Number Substitution	893022501 TIF Number Substitution	80
NSCgPN	Calling Number Substitution	893022501 TIF Number Substitution	75
SNSCgPN	Simple Number Substitution	893024001 TIF Simple Number Substitution	75
CDIAL	Corrective Dialing	NPP basic functions; no TIF feature is required	10
FWDSCS	Forward to SCS	893022201 TIF SCS Forwarding	5

NPP Conditioning Actions

TIF supports all Conditioning Actions provided by NPP. TIF provides the ACCgPN Conditioning Action.

Table 5: TIF Conditioning Action

Name	Description	Mnemonic
Area Code from Calling Party	Area code needs to be extracted from the Calling Party Number	ACCgPN

The ACCgPN Conditioning Action skips over any country code digits (matching DefCC or Multiple CC) and removes the number of digits specified in the SCCPOPTS ACLEN configuration option from the beginning of the CgPN. These digits will be used as the Area Code (AC) to condition the Called Party digits for any subsequent Service Action or Formatting Action.

If the ACCgPN Conditioning Action is invoked, but the Calling Party is not present or has fewer digits than the SCCPOPTS ACLEN option value (after any CC digits), then no change to Area Code will be made.

NPP Formatting Actions

TIF supports all Formatting Actions provided by NPP. TIF does not provide any additional Formatting Actions.

Protocol Handling

TIF protocol processing consists of the following functions:

- Gateway Screening of the MSU received by a LIM card selects a TIF Stop Action, encapsulating the MSU as SCCP data, and forwarding the MSU to Service Module cards for processing.
- On the Service Module card, TIF decodes the message, passes information to NPP services for processing, and formats and sends the resulting message.

LIM Card Processing

When a LIM card receives an MSU, the following TIF processing occurs (see the LIM processing shown in*Figure 1: TIF Overview*):

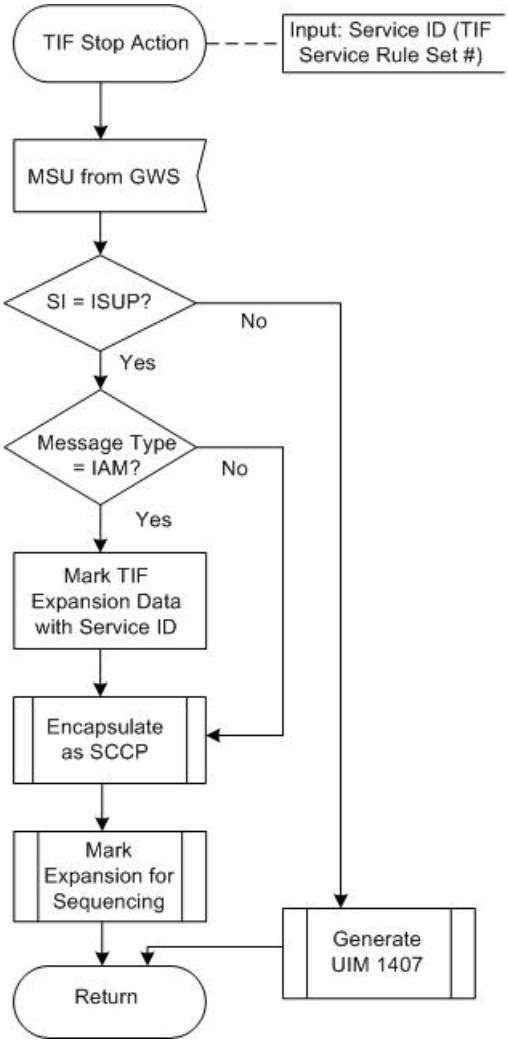
- The Gateway Screening (GWS) feature filters messages for ISUP, and ISUP messages with SI=5 are screened for selection of a TIF Stop Action.
- Selected ISUP IAM messages are marked for sequencing, encapsulated as SCCP messages, and forwarded to Service Modules for processing. TIF supports proper sequencing of IAM/SAM messages. See *IAM/SAM Splitting* for details.

  All other ISUP MSUs delivered to TIF for processing are marked for sequencing and routed.

MSUs that are TUP or not ISUP (SI=5) are routed without modification. UIM `1407 Unexpected SI in TIF Stop Action` is generated.

The TIF Stop Action processing flow is shown in *Figure 2: TIF Stop Action Processing*.

Figure 2: TIF Stop Action Processing



Gateway Screening supports the following TIF Stop Actions: TIF, TIF2, and TIF3. Existing GWS rules are used to separate ISUP traffic for TIF processing. The GWS rule must end with a Stop Action that contains TIF, TIF2, or TIF3.

The DTA, TIF, TIF2, and TIF3 Stop Actions are all mutually exclusive in Stop Action Sets, and each of these Stop Actions must be the last Stop Action for the set.

Table 6: TIF Stop Action Rules defines the processing of messages within TIF Stop Actions.

Table 6: TIF Stop Action Rules

Protocol	Message Type	Encapsulate	Sequence	Action
ISUP	IAM	Yes	Yes	Send to Service Module card
	Other	No	Yes	Send to sequencer
Other	N/A	No	No	Route Message

Each TIF Stop Action encapsulates the incoming MSU as SCCP data and forwards the new MSU to a Service Module card for processing. The expanded data portion of the MSU is marked with the TIF Stop Action number so that the appropriate Service Rule Set can be invoked on the Service Module card.

Each TIF Stop Action is associated with a different NPP Service Rule Set, so that different actions can be taken on identically formatted messages that encounter different Gateway Screening rules. This allows for customized handling based on the incoming linkset, OPC, DPC, or other GWS criteria.

Each Stop Action is assigned to the corresponding NPP Service: TIF > TIF, TIF2 > TIF2, TIF3 > TIF3.

Although TIF will not impose any size limitations on the incoming MSU size, the FWDSCS Service Action Handler for the TIF SCS Forwarding feature does have some encapsulation limits imposed by DTA processing of the message. Refer to the *Database Administration Manual - Features* for information about DTA, and see *TIF SCS Forwarding Feature* for a description of the FWDSCS Service Action Handler processing.

Service Module Card Processing

As shown in *Figure 3: SCRC Processing of TIF Messages*, SCRC provides a common entry point on Service Module cards to process SCCP messages. In LIM handling, TIF Stop Actions forward only ISUP IAM messages to Service Module cards. Because the messages from TIF are actually ISUP messages encapsulated within an SCCP header, the messages are sent to a TIF handler instead of normal SCRC processing (normally GTT or Local Subsystem handling).

Figure 3: SCRC Processing of TIF Messages shows the basic SCRC processing for ISUP messages from TIF.

Figure 3: SCRC Processing of TIF Messages

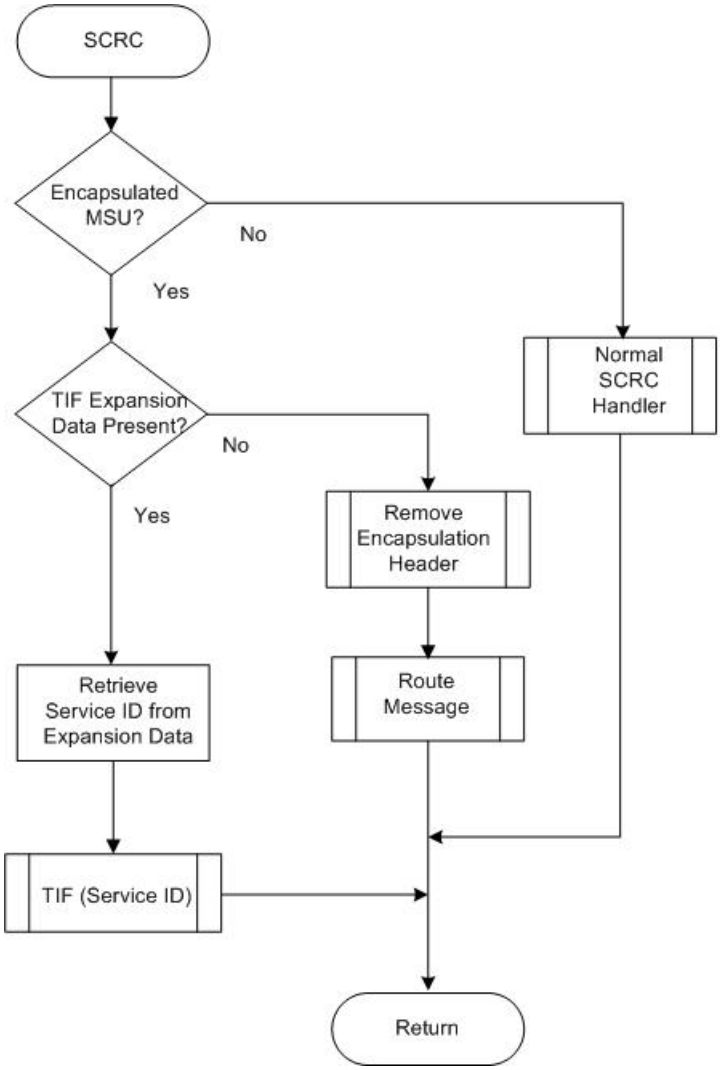
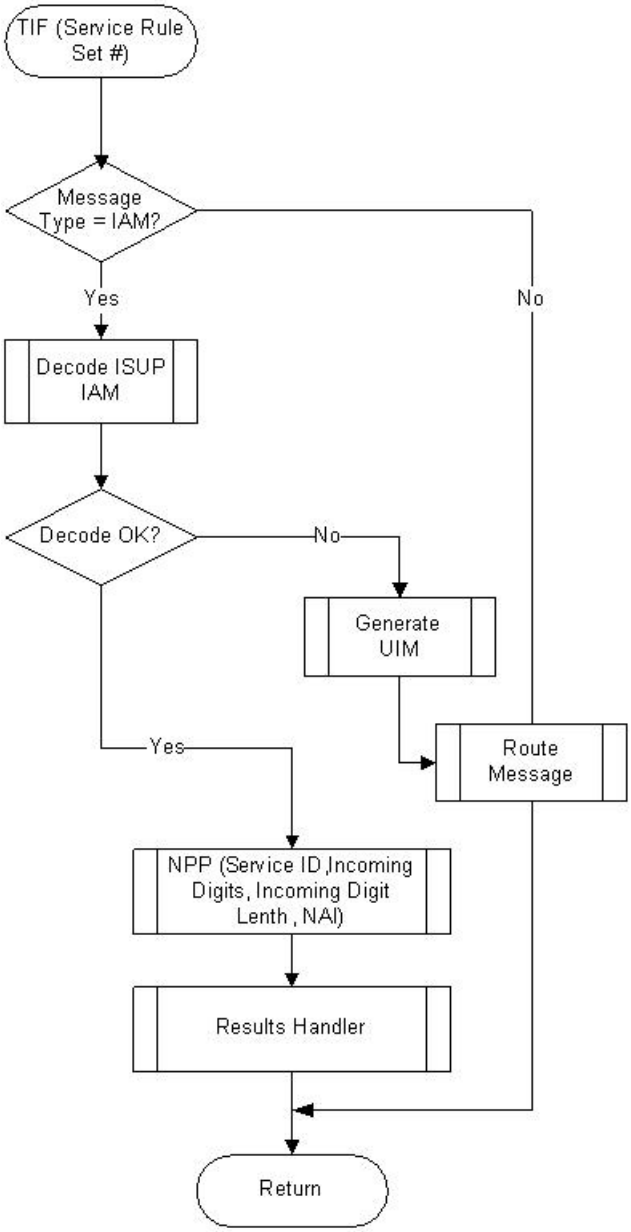


Figure 4: TIF Service Module Processing Main Flow shows the overall TIF flow for Service Module processing. NPP provides the majority of the message processing, and is responsible for calling all Service Action Handlers, as shown in *Figure 5: Basic NPP Processing*.

Figure 4: TIF Service Module Processing Main Flow


TIF (Service Rule Set #)
Message Type = IAM?
Yes
No
Decode ISUP IAM
Decode OK?
No
Generate UIM
Route Message
Yes
NPP (Service ID,Incoming Digits, Incoming Digit Lenth , NAI)
Results Handler
Return

IAM Message Decoding

Fields in the incoming MSU identify the message as ISUP, IAM, and either ITU or ANSI. TIF decodes the following information in the incoming ITU ISUP IAM message:

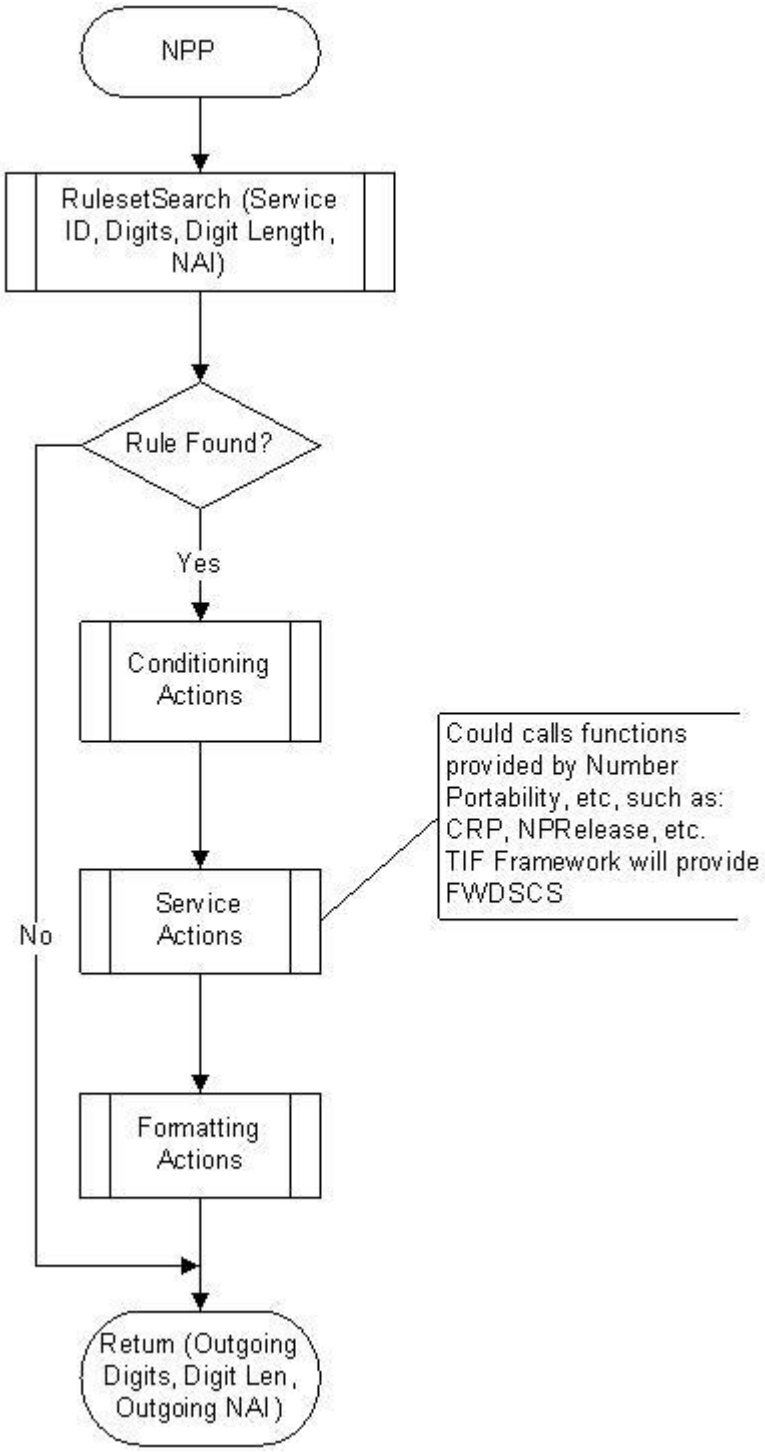
- Called Party digits and NAI values that are passed to NPP for processing
- Calling Party digits and NAI value
- Called Party and Calling Party information that is used for RTDB lookup
- NM Bits (from the Forward Call Indicator field) that indicate whether RTDB lookup has been performed. (see *Use of NM Bits*)
- Point codes and other information that are used in encoding the outgoing message.

NPP Processing for TIF

TIF invokes NPP, and passes the TIF service name, Called Party digits and length, and the incoming NAI values to NPP. NPP conditions the Called Party digits for RTDB lookup, calls Service Action Handlers for service-specific processing, and formats the outgoing digit string.

Refer to the *Numbering Plan Processor (NPP) Overview* manual for additional information on NPP processing. *Figure 5: Basic NPP Processing* shows the basic NPP processing flow.

Figure 5: Basic NPP Processing



TIF Post-NPP Processing

After NPP processing is complete, the TIF post-NPP Results Handler performs the following functions:

- Evaluates results from NPP Service Actions and Formatting Actions

- Determines whether to generate a Release (REL) message or to relay the IAM message.

If Relay is indicated, the Results Handler performs the following functions:

- Updates the Called Party digits, the Calling Party digits, or both, if needed. If ISUP IAM Called Party digits terminate with a Stop Digit (F), the Stop Digit is present to terminate those digits in the relayed IAM message. If the CONDCGPN option value is ADDCC, the provisioned STPOPTS Default Country Code (DEFCC) value is pre-pended to the Calling Party digits.
- Handles IAM/SAM splitting (see *IAM/SAM Splitting*)
- Routes one IAM message, or an IAM message and a SAM message.
- Invokes any indicated TIF feature-specific Results Handlers

If Release is indicated by a Service Action Handler, the Results Handler generates an ISUP Release message. After the Release message is generated, the original IAM message is discarded and processing terminates.

- For a Release message on a successful lookup, the message includes the Cause Value specified in the TIF RCAUSENP configuration option or the destination-based RCAUSE configuration options, depending on option settings (see *EAGLE 5 ISS Commands for Destination-based Options* and *EAGLE 5 ISS TIF and SCCP Options Commands*). The Redirection Number is included in the Release message if the TIF RNRQD configuration option value is YES.
- For a Release message on an unsuccessful lookup, the message includes the Cause Value specified in the TIF RCAUSENPFX configuration option value or the destination-based RCAUSE configuration options, depending on option settings (see *EAGLE 5 ISS Commands for Destination-based Options* and *EAGLE 5 ISS TIF and SCCP Options Commands*).. The Redirection Number is not included in the Release message.

The flow of the TIF Results Handler is shown in *Figure 6: TIF Post-NPP Results Handler*.

The following examples illustrate post-NPP results handling:

Corrective Dialing

1. IAM Relay is indicated.
2. Calling Number has not changed; replacement of the CgPN is not required.
3. CdPN number has changed; the CdPN is replaced.
4. No IAM/SAM splitting is required.
5. The FWDSCS Formatting Action is not indicated; DTA is not invoked.
6. The IAM message is routed.

NP Relay

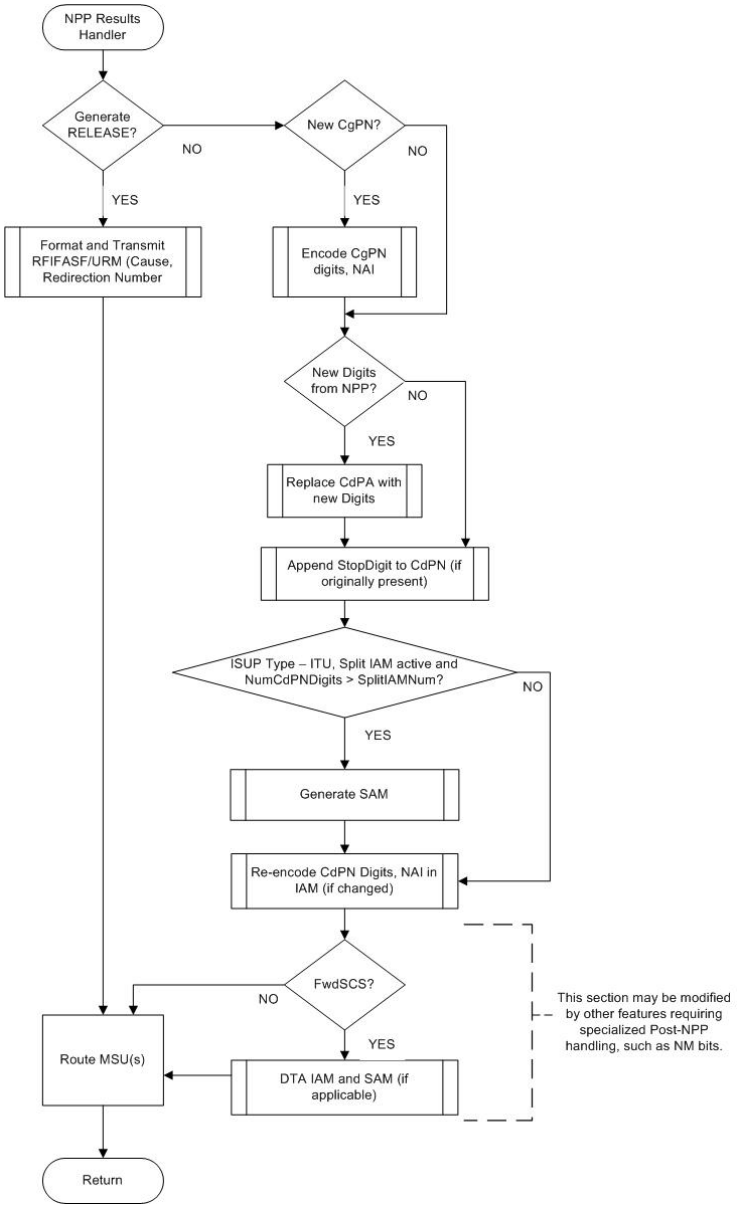
1. IAM Relay is indicated.
2. Calling Number has changed; replacement of the CgPN is performed.
3. CdPN number has changed; the CdPN is replaced.
4. The FWDSCS Formatting Action is not indicated; DTA is not invoked.
5. The NP-specific result handler is invoked for IAM Relay to update the NM bits in the ISUP IAM message.
6. The IAM is routed.

NP Circular Routing

1. Release is indicated.
2. No Redirection Number is encoded in the release message.

3. The release cause is set to a provisioned value.
4. The message is routed.

Figure 6: TIF Post-NPP Results Handler



RTDB Lookup

A single invocation of NPP can result in multiple invocations of various Service Action Handlers associated with TIF features. Because nearly all TIF Service Action Handlers perform RTDB lookups,

TIF provides a common mechanism to ensure that only a single CdPN or CgPN lookup is done and that the resulting data are shared by all Service Action Handlers.

The CdPN lookup is performed on the conditioned CdPN digit string. The conditioned string is typically in International format.

The CgPN lookup is performed on the conditioned CgPN. The conditioned CgPN is typically in International format.

Interpreting Results of an RTDB Lookup

Table 7: Portability Types Relevant to NP Lookups lists portability types that are relevant to Number Portability lookups.

Table 7: Portability Types Relevant to NP Lookups

Value	Description
0	Not known to be ported (available for backward compatibility; 36 should be used instead of 0)
1	Out-of-network; my subscriber ported out
2	Out-of-network; foreign subscriber ported in, then ported out
5	In-network; number migrated from IS41 to GSM
36	Not known to be ported
0Xff	No status; Indicates “none” in the database

Table 8: Possible Lookup Results summarizes the meanings of the normal lookup return codes:

Table 8: Possible Lookup Results

Return Code	Meaning
ENTITY FOUND	The DN was found and at least one of the specified entities is present.
ENTITY NOT FOUND	The DN was found, but none of the specified entities are present
DN NOT FOUND	The DN was not found.

The general rule for determining portability status is that a subscriber is considered own-network (or in-network) if the entity type is SP, and the subscriber is considered ported out if the entity type is RN. There is a special case that is associated with both the IS41 to GSM migration feature and the Service Portability feature. With both of these features, the case where the network entity type is RN and the portability type is 0 (own network IS41 subscriber), the RN is treated as the SP.

The RN, SP, VMSID, and GRN (Generic Routing Number) entity types are supported.

In certain networks, a network an entity type other than RN and SP can affect portability status. For example, an entity type of GRN could imply ported number. This can be indicated by setting the NPTYPERLY, NPTYPERLS, or NPTYPECGPN configuration option to ANY or ALL.

The CDPN or CGPN lookup result can be different based on the MATCHSEQ configuration option value. The MATCHSEQ option can have values NPTYPE and DN.

Note: The TIFOPTS MATCHSEQ option value must be DN when any TIF feature that accesses the RTDB, except TIF NP, is turned on. The TIFOPTS MATCHSEQ option value can be NPTYPE when the TIF NP feature is enabled. To configure the TIFOPTS SPORTRELAY and SPORTRLS options for Service Portability, the MATCHSEQ option value must be DN.

When the RTDB is searched for data using MATCHSEQ=NPTYPE (see *Table 9: RTDB Success Criteria for NP Type with MATCHSEQ=NPTYPE*),

- An individual subscriber lookup is done. If the DN is found, it is matched using the value of the TIFOPTS NPTYPERLY, NPTYPERLS, or NPTYPECGPN option. If the match is successful, the data associated with the entry is used for the Service Action processing of the applicable feature.
- If the DN is not found or the DN did not match with a TIFOPTS option value, a range lookup is done. If an entry is found, the data associated with the entry is used for the Service Action processing of the applicable feature.
- If no entry is found, there is no data available for the applicable features. The Service Actions for each feature define the specific behavior for handling this case.

Note: The combination of the IGM feature on or the Service Portability feature on, NE=RN, and PT=0 is considered entity type SP (own-network subscriber) for individual or range status.

Table 9: RTDB Success Criteria for NP Type with MATCHSEQ=NPTYPE

NP Type	Individual Status	Range Status	Result
SP	Found, NE=SP	N/A	Individual.SP
SP	Found, NE≠SP	Found, NE=SP	Range.SP
SP	Found, NE≠SP	Found, NE≠SP	None
SP	Found, NE≠SP	Not found	None
SP	Not found	Found, NE=SP	Range.SP
SP	Not found	Found, NE≠SP	None
SP	Not found	Not found	None
RN	Found, NE=RN	N/A	Individual.RN
RN	Found, NE≠RN	Found, NE=RN	Range.RN
RN	Found, NE≠RN	Found, NE≠RN	None
RN	Found, NE≠RN	Not found	None
RN	Not found	Found, NE=RN	Range.RN
RN	Not found	Found, NE≠RN	None
RN	Not found	Not found	None
RNSP / RNSPDN	Found, NE=SP	N/A	Individual.SP
RNSP / RNSPDN	Found, NE=RN	N/A	Individual.RN

NP Type	Individual Status	Range Status	Result
RNSP / RNSPDN	Found, NE≠RN or SP	Found, NE=SP	Range.SP
RNSP / RNSPDN	Found, NE≠RN or SP	Found, NE=RN	Range.RN
RNSP / RNSPDN	Found, NE≠RN or SP	Found, NE≠RN or SP	None
RNSP / RNSPDN	Found, NE≠RN or SP	Not found	None
RNSP / RNSPDN	Not found	Found, NE=SP	Range.SP
RNSP / RNSPDN	Not found	Found, NE=RN	Range.RN
RNSP / RNSPDN	Not found	Found, NE≠RN or SP	None
RNSP / RNSPDN	Not found	Not found	None
Any/All	Found, NE=SP	N/A	Individual.SP
Any/All	Found, NE=RN	N/A	Individual.RN
Any/All	Found, NE≠ RN/SP	Found, NE=SP	Range.SP
Any/All	Found, NE≠ RN/SP	Found, NE=RN	Range.RN
Any/All	Found, NE≠ RN/SP	Found, NE≠ RN/SP	None
Any/All	Found, NE≠ RN/SP	Not found	None
Any/All	Not found	Found, NE=SP	Range.SP
Any/All	Not found	Found, NE=RN	Range.RN
Any/All	Not found	Found, NE≠ RN/SP	None
Any	Not found	Not found	None
All	Not found	Not found	None

When the RTDB is searched for data using MATCHSEQ=DN (see *Table 10: RTDB Success Criteria for NP Type with MATCHSEQ=DN*),

- An individual subscriber lookup is done. If the DN is found, it is matched using the value of the TIFOPTS NPTYPERLY, NPTYPERLS, or NPTYPECGPN option. If the match is successful, the data associated with the entry is used for the Service Action processing of the applicable feature. No range lookup is done.
- If the DN is not found during the subscriber lookup, then a range lookup is done. If an entry is found, then the data associated with the entry shall be used for the Service Action processing of the applicable feature.
- If no entry is found, there is no data available for the applicable features. The Service Actions for each feature define the specific behavior for handling this case.

Table 10: RTDB Success Criteria for NP Type with MATCHSEQ=DN

NP Type	Individual Status	Range Status	Result
SP	Found, NE=SP	N/A	Individual.SP

NP Type	Individual Status	Range Status	Result
SP	Found, NE≠ SP	N/A	None
SP	Not Found	Found, NE=SP	Range.SP
SP	Not Found	Found, NE≠ SP	None
SP	Not Found	Not Found	None
RN	Found, NE≠ RN	N/A	Individual.RN
RN	Found, NE≠ RN	N/A	None
RN	Not Found	Found, NE=RN	Range.RN
RN	Not Found	Found, NE≠ RN	None
RN	Not Found	Not Found	None
RNSP / RNSPDN	Found, NE=SP	N/A	Individual.SP
RNSP / RNSPDN	Found, NE=RN	N/A	Individual.RN
RNSP / RNSPDN	Found, NE ≠ RN or SP	N/A	None
RNSP / RNSPDN	Not Found	Found, NE=SP	Range.SP
RNSP / RNSPDN	Not Found	Found, NE=RN	Range.RN
RNSP / RNSPDN	Not Found	Found, NE ≠ RN or SP	None
RNSP / RNSPDN	Not Found	Not Found	None
Any / All	Found, NE=SP	N/A	Individual.SP
Any / All	Found, NE=RN	N/A	Individual.RN
Any / All	N/A	N/A	None
Any / All	Not Found	Found, NE=SP	Range.SP
Any / All	Not Found	Found, NE=RN	Range.RN
Any / All	Not Found	Found, NE≠ RN/SP	None
Any	Not Found	Not Found	None
All	Not Found	Not Found	None

IAM/SAM Splitting

When the CdPN parameter in the ISUP message grows too long after TIF services have added Routing Numbers (RNs) or other prefixes or delimiters, the ISUP message needs to be split. A destination-based SPLITIAM configuration option and a TIFOPTS SPLITIAM configuration option can be used for determining when to split an internationally formatted ITU ISUP IAM message into one IAM message and one SAM message.

- When the number of Called Party digits is greater than the number of digits specified in the SPLITIAM option value (15-31 digits), the IAM message is split.
- The IAM message is encoded with the number of leading Called Party digits specified in the SPLITIAM option value.
- The SAM message is encoded with the remaining Called Party digits, up to the number of digits specified in the SPLITIAM option value.
- Any Called Party digits that remain after the ISM and SAM encoding are discarded.
- The SAM message is encoded with the same OPC, DPC,SLS, and CIC that are in the IAM message.

- If the SPLITIAM option value is 15-31 in the Destination table entry associated with the DPC in the incoming message, that destination-based option value is used as the maximum CdPN length.
- If the SPLITIAM option value is none in the Destination table entry associated iwth the DPC in the incoming message , and the TIFOPTS SPLITIAM option value is 15-31, the TIFOPTS SPLITIAM value is used as the maximum CdPN length.
- If both SPLITIAM option values are none, IAM/SAM splitting is not enabled for the message. Up to 32 Called Party digits are encoded in the IAM message and any remaining digits are discarded.
- When splitting is enabled for a message and the maximum CdPN length is 15-31, then that number of digits is encoded in the IAM message. Any remaining digits (up to that value) are encoded in a trailing SAM message. Any remaining digits after filling the SAM message are discarded.
- The SAM message is encoded with the same OPC, DPC, SLS, and CIC that are in the IAM message.

Note: If the DPC in the incoming message is not found in the Destination table, a UIM is generated and the message is discarded.

The SPLITIAM option is not applicable to ANSI ISUP messages; ANSI does not support SAM messages. Up to 32 Called Party digits are always encoded for ANSI ISUP messages.

MSU Sequencing

During TIF Stop Action processing, all messages are marked for sequencing on the incoming LIM card.

Sequencing of MSUs delivered to a TIF Stop Action is provided by the existing Class 1 Sequencing capabilities.

If the message is sent to the Service Module card, then the message must be returned to the incoming LIM card before actual transmission.

On the Service Module card, there are several potential actions:

- An error occurs, and the Service Module card does not generate an MSU for transmission. In this unexpected case, but the LIM card times out and transmits all pending messages.
- The Service Module card relays the IAM message. Because the original sequence information is still present, sequencing will occur as expected.
- The Service Module card generates a response message, such as REL. The sequence information from the original MSU is transferred to the response message, and sequencing is still maintained.
- The Service Module card generates multiple messages, which can occur if the Called Party digits are increased and the IAM/SAM splitting action is invoked (see *IAM/SAM Splitting*). An IAM message and a SAM message will be generated. The SAM message must follow the IAM message. Both MSUs will be given the same sequence number and sent back to the original LIM card on the same path.

If the message does not require Service Module card processing, the message is sent directly to the sequencer on the card. The message will wait in the sequencer for any preceding messages to complete processing before it is transmitted.

ISUP Decode and Encode Errors

The UIMs listed in *Table 29: TIF UIMs* indicate TIF encode and decode errors.

The UIMs listed in *Table 30: Existing ISUP Decode Errors* are used to handle ISUP decode and encode error cases.

Refer to the *Unsolicited Alarm and Information Messages* manual for information about EAGLE 5 ISS UIMs.

MPS/EPAP Platform

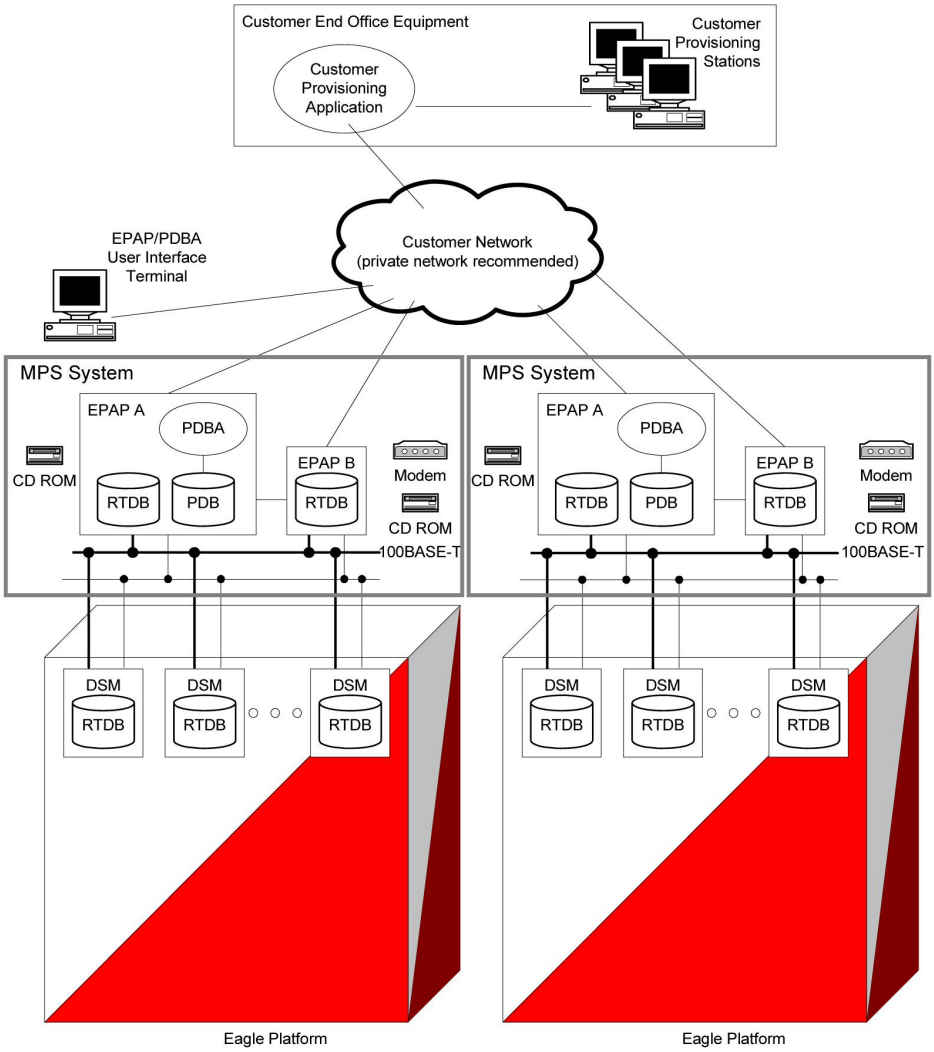
Tekelec provides the MPS (Multi-Purpose Server) platform as a subsystem of the EAGLE 5 ISS. The MPS provides support for the AINPQ, A-Port, EIR , G-Flex, G-Port, IGM, V-Flex, and INP features.

The MPS is composed of hardware and software components that interact to create a secure and reliable platform. (For details about the MPS hardware, refer to the *Tekelec 1000 Application Server Hardware Manual* or the *Tekelec 1200 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 7: MPS/EPAP Platform Architecture* 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 7: MPS/EPAP Platform Architecture



Design Overview and System Layout

Figure 7: MPS/EPAP Platform Architecture 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, network hubs when using a T1000 AS system, or network switches when using a T1200 AS system . 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 or T1200 AS system with a total of four Ethernet interfaces: one from each EPAP to the 100BASE-T Ethernet and one from each EPAP to either a 10BASE-T or a 100BASE-T Ethernet.

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 either a 10BASE-T or a 100BASE-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 EPAP-based features. It performs the following two basic functions in support of EPAP-based features:

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

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

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

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

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

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

Each EPAP server maintains a copy of the RTDB in order to provision the EAGLE 5 ISS Service Module cards. The EPAP server must comply with the hardware requirements in the *T1000 Application Server Hardware Manual* or the *T1200 Application Server Hardware Manual* . *Figure 7: MPS/EPAP Platform Architecture* illustrates the EPAP architecture contained in the MPS subsystem.

Each EPAP has a dedicated CD-ROM drive. One EPAP per EAGLE 5 ISS platform has a modem capable of supporting remote diagnostics, remote configuration, and remote maintenance; these remote operations are performed through EPAP login sessions. These sessions are accessible across the customer network as well as through an RS232 direct terminal connection to the EPAP. Refer to the *T1000 Application Server Hardware Manual* or the *T1200 Application Server Hardware Manual* for details about the hardware devices and network connections.

Chapter 3

TIF Features

Topics:

This chapter describes the EAGLE 5 ISS features that use the Triggerless ISUP Framework (TIF) and the Numbering Plan Processor (NPP) to process ISUP messages:

- TIF Number Portability (TIF NP)
- TIF SCS Forwarding (TIF SCS)
- TIF Number Substitution (TIF NS)
- TIF Simple Number Substitution (TIF SNS)
- TIF Additional Subscriber Data (TIF ASD)
- TIF Generic Routing Number (TIF GRN)

TIF Number Portability Feature

The TIF Number Portability (TIF NP) feature, along with the Numbering Plan Processor (NPP) the Service Portability feature, and the Triggerless ISUP Framework (TIF), provide the following capabilities:

- Complex prefix usage, where prefixes can be used to customize actions
- Non-NAI-compliant digit handling
- Complex outgoing digit formats
- Calling number portability
- Concurrent Release and Relay support
- Circular route prevention (CRP)
- IAM/SAM splitting
- Service Portability (S-Port)

The TIF NP feature is built upon the services provided by TIF and NPP to support ISUP messages.

TIF NP provides the following functions:

- Definition of feature-specific pre-NPP processing to be performed by TIF
- Service Action specification (including Service Action names and precedence)
- Service Action Handlers
- Feature-specific post-NPP processing, if needed

TIF NP Message Flows

Figure 8: ISUP Message Flows for TIF NP CdPN Relay shows basic TIF NP CdPN Relay use cases.

Figure 8: ISUP Message Flows for TIF NP CdPN Relay

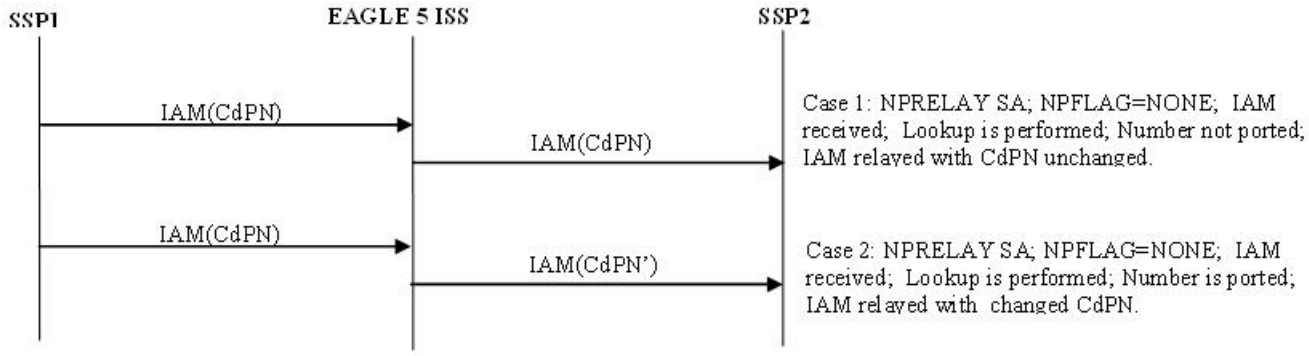


Figure 9: ISUP Message Flows for TIF NP CdPN Relay, with Optional NM Bits shows TIF NP Relay cases where NM bits are used in the ISUP IAM message. In the sequence diagrams, the NM bits are shown as binary values. Refer to *Use of NM Bits* for details on the use of NM bits.

Note: Use of NM bits in the IAM message is an optional part of TIF NP.

Figure 9: ISUP Message Flows for TIF NP CdPN Relay, with Optional NM Bits

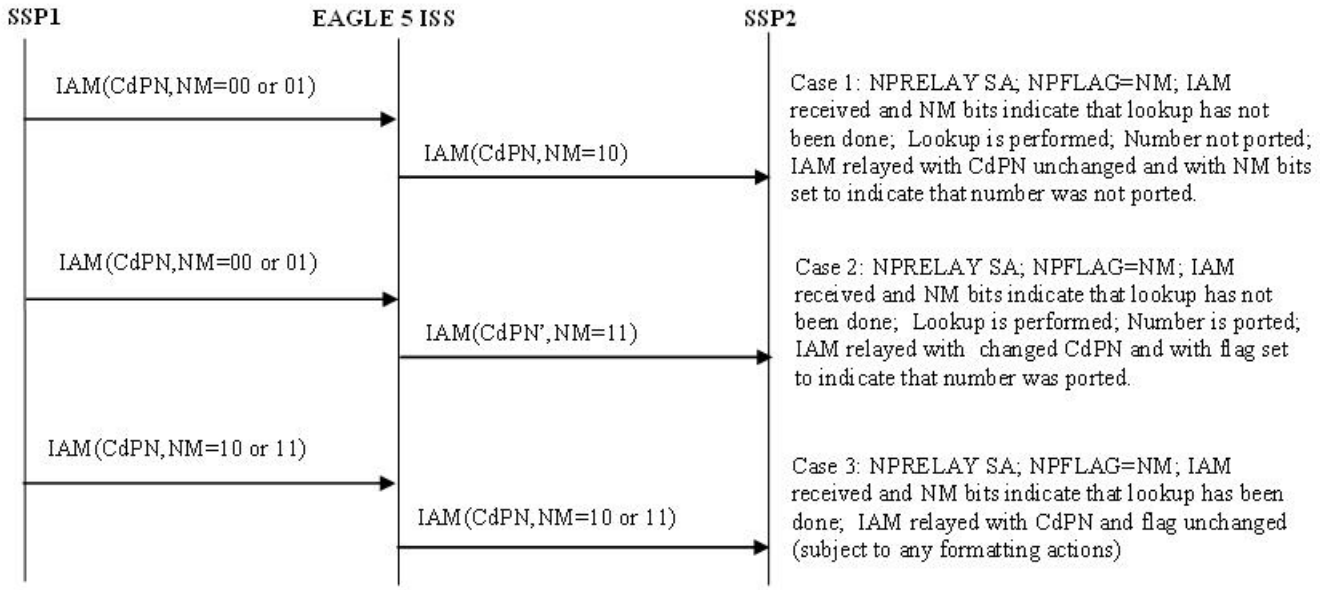


Figure 10: ISUP Message Flows for TIF NP CgPN Portability shows basic TIF NP CgPN portability use cases.

Figure 10: ISUP Message Flows for TIF NP CgPN Portability

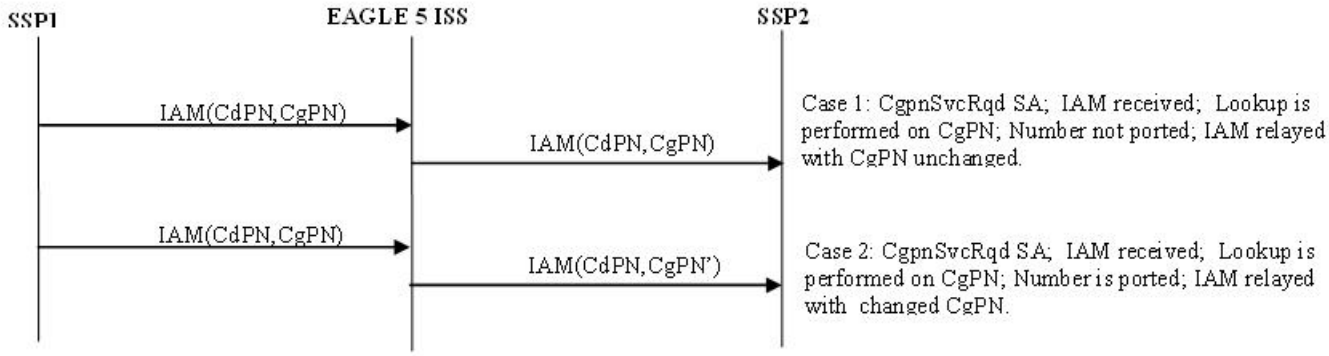


Figure 11: ISUP Message Flows for TIF NP Release shows basic TIF NP Release use cases.

Figure 11: ISUP Message Flows for TIF NP Release

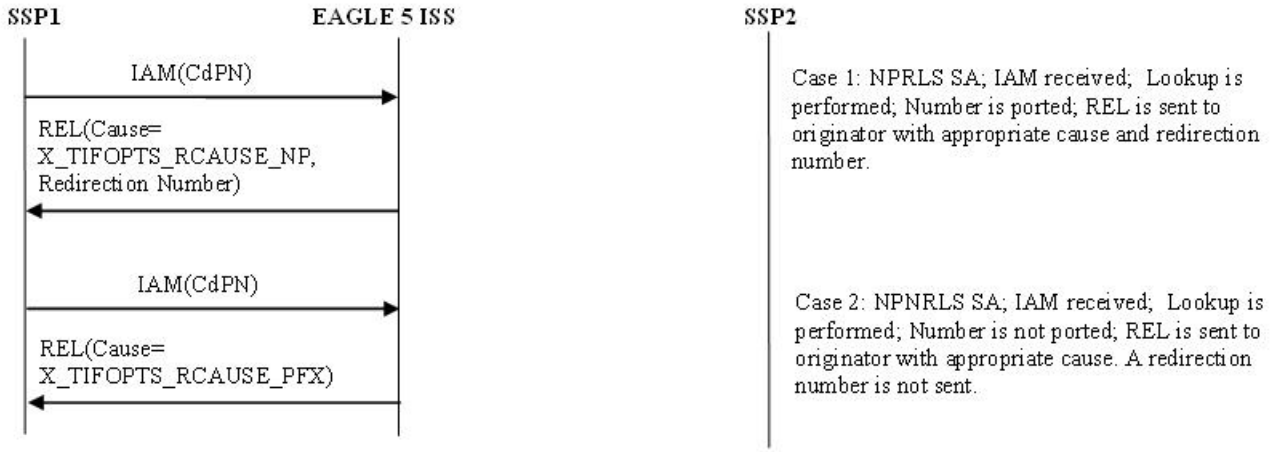


Figure 12: ISUP Message Flows for TIF NP Release, with Optional NM bits shows TIF NP Release use cases, with use of NM bits. Refer to *Use of NM Bits* for details on the use of NM bits.

Figure 12: ISUP Message Flows for TIF NP Release, with Optional NM bits

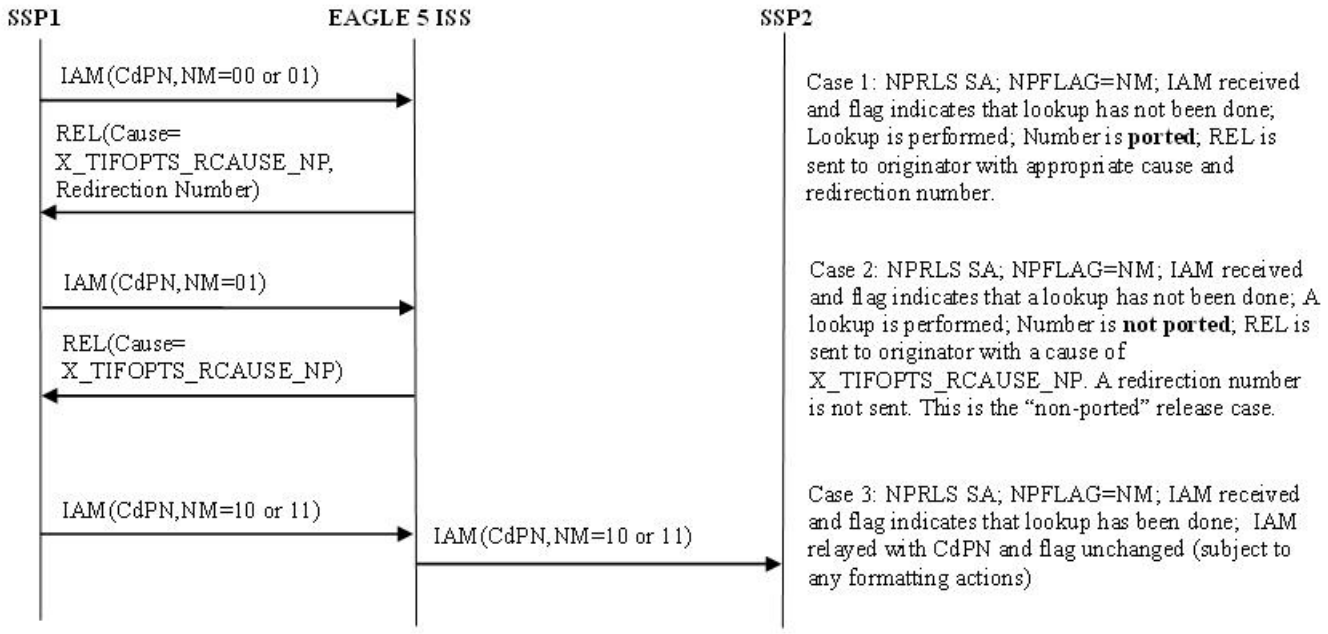
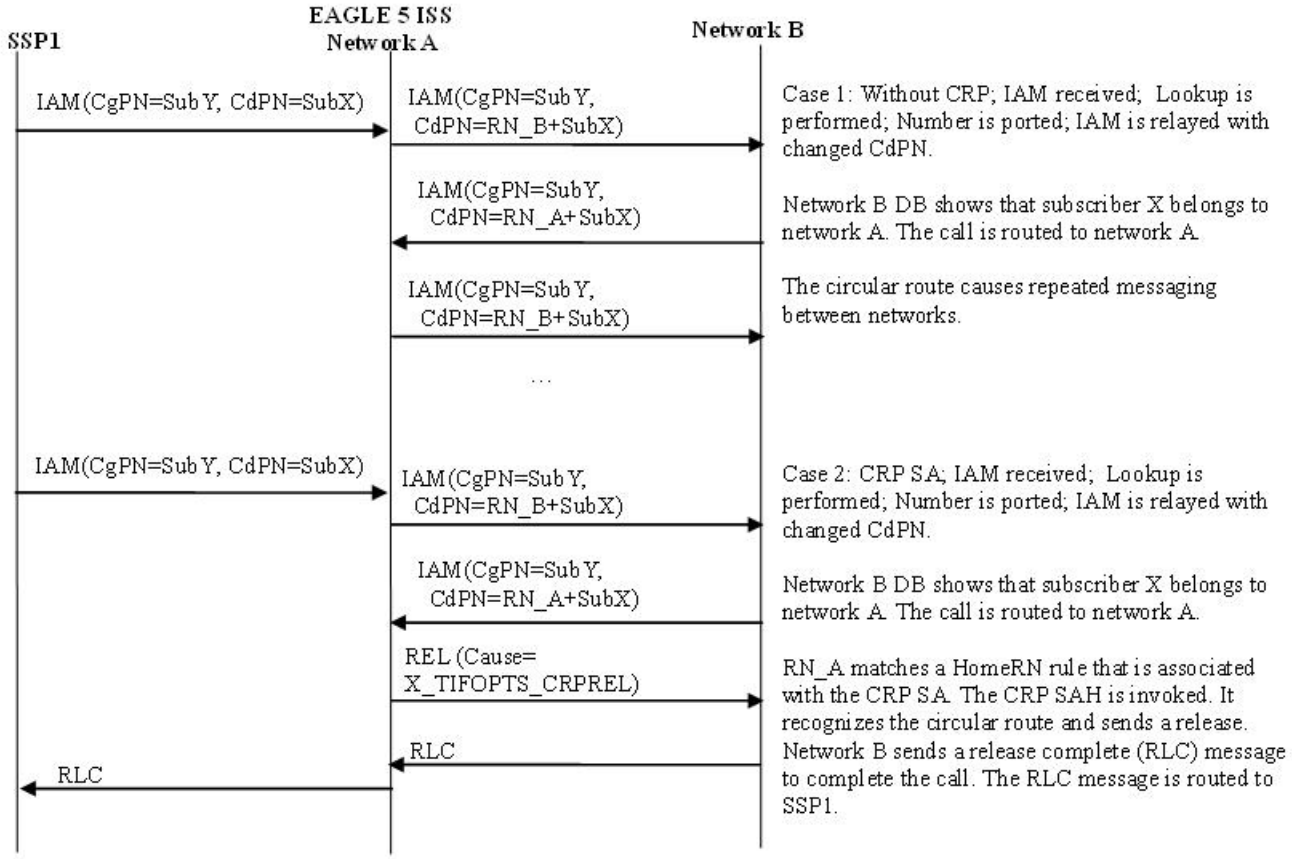


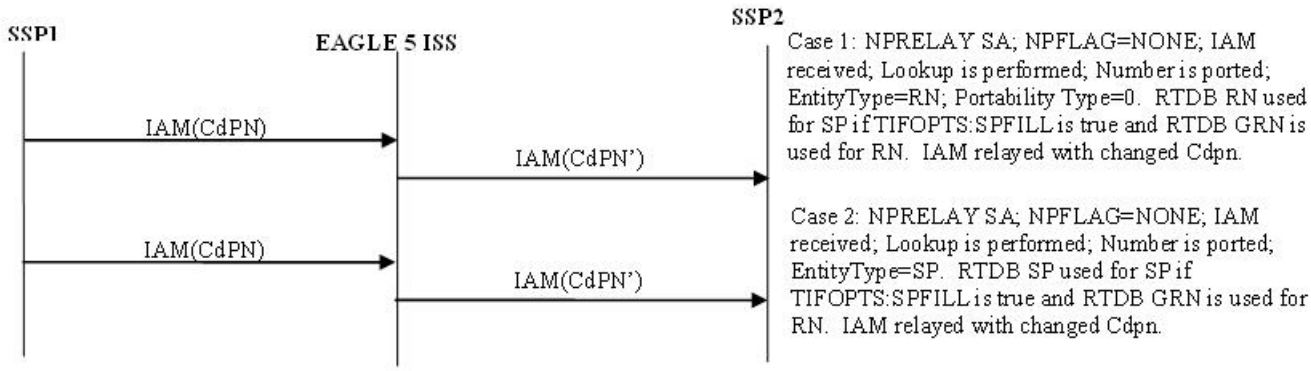
Figure 13: ISUP Message Flows for TIF CRP shows Circular Route Prevention use cases. In these cases, subscriber X is ported from network A to network B. Network A's NP database has the correct entry indicating that subscriber X is ported, but network B has incorrect routing information, indicating that subscriber B still belongs to network A. Subscriber Y belongs to network A. In the use case, subscriber Y calls subscriber X.

Figure 13: ISUP Message Flows for TIF CRP



A basic Service Portability use case is shown in *Figure 14: ISUP Message Flows for Service Portability*. In this example, the Service Portability feature is turned on and the TIFOPTS SPORTRELAY option has been configured for Service Portability. If the subscriber is an own-network GSM or IS41 subscriber, then the RTDB GRN is used for the RN.

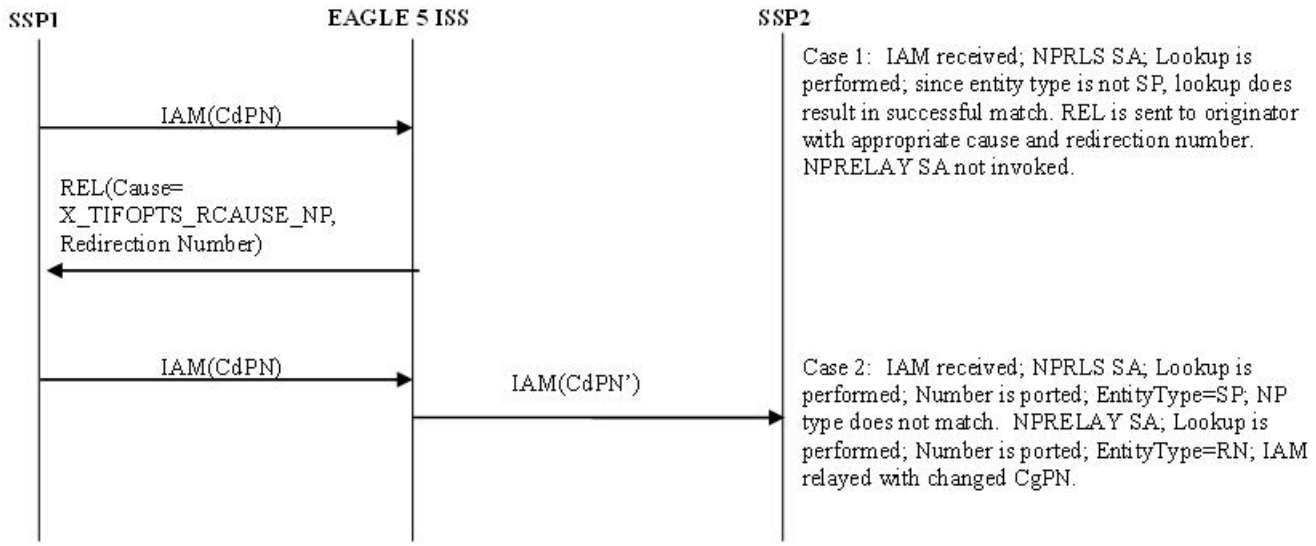
Figure 14: ISUP Message Flows for Service Portability



A use case using both the NPRLS and NPRELAY Service Actions is shown in *Figure 15: ISUP Message Flows for NPRLS + NPRELAY*. In this example, only OLO subscribers are released; own-network

subscribers are relayed. The Service Actions would be set to NPRLS and NPRELAY. The NPTYPERLS configuration option is set to RN and the NPTYPERLY configuration option is set to SP.

Figure 15: ISUP Message Flows for NPRLS + NPRELAY



TIF NP Configuration Options

Table 19: TIF Configuration Options indicates the TIF configuration options that can be used specifically by TIF NP. TIF NP can also use other options that are available to any TIF feature.

TIF NP Protocol Handling

TIF NP protocol handling provides the following functions:

- TIF NP-specific pre-NPP processing
- TIF NP Service Action Handlers
- Post NPP-processing

TIF Pre-NPP Processing for TIF NP

TIF decodes the incoming MSU and passes the following information to NPP:

- Conditioned CgPN
- Number of Country Code digits in CgPN
- Incoming NM bits

TIF NP Service Action Handlers

TIF NP provides Service Action Handlers for the NPP Service Actions that are specific to TIF NP. TIF and NPP perform the following functions for the TIF NP feature:

- RTDB lookup
- Interpretation of results from RTDB lookups
- NPP processing of Service Actions that are used for TIF NP

Table 11: Summary of TIF NP Service Actions provides a summary of the Service Actions used for TIF NP.

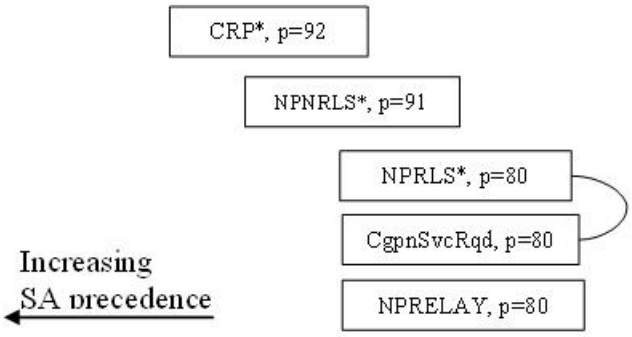
Table 11: Summary of TIF NP Service Actions

Service Action	Description	Function	Precedence
CRP	Circular Route Prevention	Performs an RTDB lookup on the CdPN and attempts to detect a circular route.	92
NPNRLS	Number Portability Release on No Match	Performs an RTDB lookup on the CdPN and indicates release behavior on an unsuccessful lookup.	91
NPRELAY	Number Portability Relay	Performs an RTDB lookup on the CdPN and indicates relay behavior.	80
NPRLS	Number Portability Release on Match	Performs an RTDB lookup on the CdPN and indicates release behavior on a successful lookup.	80
CgPNSvcRqd	Calling Number Lookup	Performs an RTDB lookup on the CgPN.	80

Relationships Between TIF NP Service Actions

Figure 16: NP Service Action Precedence shows the relationships between NP Service Actions. The figure shows the precedence values (p) and shows which Service Action s are mutually exclusive in terms of Action Set configuration. In the diagram, Service Actions that are connected by lines are mutually exclusive. Service Actions that can be terminating actions are marked with asterisks.

Figure 16: NP Service Action Precedence



The mutual exclusion relationships can be explained as follows:

- CgPNSvcRqd and NPRLS – CgPNSvcRqd implies Relay behavior.

The precedence relationships can be explained as follows:

- CRP – CRP should be first since it is a special case and a terminating action.
- NPNRLS – NPNRLS is a special condition and a terminating action.
- NPRLS – NPRELAY can be the same precedence. The NP lookup status determines whether or not the second Service Action needs to be executed.
- CgPNSvcRqd, NPRELAY – normal relay case

The following principles apply to precedence relationships:

- Special NP Release cases are given higher precedence.
- Handlers that need to override conditions set by other handlers must be given lower precedence

The mutual exclusion relationships are enforced during EAGLE 5 ISS configuration for TIF NP.

RN, SP, and DFLTRN Handling

The RN and SP values are set depending on the entity type retrieved from the RTDB and the values of the configuration options for NP type (NPTYPERLY, NPTYPERLS and NPTYPECGPN) and the SPFILL and DFLTRN configuration options. The options for NP type are used as part of the matching criteria to determine when the RTDB search is considered a success.

If a match is found and the Entity Type is RN, then RN digits are inserted into the outbound field.

If a match is found and the Entity Type is SP, then SP digits are inserted into the outbound field or the DFLTRN option digit string can be used instead of actual SP digits.

The DFLTRN and SPFILL configuration options allow a single digit string to be inserted instead of the actual SP digits to identify 'in-network subscribers'. There may be different SPs in the RTDB for use by G-Port or other EAGLE 5 ISS features, but a single digit string is needed for TIF. The DFLTRN string is considered 'routing digits'. When a DFLTRN string is provisioned, the RN Formatting Action is used to encode 'routing digits' (RN or DFLTRN) in the outbound digits. The SPFILL option is used to indicate how the SP is populated when DFLTRN is used for the RN. If the SPFILL option value is ON, RTDB network entity digits are used for the SP. If the SPFILL option value is OFF, the SP is not populated.

The RN Formatting Action inserts the 'routing digits" into the outbound digits (either be the actual RN or the DFLTRN string).

The SP Formatting Action inserts the SP digits into the outbound digits.

Note: If the IGM Feature is turned on, or the Service Portability feature is enabled, Entity Type is RN, and portability type (PT) is zero, then the Entity Type is treated as SP (in-network subscriber).

Table 12: Rules for Determining Outbound RN and SP summarizes the rules for determining the outbound RN and SP.

Table 12: Rules for Determining Outbound RN and SP

Case	NPTYPE	RTDB Entity Type	DFLTRN	SPFILL	RN	SP
1	RN, RNSP, RNSPDN, ANY, ALL	RN	N/A	N/A	Entity data digits from the RTDB	No data
2	SP	RN	N/A	N/A	No data	No data
3	RN	SP	N/A	N/A	No data	No data
4	SP, RNSP, RNSPDN, ANY, ALL	SP	Null	N/A	No data	Entity data digits from the RTDB
5	SP, RNSP, RNSPDN, ANY, ALL	SP	Not Null	ON	DFLTRN	Entity data digits from the RTDB
6	SP, RNSP, RNSPDN, ANY, ALL	SP	Not Null	OFF	DFLTRN	No data
7	SP, RN, RNSP, RNSPDN, ANY, ALL	Not RN, Not SP	N/A	N/A	No data	No data

Use of NM Bits

Use of NM bits is optional, and is controlled by the destination-based NPRST configuration option for the DPC of the incoming message and the TIFOPTS NPFLAG configuration option.

TIF determines the value of the NM Bits in the incoming message. The following CdPN-based Service Action Handlers inspect the incoming NM bits value: NPRELAY, NPRLS, NPNRLS, and CRP.

Note: The configuration options and the NM bits apply only to CdPN, not to CgPN. Therefore, theCgPNSVCRQD Service Action Handler does not look at the NM bits. The NM bits apply only for ITU ISUP messages when TIFOPTS NPFLAG=NM.

Table 13: NM Bits Values

NM Bits Value	Meaning
00	DPC is out-of-network, or no RTDB lookup performed
01	DPC is in-network, RTDB lookup was not performed

NM Bits Value	Meaning
10	DPC is in-network, unsuccessful RTDB lookup
11	DPC is in-network, successful RTDB lookup

If the TIFOPTS NPFLAG configuration option is set to NM and the outgoing message NM bits are not 00, the Destination table is searched for the DPC from the IAM message.

- If the NPRST option valued in the Destination table entry is ON, the NM bits in the outgoing message are set to 00 ("without indication").
- If the NPRST option valued in the Destination table entry is OFF, the NM bits in the outgoing message are not set to 00.

Service Portability for TIF NP

With the Service Portability feature, the subscriber has ported to a different network technology with the same service provider. The Service Portability use case is very similar to number portability with the exception of what is used as the prefix for the Called Party digits. Service Portability is applicable to TIF Number Portability Relay and TIF Number Portability Release, and is handled by the NPRELAY and the NPRLS Service Actions.

Service Portability is controlled by the Service Portability feature P/N 893-0343-01. The SPORTRELAY and SPORTRLS options in the TIFOPTS table control the mode of the Service Portability for NP Relay and NP Release. These options have the following values:

- NONE - Apply standard NP processing for own-network GSM and IS41 subscribers.
- GSM - Use the GSM Service Portability prefix for GSM own-network subscribers, and apply standard NP processing for own-network IS41 and OLO subscribers.
- IS41 - Use the IS41 Service Portability prefix for Is41 own-network subscribers, and apply standard NP processing for own-network GSM and OLO subscribers.
- ALL - Use the GSM Service Portability prefix for GSM own-network subscribers, use the IS41 Service Portability prefix for IS41 own-network subscribers, and apply standard NP processing for OLO subscribers.

The determination of whether or not to invoke Service Portability depends on the subscriber's Entity type and the Portability Type. The subscriber is considered as an own-network IS41 subscriber if the Entity type is RN and the Portability Type is 0 (RN/PT=0). The subscriber is considered as an own-network GSM subscriber if the Entity type is SP with any Portability Type. In the case of RN/PT=0, the RN for this subscriber is actually considered to be the SP (the IS-41 HLR address).

After the Service Portability feature is considered to be applicable, the Service Action attempts to use the subscriber GRN data in the RTDB as the Service Portability prefix. This GRN is populated in the RN Formatting Action value as the Service Portability prefix. The TIFOPTS SPFILL option value determines the content of the SP. If the SPFILL option value is ON, then the RTDB Network Entity digits are used for the .SP. If the SPFILL option value is OFF, then the SP value is null. The following table shows how the RN and SP are set according to the various scenarios. In all the cases, it is assumed that the Service Portability feature (893-0343-01) is ON.

If the GRN is not present in the RTDB, then UIM 1426, "S-Port: Missing GRN for srvc prtd subs" is generated indicating that Service Portability could not be applied due to missing Service Portability data. The behavior of the Service Action is as follows for the case that S-Port applies and the GRN does not exist in the RTDB:

- For the NPRELAY Service Action, the IAM message is routed with the CdPN unmodified, unless CDIAL is indicated to cause Formatting Action execution.
- For the NPRLS Service Action with NP type of RN, SP, RNSP, or RNSPDN, the IAM message is routed with the CdPN unmodified, unless CDIAL is indicated to cause Formatting Action execution.
- For the NPRLS Service Action with NP type of ALL or ANY, a REL message is sent with no redirection number.

Using NPRELAY and NPRLS in One Service Action Set

In a Service Action set containing both the NPRELAY and NPRLS Service Actions, TIF will perform Service Action processing in the order in which the Service Actions are provisioned (the lower-numbered sax configuration parameter specifies the first Service Action to be executed). If the first Service Action (NPRELAY or NPRLS) has a successful database match, then the second Service Action (NPRLS or NPRELAY) will not be executed. If the first Service Action (NPRELAY or NPRLS) does not have a successful database match, then the second Service Action (NPRLS or NPRELAY) is executed.

The TIFOPTS NPTYPERLY option will determine the Network Entity type behavior for the NPRELAY Service Action, and the The TIFOPTS NPTYPERLS option will determine the Network Entity type behavior for the NPRLS Service Action. This s allows the NPRELAY and NPRLS Service Actions to be configured for non-ported subscribers and ported subscribers independently. See the use case in *Figure 15: ISUP Message Flows for NPRLS + NPRELAY*. The following table has a list of possible combined Service Actions scenarios for NPRELAY and NPRLS. Scenarios 1 and 4 have the same behavior, and scenarios 2 and 3 have the same behavior. If the NP type is the same for both Service Actions, the second Service Action will never get executed.

Table 14: Scenarios for Combining the NPRELAY and NPRLS Service Actions

Scenario	First Service Action	Second Service Action	Result
1	NPRELAY, NPTYPERLY=SP	NPRLS, NPTYPERLS=RN	NP Relay an own-network subscriber; NP Release a foreign subscriber
2	NPRELAY, NPTYPERLY=RN	NPRLS, NPTYPERLS=SP	NP Relay foreign subscriber; NP Release an own-network subscriber
3	NPRLS, NPTYPERLS=SP	NPRELAY, NPTYPERLY=RN	NP Release an own-network subscriber; NP Relay a ported subscriber
4	NPRLS, NPTYPERLS=RN	NPRELAY, NPTYPERLY=SP	NP Release a foreign subscriber; NP Relay an own-network subscriber

NPRELAY Service Action Handler

The NPRELAY Service Action Handler performs an RTDB lookup on the conditioned CdPN digit string and indicates Relay behavior.

Configuration Options Used

The TIFOPTS NPTYPERLY configuration option indicates the conditions that are used for a successful RTDB match.

The destination-based NPRST configuration option and the TIFOPTS NPFLAG configuration option indicate when and how the NM bits should be processed.

The value of the TIFOPTS DFLTRN option, if provisioned, is used to populate the RN on a successful match on SP.

The TIFOPTS SPFILL option indicates whether SP should be populated when the DFLTRN value or the GRN data is used for the RN value.

The TIFOPTS SPORTRELAY option indicates the Service Portability processing for the NPRELAY Service Action (none, GSM, IS41, all).

Action Performed

If the NPRLS Service Action has already been executed with a successful match, no NPRELAY processing is performed.

This Service Action Handler uses the incoming NM bits to determine if a lookup has already been performed. See .*Use of NM Bits*.

If the TIFOPTS NPFLAG option is set to NM and the NM bits indicate that a lookup has already been performed, then the Service Action Handler returns immediately.

If a lookup has not already been performed, the NPRELAY Service Action Handler performs an RTDB lookup on the CdPN digit string. RN and SP can be found as a successful match. RN and SP entities are processed as described in *RN, SP, and DFLTRN Handling*.

Interpretation of lookup results is described in *Interpreting Results of an RTDB Lookup*.

Depending on the Formatting Action configuration for the selected rule, the updated RN or SP can be used during CdPN formatting by NPP.

Service portability processing is applied as described in *Service Portability for TIF NP* when the Service Portability feature is ON, and:

- Network Entity type is RN/PT=0 and the SPORTRELAY option value is IS41 or ALL
- Network Entity type is SP and the SPORTRELAY option value is GSM or ALL

If the NPTYPERLY configuration option is RNSPDN, ANY, or ALL and a match is found on a non-RN/SP condition, then the RN or SP entities are not used. The end result is that NPP performs formatting of the outgoing CdPN.

The NPP Formatting Action processing will be skipped on an unsuccessful lookup. One way to force formatting of the outgoing CdPN, even after an unsuccessful lookup, is to configure the CDIAL Service Action.

On a successful lookup, where DN and entity data was found, the CdPN message parameter is changed to the ported number and the message is relayed to the recipient network.

On a successful lookup, where DN was found but entity data was not found (NPTYPERLY=ALL), the CdPN is unchanged and the message is relayed to the original destination.

The decoded NM result is used to determine if the NM bits need to be set in the outgoing IAM message.

Terminating Action?

This is not a terminating action.

NPRLS Service Action Handler

The NPRLS Service Action Handler performs a lookup on the conditioned CdPN digit string and indicates Release behavior on a successful lookup.

This Service Action should be used after the CRP Service Action.

Configuration Options Used

The TIFOPTS NPTYPERLS configuration option indicates the conditions used for a successful match.

The TIFOPTS RNRQD configuration option indicates if a Redirection Number should be included in the Release message.

The TIFOPTS RLCOPC option indicates whether the destination-based RCAUSE configuration option value or the TIFOPTS RCAUSENP configuration option value is used as the Release Cause to be included in the Release message.

The value of the TIFOPTS DFLTRN option, if provisioned, is used to populate the RN on a successful match on SP.

The destination-based NPRST configuration option and the TIFOPTS NPFLAG configuration option indicates if the NM bits should be processed, and if a Release message should be generated if a DN is-not-found.

The TIFOPTS SPORTRLS option indicates the Service Portability processing for the NPRLS Service Action (none, GSM, IS41, all).

The TIFOPTS SPFILL option indicates whether SP should be populated when the DFLTRN value or the GRN data is used for the RN value.

Action Performed

If the NPRELAY Service Action has already been executed with a successful match, no NPRLS processing is performed.

This Service Action Handler uses the incoming NM bits to determine whether a lookup has already been performed. See *Use of NM Bits*.

If the NPFLAG configuration option is set to NM and the NM bits indicate that a lookup has already been performed, then the Service Action Handler returns immediately.

If the NM bits indicate that a lookup has not already been performed, the Service Action Handler performs an RTDB lookup on the conditioned CdPN digit string. RN or SP can be found as successful match. The RN and SP values are processed as described in *RN, SP, and DFLTRN Handling*.

Interpretation of lookup results is described in *Interpreting Results of an RTDB Lookup*.

On a match, the RNRQD option indicates whether or not a Redirection Number is included in the Release message, and the RCAUSE option or the RCAUSENP option indicates the Release Cause to be included in the Release message.

On a successful lookup, where DN and entity data was found, a Release message is sent. If the Redirection Number configuration option (RNRQD) is set to YES, then the ported number is included in the ISUP Release message.

On a successful lookup, where DN was found but entity data was not found (NPTYPERLS=ALL), a Release message is sent. If the Redirection Number configuration option (RNRQD) is set to YES, then the original CdPN is included in the ISUP Release message.

Depending on the Formatting Action configuration for the selected rule, the updated RN or SP can be used during CdPN formatting by NPP.

Service portability processing is applied as described in *Service Portability for TIF NP* when the Service Portability feature is ON, and:

- Network Entity type is RN/PT=0 and the SPORTRLS option value is IS41 or ALL
- Network Entity type is SP and the SPORTRLS option value is GSM or ALL

The Formatting Action processing will be skipped on an unsuccessful lookup. The original message is relayed using the original CdPN (unless NPFLAG=NM and a Release message is to be generated).

Terminating Action?

This is a terminating action in either of the following two conditions:

- The NPFLAG is set to NM, lookup is not successful, and the NM bits indicate "query not performed" (binary value 01).
- The lookup is successful.

NPNRLS Service Action Handler

The NPNRLS Service Action Handler performs a lookup on the conditioned CdPN digit string and indicates Release behavior on an unsuccessful lookup.

Configuration Options Used

The TIFOPTS NPTYPERLS configuration option indicates the conditions used for a successful match.

The destination-based NPRST configuration option and the TIFOPTS NPFLAG configuration option indicates when and how the NM bits should be processed.

The TIFOPTS RLCOPC option indicates whether the destination-based RCAUSE configuration option value or the TIFOPTS RCAUSENP configuration option value is used as the Release Cause to be included in the Release message.

Action Performed

This Service Action Handler uses the incoming NM bit decode result to determine if a lookup has already been performed.

If the TIFOPTS NPFLAG configuration option is set to NM and the NM bits indicate that a lookup has already been performed, then the Service Action Handler returns immediately.

If the NM bits indicate that a lookup has not already been performed, the RTDB lookup is performed and does not return a match.

In this no-match case, a Release message will be sent with a Release Cause specified in the RCAUSE option or the RCAUSEPFX option. The Redirection Number is not included in the Release message.

This Service Action Handler provides no inputs to Formatting Actions.

The post-NPP processing sends a Release message with a Release Cause that is configured in the RCAUSE option or the RCAUSEPFX option. The Redirection Number is not included in the Release message.

Terminating Action?

In the no-match case, this is a terminating action.

CgPNSvcRqd Service Action Handler

The CgPNSvcRqd Service Action Handler performs an RTDB lookup on the conditioned CgPN digit string.

The CgPNSvcRqd and NPRLS Service Actions are mutually exclusive in an Action Set.

Configuration Options Used

The NPTYPECGPN option indicates the conditions used for a successful match.

The IAMCGPN option value (DN, RN, RNDN) indicates the format of outgoing CgPN string. For the IAMCGPN configuration option, RN implies either RN or SP.

The value of the DFLTRN option, if set, is used to populate the RN on a successful match on SP.

Action Performed

On a lookup where entity data was found, the CgPN is changed according to the IAMCGPN configuration option. TIF will use the updated CgPN string to set the CgPN in the outgoing message.

On a lookup where an entry was found, but entity data was not found (NPTYPE=ALL), the CgPN is unchanged. The outgoing CgPN string is empty.

The length of the provisioned STPOPTS Default Country Code (DEFCC) parameter value provides the number of Country Code (CC) digits that are at the front of the conditioned CgPN.

On a successful lookup, where the outgoing format includes the DN (IAMCGPN=DN or RNDN) and the Country Code (CC) was added to the conditioned CgPN, the CC will be removed from the conditioned CgPN before copying the DN to the outgoing CgPN digit sting.

For example,

- On entry to the Service Action Handler:

  The conditioned CgPN is CCC1234567.
  The number of CC digits is 3.
  The IAMCGPN option values is RNDN.

- The lookup is successful.

  The value of RN is AAA.
  The resulting outgoing CgPN digit string is AAA1234567.

If a match is found and the Entity Type is RN, then RN digits are inserted into the outgoing field.

If a match is found and the Entity Type is SP, then SP digits are inserted into the outgoing field or the DFLTRN option digit string can be used instead of actual SP digits.

Note: If the IGM feature is turned on, Entity Type is RN, and PT=0, then the Entity Type is treated as SP (in-network subscriber).

Terminating Action?

This is not a terminating action.

TIF Post-NPP Processing for TIF NP

TIF post-NPP processing performs all actions required for NP Release and most actions required for NP Relay. The only extra NP-specific logic in TIF post-NPP processing is a Result Handler that performs the following functions:

- If the NPFLAG option value is NM, and the NPRST parameter value is ON for the Destination Point Code in the Destination table, then the NM bits will be set to 00 (meaning "without indication").
- If the NPFLAG option value is NM, and the NPRST parameter value is OFF for the Destination Point Code in the Destination table, and if.the incoming NM bits are not equal to the outgoing NM bits, then the outgoing NM bits are written to the outgoing ISUP IAM message (see *NPRELAY Service Action Handler* for details).
- If the Destination Point Code is not found in the Destination table, then the message is discarded and a UIM is generated.

TIF Number Substitution Feature

Number substitution of both the Calling and Called Party provides customers the ability of supporting numbers outside their normal number range without having to upgrade all the nodes in the network. The TIF Number Substitution (TIF NS) feature, along with the Numbering Plan Processor (NPP) and the Triggerless ISUP Framework (TIF), provide the following capabilities:

- Called number substitution to change a Public DN into a Private DN
- Calling number substitution to change a Private DN into a Public DN

The TIF NS feature is built upon the services provided by TIF and NPP to support RTDB lookup of both Calling Party and Called Party numbers for substitution.

TIF NS provides the following functions:

- Definition of feature-specific pre-NPP processing to be performed by TIF
- Service Action specification (including Service Action names and precedence)
- Service Action Handlers
- Feature-specific post-NPP processing, if needed

TIF NS Message Flows

Figure 17: ISUP RELAY with TIF NS shows CgPN and CdPN substitution in an ISUP IAM Relay call flow.

Figure 17: ISUP RELAY with TIF NS

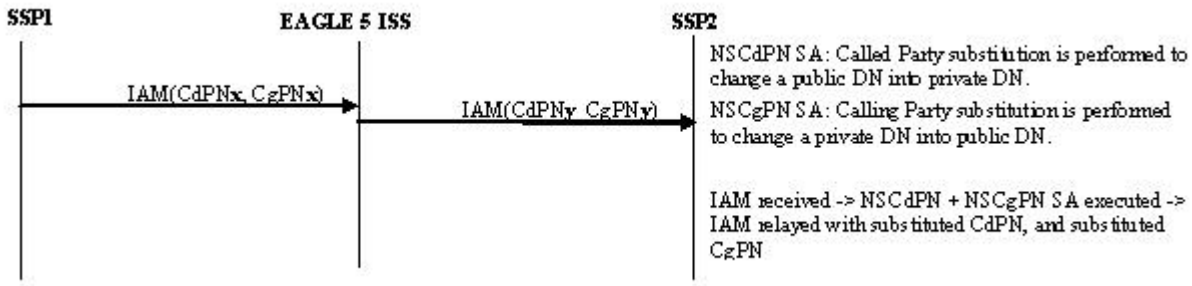
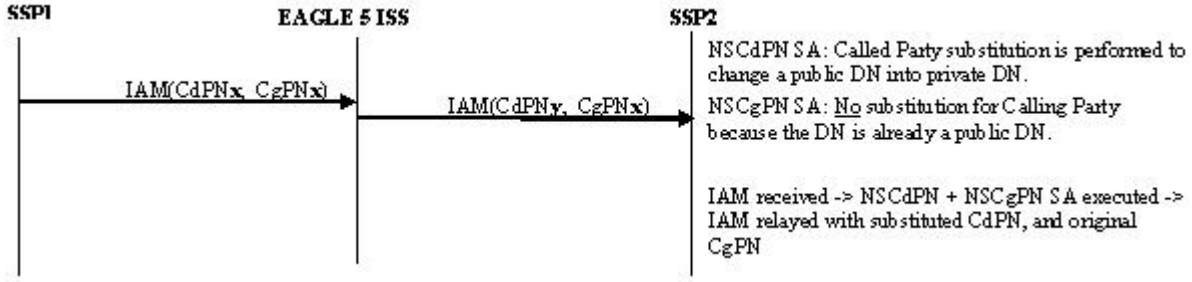


Figure 18: ISUP RELAY with TIF NS - No CgPN Substitution shows the ISUP IAM Relay call flow where CdPN is substituted and CgPN is not substituted.

Figure 18: ISUP RELAY with TIF NS - No CgPN Substitution

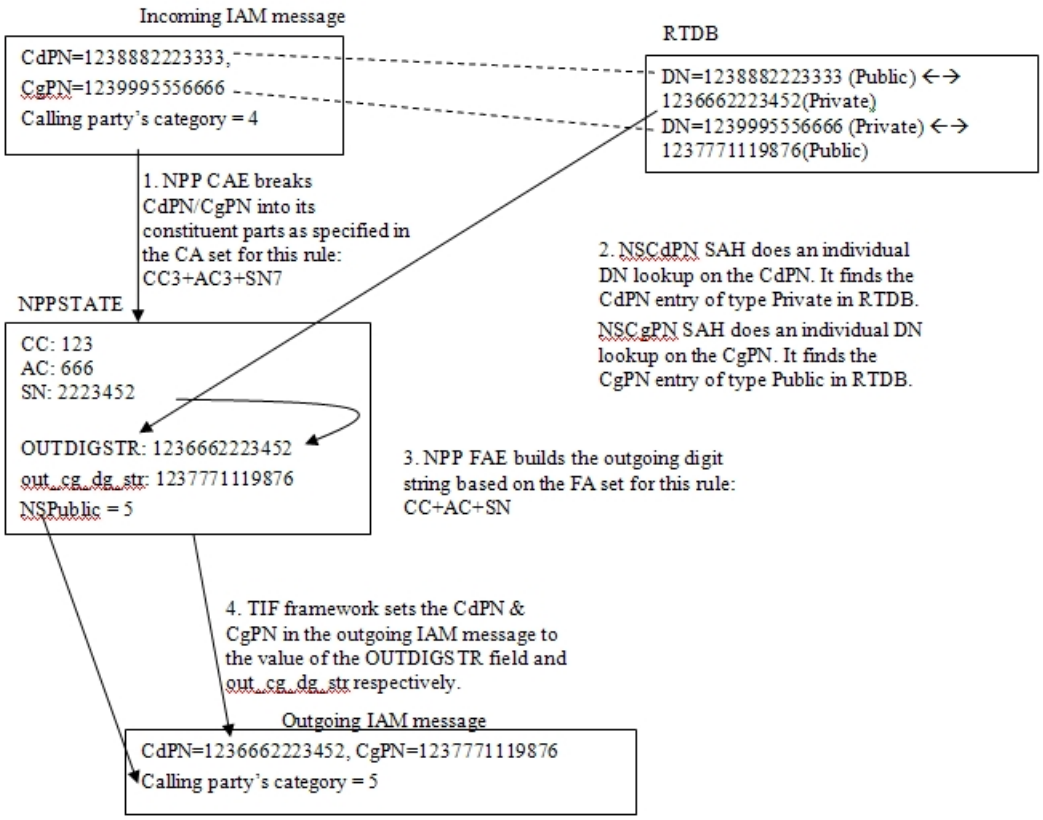


TIF NS Basic Use Case

Figure 19: TIF NS Basic Operation shows the steps involved in a basic TIF NS use case. This case uses the following rule and configuration options:

- Filter FPFX=123
- Filter FDL=13
- Conditioning Actions=CC3+AC3+SN7
- Service Actions=NSCdPN, NSCgPN
- Formatting Actions=CC+AC+SN
- TIFOPTS options NSADDLDATA=yes, NSPUBLIC=5

Figure 19: TIF NS Basic Operation



TIF NS Configuration Options

Table 19: TIF Configuration Options indicates the TIF configuration options that can be used specifically by TIF NS. TIF NS can also use other options that are available to any TIF feature.

TIF NS Handling of IAM Message

When an IAM message is received and successfully decoded, an RTDB lookup is performed on the CdPN, the CgPN, or both.

For the CdPN, upon successful retrieval of the Called Party DN (Private), the CdPN is substituted in the outgoing IAM message.

For the CgPN, upon successful retrieval of the Calling Party DN (Public), the CgPN is substituted in the outgoing IAM message. If the Calling Party's Category is not the same as the value for the TIFOPTS nspublic configuration option and the lookup was successful, the Calling Party's Category is changed to the nspublic option value in the outgoing IAM message. The outgoing IAM message is then relayed.

TIF NS Protocol Handling

TIF NS protocol handling provides the following functions:

- TIF NS-specific pre-NPP processing
- TIF NS Service Action Handlers

- Post NPP-processing

TIF Pre-NPP Processing for TIF NS

TIF decodes the incoming MSU and passes either the conditioned CdPN or the conditioned CgPN to NPP.

For the conditioned CgPN, the country code provisioned in the STPOPTS DefCC parameter value will be prepended to the conditioned CgPN if the TIFOPTS condcgpn parameter value is set to addcc.

TIF NS Service Action Handlers

TIF NS provides Service Action Handlers for the NPP Service Actions that are specific to TIF NS. TIF and NPP perform the following functions for the TIF NS feature:

- RTDB lookup
- Interpretation of results from RTDB lookups
- NPP processing of Service Actions that are used for TIF NS

Table 15: Summary of TIF NS Service Actions provides a summary of the Service Actions used specifically for TIF NS.

Table 15: Summary of TIF NS Service Actions

Service Action	Description	Function	Precedence
NSCdPN	Called Number Substitution	Performs an RTDB lookup on the CdPN; if the lookup is successful, replaces the outgoing CdPN.	80
NSCgPN	Calling Number Substitution	Performs an RTDB lookup on the CgPN. if the lookup is successful, replaces the outgoing CgPN.	75

NSCdPN Service Action Handler

The NSCdPN Service Action Handler performs a lookup on the conditioned CdPN digit string. On a successful lookup it replaces the outgoing CdPN. A successful lookup is one in which the subscriber type is Public and there is a pointer to an associated Private DN.

There are no mutually exclusive relationships with other NS Service Actions.

Configuration Options Used

None.

Action Performed

This Service Action Handler copies digits from the Private DN found in the successful RTDB lookup, and populates one of the following sets of Formatting Action values:

- ZN
- CC+DN
- CC+AC+SN

.

This Service Action assumes that Formatting Action execution will occur. If another Service Action determines that Formatting Action execution will not occur, the CDIAL Service Action must be used to force Formatting Action execution to occur.

The post-NPP processing replaces the CdPN in the outgoing message.

Terminating Action?

This is not a terminating action.

NSCgPN Service Action Handler

The NSCgPN Service Action Handler performs a lookup on the conditioned CgPN digit string. On a successful lookup it replaces the outgoing CgPN. A successful lookup is one in which the subscriber type is Private and there is an associated Public DN.

The SNSCgPN Service Action and the NSCgPN Service Action are mutually exclusive in the same Action Set.

Configuration Options Used

The nsaddldata configuration option indicates whether to compare the incoming Calling Party's Category to the nspublic configuration option value before the RTDB lookup.

The nspublic configuration option indicates the value for the Calling Party's Category in a Public DN for the network.

Formatting of the outgoing CgPN string is based on the value of the iamcgpn configuration option.

Action Performed

This Service Action Handler uses the nsaddldata and nspublic configuration options to determine whether to replace the Calling Party's Category in the outgoing message.

If a country code was prepended to the original CgPN by the TIF pre-NPP processing, the Public DN from the RTDB is assumed to begin with a country code. The STPOPTS default country code (DefCC) value is compared with the country code digits in the DN retrieved from the RTDB.

- If the two sets of digits match, the country code digits are removed from the retrieved DN.
- If the two sets of digits do not match, a UIM is generated and the Service Action returns normally.

The following actions are taken depending on the value of the iamcgpn configuration parameter:

- If iamcgpn=dn, all digits in the outgoing CgPN are substituted.
- If iamcgpn=rndn, the RN will contain the maximum number of digits allowed in the CgPN, and the digits following the RN are replaced with the substituted DN.

This Service Action Handler provides no inputs to Formatting Actions. Formatting of the outgoing CgPN digit string is completed in the Service Action Handler.

The post-NPP processing replaces the Calling Party's Category and the CgPN (only the digit string and the odd/even indicator bits, not the NAI) as NPP processing indicates.

Terminating Action?

This is not a terminating action.

TIF Post-NPP Processing for TIF NS

TIF post-NPP processing performs all actions required for NS functions. TIF performs the following processing for TIF NS:

- Calling Party's Category replacement
- CgPN replacement
- CdPN replacement

TIF Simple Number Substitution Feature

The TIF Simple Number Substitution (TIF SNS) feature allows the Calling Party number in the ISUP IAM message to be substituted with a single Calling Party number that is provisioned in a TIF configuration option. The RTDB is not used in this case.

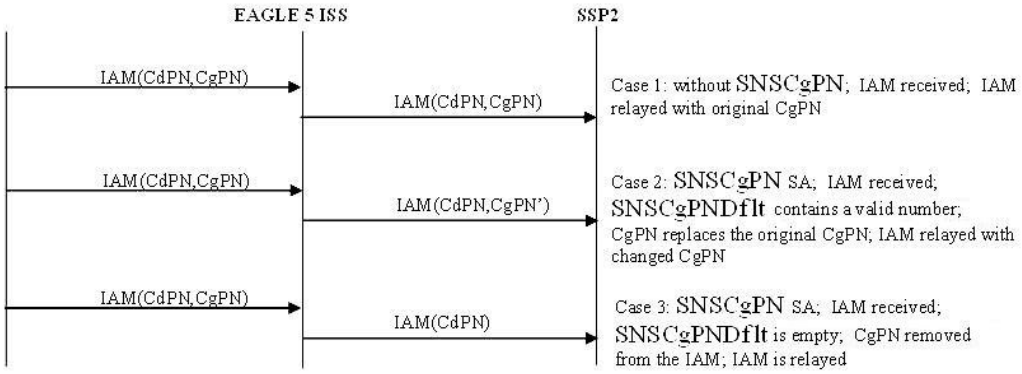
The TIF SNS feature uses services provided by the Triggerless ISUP Framework (TIF), and provides the following functions:

- Feature-specific pre-NPP processing
- Service Action specification (including Service Action names and precedence)
- Service Action Handlers
- Feature-specific post-NPP processing

TIF SNS Message Flows

Figure 20: ISUP Message Flows for TIF SNS shows TIF SNS use cases.

Figure 20: ISUP Message Flows for TIF SNS



TIF SNS Configuration Option

The SNSCgPNDefault configuration option is used by TIF SNS. The provisioned option value indicates the number to be used to replace the CgPN during simple number substitution. A value of **none** indicates that the CgPN will be removed from the outgoing message.

The TIF SNS feature can use other TIF configuration options that are available to any TIF feature. See *TIF Configuration Options*.

TIF SNS Protocol Handling

TIF SNS protocol handling consists of the following functions:

- SNS-specific pre-NPP Processing

  TIF sends the conditioned CgPN to NPP.

- SNSCgPN Service Action Handler
- SNS-specific post NPP-Processing

TIF SNS Service Action Handler

The SNSCgPN Service Action Handler indicates how to update the outgoing CgPN based on the value of the SNSCgPNDefault configuration option.

Configuration Options Used

The SNSCgPNDefault option indicates the number used to replace the CgPN, or a value of NONE if the CgPN should be removed.

Actions Performed

If the SNSCgPNDefault option value is the number used to replace the CgPN, the SNSCgPN Service Action Handler indicates that the CgPN is to be replaced.

If the SNSCgPNDefault option value is NONE, then the SNSCgPN Service Action Handler indicates that the CgPN should be removed from the message.

This Service Action Handler provides no input to NPP Formatting Actions.

Note: Formatting of the outgoing CgPN string is not based on the value of the IAMCGPN configuration option.

NPP Post-Processing

TIF post-NPP processing performs all actions required for SNS-related updates to the outgoing message:

- If the value of the SNSCgPNDefault option is NONE, then TIF removes the CgPN.
- If the value of the SNSCgPNDefault option is not NONE, then TIF replaces the CgPN with the SNSCgPNDefault value in the outgoing message. The CgPN NAI is not changed.

TIF SCS Forwarding Feature

The TIF SCS Forwarding feature provides the ability to forward messages to the SCS for additional processing after TIF processing is complete.

The only modifications made to the message by TIF are:

- Re-encode a modified CdPN
- Forward message to SCS, using DTA

The TIF SCS Forwarding feature provides the Service Action Handler for the FWDSCS Service Action that is provided by TIF to NPP. Before an NPP Rule can be provisioned with the FWDSCS Service Action in the Action Set, the TIF SCS Forwarding feature must be enabled in the system.

The feature does not require EPAP and RTDB lookup, but can operate with EPAP or ELAP subsystems.

FWDSCS Service Action Handler

The FWDSCS Service Action indicates that any relayed IAM and SAM messages require processing by the Database Transport Access (DTA; also called Redirect), a feature that encapsulates an MSU in an SCCP header and forwards it to a destination (the DTA DPC, usually an SCS). Refer to the *Database Administration Manual - Features* for more information about DTA, including message size limits for encapsulation.

DTA might not be able to forward a message for the following reasons:

- The message is too large for DTA to process.
- The DTA DPC is prohibited or congested (through TFC, local link congestion is not considered).
- The DTA node is disabled.

If DTA encapsulation is requested but cannot be performed, the message is relayed without additional modification.

TIF Additional Subscriber Data Feature

The TIF Additional Subscriber Data (TIF ASD) feature allows for the insertion of Additional Subscriber Data (ASD) from the incoming CgPN and CdPN digit strings into the CdPN of an outgoing IAM or Redirection Number.

TIF ASD provides Service Action Handlers for the ASDLKUP and CgPNASDRqd Service Actions in NPP.

The NPP ASD Formatting Action is used to process the ASD that is retrieved by TIF ASD Service Actions.

Basic TIF ASD Use Case

The incoming IAM message contains CdPN=1238882223333 and CgPN=1239995556666.

The following Filter and Action Set components are used for the example:

- Filter Prefix (FPFX) = 123
- Filter Digit Length (FDL) = 13
- Conditioning Actions = CC3 + AC3 + DN7
- Service Action = CgPNASDRqd
- Formatting Actions = CC + ASD + AC + DN

NPP extracts the following information from the incoming CdPN:

- Country Code (CC) = 123
- Area Code (AC) = 888
- Dialed Number (DN) = 223333

The CgPNASDRqd Service Action Handler performs an RTDB lookup for the DN in the CgPN. The CgPN entry is found and contains ASD = a5d.

NPP Formatting Action execution uses the extracted information and the ASD to construct the outgoing digit string as CC + ASD + AC + DN = 123a5d8882223333.

TIF uses the constructed CdPN digit string in the outgoing IAM message. The CgPN is not changed. The outgoing message is relayed.

TIF ASD Message Flows

Figure 21: ISUP IAM Message Flows for TIF ASD shows TIF ASD use cases.

Figure 21: ISUP IAM Message Flows for TIF ASD

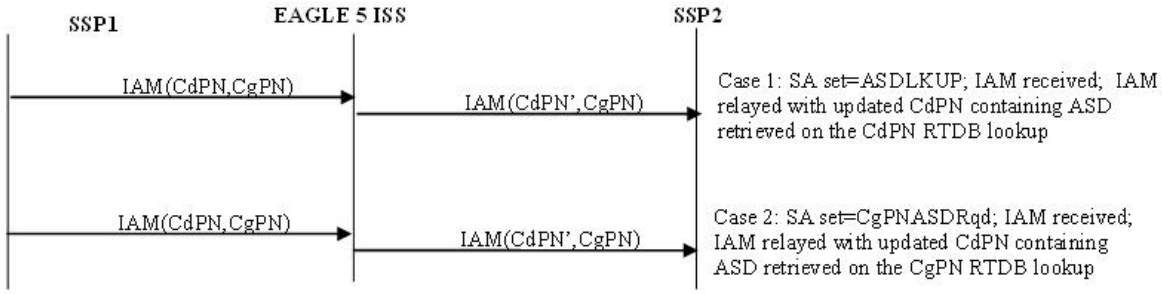
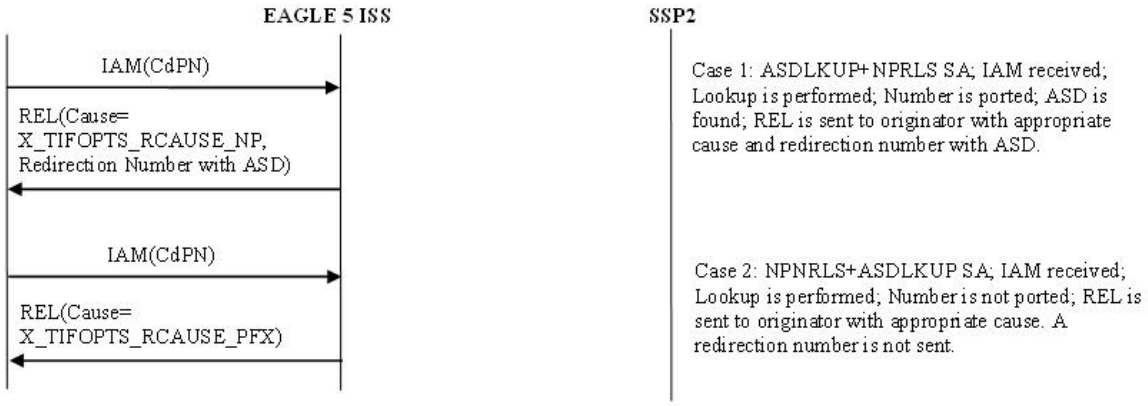


Figure 22: ISUP REL Message Flow for TIF ASD shows TIF ASD use cases with the NPRLS and NPNRLS Service Actions.

Figure 22: ISUP REL Message Flow for TIF ASD



TIF ASD Service Action Handlers

TIF ASD provides Service Action Handlers for the NPP Service Actions shown in :

Table 16: NPP Service Actions used by TIF ASD

Service Action	Description
ASDLKUP	Performs an individual or range RTDB lookup on the CdPN to find an entry containing an ASD digit string.
CgPNASDRqd	Performs an individual or range RTDB lookup on the CgPN to find an entry containing an ASD digit string.

The ASDLKUP Service Action or CgPNASDRqd Service Action can coexist in the same Service Action group with any other Service Actions used by TIF. The ASDLKUP Service Action and the CgPNASDRqd Service Action are mutually exclusive in the same Action Set.

ASDLKUP Service Action Handler

The ASDLKUP Service Action Handler uses the ASDLKUP Service Action to perform an individual or range RTDB lookup on the conditioned CdPN, to find an entry containing an ASD digit string.

Depending on the Formatting Action configuration for the selected NPP Rule, the ASD digit string can be used during CdPN formatting by NPP.

TIF uses the formatted CdPN in the outgoing IAM or REL message.

If the TIF ASD feature is turned off in the system, the ASDLKUP Service Action Handler returns immediately.

CgPNASDRqd Service Action Handler

The CgPNASDRqd Service Action Handler uses the CgPNASDRqd Service Action to perform an individual or range RTDB lookup on the conditioned CgPN, to find an entry containing an ASD digit string.

Depending on the Formatting Action configuration for the selected NPP Rule, the ASD digit string can be used during CdPN formatting by NPP.

TIF uses the formatted CdPN in the outgoing IAM or REL message.

If the TIF ASD feature is turned off in the system, the CgPNASDRqd Service Action Handler returns immediately.

TIF Generic Routing Number Feature

The TIF Generic Routing Number (TIF GRN) feature allows for the insertion of a Generic Routing Number (GRN) digit string into the CdPN of an outgoing IAM or Redirection Number

TIF GRN provides Service Action Handlers for the GRNLKUP and CgPNGRNRqd Service Actions in NPP.

The NPP GRN Formatting Action is used to process the GRN that is retrieved by TIF GRN Service Actions.

TIF GRN Message Flows

Figure 23: ISUP Message Flows for TIF GRN shows TIF GRN use cases.

Figure 23: ISUP Message Flows for TIF GRN

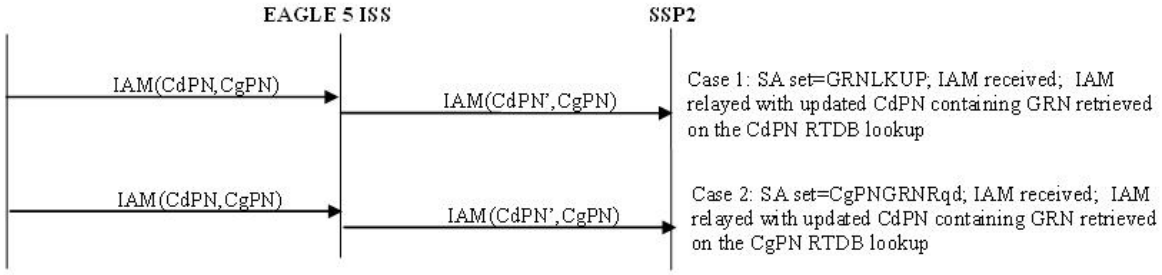
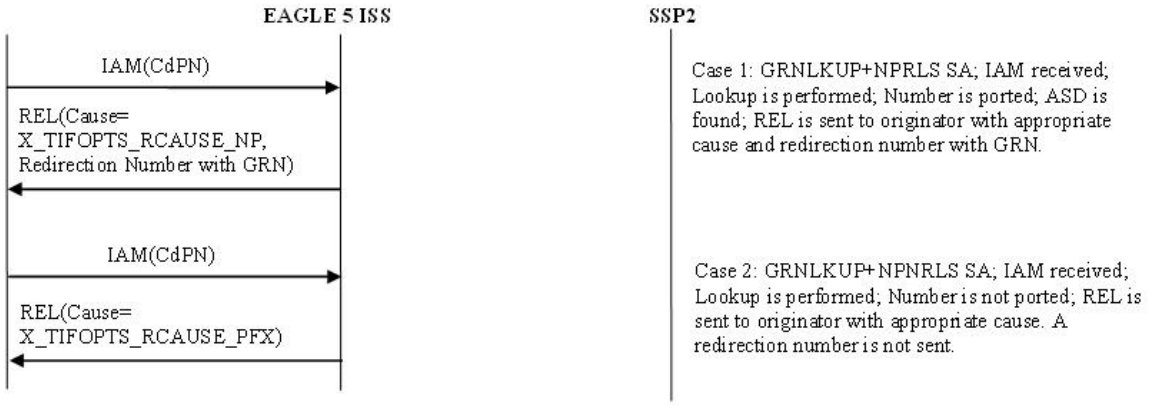


Figure 24: ISUP REL Message Flow for TIF GRN shows TIF GRN use cases with NPRLS and NPNRLS.

Figure 24: ISUP REL Message Flow for TIF GRN



TIF GRN Service Action Handlers

TIF GRN provides Service Action Handlers for the NPP Service Actions shown in :

Table 17: NPP Service Actions used by TIF GRN

Service Action	Description
GRNLKUP	Performs an individual or range RTDB lookup on the CdPN to find an entry containing a GRN digit string.
CgPNGRNRqd	Performs an individual or range RTDB lookup on the CgPN to find an entry containing a GRN digit string.

The GRNLKUP Service Action or CgPNGRNRqd Service Action can coexist in the same Service Action group with any other Service Actions used by TIF. The GRNLKUP Service Action and the CgPNGRNRqd Service Action are mutually exclusive in the same Action Set.

GRNLKUP Service Action Handler

The GRNLKUP Service Action Handler uses the GRNLKUP Service Action to perform an individual or range RTDB lookup on the conditioned CdPN, to find an entry containing a GRN digit string.

Depending on the Formatting Action configuration for the selected NPP Rule, the GRN digit string can be used during CdPN formatting by NPP.

TIF uses the formatted CdPN in the outgoing IAM or REL message.

If the TIF GRN feature is turned off in the system, the GRNLKUP Service Action Handler returns immediately.

CgPNGRNRqd Service Action Handler

The CgPNGRNRqd Service Action Handler uses the CgPNGRNRqd Service Action to perform an individual or range RTDB lookup on the conditioned CgPN, to find an entry containing an GRN digit string.

Depending on the Formatting Action configuration for the selected NPP Rule, the GRN digit string can be used during CdPN formatting by NPP.

TIF uses the formatted CdPN in the outgoing IAM or REL message.

If the TIF GRN feature is turned off in the system, the CgPNGRNRqd Service Action Handler returns immediately.

Chapter 4

EAGLE 5 ISS TIF Commands

Topics:

This chapter contains brief descriptions of the EAGLE 5 ISS commands that are used for the configuration, maintenance, debug, and test for the Triggerless ISUP Framework (TIF) and the features that use TIF.

EAGLE 5 ISS Commands for TIF Features

This chapter describes the EAGLE 5 ISS commands that are used for the configuration and maintenance for the following features:

- TIF Number Portability
- TIF SCS Forwarding
- TIF Number Substitution
- TIF Simple Number Substitution
- TIF Additional Subscriber Data
- TIF Generic Routing Number

Refer to the *Commands Manual* for complete descriptions of the following commands, including parameter names, valid values, and output examples for the commands.

- System Serial Number commands: `ent/rtrv-serial-num`
- Card commands: `ent/dlt/rtrv/alw/inh/init/rept-stat-card`
- Feature control commands: `enable/chg/rtrv-ctrl-feat, chg/rtrv-feat`
- Gateway Screening and linkset commands: `chg/rtrv-gws-actset, ent/chg/dlt/rtrv-scr-sio, ent/chg/dlt/rtrv-scrset, ent/chg/dlt/rtrv-ls`
- TIF Options commands: `chg/rtrv-tifopts`
- SCCP Options commands: `chg-rtrv-sccpopts`
- NPP commands: `ent/chg/dlt/rtrv-npp-as, ent/chg/dlt/rtrv-npp-srs, chg/rtrv-npp-serv`
- Retrieve, Report Status, and Maintenance commands: `chg-th-alm, ent-trace. init-network, init-sys, rept-stat-alm, rept-stat-db, rept-stat-mps, rept-stat-sccp, rept-stat-sys, rept-stat-trbl`
- TIF Test Tool commands: `chg/rtrv-isup-msg, tst-msg`

EAGLE 5 ISS Serial Number Commands

Before any controlled features can be enabled, the database must contain a valid and locked serial number for the EAGLE 5 ISS. The system is shipped with a serial number in the database, but the serial number is not locked. The serial number can be changed, if necessary, and locked after the system is on-site.

The `ent/rtrv-serial-num` commands are used to enter, lock, and display the status of the system serial number. The serial number must be entered once in the `ent-serial-num` command without the lock parameter, and entered again with the lock=yes parameter. The serial number cannot be changed after it is locked.

EAGLE 5 ISS Card Commands

The `ent/dlt/rtrv/alw/inh-card` commands are used to add, remove, display information about, allow operation of, and stop operation of cards in the system.

The `ent-card` command is used to add cards to the database.

- For Service Module cards (DSM cards and E5-SM4G cards) the command specifies the card location, the card type (**dsm**), and the application that runs on the card (**vsccp**).
- TSM cards or E5-TSM cards can be used for Gateway Screening. The command specifies the card location, the card type (**tsm**), and the application that runs on the card (**gls**).

The `dlt-card` command is used to remove provisioned cards from the database, before they are physically removed from the card location in the shelf. The TIF features use only Service Module cards running the **vsccp** application.

The `rtrv-card` command is used to display information about the cards that are provisioned in the database. When the command is entered with no parameters, all cards that are provisioned in the database are listed. The command can be entered with the loc parameter to display nformation about a specific card.

The `alw-card` command is used to cause a card to begin operation in the system. The card status is changed from Out-of-Service-Maintenance-Disabled (OOS-MT-DSBLD) to In-Service-Normal (IS-NR) if the GPL loading is successful. When the command is entered with the loc parameter, the approved version of the GPL is loaded on the specified card.

The `inh-card` command is used to cause a card to stop operation in the system. When the card status has changed from In-Service Normal (IS-NR) to Out-of-Service Maintenance-Disabled (OOS-MT-DSBLD), the card can be physically removed from the shelf. The force parameter must be used to inhibit the last card that is supporting an SCCP subsystem or MPS-to-DSM network connection.

The `rept-stat-card` command is used to report the operating status of all cards or of a specific card in the system.

EAGLE 5 ISS Feature Control Commands

The `chg/rtrv-feat` commands are used to turn on and display the on/off status of features, such as the GTT feature, that are controlled with feature bits. After a feature that is controlled with a feature bit is turned on, the feature cannot be turned off.

The `enable/chg/rtrv-ctrl-feat` commands are used to enable, turn on, and display the status of features that are controlled by feature access keys. The feature access key is based on the feature part number and the serial number of the system that uses the feature, making the feature access key site-specific. When a feature is enabled by entering the `enable-ctrl-feat` command with the feature part number and feature access key, the feature is recognized by the system. Other actions might be required to make the feature fully operational, such as turning the feature on, installing hardware, and provisioning information in database tables.

Some features can be enabled with a temporary part number and feature access key for a limited trial of the feature. When the trial period expires, the feature must be enabled with a permanent part number and feature access key to continue use of the feature.

The following feature controls are used for the TIF features:

- The GTT feature and the Gateway Screening feature (GWS) must be turned on, using the chg-feat command, before one or more TIF features can be enabled in the system.
- Each TIF feature must be enabled, using the `enable-ctrl-feat` command with its feature part number and a feature access key.
    - TIF Number Portability - part number 893018901
    - TIF SCS Forwarding - part number 893022201
    - TIF Number Substitution - part number 893022501

  - TIF Simple Number Substitution - part number 893024001
  - TIF Additional Subscriber Data - part number 893024501
  - TIF Generic Routing Number - part number 893025501

- The Service Portability feature must be enabled, using the `enable-ctrl-feat` command with part number 893034301 and a feature access key.
- After the feature is enabled, the feature must be turned on, using the `chg-ctrl-feat` command to set the feature status to on.
- The following TIF features are Permanently On features. The features cannot be turned off after they are turned on.

```
Feature Name             Partnum   Status Quantity
TIF Number Portability   893018901 on         ----
TIF SCS Forwarding       893022201 on         ----
TIF Simple Number Subst. 893024001 on         ----
```

- The following TIF features are On/Off features. After the features have been enabled, they can be turned on and off using the chg-ctrl-feat command.

```
Feature Name             Partnum   Status Quantity
TIF ASD                  893024501 off        ----
TIF GRN                  893025501 off        ----
TIF Number Substitution  893022501 off        ----
```

- After each feature is enabled or turned off, the feature entry in the `rtrv-ctrl-feat` command output shows the Status as off. After the feature is turned on, the feature entry in the command output shows the Status as on.
- The TIF features cannot be enabled using a temporary part number and feature access key.

EAGLE 5 ISS Gateway Screening and Linkset Commands

The `chg/rtrv-gws-actset, ent/chg/dlt/rtrv-scr-<xxx>,` and `ent/chg/dlt/rtrv-scrset` commands are used to define, change, and display the gateway screening stop action sets in the system database. Stop action sets are used to define the actions performed on the Message Sending Units (MSUs) that pass the gateway screening process.

TIF adds the TIF, TIF2, and TIF3 stop actions for gateway screening; each of these stop actions must be the last stop action in its Action Set. Each TIF stop action encapsulates incoming messages as SCCP data and forwards them to Service Module cards for processing . Each TIF stop action is association with a corresponding NPP service.

The `ent/chg/dlt/rtrv-ls` commands are used to turn on the gateway screening options (gwsa, gwsm, and gwsd) for linksets. The options determine whether gateway screening is on or off for the linkset, and how MSUs are handled when gateway screening is on for the linkset. The options need to be on for the TIF features.

EAGLE 5 ISS Commands for Destination-based Options

The `chg/rtrv-dstn` commands define and display configuration options that are provisioned in the Destination table. The destination-base options for TIF are used with or instead of the TIFOPTS configuration options for the following functions:

- Indicate the setting of the NM Bits in ITU IAM messages when the TIFOPTS npflag option indicates that NM Bits are used.
- Specify the release cause for a Release message when the TIFOPTS rlcopc option is on.

- Indicate when and how to split the IAM message into an IAM message and a SAM message.

See *EAGLE 5 ISS TIF and SCCP Options Commands* for a description of the TIFOPTS options.

The `chg-dstn` command uses the following parameters to provision the data in the Destination table:

Table 18: Destination-based Configuration Options

Parameter	Range	Description	Used by TIF Feature
nprst	on, off	Indicates whether the NM Bits should be set to 00 in ITU IAM messages when the TIFOPTS npflag option value is NM.	TIF Number Portability
rcause	0-127, none	Specifies the value to be used for the Release Cause field in a REL message instead of the TIFOPTS rcausenp option value (ported case) or the TIFOPTS rcausenpfx option value (not-ported case).	TIF Number Portability
splitiam	15-31, none	Determines when and how to split the IAM into 1 IAM message + 1 SAM message for ITU IAM message, instead of using the TIFOPTS SPLITIAM option value.	Any TIF feature

EAGLE 5 ISS TIF and SCCP Options Commands

The `chg/rtrv-tifopts` commands define and display TIF configuration options that are provisioned in the TIFOPTS table. The TIF options are used for the following functions:

- Specify the conditioning that is needed before CdPN or CgPN lookup.
- Specify the conditions that indicate a successful RTDB lookup.
- Specify Service Portability processing that can be performed for IAM messages.
- Specify the cause for a Release message.
- Indicate when to split the IAM message into an IAM message and a SAM message.
- Specify the digits to substitute for the Calling Party Number in Simple Number Substitution.
- Indicate the Calling Party's Category value for the Public DN for the network in Number Substitution.
- Specify the format and contents of fields in the outgoing message (CgPN digits, NM bits, delimiter digits, Area Code, Release Cause, Default RN) .

The `chg-tifopts` command uses the following parameters to provision the data in the TIFOPTS table:

Table 19: TIF Configuration Options

Parameter	Range	Description	Used by TIF Feature
IAMCGPN	dn, rn, rndn	Indicates the format of the outgoing CgPN digits, if they were modified by a feature	Any TIF feature
DLMA	1-16 hexadecimal digits, none	Digits used for Delimiter A (DLMA) in NPP Formatting Action **Note:** If a TIF service has DLMA-DLMC values provisioned in NPP Formatting Actions and in the TIFOPTS table, the values from the TIFOPTS table will be used in NPP processing.	Any TIF feature
DLMB	1-16 hexadecimal digits, none	Digits used for Delimiter B (DLMB) in NPP Formatting Action **Note:** If a TIF service has DLMA-DLMC values provisioned in NPP Formatting Actions and in the TIFOPTS table, the values from the TIFOPTS table will be used in NPP processing.	Any TIF feature
DLMC	1-16 hexadecimal digits, none	Digits used for Delimiter C (DLMC) in NPP Formatting Action **Note:** If a TIF service has DLMA-DLMC values provisioned in NPP Formatting Actions and in the TIFOPTS table, the values from the TIFOPTS table will be used in NPP processing.	Any TIF feature

Parameter	Range	Description	Used by TIF Feature
SPLITIAM	15-31, none	Determines when to split the IAM message into 1 IAM message + 1 SAM message. This option is used only if the splitiam option in the Destination table for the associated DPC is set to none.	Any TIF feature
CONDCGPN	addcc, none	Indicates the preconditioning required when a CgPN lookup is needed.	Any TIF feature
DFLTRN	1-15 hexadecimal digits	Digits to substitute for an SP. Used for CdPN and CgPN	Any TIF feature
NPFLAG	nm, none	Specifies whether the NM bits are modified in the IAM message to show that RTDB lookup has been performed. (The NM bits exist only in incoming and outgoing IAM messages.) **Note:** See the related nprst option (NP Reset flag) for point codes in the Destination table.	TIF Number Portability (893-0189-01)
RCAUSENP	0-127	Specifies the value to be used for the Release Cause field in a REL message sent in the number-ported case. **Note:** See the related rcause option for point codes in the Destination table.	TIF Number Portability (893-0189-01)
RCAUSEPFX	0-127	Specifies the value to be used for the Release Cause field in a REL message sent in the	TIF Number Portability (893-0189-01)

Parameter	Range	Description	Used by TIF Feature
		number-not-ported case. **Note:** See the related rcause option for point codes in the Destination table.	
RLCOPC	on, off	Indicates if the per-OPC rcause option value should be used to override the TIFOPTS rcausenp or rcausepfx option values	TIF Number Portability (893-0189-01)
NPTYPERLS	rnspdn, rn,sp, rnsp, any, all	NP entity type. Specifies the entity type of the DN that is used to indicate that a successful RTDB lookup occurred for the NPRLS Service Action and NPNRLS Service Action. RTDB lookup will result in an unsuccessful match and Service Portability processing is skipped if this value is rn.	TIF Number Portability (893-0189-01)
NPTYPERLY	rnspdn, rn, sp, rnsp, any, all	NP entity type. Specifies the entity type of the DN that is used to indicate that a successful RTDB lookup occurred for the NPRELAY Service Action. RTDB lookup will result in an unsuccessful match and Service Portability processing is skipped if this value is rn.	TIF Number Portability (893-0189-01)
NPTYPECGPN	rnspdn, any, sp, rn, sprn, all	NP entity type of the CgPN. Specifies the entity type of the DN that is used to indicate that a successful RTDB lookup occurred.	TIF Number Portability (893-0189-01)

Parameter	Range	Description	Used by TIF Feature
CRPREL	0-255	Provides the ISUP Release Cause for message that are determined to be Circular Routed	TIF Number Portability (893-0189-01)
RNRQD	yes, no	Indicates if the Redirection Number parameter shall be included in the Release message when Release handling is indicated	TIF Number Portability (893-0189-01)
NSADDLDATA	yes, no	Indicates that the Calling Party's Category data value must match before Calling Party number substitution can occur.	TIF Number Substitution (893-0225-01)
NSPUBLIC	0-255	Non-zero value indicates that a Calling Party number is Public.	TIF Number Substitution (893-0225-01)
SNSCGPNDFLT	1-32 hexadecimal digits, none	Digits to used in Calling Number Simple Number Substitution	TIF Simple Number Substitution (893-0240-01)
MATCHSEQ	dn, nptype	Determines the RTDB lookup mechanism. See *RTDB Lookup*. TIF NP, TIF ASD, and TIF GRN support matchseq=nptype. TIF NS supports matchseq=dn. **Note:** Used only during upgrade, for backward compatibility.	TIF features requiring RTDB lookup: TIF Number Portability (893-0189-01) TIF Additional Subscriber Data 893-0245-01 TIF Generic Routing Number (893-0255-01) TIF Number Substitution (893-0225-01)
SPORTRLS	none, gsm, is41, all	Service Portability configuration option for the NPRLS Service Action	TIF Number Portability (893-0189-01) Service Portability (893-0343-01)

Parameter	Range	Description	Used by TIF Feature
SPORTRELAY	none, gsm, is41, all	Service Portability configuration option for the NPRELAY Service Action	TIF Number Portability (893-0189-01) Service Portability (893-0343-01)
SPFILL	on, off	Indicates whether SP should be populated when DFLTRN or GRN is used for RN	TIF Number Portability (893-0189-01)

The `chg-sccpopts` command uses the following parameter to provision the data in the SCCPOPTS table:

Table 20: SCCPOPTS Configuration Option used by TIF

Parameter	Range	Description	Used by TIF Feature
ACLEN	0-8	Length of Area Code (used for CgPN handling)	Any TIF feature

EAGLE 5 ISS NPP Commands

The `ent/chg/dlt/rtrv-npp-as` commands are used to enter, change, delete, and display NPP Action Sets that contain various Service Actions, Conditioning Actions, and Formatting Actions.

The `ent/chg/dlt/rtrv-npp-srs` commands are used to create, change, delete, and display NPP Service Rule Sets for calling services.

The `chg/rtrv-npp-serv` commands are used to change and display the On/Off status for NPP Services, Delimiter values to use in formatting the outgoing digit string, and the FNAI Class mapping values for the outgoing NAI, and display the Service Action precedence values. An NPP Service is any EAGLE 5 ISS feature or function that uses NPP to process digit strings.

Refer to the *Numbering Plan Processor (NPP) Overview* manual for descriptions of the NPP components: Service Actions, Conditioning Actions, Formatting Actions, Action Sets, Rules, and Service Rule Sets. See the TIF and TIF feature descriptions in this manual for the NPP components used by TIF and each feature.

TIF Test Tool Commands

The TIF Test Tool is used to send a test message to a specified TIF service to verify the call flow behavior when the message information is injected into the call path without affecting live traffic. Refer to *TIF Test Tool* for a description of the TIF Test Tool.

`chg/rtrv-isup-msg` commands are used with the TIF Test Tool to enter, change, and display ISUP test messages in the TSTMSG table.

The `tst-msg` command invokes the test for the specified ISUP test message from the TSTMSG table, and displays the results.

Refer to the *Commands Manual* for a complete description of the TIF Test Tool commands.

Maintenance Commands

The following commands can be used for maintenance when an EPAP-based feature is on.

Refer to the command descriptions in the *Commands Manual* for complete descriptions of the commands, including parameters, valid values, and output examples.

Table 21: Maintenance Commands

Command	Description
rept-stat-sys	Reports the status of system entities, including cards. The output includes the number of Service Module cards that are in service (IS-NR) and how many are in another state (IS-ANR, OOS-MT, OOS-MT-DSBLD).
rept-stat-sccp	Reports subsystem operating status, CPU usage, and Service Module card status. When the loc parameter is specified, the command displays detailed card traffic statistics.
rept-stat-mps	Displays the overall status of the application running on the MPS (multi-purpose server). Command output for the various reports of this command include overall MPS alarm status and card status, and status for a specific Service Module card when a feature is on.
rept-stat-trbl	Includes a summary of any trouble notifications (UAMs) for local subsystems, cards, and linksets. The severity of each alarm is indicated in the output report.
rept-stat-alm	Displays the alarm counts and totals for local subsystems and DSM/EPAP IP links.
rept-stat-db	Displays the status information for the EAGLE 5 ISS databases. This includes the level information for each Service Module 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 birth dates and levels. It shows the status of the PDB and RTDB databases when an EPAP-based feature is enabled.
rept-tbl capacity	Retrieves table use capacity summary information. For each table listed, the number of table entry elements in use and the total allowed number of table elements is presented, along with a percent (%) full value. Information is shown for some tables only if the feature that uses the table is enabled.
inh-card/alw-card	Used to change the operating 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 card loading is successful.

Command	Description
inh-alm/unhb-alm	Used to allow and inhibit alarms on the Service Module card ports. The commands allow both Port A and Port B to be specified.
rtrv-data-rtdb	Retrieves Entity data, DN data, IMEI data, IMSI data, TN data, NPANXX data, and LRN data from the RTDB on an active Service Module card. If the loc parameter is specified and the target card is an active Service Module card, the RTDB data is retrieved from that card. If the loc parameter is not specified, the RTDB data is retrieved on the active Service Module card that has the lowest IMT address. The RTDB status on the active Service Module card can be coherent or incoherent.

Debug Commands

The *Commands Manual* contains descriptions of debug commands that can be used in assessing and modifying system status and operation. Most of the debug commands are used only under the direction of Tekelec support personnel.

The `ent-trace` command can be used to trace MSUs sent to Service Module cards that are running the VSCCP application. The EAGLE 5 ISS traps MSUs that meet the specified tracing criteria, which include DN, some point codes, Entity ID, and message verification and message processing errors.

Refer to the *Commands Manual* for a complete description of the *ent-trace* command.

For TIF, the `ent-trace` command can trace any MSU that is screened with the TIF, TIF2, or TIF3 Gateway Screening Stop Action. The trace output can be in standard format and in a brief format similar to the TIF Test Tool information (see *TIF Test Tool*). For full-format test output, the TIF Test Tool should be used.

Chapter 5

TIF Feature Configuration

Topics:

This chapter provides procedures for configuring the TIF features for use in the EAGLE 5 ISS.

Introduction

This chapter describes prerequisites and procedures for the EAGLE 5 ISS configuration of the TIF features. This chapter also provides procedures for configuration of the Service Portability feature for use with the TIF NP feature.

TIF Configuration Procedure lists the steps for enabling and turning on each TIF feature and the Service Portability feature, and for the provisioning required for the features. Each step contains a link or reference to information and procedures to use to complete the step. Feature provisioning can be performed after the features are enabled and before the features are turned on.

Note: Controlled features are optional and must be purchased from Tekelec before they can be used in your system. If you are not sure whether you have purchased a specific feature, contact your Tekelec Sales or Account Representative.

TIF Configuration Procedure

The EAGLE 5 ISS configuration of each TIF feature consists of the following steps. The steps contain links and references to detailed procedures and information needed to complete each step.

1. Verify, and provision if needed, the system prerequisites. See *System Prerequisites*.
2. Verify, and provision if needed, the feature prerequisites. See *TIF Feature Prerequisites and Considerations*.
3. Enable each TIF feature. See *Enabling TIF Features*.
4. Enable the Service Portability feature, if it will be used with the TIF NP feature. See *Enabling the Service Portability Feature*.
5. Provision Gateway Screening stop actions for TIF. See *TIF Feature Prerequisites and Considerations* and refer to the procedures in the *Database Administration Manual - Gateway Screening*.
6. Provision TIF and SCCP options. See *Provisioning the TIF and SCCP Options*.
7. Provision NPP Action Sets, Service Rule Sets, and Services. See *Provisioning NPP for TIF*.
8. Turn on each TIF feature. See *Turning On TIF Features*.
9. Turn on the Service Portability feature if it will be used with the TIF NP feature. See *Turning On the Service Portability Feature*.
10. Turn on Gateway Screening in linksets. See *TIF Feature Prerequisites and Considerations* and refer to the procedures in the *Database Administration Manual - Gateway Screening*.

System Prerequisites

Before any feature that is described in this manual can be enabled, the prerequisites listed in *Table 22: System Prerequisites* are required in the system.

Table 22: System Prerequisites

Prerequisite	Verification and Provisioning
The system serial number must be correct and locked. For new installations, the system is shipped with an unlocked serial number. The serial number can be changed if necessary and must be locked after the system is on-site. For systems that are being upgraded, the serial number is usually already verified and locked.	**Note:** The serial number cannot be changed after it is entered and locked in the system. Locate the serial number for the system on a label affixed to the control shelf (1100). Enter the `rtrv-serial-num` command to display the serial number and its locked status. Verify that the displayed serial number is correct for the system. If no serial number is displayed, enter the `ent-serial-num` command (without the lock parameter) to provision the serial number that appears on the control shelf label. Enter the rtrv-serial-num command and verify that the serial number was entered correctly. Enter the `ent-serial-num` command with the lock=yes parameter to lock the serial number in the system.
Up to 25 Service Module cards must be equipped. Some features require only E5-SM4G cards and cannot use DSM cards. See specific feature prerequisites, if any, in this section. **Note:** Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for information on the dimensioning rules and the database capacity requirements for EPAP-related features.	Enter the `rept-stat-card:appl=vsccp` command to list the Service Module cards in the system. If more cards or cards of a different type are needed, refer to the procedures in the *Database Administration Manual - GTT* to add Service Module cards or remove DSM cards.
The GTT feature must be on in the system. Some features require an additional GTT-related feature such as EGTT. See the specific feature prerequisites in this section.	Enter the `rtrv-feat` command to display the GTT feature status. If the GTT feature is on, the gtt=on entry appears in the output. If the gtt=off entry appears in the output, use the procedures in the *Database Administration Manual - GTT* to turn on and provision the GTT feature and any other GTT-related features that will be used in the system.

TIF Feature Prerequisites and Considerations

Before any TIF feature can be enabled, the following prerequisites are required in the system:

Table 23: TIF Feature Prerequisite

Prerequisite	Verification and Provisioning
GLS cards must be equipped and the Gateway Screening feature must be turned on.	Refer to the procedures in the *Database Administration Manual - Gateway Screening* for procedures to provision up to 8 GLS cards and to turn on the Gateway Screening feature.
The LNP feature cannot be on in the system	Enter the `rtrv-ctrl-feat` command. If the LNP feature is on, shown with a quantity greater than zero for the LNP ported TNs entry in the command output, features described in this manual cannot be enabled.

The following functions and components of the Gateway Screening (GWS) feature are used by TIF:

- Stop Action TIF, TIF2, or TIF3.

  The provisioned Stop Action for TIF must have the same name as the TIF service that calls NPP for processing, and must be the last Stop Action in the Stop Action Set. See *TIF Services That Call NPP* and *Protocol Handling*.

  At least one TIF feature must be enabled before a GWS Stop Action can be provisioned.
- Gateway Screening linkset options

  The options determine whether Gateway Screening is on or off for the linkset, and how MSUs are handled when Gateway Screening is on for the linkset.

  The options need to be turned on for the TIF features after all other TIF configuration is complete, to make the TIF feature fully operational. Refer to the *Database Administration Manual - Gateway Screening* for procedures to turn on the options .

Provisioning Service Module Cards

EPAP-based features that perform RTDB lookup require “Service Module cards” running the VSCCP application.

Any of the following cards can be used as Service Module cards running the VSCCP application in the system:

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

This section contains a procedure for adding Service Module cards to the system.

Adding a Service Module Card

This procedure uses the `ent-card` command to add Service Module cards to the database, to support GTT-related features and EPAP-related features.

CAUTION

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

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

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

Table 24: Service Module Card Locations

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

The shelf to which the card is to be added must already be provisioned in the database. This can be verified with the `rtrv-shlf` command. If the shelf is not in the database, refer to the procedure for adding a shelf in the *Database Administration Manual – System Management*.

The card cannot be added to the database if the specified card location already has a card assigned to it.

The system can contain a maximum of 25 Service Module cards for EPAP-based features.

Note: This manual contains brief descriptions of the commands that are used in these procedures to configure EPAP-based features. Refer to the *Commands Manual* for complete descriptions of the commands that are used in this procedure. The complete descriptions include all valid parameter values and output examples.

1. Verify that the GTT feature is on. Enter the `rtrv-feat` command.

   If the GTT feature is on, the GTT = on field appears in the command output.

Note: The `rtrv-feat` command output contains other fields that are not used by this procedure. To see all the fields displayed by the `rtrv-feat` command, refer to the `rtrv-feat` command description in the *Commands Manual*.

- If the GTT feature is on, shown by the entry GTT = on in the `rtrv-feat` command output, continue with *Step 2*.
- If the GTT feature is off, shown by the entry GTT = off in the `rtrv-feat` command output, use the procedures in the *Database Administration Manual - GTT* to turn on the GTT feature. Then continue with *Step 2*.

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

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

;
```

3. If an E5-SM4G card is being added, verify that card locations 09 and 10 contain HIPR cards or HIPR2 cards in the shelf where the E5-SM4G card will be installed.

Enter the `rept-stat-gpl:gpl=hipr` command and the `rept-stat-gpl:gpl=hipr2` command to list the installed HIPR cards and HIPR2 cards in the system.

- If the shelf contains HIPR cards or HIPR2 cards, continue with *Step 4*.
- If the shelf does not contain HIPR cards or HIPR2 cards, refer to the *Installation Manual - EAGLE 5 ISS* to install HIPR cards or HIPR2 cards in the shelf. Continue with *Step 4*.

Note: Cards should be distributed throughout the system for proper power distribution. Refer to the *Installation Manual - EAGLE 5 ISS* for the shelf power distribution.

4. Verify that the Service Module card has been physically installed into the proper location.

CAUTION

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

5. Add the Service Module card to the database, using the `ent-card` command.
`ent-card:loc=1301:type=dsm:appl=vsccp`

6. Verify the temperature threshold settings for an E5-SM4G card by performing the "Changing the High-Capacity Card Temperature Alarm Thresholds" procedure in the *Database Administration Manual - SS7*.

7. Verify the changes by entering the `rtrv-card` command with the card location specified.

```
rtrv-card:loc=1102
    rlghncxa03w 08-03-15 16:34:56 EST  EAGLE 39.2.0
    CARD   TYPE      APPL      LSET NAME     LINK SLC LSET NAME     LINK SLC
    1301   DSM       VSCCP     ------------  A    --  ------------  B
;
```

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

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

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

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

9. Repeat this procedure for each Service Module card that needs to be added to the system.
10. If TSM cards need to be removed from the system, go to (Removing a TSM Card).

Enabling TIF Features

This procedure is used to enable TIF features in the EAGLE 5 ISS.

Each TIF feature must be enabled using its feature part number and a feature access key.

- TIF Number Portability - Part Number 893018901
- TIF SCS Forwarding - Part Number 893022201
- TIF Number Substitution - Part Number 893022501
- TIF Simple Number Substitution - Part Number 893024001
- TIF Additional Subscriber Data - Part Number 893024501
- TIF Generic Routing Number - Part Number 893025501

Note: Controlled features must be purchased before you can receive the feature access key to use to enable the feature. If you are not sure if you have purchased a feature and received the feature access key, contact your Tekelec Sales Representative or Account Representative.

When a TIF feature is enabled, it is permanently enabled. The TIF features cannot be temporarily enabled.

Provisioning of TIF options and other information can be done after the feature is enabled and before the feature is turned on.

After a TIF feature has been enabled and database provisioning is complete, the TIF feature status must be set to on (the feature must be “turned on”) See *Turning On TIF Features*.

1. Display the status of the features that are controlled with feature access keys. Enter the `rtrv-ctrl-feat` command. The output lists the enabled features in the system and shows the on/off status for each feature.

   If the entry for the TIF feature that you want to enable appears in the `rtrv-ctrl-feat` output with status on, performing this procedure is not necessary.

2. Enable the TIF feature, by entering the `enable-ctrl-feat` command and specify the part number and feature access key for the feature.
   `enable-ctrl-feat:partnum=<893xxxxx>:fak=<feature access key>`

   Note: The feature access key is provided by Tekelec when the feature is purchased. If you do not have the controlled feature part number or the feature access key for a feature, contact your Tekelec Sales Representative or Account Representative.

   When the feature is enabled, the entry for the enabled feature appears in the output of the `rtrv-ctrl-feat` command. The feature Status is off.

```
    rlghncxa03w 09-06-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    TIF Number Portability    893018901  off         ----
    TIF SCS Forwarding        893022201  off         ----
    TIF Number Substitution   893022501  off         ----
    TIF Simple Number Subst.  893024001  off         ----
    TIF ASD                   893024501  off         ----
    TIF GRN                   893025501  off         ----
;
```

3. Back up the database changes, by entering the following command.
   `chg-db:action=backup:dest=fixed`

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

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

Enabling the Service Portability Feature

If Service Portability can be applied to the messages processed by a feature described in this manual, use this procedure to enable the Service Portability (S-Port) feature in the EAGLE 5 ISS.

The Service Portability feature must be enabled using the feature part number 893034301 and the feature access key.

Note: Controlled features must be purchased before you can receive the feature access key to use to enable the feature. If you are not sure if you have purchased a feature and received the feature access key, contact your Tekelec Sales Representative or Account Representative.

When the S-Port feature is enabled, it is permanently enabled. The S-Port feature cannot be temporarily enabled. After the S-Port feature is enabled and turned on, the S-Port feature can be turned off again.

Provisioning of S-Port options can be done after the feature is enabled and before the feature is turned on.

After the S-Port feature has been enabled and database provisioning is complete, the S-Port feature status must be set to on (the feature must be “turned on”) before S-Port processing will occur.

1. Display the status of the features that are controlled with feature access keys. Enter the `rtrv-ctrl-feat` command. The output lists the enabled features in the system and shows the on/off status for each feature.

```
    rlghncxa03w 09-06-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
;
```

   If the `rtrv-ctrl-feat` output shows a LNP ported TNs quantity entry, this procedure cannot be performed.

   If the Service Portability entry appears in the `rtrv-ctrl-feat` output, performing this procedure is not necessary.

2. Enable the S-Port feature, by entering the `enable-ctrl-feat` command.
   `enable-ctrl-feat:partnum=893034301:fak=<feature access key>`

   Note: The feature access key (the fak parameter) is provided by Tekelec. If you do not have the controlled feature part number or the feature access key for the S-Port feature, contact your Tekelec Sales Representative or Account Representative.

   When the feature is enabled, the Service Portability entry appears in the output of the `rtrv-ctrl-feat` command.

```
    rlghncxa03w 09-06-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    Service Portability       893034301  off         ----
 ;
```

3. Back up the database changes, by entering the following command.
   `chg-db:action=backup:dest=fixed`

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

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

Provisioning the TIF and SCCP Options

This procedure is used to provision the configuration options for TIF and TIF features, and the SCCP option for Area Code length. At least one TIF feature must be enabled before TIF options can be provisioned.

Refer to *EAGLE 5 ISS TIF and SCCP Options Commands* in this manual and to the command descriptions in the *Commands Manual* for valid parameter values, input examples, and rules for entering the command correctly in this procedure.

1. Verify that each TIF feature is enabled for which options are being provisioned, by entering the `rtrv-ctrl-feat` command.

If a TIF feature is enabled but has not been turned on, the feature status in the entry is off.

```
    rlghncxa03w 09-03-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    TIF Number Portability    893018901  off         ----
    TIF Number Substitution   893022501  off         ----
    TIF SCS Forwarding        893022201  off         ----
    TIF Simple Number Subst.  893022101  off         ----
    TIF ASD                   893024501  off         ----
    TIF GRN                   893025501  off         ----
;
```

- If a TIF feature is not enabled (the entry does not appear in the output), go to *Enabling TIF Features* to enable a TIF feature. Then continue with *Step 2*.
- If a TIF feature is enabled, continue with *Step 2*.

2. Display the current settings of the TIF options, using the `rtrv-tifopts` command.
3. Change the TIF options to the desired settings, by entering the `chg-tifopts` command with at least one of the option parameters specified.
4. Verify the changes, by entering the `rtrv-tifopts` command.
5. Display the current settings of the SCCP options, using the `rtrv-sccpopts` command.
6. Change the SCCP ACLEN option to the desired setting, by entering the chg-sccpopts command with the ACLEN parameter specified.
7. Verify the change, by entering the `rtrv-sccpopts` command.
8. Back up the changes, using the `chg-db:action=backup:dest=fixed` command.

   These messages appear, the active Maintenance and Administration Subsystem Processor (MASP) appears first.

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

Provisioning the Destination-based Options for TIF

This procedure is used to provision the point codes and destination-based configuration options for TIF and TIF features. At least one TIF feature must be enabled before destination-based options can be provisioned.

1. Verify that each TIF feature is enabled for which options are being provisioned, by entering the `rtrv-ctrl-feat` command.

   If a TIF feature is enabled but has not been turned on, the feature status in the entry is off.

```
    rlghncxa03w 09-03-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    TIF Number Portability    893018901  off         ----
    TIF Number Substitution   893022501  off         ----
    TIF SCS Forwarding        893022201  off         ----
    TIF Simple Number Subst.  893022101  off         ----
    TIF ASD                   893024501  off         ----
```

```
    TIF GRN                    893025501  off         ----
;
```

- If a TIF feature is not enabled (the entry does not appear in the output), go to *Enabling TIF Features* to enable a TIF feature. Then continue with *Step 2*.
- If a TIF feature is enabled, continue with *Step 2*.

2. Display the currently provisioned point codes and destination-based options, using the `rtrv-dstn` command.
3. Enter new point codes and options using the `ent-dstn` command, or change the destination-based options to the desired settings using the `chg-dstn` command.

   Refer to the procedures in the *Database Administration Manual - SS7* for configuring point codes destination-based options in the Destination table.

   Refer to *EAGLE 5 ISS TIF and SCCP Options Commands* in this manual and to the `ent-dstn` and `chg-dstn` command descriptions in the *Commands Manual* for valid parameter values, input examples, and rules for entering the commands correctly.
4. Verify the changes, by entering the `rtrv-dstn` command.
5. Back up the changes, using the `chg-db:action=backup:dest=fixed` command.

   These messages appear, the active Maintenance and Administration Subsystem Processor (MASP) appears first.

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

Provisioning NPP for TIF

Refer to the *Numbering Plan Processor (NPP) Overview* manual and the *Commands Manual*, and see the TIF and TIF feature descriptions in this manual for the required information and procedures to provision NPP components for TIF services.

NPP provisioning is performed in the following sequence for the components that are used for the specified TIF service.

1. Provision the FNAI mnemonic values required for filter matches on the NAI values for the service, using the `chg-npp-serv` command.
2. Provision the NPP Action Sets with the Conditioning Actions, Service Actions, Formatting Actions, and outgoing NAI value that are to be used by TIF and the enabled TIF features, using the `ent-npp-as`.command.
3. Provision the Service Rule Sets (Rules that specify the filter values and Action Sets) that are to be used by TIF and the enabled TIF features. Enter the `ent-npp-srs` command.
4. Provision any delimiter values that are used in the outgoing digit string formatting. Enter the `chg-npp-serv` command.
5. Change the service Status to On to allow NPP processing for the specified service. Enter the `chg-npp-serv:srvn=<service name>:status=on` command.

Turning On TIF Features

Before a TIF feature can be turned on, the feature must be enabled in the EAGLE 5 ISS.

Provisioning of TIF options and other information can be done after the feature is enabled and before the feature is turned on.

After a TIF feature has been enabled and database provisioning is complete, the TIF feature status must be set to on (the feature must be "turned on"). MSUs will not be processed by the TIF feature until the feature is turned on.

This procedure is used to turn on TIF features in the EAGLE 5 ISS. Each TIF feature must be turned on using its feature part number.

- TIF Number Portability - Part Number 893018901
- TIF SCS Forwarding - Part Number 893022201
- TIF Number Substitution - Part Number 893022501
- TIF Simple Number Substitution - Part Number 893024001
- TIF Additional Subscriber Data - Part Number 893024501
- TIF Generic Routing Number - Part Number 893025501

After some TIF features are enabled and turned on, they cannot be turned off again. Other TIF features can be turned on and off after they are enabled.

1. Display the status of the features that are controlled with feature access keys. Enter the `rtrv-ctrl-feat` command. The output lists the enabled features in the system and shows the on/off status for each feature.

```
rlghncxa03w 09-03-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    TIF Number Portability    893018901  off         ----
    TIF SCS Forwarding        893022201  off         ----
    TIF Number Substitution   893022501  off         ----
    TIF Simple Number Subst.  893024001  off         ----
    TIF ASD                   893024501  off         ----
    TIF GRN                   893025501  off         ----
;
```

   If the entry for the TIF feature that you want to turn on appears in the `rtrv-ctrl-feat` output with status on, performing this procedure is not necessary.

   If the status of the TIF feature in the output is off, continue with *Step 2*.

2. Turn on the TIF feature, by entering the `chg-ctrl-feat` command.
   `chg-ctrl-feat:partnum=<893xxxxxx>:status=on`

   When the feature is turned on, the feature status changes to on in the `rtrv-ctrl-feat` command output.

```
    rlghncxa03w 09-06-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    TIF Number Portability    893018901  on          ----
    TIF SCS Forwarding        893022201  on          ----
    TIF Number Substitution   893022501  on          ----
```

```
    TIF Simple Number Subst.  893024001  on          ----
    TIF ASD                   893024501  on          ----
    TIF GRN                   893025501  on          ----
;
```

3. Back up the database changes, by entering the following command.
   `chg-db:action=backup:dest=fixed`

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

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

Turning On the Service Portability Feature

This procedure is used to turn on the Service Portability feature in the EAGLE 5 ISS, using the feature part number 893034301.

Before the Service Portability (S-Port) feature can be turned on, the feature must be enabled in the EAGLE 5 ISS.

Provisioning of S-Port options can be done after the feature is enabled and before the feature is turned on.

After the S-Port feature has been enabled and database provisioning is complete, the Service Portability feature status must be set to on (the feature must be "turned on"). MSUs will not be processed by the Service Portability feature until the feature is turned on.

After the Service Portability feature is enabled and turned on, it can be turned off again. Service Portability processing can occur only when the Service Portability feature is on and a feature that uses S-Port is on.

1. Display the status of the features that are controlled with feature access keys. Enter the `rtrv-ctrl-feat` command. The output lists the enabled features in the system and shows the on/off status for each feature.

   If the entry for the Service Portability feature appears in the `rtrv-ctrl-feat` output with status on, performing this procedure is not necessary.

   If the status of the Service Portability feature in the output is off, continue with *Step 2*.

2. Turn on the S-Port feature, by entering the `chg-ctrl-feat` command.
   `chg-ctrl-feat:partnum=893034301:status=on`

   When the feature is turned on, the feature status changes to on in the `rtrv-ctrl-feat` command output.

```
    rlghncxa03w 09-08-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    ATINP                     893022101  on          ----
    Service Portability       893034301  on          ----
;
```

3. Back up the database changes, by entering the following command.
`chg-db:action=backup:dest=fixed`

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

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

Turning Off TIF Features

Before a TIF feature can be turned on and off, the feature must be enabled in the EAGLE 5 ISS.

After some TIF features are enabled, they can be turned on and off in the EAGLE 5 ISS.

This procedure is used to turn off the TIF features that can be turned off in the EAGLE 5 ISS. Each TIF feature must be turned off using its feature part number.

- TIF Additional Subscriber Data - Part Number 893024501
- TIF Generic Routing Number - Part Number 893025501
- TIF Number Substitution - Part Number 893022501

Note: MSUs will not be processed by a feature when the feature is turned off in the system.

1. Display the status of the features that are controlled with feature access keys. Enter the `rtrv-ctrl-feat` command. The output lists the enabled features in the system and shows the on/off status for each feature.

```
    rlghncxa03w 09-03-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    TIF Number Portability    893018901  on          ----
    TIF SCS Forwarding        893022201  on          ----
    TIF Simple Number Subst.  893024001  on          ----
    TIF Number Substitution   893022501  on          ----
    TIF ASD                   893024501  on          ----
    TIF GRN                   893025501  on          ----
;
```

   If the entry for the TIF feature that you want to turn on appears in the `rtrv-ctrl-feat` output with status off, performing this procedure is not necessary.

   If the status of the TIF feature in the output is on, continue with *Step 2*.

2. Turn off the TIF feature, by entering the `chg-ctrl-feat` command.
`chg-ctrl-feat:partnum=<893xxxxxx>:status=off`

   When the feature is turned off, the feature status changes to off in the `rtrv-ctrl-feat` command output.

```
    rlghncxa03w 09-03-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    TIF Number Portability    893018901  on          ----
    TIF SCS Forwarding        893022201  on          ----
```

```
    TIF Number Substitution   893022501  off         ----
    TIF Simple Number Subst.  893024001  on          ----
    TIF ASD                   893024501  off         ----
    TIF GRN                   893025501  off         ----
;
```

3. Back up the database changes, by entering the following command.
   `chg-db:action=backup:dest=fixed`

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

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

Turning Off the Service Portability Feature

Before the Service Portability (S-Port) feature can be turned on and off, the feature must be enabled in the EAGLE 5 ISS.

This procedure is used to turn off the Service Portability feature, using its feature part number 8930343091.

Note: MSUs will not be processed by a feature when the feature is turned off in the system.

1. Display the status of the features that are controlled with feature access keys. Enter the `rtrv-ctrl-feat` command. The output lists the enabled features in the system and shows the on/off status for each feature.

```
    rlghncxa03w 09-06-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    TIF Number Portability    893018901  on          ----
    Service Portability       893025501  on          ----
;
```

   If the entry for the Service Portability feature appears in the `rtrv-ctrl-feat` output with status off, performing this procedure is not necessary.

   If the status of the Service Portability feature in the output is on, continue with *Step 2*.

2. Turn off the S-Port feature, by entering the `chg-ctrl-feat` command.
   `chg-ctrl-feat:partnum=<893xxxxxx>:status=off`

   When the feature is turned off, the feature status changes to off in the `rtrv-ctrl-feat` command output.

```
    rlghncxa03w 09-05-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    TIF Number Portability    893018901  on          ----
    Service Portability       893034301  off         ----
;
```

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

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

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

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

Activating the 1100 TPS/DSM for ITU NP Feature

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

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

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

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

- The EAGLE 5 ISS does not contain any Service Module cards.
- The LNP feature is enabled.
- The ANSI G-Flex STP Option is enabled.
- The GTT feature is not turned on.

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

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

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

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

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

   Example of a possible output:

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

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

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

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

2. Based on the output in *Step 1*, perform one of the following:

   - If the `rtrv-ctrl-feat` output shows that the LNP feature is enabled, this procedure cannot be performed. The 1100 TPS/DSM for ITU NP feature cannot be enabled if the LNP feature is enabled.
   - If the 1100 TPS/DSM for ITU NP entry of the `rtrv-ctrl-feat` output shows that the 1100 TPS/DSM for ITU NP feature is enabled and the feature status is on, no further action is necessary.
   - If the feature is enabled and the feature status is off, go to *Step 13*.
   - If the 1100 TPS/DSM for ITU NP and LNP features are not enabled, continue to *Step 3*.

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

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

   - If the G-Flex feature is on, continue to *Step 4*.
   - If the G-Flex feature is off, go to *Step 5*.

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

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

   The ANSI G-Flex option is shown by the ANSIGFLEX entry in the `rtrv-stpopts` output. If the ANSIGFLEX entry is displayed in the `rtrv-stpopts` output, both the G-Flex and the GTT features are turned on.

   - If the ANSIGFLEX value is *yes* in the `rtrv-stpopts` output , the ANSI G-Flex option is enabled and the remainder of this procedure cannot be performed.
   - If the ANSIGFLEX value is *no* in the `rtrv-stpopts` output, the ANSI G-Flex option is not enabled. Proceed to *Step 6*.

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

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

- If the GTT feature is turned on, continue to *Step 6*.
- If the GTT feature is turned off, perform "Adding a Service Module" in *Database Administration Manual - Global Title Translation* to turn on the GTT feature and to add the required number of Service Module cards to the database. After "Adding a Service Module" has been performed, go to *Step 11*.

6. Verify the number of Service Module cards provisioned in the database using the `rtrv-card:appl=vsccp` command:

   Example of a possible output:

```
tklc1110501 07-04-12 17:28:02 EST  EAGLE5 37.0.0
CARD   VERSION      TYPE      GPL        PST            SST        AST
1111   128-015-000  DSM       SCCPHC     IS-NR          Active     -----
1101   128-015-000  DSM       VSCCP      IS-NR          Active     -----

Command Completed.
```

7. Based on the output shown in *Step 6*, perform one of the following:

   - If the required number of Service Module cards is provisioned in the database, continue to *Step 8*.
   - If the required number of Service Module cards is not provisioned in the database, perform "Adding a Service Module" in *Database Administration Manual - Global Title Translation* to add the required number of Service Module cards to the database. After "Adding a Service Module" has been performed, continue with *Step 8*.

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

   Example of a possible output:

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

System serial number = nt00000123

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

9. Compare the serial number located on a label affixed to the control shelf (shelf 1100) to the output shown in *Step 8*, then perform one of the following:

   - If the serial number is not correct and is locked, this feature cannot be enabled and the remainder of this procedure cannot be performed. Contact *Customer Care Center* to change an incorrect and locked serial number.
   - If the serial number is not correct and is not locked, continue to *Step 10*.
   - If the serial number is correct but is not locked, go to *Step 12*.
   - If the serial number is correct and is locked, go to *Step 13*.

10. Enter the correct serial number into the database using the `ent-serial-num` command with the `serial` parameter.

    Command example:

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

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

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

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

    Example of a possible output:

```
rlghncxa03w 09-08-24 21:15:37 EST  EAGLE 40.1.0
System serial number = nt00000123

System serial number is not locked.

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

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

    Command example:

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

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

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

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

    Command example:

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

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

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

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

14. Perform on of the following:

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

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

    Command example:

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

    This message is displayed:

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

CAUTION

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

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

Command example:

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

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

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

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

Command example:

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

Example of a possible output:

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

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

The following features have expired temporary keys:
Feature Name              Part Num
Zero entries found.
```

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

Command example:

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

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

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

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

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

This message is displayed:

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

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

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

This message is displayed:

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

Activating the E5-SM4G Throughput Capacity Feature

The E5-SM4G Throughput Capacity feature quantities are used to increase the processing capacity of the E5-SM4G card and of system SCCP traffic for an EAGLE 5 ISS that contains E5-SM4G cards only (no DSM cards). The achievable TPS maximums are shown in *Table 25: Maximum E5-SM4G Card and System TPS Capacity* .

Table 25: Maximum E5-SM4G Card and System TPS Capacity

Feature Quantity Part Number	Maximum TPS Capacity per E5-SM4G Card	Maximum System TPS Capacity
893019101 - Feature Quantity 5000	3125	• 75,000 TPS with one or more EPAP-related features and 24+1 cards
	5000	• 150,000 TPS with no EPAP-related or ELAP-related feature traffic and 31+1 cards • 120,000 TPS with G-Flex and the ANSIGFLEX STP option and 24+1 cards • 40,000 TPS with ELAP and 8+1 cards
893019102 - Feature Quantity 6800	6800	• 210,800 TPS with no EPAP-related or ELAP-related feature traffic and 31+1 cards • 163,200 TPS with one or more EPAP-related features and 24+1 cards • 54,400 TPS with ELAP and 8+1 cards

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

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

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

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

System Prerequisites

Before any feature that is described in this manual can be enabled, the prerequisites listed in *Table 26: System Prerequisites* are required in the system.

Table 26: System Prerequisites

Prerequisite	Verification and Provisioning
For new installations, the system serial number must be verified and locked. The system is shipped with an unlocked serial number. The serial number can be changed if necessary and must be locked after the system is on-site. For systems that are being upgraded, the serial number has already been verified and locked.	Enter the `rtrv-serial-num` command to display the serial number and its lock status. Verify that the displayed serial number is correct for the system. The serial number is shown on a label affixed to the control shelf (shelf 1100). If no serial number is displayed, or if the displayed serial number is not locked, refer to the `ent-serial-number` command description in the *Commands Manual* for instructions to enter and lock the serial number.
Service Module cards (DSM cards, E5-SM4G cards, or a mixture of both) must be equipped. Some features require only E5-SM4G cards and cannot use DSM cards. See the specific feature prerequisites in this section. Some features require only E5-SM4G cards and cannot use DSM cards. See the specific feature prerequisites in this section. **Note:** Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for information on the dimensioning rules and the database capacity requirements for EPAP-related features.	Enter the `rept-stat-card:appl=vsccp` command to list the Service Module cards in the system.
The GTT feature must on in the system.	Enter the `rtrv-feat` command. If the GTT feature is on, the gtt=on entry appears in the output. If the gtt=off entry appears in the output, use the procedures in the *Database Administration Manual – Global Title Translation* to turn on the GTT feature.

E5-SM4G Throughput Capacity Feature Prerequisite

Before the E5-SM4G Throughput Capacity feature can be enabled, the prerequisite shown in *Table 27: E5-SM4G Throughput Capacity Feature Prerequisite* is required in the system.

Table 27: E5-SM4G Throughput Capacity Feature Prerequisite

Prerequisite	Verification and Provisioning
E5-SM4G cards running the VSCCP application must be equipped. The required number of cards depends on the desired total system TPS to be achieved by the cards. See *Table 25: Maximum E5-SM4G Card and System TPS Capacity* .	Enter the `rept-stat-gpl:gpl=sccphc` command to list the E5-SM4G cards in the system. If the number of cards is not sufficient, use the procedure in *Adding a Service Module Card* to add E5-SM4G cards.

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

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

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

```
    rlghncxa03w 09-07-29 16:40:40 EST  EAGLE5 41.1.0
    The following features have been permanently enabled:
    Feature Name              Partnum    Status  Quantity
    HC-MIM SLK Capacity       893012707  on            64
    E5-SM4G Throughput Cap    893019101  on          5000
;
```

   - If the `rtrv-ctrl-feat` output shows that the correct E5-SM4G Throughput Capacity quantity feature is enabled and its status is on, no further action is necessary.
   - If no E5-SM4G Throughput Capacity feature quantity is enabled or a higher quantity needs to be enabled, continue with step *Step 2*.

2. Enable the E5-SM4G Throughput Capacity quantity feature by entering the `enable-ctrl-feat` command with the correct part number and FAK for the desired quantity.
3. Verify the status of the E5-SM4G Throughput Capacity quantity feature by entering the `rtrv-ctrl-feat` command with the feature part number that was just enabled (893033501 or 893019102).
   `rtrv-ctrl-feat:partnum=893019102`

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

TIF Test Tool

The TIF Test Tool can be used to send provisioned ISUP messages to a TIF service to test the call flow for a TIF feature. The test message is used to modify the internal data structure of the service and to study the call flow behaviour when the message in injected into the call path. The test message is never sent out to the network.

The Test Tool provides the following capabilities:

- Define up to 10 ISUP test messages in the TSTMSG table.
- Invoke TIF and NPP to process the a test message.
- Generate a report of the actions taken and the results of the test.

The Test Tool can be invoked as follows:

- After initial provisioning of TIF and NPP, before Gateway Screening is turned on for the linksets, to verify the provisioning
- During TIF feature operation, to quickly debug an issue
- After turning off Gateway Screening for a linkset, to debug an issue or test provisioning changes

The following information can be configured for each test message:

Table 28: TIF Test Tool Parameters

Parameter		Range	Default
Called Party Digits	CDPNDGTS	0-32 hexadecimal digits	1234567890
Called Party NAI	CDPNNAI	0-127	0
Calling Party Digits	CGPNDGTS	0-32 hexadecimal digits	1234567890
Calling Party NAI	CGPNNAI	0-127	0
Calling Party Category	CGPNCAT	0-255	0
Active	ACTIVE	No, Yes	No
NM Bits	NMBITS	0-3	0

The `chg-isup-msg` command is used to configure the parameter values for each ISUP test message. The command must specify the message number (one of up to 10 messages) for the message that is being configured.

The `rtrv-isup-msg` command displays the configured messages in the ISUP Message table. Configured information for all messages or for one specified message number can be displayed.

The `tst-msg` command invokes the test. The command must specify the prot=isup parameter, the message number for the test, the TIF service (TIF, TIF2, or TIF3), and the mode for displaying the results (full, brief, debug). The most complete and accurate test result information is provided when debug mode is used.

Note: The specified test message must be set to `active=yes` before the test is invoked for the message.

Refer to the *Commands Manual* for descriptions of the commands, parameter values, and output examples.

Chapter 6

Maintenance

Topics:

This chapter describes the maintenance information that is available from the EAGLE 5 ISS for the TIF features. The information includes status, alarms (UAMs), and information messages (UIMs).

Hardware Requirements

EPAP-related features require Service Module cards (DSM cards or E5-SM4G cards) running the VSCCP application. The EAGLE 5 ISS can be equipped with up to 25 Service Module cards to support EPAP-related features.

EPAP-related features require EPAP running in a T1000 AS or T1200 AS MPS system.

EPAP Status and Alarms

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

EPAP Maintenance Blocks

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

The EPAP sends maintenance blocks that contain at least the following information:

- Status of EPAP 'A' - actual states are active, standby, and down (inoperative). Maintenance blocks include a field for this information so that it can be forwarded to the EPAP A Device Control Block (DCB), where it is available for the output of the `rept-stat-mps` command.
- Status of EPAP 'B' - actual states are active, standby, and down (inoperative). Maintenance blocks include a field for this information so that it can be forwarded to the EPAP B DCB, where it is available for the output of the `rept-stat-mps` command.
- Identification of Active EPAP - a field to identify the active EPAP.
- Congestion Indicator - an indicator showing provisioning link congestion. The link between the EPAPs and the external source of provisioning data can become congested in high-provisioning traffic situations. When this occurs and subsequently as the congestion clears, the EPAP sends maintenance blocks to the Service Module card. The EPAP must ensure that no more than one maintenance block per second is sent to the primary Service Module card if the only reason is to report a change in congestion status.
- Alarm Conditions - an error code field. If the EPAP needs to report an alarm condition, it puts an appropriate UAM identifier in this field.
- Current MPS Database Size - a field indicating the current RTDB size. The Service Module card uses this information to calculate the percentage of memory utilized by the RTDB.

DSM Status Requests

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

DSM Status Reporting to the EPAP

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

DSM Status Messages – When Sent

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

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

DSM Status Messages Fields

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

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

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

Alarms

Refer to the *Unsolicited Alarms and Information Messages* manual for descriptions and corrective procedures for EAGLE 5 ISS related alarms (UAMs). Refer to the *MPS Platform Software and Maintenance Manual - EAGLE 5 ISS with T1000 AS* or the EPAP Alarms on T1200 Platform Manual for descriptions and corrective procedures for MPS-related alarms.

TIF UIMs

Refer to the *Unsolicited Alarms and Information Messages* manual for descriptions of EAGLE 5 ISS UIMs.

UIM 1407 is issued when a message that is not ISUP is received by a TIF, TIF2, or TIF3 Stop Action.

UIM 1408 is issued when a TIF modified message is too large to route.

UIM 1426 is issued when Service Portability could not be applied due to missing GRN data.

Table 29: TIF UIMs

UIM #	Message Text	UIM Format	Output Group
1407	`Unexpected SI in TIF Stop Action`	I6 (MTP Data Dump)	GWS
1408	`TIF: Modified MSU too large to route`	I15 (RPT_SCCP_INV_MSG)	APSS
1426	S-Port: Missing GRN for srvc prtd subs	I15 (SCCP MESSAGE)	APSS

The UIMs listed in *Table 30: Existing ISUP Decode Errors* are used to handle ISUP decode and encode errors.

Table 30: Existing ISUP Decode Errors

Protocol Type	Error Description	UIM #	UIM Text
ISUP	IAM Decode Error (such as length or, missing parameter; the message is routed without modification)	1369	ISUP IAM decode failed
ISUP	IAM Called Party Decode Error, such as missing Called Party digits. The message is routed without modification.	1370	ISUP IAM Cld Pty decode failed
ISUP	Problem encoding IAM or SAM, Unknown DPC in REL	1371	ISUP encode failed

EPAP System Status Reports

This section describes the following EPAP status reporting:

- System status
- EPAP-based feature status
- DSM memory capacity status
- Loading mode support status

System Status Reporting

The `rept-stat-sys` command and the `rept-stat-sccp` command report the status of the Service Module cards running the VSCCP application. EPAP-based feature statistics are reported in the

`rept-stat-sccp` command. Refer to the *Commands Manual* for descriptions of the commands and their output .

MPS Status Reporting

The `rept-stat-mps` command reports the status of the MPS system, particularly the provisioning system. Refer to the *Commands Manual* for examples of the `rept-stat-mps` command output.

DSM Memory Capacity Status Reporting

As mentioned in the *DSM Status Reporting to the EPAP*, the Service Module card sends a message to the EPAP containing the amount of memory on the Service Module board. The EPAP determines whether the DSM has enough memory to store the RTDB and sends an ACK or NACK back to the Service Module card indicating whether or not the Service Module card has an adequate amount of memory. Refer to the *Dimensioning Guide for EPAP Advanced DB Features Technical Reference* for important information on the dimensioning rules and the DSM database capacity requirements.

The `rept-stat-mps:loc=xxxx` command shows the amount of memory used by the RTDB as a percent of available Service Module card memory.

Loading Mode Support Status Reporting

The OAM application determines whether or not the system is in an unstable loading mode because it knows the state of all LIM and Service Module cards in the system. When the loading mode is unstable, the `rept-stat-sys` command reports the existence of the unstable loading mode and the specific conditions that caused it. See *EPAP Application Data Loading* for more details.

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 STP portion of the database has completed loading and is waiting for the RTDB to download.

DSM Code Loading

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

EPAP Application Data Loading

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

The VSCCP GPL Application Data Loader (ADL) registers all tables for loading, independent of EPAP-based feature provisioning and main board and 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 card stores or discards RTDB table data based on whether or not it has RTDB-capable hardware for EPAP-based features.

The OAM, on the other hand, downloads or sets memory boundaries for feature configuration options and service selector tables only if an EPAP-based feature is provisioned. When an EPAP-based feature

is not provisioned, the OAM does not attempt to read these tables from disk. Instead, empty tables (tables without entries) are downloaded. All other tables requested for loading are read from disk and downloaded routinely.

80% Threshold of Support

Loading mode is based on the ability of the system to provide SCCP service to at least 80% of the LIMs.

VSCCP Capacity

An insufficient number of Service Module cards that are in an IS-NR or OOS-MT-DSBLD state relative to 80% of the number of provisioned LIMs is called a "failure to provide adequate SCCP capacity."

Insufficient SCCP Service

It is also possible for LIM cards 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 LIM cards. This is called "insufficient SCCP service." When this occurs, some of the LIM cards are denied SCCP service. It is possible to inhibit LIMs to bring the ratio back to 16:1 or better.

Conditions That Create an Unstable Loading Mode

Current system implementation interrupts and stops 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 in an IS-NR or OOS-MT-DSBLD state.
- The number of IS-NR and OOS-MT-DSBLD Service Module cards is insufficient to service at least 80% of all provisioned LIMs.
- Insufficient SCCP service occurs when an insufficient number of IS-NR Service Module cards are available to service at least 80% of the number of IS-NR LIMs.
- LIM cards are being denied SCCP service and any Service Module cards are in an abnormal state (OOS-MT-DSBLD, IS-ANR).

Actions Taken When the System is in an Unstable Loading Mode

- No effect on RTDB downloads or updates.

  Unstable loading mode has no impact on RTDB downloads or the stream of RTDB updates.
- The `rept-stat-sys` command reports unstable loading mode.

  When the loading mode is unstable, the `rept-stat-sys` command reports the existence of the unstable loading mode and the specific trigger that caused it.
- No EAGLE 5 ISS database updates allowed.

  When in an unstable loading mode, the EAGLE 5 ISS does not accept database updates. When updates are rejected, the reason is given as: E3112 Cmd Rej: Loading Mode unstable due to SCCP service is deficient.

The `inh-card` and `alw-card` commands can be used to alter SCCP service levels to achieve the 80% threshold. This can be repeated for each card until the system is able to supply SCCP services to at least 80% of the IS-NR LIM cards. 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.

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

Once an EAGLE 5 ISS database has been loaded, that database can be updated (as long as the system is not in an unstable loading mode). However, if an database update comes in during EAGLE 5 ISS database loading, the Service Module card stops the current loading, issues a class 01D7 obit, and reboots. The obit is shown in the following example.

Figure 25: 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
```

Glossary

A

AC	Alternating Current Application Context Authentication Center
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,

A

of which one or more normally is actively processing traffic.

Application Simulator

Test tool that can simulate applications and/or SMSCs.

ASD

Additional Subscriber Data

Additional data that is associated with a subscriber (DN) or a range of subscribers.

C

CC

Country Code

CgPN

Calling party number

CIC

Carrier Identification Code

A 4-digit code that controls the routing applied to a message.

CRP

Circular Route Prevention

A G-Port MNP feature that detects instances of circular routing caused by incorrect information in one or more of the network number portability databases. If a circular route has been detected, a message will be generated by the EAGLE 5 ISS and returned to the originator.

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.

D

DCB	Device Control Block
DEFCC	Default Country 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.
DTA	Database Transport Access A feature in the EAGLE 5 ISS that encapsulates specific MSUs into the data portion of SCCP within a new SS7 MSU and sends the new MSU to the destination using global title translation. The EAGLE 5 ISS uses gateway screening to determine which MSUs are used by the DTA feature.

E

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

E

	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
EPAP	EAGLE Provisioning Application Processor

G

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.
G-Port	GSM Mobile Number Portability A feature that provides mobile subscribers the ability to change the GSM subscription network within a portability cluster, while retaining their original MSISDN(s).
GRN	Generic Routing Number
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

G

network by a point code and a subsystem number.

GWS — Gateway Screening

Used at gateway STPs to limit access into the network to authorized users. A gateway STP performs inter-network routing and gateway screening functions. GWS controls access to nonhome SS7 networks. Only an MSU that matches predefined criteria in the EAGLE 5 ISS's database is allowed to enter the EAGLE 5 ISS.

I

IAM — Initial Address Message

IGM — IS41 GSM Migration

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

ISS — Integrated Signaling System

ISUP — ISDN User Part

ITU — International Telecommunications Union

L

L

LIM — Link Interface Module

Provides access to remote SS7, IP and other network elements, such as a Signaling Control Point (SCP) through a variety of signaling interfaces (DS0, MPL, E1/T1 MIM, LIM-ATM, E1-ATM, IPLIMx, IPGWx). The LIMs consist of a main assembly and possibly, an interface appliqué board. These appliqués provide level one and some level two functionality on SS7 signaling links.

M

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.

MSU — Message Signaling Unit

The SS7 message that is sent between signaling points in the SS7 network with the necessary information to get the message to its destination and allow the signaling points in the network to set up either a voice or data connection between themselves. The message contains the following information:

- The forward and backward sequence numbers assigned to the message which indicate the position of the message in the traffic stream in relation to the other messages.
- The length indicator which indicates the number of bytes the message contains.
- The type of message and the priority of the message in the

M

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.

N

NAI

Nature of Address Indicator

Standard method of identifying users who request access to a network.

NM

Network Management

The execution of the set of functions required for controlling, planning, allocating, deploying, coordinating and monitoring the resources of a telecommunications network, including performing functions such as initial network planning, frequency allocation, predetermined traffic routing to support load balancing, cryptographic key distribution authorization, configuration management, fault management, security management, performance management, and accounting management. Note: Network management does not include user-terminal equipment.

NPP

Numbering Plan Processor

N

	Provides the flexible service application behavior that satisfies the needs of customers resident in complex signaling networks. It is used for number conditioning, RTDB lookup, and outgoing number formatting.

O

OPC	Originating Point Code

P

PDB	Provisioning Database

R

REL	Release
RMTP	Reliable Multicast Transport Protocol
RN	Routing Number
RTDB	Real Time Database
Rule	An association between a Filter and an Action Set.

S

SAM	Subsequent Address Message
SCCP	Signaling Connection Control Part
SCRC	SCCP Routing Control
Service Action Handler	Service-specific function associated with a Service Action.

S

Service Portability	See S-Port.
SI	Service Indicator
SLS	Signaling Link Selector
SP	Signaling Point A set of signaling equipment represented by a unique point code within an SS7 domain.
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.

T

TCP/IP	Transmission Control Protocol/Internet Protocol

U

UAM	Unsolicited Alarm Message.
UIM	Unsolicited Information Message