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What's New in This Guide

This section introduces the documentation updates for Release 9.1.0.0.0

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There are no updates in this release.

1

Introduction

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

1.1 TIF Description

For TIF features, TIF provides an overall structure that allows the vSTP 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.

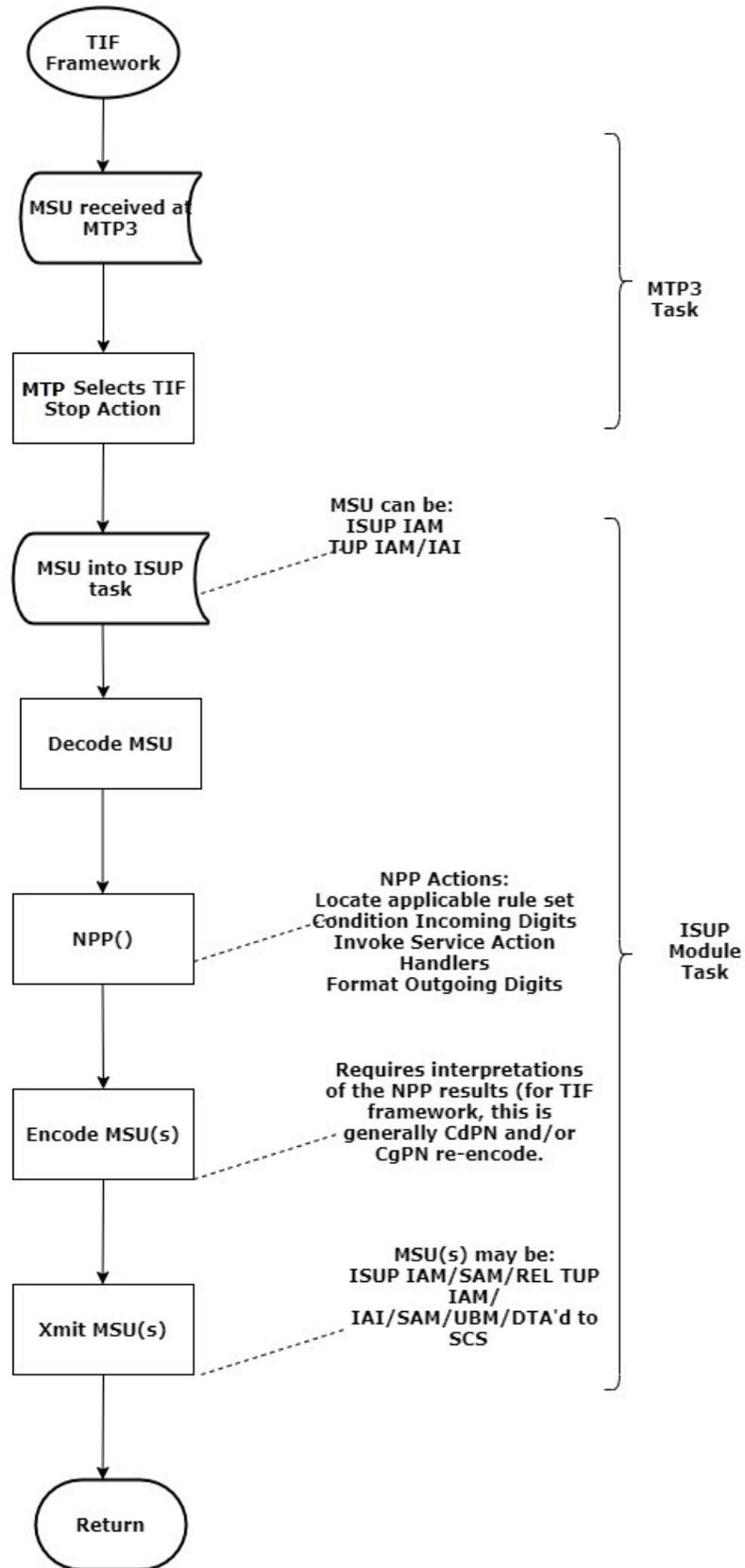
TIF processing consists of two main sections:

- TIF uses MTP to select an ISUP MSU for processing, and forwards the MSU to Service Module cards for processing.
- 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 the following figure:

Figure 1-1 TIF Overview



1.2 TIF Features

All of the features that are listed in [Table 2-1](#) use TIF ("TIF features"). The [TIF Features](#) chapter describes each feature in detail.

- TIF Number Portability (TIF NP)
- TIF Number Substitution (TIF NS)
- TIF Simple Number Substitution (TIF SNS)
- TIF Additional Subscriber Data (TIF ASD)
- TIF Generic Routing Number (TIF GRN)
- TIF Subscr CgPN Blacklist
- TIF Range CgPN Blacklist

1.3 TIF Configuration Options

The following types of configuration options are used with TIF features:

- TIF configuration option values in the TIFOPTS table influence number conditioning, response message formatting and generation, and Service Portability processing.
- Remote SP based options can be used with or instead of the TIFOPTS configuration options for outgoing message formatting.

TIFOPTS Configuration Options

The options described in the following table are used for the following functions:

- Specify the conditioning that is needed before CdPN or CgPN lookup.
- Specify the conditions that indicate a successful Number Portability 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).

Table 1-1 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

Table 1-1 (Cont.) TIF Configuration Options

Parameter	Range	Description	Used by 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
ACLEN	0-8	Length of area code (used for CgPN handling)	Any 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 <code>splitiam</code> option in the Remote SP table for the associated DPC is set to <code>none</code> .	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

Table 1-1 (Cont.) TIF Configuration Options

Parameter	Range	Description	Used by TIF Feature
NPFLAG	nm, none	Specifies whether the NM bits are modified in the IAM message to show that Number Portability lookup has been performed. (The NM bits exist only in incoming and outgoing IAM messages.) Note: See the related <code>nprst</code> option (NP Reset flag) for point codes in the Remote SP 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 <code>rcause</code> option for point codes in the Remote SP 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 number-not-ported case. Note: See the related <code>rcause</code> option for point codes in the Remote SP table.	TIF Number Portability (893-0189-01)
RLCOPC	on, off	Indicates if the per-OPC <code>rcause</code> option value should be used to override the TIFOPTS <code>rcausenp</code> or <code>rcausepfx</code> option values	TIF Number Portability (893-0189-01)
NPTYPE	rnsdpn, any, sp, rn, sprn, all	NP entity type. Specifies the entity type of the DN that is used to indicate that a successful Number Portability lookup occurred.	TIF Number Portability (893-0189-01)
NPTYPEPRLS	rnsdpn, rn,sp, rnsdp, any, all	NP entity type. Specifies the entity type of the DN that is used to indicate that a successful Number Portability lookup occurred for the NPRLS Service Action and NPNRLS Service Action. Number Portability lookup will result in an unsuccessful match and Service Portability processing is skipped if this value is <code>rn</code> .	TIF Number Portability (893-0189-01)

Table 1-1 (Cont.) TIF Configuration Options

Parameter	Range	Description	Used by TIF Feature
NPTYPEPLY	rnsdpn, rn, sp, rnsdp, any, all	NP entity type. Specifies the entity type of the DN that is used to indicate that a successful Number Portability lookup occurred for the NPRELAY Service Action. Number Portability lookup will result in an unsuccessful match and Service Portability processing is skipped if this value is <code>rn</code> .	TIF Number Portability (893-0189-01)
NPTYPECGPN	rnsdpn, 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 Number Portability lookup occurred.	TIF Number Portability (893-0189-01)
CRPREL	0-255	Provides the ISUP Release Cause for messages 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 the value of the NSPUBLIC option value 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. Indicates the Calling Party Category value for <code>:public DN</code> for the network.	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 Number Portability lookup mechanism. See Number Portability Lookup . TIF ASD and TIF GRN support only <code>matchseq=dn</code> . TIF NS supports only <code>matchseq=dn</code> . Note: Used only during upgrade, for backward compatibility.	TIF features requiring Number Portability 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) TIF Subscr CgPN Blacklist (893-0376-01)

SCCP MNP Option

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

Table 1-2 SCCPMNPOPTIONS 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

Remote SP based Options

The Remote SP based 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.

Table 1-3 Remote SP 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 <code>npflag</code> 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 <code>rcausenp</code> option value (ported case) or the TIFOPTS <code>rcausenpfx</code> 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 <code>SPLITIAM</code> option value.	Any TIF feature

1.4 TIF Services That Call NPP

For TIF services, **NPP** processes traffic filtered by the corresponding MTP Screening **Stop Action**, as shown in the following table:

Table 1-4 MTP Screening Stop Action Mapping to CdPN Service Name to CgPN Service Name

MTP Screening Stop Action	NPP CdPN Service Name	NPP CgPN Service Name
TIF	TIF	TIFCGPN
TIF2	TIF2	TIFCGPN2
TIF3	TIF3	TIFCGPN3

The services for TIF features allow NPP Rules to be defined for handling different types of traffic, such as inter-carrier traffic and local traffic.

NPP processing for a TIF CdPN service can invoke the corresponding TIF CgPN service, depending on the value of the INVKSERV parameter in the TIF CdPN Service Rule.

For example, if the MSU was filtered by the TIF2 MTP Stop Action, the TIF2 NPP service is invoked using the CdPN in the message. If the INVKSERV value in the matched TIF2 NPP Service Rule is TIFCGPN2, then the TIFCGPN2 NPP service is invoked using the CgPN in the message.

Table 1-5 NPP Service Name to MTP Screening Stop Action Mapping

TIF Service Name	MTP Screening Stop Action Name
TIF	TIF
TIF2	TIF2
TIF3	TIF3

1.4.1 NPP Conditioning Actions

TIF supports all Conditioning Actions that are provided by NPP.

TIF ACCgPN Conditioning Action

TIF provides the ACCgPN Conditioning Action to extract the Area Code from the CgPN while processing CdPN services. The ACCgPN **Conditioning Action** skips over any country code digits (matching DefCC or Multiple **CC**) and removes the number of digits specified in the SCCPMNPOPTIONS 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 SCCPMNPOPTIONS ACLEN option value (after any CC digits), then no change to Area Code will be made.

The ACCgPN Conditioning Action can be provisioned with the TIF, TIF2, and TIF3 services. The ACCGPN Conditioning Action is mutually exclusive with the ACCgPNx Conditioning Actions and with any other Conditioning Action that is used to populate the AC (Area Code) Formatting Action value for NPP.

Table 1-6 TIF ACCgPN Conditioning Action

Conditioning Action	Description
ACCgPN	Area Code from Calling Party Area code needs to be extracted from the Calling Party Number

TIF ACCgPN1 through ACCgPN8 Conditioning Actions

TIF uses the ACCgPN1 - ACCgPN8 (ACCgPNx) Conditioning Actions to extract the Area Code from the CgPN while processing CdPN services. The length of the Area Code to be extracted from the CgPN is not specified by SCCPMNPOPTIONS:ACLEN configuration parameter. Instead, the digit suffix "x" of the Conditioning Action parameter name specifies the length of the Area Code to be extracted. For example, the Conditioning Action ACCgPN4 will extract an Area Code of 4 digits from the CgPN. The ACCgPNx Conditioning Actions skip over any Country Code digits (matching DefCC or Multiple CC) and remove the specified "x" number of Area Code digits.

If an ACCgPNx Conditioning Action is invoked, but the Calling Party is not present or has fewer digits than the specified "x" number of digits (after any CC digits), then no change to Area Code will be made.

The ACCgPNx Conditioning Actions can be provisioned with the TIF, TIF2, and TIF3 services. The ACCgPNx Conditioning Actions are mutually exclusive with each other, with the ACCgPN Conditioning Action, and with any other Conditioning Action that is used to populate the AC (Area Code) Formatting Action value for NPP.

Table 1-7 TIF ACCgPNx Conditioning Actions

Conditioning Action	Description
ACCgPN1	Area Code from Calling Party One-digit Area Code needs to be extracted from the Calling Party Number.
ACCgPN2	Area Code from Calling Party Two-digit Area Code needs to be extracted from the Calling Party Number.
ACCgPN3	Area Code from Calling Party Three-digit Area Code needs to be extracted from the Calling Party Number.
ACCgPN4	Area Code from Calling Party Four-digit Area Code needs to be extracted from the Calling Party Number
ACCgPN5	Area Code from Calling Party Five-digit Area Code needs to be extracted from the Calling Party Number.
ACCgPN6	Area Code from Calling Party Six-digit Area Code needs to be extracted from the Calling Party Number.
ACCgPN7	Area Code from Calling Party Seven-digit Area Code needs to be extracted from the Calling Party Number.

Table 1-7 (Cont.) TIF ACCgPNx Conditioning Actions

Conditioning Action	Description
ACCgPN8	Area Code from Calling Party Eight-digit Area Code needs to be extracted from the Calling Party Number.

1.4.2 NPP Service Actions

The NPP Service Actions listed in [Table 1-8](#) 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 turned on. The precedence indicates the sequence of execution if more than one Service Action is used by a service; services are executed in high-to-low precedence.

Table 1-8 Service Actions used by TIF Features

Service Action	Description	Required Feature	Precedence	CdPN	CgPN
CRP	Circular Route Prevention	893018901 TIF Number Portability	92	X	
FPFXRLS	Matched NPP rule prefix; always release (no UDR lookup)	893037701 TIF Range CgPN Blacklist (CgPN) 893040201 TIF Selective Screening (CdPN)	92	X	X
BLRLS	Release because Blacklist Flag Set in UDR	893037601 TIF Subscr CgPN Blacklist 893040201 TIF Selective Screening (CdPN)	91	X	X
BLNFNDRLS	Release because Blacklist Record not found in UDR	893037601 TIF Subscr CgPN Blacklist 893040201 TIF Selective Screening (CdPN)	91	X	X
NPNRLS	Number Portability Release on No Match	893018901 TIF Number Portability	91	X	
SELSCR	Selective Screening	893040201 TIF Selective Screening	91	X	
ASDLKUP	Use of CdPN Additional Subscriber Data when formatting CdPN	89302450 TIF Additional Subscriber Data	90	X	X
CgPNASDRqd	Use of CgPN Additional Subscriber Data when formatting CdPN	89302450 TIF Additional Subscriber Data	90	X	
GRNLKUP	Use of CdPN Generic Routing Number when formatting CdPN	89302550 TIF Generic Routing Number	90	X	X
CgPNGRNRqd	Use of CgPN Generic Routing Number when formatting CdPN	89302550 TIF Generic Routing Number	90	X	
CGPNNP	Calling Number Portability	893018901 TIF Number Portability	80		X

Table 1-8 (Cont.) Service Actions used by TIF Features

Service Action	Description	Required Feature	Precedence	CdPN	CgPN
CGPNSVCRQD	Calling Number Lookup	893018901 TIF Number Portability	80	X	
NOCGPNRLS	Release if no CgPN data exists	893037701 TIF Range CgPN Blacklist	80	X	
NPRELAY	Number Portability Relay	893018901 TIF Number Portability	80	X	
NPRLS	Number Portability Release on Match	893018901 TIF Number Portability	80	X	
NSCdPN	Called Number Substitution	893022501 TIF Number Substitution	80	X	
NSCgPN	Calling Number Substitution	893022501 TIF Number Substitution	75		X
SNSCgPN	Simple Number Substitution	893024001 TIF Simple Number Substitution	75	X	X
CDIAL	Corrective Dialing	NPP basic functions; no TIF feature is required	10	X	X

TIF Service Action Interactions

Service Actions (SAs) that are mutually exclusive ([Table 1-9](#)) cannot be provisioned together.

Table 1-9 Mutually Exclusive TIF Service Actions

Provisioned NPP Services	Mutually Exclusive SAs	Conflict
TIF, TIF2, or TIF3	ASDLKUP, CgPNASDRqd	Both process ASD.
TIF, TIF2, or TIF3	GRNLKUP, CgPNGRNRqd	Both process GRN.
TIF, TIF2, or TIF3	CgPNSVCRqd, NPRLS	CgPNSVCRqd applies NP on the CgPN with intent to relay the IAM, whereas NPRLS applies NP on the CdPN with intent to send REL.
TIF, TIF2, or TIF3, and TIFCGPN, TIFCGPN2, or TIFCGPN3	SNSCgPN, NSCgPN	The outgoing digit string resulting from SNSCgPN could be modified by NSCgPN.
TIF, TIF2, or TIF3, and INVKSERV=TIFCGPN, TIFCGPN2, or TIFCGPN3	TIF:SA=FPFXRLS / CgPNASDRqd / CgPNGRNRqd / CgPNSVCRqd / NSCgPN / SNSCgPN	These TIF SAs use CgPN digits that have not undergone NPP number conditioning, and therefore are not allowed to be provisioned if a TIF CgPN service is also provisioned.
TIF, TIF2, or TIF3, and TIFCGPN, TIFCGPN2, or TIFCGPN3	FPFXRLS and any supported SA for this service shown in Table 1-8	REL must be sent.
TIF, TIF2, or TIF3	SA=SELSCR and NSCdPN / NSCgPN	SELSCR uses Number Substitution DN as a set of Call Types for the DN.

Unusual Service Action Behavior

[Table 1-10](#) describes unusual behavior exhibited by some combinations of Service Actions.

Table 1-10 Unusual Service Action Behavior

Provisioned NPP Services	Provisioned SAs	Unusual Behavior
TIF, TIF2, or TIF3	CgPNSVCRqd, NSCgPN	<p>The outgoing CgPN digit string set by CgPNSVCRqd can be modified by NSCgPN based on the value of the TIFOPTS IAMCGPN option.</p> <p>This combination would work only if IAMCGPN=RNDN, CgPNSVCRqd sets the RN digits and NSCgPN would set the DN digits, but:</p> <ul style="list-style-type: none"> • If IAMCGPN=RN, then NSCgPN is ignored. • If IAMCGPN=DN, the CgPNSVCRqd is ignored.
TIF, TIF2, or TIF3	CgPNSVCRqd, SNSCgPN	<p>The outgoing CgPN digit string is set by CgPNSVCRqd.</p> <p>If the TIFOPTS SNSCGPNDFLT option is NONE, then the outgoing CgPN digit string is not read.</p>
TIF, TIF2, or TIF3	NPNRLS, NPRELAY	<p>There can be cases where the combination of the values of the TIFOPTS NPTYPEPLS and NPTYPEPLY option and the entity type from Number Portability lookup of CdPN digits can cause the original IAM to be relayed. For example:</p> <ul style="list-style-type: none"> • Entity=RN; NPNRLS reads NPTYPEPLS=RN, SPRN, ALL, RNSPDN, ANY; NPRELAY reads NPTYPEPLY=SP • Entity=SP; NPNRLS reads NPTYPEPLS=SP, SPRN, ALL, RNSPDN, ANY; NPRELAY reads NPTYPEPLY=RN
TIF, TIF2, or TIF3	NPNRLS, NPRLS	<p>Because both of these SAs use the same TIFOPTS NPTYPEPLS option value, final outcome is always release. REL due to NPNRLS does not include a Redirection Number. REL due to NPRLS may include a Redirection Number depending on the value of the TIFOPTS RNRQD option.</p>

Table 1-10 (Cont.) Unusual Service Action Behavior

Provisioned NPP Services	Provisioned SAs	Unusual Behavior
TIF, TIF2, or TIF3	NPRLS, NPRELAY	<p>There can be cases where the combination of the values of the TIFOPTS NPTYPECLS and NPTYPEPLY option and the entity type from Number Portability lookup of CdPN digits can cause the original IAM to be relayed. For example:</p> <ul style="list-style-type: none"> Entity=RN; NPRLS reads NPTYPECLS=SP, NPRELAY reads NPTYPEPLY=SP Entity=SP; NPRLS reads NPTYPECLS=RN; NPRELAY reads NPTYPEPLY=RN

1.4.3 NPP Formatting Actions

All of the Formatting Actions that are provided by NPP are supported for TIF CdPN NPP services and TIF CgPN NPP services.

TIF CdPN services provide the Formatting Actions as shown in [Table 1-11](#). These actions can be used with the TIF ASD and TIF GRN features.

Table 1-11 Formatting Actions Provided by TIF CdPN Services

Formatting Action	Name	Description
ASDOTHER	Additional Subscriber Data (ASD) from Other NPP Service	If ASD is supplied from the Calling Party Service, then the ASD will be formatted into the Called Party digits.
GRNOTHER	Generic Routing Number (GRN) from Other NPP Service	If a GRN is supplied from the Calling Party Service, then the GRN will be formatted into the Called Party digits.

The ASDOTHER and GRNOTHER Formatting Action values can be populated only if another NPP service is invoked. If the Action Set in the NPP Service Rule contains either the ASDOTHER or GRNOTHER Formatting Action, then the value of the INVKSERV parameter must not be NONE in the Service Rule.

TIF provides the Formatting Actions shown in the [Table 1-12](#) to facilitate CdPN and CgPN digit formatting when a message is relayed by the TIF Selective Screening feature.

Table 1-12 Formatting Actions - TIF Selective Screening

Formatting Action	Description
FASCRCDD	Formatting action list to format ISUP CdPN digits when the Called Party Number is screened by the TIF Selective Screening process.
FASCRCGG	Formatting action list to format ISUP CgPN digits when the Called Party Number is screened by TIF Selective Screening process.

1.5 Protocol Handling

TIF protocol processing consists of the following functions:

- MTP Screening of the MSU received by a MTP3 card selects a TIF Stop Action, encapsulating the MSU as **SCCP** data, and forwarding the MSU to MTP3 cards for processing.
- On the MTP3 card, TIF decodes the message, passes information to NPP services for processing, and formats and sends the resulting message.

MTP3 Card Processing

When a MTP3 card receives an MSU, the following TIF processing occurs:

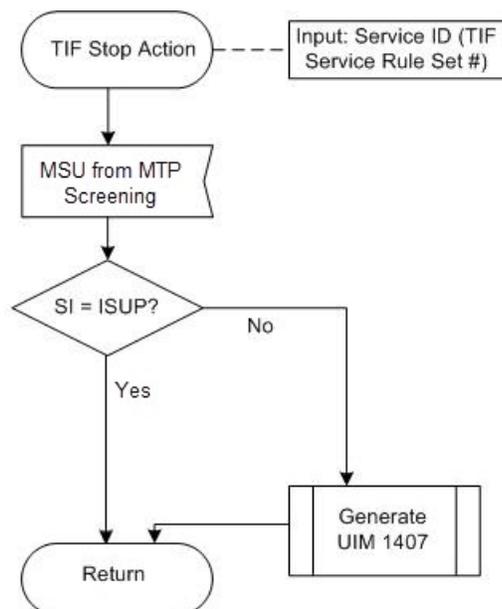
- The MTP Screening feature filters messages for ISUP, and ISUP messages with SI=5 are screened for selection of a TIF Stop Action.
- Selected ISUP IAM messages are marked for sequencing, encapsulated as SCCP messages, and forwarded to Service Modules for processing. TIF supports proper sequencing of 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. An Event is raised for unexpected SI in TIF Stop Action.

The TIF Stop Action processing flow is shown in [Figure 1-2](#).

Figure 1-2 TIF Stop Action Processing



MTP Screening supports the following TIF Stop Actions: TIF, TIF2, and TIF3. Existing MTP rules are used to separate ISUP traffic for TIF processing. The MTP 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.

The following table defines the processing of messages within TIF Stop Actions:

Table 1-13 TIF Stop Action Rules

Protocol	Message Type	Encapsulate	Sequence	Action
ISUP	IAM	Yes	Yes	Send to MTP3 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 MTP Screening rules. This allows for customized handling based on the incoming linkset, **OPC**, **DPC**, or other MTP criteria.

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

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 Number Portability lookup
- NM Bits (from the Forward Call Indicator field) that indicate whether Number Portability 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 Number Portability lookup, calls Service Action Handlers for service-specific processing, and formats the outgoing digit string.

In the basic flow of NPP, 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 Number Portability lookup, calls Service Action Handlers for service-specific processing, and formats the outgoing digit string.

There are two methods of invoking a TIF service for Calling Party digit processing:

- The CdPN Service Rule defined in NPP provides all instructions for handling the CgPN. Basic conditioning and formatting is supported with global TIFOPTS settings.

The 3 TIF CdPN services TIF, TIF2 and TIF3 all do a lookup in the NPP Service Rule Set based upon data from the CdPN portion of the messages. The three CdPN services also do some minimal conditioning (controlled by the TIFOPTS CondCgPN option) and

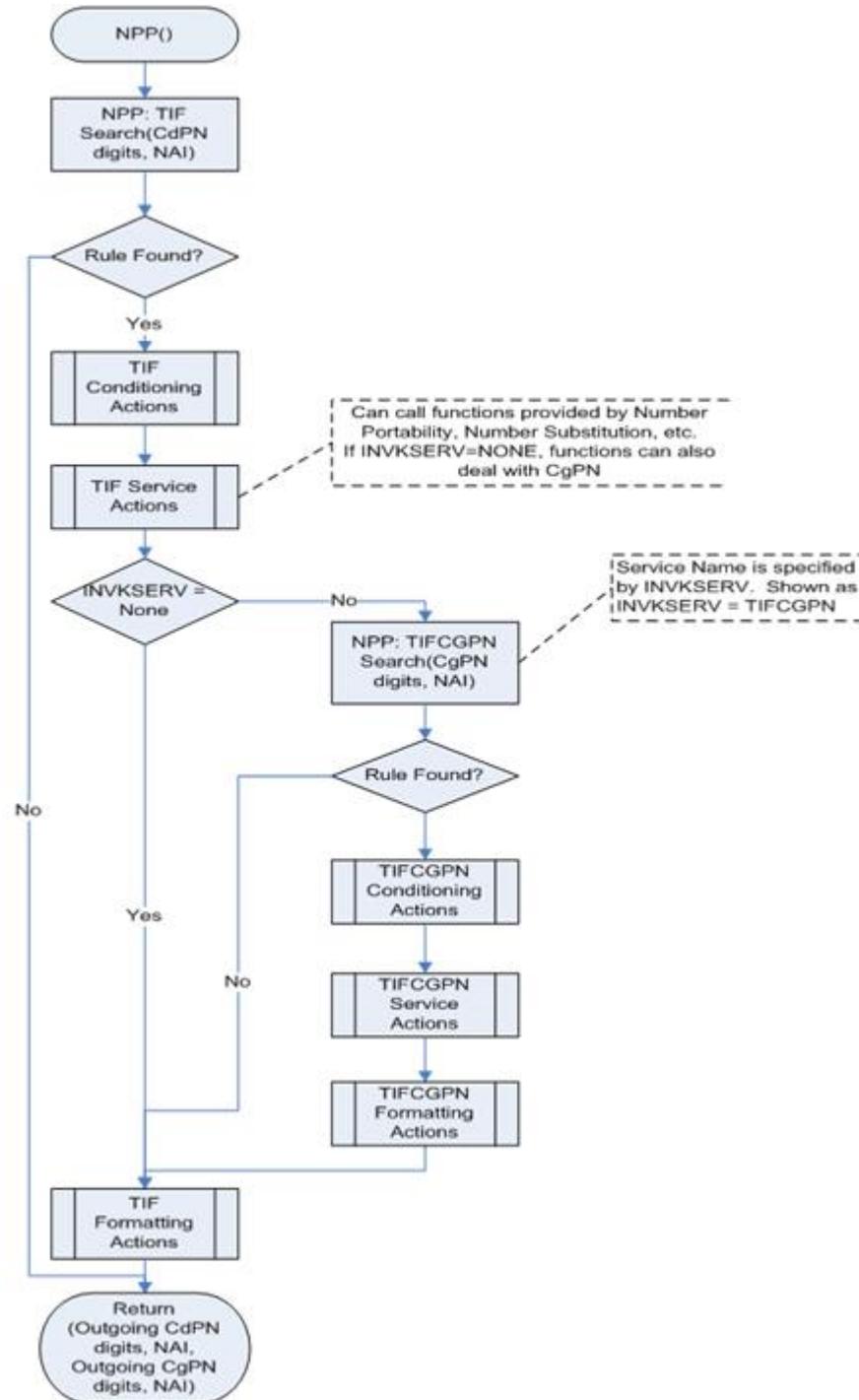
formatting on the CgPN (controlled by the TIFOPTS IAMCGPN option). See [TIF Configuration Options](#). This minimal conditioning and formatting is always done the same regardless of the CgPN digits and NAI values. Service Actions concerning the CgPN are provisioned in the CdPN service, and use the minimally conditioned CgPN for their international form of the Calling Party. All CdPN Service Actions that reference the CgPN can use this method of processing Calling Party digits.

This method is used if the INVKSERV parameter value is NONE in the Service Rule TIF CdPN service. The Action Set in the Service Rule can contain most Service Actions that process CgPN digits. See [NPP Service Actions](#).

- The CgPN is processed via NPP rules, with access to all NPP Conditioning and Formatting controls.

The 3 TIF CgPN services TIFCGPN, TIFCGPN2, and TIFCGPN3 are invoked from the corresponding TIF CdPN service based on the INVKSERV value (not NONE) in the Service Rule for the TIF CdPN service . Because TIF CgPN services have full NPP processing, different conditioning and formatting for different CgPN and NAI values can be used. In some circumstances, information such as ASD can be shared between the TIF CdPN service and the TIF CgPN service.

Figure 1-3 Basic NPP Processing



1.5.1 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 [TIF Configuration Options](#)). 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 [TIF Configuration Options](#)). The Redirection Number is not included in the Release message.

The flow of the TIF Results Handler is shown in [Figure 1-4](#).

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 IAM message is routed.

NP Relay

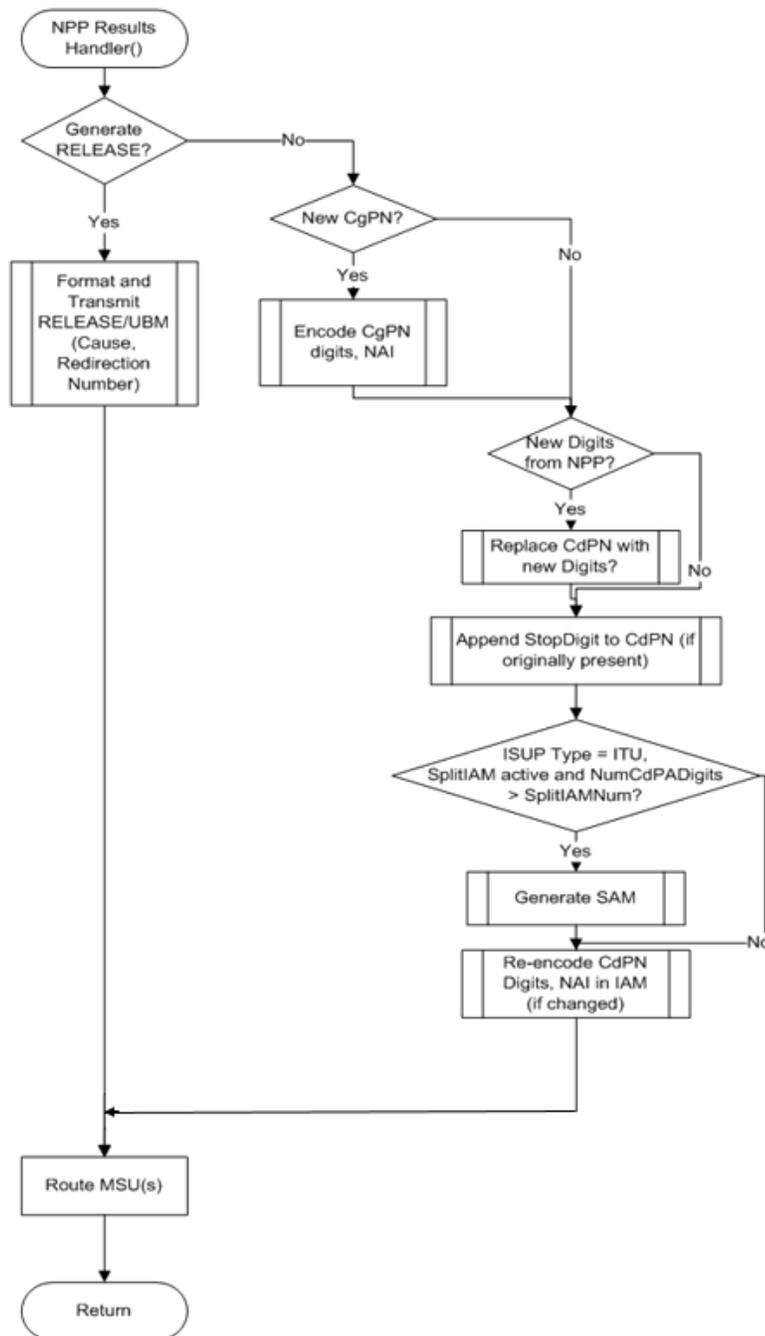
1. IAM Relay is indicated.
2. Calling Number has changed; replacement of the CgPN is performed.
3. CdPN number has changed; the CdPN is replaced.
4. The NP-specific result handler is invoked for IAM Relay to update the NM bits in the ISUP IAM message.
5. The IAM is routed.

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.

- The message is routed.

Figure 1-4 TIF Post-NPP Results Handler



1.6 Number Portability 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 Number Portability 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 Number Portability Lookup

The following table lists portability types that are relevant to Number Portability lookups.

Table 1-14 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

The following table summarizes the meanings of the normal lookup return codes:

Table 1-15 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 following general rules determine portability status:

- A subscriber is considered in-network if the entity type is SP
- A subscriber is considered ported out if the entity type is RN. One exception to this rule is the case of subscribers migrated from GSM to IS41. These subscribers are considered IS41 own-network even though the entity type is RN.

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 NPTYPENPTYPEPLY, NPTYPEPLS, or NPTYPECGPN configuration option to ANY or ALL.

1.7 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 with 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.

2

TIF Features

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

- TIF Number Portability (TIF NP)
- TIF Number Substitution (TIF NS)
- TIF Simple Number Substitution (TIF SNS)
- TIF Additional Subscriber Data (TIF ASD)
- TIF Generic Routing Number (TIF GRN)
- TIF Blacklist Features
 - TIF Subscriber CgPN Blacklist (TIF Subscr CgPN Blacklist)
 - TIF Range CgPN Blacklist
 - TIF Selective Screening

2.1 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

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

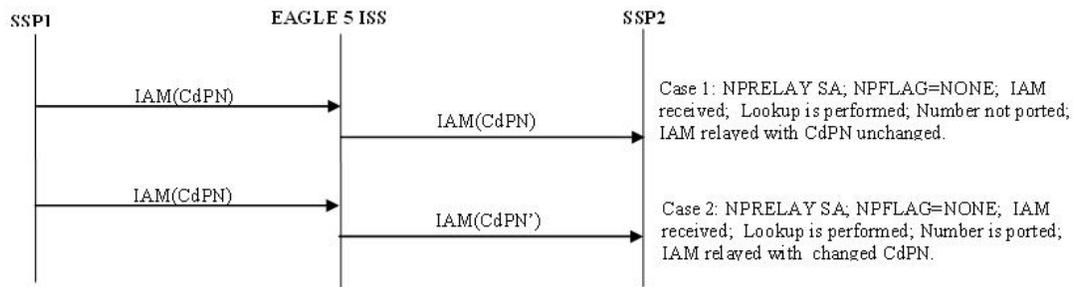
TIF NP provides the following functions:

- 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

2.1.1 TIF NP Message Flows

The following figure shows basic **TIF NP** CdPN Relay use cases.

Figure 2-1 ISUP Message Flows for TIF NP CdPN Relay

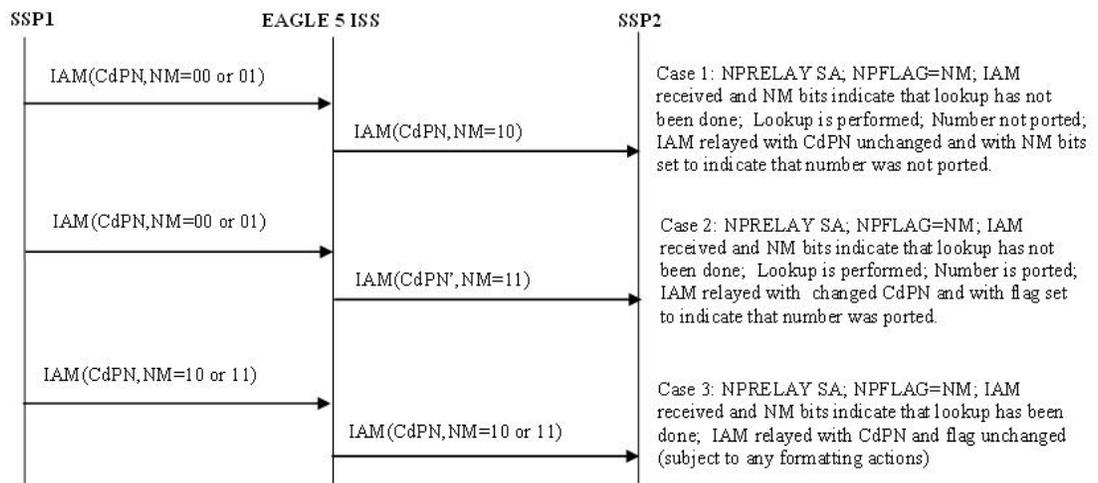


The following figure shows TIF NP Relay cases where NM bits are used in the ISUP IAM message. In the sequence diagrams, the NM bits are shown as binary values. Refer to [Use of NM Bits](#) for details on the use of NM bits.

Note:

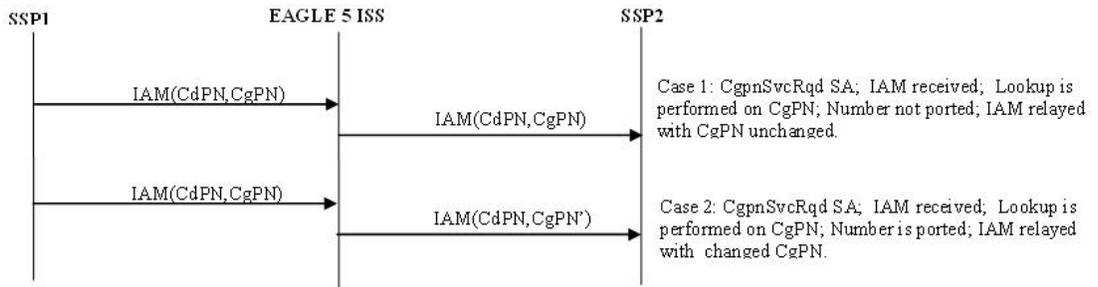
Use of NM bits in the IAM message is an optional part of TIF NP.

Figure 2-2 ISUP Message Flows for TIF NP CdPN Relay, with Optional NM Bits



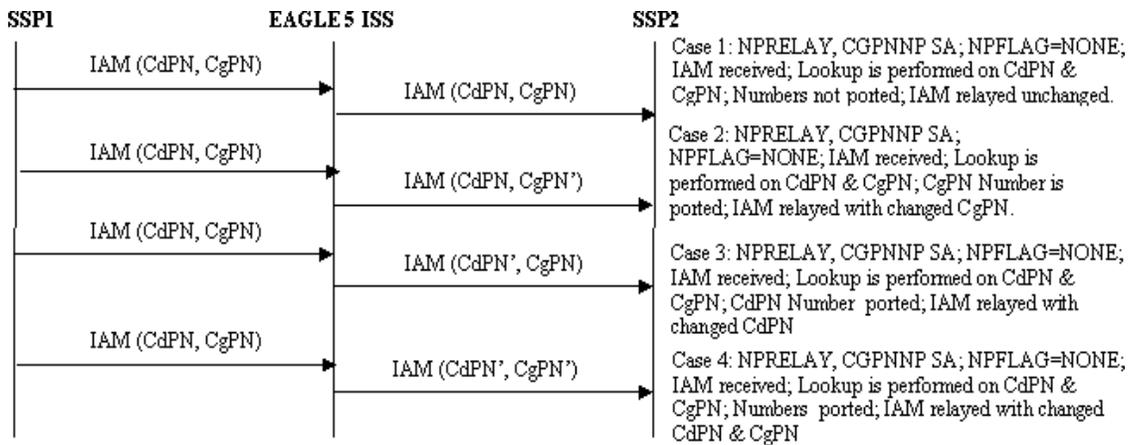
The following figure shows basic TIF NP CgPN portability use cases.

Figure 2-3 ISUP Message Flows for TIF NP CgPN Portability



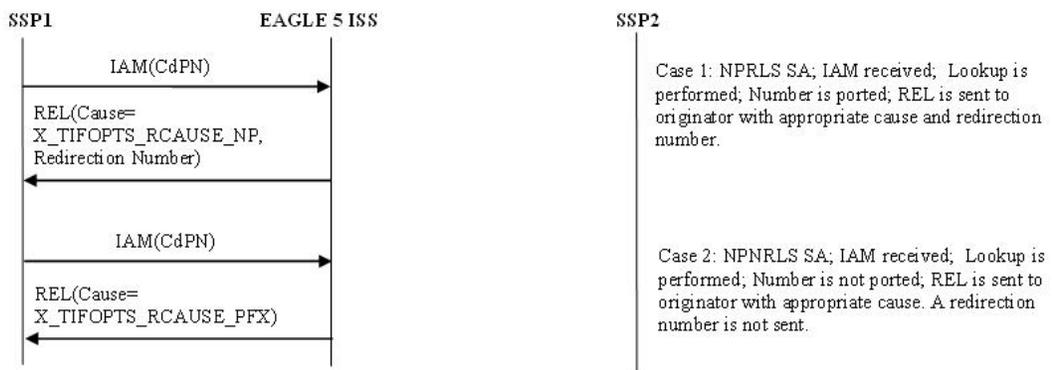
A TIF NP CgPN use case is shown in the following figure for a TIFCGPN, TIFCGPN2, or TIFCGPN3 NPP service when NP RELAY (in TIF, TIF2, or TIF3) and CGPNNP (in TIFCGPN, TIFCGPN2, or TIFCGPN3) Service Actions are provisioned and Number Portability lookup is performed on both CdPN and CgPN. A TIFCGPN, TIFCGPN2, and TIFCGPN3 NPP service is invoked by the corresponding TIF, TIF2, or TIF3 NPP Service.

Figure 2-4 ISUP Message Flows for TIF NP CgPN with NP RELAY and CGPNNP



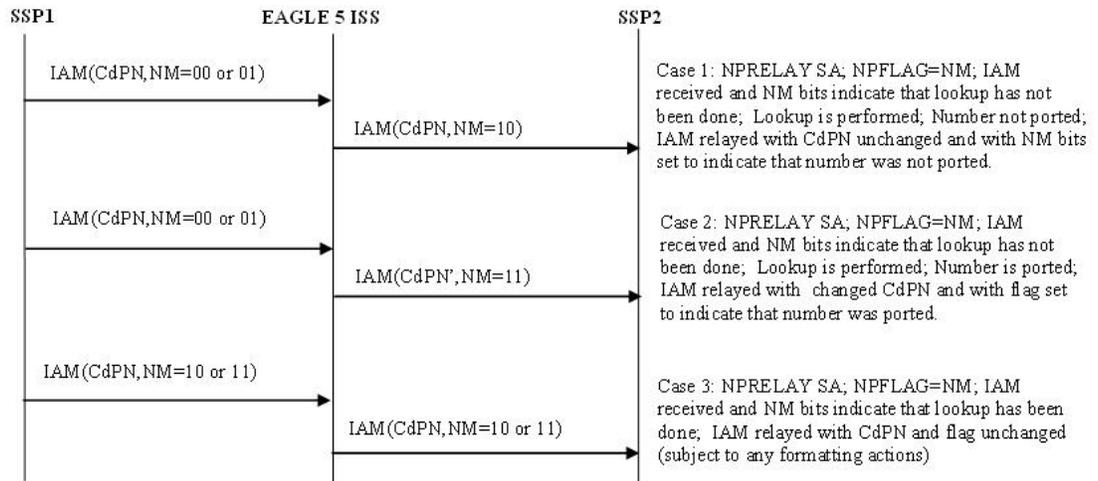
The following figure shows basic TIF NP Release use cases.

Figure 2-5 ISUP Message Flows for TIF NP Release



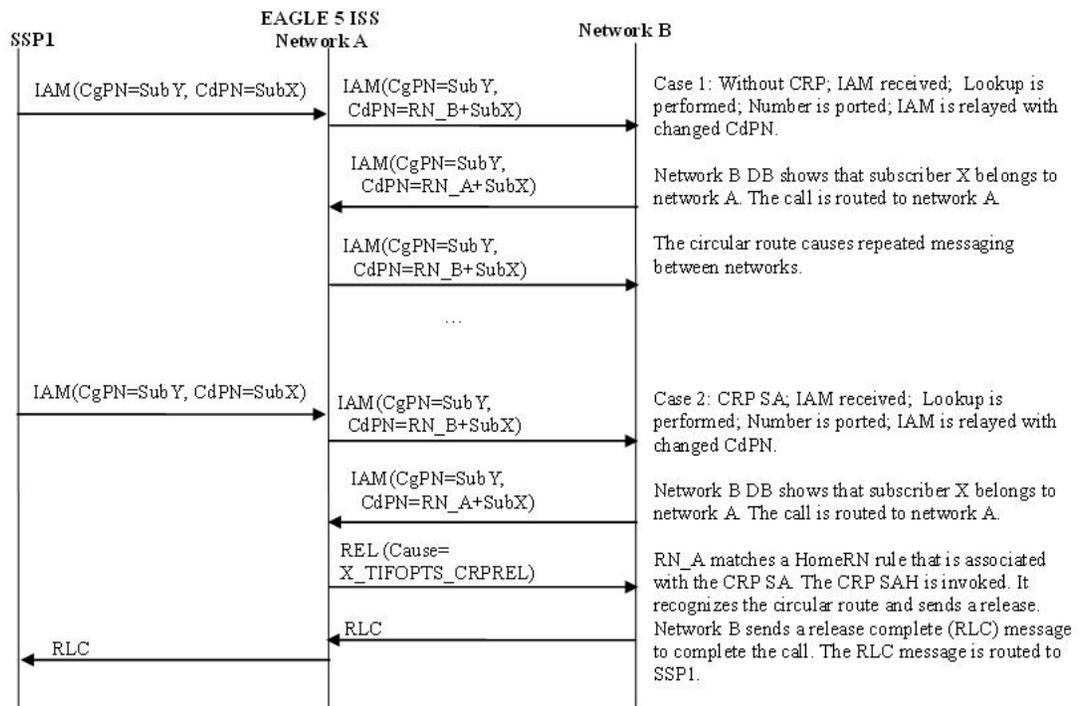
The following figure shows TIF NP Release use cases, with use of NM bits. See [Use of NM Bits](#) for details on the use of NM bits.

Figure 2-6 ISUP Message Flows for TIF NP Release, with Optional NM bits



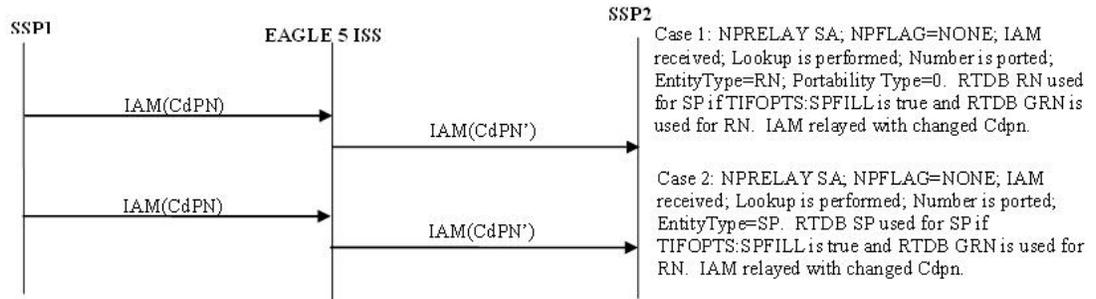
The following figure shows Circular Route Prevention use cases. In these cases, subscriber X is ported from network A to network B. Network A's NP database has the correct entry indicating that subscriber X is ported, but network B has incorrect routing information, indicating that subscriber B still belongs to network A. Subscriber Y belongs to network A. In the use case, subscriber Y calls subscriber X.

Figure 2-7 ISUP Message Flows for TIF CRP



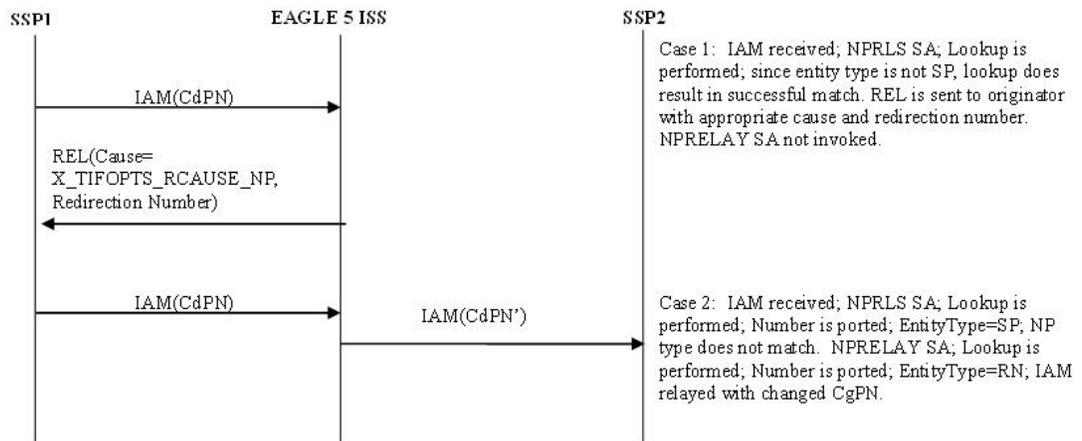
A basic Service Portability use case is shown in the following figure. In this example, the Service Portability feature is turned on and the TIFOPTS SPORTRELAY option has been configured for Service Portability. If the subscriber is an own-network GSM or IS41 subscriber, then the Number Portability GRN is used for the RN.

Figure 2-8 ISUP Message Flows for Service Portability



A use case using both the NPRLS and NPRELAY Service Actions is shown in the following figure. In this example, only OLO subscribers are released; own-network subscribers are relayed. The Service Actions would be set to NPRLS and NPRELAY. The NPTYPE RLS configuration option is set to RN and the NPTYPE RLY configuration option is set to SP.

Figure 2-9 ISUP Message Flows for NPRLS + NPRELAY



2.1.2 TIF NP Configuration Options

[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.

2.1.3 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

2.1.4 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

2.1.5 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:

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

The following table provides a summary of the Service Actions used for TIF NP.

Table 2-1 Summary of TIF NP Service Actions

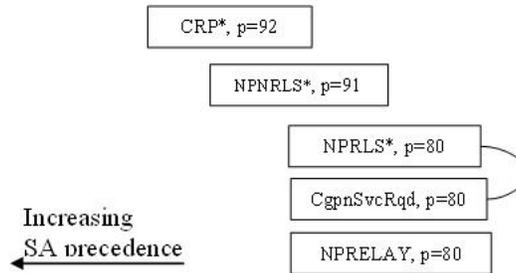
Service Action	Description	Function	Precedence
CRP	Circular Route Prevention	Performs an Number Portability lookup on the CdPN and attempts to detect a circular route.	92
NPNRLS	Number Portability Release on No Match	Performs an Number Portability lookup on the CdPN and indicates release behavior on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

2.1.5.1 Relationships Between TIF NP Service Actions

The following figure shows the relationships between NP Service Actions. The figure shows the precedence values (p) and shows which Service Actions 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 2-10 NP Service Action Precedence



The mutual exclusion relationships can be explained as follows:

- NPRELAY and NPRLS – For the successful NP lookup case, must choose between Relay or Release
- CgPNSvcRqdCgpnNPRqd and NPRLS – CgPNNPRqdCgPNSvcRqd 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 – Normal Release case; can be same precedence as normal Relay cases since they are mutually exclusive and cannot appear in the same action set with CgpnSvcRqd.
- 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 vSTO configuration for TIF NP.

2.1.5.2 RN, SP, and DFLTRN Handling

The RN and SP values are set depending on the entity type retrieved from the Number Portability and the values of the NPTYPE configuration options for NP type (NPTYPEPERLY, NPTYPEPERLS and NPTYPECGPN) and the SPFILL and DFLTRN configuration options. The NPTYPE option isoptions for NP type are used as part of the matching criteria to determine when the Number Portability 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 Number Portability for use by G-Port or other vSTP 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, Number Portability 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).

The following table summarizes the rules for determining the outbound RN and SP.

Table 2-2 Rules for Determining Outbound RN and SP

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

2.1.5.3 Use of NM Bits

The Number Portability Forward Call Indicator NM bit values as shown in the following table are used in ISUP IAM messages to indicate CdPN portability status.

Table 2-3 NM Bits Values

NM Bits Value	Meaning
00	"Without indication" - DPC is out-of-network, or no Number Portability lookup performed
01	"Query not performed" - DPC is in-network, Number Portability lookup was not performed
10	"Query performed, not ported" - DPC is in-network, unsuccessful Number Portability lookup
11	"Query performed, ported" - DPC is in-network, successful Number Portability lookup

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

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.

- If TIFOPTS NPFLAG=NM and the incoming NM Bits value is 10 or 11, the Service Action Handler ends processing immediately.
- If TIFOPTS NPFLAG=NM and the NPRELAY Service Action Handler performs an Number Portability lookup on the CdPN, TIF uses the NM Bits value indicated by the NPRELAY processing to determine if the NM Bits value needs to be updated in the outgoing IAM message.
- If TIFOPTS NPFLAG=NM, the incoming NM Bits value is 01, the NPRLS Service Action Handler performs an Number Portability lookup on the CdPN, and no match is found, the NPRLS Service Action Handler sends a RELEASE message with no Redirection Number and the Release Cause set to the value of the TIFOPTS RCAUSENP option.

 **Note:**

The configuration options and the NM Bits apply only to the **CdPN**, not to the CgPN. Therefore, the CgPNSVCRQD Service Action Handler does notCgPNSVCRQD and CGPNNP Service Action Handlers do not look at the NM bits. The NM Bits apply only for ITU **ISUP** messages when TIFOPTS NPFLAG=NM.

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.

2.1.5.4 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 NPTYPEPERLY option will determine the Network Entity type behavior for the NPRELAY Service Action, and the TIFOPTS NPTYPEPERLS option will determine the Network Entity type behavior for the NPRLS Service Action. This allows the NPRELAY and NPRLS Service Actions to be configured for non-ported subscribers and ported subscribers independently. 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 2-4 Scenarios for Combining the NPRELAY and NPRLS Service Actions

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

2.1.5.5 NPRELAY Service Action Handler

The NPRELAY Service Action Handler performs a Number Portability lookup on the conditioned CdPN digit string and indicates Relay behavior.

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

Configuration Options Used

The TIFOPTS NPTYPEPERLYNPTYPE configuration option indicates the conditions that are used for a successful Number Portability 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 Number Portability 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 [Number Portability Lookup](#).

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

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 NPTYPELY 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 (NPTYPELY=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.

2.1.5.6 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.

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

Configuration Options Used

The TIFOPTS NPTYPELYSNPTYPE 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 RCAUSENP configuration option indicates 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 Number Portability 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 [Number Portability 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 (NPTYPE=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.

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. If TIFOPTS NPFLAG=NM, the incoming NM Bits value is 01, and no match is found in the Number Portability lookup on the CdPN, then the NPRLS Service Action Handler sends a Release message with no Redirection Number and the Release Cause set to the value of the TIFOPTS RCAUSENP option.

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.

2.1.5.7 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 NPTPERLS 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.

The RCAUSEPFX configuration option indicates the Reason Cause Value to be included in a 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 Number Portability 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.

2.1.5.8 CGPNNP Service Action Handler

The CGPNNP Service Action Handler performs an Number Portability lookup on the CgPN digits from the ISUP IAM message.

The CGPNNP Service Action Handler is supported for the TIFCGPN, TIFCGPN2, and TIFCGPN3 services, which are invoked only if the INVKSERV parameter value is not NONE for the corresponding TIF, TIF2, or TIF3 service.

The CGPNNP Service Action can be provisioned with any of the other Service Actions supported by the TIFCGPN, TIFCGPN2, and TIFCGPN3 services except for PPFXRLS.

Configuration Options Used

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

The value of the TIFOPTS DFLTRN option, if set, is used to populate the RN on a successful DN match and the effective entity type is SP.

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

Action Performed

Number Portability lookup is performed on the conditioned digit string in international format. The result is determined based on the TIFOPTS NPTYPECGPN option value.

On a lookup where an RN or SP entity was found

- The SRFIMSI digits assigned to the entity are used to populate the SRFIMSI Formatting Action value.
- 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).

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 effective Entity Type is SP, then SP digits are inserted into the outgoing field or the DFLTRN option digit string can be used to populate the RN Formatting Action value instead of actual SP digits.

If a match is found and the Entity Type is SP, then SPFILL=ON causes the SP digits to populate the SP Formatting Action value when the DFLTRN value is used to populate the RN Formatting Action value.

On a lookup where an entry was found, but entity data was not found (NPTYPECGPN=ALL), the CgPN is unchanged, if the Formatting Actions do not modify the digits in some other manner.

Formatting Action processing is skipped on an unsuccessful lookup. Depending on the Formatting Action configuration for the selected rule, the updated RN, SP or SRFIMSI can be used during CgPN formatting by NPP.

Terminating Action?

This is not a terminating action.

2.1.5.9 CgPNSvcRqd Service Action Handler

The CgPNSvcRqd Service Action Handler performs an Number Portability 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 string.

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.

2.1.5.10 CRP Service Action Handler

The Circular Route Prevention (CRP) Service Action Handler attempts to detect a circular route.

The CRP Service Action must have a higher precedence than the NPRLS Service Action, which is a terminating action.

Configuration Options Used

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

The TIFOPTS CRPREL configuration option indicates the Release Cause code to be included in the Release message.

Actions 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. (NM bits are used in-network only. If the NM bits have been set, then portability has already been checked in the network. Another CRP check is not needed.)

If the NM bits indicate that a lookup has not already been performed, the Number Portability lookup is performed. If an RN is returned, then it is assumed that the number was ported and that a circular route is detected.

A Release Cause code will be included, and a Redirection Number will not be included, in the outgoing Release message.

The NPP Formatting Action processing will be skipped when a circular route is detected. One way to force formatting of the outgoing CdPN is to configure the CDIAL Service Action.

Terminating Action?

If a circular route is detected, then this is a terminating action.

2.1.6 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 DestinationCommon Screening List (CSL) 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 DestinationCSL 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.

2.2 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 Number Portability lookup of both Calling Party and Called Party numbers for substitution.

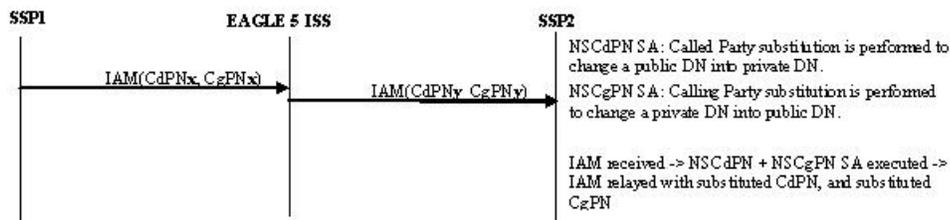
TIF NS provides the following functions:

- 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

2.2.1 TIF NS Message Flows

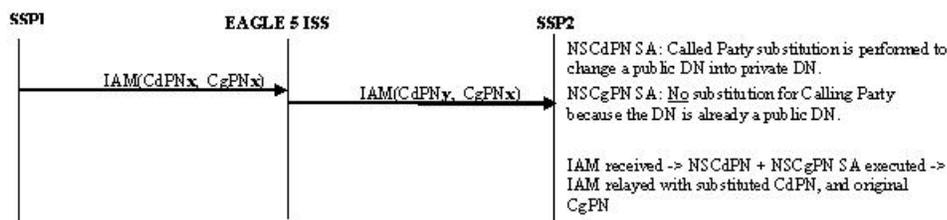
The following figure shows CgPN and CdPN substitution in an ISUP IAM Relay call flow.

Figure 2-11 ISUP RELAY with TIF NS



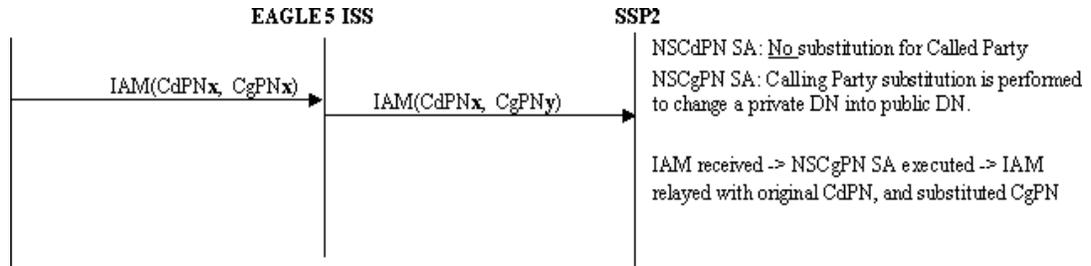
The following figure shows the ISUP IAM Relay call flow where CdPN is substituted and CgPN is not substituted.

Figure 2-12 ISUP RELAY with TIF NS - No CgPN Substitution



The following figure shows the ISUP IAM Relay call flow where CgPN is substituted and CdPN is not substituted.

Figure 2-13 ISUP RELAY with TIF NS - No CdPN Substitution



2.2.2 TIF NS Basic Use Cases

This section describes two basic use cases for TIF NS:

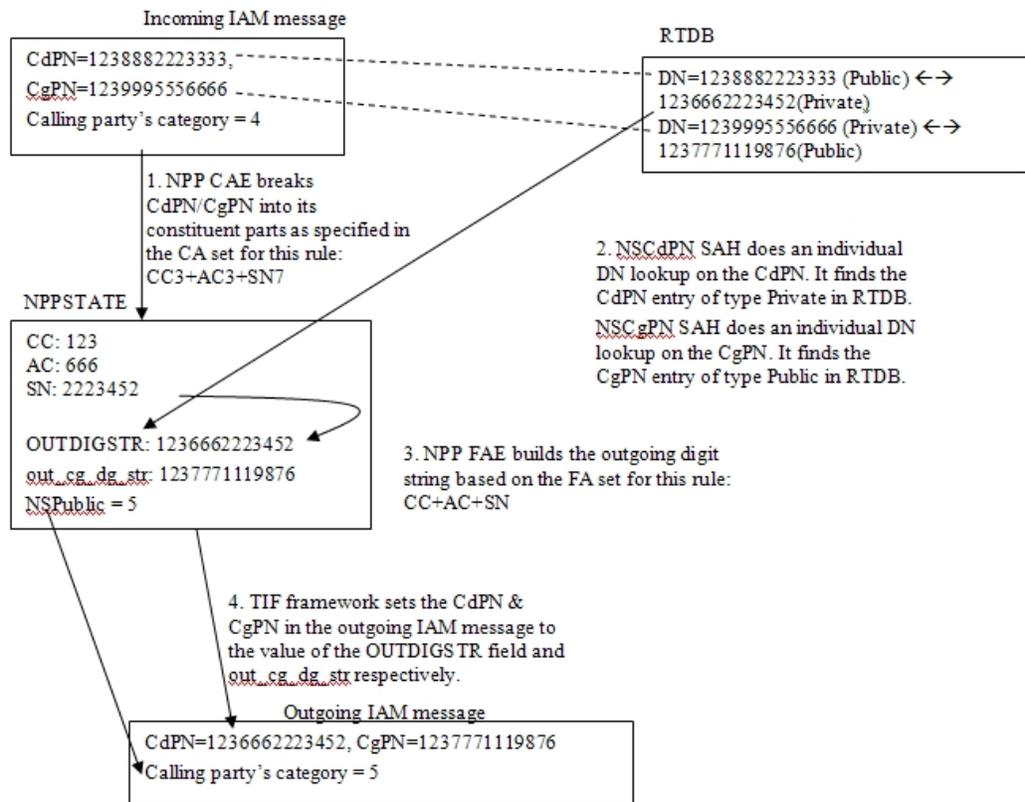
- TIF NS use case for TIF CdPN Service
- TIF NS use case for TIF CgPN Service

TIF NS Use Case for TIF CdPN Service

The following figure shows the steps involved in a basic TIF NS use case for CdPN service. This case uses the following Service Rule and configuration options:

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

Figure 2-14 TIF NS Basic Operation for TIF CdPN Service

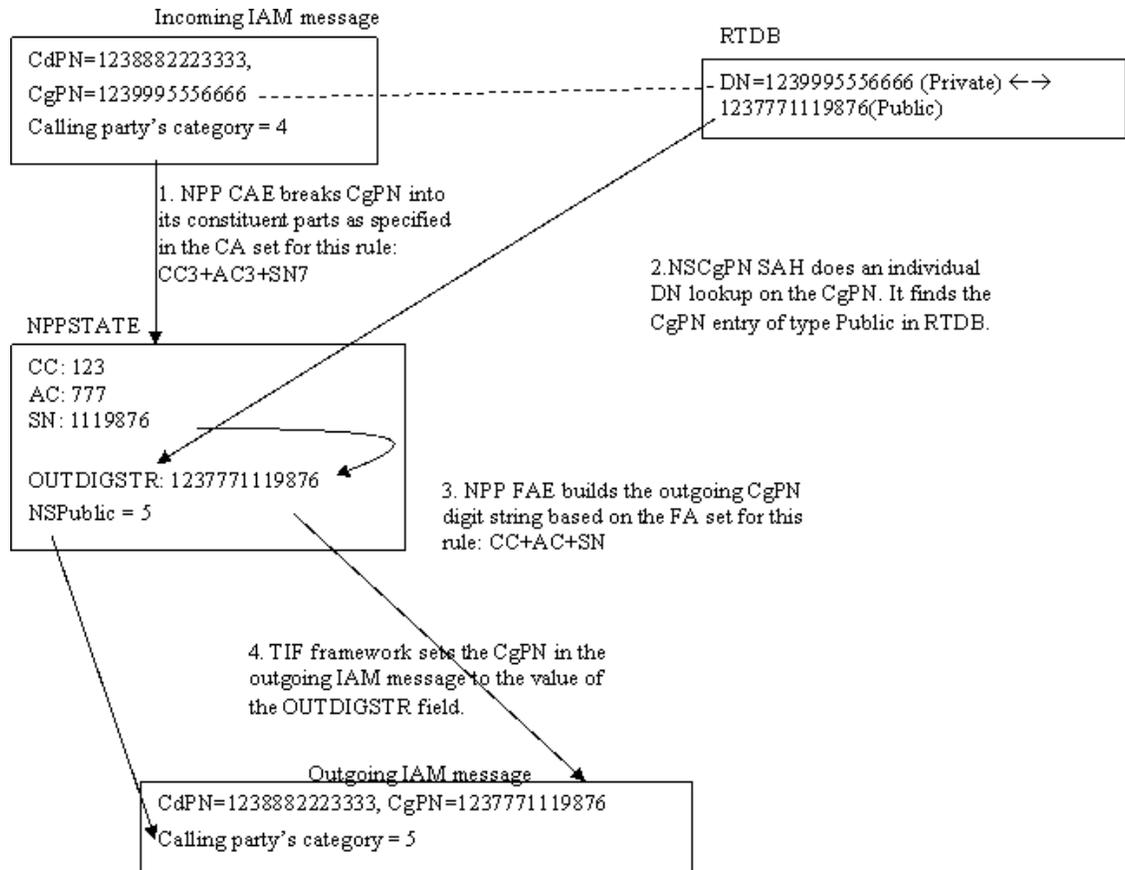


TIF NS Use Case for TIF CgPN Service

The following figure shows the steps involved in a basic TIF NS use case for CgPN service. This case uses the following Service Rule and configuration options:

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

Figure 2-15 TIF NS Basic Operation for TIF CgPN Service



2.2.3 TIF NS Configuration Options

[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.

2.2.4 TIF NS Handling of IAM Message

When an IAM message is received and successfully decoded, a Number Portability 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.

2.2.5 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

2.2.6 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`.

2.2.7 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:

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

The following table provides a summary of the Service Actions used specifically for TIF NS.

Table 2-5 Summary of TIF NS Service Actions

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

2.2.7.1 NSCdPN Service Action Handler

The TIF NSCdPN Service Action Handler executes the NSCdPN Service Action when NSCdPN is associated in a Service Rule Set with a CdPN service (TIF, TIF2, TIF3).

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

Configuration Options Used

None.

Action Performed

The NSCdPN Service Action Handler performs an Number Portability 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. The subscriber can come from either the individual or range data.

This Service Action Handler copies digits from the Private DN found in the successful Number Portability 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.

2.2.7.2 TIF CdPN NSCgPN Service Action Handler

The TIF CdPN NSCgPN Service Action Handler executes the NSCgPN Service Action when NSCgPN is associated in a Service Rule Set with a CdPN service (TIF, TIF2, TIF3).

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

NSCgPN for a TIF CdPN service cannot be specified if a TIF CgPN is configured to be invoked (INVKSERV parameter not NONE in CdPN Service Rule).

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 Number Portability 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

The NSCgPN Service Action Handler performs an Number Portability 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 Calling Party Category can be:

- Used to determine if the incoming CgPN is Public or Private
- Replaced in the outgoing message with a "Public" value

This Service Action Handler uses the `nsaddldata` configuration option to determine whether to check the Calling Party Category for "Public" or "Private", and the `nspublic` configuration option value to replace the Calling Party 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 Number Portability 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 Number Portability.

- 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 option:

- 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'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.

2.2.7.3 TIF CgPN NSCgPN Service Action Handler

The TIF CgPN NSCgPN Service Action Handler executes the NSCgPN Service Action when NSCgPN is associated in a Service Rule Set with a CgPN service (TIFCGPN, TIFCGPN2, TIFCGPN3).

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 Number Portability lookup.

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

Action Performed

The NSCgPN Service Action Handler performs an Number Portability 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 Calling Party Category can be:

- Used to determine if the incoming CgPN is Public or Private
- Replaced in the outgoing message with a "Public" value

This Service Action Handler uses the nsaddldata configuration option to determine whether to check the Calling Party Category for "Public" or "Private", and the nspublic configuration option value to replace the Calling Party Category in the outgoing message.

This Service Action Handler populates the ZN, CC+DN. or CC+AC+SN Formatting Action values that correspond to the provisioned Conditioning Actions.

The TIF post-NPP processing replaces the Calling Party Category and the CgPN (only the digit string and the odd/even indicator bits, not the NAI) as NPP processing indicates. Formatting Action execution uses the populated values to generate the outgoing CgPN digit string.

Terminating Action?

This is not a terminating action.

2.2.8 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

2.3 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 Number Portability is not used in this case.

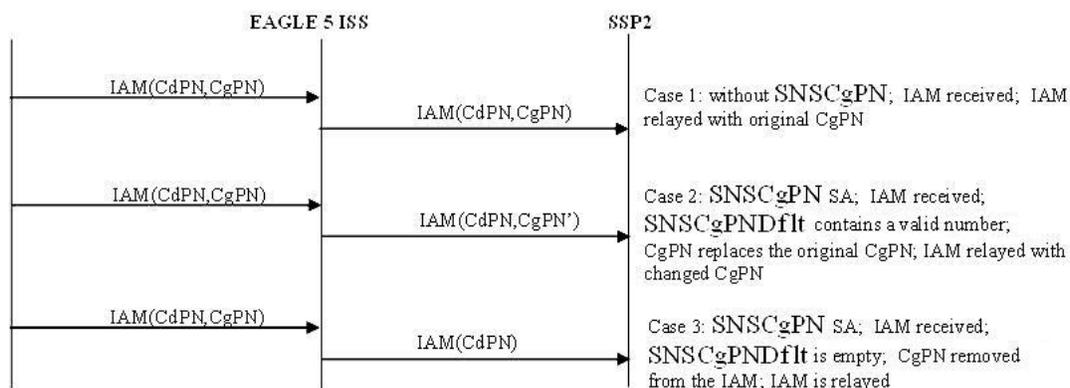
The TIF SNS feature uses services provided by the Triggerless ISUP Framework (TIF), and provides the following functions:

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

2.3.1 TIF SNS Message Flows

The following figure shows TIF SNS use cases.

Figure 2-16 ISUP Message Flows for TIF SNS



2.3.2 TIF SNS Basic Use Cases

This section describes two basic use cases for TIF SNS:

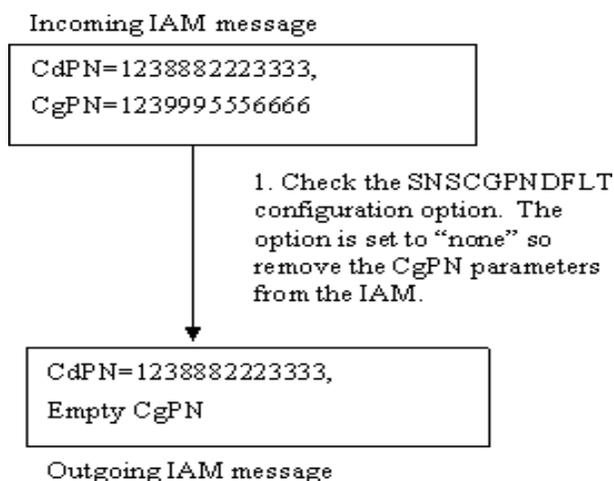
- TIF SNS use case for TIF CdPN Service
- TIF SNS use case for TIF CgPN Service

TIF SNS Use Case for TIF CdPN Service

The [Figure 2-17](#) shows the steps involved in a basic TIF SNS use case for CdPN service. This case uses the following Service Rule and configuration options:

- Filter FPFX=123
- Filter FDL=13
- Conditioning Actions=CC3+AC3+SN7
- Service Action=SNSCgPN
- Formatting Actions=CC+AC+SN
- TIFOPTS option SNSCGPNDFLT=none

Figure 2-17 TIF SNS Basic Operation for TIF CdPN Service

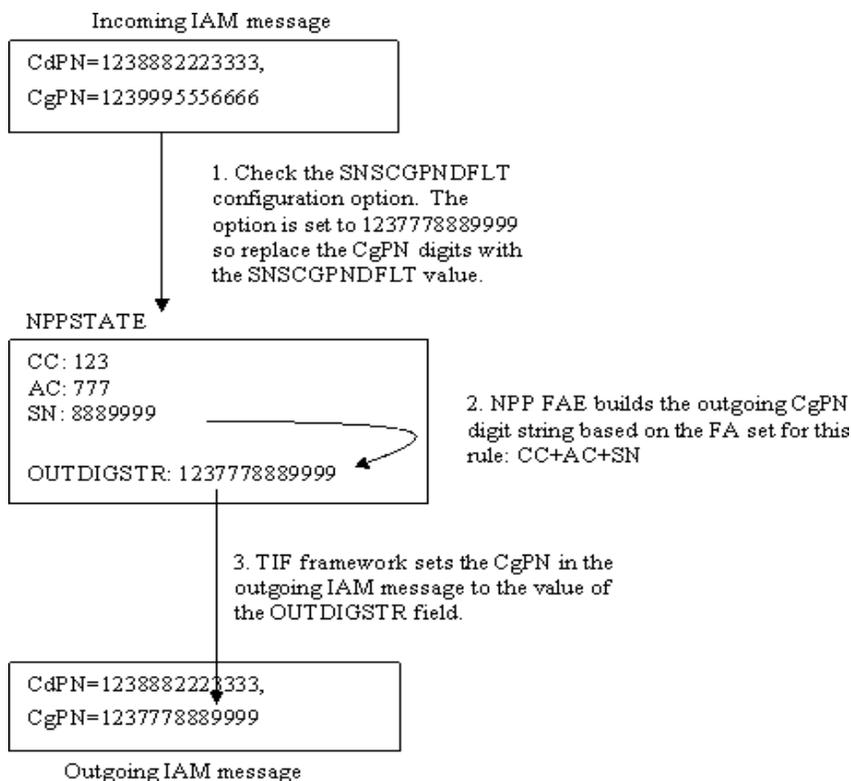


TIF SNS Use Case for TIF CgPN Service

[Figure 2-18](#) shows the steps involved in a basic TIF SNS use case for CgPN service. This case uses the following Service Rule and configuration options:

- Filter FPFX-123
- Filter FDL=13
- Conditioning Actions=CC3+AC3+SN7
- Service Action=SNSCgPN
- Formatting Actions=CC+AC+SN
- TIFOPTS option SNSCGPNDFLT=123777888999

Figure 2-18 TIF SNS Basic Operation for TIF CgPN Service



2.3.3 TIF SNS Configuration Option

The SNSCGPNDFLT 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](#).

2.3.4 TIF SNS Protocol Handling

TIF SNS protocol handling consists of the following functions:

- TIF SNS-specific pre-NPP Processing
 - TIF sends the conditioned CgPN to NPP.
- SNSCGPN Service Action Handler
- TIF SNS-specific post NPP-Processing

2.3.5 TIF SNS Service Action Handlers

The SNSCGPN Service Action can be associated with a TIF CdPN service (TIF, TIF2, TIF3) or a TIF CgPN service (TIFCGPN, TIFCGPN2, TIFCGPN3) in a Service Rule Set. Two SNSCGPN Service Action Handlers indicate how to update the outgoing CgPN based on the value of the SNSCGPNDFLT configuration option:

-

2.3.5.1 TIF CdPN SNSCgPN Service Action Handler

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

SNSCgPN for a TIF CdPN service cannot be specified if a TIF CgPN service is invoked using the INVKSERV parameter in the CdPN Service Rule.

Configuration Options Used

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

Actions Performed

If the CgPN parameter is not included in the IAM message or the CgPN digits are empty in the CgPN parameter, then the TIF CgPN SNSCgPN Service Action will not be invoked.

If the SNSCgPNDflt option value is not NONE, the SNSCgPN Service Action Handler indicates that the CgPN is to be replaced with the specified SNSCgPNDflt option value.

If the SNSCgPNDflt option value is NONE, then the SNSCgPN Service Action Handler indicates that the CgPN will 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 SNSCgPNDflt option is NONE, then TIF removes the CgPN.
- If the value of the SNSCgPNDflt option is not NONE, then TIF replaces the CgPN in the outgoing message with the SNSCgPNDflt value. The CgPN NAI is not changed.

Terminating Action?

This is not a terminating action.

2.3.5.2 TIF CgPN SNSCgPN 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.

2.4 TIF Additional Subscriber Data Feature

The TIF Additional Subscriber Data (TIF ASD) feature allows for the insertion of Additional Subscriber Data (ASD) into the CdPN or CgPN of an outgoing IAM or Redirection Number of a REL ISUP message.

The ASD is obtained from the Number Portability lookup of the CdPN and CgPN digits.

TIF ASD provides Service Action Handlers for the ASDLKUP and CgPNASDRqd Service Actions associated with TIF CdPN services TIF, TIF2, and TIF3 in NPP. The ASDLKUP Service Action allows retrieval of ASD from the matched incoming CdPN to be inserted into the outgoing CdPN digits. The CgPNASDRqd Service Action allows retrieval of ASD from the matched incoming CgPN to be inserted into the outgoing CdPN digits.

TIF ASD provides a Service Action Handler for the ASDLKUP Service Action associated with TIF CgPN services TIFCGPN, TIFCGPN2, and TIFCGPN3 in NPP. The ASDLKUP Service Action allows retrieval of ASD from the matched incoming CgPN to be inserted into the outgoing CgPN digits.

A TIF CgPN service is invoked by the corresponding TIF CdPN service by setting the INVKSERV parameter value to the TIF CgPN service name in the Service Rule for the TIF CdPN service.

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

The NPP ASD and ASDOTHER Formatting Actions are used for TIF ASD:

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

- The ASDOTHER Formatting Action allows the ASD returned from a Number Portability search by the ASDLKUP Service Action for a TIF CgPN service to be used in CdPN formatting.

Basic TIF ASD Use Case for TIF CdPN Service

In the use case described in this section, 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 + SN7
- Service Action = CgPNASDRqd
- Formatting Actions = CC + ASD + AC + SN

The CgPNASDRqd Service Action Handler performs a Number Portability DN lookup on the CgPN, finds the CgPN entry with ASD value a5d, and populates the ASD Formatting Action value with the ASD value.

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

TIF inserts the outgoing CdPN digit into the outgoing IAM message. The CgPN is not changed. The IAM message is relayed.

Basic TIF ASD Use Case for TIF CgPN Service

In the use case described in this section, 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 + SN7
- Service Action = ASDLKUP
- Formatting Actions = CC + ASD + AC + SN

The ASDLKUP Service Action Handler performs a Number Portability lookup for the DN in the CgPN, finds the CgPN entry with ASD value a5d, and populates the ASD Formatting Action value with the ASD value.

NPP Formatting Action execution uses the extracted information and the ASD to construct the outgoing CgPN digit string as CC + ASD + AC + SN = 123a5d9995556666.

TIF inserts the outgoing CgPN digit string into the outgoing IAM message. The CdPN is not changed. The IAM message is relayed.

TIF ASD Use Case for TIF CgPN Service using ASDOTHER

In the use case described in this section, the incoming IAM message contains CdPN=4568882223333 and CgPN=1239995556666.

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

- Filter Prefix (FPFX) = 456

- Filter Digit Length (FDL) = 13
- INVKSERV=TIFCGPN
- Conditioning Actions = CC3 + AC3 + SN7
- Service Action = CDIAL
- Formatting Actions = CC + ASDOTHER + AC + SN

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

- Filter Prefix (FPFX) = 123
- Filter Digit Length (FDL) = 13
- Conditioning Actions = CC3 + AC3 + SN7
- Service Action = ASDLKUP
- Formatting Actions = CC + AC + SN

The ASDLKUP Service Action Handler performs an Number Portability lookup for the DN in the CgPN, finds the CgPN entry with ASD value a5d, and populates the CgPN ASD Formatting Action value with the ASD value.

NPP Formatting Action execution uses the extracted information to construct the outgoing CgPN digit string as CC + AC + SN = 1239995556666.

TIF populates the CdPN ASDOTHER Formatting Action value from the CgPN ASD Formatting Action value.

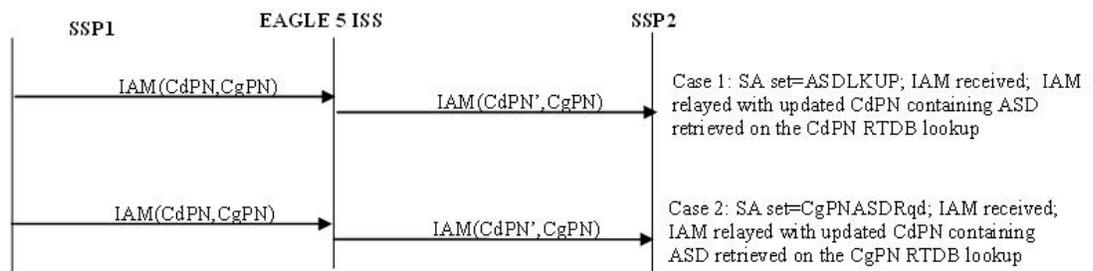
NPP Formatting Action execution uses the extracted information and the CdPN ASDOTHER value to construct the outgoing CdPN digit string as CC + ASDOTHER + AC + SN = 456a5d8882223333.

TIF inserts the outgoing CdPN and CgPN into the outgoing IAM message. The IAM message is relayed.

2.4.1 TIF ASD Message Flows

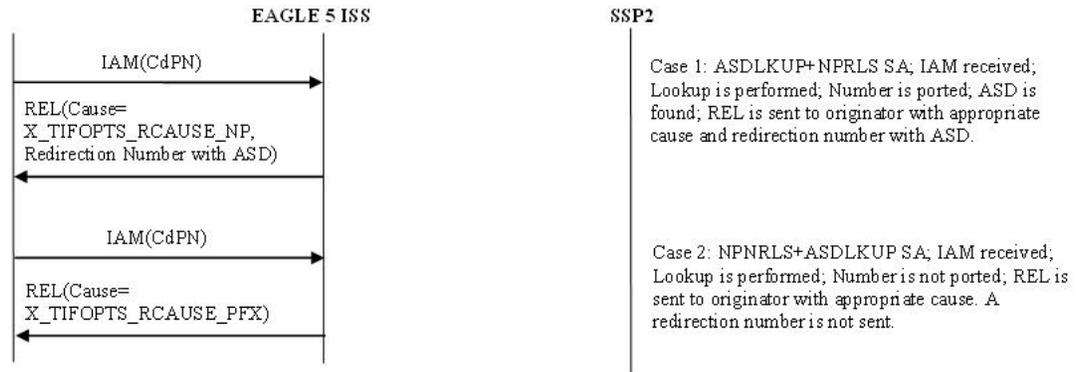
The following figure shows TIF ASD use cases for ISUP IAM messages, with TIF CdPN service.

Figure 2-19 ISUP IAM Message Flows for TIF ASD for TIF CdPN Service



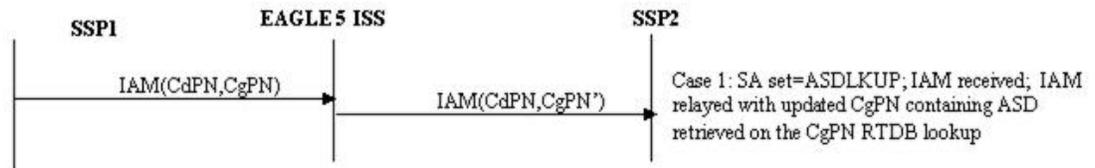
The following figure shows TIF ASD use cases with the NPRLS and NPNRLS Service Actions.

Figure 2-20 ISUP REL Message Flow for TIF ASD for TIF CdPN Service with NPRLS and NPNRLS SAs



The following figure shows TIF ASD use cases for TIF CgPN service.

Figure 2-21 ISUP IAM Message Flow for TIF ASD for CgPN Service



2.4.2 TIF ASD Service Action Handlers

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

Table 2-6 NPP Service Actions used by TIF ASD

TIF Services	Service Action	Description
TIF, TIF2, TIF3	ASDLKUP	Performs an individual or range Number Portability lookup on the CdPN to find an entry containing an ASD digit string.
TIF, TIF2, TIF3	CgPNASDRqd	Performs an individual or range Number Portability lookup on the CgPN to find an entry containing an ASD digit string.
TIFCGPN, TIFCGPN2, TIFCGPN3	ASDLKUP	Performs an individual or range Number Portability lookup on the CgPN to find an entry containing an ASD digit string.

2.4.2.1 Concept Topic Title

(Required) Enter introductory text here, including the definition and purpose of the concept.

Section Title

(Optional) Use sections to add and organize related content if another section heading is needed.

Example 2-1 Example Title

(Optional) Use sections to add and organize related examples when including an example with a concept topic.

2.4.2.2 Concept Topic Title

(Required) Enter introductory text here, including the definition and purpose of the concept.

Section Title

(Optional) Use sections to add and organize related content if another section heading is needed.

Example 2-2 Example Title

(Optional) Use sections to add and organize related examples when including an example with a concept topic.

2.4.2.3 Concept Topic Title

(Required) Enter introductory text here, including the definition and purpose of the concept.

Section Title

(Optional) Use sections to add and organize related content if another section heading is needed.

Example 2-3 Example Title

(Optional) Use sections to add and organize related examples when including an example with a concept topic.

2.5 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 or CgPN of an outgoing IAM or Redirection Number of a REL ISUP message.

The GRN is obtained from the Number Portability lookup of the CdPN and CgPN digits.

TIF **GRN** provides Service Action Handlers for the GRNLKUP and CgPNGRNRqd Service Actions associated with TIF CdPN services TIF, TIF2, and TIF3 in NPP. The GRNLKUP Service Action allows retrieval of the GRN from the matched incoming CdPN to be inserted into the outgoing CdPN digits. The CgPNGRNRqd Service Action allows retrieval of GRN from the matched incoming CgPN to be inserted into the outgoing CdPN digits.

TIF GRN provides a Service Action Handler for the GRNLKUP Service Actions associated with TIF CgPN services TIFCGPN, TIFCGPN2, and TIFCGPN3 in NPP. The GRNLKUP Service Action allows retrieval of the GRN from the matched incoming CgPN to be inserted into the outgoing CgPN digits.

A TIF CgPN service is invoked by the corresponding TIF CdPN service by setting the INVKSERV parameter value to the TIF CgPN service name in the Service Rule for the TIF CdPN service.

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

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

The NPP GRN and GRNOTHER Formatting Actions are used for TIF GRN:

- The GRN Formatting Action is used to process the GRN that is retrieved by TIF GRN Service Actions.
- The GRNOTHER Formatting Action allows the GRN returned from a Number Portability search by the GRNLKUP Service Action for a TIF CgPN service to be used in CdPN formatting.

Basic TIF GRN Use Case for TIF CdPN Service

In the use case described in this section, 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 + SN7
- Service Action = CgPNGRNRqd
- Formatting Actions = CC + GRN + AC + SN

The CgPNGRNRqd Service Action Handler performs an Number Portability DN lookup on the CgPN, finds the CgPN entry with GRN value a5d, and populates the GRN Formatting Action value with the GRN value.

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

TIF inserts the outgoing CdPN digit into the outgoing IAM message. The CgPN is not changed. The IAM message is relayed.

Basic TIF GRN Use Case for TIF CgPN Service

In the use case described in this section, 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 + SN7
- Service Action = GRNLKUP

- Formatting Actions = CC + GRN + AC + SN

The GRNLKUP Service Action Handler performs a Number Portability lookup for the DN in the CgPN, finds the CgPN entry with GRN value a5d, and populates the GRN Formatting Action value with the GRN value.

NPP Formatting Action execution uses the extracted information and the GRN to construct the outgoing CgPN digit string as CC + GRN + AC + DN = 123a5d9995556666.

TIF inserts the outgoing CgPN digit into the outgoing IAM message. The CdPN is not changed. The IAM message is relayed.

TIF GRN Use Case for TIF CgPN Service using GRNOTHER

In the use case described in this section, the incoming IAM message contains CdPN=4568882223333 and CgPN=1239995556666.

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

- Filter Prefix (FPFX) = 456
- Filter Digit Length (FDL) = 13
- INVKSERV=TIFCGPN
- Conditioning Actions = CC3 + AC3 + SN7
- Service Action = CDIAL
- Formatting Actions = CC + GRNOTHER + AC + SN

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

- Filter Prefix (FPFX) = 123
- Filter Digit Length (FDL) = 13
- Conditioning Actions = CC3 + AC3 + SN7
- Service Action = GRNLKUP
- Formatting Actions = CC + AC + SN

The GRNLKUP Service Action Handler performs a Number Portability lookup for the DN in the CgPN, finds the CgPN entry with GRN value a5d, and populates the CgPN GRN Formatting Action value with the GRN value.

NPP Formatting Action execution uses the extracted information to construct the outgoing CgPN digit string as CC + AC + SN = 1239995556666.

TIF populates the CdPN GRNOTHER Formatting Action value from the CgPN GRN Formatting Action value.

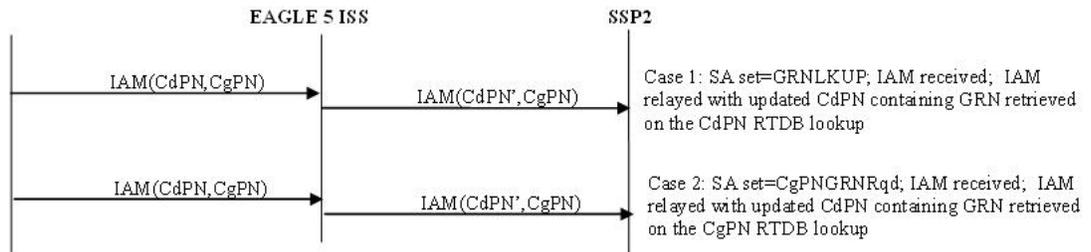
NPP Formatting Action execution uses the extracted information and the CdPN GRNOTHER value to construct the outgoing CdPN digit string as CC + GRNOTHER + AC + SN = 456a5d8882223333.

TIF inserts the CdPN and CgPN in the outgoing IAM message. The outgoing message is relayed.

2.5.1 TIF GRN Message Flows

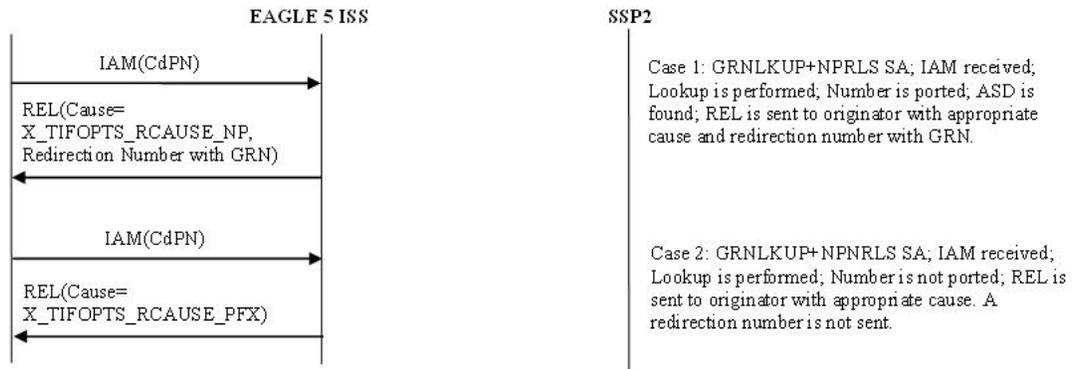
The following figure shows TIF GRN use cases for TIF CdPN service.

Figure 2-22 ISUP IAM Message Flows for TIF GRN for TIF CdPN Service



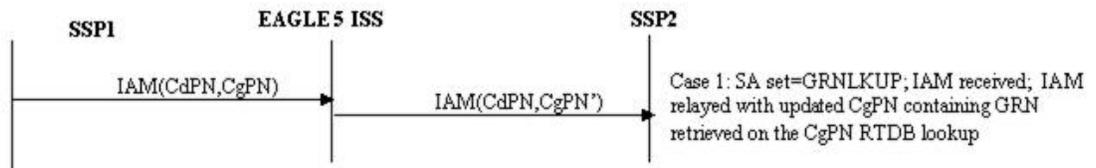
The following figure shows TIF GRN use cases with NPRLS and NPNRLS for TIF CdPN service.

Figure 2-23 ISUP REL Message Flow for TIF GRN for TIF CdPN Service with NPRSL and NPNRLS



The following figure shows TIF GRN use cases for TIF CgPN service.

Figure 2-24 ISUP IAM Message Flows for TIF GRN for TIF CgPN Service



2.5.2 TIF GRN Service Action Handlers

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

Table 2-7 NPP Service Actions used by TIF GRN

TIF Services	Service Action	Description
TIF, TIF2, TIF3	GRNLKUP	Performs an individual or range Number Portability lookup on the CdPN to find an entry containing a GRN digit string.
TIF, TIF2, TIF3	CgPNGRNRqd	Performs an individual or range Number Portability lookup on the CgPN to find an entry containing a GRN digit string.
TIFCGPN, TIFCGPN2, TIFCGPN3	GRNLKUP	Performs an individual or range Number Portability lookup on the CgPN to find an entry containing a GRN digit string.

2.5.2.1 TIF CdPN GRNLKUP Service Action Handler

The GRNLKUP Service Action Handler executes the GRNLKUP Service Action associated with a TIF CdPN service (TIF, TIF2, TIF3) to find a CdPN entry containing a GRN digit string.

The TIF CdPN GRNLKUP Service Action and the CgPNGRNRqd Service Action are mutually exclusive in the same Action Set. The CgPNGRNRqd Service Action cannot be specified if a TIF CgPN service is invoked.

Configuration Options Used

None.

Action Performed

The TIF CdPN GRNLKUP Service Action Handler performs an individual or range Number Portability lookup on the conditioned CdPN, to find an entry containing an GRN digit string.

GRNLKUP populates the GRN Formatting Action value with the GRN digit string.

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

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

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

Terminating Action?

This is not a terminating action.

2.5.2.2 TIF GRN CgPNGRNRqd Service Action Handler

The CgPNGRNRqd Service Action Handler executes the CgPNGRNRqd Service Action associated with a TIF CdPN service (TIF, TIF2, TIF3) to find a CgPN entry containing a GRN digit string.

The TIF CdPN GRNLKUP Service Action and the CgPNGRNRqd Service Action are mutually exclusive in the same Action Set. The CgPNGRNRqd Service Action cannot be specified if a TIF CgPN service is invoked using the INVKSERV parameter in the TIF CdPN Service Rule.

Configuration Options Used

None.

Action Performed

The CgPNGRNRqd Service Action Handler performs an individual or range Number Portability lookup on the conditioned CgPN, to find an entry containing a GRN digit string.

CgPNGRNRqd populates the GRN Formatting Action value with the GRN digit string.

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

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

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

Terminating Action?

This is not a terminating action.

2.5.2.3 TIF CgPN GRNLKUP Service Action Handler

The GRNLKUP Service Action Handler executes the GRNLKUP Service Action associated with a TIF CgPN service (TIFCGPN, TIFCGPN2, TIFCGPN3) to find a CgPN entry containing a GRN digit string.

Configuration Options Used

None.

Action Performed

The TIF CgPN GRNLKUP Service Action Handler performs an individual or range Number Portability lookup on the conditioned CgPN, to find an entry containing an GRN digit string.

GRNLKUP populates the TIF CgPN GRN Formatting Action value with the GRN digit string.

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

If the TIF GRNOTHER Formatting Action is provisioned for the TIF CdPN service that invoked the TIF CgPN service, TIF copies the TIF CgPN GRN Formatting Action value to the TIF CdPN GRNOTHER Formatting Action value for use in CdPN formatting. TIF uses the formatted CgPN in the outgoing IAM or the Redirection Number in the outgoing REL message.

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

Terminating Action?

This is not a terminating action.

2.6 TIF Blocklist Features

The TIF Subscriber CgPN Blocklist, TIF Range CgPN Blocklist, and TIF Selective Screening features provide TIF Blocklist capabilities, which help Network Operators reduce significantly or completely prevent spoofing their networks with illegal messages.

The TIF CgPN Blocklist functionality is controlled by the TIF Subscriber CgPN Blocklist feature. The TIF Subscriber CgPN Blocklist (TIF Subscr CgPN Blocklist) feature generates an ISUP Release (REL) message back to the originator of a processed ISUP IAM, based on the Calling Party Number (CgPN), if either of the following scenarios occur:

- The CgPN that is found in the Number Portability is Blocklisted; the CgPN has CgBL flag=YES.
- The CgPN is not found in the Number Portability.

The TIF Range CgPN Blocklist feature generates an ISUP Release (REL) message back to the originator of a processed ISUP IAM, based on the CgPN, if either of the following scenarios occur:

- The CgPN begins with a specific prefix.
- The Calling Party parameter is not present in the IAM or it is present with no digits in it.

The TIF CdPN Blocklist functionality is controlled by the TIF Selective Screening feature. The TIF Selective Screening feature generates an ISUP Release (REL) message back to the originator of a processed ISUP IAM, based on the Called Party Number (CdPN), if any of the following scenarios occur:

- The CdPN that is found in the Number Portability is Blocklisted; the CdPN has CdBL flag = YES.
- The CdPN is not found in Number Portability.
- The CdPN begins with a specific prefix.
- The Called Party is screened by TIF Selective Screening and the Release cause is not *NONE*.

2.6.1 NPP Service Action Data

An NPP Action Set can have optional Service Action Data (SA Data) for one or more Service Actions (SAs) in the Action Set. Not all NPP Service/Service Action combinations support SA Data. The SA Data contains two numerical values: SAxVAL configuration parameter values, where x is the same number as the associated Service Action parameter.

The following table lists the TIF CdPN and TIF CgPN NPP services and Service Actions that support SA Data.

Table 2-8 NPP Service Actions that Support SA Data

NPP Service	Service Action	SA Values (SAxVAL)
TIFCGPN, TIFCGPN2, TIFCGPN3 TIF, TIF2, TIF3	FPFXRLS	Require 2 numerical values for an SAxVAL parameter, one value for ANSI and one value for ITU release causes, respectively. Both values have range 0-127.

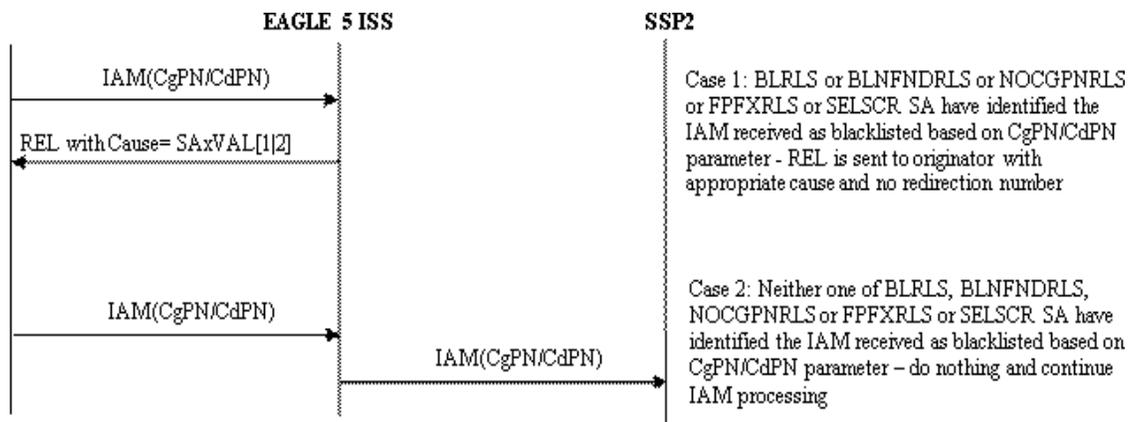
Table 2-8 (Cont.) NPP Service Actions that Support SA Data

NPP Service	Service Action	SA Values (SAxVAL)
TIFCGPN, TIFCGPN2, TIFCGPN3 TIF, TIF2, TIF3	BLRLS	Require 2 numerical values for an SAxVAL parameter, one value for ANSI and one value for ITU release causes, respectively. Both values have range 0-127.
TIFCGPN, TIFCGPN2, TIFCGPN3 TIF, TIF2, TIF3	BLNFNDRLS	Require 2 numerical values for an SAxVAL parameter, one value for ANSI and one value for ITU release causes, respectively. Both values have range 0-127.
TIF, TIF2, TIF3	NOCGPNRLS	Require 2 numerical values for an SAxVAL parameter, one value for ANSI and one value for ITU release causes, respectively. Both values have range 0-127.
TIF, TIF2, TIF3	SELSCR	Require 2 numerical values for an SAxVAL parameter, one value for ANSI and one value for ITU release causes, respectively. Both values have range 0-127. Additionally supports SAxDGTS (range 0-FF) to provision Call Types for CdPN.

2.6.2 TIF Blocklist Message Flow

The following figure shows the basic TIF Blocklist message flow.

Figure 2-25 TIF Blocklist Basic Message Flow



2.6.3 TIF Subscr CgPN Blocklist Feature

The TIF Subscr CgPN Blocklist feature generates an ISUP Release (REL) message back to the originator of a processed ISUP IAM, based on the Calling Party Number (CgPN), if the following UDR based scenarios occur:

- The Calling Party is found in the Number Portability and the CgPN is marked as Blocklisted; the CgPN has CgBL flag=YES.
- The CgPN is not found in the Number Portability.

Two Service Action Data (SA Data) values can be associated with provisioned TIF CgPN Blocklist Service Actions to provide configurable Release Cause values for the Blocklist scenarios. One value is used for ANSI ISUP and the other value is used for ITU ISUP.

TIF Subscr CgPN Blocklist 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 Subscr CgPN Blocklist Service Action Handlers

The TIF Subscr CgPN Blocklist feature provides feature-specific Service Action Handlers for NPP Service Actions. TIF and NPP perform the following functions for the TIF Subscr CgPN Blocklist feature:

- Number Portability lookup
- Interpretation of results from Number Portability lookups
- NPP processing of Service Actions that are used for TIF Subscr CgPN Blocklist
- Post-NPP processing of the outgoing message

The following table provides a summary of the Service Actions used specifically for TIF Subscr CgPN Blocklist.

Table 2-9 Summary of TIF Subscr CgPN Blocklist Service Actions

Service Action	Description	Function	Precedence
BLRLS	TIF CgPN Blocklist in UDR Release	Indicates that a Release (REL) will be generated if the Calling Party is found in the Number Portability and the CgPN contains the CgBL flag=YES.	91
BLNFNDRLS	TIF CgPN not-in-UDR Release	Indicates that a Release (REL) will be generated if the CgPN digits are not found in the Number Portability and finds the CgPN digits.	91

BLRLS Service Action Handler for TIF CgPN UDR-based RELEASE

The BLRLS Service Action Handler indicates that an REL will be sent if Calling Party digits are found in the Number Portability with CgBL=YES.

Configuration Options Used

The provisioned SAxVAL[1] value contains the Release Cause value used in the REL for an IAM ISUP ANSI message; the provisioned SAxVAL[2] value contains the Release Cause value used in the REL for an IAM ISUP ITU message.

Action Performed

The BLRLS Service Action Handler performs a Number Portability lookup and finds the CgPN digits in the Number Portability. If the Calling Party digits in the Number Portability have CgBL=YES, the Service Action Handler indicates that an REL will be sent to the originator of the IAM during post-NPP processing. The REL will contain the provisioned SAxVAL[1] value for the Release Cause if ANSI ISUP, or the provisioned SAxVAL[2] value for the Release Cause if ITU ISUP. The REL will not include a Redirection Number. The original MSU is discarded.

If the TIF Subscr CgPN Blocklist feature is not turned ON or the CgPN is not found in the Number Portability, or if the CgPN is found but is not marked as Blocklisted, the Service Action Handler completes without any changes.

No Formatting Actions are populated.

Terminating Action?

Yes when the subscriber is Blocklisted.

BLNFNDRLS Service Action Handler for TIF CgPN not-in-UDR RELEASE

The BLNFNDRLS Service Action Handler performs a Number Portability lookup and does not find the CgPN digits in the Number Portability.

Configuration Options Used

The provisioned SAxVAL[1] value contains the Release Cause value used in the REL for an IAM ISUP ANSI message; the provisioned SAxVAL[2] value contains the Release Cause value used in the REL for an IAM ISUP ITU message.

Action Performed

If CgPN digits are not found in the Number Portability, the Service Action Handler indicates that an REL will be sent to the originator of the IAM during post-NPP processing. The REL will contain the provisioned SAxVAL[1] value for the Release Cause if ANSI ISUP, or with the provisioned SAxVAL[2] value for the Release Cause if ITU ISUP. The REL will not include a Redirection Number. The original MSU is discarded.

If the TIF Subscr CgPN Blocklist feature is not turned ON or if the CgPN is found in the Number Portability, the Service Action Handler completes without any changes.

No Formatting Actions are populated.

Terminating Action?

Yes

2.6.4 TIF Range CgPN Blocklist Feature

The TIF Range CgPN Blocklist feature generates an ISUP Release (REL) message back to the originator of a processed ISUP IAM, based on the Calling Party Number (CgPN), if the following non-UDR-based scenarios occur:

- The CgPN begins with a specific prefix.
- The Calling Party parameter is not present in the IAM or it is present with no digits in it.

Two Service Action Data (SA Data) values can be associated with provisioned TIF CgPN Blocklist Service Actions to provide configurable Release Cause values for the Blocklist scenarios. The SAxVAL[1] value is used for ANSI ISUP and the SAxVAL[2] value is used for ITU ISUP.

TIF Range CgPN Blocklist 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 Range CgPN Blocklist Service Action Handlers

The TIF Range CgPN Blocklist feature provides feature-specific Service Action Handlers for NPP Service Actions. TIF and NPP perform NPP processing of Service Actions that are used for TIF Range CgPN Blocklist and post-NPP processing of the outgoing message.

The following table provides a summary of the Service Actions used specifically for TIF Range CgPN Blocklist.

Table 2-10 Summary of TIF Range CgPN Blocklist Service Actions

Service Action	Description	Function	Precedence
FPFXRLS	TIF CgPN Blocklist non-UDR Release	Indicates that a Release (REL) will be generated if a matching Calling Party Rule is found in NPP.	92
NOCGPNRLS	TIF CgPN Empty Release	Indicates that a Release (REL) will be generated if the Calling Party parameter is not present in the ISUP IAM or it is present with no digits in it.	80

FPFXRLS Service Action Handler for TIF Prefix CgPN non-UDR-based RELEASE

The FPFXRLS Service Action Handler indicates that an REL will be sent to the originator of the IAM if a matching Calling Party Rule is found by NPP.

The FPFXRLS Service Action is mutually exclusive with all other Service Actions in the same Action Set.

Configuration Options Used

The provisioned SAxVAL[1] value contains the Release Cause value used in the REL for an IAM ISUP ANSI message; the provisioned SAxVAL[2] value contains the Release Cause value used in the REL for an IAM ISUP ITU message.

Action Performed

If the Calling Party prefix is found by NPP, the Service Action Handler indicates that an REL will be sent to the originator of the IAM during post-NPP processing. If the subscriber is marked as Blocklisted, the REL will contain the provisioned SAxVAL[1] value for the Release Cause if ANSI ISUP, or with the provisioned SAxVAL[2] value for the Release Cause if ITU ISUP. The REL will not include a Redirection Number. The original MSU is discarded.

If the TIF Range CgPN Blocklist feature is not turned ON , the Service Action Handler completes without any changes.

No Formatting Actions are populated.

Terminating Action?

Yes

NOCGPNRLS Service Action Handler for TIF Empty CgPN non-UDR-based RELEASE

The NOCGPNRLS Service Action Handler indicates that an REL will be sent to the originator of the IAM if the CgPN is not present in the IAM or the CgPN is present but has no digits in it.

Configuration Options Used

The provisioned SAxVAL[1] value contains the Release Cause value used in the REL for an IAM ISUP ANSI message; the provisioned SAxVAL[2] value contains the Release Cause value used in the REL for an IAM ISUP ITU message.

Action Performed

If CgPN digits are not present in the MSU, the Service Action Handler indicates that an REL will be sent to the originator of the IAM during post-NPP processing. If the subscriber is marked as Blocklisted, the REL will contain the provisioned SAxVAL[1] value for the Release Cause if ANSI ISUP, or with the provisioned SAxVAL[2] value for the Release Cause if ITU ISUP. The REL will not include a Redirection Number. The original MSU is discarded.

If the TIF Range CgPN Blocklist feature is not turned ON or if the CgPN in the processed MSU contains digits, the Service Action Handler completes without any changes.

No Formatting Actions are populated.

Terminating Action?

Yes when the subscriber is Blocklisted.

2.6.5 TIF Selective Screening Feature

The TIF CdPN Blocklist functionality is controlled by the TIF Selective Screening feature. The TIF Selective Screening feature generates an ISUP Release (REL) message back to the originator of a processed ISUP IAM, based on the Called Party Number (CdPN), if the following scenarios occur:

- The CdPN that is found in the Number Portability is Blocklisted; the CdPN has CdBL flag = YES.
- The CdPN is not found in Number Portability.
- The CdPN begins with a specific prefix.
- The Called Party is screened by TIF Selective Screening and the Release cause is not *NONE*.

Three Service Action Data (SA Data) values can be associated with provisioned TIF Selective Screening Service Actions to provide configurable Release Cause values for the Blocklist scenarios. The SAxVAL[1] value is used to indicate the Release Cause for ANSI ISUP; the SAxVAL[2] value is used to indicate the Release Cause for ITU ISUP. The SAxDGTS parameter indicates the Call Type for CdPNs that match the associated NPP Rule.

TIF Selective Screening 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 Selective Screening Service Action Handlers

The TIF Selective Screening feature provides feature-specific Service Action Handlers for NPP Service Actions. TIF and NPP perform the following functions for the TIF Selective Screening feature:

- Number Portability lookup
- Interpretation of results from Number Portability lookups
- NPP processing of Service Actions that are used for TIF Selective Screening
- Post-NPP processing of the outgoing message

Table 2-11 provides a summary of the Service Actions used for TIF Selective Screening.

Table 2-11 Summary of TIF Selective Screening Service Actions

Service Action	Description	Function	Precedence
BLRLS	TIF CdPN Blocklist in UDR-based Release	Indicates that a Release (REL) message will be generated if the Called Party is found in the Number Portability and the CdPN contains the CdBL flag=YES	91
BLNFNDRLS	TIF CdPN not-in-UDR Release	Indicates that a Release (REL) message will be generated if a matching Called Party number is not found in the Number Portability	91
FPFXRLS	TIF Pfx CdPN Release (non-UDR based)	Indicates that a Release (REL) message will be generated if a matching Called Party rule is found by NPP	92
SELSCR	TIF CdPN UDR-based Selective Screening	Indicates that the message is selectively screened based on CdPN and CgPN Call Types	91

BLRLS Service Action Handler for TIF Selective Screening (CdPN) UDR-based RELEASE

The BLRLS Service Action Handler indicates that a Release (REL) message will be sent if Called Party digits are found in the Number Portability with CdBL=YES.

Configuration Options Used

TIFOPTS options SAxVAL[1] and SAxVAL[2] contain the Release Cause value used in the Release (REL) message for an IAM ISUP ANSI message and an IAM ISUP ITU message.

Action Performed

The BLRLS Service Action Handler performs an Number Portability lookup and finds the CdPN digits in the Number Portability. If the Called Party digits in the Number Portability have CdBL=YES, the Service Action Handler indicates that a Release (REL) message will be sent to the originator of the IAM during post-NPP processing. The Release (REL) message will contain the provisioned SAxVAL[1] value for the Release Cause if ANSI ISUP, or the provisioned SAxVAL[2] value for the Release Cause if ITU ISUP. The REL will not include a Redirection Number. The original MSU is discarded.

If the TIF Selective Screening feature is not turned on, the CdPN is not found in the Number Portability, or the CdPN is found but is not marked as Blocklisted, the Service Action Handler completes without any changes.

No Formatting Actions are populated.

Terminating Action?

Yes, when the subscriber is marked as Blocklisted.

BLNFNDRLS Service Action Handler for TIF Selective Screening (CdPN) not-in-UDR RELEASE

The BLNFNDRLS Service Action Handler performs a Number Portability lookup and does not find the CdPN digits in the Number Portability.

Configuration Options Used

TIFOPTS options SAxVAL[1] and SAxVAL[2] contain the Release Cause value used in the Release (REL) message for an IAM ISUP ANSI message and an IAM ISUP ITU message.

Action Performed

If CdPN digits are not found in the Number Portability, the Service Action Handler indicates that a Release (REL) message will be sent to the originator of the IAM during post-NPP processing. The Release (REL) message will contain the provisioned SAxVAL[1] value for the Release Cause if ANSI ISUP, or the provisioned SAxVAL[2] value for the Release Cause if ITU ISUP. The REL will not include a Redirection Number. The original MSU is discarded.

If the TIF Selective Screening feature is not turned on, the CdPN is not found in the Number Portability, or the CdPN is found but is not marked as Blocklisted, the Service Action Handler completes without any changes.

No Formatting Actions are populated.

Terminating Action?

Yes.

FPFXRLS Service Action Handler for TIF Prefix CdPN non-UDR-based RELEASE

The FPFXRLS Service Action Handler indicates that a Release (REL) message will be sent to the originator of the IAM if a matching Called Party Rule is found by NPP.

The FPFXRLS Service Action is mutually exclusive with all other Service Actions in the same Action Set.

Configuration Options Used

TIFOPTS options SAxVAL[1] and SAxVAL[2] contain the Release Cause value used in the Release (REL) message for an IAM ISUP ANSI message and an IAM ISUP ITU message.

Action Performed

If the Called Party prefix is found by NPP, the Service Action Handler indicates that a Release (REL) message will be sent to the originator of the IAM during post-NPP processing. If the subscriber is marked as Blocklisted, the Release (REL) message will contain the provisioned SAxVAL[1] value for the Release Cause if ANSI ISUP, or with the provisioned SAxVAL[2] value for the Release Cause if ITU ISUP. The Release (REL) message will not include a Redirection Number. The original MSU is discarded.

If the TIF Range CdPN Blocklist feature is not turned ON , the Service Action Handler completes without any changes.

No Formatting Actions are populated.

Terminating Action?

Yes.

SELSCR Service Action Handler for TIF CdPN UDR-based Selective Screening

The SELSCR Service Action Handler Indicates that the message is selectively screened based on CdPN and CgPN Call Types.

Configuration Options Used

TIFOPTS options SAxVAL[1] and SAxVAL[2] contain the Release Cause value used in the Release (REL) message for an IAM ISUP ANSI message and an IAM ISUP ITU message. TIFOPTS options SAxDGTS indicate the Call Type for CdPNs that match the associated NPP Rule.

Action Performed

If the CdPN is screened by the TIF selective screening process, the TIF selective screening post-processing checks whether the SAxVAL values are provisioned with SELSCR Service Action in the TIF NPP Service. If the SAxVAL is provisioned for the incoming ISUP message type, then the ISUP RELEase (REL) message is generated with the RELEase cause provisioned in SAxVAL.

If the SAxVAL is not provisioned (*None*) for the incoming ISUP message type, then the ISUP message is relayed to the destination point code in the incoming message (original DPC). The CdPN and CgPN parameters in the ISUP message are formatted based on the respective FASCRCd and FASCRCG formatting list values provisioned in the NPP Action Set associated with TIF NPP Service.

Terminating Action?

No

2.6.5.1 TIF Selective Screening Call Types

The TIF Selective Screening process is based on Call Types configured for a DN in the Number Portability. The Call Types of a DN are a list of numerical values in the range of 1-254, 255, and 0. The zero (0) value indicates that the specific Call Type is *not provisioned*. The 255 value (hexadecimal 0xFF) of the first Call Type, which is the first byte of the digit string, indicates a wild card (any/*). Only the first number in the set of eight numbers can be provisioned with this wild card value of 255 (any/*) because the following seven numbers will be ignored. Any other Call Type except the first Call Type provisioned as 255 (0xFF/any/*) will be treated as *not provisioned*.

The Call Types for a DN are stored in the Number Substitution DN field. The Number Substitution DN field for the DN is stored in the Number Portability. The Number Substitution DN field is a 15-digit digit string, with two digits stored per byte for a total of eight bytes). This allows provisioning seven 1-byte Call Types and one 4-bit Call Type for a total of eight possible Call Types per DN. The first seven Call Types a range from 1 till 254, and the eighth Call Type can have a value between 1 and 15. The Call Types are provisioned as hexadecimal digits: the first 7 Call Types are one-byte-long Call Types - as a pair of hexadecimal digits, and the last - eighth Call Type - as a single hexadecimal digit.

The Call Type for CdPN can also be configured with NPP rules for TIF NPP Service. The SELSCR Service Action is associated with the configurable SAxDGTS parameter. A single Call Type (0x0 - 0xFF) can be configured in the SAxDGTS field corresponding to the SELSCR Service Action in the NPP Action Set.

The Call Types configured in the SAxDGTS parameter take precedence over the Call Types configured in the Number Substitution DN field. If the Call Type for the CdPN is configured in the SAxDGTS field, then the Call Types configured in the Number Portability are not

considered for the CdPN. The Call Types for CgPN are always fetched from Number Portability.

Only the first Call Type configured for the CdPN in Number Portability is considered for Selective Screening. If more than one Call Type is configured for the CdPN in Number Portability, then the rest of the Call Types after the first Call Type are ignored.

2.6.6 TIF Blocklist Post-NPP Processing

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

- If the IAM MSU is marked as Blocklisted, TIF generates a Release MSU with the Release Cause value obtained by a Service Action that identified this MSU as Blocklisted, and sends the RElease MSU to the originator of the incoming IAM.
- If the IAM MSU is not marked as Blocklisted, the IAM message is relayed intact.

2.6.7 TIF Linkset Based Blocklist Feature

The TIF Linkset Based Blocklist functionality enables a misused user to still make legitimate calls in case it is blocked on a particular linkset. The Blocklisted information for each number includes the Blocklisted SetID. Therefore, all the messages arriving on vSTP are screened with the following combination:

- The Blocklisted SetID referred in incoming linkset
- The Blocklisted SetID configured in UDR

This functionality enables a misused user to still make legitimate calls in case it is blocked on a particular linkset.

The following table provides a summary of the Service Action used specifically for TIF Linkset Based Blocklist:

Table 2-12 Summary of TIF Linkset Based Blocklist Service Actions

Service Action	Description	Function	Precedence
TIFLSBL	CgPN Service Action	Indicates that a Release should be generated if the blocklisted SetID (CgPNBLSet) configured with the incoming linkset matches with the blocklisted SetID configured against the DN in the UDR	91

Configuration Options Used

No specific configuration options are used.

Action Performed

Indicates that a Release should be generated if the blocklisted SetID (CgPNBLSet) configured with the incoming linkset matches with the blocklisted SetID configured against the DN in the UDR. If Similar SetID (CgPNBLSet) is found in linkset table after the UDR lookup, indicate that a Release for TIFLSBL should be sent.

Terminating Action

Yes

2.6.8 TIF Generic Name Based Screening Feature

The TIF Generic Name Based Screening functionality stores the blocklisted information for a particular name arriving from a specific linkset (National or International) on vSTP. Therefore, any message arriving on vSTP are screened with the combination of name and linkset from which it is arriving. This enables users to block any span calls with different names.

The following table provides a summary of the Service Action used specifically for TIF Generic Name Based Screening.

Table 2-13 Summary of TIF Generic Name Based Blocklist Service Actions

Service Action	Description	Function	Precedence
TIFGNBL	CgPN Service Action	Indicates that a Release should be generated if the generic name present in IAM message is available in the Generic name table with a certain combination of linkset type.	90

Configuration Options Used

No specific configuration options are used.

Action Performed

Indicate that a Release for TIFGNBL should be sent when a similar Generic name is found in the Generic Name table with the same combination of the following parameters:

- The `settype` parameter in Generic name table
- The `gnameset` parameter in linkset table

Terminating Action

Yes

2.6.9 TIF Redirecting-Number Based Blocklist Feature

The TIF Redirecting-Number Based Blocklisting Feature allows modifying CdPN based on the redirecting number, if present in the incoming message.

If the redirecting number is found in the incoming message, then it is decoded. UDR lookup is executed to check the presence of ASD with RDN as a key. If the SUBCDPN parameter is configured, the number substitutes the CdPN digits instead of ASD.

The following table provides a summary of the Service Action used specifically for TIF Redirecting-Number Based Blocklist.

Table 2-14 Summary of TIF Redirecting-Number Based Blocklist Service Actions

Service Action	Description	Function	Precedence
TIFRDNBL	CdPN Service Action	Sets the NPPSTATE . ASD field if an individual or range lookup on the Redirecting Number or CgPN leads to an entry containing a non-empty ASD digit string. And substitutes SUBCDPN digits instead of ASD digits in-case the lookup was performed on Redirecting-Number.	90

Configuration Options Used

No specific configuration options are used.

Action Performed

The redirecting number is decoded from the IAM message received. If redirecting number is present in IAM and the applied Service Action is TIFRDNBL, UDR is queried with the redirecting number as a key. However, if redirecting number is not present in IAM, UDR is queried using the original CgPN digits as a key.

If ASD is returned from UDR, it is stored in NPPSTATE.ASD, which is used during the processing of FA, when FA is equal to ASD. If ASD is found corresponding to CgPN in UDR, ASD digits are used to replace CdPN in outgoing digits. However, if ASD is found corresponding to RDN in UDR, SUBCDPN digits are used to replace CdPN in outgoing digits.

If there is no redirecting number available in IAM or any of the criteria for RDN is not met, then the functionality remains same as CgPNASDRqd.

Terminating Action

Yes

3

TIF Feature Configuration

This section provides procedures to configure the TIF feature.

TIF is configured using the vSTP managed objects. The MMI API contains details about the URI, an example, and the parameters available for each managed object.

3.1 MMI Managed Objects for TIF Support

MMI information associated with TIF support is accessed from a DSR NOAM or SOAM from **Main Menu**, and then **MMI API Guide**.

Once the *MMI API Guide* displays, use the application navigation to locate specific vSTP managed object information.

The following table lists the managed objects and operations supported for vSTP TIF Support feature:

Table 3-1 vSTP TIF Support Managed Objects and Supported Operations

Managed Object Name	Supported Operations
Generic Name	Insert, Update, Delete
Linksets	Insert, Update, Delete
MtpScreeningRules	Insert, Update, Delete
NppActionSet	Insert, Update, Delete
NppServiceRuleSet	Insert, Update, Delete
NppServices	Display, Update
RemoteSignalingPoints	Insert, Update, Delete
TIFOptions	Display, Update

genericname - Insert, Update, Delete

Using Generic name, you can block messages with specific generic name on certain linkset.

Example output for Display:

```
{  
  "gname": "gname1",  
  "settype": "Both"  
}
```

linkset - Insert, Update, Delete

A Link Set is a logical element representing link attributes assigned to a Link (/vstp/links) and a far-end point assigned to a Route (/vstp/routes).

Example output for Display:

```
{
    "asNotification": true,
    "asls8": false,
    "cgGtmod": false,
    "cgpnblSet": "None",
    "configurationLevel": "16",
    "enableBroadcastException": false,
    "gnameset": "Both",
    "gttmode": "Sysdflt",
    "islsrsb": 1,
    "ituTransferRestricted": false,
    "l2TimerSetName": "Default",
    "l3TimerSetName": "Default",
    "linksetAccMeasOption": "No",
    "localSignalingPointName": "LSP2",
    "maximumLinkTransactionsPerSecond": 4000,
    "name": "LS01",
    "numberSignalingLinkAllowedThreshold": 1,
    "numberSignalingLinkProhibitedThreshold": 1,
    "randsls": "Off",
    "remoteSignalingPointName": "RSP2",
    "reservedLinkTransactionsPerSecond": 4000,
    "rsls8": false,
    "securityLogging": "Off",
    "slsci": false,
    "slsrsb": 1,
    "smsProxy": "Off",
    "type": "M3ua"
}
```

MtpScreeningRules - Insert, Update, Delete

Sample JSON to configure MTPScreeningRules named *mtpscrule*:

```
/vstp/mtpscreeningrules -v POST -r mtpscrule.json
{
    "networkIndicatorCode": "0-2",
    "nsfi": "Stop",
    "ruleName": "rule1",
    "priority": "2",
    "scrRuleGroupType": "Sio",
    "scrRuleGroupName": "scr2",
    "serviceIndicator": "5",
    "actionIsup": "Tif_Ruleset_2",
    "actionSccp": false
}
```

Execute following command on Active SOAM to insert:

```
/vstp/mtpscreeningrules -v POST -r mtpscrule.json
```

NppActionSet - Insert, Update, Delete

A Numbering Plan Processor (NPP) Action Set is a collection of Conditioning Actions (CAs), Service Actions (SAs), and Formatting Actions (FAs).

Create a JSON file with the following content:

```
{
    "actSetName": "as2",
    "caList": [
        "Cc2",
        "Ac2",
        "Snx"
    ],
    "faList": [
        "Cc",
        "Ac"
    ],
    "fascrcg": [
        "Dlmb",
        "Dlma"
    ],
    "ofnai": "Inc",
    "saldgts": "ab",
    "salval": [
        10,
        40
    ],
    "saList": [
        "Selscr"
    ]
}
```

Execute following command on Active SOAM to insert :

```
/vstp/nppactionsets -v POST -r <filename>.json
```

Example Output:

```
{
    "actSetName": "as2",
    "caList": [
        "Cc2",
        "Ac2",
        "Snx"
    ],
    "faList": [
        "Cc",
        "Ac"
    ],
    "fascrcg": [
        "Dlmb",
```

```
        "Dlma"  
    ],  
    "ofnai": "Inc",  
    "saldgts": "ab",  
    "salval": [  
        10,  
        40  
    ],  
    "saList": [  
        "Selscr"  
    ]  
}
```

NppServiceRuleSet - Insert, Update, Delete

Create a JSON file with the following content:

```
{  
    "asn": "as2",  
    "fdl": "12",  
    "fnai": "Intl",  
    "fpfx": "*",  
    "invkserv": "None",  
    "srvn": "Tif"  
}
```

Execute following command on Active SOAM to insert :

```
/vstp/nppservicerulesets -v POST -r <Filename>.json
```

Example Output:

```
{  
    "asn": "as2",  
    "fdl": "12",  
    "fnai": "Intl",  
    "fpfx": "*",  
    "invkserv": "None",  
    "srvn": "Tif"  
}
```

NPP Services - Insert, Update, Delete

Create a JSON file with the following content:

```
{  
    "dlma": "33",  
    "dlmb": "None",  
    "dlmc": "None",  
    "dlmd": "None",  
    "dlme": "None",  
}
```

```
"dlmf": "None",  
"dlmg": "None",  
"dlmh": "None",  
"dlmi": "None",  
"dlmj": "None",  
"dlmk": "None",  
"dlml": "None",  
"dlmm": "None",  
"dlmn": "None",  
"dlmo": "None",  
"dlmp": "None",  
"intl": "4",  
"nai1": "1",  
"nai2": "2",  
"nai3": "3",  
"nat1": "3",  
"ruleCount": 0,  
"sdwcCount": 0,  
"srvn": "Tif",  
"status": "On",  
"unkn": 0  
}
```

Execute following command on Active SOAM to update:

```
/vstp/nppservices -v PUT -r <Filename>.json
```

Example Output:

```
{  
    "dlma": "33",  
    "dlmb": "None",  
    "dlmc": "None",  
    "dlmd": "None",  
    "dlme": "None",  
    "dlmf": "None",  
    "dlmg": "None",  
    "dlmh": "None",  
    "dlmi": "None",  
    "dlmj": "None",  
    "dlmk": "None",  
    "dlml": "None",  
    "dlmm": "None",  
    "dlmn": "None",  
    "dlmo": "None",  
    "dlmp": "None",  
    "intl": "4",  
    "nai1": "1",  
    "nai2": "2",  
    "nai3": "3",  
    "nat1": "3",  
    "ruleCount": 0,  
    "sdwcCount": 0,  
}
```

```
"srvn": "Tif",  
"status": "On",  
"unkn": 0  
}
```

RemoteSignalingPoints - Insert, Update, Delete

Create a JSON file with the following content:

```
{  
    "configurationLevel": "381",  
    "enableBroadcastException": true,  
    "mtpPointCode": "012-160-014",  
    "name": "rspl",  
    "nprst": "On",  
    "rcause": "100",  
    "splitiam": "20",  
    "ss7DomainType": "Ansi"  
}
```

Execute following command on Active SOAM to insert :

```
/vstp/remotesignalingpoints -v POST -r <Filename>.json
```

Example Output:

```
{  
    "configurationLevel": "381",  
    "enableBroadcastException": true,  
    "mtpPointCode": "012-160-014",  
    "name": "rspl",  
    "nprst": "On",  
    "rcause": "100",  
    "splitiam": "20",  
    "ss7DomainType": "Ansi"  
}
```

TIFOptions - Display, Update

The Trigger less ISUP Framework (TIF) Options are those configuration values that govern the overall TIF Framework. There is a single instance of this resource, which contains each of the individual options that can be retrieved and set. Because there is no collection of instances, there is no collection GET action. No new TIF Options resource can be created, so there is no POST action, and the single instance cannot be removed, so there is no DELETE action. The single instance GET is used to retrieve the options, and PUT is used to update one or more values within the set of options. A name for this single, non-deletable instance is neither required nor expected.

Execute following command on Active SOAM to update :

```
/vstp/tifoptions -v PUT -r <Filename>.json
```

Example Output:

```

{
    "condcgpn": "None",
    "condrdn": "None",
    "crprel": 31,
    "dfltrn": "None",
    "dlma": "None",
    "dlmb": "None",
    "dlmc": "None",
    "iamcgpn": "Dn",
    "matchseq": "Dn",
    "npflag": "None",
    "nptypecgpn": "Sprn",
    "nptyperls": "Sprn",
    "nptyperly": "Sprn",
    "nsaddldata": "No",
    "nspublic": 0,
    "rcausenp": 0,
    "rcausepfx": 0,
    "rlcopc": "Off",
    "rnrqd": "Yes",
    "sncgpnflt": "None",
    "spfill": "Off",
    "splitiam": "None",
    "subcdpn": "None"
}

```

3.2 Alarms and Measurements

Alarms and Events

The following table lists the Alarms and Events specific to TIF feature:

Alarm/ Event ID	Name
70423	Unexpected SI in TIF Stop Action
70424	Modified MSU too large to route
70425	ISUP IAM decode failed
70426	ISUP IAM Cld Pty decode failed
70427	ISUP encode failed
70428	TIF CgPN NS Failure: CC mismatch in DN

For more details related to Alarms and Events, refer to Alarms and KPIs Reference document.

Measurements

The following table lists the measurements specific to the TIF feature:

Measurement ID	Measurement Name
21921	VstpTinpMsgRcv
21922	VstpTinpMsgGen

Measurement ID	Measurement Name
21923	VstpTinpErr
21924	VstpTifRelease
21925	VstpTifNotFoundDnRelease
21926	VstpTifPfxRelease
21927	VstpTifNoCgpnRelease
21928	VstpTifSelscrRelease
21929	VstpTifSelscrRelay
21930	VstplsupCAAvgProcessTime
21931	VstplsupCAMaxProcessTime
21932	VstplsupInternalError
21933	VstplsupCADecodeFail
21934	VstplsupCATimeOut
21936	VstplsupCAProcessTime
21949	VstpTifLinksetBlacklistRel
21950	VstpTifGenericNameBlacklistRel
21951	VstpTifRdnBlacklistRly

For more details related to measurements, refer to Measurement Reference document.

3.3 UDR Configuration for TIF

Before performing any TIF service configuration, the UDR connection must be configured. Configuring UDR for TIF involves adding vSTP MP(s) to UDR and then configuring UDR on the ComAgent server.

This procedure assumes:

- the user is aware of UDR and ComAgent functionality, and
- UDR is already installed and UDR topology is already configured

Note:

UDR does not support Hexadecimal digits.

1. Add details about the vSTP MP on the ComAgent Remote Servers screen as a client by navigating to **Communication Agent**, and then **Configuration**, and then **Remote Servers** and clicking **Insert** on an active OCUDR NOAMP.
2. Select the OCUDR server group from the *Available Local Server Groups* that needs to communicate with vSTP MP.
3. From the active OCUDR GUI, navigate to **Communication Agent**, and then **Maintenance**, and then **Connection Status** and verify connection are *InService*.
4. From the active OCUDR GUI, navigate to **Communication Agent**, and then **Maintenance**, and then **Routed Services Status** and verify the *STPDbSvc* status is *Normal*.

5. From an active DSR NOAM, navigate to **Communication Agent**, and then **Configuration**, and then **Remote Servers** and click **Insert**.
6. Add the UDR NO IP in the ComAgent Remote Server screen as a Server.
7. Select the STP MP server group from the *Local SG* that needs to communicate with UDR.
8. Also add the Standby and DR NOs to the Local SG.
9. Navigate to **Communication Agent**, and then **Configuration**, and then **Connection Groups**, select *STPSvcGroup* and click **Edit**.
10. Add all available UDR NO servers.
11. Navigate to **Communication Agent**, and then **Maintenance**, and then **Connection Status**, select the server name, and check the connection status.
12. On UDR NOAM, navigate to **UDR**, and then **Subscriber Entity Configuration**, and then **Transparent Entity**, select **Base field set**.
13. Select the **Subscriber** and click on **Edit** button.
14. Click on **Add Field** and define the following field values as follows:
 - **NSC** - Set **Type** as **Integer**
 - **NSA** - Set **Type** as **String**
15. Click on the **Ok** button.

UDR Configuration: SOAP Provisioning Request for IMSI

Here's an example of provisioning TIF data with the Type as RNID and GRNID in an individual MSISDN:

Adding GRNID

Insert:

```
<req name="insert" resonly="y" inputType="mnpGrnId">
  <ent name="Subscriber"/>
  <set>
    <expr><attr name="GRNID"/><value val="10000"/></expr>
    <expr><attr name="MnpDataGRN"/><op value="="/>
      <CDATA[&lt;![CDATA[<?xml version="1.0" encoding="UTF-8"?>
        <MnpGRN>
          <EDigit>10000</EDigit>
          <RI>1</RI>
          <PC>111-222-333</PC>
          <PCDom>ansi</PCDom>
          <SSN>3</SSN>
          <SRFIMSI>22222222</SRFIMSI>
          <DigAct>INSERTENTITYID</DigAct>
        </MnpGRN>]]&gt;
      </CDATA>
    </expr>
  </set>
</req>
```

Adding SPRNID

```
<req name="insert" resonly="y" inputType="mnpSprnId">
  <ent name="Subscriber"/>
```

```

<set>
  <expr><attr name="SPRNID"/><value val="68547777"/></expr>
  <expr><attr name="MnpDataSPRN"/><op value="="/>
    <cdata>&lt;![CDATA[<?xml version="1.0" encoding="UTF-8"?>
      <MnpSPRN>
        <Type>RN</Type>
        <EDigit>68547777</EDigit>
        <RI>0</RI>
        <PC>111-222-444</PC>
        <PCDom>ansi</PCDom>
        <SSN>3</SSN>
        <SRFIMSI>11111111</SRFIMSI>
        <DigAct>INSERTENTITYID</DigAct>
      </MnpSPRN>]]&gt;
    </cdata>
  </expr>
</set>
</req>

```

Adding MNP Subscriber with SPRNID & GRNID

```

<req name="insert" resonly="y" inputType="mnpSubscriber">
  <ent name="Subscriber"/>
  <set>
    <expr><attr name="MSISDN"/><value val="22222222333"/></expr>
    <expr><attr name="CLDBL"/><value val="1"/></expr>
    <expr><attr name="CLNBL"/><value val="1"/></expr>
    <expr><attr name="PType"/><value val="1"/></expr>
    <expr><attr name="ASD"/><value val="abcd"/></expr>
    <expr><attr name="SPRNID"/><value val="68547777"/></expr>
    <expr><attr name="GRNID"/><value val="10000"/></expr>
    <expr><attr name="NSC"/><value val="685477"/></expr>
    <expr><attr name="NSA"/><value val="abcd"/></expr>
    <expr><attr name="LSBLSET"/><value val="7"/></expr>
  </set>
</req>

```

4

Troubleshooting

In case of error scenarios, the measurements specific to TIF feature are pegged. For information related to TIF measurements, see [TIF Alarms and Measurements](#).

5

Dependencies

The TIF feature has no dependency on any other vSTP operation.

The UDR connection must be configured before any service configuration.