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Numbering Plan Processor (NPP) User's Guide

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Oracle Communications EAGLE Numbering Plan Processor (NPP) User's Guide, Release 46.4

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Chapter 1

Introduction

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- *Scope and Audience.....10*
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This chapter contains a brief description of the Numbering Plan Processor (NPP). The contents include sections about the manual scope, audience, and organization; how to find related publications; and how to contact Oracle for assistance.

Introduction

NPP provides a generic software process used to simplify provisioning of complex numbering plans and execution of digit string manipulation and formatting.

Digit string manipulation common to most features can be organized into three categories:

- Digit string filtering, to select or bypass processing of the string
- Digit string conditioning, to ensure that the string is in International format before Real Time Database RTDB lookup
- Digit string formatting, using provisioned option values and any available results from the RTDB lookup

To address digit string manipulation needs, NPP provides:

- A consistent and flexible interface for number string conditioning and formatting
- A flexible and precise interface for the execution of specific feature logic

The ability to customize feature operation to specific numbering plan requirements enables

- Simple corrective dialing
- Number conditioning
- Operator-specific code deletion and insertion
- Flexible arrangement of numbering plan tokens

Scope and Audience

Numbering Plan Processor (NPP) User's Guide is an introductory and conceptual document for the Numbering Plan Processor. Component definitions, fundamentals, key terms and phrases, and a basic working knowledge of NPP are provided.

This manual describes NPP functions, NPP operation, and commands used for NPP provisioning of criteria and software parameters. Some "examples" scenarios are provided for NPP provisioning and for validating the provisioning. Details of the use of NPP for specific features are described in the Feature Manual for each feature.





Audience

This overview document is intended for Oracle Communications EAGLE users who will benefit from an overall understanding of NPP and the concept of NPP relative to EAGLE features. Users of this document are expected to have a working knowledge of telecommunications in general, and EAGLE specifically.

Documentation Admonishments

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

Table 1: Admonishments

Icon	Description
 DANGER	Danger: (This icon and text indicate the possibility of <i>personal injury</i> .)
 WARNING	Warning: (This icon and text indicate the possibility of <i>equipment damage</i> .)
 CAUTION	Caution: (This icon and text indicate the possibility of <i>service interruption</i> .)
 TOPPLE	Topple: (This icon and text indicate the possibility of <i>personal injury and equipment damage</i> .)

Manual Organization

This document is organized into the following chapters:

- [Introduction](#) contains a brief description of the Numbering Plan Processor (NPP). The contents include section about the manual scope, audience, and organization; how to find related publications; and how to contact Oracle for assistance.
- [NPP Overview](#) describes the overall structure and operation of NPP.
- [Filters](#) describes how to define and use Filters to identify incoming digit strings for NPP processing.
- [Action Sets](#) describes the components and functions of Action Sets, the relationship between the components of an Action Set, and execution of the components of an Action Set.
- [Rules and Service Rule Sets](#) describes how Filters and Action Sets combine to form Rules, and how Rules form Service Rule Sets.
- [NPP Provisioning and NPP Test Service](#) describes commands and procedures used for provisioning NPP components, and describes the use of the NPP Test service to define and validate Service Rule Sets without affecting live traffic.

My Oracle Support (MOS)

MOS (<https://support.oracle.com>) is your initial point of contact for all product support and training needs. A representative at Customer Access Support (CAS) can assist you with MOS registration.

Call the CAS main number at 1-800-223-1711 (toll-free in the US), or call the Oracle Support hotline for your local country from the list at <http://www.oracle.com/us/support/contact/index.html>. When calling, make the selections in the sequence shown below on the Support telephone menu:

1. Select **2** for New Service Request
2. Select **3** for Hardware, Networking and Solaris Operating System Support
3. Select one of the following options:
 - For Technical issues such as creating a new Service Request (SR), Select **1**
 - For Non-technical issues such as registration or assistance with MOS, Select **2**

You will be connected to a live agent who can assist you with MOS registration and opening a support ticket.

MOS is available 24 hours a day, 7 days a week, 365 days a year.

Emergency Response

In the event of a critical service situation, emergency response is offered by the Customer Access Support (CAS) main number at 1-800-223-1711 (toll-free in the US), or by calling the Oracle Support hotline for your local country from the list at <http://www.oracle.com/us/support/contact/index.html>. The emergency response provides immediate coverage, automatic escalation, and other features to ensure that the critical situation is resolved as rapidly as possible.

A critical situation is defined as a problem with the installed equipment that severely affects service, traffic, or maintenance capabilities, and requires immediate corrective action. Critical situations affect service and/or system operation resulting in one or several of these situations:

- A total system failure that results in loss of all transaction processing capability
- Significant reduction in system capacity or traffic handling capability
- Loss of the system's ability to perform automatic system reconfiguration
- Inability to restart a processor or the system
- Corruption of system databases that requires service affecting corrective actions
- Loss of access for maintenance or recovery operations
- Loss of the system ability to provide any required critical or major trouble notification

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

Related Specifications

For information about additional publications that are related to this document, refer to the Oracle Help Center site. See [Locate Product Documentation on the Oracle Help Center Site](#) for more information on related product publications.

Customer Training

Oracle University offers training for service providers and enterprises. Visit our web site to view, and register for, Oracle Communications training:

<http://education.oracle.com/communication>

To obtain contact phone numbers for countries or regions, visit the Oracle University Education web site:

www.oracle.com/education/contacts

Locate Product Documentation on the Oracle Help Center Site

Oracle Communications customer documentation is available on the web at the Oracle Help Center (OHC) site, <http://docs.oracle.com>. You do not have to register to access these documents. Viewing these files requires Adobe Acrobat Reader, which can be downloaded at <http://www.adobe.com>.

1. Access the Oracle Help Center site at <http://docs.oracle.com>.
2. Click **Industries**.
3. Under the Oracle Communications subheading, click the **Oracle Communications documentation** link.
The Communications Documentation page appears. Most products covered by these documentation sets will appear under the headings "Network Session Delivery and Control Infrastructure" or "Platforms."
4. Click on your Product and then the Release Number.
A list of the entire documentation set for the selected product and release appears.
5. To download a file to your location, right-click the **PDF** link, select **save target as** (or similar command based on your browser), and save to a local folder.

Chapter 2

NPP Overview

Topics:

- [NPP Overview.....15](#)

This chapter describes the components of NPP and provides examples and scenarios for using the components in NPP processing.

NPP Overview

EAGLE features and functions (referred to as "calling services") invoke NPP to process an incoming digit string, apply service-specific behaviors based on the digit string, and to produce an outgoing digit string in the desired conditioned format. The features and functions that use NPP and their calling services are listed in [Table 18: NPP Services](#).

EAGLE commands provide the ability to provision numbering plan processing criteria to cause digit string conditioning and formatting and specific processing to take place. See [NPP Provisioning and NPP Test Service](#).

For an incoming digit string that does not match specified conditioning and formatting criteria, NPP allows the original incoming digit string to pass through the system without numbering plan processing.

NPP is a rules-based engine providing the ability to specify:

- **Action Sets** (consisting of Conditioning Actions for the digit string, Service Actions for feature-specific logic, and Formatting Actions for digit string formatting)
- **Filters** (to classify a digit string based on NAI, digit string patterns, and length of digit string)
- **Rules** (to associate a Filter with an Action Set)
- **Service Rule Set** (a set of Rules for a specific service)

The high-level NPP call flow for an incoming number and an outgoing number is:

1. NPP receives the incoming message as an incoming digit string, with an NAI.
2. NPP recognizes the NAI and selects a Rule based on the incoming digit string and a corresponding filter NAI (FNAI) value.
3. NPP executes Conditioning Actions to extract digits from the digit string to be used for Service Actions and Formatting Actions.
4. NPP produces an outgoing digit string to pass back to the calling service or to a specified destination.

[Figure 1: NPP Operation Overview](#) shows the high-level events and sequence of NPP operation.

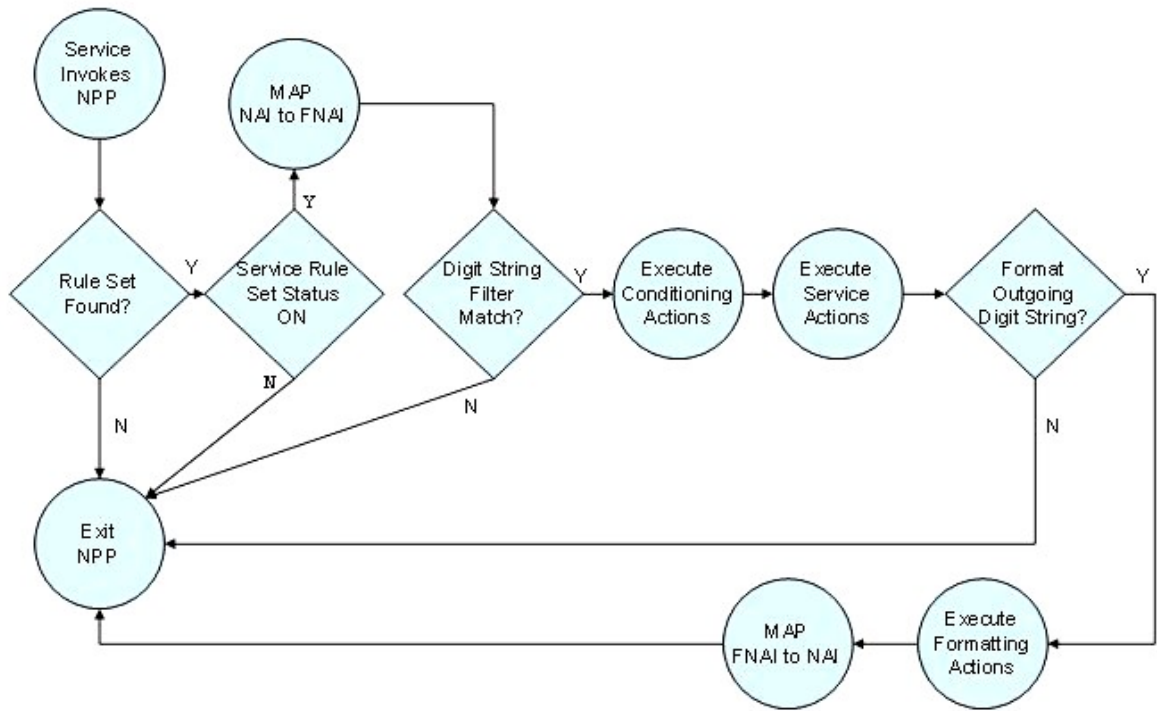


Figure 1: NPP Operation Overview

Chapter 3

Filters

Topics:

- [Filters.....18](#)
- [Filter Search Execution.....20](#)

This chapter provides a high level description of NPP Filters.

When a service calls NPP to process an incoming digit string, an NPP Filter is used to determine that the digit string will be processed by NPP.

Filters

NPP uses Filters to identify incoming digit strings that need NPP processing for a service. When a digit string matches a defined filter, the digit string is processed by NPP. If the digit string does not match a Filter, the digit string exits NPP as it originally entered.

An NPP Filter is composed of the following three components:

- Filter Nature of Address Indicator (FNAI) class - maps to generic (international, national, and unknown) and service-specific NAI values for determining applicable digit string formatting.
- Filter Prefix (FPFX) - Hexadecimal digit string pattern or prefix that can occur at the beginning of an incoming digit string. See section [Searching NPP Filters with Wildcard Values](#) for more information about wildcard values.
 - Can be a wildcard (*) value to indicate that all digits match the Filter.
 - When the NPP Unlimited SDWC Chars feature is turned on, can contain up to 3 single digit wildcard characters (?) in the first 6 digits, to indicate that any digit in that position in the string is a match. (The last digit cannot contain a single digit wildcard character if the string is less than or equal to six digits.)
 - When the NPP Unlimited SDWC Chars feature is turned off, can contain single digit wild card characters (?) in any positions except the last digit, to indicate that any digit in that position in the string is a match.
- Filter Digit Length (FDL) - The number of digits that the incoming digit string must have to match the Filter. Can be a wildcard (*) value to indicate a Filter match for any digit length.

For NPP filter examples and scenarios, see [Filter Examples](#) and [Filter Search Execution](#).

Filter Nature of Address Indicator (FNAI) Class

Many EAGLE protocols infer digit string formatting based on a protocol-specific Nature of Address Indicator (NAI) value. NPP uses this same concept to help isolate digit strings. NPP defines NPP-specific FNAI Classes to which services can map service-specific NAI values.

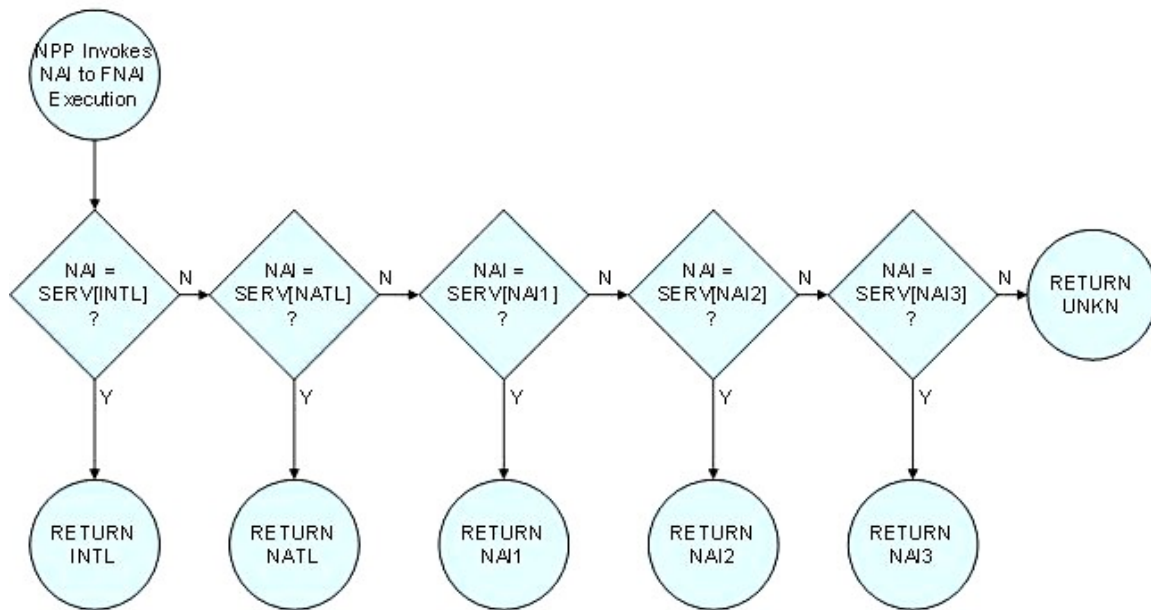
Services that invoke NPP processing provide an incoming NAI value along with the incoming digit string. NPP maps the incoming service-specific NAI value to an appropriate NPP FNAI Class mnemonic value.

NPP supports six different FNAI Classes:

- NATL (national)
- INTL (international)
- NAI1 (generic1)
- NAI2 (generic2)
- NAI3 (generic3)
- UNKN (Unknown)

The execution of the NAI-to-FNAI Class algorithm is described in [Figure 2: NAI to FNAI Mapping Algorithm](#). Any NAI value not mapped to an FNAI Class is interpreted as UNKN (Unknown). If support is not needed for an FNAI Class, the FNAI Class value is NONE.

Figure 2: NAI to FNAI Mapping Algorithm



Filter Prefix

Many EAGLE features search for matching digit patterns at the beginning of digit strings to determine if processing is required. NPP provides this function with a Filter Prefix (FPFX).

An FPFX value can be a hexadecimal string of digits that are located at the beginning of an incoming digit string, such as d, 919, 060, or 9090). For example, the incoming digit string 00152558776925 would match a Filter Prefix (FPFX) of 001.

An FPFX value can be a wildcard (*) to match any leading digit string.

When the NPP Unlimited SDWC Chars feature is turned on, an FPFX value can be a series of hexadecimal digits that includes up to 3 single digit wildcard characters (?) in the first 6 digits of the string (except the last digit if the string is less than or equal to six digits). For example, the incoming digit strings 00152559776925 and 00252559886925 would match a Filter Prefix of 00?525.

When the NPP Unlimited SDWC Chars feature is turned off, an FPFX value can be a series of hexadecimal digits that includes single digit wildcard characters (?) in any positions except the last digit of the string. The total number of single digit wildcard characters used in all of the filters in the Service Rule Set for a service cannot exceed 25.

When the FPFX filter parameter is defined in NPP, the leading incoming digit pattern must match the FPFX filter value for further NPP processing. See [Searching NPP Filters with Wildcard Values](#) for wildcard descriptions and examples.

Filter Digit Length

NPP provides digit string isolation based on the incoming length of the digit string. The NPP Filter Digit Length (FDL) specifies the number of digits that the incoming digit string must have to match the Filter.

An FDL value can be a wildcard (*) to match a digit string of any length.

Filter Search Execution

NPP uses Filters to identify incoming digit strings that need NPP processing for a service. When a digit string matches a defined Filter, the digit string is processed by NPP. If the digit string does not match a Filter, the digit string exits NPP as it originally entered.

NPP first consider the Filter NAI (FNAI), then Filter Prefix (FPFX), then the Filter Digit Length (FDL) when searching for a Filter match to the incoming digit string.

[Table 2: Filter Match Search Order](#) specifies the order in which the matching algorithm searches for a Filter match to the incoming digit string.

Table 2: Filter Match Search Order

Search Order	FNAI [NATL, INTL, UNKN, NA1...3]	FPFX	FDL
1	Specific	Specific	Specific
2	Specific	Specific	Wildcard (*)
3	Specific	Wildcard (*)	Specific
4	Specific	Wildcard (*)	Wildcard (*)

Filter Examples

[Table 3: NPP Filter Examples](#) illustrates NPP Filters, some with values for all components and some with wildcard values.

Table 3: NPP Filter Examples

Filter Nature of Address Indicator (FNAI) Class	Filter Prefix (FPFX)	Filter Digit Length (FDL)
INTL	9090	8
INTL	060	12
NATL	*	8
INTL	d	*
INTL	*	*
NAI1	919	*
UNKN	*	*
INTL	abc?3	16
INTL	abc?23	*

The following examples illustrate some specific NPP Filter scenarios:

- All standard national calls receive the same handling where NAI=NATL, digits XXXXXXXXXXXX
 - FNAI = NATL
 - FPFX = *
 - FDL = *
- International calls with International Escape Code where NAI=INTL, digits 011+XXXXXXXXXXXXX
 - FNAI = INTL
 - FPFX = 011
 - FDL = *
- Collect calls with Operator Code, Area Code following the Operator Code, NAI=Unknown, digits 'b'+AC+9090+XXXXXXXXX
 - FNAI = UNKNOWN
 - FPFX = b (or FPFX = b339090 or FPFX=b349090, and so on -- there are many options for this configuration)
 - FDL = 15

Searching NPP Filters with Wildcard Values

Filters can be defined that have wildcard values for the Filter Prefix (FPFX) value, the Filter Digit Length (FDL) value, or both values.

When the FPFX or FDL value is the wildcard character (*), the value is considered to be categorically wildcarded; it contains no characters other than the * character.

Filters can be defined with specific digit FPFX values that include one or more of the single digit wildcard character "?" along with hexadecimal digits in the value.

Categorical Wildcarding

There are three search cases where categorical wildcard values are used. In each case the search algorithm considers only NPP Filters that have the wildcard value specified for the Filter criteria. If no specific match is found, NPP then searches the NPP Filters that have FDL=*, then the Filters that have FPFX=*. When searching with wildcard values for FDL or FPFX, NPP considers only the NPP Filters that are provisioned with wildcard values. NPP Filters with specific values and no wildcard values for FDL or FPFX, are not considered during wildcard searches.

Table 5: NPP Filter Search for Categorical Wildcard Example Filters indicates the example Filter that is selected for each Filter selection scenario shown in *Table 4: NPP Provisioned Filter Examples for Categorical Wildcarding*.

Table 4: NPP Provisioned Filter Examples for Categorical Wildcarding

Provisioned Filter	FNAI	FPFX	HL	NOTES
1	INTL	abc	16	Specific, Specific, Specific
2	INTL	abcd23	16	Specific, Specific, Specific
3	INTL	abc12	*	Specific, Specific, Wildcard
4	INTL	*	16	Specific, Wildcard, Specific
5	UNKN	*	*	Specific, Wildcard, Wildcard

Table 5: NPP Filter Search for Categorical Wildcard Example Filters

Example	Incoming FNAI	Incoming Digit String	Incoming Digit Length	Example Filter Selected
1	INTL	abcdef12345678901	16	1
2	INTL	abc123def12345678	16	2
3	INTL	abc2345678901def	16	1
4	INTL	abc1234567890	13	3
5	INTL	0123456789abcdef	16	4
6	INTL	1234567890abcde	15	5

Single Digit Wildcarding

When the NPP Unlimited SDWC Chars feature is turned off, a Filter Prefix can include single digit wildcard characters (?) in any positions except the last digit of the string. The number of single digit wildcard characters used in all of the filters in the Service Rule Set for a service cannot exceed 25.

When the NPP Unlimited SDWC Chars feature is turned on, a Filter Prefix can contain up to 3 single digit wildcard characters (?) in the first 6 digits, but not the last digit if the string is less than or equal to 6 digits. An unlimited number of SDWC characters are allowed for each NPP service.

Based on the presence of the single digit wildcard value “?” in the Filter Prefix (FPFX), the Filter with the larger number of matching leading digits not involving the “?” wildcard will have priority. If the number of matching leading digits is the same for two Filters, then Filter priorities are established as follows: A non-wildcard digit has the highest priority, followed by the “?” wildcard, with the lowest priority assigned to Filters with no further digits to match.

For example, if two Filters exist with FPFX values of 12345678 and 12?45?78. An incoming digit string of 123456789 would be filtered by FPFX=123456789. An incoming digit string of 12a456789 would be filtered by FPFX=12?4.

Table 7: NPP Filter Search for Single Digit Wildcard Example Filters indicates the example Rule that is selected for each Filter selection scenario from *Table 6: NPP Provisioned Filter Examples for Single Digit Wildcarding*.

Table 6: NPP Provisioned Filter Examples for Single Digit Wildcarding

Provisioned Filter	FNAI	FPFX	FDL	Notes
1	INTL	abc	16	specific, specific, specific
2	INTL	abc123	16	specific, specific, specific
3	INTL	abc12	*	specific, specific, wildcard
4	INTL	abc?3	16	specific, specific, specific
5	INTL	abc?23	*	specific, specific, wildcard
6	INTL	*	16	specific, wildcard, specific
7	UNKN	*	*	specific, wildcard, wildcard

Table 7: NPP Filter Search for Single Digit Wildcard Example Filters

Example	Incoming FNAI	Incoming Digit String	Incoming Digit Length	Filter Selected
1	INTL	abcdef1234567890	16	1
2	INTL	abc123def4567890	16	2
3	INTL	abc2345678901def	16	4
4	INTL	abc1234567890	13	3
5	INTL	0123456789abcdef	16	6
6	UNKN	1234567890abcde	15	7

Chapter 4

Action Sets

Topics:

- *Action Sets.....25*
- *Conditioning Actions.....27*
- *Service Actions29*
- *Formatting Actions.....33*
- *Outgoing FNAI Class.....37*

This chapter describes the components and functions of an NPP Action Set.

Action Sets

NPP allows customized numbering plan processing behavior to be provisioned as an Action Set. Up to 1024 Action Sets are supported by an EAGLE.

An Action Set consists of three types of Actions and an outgoing FNAI class:

- **Conditioning Actions** (CAs; up to 12 per Action Set) determine how a digit string is manipulated prior to applying service-specific behavior. Digit manipulation includes number conditioning to international format and extraction of digits to use in formatting the outgoing digit string.
- **Service Actions** (SAs; up to 8 per Action Set) determine what service-specific behavior to apply to a digit string (such as corrective dialing and number portability checking).
- **Formatting Actions** (FAs; up to 12 per Action Set) determine how the outgoing digit string is formatted after Service Action execution.
- **Outgoing FNAI Class** (outgoing FNAI or OFNAI ; one per Action Set) setting communicates the NAI of the outgoing digit string to the calling service.

Figure 3: Action and Action Set Relationship shows the relationship between Actions and Action Sets.

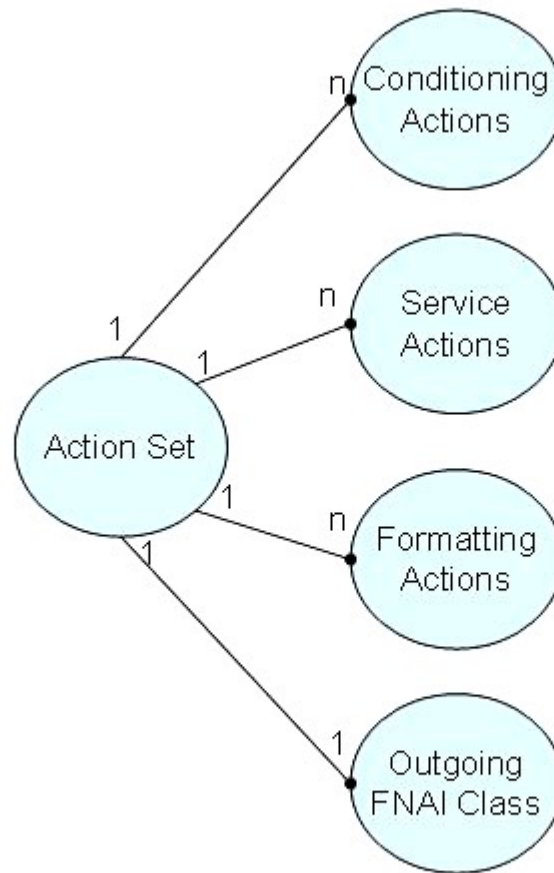


Figure 3: Action and Action Set Relationship

Action Set Examples

Examples of simple NPP Action Sets can be where number portability processing is needed on the following types of calls and all other calls are not subject to the specified number portability processing:

- Properly formatted NATL calls
- Messages with unknown NAI, a National Escape Code of 1, and 10 digits

The Actions for the examples are shown in [Table 8: Action Set Actions Scenarios](#):

Table 8: Action Set Actions Scenarios

Filter Nature of Address	Filter Prefix	Filter Digit Length	Conditioning Actions	Service Actions	Format	Outgoing NAI
NATL	*	*	Add Default Country Code	Number portability	RN+DN	NATL

Filter Nature of Address	Filter Prefix	Filter Digit Length	Conditioning Actions	Service Actions	Format	Outgoing NAI
Unknown	1	11	Delete matched prefix, add Default Country Code	Number portability	RN+DN	Incoming

Conditioning Actions

NPP defines a set of Conditioning Actions (CAs) that are available to all NPP services. Conditioning Actions determine how a digit string is manipulated before service-specific behavior is applied to the digit string. The behavior of CAs does not differ between services; however, each service defines which CAs it supports. NPP allows up to 12 CAs per Action Set; certain CAs can occur more than once in an Action Set.

Table 22: Conditioning Actions lists CAs and their purpose.

Conditioning Actions determine whether or not digit strings that represent subscriber numbers are in international format. International format is defined as "CC + AC + SN" or "CC + DN" or "ZN" (see *Table 22: Conditioning Actions* for definitions). If a digit string is not in international format, the Conditioning Actions are used to convert the digit string to international format, which is required for performing RTDB lookup.

Conditioning Actions extract digits from the incoming digit string and assign the digits as values that are later used to format the outgoing digit string.

For filters with FDL=* (wildcard), the associated Conditioning Action group must contain a ZNX, DNX, or SNX Conditioning Action. For filters with specific FDL (Filter Digit Length) values, the associated Conditioning Action group must process the entire number of digits (by either ignoring or processing them).

Conditioning Action Examples

The following examples illustrate simple to more complex Conditioning Action scenarios:

- EXAMPLE 1: Standard national calls all receive the same handling where NAI=NATL, digits XXXXXXXXXXXX

To condition this number to international format, the Country Code must be prefixed. The conditioning action (CA) for this is Country Code Default (CCDEF)

If CCDEF = 55 (for example), and the digit string is 87654321, then the digit string will become 5587654321

- Filter NAI = national (FNAI = NATL)
- Filter Prefix = wildcard (FPFX = *)
- Filter Digit Length = wildcard (FDL = *)
- EXAMPLE 2: International calls with International Escape Code where NAI = international (INTL), digits 011 + XXXXXXXXXXXXXX

It is common that international calls need only to "escape" any service processing. In these cases, no CAs are required.

- FNAI = INTL
- FPFX = 011
- FDL = *
- EXAMPLE 3: Collect calls with Operator Code, Area Code follows the Operator Code, NAI=Unknown, digits 'b' + AC + 9090 + XXXXXXXX

If the digit string is b33909087654321, FPFX = b339090 is matched. To achieve standard international format, "b" and "9090" must be stripped, Area Code "33" must be placed next to Directory Number "87654321", and the Country Code must be prefixed. The Conditioning Actions for this scenario are shown in [Table 9: Conditioning Actions for Collect Calls with Operator Code](#) .

- FNAI = UNKNOWN
- FPFX = b (or FPFX = b339090 or FPFX = b349090, etc. -- there are many options for this configuration)
- FDL = 15

Table 9: Conditioning Actions for Collect Calls with Operator Code

Conditioning Action...	Consisting of Formatting Actions...	Resulting Digit String
		[incoming digit string = b33909087654321]
IGN1	[no Formatting Action, just ignore first digit]	33909087654321
AC2	AC =33	909087654321
PFXA4	AC=33, PFXA=9090	87654321
SNX	AC=33, PFXA=9090, SN=87654321	
CCDEF	AC=33, PFXA=9090, SN=87654321, CC=55	

Conditioning Action Execution

Conditioning Actions process the incoming digit string from the beginning to the end of the string, and extract digits from the string to be used in Service Action execution and Formatting Action execution. All digits must be ignored, assigned as Formatting Action values, or replaced by a Formatting Action value with a provisioned default value.

Conditioning Action execution identifies the digit strings that correspond to the subscriber number in international format, and populates the appropriate Formatting Action values to encode the outgoing digit string. A digit string in international format is passed to each Service Action that is executed for the service.

Service Actions

Service Actions (SAs) determine the EAGLE behavior to apply to a digit string. NPP allows up to 8 SAs to be associated with a single Action Set. Service Actions are provisioned and executed in order of an assigned precedence (see [Service Action Precedence](#)).

Service Action behavior is determined by the EAGLE feature or function (service) that invokes NPP. The service must provide a Service Action Handler for each Service Action that it supports. Such behavior includes Number Portability Release and Relay, RTDB lookup, simple number substitution, and use of Additional Subscriber Data (ASD) and Generic Routing Number (GRN).

[Table 23: Service Actions](#) describes valid Service Actions, the precedence for each Service Action, and EAGLE features and functions that use each Service Action.

Service Action Examples

The following examples illustrate Service Action scenarios:

- Example 1: Standard national calls all receive the same handling; NAI=NATL XXXXXXXXXXXX
If number portability service is needed here, then the IDP Relay Service Action can be just CDPNNP.
- Example 2: International calls with International Escape Code; NAI=INTL 011+XXXXXXXXXXXXX
This call just wants to "escape" any service processing. There is no Service Action in this rule.
- Example 3: Collect Calls with Operator Code, Area Code in-between; NAI=Unknown
'b'+AC+9090+XXXXXXXXX

For this filter, the desired actions are number portability and forward the message to the Service Creation System (SCS). The Service Actions for TIF are NPRELAY and FWDSCS.

- Example 4: Fraudulent Calls

The FRAUDCHK Service Action uses the conditioned digit string for the RTDB lookup to determine whether the message Calling Party belongs to the network and to determine whether the call is fraudulent.

- Example 5: Prepaid calls

The PPRELAY Service Action uses the conditioned digit string for RTDB lookup to determine whether the Calling Party or Called Party is a prepaid subscriber, and for prepaid calls sets the message to be routed to a Prepaid Server.

Service Action Execution

Each service can support one or more Service Actions that can be assigned to the Action Sets in the Service Rule Set for the service.

Each Service Actions performs service-specific behavior for a conditioned digit string that it receives from a Conditioning Action that is executed for the service. The behavior is determined by feature-specific provisioned data and feature-specific logic. NPP verifies that the service status is ON for the calling service before executing Service Actions for the service.

When multiple Service Actions can be associated with an NPP Action Set for a service, the service must define the precedence value for each Service Action that it supports. The precedence determines the order in which multiple Service Actions will be executed for the service. Service Action precedence is represented by a number between 0 and 100. Higher precedence Service Actions are always executed before lower precedence Service Actions; execution of a lower precedence Service Action ahead of higher precedence Service Action is prevented. Service Actions can be defined with equal precedence. NPP executes Service Actions of equal precedence in the order of the sequenced list of comma-separated SA parameter values.

NPP processes messages for MO SMS features when the **smsmr** service selector is provisioned. NPP verifies that the required MO SMS feature is enabled and on before executing a Service Action that is provisioned for an MO SMS service. The Service Actions are executed in precedence sequence first for Calling Party numbers (IS41 Original Originating Address digits or GSM MSISDN digits), then for Called Party numbers (IS41 Destination Address or Original Destination Address, or GSM TP-DA digits).

When the TIF Subscr CgPN Blacklist feature, the TIF Range CgPN Blacklist feature, or the TIF Selective Screening feature is on, two Service Action Data (SA Data) values can be associated with each provisioned TIF CgPN/CdPN Blacklist Service Action to provide configurable Release Cause values for the blacklist scenarios. The first value is used for ANSI ISUP and the second value is used for ITU ISUP.

NPP Formatting Action values can be populated during Service Action execution (see [Provisioning Formatting Actions](#)).

Upon execution completion, the Service Action indicates whether to continue executing another Service Action and whether to execute Formating Actions. The CDIAL Service Action can be provisioned to execute Formatting Actions even when a Service Action indicates that Formatting Action execution should not occur.

Service Action Precedence

Multiple service actions (SAs) can be associated with an NPP Action Set. To provide a systematic method for Service Action provisioning and execution, SA precedence value is assigned. Each service defines the order in which SAs are executed. SA execution order follows the defined SA precedence value.

SA precedence is represented by a number between 0 and 100. Higher precedence SAs are always executed before lower precedence SAs; provisioning of a lower precedence SA ahead of higher precedence SA is prevented. SAs can be defined with equal precedence. NPP executes SAs of equal precedence in the order of the sequence of the values in the SA parameter comma-separated list.

[Table 10: Service Action Precedence Example](#) shows an example group of SAs and their precedence values.

Table 10: Service Action Precedence Example

Example Service Action Name	Precedence	Notes
EXSA1	100	Always executed first regardless of provisioning order
EXSA2	50	Always executed after EXSA1 and prior to EXSA4; EXSA2 and EXSA3 execution order is dependent on the order provisioned.

Example Service Action Name	Precedence	Notes
EXSA3	50	Always executed after EXSA1 and prior to EXSA4; EXSA2 and EXSA3 execution order is dependent on the order provisioned.
EXSA4	10	Always executed last

Given the SA precedence values defined in [Table 10: Service Action Precedence Example](#), the SA groups defined in [Table 11: Valid Service Action Group Examples](#) are allowed and the SA groups defined in [Table 12: Invalid Service Action Group Examples](#) are prevented.

Table 11: Valid Service Action Group Examples

Service Action Group	Validity	Notes
:sa=EXSA1	Valid	Single Service Actions always execute in the correct order [100]
:sa=EXSA2	Valid	Single Service Actions always execute in the correct order [50]
:sa=EXSA3	Valid	Single Service Actions always execute in the correct order [50]
:sa=EXSA4	Valid	Single Service Actions always execute in the correct order [10]
:sa=EXSA1,EXSA2	Valid	Service Actions executed in order of precedence [100, 50]
:sa=EXSA1,EXSA3	Valid	Service Actions executed in order of precedence [100, 50]
:sa=EXSA1,EXSA4	Valid	Service Actions executed in order of precedence [100, 10]
:sa=EXSA1,EXSA2,EXSA3	Valid	Service Actions executed in order of precedence [100,50,50] – Service Actions of equal precedence execute in the order provisioned (EXSA2 then EXSA3).
:sa=EXSA1,EXSA2,EXSA4	Valid	Service Actions executed in order of precedence [100,50, 10]
:sa=EXSA1,EXSA3,EXSA2	Valid	Service Actions executed in order of precedence [100,50,50] – Service Actions of equal precedence execute in the order provisioned (EXSA3 then EXSA2).
:sa=EXSA1,EXSA3,EXSA4	Valid	Service Actions executed in order of precedence [100,50,10]
:sa=EXSA1,EXSA2,EXSA3,EXSA4	Valid	Service Actions executed in order of precedence [100,50,50,10] – Service Actions of equal precedence execute in

Service Action Group	Validity	Notes
		the order provisioned (EXSA2 then EXSA3).
:sa=EXSA1,EXSA3,EXSA2,EXSA4	Valid	Service Actions executed in order of precedence [100,50,50,10] – Service Actions of equal precedence execute in the order provisioned (EXSA3 then EXSA2)
:sa=EXSA2,EXSA3	Valid	Service Actions executed in order of precedence [50,50] – Service Actions of equal precedence execute in the order provisioned (EXSA2 then EXSA3)
:sa=EXSA2,EXSA3,EXSA4	Valid	Service Actions executed in order of precedence [50,50, 10] – Service Actions of equal precedence execute in the order provisioned (EXSA2 then EXSA3)
:sa=EXSA2,EXSA4	Valid	Service Actions executed in order of precedence [50,10]
:sa=EXSA3,EXSA2	Valid	Service Actions executed in order of precedence [50,50] – Service Actions of equal precedence execute in the order provisioned (EXSA3 then EXSA2).
:sa=EXSA3,EXSA2,EXSA4	Valid	Service Actions executed in order of precedence [50,50,10] – Service Actions of equal precedence execute in the order provisioned (EXSA3 then EXSA2)
:sa=EXSA3,EXSA4	Valid	Execution follows Service Action precedence in decreasing order [50, 10]

Table 12: Invalid Service Action Group Examples

Service Action Group	Validity	Notes
:sa1=EXSA4,EXSA1	Invalid	Violated Service Action precedence (10 < 100)
:sa=EXSA4,EXSA2	Invalid	Violated Service Action precedence (10 < 50)
:sa=EXSA4,EXSA3	Invalid	Violated Service Action precedence (10 < 50)
:sa=EXSA2,EXSA1	Invalid	Violated Service Action precedence (50 < 100)
:sa=EXSA3,EXSA1	Invalid	Violated Service Action precedence (50 < 100)

Service Action Group	Validity	Notes
:sa=EXSA1,EXSA4,EXSA2	Invalid	Violated Service Action precedence (10 < 50)
:sa=EXSA1,EXSA4,EXSA3	Invalid	Violated Service Action precedence (10 < 50)

Formatting Actions

Formatting Actions (FAs) are applied after Service Action execution and determine how the outgoing digit string is formatted. The digits associated with each provisioned Formatting Action are made available during Conditioning Action execution and Service Action execution. The outgoing digit string is constructed by inserting digits associated with each FA into the string. If values are empty (no digit value assigned), they are skipped.

The behavior of a Formatting Action does not differ between services; however, each service defines the Formatting Actions that it supports. NPP allows up to 12 Formatting Actions to be associated with one Action Set. Formatting Actions are executed in the order of the sequenced list of comma-separated FA parameter values.

Valid Formatting Actions are listed in [Table 24: Formatting Actions](#).

To provision Formatting Action parameters, Conditioning Actions for at least one of the following international formats must be provisioned:

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

Service Actions might also have to be provisioned, depending on the particular Formatting Action.

Formatting Action List Type for Response Messages (FATYPE)

In addition to the Formatting Actions used to format the outgoing digits of the relayed message, Formatting Action List Types are used to format outgoing digits in the response messages generated by the services using NPP. These Formatting Action List Types are provisioned with the Formatting Actions to provide various combinations of digit formatting for different conditions. The service using NPP defines the service-specific usage of the Formatting Actions List Types. Valid values for Formatting Action List Types are shown in [Table 25: Formatting Action List Types \(FATYPE\)](#).

Formatting Action Execution

Conditioning Actions and Service Actions populate Formatting Action digit string values that are used to construct the outgoing digit string during Formatting Action execution.

Formatting Action execution occurs after Service Action execution is complete for a digit string. The Service Action can indicate whether Formatting Action execution will or will not occur for the string.

NPP begins with an empty outgoing digit string, and inserts digits into the string in the order in which the Formatting Action values are provisioned in a sequenced list of comma-separated parameter values

. If a provisioned Formatting Action is not populated, the outgoing digit string is not modified for that Formatting Action.

After successful digit string processing and Formatting Action execution, NPP sends an outgoing NAI value (see *Outgoing FNAI Class* with the outgoing digit string to the calling service.

Formatting Actions Examples

The effects of Formatting Actions on digit strings are shown in *Table 13: FA Example 1*, *Table 14: FA Example 2*, *Table 15: FA Example 3*, and *Table 16: FA Example 4*. The examples include assumptions for required Conditioning Actions and Service Actions.

Table 13: FA Example 1

Example 1: Standard national calls all receive the same handling		
Assumptions:		
<ul style="list-style-type: none"> • NAI=NATL XXXXXXXXXX • To condition this number to international format, the Country Code must be prefixed, CA=CCDEF • Example digit string is 87654321 before Conditioning Action • Example digit string after Conditioning Action (CA) is 559192252645 • Assume the example requires number portability service and the Service Action (SA) is just CdPNNP. • Assume the example requires just prefixing the Routing Number (RN) returned from the Realtime Database (RTDB) and the outgoing digit string should be sent in NATL format. • Assume the Routing Number (RN) that was returned from the RTDB is "7777". • The resulting outgoing format is RN DN. 		
Formatting Action set = {FA=RN, DN}		
Formatting Action	==>	Resulting Outgoing Digit String
Begin	==>	
RN	==>	7777
DN	==>	7777559192252645

Table 14: FA Example 2

Example 2: International calls with International Escape Code		
Assumptions: <ul style="list-style-type: none"> • NAI=INTL 011+XXXXXXXXXXXX • Assume the original number is 449192252645. • Assume this call just needs to "escape" any service processing; only minimum Conditioning Actions (CAs) are required (ZNX). • Because this call needs to "escape" any service processing, there are no Service Actions (SA) required. • Because this call just needs to "escape" any service processing, the outgoing format is the original number (ORIG). 		
Formatting Action set = {FA=ORIG}		
Formatting Action	==>	Resulting Outgoing Digit String
Begin	==>	
ORIG	==>	011449192252645

Table 15: FA Example 3

Example 3: Collect calls with Operator Code, Area Code in-between		
Assumptions: <ul style="list-style-type: none"> • NAI=Unknown 'b' + AC + 9090 + XXXXXXXX • Assume the digit string is b33909087654321 • If the desired outgoing format is to replace the 'b' with a 'd', and to insert the number portability RN after the '9090'. <ul style="list-style-type: none"> • '9090' put in PFX4 • The NPRelay Service Action updated the RN token. • Assume DLM1 is provisioned as 'd'. • Assume the RN is "5555". • In this case, the desired outgoing format is <ul style="list-style-type: none"> • DLMA • AC • PFX4 • RN • SN 		
Formatting Action set = {FA=DLMA, AC, PFX4, RN, SN}		
Formatting Action	==>	Resulting Outgoing Digit String
Begin	==>	
DLMA	==>	d
AC	==>	d33

Example 3: Collect calls with Operator Code, Area Code in-between		
Assumptions: <ul style="list-style-type: none"> • NAI=Unknown 'b' + AC + 9090 + XXXXXXXX • Assume the digit string is b33909087654321 • If the desired outgoing format is to replace the 'b' with a 'd', and to insert the number portability RN after the '9090'. <ul style="list-style-type: none"> • '9090' put in PFX4 • The NPRelay Service Action updated the RN token. • Assume DLM1 is provisioned as 'd'. • Assume the RN is "5555". • In this case, the desired outgoing format is <ul style="list-style-type: none"> • DLMA • AC • PFX4 • RN • SN 		
Formatting Action set = {FA=DLMA, AC, PFX4, RN, SN}		
Formatting Action	==>	Resulting Outgoing Digit String
PFX4	==>	d339090
RN	==>	d3390905555
SN	==>	d339090555587654321

Figure 4: Formatting Action Execution Example shows the Formatting Action Execution for FA Example 4.

Table 16: FA Example 4

Generic Example		
Assumptions: <ul style="list-style-type: none"> • Variables (Formatting Actions): PFXA = c, PFXB = b, DN = 669192252645, RN = 1234567890 		
Formatting Action set = {FA=PFXA, RN, PFXB, DN}		
Action	==>	Resulting Outgoing Digit String
Begin	==>	
PFXA	==>	c
RN	==>	c1234567890
PFXB	==>	c1234567890b
DN	==>	c1234567890b669192252645

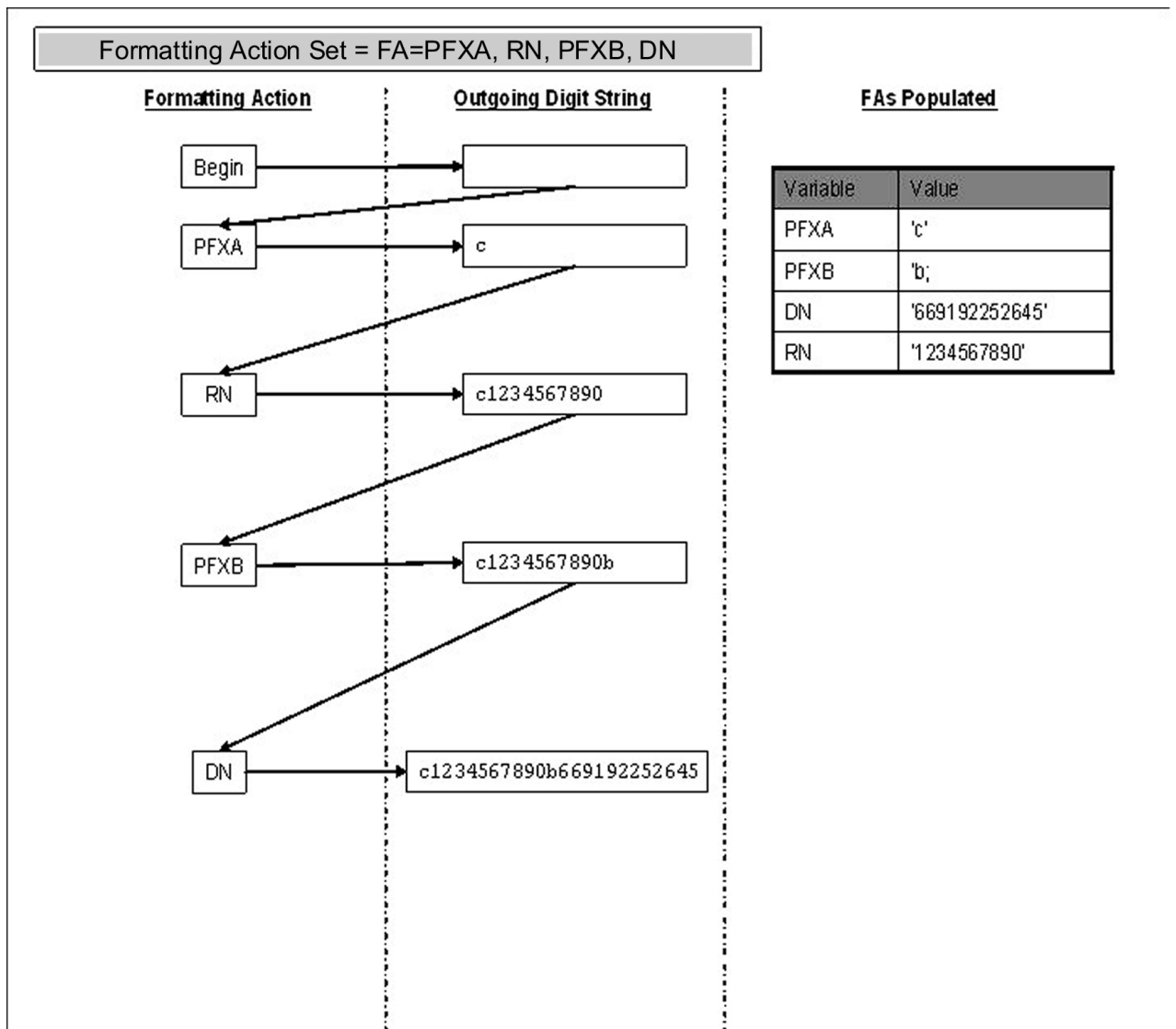


Figure 4: Formatting Action Execution Example

Outgoing FNAI Class

The calling service sends an incoming NAI value to NPP with the incoming digit string to be processed. NPP maps NAI numerical values to provisioned Filter NAI (FNAI) mnemonic values (NATL, INTL, NAI1, NAI2, NAI3, UNKN). The FNAI values are used in filtering incoming digit strings and NAI values for a service, to determine if NPP will process the string for the calling service.

After successful digit string processing and Formatting Action execution, NPP returns an outgoing NAI value with the outgoing digit string to the calling service.

Each Action Set for a service must indicate by the provisioned outgoing FNAI (OFNAI) mnemonic value that either:

- The OFNAI mnemonic value will be mapped to a corresponding numerical value to be sent as the outgoing NAI value.
- The incoming numerical NAI value will be returned to the calling service.

Chapter 5

Rules and Service Rule Sets

Topics:

- [Rules.....40](#)
- [Services and Service Rule Sets.....41](#)

This chapter provides a high level description of NPP Rules and Service Rule Sets.

When an incoming digit string is selected for processing by an NPP Filter in a Rule, the Action Set in the Rule determines what NPP processing will be applied to the digit string.

A set of Rules with different Filters and Action Sets can be created in a Service Rule Set for each service that calls NPP.

Rules

Defining and combining a Filter and an Action Set results in the creation of a Rule. An NPP Rule specifies the message type through the Filter and the Actions to apply to each digit string through the Action Set.

The relationship between Rules, Filters, Action Sets, and Actions is shown in [Figure 5: Rule, Filter, and Action Set Relationship](#).

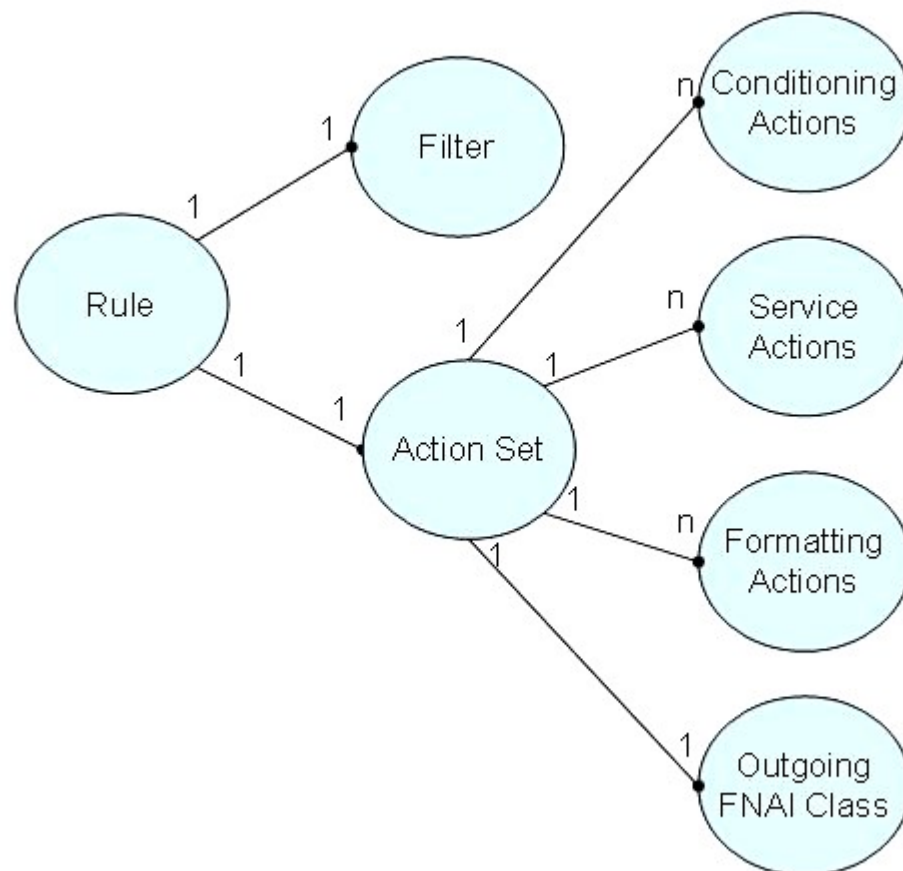


Figure 5: Rule, Filter, and Action Set Relationship

A simple representation of Rule definition is shown in [Table 17: Rule Definition Criteria](#)

Table 17: Rule Definition Criteria

Rule Definition						
Filters			Action Set			
Filter NAI	Filter Prefix	Filter Digit Length	Conditioning Action	Service Action	Formatting Action	Outgoing FNAI Class
(FNAI)	(FPFX)	(FDL)	(CA)	(SA)	(FA)	(OFNAI)

Services and Service Rule Sets

An NPP Service Rule Set is a collection of Rules that are associated with an NPP service. NPP supports up to 4096 rules per Service Rule Set. The maximum number of NPP Rules per EAGLE is 8192.

An NPP service is an EPAP-related feature such as Prepaid IDP Query Relay (IDP Relay) or TIF Number Portability, or a function used by one of those features, such as TIF. [Table 18: NPP Services](#) lists features and functions and their services that call NPP for processing. The Service Actions used by each service are described in [Table 23: Service Actions](#).

Table 18: NPP Services

Feature or Function	Calling Services
Info Analyzed Relay Base (IAR Base)	IARCDPN, IARCGPN
Prepaid IDP Query Relay (IDP Relay)	IDPRCDPN, IDPRCDPN2, IDPRCDPN3, IDPRCDPN4, IDPRCGPN
IDP A-Party Blacklist	IDPRCGPN
IDP A-Party Routing	IDPRCGPN
Triggerless ISUP Framework (TIF) Number Portability, TIF Simple Number Substitution, TIF Forward to SCS, TIF ASD, TIF GRN, TIF Range CgPN Blacklist	TIF, TIF2, TIF3, TIFCGPN, TIFCGPN2, TIFCGPN3
TIF Subscr CgPN Blacklist	TIFCGPN, TIFCGPN2, TIFCGPN3
TIF Selective Screening	TIF, TIF2, TIF3
Prepaid SMS Intercept Phase I (PPSMS)	MOSMSGCDPN, MOSMSGCGPN
Portability Check for MO SMS (MNP SMS)	MOSMSGCGPN
MO-based GSM SMS NP, MO SMS ASD, MO SMS GRN	MOSMSGCDPN, MOSMSGCGPN
MO-based IS41 SMS NP, MO SMS ASD, MO SMS GRN	MOSMSICDPN, MOSMSICGPN
MO SMS IS41-to-GSM Migration	MOSMSICDPN

Feature or Function	Calling Services
NPP Test Service	NPPT

The relationship between services, Service Rule Sets, and Action Sets is shown in *Figure 6: Service Rule Set and Rule Relationship*.

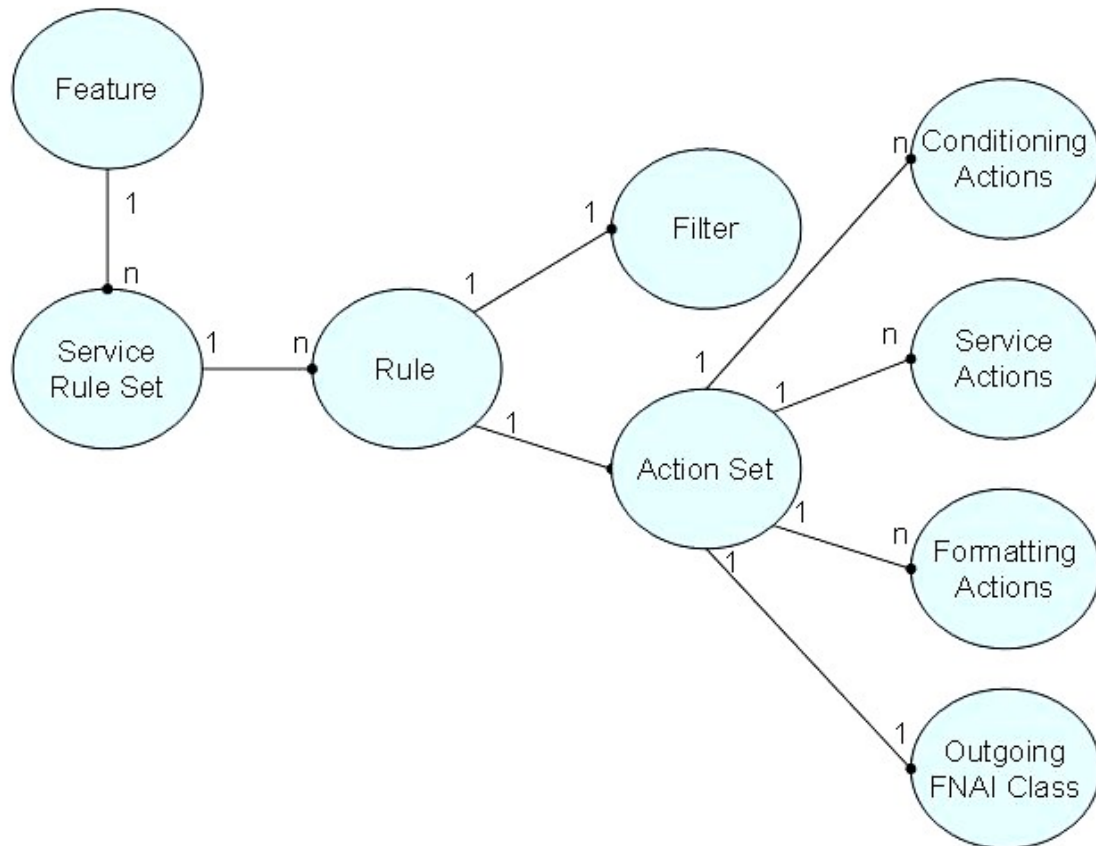


Figure 6: Service Rule Set and Rule Relationship

Service Rule Set Example

A simple example of a Service Rule Set is shown in *Table 19: Service Rule Set Example*.

Table 19: Service Rule Set Example

:srvn = NPPT		
:fnai = NATL	:fnai = INTL	:fnai = UNKN
:fpfx = 060	:fpfx = *	:fpfx = *
:fdl = 10	:fdl = 15	:fdl = *

:srvn = NPPT		
:asn = ACTSET1	:asn = ACTSET2	:asn = ACTSET3

Multiple Services

An NPP service is used by EAGLE EPAP-related features such as IDP Relay, to process digit strings according to the Service Rule Set for that feature. NPP supports multiple services at the same time, each with a separate Service Rule Set.

Table 20: Sample NPP Configuration illustrates a sample NPP configuration containing Service Rule Sets.

Table 20: Sample NPP Configuration

	Rule						
	Filter			Action Set			
Service Rule Set	NAI	HEX	HL	CA	SA	FA	OFNAI CLASS
NPPT	NATL	060	8	IGN2, CCDEF DN12	RTDBTRN	CC, RN, DN	INTL
NPPT	NATL	*	*	NONE	NONE	ORIG	NATL
NPPT	INTL	*	*	NONE	RTDBTRNSP	ORIG	INTL
IDPRCD	UNKN	9090	12	FPEX, CCDEF DN8	SA1	RN, DN	NATL
IDPRCD	UNKN	*	*	NONE	NONE	ORIG	UNKN

Chapter 6

NPP Provisioning and NPP Test Service

Topics:

- *NPP Provisioning.....45*
- *Provisioning Action Sets.....45*
- *Action Set Provisioning Procedures.....69*
- *Provisioning Service Rule Sets.....73*
- *Service Rule Set Provisioning Procedures.....77*
- *Provisioning Service Data.....79*
- *Service Data Provisioning Procedures.....82*
- *NPP Unlimited SDWC Chars Feature Configuration Procedures.....83*
- *NPP Test Service.....86*

This chapter describes the NPP provisioning process, including command descriptions and sequence of provisioning for correct execution.

This chapter also describes the NPP Test Service and gives examples of its application. The NPPT Service is an EAGLE EPAP-based function that allows NPP action sets and rules associated with the NPPT Service rule set to be tested and validated without affecting live traffic.

NPP Provisioning

This section contains procedures and information for general provisioning of NPP components for the services that call NPP. Information and procedures from the following sources must be used together to correctly and completely provision NPP for a calling service:

- Provisioning procedures and information in this manual
- Service-specific NPP provisioning procedures and information in the Feature Manual for the calling service (some service-specific information is included in this manual where appropriate)
- NPP command descriptions in *Commands User's Guide*; the command information includes parameter descriptions and valid values, provisioning dependencies, output examples, and notes for the correct use of each command.

EAGLE controlled features must be enabled or turned on before NPP provisioning commands can be entered. Refer to the Feature Manuals for the calling services for controlled feature provisioning procedures.

Some calling services use provisioned default values for fields or digits in an outgoing message or digit string (such as Default Country Code and Default Network Destination Code). These default values must be provisioned before the NPP components are executed to process an incoming digit string from the calling service. Requirements for provisioning default digit values are included in the Feature Manual for the calling service.

NPP provisioning consists of the following tasks. The provisioning sequence depends somewhat on the data required by a service.

- Provision the NPP Action Sets.
- Provision the NPP Service Rule Sets (associate a Filter with an Action Set to create a Rule for a service).
- Provision NAI mapping values and Delimiter Digit values.
- Change the NPP on/off status for a service.

The procedures in this section describe how to provision the components of NPP. Each section describes the commands used and the provisioning considerations for a component, including required provisioning sequences, mutually exclusive components, and components that must be provisioned together.

Provisioning Action Sets

The Action Set components customize how the incoming and outgoing digit strings are processed by NPP for a calling service. A maximum of 1024 Action Sets can be provisioned per system.

The procedures in this section describe how to provision the information for each of the following Action Set components:

- Conditioning Actions
- Service Actions
- Formatting Actions
- Formatting Action List Type

- Outgoing FNAI Class

The following commands are used to provision NPP Action Sets:

Table 21: NPP Action Set Commands

Command	Description	Parameters	Parameter Values
ent/chg-npp-as	Create or Change an NPP Action Set		
	Action Set Name	asn	Ten-character string that uniquely identifies the Action Set.
	Conditioning Actions	:ca=<ca1>,...,<ca12>	See Table 22: Conditioning Actions . Default: Any unspecified ca(x) value defaults to NONE.
	Service Actions	:sa=<sa1>,...,<sa8> :sa1val...:sa8val	See Table 23: Service Actions . Default: Any unspecified sa(x) value defaults to NONE.
	Formatting Action	fa=<fa1> (not orig) fa=orig	See Table 24: Formatting Actions . Default = ORIG
	Formatting Actions	fa=<fa1>,...,<fa12> (fa1 not orig)	See Table 24: Formatting Actions . Default: Any unspecified fa(2-12) value defaults to NONE.
	Formatting Action List Type	fatype	See Table 25: Formatting Action List Types (FATYPE) . The fatype parameter is valid with only the chg-npp-as command.
	Outgoing FNAI Class	ofnai	NPP FNAI Class used to map the outgoing NAI value. INTL NATL NAI1 NAI2 NAI3 UNKN INC = Value of incoming NAI Default = INC
dlt-npp-as	Delete an NPP Action Set		

Command	Description	Parameters	Parameter Values
	Action Set Name	asn	Ten-character string that uniquely identifies the Action Set.
rtrv-npp-as	Retrieve one or all NPP Action Sets		
	Action Set Name	asn	Ten-character string that uniquely identifies the Action Set. When the asn parameter is not specified, the command displays all Action Sets.
	Output Mode	mode=full	If no parameters are specified or only the asn parameter is specified, "brief" data is displayed for each Action Set: Action Set Name, Conditioning Actions, Service Actions, Formatting Actions, Outgoing FNAI, and Reference Count. If mode=full is specified, all "brief" data and Service Action Data (SA Data SAxVAL values) are displayed for each Action Set.

Provisioning Conditioning Actions

Conditioning Actions perform the following actions in processing the incoming digit string:

- Ignore the specified number of digits.
- Populate a Formatting Action value with the specified or remaining number of digits. The Formatting Action that will be populated must be provisioned in the Action Set. See [Provisioning Formatting Actions](#).
- Populate a Formatting Action value with a provisioned STP option default value to be used in the outgoing digit string.

Some calling services use provisioned default values for fields or digits in an outgoing message or digit string (such as Default Country Code and Default Network Destination Code). The default values must be provisioned before the NPP components are executed to process an incoming digit string from the calling service. Procedures for provisioning default digit values are included in the Feature Manual for the calling service. The Formatting Action that will be populated must be provisioned in the NPP Action Set. See [Provisioning Formatting Actions](#).

Some Conditioning Action parameter values end in a number (such as ac3 or dn5). The number indicates the number of digits in the incoming digit string that will be processed by that Conditioning Action.

Table 22: Conditioning Actions describes Conditioning Action parameters, lists populated Formatting Actions, and indicates provisioning considerations. Up to 12 Conditioning Actions can be provisioned per Action Set.

Note: "IDPRCDPN(X)" indicates any of the IDPRCDPN, IDPRCDPN2, IDPRCDPN3, and IDPRCDPN4 services.

- Enough Conditioning Actions must be provisioned in an Action Set to process the entire incoming digit string, in sequence from the beginning to the end of the string.
- For filters with FDL=* (wildcard), the associated Conditioning Action group must contain a ZNX, DNX, or SNX Conditioning Action. For filters with specific FDL (Filter Digit Length) values, the associated Conditioning Action group must process the entire number of digits (by either ignoring or processing them).
- At a minimum, one or more Conditioning Actions must be provisioned to populate one of the following sets of Formatting Actions:
 - Internationally formatted Dialed Number (ZN) ZN consists of the Country Code (CC), Area Code (AC), and Subscriber Number (SN)
 - Country Code (CC) + Directory Number (DN) DN consists of the Area Code (AC) and Subscriber Number (SN)
 - Country Code (CC) + Area Code (AC) + Subscriber Number

Conditioning Actions are provisioned as a comma-separated list of values for the ca parameter. At least one value must be specified for the ca parameter. For any additional values, one comma must be entered between each two values.

The ca parameter values must specify the Conditioning Actions in the order in which they are executed by NPP. The first or only value for the ca parameter must be the first or only Conditioning Action that will be executed by NPP in the Conditioning Action group; the second value in the ca parameter list must be the second Conditioning Action that will be executed by NPP in the Conditioning Action group; and so on.

Table 22: Conditioning Actions

Conditioning Action	Formatting Action Populated	Description
AC[1..8]	AC	Area Code digits Use the specified number of digits (1-8) as the AC Formatting Action value. Provisioning Considerations: <ol style="list-style-type: none"> 1. Only one AC[1..8] Conditioning Action can be specified in an Action Set. 2. AC[1..8] cannot be specified in the same Action Set with (is mutually exclusive with) the ZNX Conditioning Action, any Conditioning Action that begins with DN, or any other Conditioning Action that begins with AC.
ACCgPN	AC	Area Code digits

Conditioning Action	Formatting Action Populated	Description
		<p>Skip over any Country Code digits (matching STPOPTS:DEFCC parameter value or Multiple CC value) and remove the next SCCPOPTS:ACLen number of digits from the beginning of the CgPN. Use the removed ACLen digits as the Area Code for the Called Party. If the Formatting Action AC is specified, use these digits as the AC Formatting Action value.</p> <p>If no Calling Number was present, or the CgPN was less than the ACLen number of digits, then no replacement action is taken.</p> <p>Provisioning Considerations:</p> <ul style="list-style-type: none"> • Cannot be specified in the same Action Set with (is mutually exclusive with) the ZNX Conditioning Action, any Conditioning Action that begins with DN, or any other Conditioning Action that begins with AC. • Used for IDP Relay IDPRCDPN(X) services. • Used for TIF, TIF2, and TIF3 services. • Used for the MO SMS NPP Called Party services MOSMSGCDPN and MOSMSICDPN.
ACCgPN[1..8] (ACCgPNx)	AC	<p>Area Code digits</p> <p>Remove the next "x" number of digits from the beginning of the CgPN. "x" is the number at the end of the Conditioning Action name (for example, the ACCgPN4 CA removes 4 Area Code digits from the CgPN). Use the removed Area Code digits as the Area Code for the Called Party. If the Formatting Action AC is specified, use these digits as the AC Formatting Action value.</p> <p>If no Calling Number was present, or the CgPN was less than the "x" number of digits, then no replacement action is taken.</p> <p>For TIF, skip over any Country Code digits (matching STPOPTS:DEFCC parameter value or Multiple CC value) at the beginning of the CgPN.</p> <p>Provisioning Considerations:</p> <ul style="list-style-type: none"> • Cannot be specified in the same Action Set with (is mutually exclusive with) each other, the ZNX Conditioning Action, any Conditioning Action that begins with DN, or any other Conditioning Action that begins with AC. • Used for IDP Relay IDPRCDPNX services. • Used for TIF, TIF2, and TIF3 services. • Used for the MO SMS NPP Called Party services MOSMSGCDPN and MOSMSICDPN.
ACDEF	AC	Default Area Code digits

Conditioning Action	Formatting Action Populated	Description
		<p>Use the provisioned Default Network Destination Code (STPOPTS:DEFNDC parameter value) as the AC Formatting Action value.</p> <p>Provisioning Considerations:</p> <ul style="list-style-type: none"> • The STPOPTS:DEFNDC parameter value must be provisioned before the service state is set to On to allow NPP processing for the service. • ACDEF can be specified only once in an Action Set. • ACDEF cannot be specified in the same Action Set with (is mutually exclusive with) the ZNX Conditioning Action, any Conditioning Action that begins with DN, or any other Conditioning Action that begins with AC.
ACLAC	AC	<p>Area Code digits</p> <p>Use the LAC field of the LAI as the AC Formatting Action value.</p> <p>Provisioning Considerations:</p> <p>IDP Relay-specific only with the IDPRCDPN(X) Service Actions.</p>
CC[1..3]	CC	<p>Country Code digits</p> <p>Use the next number of specified digits [1..3] as the CC Formatting Action value.</p> <p>Provisioning Considerations:</p> <ol style="list-style-type: none"> 1. Only one CC[1..3] Conditioning Action can specified in an Action set. 2. CC[1..3] cannot be specified in the same Action Set with (is mutually exclusive with) the ZNX Conditioning Action or the CCDEF Conditioning Action.
CCDEF	CC	<p>Default Country Code digits</p> <p>Use provisioned Default Country Code (STPOPTS:DEFCC parameter value) as the CC Formatting Action value.</p> <p>Provisioning Considerations:</p> <ol style="list-style-type: none"> 1. The STPOPTS:DEFCC parameter value must be provisioned before the service state is set to On to allow NPP processing for the service. 2. CCDEF can be specified only once in an Action Set. 3. CCDEF cannot be specified in the same Action Set with (is mutually exclusive with) the ZNX Conditioning Action and any CC[1..3] Conditioning Action.
CCCGPN	CC	Country Code digits

Conditioning Action	Formatting Action Populated	Description
		<p>Indicates that the the Country Code (CC) digits need to be extracted from the Calling Party Number. The number of digits to extract is the SCCOPTS CCLen option value. If CC Formatting Action is specified, the extracted CC digits will be used in the resulting CdPN. If a CC is not detected, then the CC digits will be empty in Formatting Action execution.</p> <p>Used by IDP-related features.</p>
DN[1..15]	DN RNOSPODN	<p>Dialed Number digits</p> <p>Use the specified number of digits [1..15] as the DN Formatting Action value.</p> <p>Provisioning Considerations:</p> <ol style="list-style-type: none"> 1. Only one DN[1..15] Conditioning Action can be specified in an Action set. 2. DN[1..15] cannot be specified in the same Action Set with (is mutually exclusive with) any Conditioning Action that begins with AC, the DNX Conditioning Action, any Conditioning Action that begins with SN and the ZNX Conditioning Action. 3. The DN[1..15] or DNX Conditioning Action must be specified to populate the RNOSPODN Formatting Action value when an RN or SP is not found in the RTDB lookup.
DNX	DN RNOSPODN	<p>Dialed Number digits</p> <p>Use the remaining digits as the DN Formatting Action value.</p> <p>Provisioning Considerations:</p> <ol style="list-style-type: none"> 1. DNX can be specified only once in an Action Set. 2. DNX cannot be specified in the same Action Set with (is mutually exclusive with) any Conditioning Action that begins with AC, any DN[1..15] Conditioning Action, any Conditioning Action that begins with SN and the ZNX Conditioning Action. 3. The DN[1..15] or DNX Conditioning Action must be specified to populate the RNOSPODN Formatting Action value when an RN or SP is not found in the RTDB lookup.
FPFX	FPFX	<p>Filter Prefix digits</p> <p>Use the provisioned Filter Prefix (FPFX) digits as the FPFX Formatting Action value. See <i>Provisioning Service Rule Sets</i>.</p> <p>Provisioning Considerations:</p> <ol style="list-style-type: none"> 1. Must be the first Conditioning Action specified for the Action Set 2. FPFX can be specified only once in an Action set

Conditioning Action	Formatting Action Populated	Description
		3. Conditioning Action FPFX cannot be used when the NPP filter value is FPFX="*"
IGN[1..10]	N/A	Number of digits to ignore Ignores 1 to 10 digits. Provisioning Considerations: <ul style="list-style-type: none"> • Can be specified more than once in an Action Set.
PFXA[1..8], PFXB[1..8], PFXC[1..8], PFXD[1..8], PFXE[1..8], PFXF[1..8]	PFXA, PFXB, PFXC, PFXD, PFXE, PFXF	Prefix A-F digits Use the next number of specified digits [1..8] as the corresponding Formatting Action value. Provisioning Considerations: <ol style="list-style-type: none"> 1. PFXA[1..8] can be specified only once in an Action Set. 2. PFXB[1..8] can be specified only once in an Action Set. 3. PFXC[1..8] can be specified only once in an Action Set. 4. PFXD[1..8] can be specified only once in an Action Set. 5. PFXE[1..8] can be specified only once in an Action Set. 6. PFXF[1..8] can be specified only once in an Action Set.
SN[1..15]	SN RNOSPOSN	Subscriber Number digits Use the specified number of digits [1..15] as the SN Formatting Action value. Provisioning Considerations: <ol style="list-style-type: none"> 1. SN[1..15] can be specified only once in an Action Set. 2. SN[1..15] cannot be specified in the same Action Set with (is mutually exclusive with) the SNX Conditioning Action, any Conditioning Action that begins with DN, or the ZNX Conditioning Action. 3. The SN[1..15] or SNX Conditioning Action must be specified to populate the RNOSPOSN Formatting Action value when an RN or SP is not found in the RTDB lookup.
SNX	SN RNOSPOSN	Subscriber Number digits Use the remaining digits as the SN Formatting Action value. Provisioning Considerations: <ol style="list-style-type: none"> 1. SNX can be specified only once in an Action Set. 2. SNX cannot be specified in the same Action Set with (is mutually exclusive with) any SN[1..15] Conditioning Action, any Conditioning Action that begins with DN, or the ZNX Conditioning Actions.

Conditioning Action	Formatting Action Populated	Description
		3. The SN[1..15] or SNX Conditioning Action must be specified to populate the RNOSPOSN Formatting Action value when an RN or SP is not found in the RTDB lookup.
ZNX	ZN RNOSPOZN	<p>Remaining digits</p> <p>Use the remaining digits as the ZN Formatting Action value.</p> <p>Provisioning Considerations:</p> <ol style="list-style-type: none"> 1. ZNX can be specified only once in an Action Set. 2. ZNX cannot be specified in the same Action Set with (is mutually exclusive with) any Conditioning Action that begins with CC, any Conditioning Action that begins with AC, any Conditioning Action that begins with SN, or any Conditioning Action that begins with DN. 3. The ZNX Conditioning Action must be specified to populate the RNOSPOZN Formatting Action value when an RN or SP is not found in the RTDB lookup.

Provisioning Service Actions

A Service Action performs service-specific behavior on the internationally formatted digit string that it receives from Conditioning Action execution. Service Action behavior is determined by feature-specific functions, state information, and provisioned data from the service that is using NPP. Such behavior can include database access, data evaluation, and any special handling for outgoing messages.

Each service must define the Service Actions that it supports and the sequence (precedence) in which the supported Service Actions must be executed. The service assigns a precedence value (a number between 0 and 100) to each Service Action. Higher precedence Service Actions are always executed before lower precedence Service Actions. NPP executes Service Actions of equal precedence in the order of the sequence of the values in the SA parameter comma-separated list.

Table 23: Service Actions describes Service Actions, lists their precedence values, and indicates the calling services that support each Service Action. Up to 8 Service Actions can be provisioned per Action Set.

Formatting Action values can be populated by Service Actions. The Formatting Actions that are populated by the Service Actions in an Action Set must also be provisioned in the Action Set. See *Provisioning Formatting Actions*.

Service Actions are provisioned as a comma-separated list of values for the sa parameter. At least one value must be specified for the sa parameter. For additional values, one comma must be entered between each two values.

The sa parameter values must specify the Service Actions in the order in which they are executed by NPP, from highest precedence value to lowest precedence value. The first or only value for the sa parameter must be the first or only Service Action that will be executed by NPP in the Service Action group; the second value in the sa parameter list must be the second Service Action that will be executed by NPP in the Service Action group; and so on.

The Service Action parameter values must specify the Service Actions in the order in which they will be executed, from highest precedence value to lowest precedence value. The values that specify Service Actions that have the same precedence values must be specified in the list in the sequence in which the Service Actions will be executed. See [Service Action Precedence](#) for examples of Service Action execution that depend on provisioning sequence.

Table 23: Service Actions

Service Action	Feature Service	Precedence	Description
Info Analyzed Relay Base Called Party Service			
CCNCCHK	IAR Base IARCDPN	100	Attempts to find a match between the first digits of the DN and one of the entries in the CCNC list of the CSL table. When a match is not found, causes NPP processing to fail so that the message on hand will be relayed without IAR modifications .
CDPNNP	IAR NP IARCDPN	80	Evaluates the result of an RTDB lookup based on the TATROPTS CDNPTYPE option value or TATROPTS SPORTTYPE option value. The Service Action will also populate the SRFIMSI Formatting Action value with the SRFIMSI associated with the RN or SP entity returned by the RTDB, if any. Applies Service Portability processing.
CGPNSVCRQD	IAR Base IARCDPN	60	Used by the IARCDPN service to invoke the IARCGPN service.
ASDLKUP	IAR ASD IARCDPN	50	Populates the ASD Formatting Action value with the ASD from the RTDB.
GRNLKUP	IAR GRN IARCDPN	50	Populates the GRN Formatting Action value using data from the RTDB.
CGPNASDRQD	IAR ASD IARCDPN	50	Used by the IARCDPN service to invoke the IARCGPN service, and populate the IARCDPN ASD Formatting Action value with the IARCGPN ASD Formatting Action value before IARCDPN Formatting Action Execution
CGPNGRNRQD	IAR GRN IARCDPN	50	Used by the IARCDPN service to invoke the IARCGPN service, and populate the IARCDPN GRN Formatting Action value with the IARCGPN GRN Formatting Action value before IARCDPN Formatting Action Execution.

Service Action	Feature Service	Precedence	Description
Info Analyzed Relay Base Calling Party Service			
CGPNNP	IAR NP IARCGPN	80	Evaluates the result of an RTDB lookup based on the TATROPTS CGNPTYPE option value. The Service Action will also populate the SRFIMSI Formatting Action value with the SRFIMSI associated with the RN or SP entity returned by the RTDB, if any.
ASKLKUP	IAR ASD IARCGPN	50	Populates the ASD Formatting Action using data from the RTDB.
GRNLKUP	IAR GRN IARCGPN	50	Populates the GRN Formatting Action using data from the RTDB.
IDP Relay feature Called Party Service			
CCNCCHK	IDP Relay IDPRCDPN IDPRCDPN2 IDPRCDPN3 IDPRCDPN4	100	Verifies that the conditioned number is available under CSL CCNDC screening list. Note: Used ONLY for upgrade.
INPRTG	IDP Relay IDPRCDPN IDPRCDPN2 IDPRCDPN3 IDPRCDPN4	95	Determines: <ul style="list-style-type: none"> • If a CONNECT, CONTINUE, or RELEASECALL response will be sent based on RTDB lookup on conditioned Cdpn • If the IDP message should be relayed
CDPNNP	IDP Relay IDPRCDPN IDPRCDPN2 IDPRCDPN3 IDPRCDPN4	80	If RTDB lookup for conditioned number finds a DN, entity data is updated in RN or SP, as per the entity-type. If entity-type is SP, DFLTRN is configured and FA contains RN, RN is replaced by DFLTRN. If RTDB lookup finds a Network Entity, then the SRFIMSI digits from the Network Entity populate the SRFIMSI Formatting Action.
CGPNSVCRQD	IDP Relay IDPRCDPN	60	Indicates whether the IDPRCGPN service is to be invoked. This implies that CgPN number conditioning, Service Actions, and

Service Action	Feature Service	Precedence	Description
	IDPRCDPN2 IDPRCDPN3 IDPRCDPN4 <i>IDP A-Party Blacklist</i> IDPRCDPN IDPRCDPN2 IDPRCDPN3 IDPRCDPN4 <i>IDP A-Party Routing</i> IDPRCDPN IDPRCDPN2 IDPRCDPN3 IDPRCDPN4		formatting are done based on the configured CgPN Rules
LACCK	<i>IDP Relay</i> IDPRCDPN IDPRCDPN2 IDPRCDPN3 IDPRCDPN4	60	Compares the LAC obtained for LAI with the Area Code present in the incoming DN. Used to format the outgoing number by removing the digit and length prefixes (filter prefix in NPP) from the outgoing digit string if LAC =AC.
ASDLKUP	<i>IDP Relay</i> IDPRCDPN IDPRCDPN2 IDPRCDPN3 IDPRCDPN4	50	If DN is found in individual or range database lookup and ASD is present in the lookup result, the ASD populates the ASD Formatting Action value. If ASD is not present, the ASD Formatting Action value is NONE and Service Action execution continues. This SA can be used with the CDPNNP SA.
CGPNASDRQD	<i>IDP Relay</i> IDPRCDPN IDPRCDPN2 IDPRCDPN3 IDPRCDPN4	50	Indicates that IDPRCGPN service is to be invoked before the outgoing CdPN is formatted. This SA is used with CgPN ASDLKUP SA to populate the ASD Formatting Action value from CgPN lookup for CdPN formatting.
GRNLKUP	<i>IDP Relay</i> IDPRCDPN	50	If DN is found in individual or range database lookup and GRN is present in the lookup result, the GRN populates the GRN

Service Action	Feature Service	Precedence	Description
	IDPRCDPN2 IDPRCDPN3 IDPRCDPN4		Formatting Action value. If GRN is not present, the GRN Formatting Action value is NONE and Service Action execution continues. This SA can be used with the CGPNGRNRQD SA to format the outgoing CdPN based on CgPN GRN lookup. This SA can be used with CGPNNP SA.
CGPNGRNRQD	IDP Relay IDPRCDPN IDPRCDPN2 IDPRCDPN3 IDPRCDPN4	50	Indicates that IDPRCGPN service is to be invoked before the outgoing CdPN is formatted. This SA is used with CgPN GRNLKUP SA to populate the GRN Formatting Action value from CgPN lookup for CdPN formatting.
SKGTARTG	IDP Relay IDPRCDPN IDPRCDPN2 IDPRCDPN3 IDPRCDPN4	50	Replaces the SCCP CdPA GTA in the incoming IDP or IDPSMS message with the GTA provisioned in the the matching entry of the CSL SKBCSM list.
IDP Relay feature Calling Party service			
INPRTG	IDP Relay IDPRCGPN	95	Determines: <ul style="list-style-type: none"> • If a CONNECT, CONTINUE, or RELEASECALL response will be sent based on RTDB lookup on conditioned CgPN • If the IDP message should be relayed
BLKLSTRLY	IDP A-Party Blacklist IDPRCGPN	90	Used when a query/response mode is desired only for the blacklist-match case. The blacklist-match case is where the RTDB lookup on the conditioned CgPN results in an entry in which the blacklist flag is on and GRN data is present. In the no-match case, the message is serviced through other applicable IDP Relay services or falls through to GTT. This SA is used only with the IDPRCGPN service, has the highest precedence, and is mutually exclusive with the BLKLSTQRY NPP SA in the same rule.

Service Action	Feature Service	Precedence	Description
BLKLSTQRY	<i>IDP A-Party Blacklist</i> IDPRCGPN	90	Used when a query/response mode is desired for both the blacklist-match and blacklist-no-match cases. The blacklist-match case is where the RTDB lookup on the conditioned CgPN results in an entry in which the blacklist flag is on and GRN data is present. The blacklist-no-match case is where an RTDB entry is not found for that CgPN, or where an entry is found but the blacklist flag is off or GRN data is not present. This SA is used only with the IDPRCGPN service, and is mutually exclusive with the rest of the IDPRCGPN NPP SAs in the same rule.
CGPNNP	<i>IDP Relay</i> IDPRCGPN	80	NPP SA does a RTDB lookup for the conditioned number and analyzes success criteria. If RTDB lookup is successful (DN is found), entity-data is updated in RN or SP, per the entity-type. If entity-type is SP, DFLTRN is configured, and FA contains RN, RN shall be replaced by DFLTRN. If RTDB lookup is successful, and a Network Entity is found, then the SRFIMSI digits from the Network Entity are used for the Formatting Action SRFIMSI value.
CGPNRTG	<i>IDP A-Party Routing</i> IDPRCGPN	80	Determines whether A-Party Routing, SK/BCSM Routing, or both should be attempted in post-NPP processing
ASDLKUP	<i>IDP Relay</i> IDPRCGPN	50	If DN is found in individual or range database lookup and ASD is present in the lookup result, the ASD populates the ASD Formatting Action value. If ASD is not present, the ASD Formatting Action value is NONE and Service Action execution continues. This SA can be used with the IDPRCDPN(X) services CGPNASDRQD SA to format outgoing CDPN based on CgPN ASD lookup. This SA can be used with CGPNNP SA.

Service Action	Feature Service	Precedence	Description
GRNLKUP	IDP Relay IDPRCGPN	50	If DN is found in individual or range database lookup and GRN is present in the lookup result, the GRN populates the GRN Formatting Action value. If GRN is not present, the GRN Formatting Action value is NONE and Service Action execution continues. This SA can be used with the IDPRCDPN(X) services CGPNGRNRQD SA to format the outgoing CDPN based on CgPN GRN lookup. This SA can be used with CGPNNP SA.
TIF and TIF feature services			
CRP	TIF NP TIF, TIF2, TIF3	92	Circular Route Prevention
FPFXRLS	TIF Range CgPN Blacklist TIF Selective Screening TIFCGPN, TIFCGPN2, TIFCGPN3 TIF, TIF2, TIF3	92	Generate REL if a matching Calling/Called Party Rule Prefix is found by NPP
NPNRLS	TIF NP TIF, TIF2, TIF3	91	Number Portability Release on No Match
BLRLS	TIF Subscr CgPN Blacklist TIF Selective Screening TIFCGPN, TIFCGPN2, TIFCGPN3 TIF, TIF2, TIF3	91	REL generated because matching Calling/Called Party is found with Blacklist flag set in RTDB
BLNFNDRLS	TIF Subscr CgPN Blacklist TIF Selective Screening TIFCGPN, TIFCGPN2, TIFCGPN3 TIF, TIF2, TIF3	91	REL generated because Blacklist record is not found in RTDB

Service Action	Feature Service	Precedence	Description
SELSCR	<i>TIF Selective Screening</i> TIF, TIF2, TIF3	91	Message is selectively screened based on CdPN and CgPN Call Types <ul style="list-style-type: none"> REL is generated if CdPN is Screened and SAxVAL is between 0 and 127. RELay if CdPN is Screened and SAxVAL is <i>none</i>. Use FATYPE FASCRCd on CdPN and FASCRCG on CdPN.
ASDLKUP	<i>TIF ASD</i> TIF, TIF2, TIF3 TIFCGPN, TIFCGPN2, TIFCGPN3	90	Use of CdPN Additional Subscriber Data when formatting CdPN. Use of CgPN Additional Subscriber Data when formatting CgPN.
CGPNASDRQD	<i>TIF ASD</i> TIF, TIF2, TIF3	90	Use of CgPN Additional Subscriber Data when formatting CdPN.
GRNLKUP	<i>TIF GRN</i> TIF, TIF2, TIF3 TIFCGPN, TIFCGPN2, TIFCGPN3	90	Use of CdPN Generic Routing Number when formatting CdPN. Use of CgPN Generic Routing Number when formatting CgPN.
CGPNGRNRQD	<i>TIF GRN</i> TIF, TIF2, TIF3	90	Use of CgPN Generic Routing Number when formatting CdPN.
CGPNNP	<i>TIF NP</i> TIFCGPN, TIFCGPN2, TIFCGPN3	80	Calling Number Portability
CGPNSVCRQD	<i>TIF NP</i> TIF, TIF2, TIF3	80	Performs an RTDB lookup on the CgPN
NPRELAY	<i>TIF NP</i> TIF, TIF2, TIF3	80	Number Portability Relay
NPRLS	<i>TIF NP</i> TIF, TIF2, TIF3	80	Number Portability Release on Match
NSCdPN	<i>TIF NS</i> TIF, TIF2, TIF3	80	CdPN RTDB lookup for outgoing CdPN substitution
NOCGPNRLS	<i>TIF Range CgPN Blacklist</i> TIF, TIF2, TIF3	80	Generate REL if the Calling Party parameter is not present in the ISUP IAM or it is present with no digits in it

Service Action	Feature Service	Precedence	Description
NSCgPN	TIF NS TIF, TIF2, TIF3, TIFCGPN, TIFCGPN2, TIFCGPN3	75	CgPN RTDB lookup for outgoing CgPN substitution
SNSCgPN	TIF SNS TIF, TIF2, TIF3, TIFCGPN, TIFCGPN2, TIFCGPN3	75	Simple Number Substitution
FWDCS	TIF SCS TIF, TIF2, TIF3	5	Forward to SCS
MO SMS feature services			
FRAUDCHK	MNP SMS MOSMSGCGPN	80	CgPN RTDB lookup; discards message if subscriber is fraudulent.
PPRELAY	PPSMS, MO SMS Prepaid Intercept on B-Party MOSMSGCDPN	80	CdPN RTDB lookup; redirect message to prepaid subscriber if CdPN is prepaid. (PPSOPTS BPARTYCHK configuration option must be on)
	PPSMS MOSMSGCGPN	80	CgPN RTDB lookup; redirect message to prepaid subscriber if CgPN is prepaid. If the message is redirected to a Prepaid server, Formatting Action execution is skipped and the message can be routed without falling through to GTT.
CDPNNP	MO-based GSM SMS NP MOSMSGCDPN	60	Number portability for GSM Forward Short Message.
	MO-based IS41 SMS NP MOSMSICDPN	60	Number portability for IS41 SMDPP
MIGRATE	MO SMS IS41-to-GSM Migration MOSMSICDPN	70	Determine from RTDB lookup whether subscriber is migrated
ASDLKUP	MO SMS ASD MOSMSGCDPN MOSMSGCGPN	50	If DN is found in individual or range database lookup and ASD is present in the lookup result, the ASD populates the ASD Formatting Action value.

Service Action	Feature Service	Precedence	Description
	MOSMSICDPN MOSMSGCGPN		
CGPNASDRQD	MO SMS ASD MOSMSGCDPN	50	Indicates that the MOSMSGCGPN service is to be invoked before the outgoing CdPN is formatted. This SA is used with the MOSMSGCGPN ASDLKUP SA to populate the ASD Formatting Action value from CgPN lookup for CdPN formatting.
	MO SMS ASD MOSMSICDPN	50	Indicates that the MOSMSICGPN service is to be invoked before the outgoing CdPN is formatted. This SA is used with the MOSMSICGPN ASDLKUP SA to populate the GRN Formatting Action value from CgPN lookup for CdPN formatting
GRNLKUP	MO SMS GRN MOSMSGCDPN MOSMSGCGPN MOSMSICDPN MOSMSICGPN	50	If DN is found in individual or range database lookup and GRN is present in the lookup result, the GRN populates the GRN Formatting Action value.
CGPNGRNRQD	MO SMS GRN MOSMSGCDPN	50	Indicates that the MOSMSGCGPN service is to be invoked before the outgoing CdPN is formatted. This SA is used with the MOSMSGCGPN GRNLKUP SA to populate the GRN Formatting Action value from CgPN lookup for CdPN formatting.
	MO SMS GRN MOSMSICDPN	50	Indicates that the MOSMSICGPN service is to be invoked before the outgoing CdPN is formatted This SA is used with the MOSMSICGPN GRNLKUP SA to populate the GRN Formatting Action value from CgPN lookup for CdPN formatting.
Service used by any feature or function that uses NPP			
CDIAL	Any service	10	Corrective Dialing

Service Action	Feature Service	Precedence	Description
			Execute Formatting Actions even if the last Service Action indicates to skip Formatting Action execution.

Provisioning Formatting Actions

Formatting Action values are used to construct the outgoing digit string after Conditioning Action execution and Service Action execution are completed. Formatting Action values can be populated by Conditioning Actions and Service Actions. The Conditioning Action or Service Action that populates a Formatting Action in an Action Set must also be provisioned in the Action Set. See [Provisioning Conditioning Actions](#) and [Provisioning Service Actions](#).

Table 24: Formatting Actions describes Formatting Actions, indicates population of the Formatting Action by a Conditioning Action or Service Action, and indicates provisioning considerations. Up to 12 Formatting Actions can be provisioned per Action Set.

Note: If the MIGRATE and CDPNNP Service Actions are both provisioned in the same Action Set for an MO SMS feature , the outgoing number format can be only a single format. For example, it is not possible for a migrated subscriber to be formatted as RN+DN and a ported subscriber to be formatted as CC+RN+DN by the same Action Set.

Formatting Actions are provisioned as a comma-separated list of values for the fa parameter. At least one value must be specified for the fa parameter. For Any additional values, one comma must be entered between each two values.

The fa parameter values must specify the Formatting Actions in the order in which they are executed by NPP. The first or only value for the fa parameter must be the first or only Formatting Action that will be executed by NPP in the Formatting Action group; the second value in the fa parameter list must be the second Formatting Action that will be executed by NPP in the Formatting Action group; and so on.

Table 24: Formatting Actions

Formatting Action	Populated By	Description
AC	CA AC[1..3], ACDEF, ACCgPN, ACCgPN[1..8]	Area Code digits Adds the AC Formatting Action value to the outgoing digit string. Provisioning Considerations: 1. The EAGLE prevents the AC Formatting Action from being provisioned if the AC is not populated during Conditioning Action execution (by AC[1..3] , ACDEF, ACCgPN, ACCgPN[1..8], or some other AC-loading Conditioning Action).

Formatting Action	Populated By	Description
		<p>2. The AC Formatting Action cannot be specified with (is mutually exclusive with) the DN and ZN Formatting Actions in the same Action Set.</p>
CC	CA CC[1..3], CCDEF, or CCCGPN	<p>Country Code digits</p> <p>Adds the CC Formatting Action value to the outgoing digit string.</p> <p>Provisioning Considerations:</p> <ol style="list-style-type: none"> 1. The EAGLE prevents the CC Formatting Action from being provisioned if the CC is not populated during Conditioning Action execution (by CC[1..3] or CCDEF or some other CC-loading Conditioning Action). 2. The CC Formatting Action cannot be specified with (is mutually exclusive with) the ZN Formatting Action in the same Action Set.
DLMA, DLMB, DLMC, DLMD, DLME, DLME, DLMF, DLMG, DLMH, DLMI, DLMJ, DLMK, DLML, DLMM, DLMN, DLMO, DLMP	<p>Default Delimiter digits</p> <p>Service Action execution</p>	<p>Adds the corresponding Delimiter Formatting Action value to the outgoing digit string.</p> <p>The Delimiter Formatting Action values are populated from the NPP Service State delimiter values during Service Action execution. If a Delimiter Formatting Action value is not populated during Service Action execution, the outgoing digit string is not modified for that Formatting Action.</p> <p>Note: If a TIF or IDP Relay service has DLMA-DLMC values that are not NONE in the TIFOPTS or TTROPTS table, the values from the TIFOPTS or TTROPTS table will be used in NPP processing.</p> <p>The maximum length of the Delimiter Formatting Actions is 16 digits.</p> <p>Provisioning Considerations: None.</p>
DN	CA DN[1..15] or DNX	<p>Dialed Number</p> <p>Adds the DN Formatting Action value to the outgoing digit string.</p> <p>Provisioning Considerations:</p> <ol style="list-style-type: none"> 1. When the DN Formatting Action is specified in the Action Set, the DN[1..15] or DNX Conditioning Action must be specified in the corresponding Conditioning Action group. 2. The DN Formatting Action cannot be specified with (is mutually exclusive with) the ZN, SN, and AC Formatting Actions in the same Action set.
FPEX	CA FPEX	Filter Prefix digits

Formatting Action	Populated By	Description
		<p>Adds the FPFX Formatting Action value to the outgoing digit string.</p> <p>Provisioning Considerations:</p> <p>When the FPFX Formatting Action is specified, the FPFX Conditioning Action must be specified in the Action Set to populate FPFX during Conditioning Action execution.</p>
ASD	Service Action execution	<p>Additional Subscriber Data</p> <p>Adds the CdPN ASD Formatting Action value to the outgoing CdPN digit string.</p> <p>The ASD Formatting Action is populated during Service Action execution. If the ASD Formatting Action is not populated during Service Action execution, the ASD Formatting Action does not modify the outgoing digit string.</p> <p>Provisioning Considerations: None.</p>
ASDOTHER	Service Action execution	<p>Additional Subscriber Data from another service.</p> <p>Adds the CgPN ASD Formatting Action value to the outgoing CdPN digit string.</p> <p>The ASDOTHER Formatting Action is populated during Service Action execution when a TIF CdPN service invokes the TIF CgPN service that is indicated in the Service Rule INVKSERV parameter value. If Additional Subscriber Data is supplied from the Calling Party Service, then it will be formatted into the Called Party digits.</p> <p>Provisioning Considerations: Used with the TIF ASD feature.</p>
GRN	Service Action execution	<p>Generic Routing Number</p> <p>Adds the CdPN Generic Routing Number digit string to the outgoing CdPN digit string.</p> <p>The GRN Formatting Action value is populated during Service Action execution. If the GRN Formatting Action is not populated during Service Action execution, the GRN Formatting Action does not modify the outgoing digit string.</p> <p>Provisioning Considerations: None.</p>
GRNOTHER	Service Action execution	<p>Generic Routing Number from another service.</p> <p>Adds the CgPN Generic Routing Number digit string to the outgoing CdPN digit string.</p> <p>The GRNOTHER Formatting Action is populated during Service Action execution when a TIF CdPN service invokes the TIF CgPN service that is indicated in the Service Rule INVKSERV parameter value. If the Generic Routing Number</p>

Formatting Action	Populated By	Description
		is supplied from the Calling Party Service, then it will be formatted into the Called Party digits. Provisioning Considerations: Used with the TIF GRN feature.
NONE	Default Formatting Action value	Do not perform any formatting for this Formatting Action. Provisioning Considerations: The NONE value is the default value for all Formatting Actions in an Action Set. The NONE Formatting Action value indicates the end of Formatting Actions in a Formatting Action group.
ORIG		Original incoming digit string Adds the incoming digit string (unmodified) to the outgoing digit string. The ORIG Formatting Action is always available. Provisioning Considerations: None.
PFXA, PFXB, PFXC, PFXD, PFXE, PFXF	CA PFX[A..F]	Prefix digits (1-8 digits) Adds the PFX[A..F] Formatting Action value to the outgoing digit string. Provisioning Considerations: When a PFX[A..F] Formatting Action is specified, the PFX[A..F] Conditioning Action must be specified to populate the Formatting Action value during Conditioning Action execution.
RN	Service Action execution	Routing Number digits Adds the RN Formatting Action value to the outgoing digit string. The RN Formatting Action value is populated during Service Action execution. If the RN Formatting Action is not populated during Service Action execution, the RN Formatting Action does not modify the outgoing digit string. Provisioning Considerations: None.
RNOSPODN	RN or SP from RTDB lookup, or CA DN[1..15] or DNX	RN or SP if found in the RTDB lookup; if not found, a DN Conditioning Action value populates this Formatting Action. Provisioning Considerations: A DN Conditioning Action must be provisioned when the RNOSPODN Formatting Action is provisioned.
RNOSPOSN	RN or SP from RTDB lookup, or CA SN[1..15] or SNX	RN or SP if found in the RTDB lookup; if not found, an SN Conditioning Action value populates this Formatting Action. Provisioning Considerations:

Formatting Action	Populated By	Description
		An SN Conditioning Action must be provisioned when the RNOSPOSN Formatting Action is provisioned.
RNOSPOZN	RN or SP from RTDB lookup, or CA ZNX	RN or SP if found in the RTDB lookup; if not found, the ZN Conditioning Action value populates this Formatting Action. Provisioning Considerations: The ZNX Conditioning Action must be provisioned when the RNOSPOZN Formatting Action is provisioned.
SN	CA SN[1..15] or SNX	Subscriber Number Adds the SN Formatting Action value to the outgoing digit string. Provisioning Considerations: 1. The EAGLE prevents the SN Formatting Action from being provisioned if the SN[1..15] or SNX is not specified in the corresponding Conditioning Action Set. 2. The SN Formatting Action cannot be specified with (is mutually exclusive with) the ZN and DN Formatting Actions in the same Action Set.
SP	Service Action execution	Service Provider digits Adds the SP Formatting Action value to the outgoing digit string. The SP Formatting Action is populated during Service Action execution. If the SP Formatting Action is not populated during Service Action execution, the SP Formatting Action does not modify the outgoing digit string. Provisioning Considerations: None.
SRFIMSI	Service Action execution	Signaling Relay Function International Mobile Subscriber Identity Adds the SRFIMSI Formatting Action value to the outgoing digit string. The SRFIMSI Formatting Action value is populated during Service Action execution. If the SRFIMSI Formatting Action is not populated during Service Action execution, the SRFIMSI Formatting Action does not modify the outgoing digit string. Provisioning Considerations: None.
VMID	Service Action execution	Voice Mail Identifier digits Adds the VMID Formatting Action value to the outgoing digit string. The VMID Formatting Action is populated during Service Action execution. If the VMID Formatting Action is not populated during Service Action execution, the VMID Formatting Action does not modify the outgoing digit string.

Formatting Action	Populated By	Description
		Provisioning Considerations: None.
ZN	CA ZNX	<p>Internationally formatted Dialed Number</p> <p>Adds the ZN Formatting Action value to the outgoing digit string.</p> <p>Provisioning Considerations:</p> <ol style="list-style-type: none"> 1. The EAGLE prevents the ZN Formatting Action from being provisioned if the ZNX is not specified in the corresponding Conditioning Action Set. 2. The ZN Formatting Action cannot be specified with (is mutually exclusive with) the DN, SN, AC, and CC Formatting Actions in the same Action Set.

Formatting Action List Type

Formatting Action List Types are used with Formatting Actions to format outgoing digits in the response messages generated by the services using NPP.

When a new Action Set is entered using the `ent-npp-as` command, the FANF, FASP, FARN, FANE, FASCRCRCD, and FASCRCRGC Formatting Action Lists are unpopulated. These lists are populated using the `chg-npp-as` command. Only one Formatting Action List specified by the FATYPE parameter can be included in a single `chg-npp-as` command.

The Formatting Action Lists are provisioned with the FA and FATYPE parameters. When the FATYPE parameter is specified in combination with the FA parameter in the `chg-npp-as` command, the Formatting Action List specified by the FATYPE parameter is updated. When the FATYPE parameter is specified in a `chg-npp-as` command, the FA parameter and appropriate parameter values must be included in the entered command.

Examples

To configure the FARN Formatting Action List, enter:

```
chg-npp-as:asn=example:fa=cc,rn,dn:fatype=farn
```

To remove the Formatting Actions associated with the FARN Formatting Action List, enter the `chg-npp-as` command with the FATYPE parameter and FA=NONE.

```
chg-npp-as:asn=example:fa=none:fatype=farn
```

To configure the Formatting Actions which are not associated with a Formatting Action List, enter the `chg-npp-as` command with the FATYPE=DFLT or omit the FATYPE parameter.

```
chg-npp-as:asn=example:fa=cc,rn,dn:fatype=dflt
```

or

```
chg-npp-as:asn=example:fa=cc,rn,dn
```

Table 25: Formatting Action List Types (FATYPE)

Formatting Action List Type	Description
DFLT	Digits are formatted using the TTROPTS:CDDRA and TTROPTS:CGDRA parameters.
FANE	Formatting Action List to format digits when neither the SP nor the RN network entity is associated with the DN in the RTDB
FANF	Formatting Action List to format digits when the DN is not present in the RTDB
FARN	Formatting Action List to format digits when the RN network entity is associated with the DN in the RTDB
FASP	Formatting Action List to format digits when the SP network entity is associated with the DN in the RTDB
FASCRC	Formatting Action List to format ISUP CdPN digits when CdPN is screened by the SELSCR Service Action and SAxVAL is none
FASCRCG	Formatting Action List to format ISUP CgPN digits when CdPN is screened by the SELSCR Service Action and SAxVAL is none

Provisioning the Outgoing FNAI

After successful Formatting Action execution, NPP sends an outgoing NAI value with the outgoing digit string to the calling service.

The provisioned OFNAI parameter value in each Action Set indicates the value to use for the outgoing NAI value: either a provisioned FNAI Class value that NPP maps to the outgoing NAI value, or the NAI that was sent to NPP with the incoming digit string. See [Outgoing FNAI Class](#).

Action Set Provisioning Procedures

Use the following procedures to create, change, and delete Action Sets.

Although there is a step to enter each group of Actions, the parameters with comma-separated lists do not need to be entered in a specific sequence. The values in a comma-separated list must be entered in the order in which the values will be used in execution. The steps indicate the types of Actions and other components that must be provisioned.

Each procedure builds one command. Do not press ENTER to execute the command until a procedure step instructs you to press ENTER. Refer to *Commands User's Guide* for complete descriptions of the commands used in these procedures.

For example, an Action Set named ACTSET1 contains Conditioning and Formatting Actions to construct the International digit format CC+AC+SN, the CdPNNP Service Action, and an outgoing FNAI value of INTL. The following procedure steps could be used to enter the complete command to create the Action Set; the last step indicates that Enter can be pressed to execute the command.

1. Enter the command keyword; the command line contains `ent-npp-as`
2. Enter the asn parameter to specify the Action Set Name; the command line contains `ent-npp-as:asn=actset1`
3. Enter the Conditioning Actions; the command line contains `ent-npp-as:asn=actset1:ca=cc2,ac3,sn7`
4. Enter the Service Action; the command line contains `ent-npp-as:asn=actset1:ca=cc2,ac3,sn7:sa=cdpnp`
5. Enter the Formatting Actions; the command line contains `ent-npp-as:asn=actset1:ca=cc2,ac3,sn7:sa=cdpnp:fa=cc,ac,sn`
6. Enter the OFNAI value; the command line contains the complete command to create the Action Set:
`ent-npp-as:asn=actset1:ca=cc2,ac3,sn7:sa=cdpnp:fa=cc,ac,sn:ofnai=int1`
7. Press ENTER to execute the command.

Create a New Action Set

Use the following procedure to provision a new Action Set.

Enter each part of one command as described in each step of the procedure. A step near the end of the procedure instructs you to press ENTER to execute the command when the complete command has been entered. See an example in [Action Set Provisioning Procedures](#).

1. Enter `ent-npp-as` (the command keyword).
2. Enter the asn parameter to specify the Action Set Name.
3. Enter the Conditioning Action parameters for the Action Set. See the provisioning considerations in [Provisioning Conditioning Actions](#).
4. Enter the Service Actions for the Action Set. See the provisioning considerations in [Provisioning Service Actions](#).
5. Enter the Formatting Actions for the Action Set. See the provisioning considerations in [Provisioning Formatting Actions](#).
6. Enter the OFNAI parameter. See the provisioning considerations in [Provisioning the Outgoing FNAI](#).
7. Press **Enter** to execute the command.
8. Enter the `rtrv-npp-as` command and verify the Action Set entries in the output.

Add an Action to an Existing Group

Use the following procedure to add a Conditioning, Service, or Formatting Action to an existing group in an Action Set.

Note: An Action Set cannot be changed if it is associated with any Rules in Service Rule Sets. Either:

- Delete every Rule that contains the Action Set from the Service Rule Sets, change the Action Set, and add the Rules back into the Service Rule Sets.
- Create a new Action Set that contains the desired changes, and create new Rules that contain the new Action Set in the appropriate Service Rule Sets.

Enter each part of one command as described in each step of the procedure. A step near the end of the procedure instructs you to press ENTER to execute the command when the complete command has been entered. See an example in [Action Set Provisioning Procedures](#).

Considerations for adding Actions to a group:

- The new Actions must be supported by the specified service.
 - The correct execution sequence of the Actions must be maintained in the parameters which use comma-separated lists of parameter values.
 - For Service Actions, a new Service Action must be in the correct high-to-low precedence sequence in the comma-separated list of parameter values.
 - The groups in the Action Set must contain corresponding Actions. For example, if a Conditioning Action populates a Formatting Action, that Formatting Action must be provisioned in the Action Set.
1. Enter the `rtrv-npp-as` command and specify the Action Set name to display the existing group of Actions.
 2. Enter `chg-npp-as` (the command keyword).
 3. Enter the `asn` parameter to specify the Action Set Name.
 4. Enter the Action parameters for the group in the Action Set. See the provisioning considerations in [Provisioning Action Sets](#).

Include a parameter value for each new Action in the group, maintaining the correct sequence for Action execution.

5. Press **Enter** to execute the command.
6. Enter the `rtrv-npp-as` command and verify the Action Set entries in the output.

Change an Action in an Existing Group

Use the following procedure to change Conditioning Actions, Service Actions, or Formatting Actions in an existing group in an Action Set.

Note: An Action Set cannot be changed if it is associated with any Rules in Service Rule Sets. Either:

- Delete every Rule that contains the Action Set from the Service Rule Sets, change the Action Set, and add the Rules back into the Service Rule Sets.
- Create a new Action Set that contains the desired changes, and create new Rules that contain the new Action Set in the appropriate Service Rule Sets.

To change one or more Conditioning Action, Service Action, or Formatting Action parameter values in an Action Set, the entire group of Action parameters in the existing group for the Action Set must be specified in the `chg-npp-as` command, including the parameters that are not changing values. The new value is specified for each parameter that needs to change value. Conditioning Actions are shown in this example; however, this same method is used for Service Actions and Formatting Actions.

- Conditioning Actions `ign1`, `ac1`, `cc3`, and `sn2` are specified in the existing Conditioning Action group.
- To change “`ac1`” to “`ac3`”, the following command can be entered:

```
chg-npp-as:asn=asn7:ca=ign1,ac3,cc3,sn2
```

Considerations for changing Actions in a group:

- The new value must be supported by the specified service.
 - The correct execution sequence of the Actions must be maintained in the parameters which use comma-separated lists of parameter values.
 - For Service Actions, the new Service Action must be in the correct high-to-low precedence sequence in the comma-separated list of parameter values.
 - The groups in the Action Set must contain corresponding Actions. For example, if a Conditioning Action populates a Formatting Action, that Formatting Action must be provisioned in the Action Set.
1. Enter the `rtrv-npp-as` command and specify the name of the Action Set that contains the group with the Action or Actions to be changed.
 2. Enter `chg-npp-as` (the command keyword).
 3. Enter the `asn` parameter to specify the name of the Action Set.
 4. Enter all of the Action parameters in the group that are shown in the output in [Step 1](#).
Specify the existing value for each Action parameter that will not change.
Specify the new value for each Action parameter that will change.
 5. Press Enter to execute the command.
 6. Enter the `rtrv-npp-as` command and specify the name of the Action Set, to verify the changes.

Remove an Action from an Existing Group

To remove from an Action Set the last Conditioning Action, Service Action, or Formatting Action that is executed in a group, the entire group of Action parameters must be specified in the command – except for the parameter for the Action that is to be removed. Conditioning Actions are shown in the following example; however, this same method is used for Service Actions and Formatting Actions.

When the `w` value is omitted from the list, the `w` Conditioning Action is removed from the Action Set. The entire group of specified Conditioning Action parameter values replaces the entire previously defined group of values.

To remove from an Action Set an Action that is not the last one that is executed, the entire group of Action parameters must be specified in the command – except for the parameter for the Action that is to be removed.

For example:

- An Action Set contains Conditioning Actions `x`, `y`, and `w`.
- To delete the `y` Conditioning Action from the Action Set, enter the following command:

```
chg-npp-as:ca=x,w
```

When the `y` value is omitted from the list, the `y` Conditioning Action is removed from the Action Set. The entire group of specified Conditioning Action parameter values replaces the entire previously defined group of values.

Use the following procedure to remove an Action from an Action Set.

Note: An Action Set cannot be changed if it is associated with any Rules in Service Rule Sets. Either:

- Delete every Rule that contains the Action Set from the Service Rule Sets, change the Action Set, and add the Rules back into the Service Rule Sets.

- Create a new Action Set that contains the desired changes, and create new Rules that contain the new Action Set in the appropriate Service Rule Sets.
1. Enter `chg-npp-as` (the command keyword).
 2. Enter the `asn` parameter to specify the Action Set Name.
 3. Enter the comma-separated list of values in the group for the Action Set, except for the Action or Actions that are removed. See the provisioning considerations in [Provisioning Action Sets](#).
 4. Press **Enter** to execute the command.
 5. Enter the `rtrv-npp-as` command and verify the Action Set entries in the output.

Provisioning Service Rule Sets

A Service Rule Set is collection of Rules associated with a service. A Rule is an association of a filter and an Action Set. Each Rule is provisioned to indicate the Action Set that will be executed for an incoming digit string that matches the filter in the Rule. The combined FNAI Class, Filter Prefix, and Filter Digit Length values of a filter in a Rule determine whether NPP will process an incoming digit string.

When the digit string matches a filter in a Rule for the calling service, the incoming digit string is processed by NPP through the associated Action Set.

If the digit string does not find a filter match in the Rules for the calling service, NPP does not process the string and exits to the calling service.

Up to 20 Service Rule Sets can be provisioned per system. Up to 4096 Rules can be provisioned for one Service Rule Set. Up to 8192 Rules can be provisioned per system. The following commands are used to provision Rules in NPP Service Rule Sets. Each execution of a command creates or modifies one Rule in the Service Rule Set for a service.

Refer to *Commands User's Guide* for complete command descriptions, including parameter names, valid values, rules for using the commands correctly, and output examples.

Table 26: NPP Service Rule Set Commands

Command	Description	Parameter(s)	Parameter Values
<code>ent-npp-srs</code>	Create an NPP Rule in a Service Rule Set		
<code>chg-npp-srs</code>	Change the Action Set name in a Rule		
	Service Name	<code>srvn</code>	TTR, TIF, TIF2, TIF3, TIFCGPN, TIFCGPN2, TIFCGPN3, IARCDPN, IARCGPN, IDPRCDPN, IDPRCDPN2, IDPRCDPN3, IDPRCDPN4, IDPRCGPN, MOSMSGCDPN, MOSMSGCGPN, MOSMSICDPN, MOSMSICGPN, NPPT
	Filter NAI	<code>fnai</code>	INTL: filter messages with NAI=INTL. NATL: filter messages with NAI=NATL. NAI1: filter messages with NAI=NAI1. NAI2: filter messages with NAI=NAI2.

Command	Description	Parameter(s)	Parameter Values
			NAI3: filter messages with NAI=NAI3. UNKN: filter messages with NAI=UNKN.
	Filter Prefix	fpfx	1 to 16 digit hexadecimal digit string (including single digit wildcard [?]), or wildcard [*].
	Filter Digit Length	fdl	Specific or variable length of the incoming digit string. Decimal value [1..32] or wildcard [*].
	Action Set Name	asn	Ten-character string that uniquely identifies the Action Set to associate with this Rule.
	Invoke Service Name	invkserv	TIF CgPN service to be invoked by the corresponding TIF CdPN service. TIFCGPN, TIFCGPN2, TIFCGPN3, NONE
dlt-npp-srs	Delete a Rule from an NPP Service Rule Set		
	Service Name	srvn	TTR, TIF, TIF2, TIF3, TIFCGPN, TIFCGPN2, TIFCGPN3, IARCDPN, IARCGPN, IDPRCDPN, IDPRCDPN2, IDPRCDPN3, IDPRCDPN4, IDPRCGPN, MOSMSGCDPN, MOSMSGCGPN, MOSMSICDPN, MOSMSICGPN, NPPT
	Filter NAI	fnai	INTL: filter messages with NAI=INTL. NATL: filter messages with NAI=NATL. NAI1: filter messages with NAI=NAI1. NAI2: filter messages with NAI=NAI2. NAI3: filter messages with NAI=NAI3. UNKN: filter messages with NAI=UNKN.
	Filter Prefix	fpfx	Specific or variable length of the incoming digit string. 1 to 16 digit hexadecimal string (including single digit wildcard [?]), or wildcard [*].
	Filter Digit Length	fdl	Decimal value [1..32] or wildcard [*].
rtrv-npp-srs	Retrieve all NPP Service Rule Sets or the Rules with the specified content		
	Service Name	srvn	TTR, TIF, TIF2, TIF3, TIFCGPN, TIFCGPN2, TIFCGPN3, IARCDPN, IARCGPN, IDPRCDPN, IDPRCDPN2, IDPRCDPN3, IDPRCDPN4, IDPRCGPN, MOSMSGCDPN, MOSMSGCGPN, MOSMSICDPN, MOSMSICGPN, NPPT

Command	Description	Parameter(s)	Parameter Values
	Filter NAI	fnai	INTL: Display Rules with NAI=INTL. NATL Display Rules with NAI=NATL. NAI1: Display Rules with NAI=NAI1. NAI2: Display Rules with NAI=NAI2. NAI3: Display Rules with NAI=NAI3. UNKN: Display Rules with NAI=UNKN.
	Filter Prefix	fpfx	Specific or variable length of the incoming digit string. 1 to 16 digit hexadecimal string (including single digit wildcard [?]), or wildcard [*].
	Filter Digit Length	fdl	Decimal value [1..32] or wildcard [*].
	Action Set Name	asn	Added new parameter Ten-character string that uniquely identifies the Action Set associated with the Rule(s).

Considerations for provisioning Rules:

- A Rule cannot be provisioned with an OFNAI-Class value that is not supported by the specified service. For example, if NAI1=NONE for the service, a Rule for the service cannot contain an OFNAI Class value of NAI1.
- A Rule that is provisioned with FDL=* must be associated with a Conditioning Action group that contains the ZNX, DNX, or SNX Conditioning Action.
- A Rule that is provisioned with FDL=<specific value> cannot be associated with a Conditioning Action group that contains Conditioning Actions that process more than <specific value> number of digits.
- A Rule cannot be associated with an Action Set that contains Service Actions that are not supported by the service for the Service Rule Set
- A Rule cannot be associated with an Action Set that contains Service Actions with precedence values that are not valid for the specified service.
- A Rule cannot be associated with an Action Set that contains Formatting Actions that are not supported by the specified service.
- A Rule cannot be provisioned with an FPFX digit length greater than the specified FDL value when both the FPFX and FDL values are specific values (not wildcard values).

Provisioning the Filter NAI Class (FNAI Class)

The Filter NAI Class indicates the mnemonic that has the numeric value that must match the incoming NAI value before NPP processing will continue.

NPP maps the incoming service-specific NAI value to an FNAI Class mnemonic (NATL, INTL, NAI1, NAI2, NAI3, UNKN). Each mnemonic is assigned a number value. The incoming NAI value is mapped

to the mnemonic with the matching number. For example, if the incoming NAI of 4 indicates an internationally formatted incoming digit string, the INTL mnemonic must be provisioned with the value 4 and the FNAI Class value for the filter must be INTL.

If the service does not need support for an FNAI Class, the mnemonic value is provisioned to NONE. (The digit string formatting is inferred based on a protocol-specific NAI value.) A Rule cannot specify that FNAI Class in the FNAI parameter value.

Provisioning an FNAI Class mnemonic value to NONE for a service can be done only if the Service Rule Set for the service is empty.

Provisioning the Filter Prefix (FPFX)

The Filter Prefix is a hexadecimal digit string. When an FPFX value is provisioned, the digits at the beginning of an incoming digit string must match the FPFX digits for NPP processing to continue.

The provisioned FPFX value can be a wildcard (*) to consider any digits in the incoming string to be a match.

When the NPP Unlimited SDWC Chars feature is turned on, the provisioned FPFX digits can contain up to 3 single digit wildcard characters (?) in the first 6 digits, but not the last digit if the string is less than or equal to 6 digits. An unlimited number of SDWC characters are allowed for each NPP service.

When the NPP Unlimited SDWC Chars feature is turned off, the provisioned FPFX digits can contain single digit wildcard characters (?) in any positions of the value except the last digit. The total number of single digit wildcard characters in all of the filter prefixes in the Service Rule Set for a service cannot exceed 25.

The FPFX string can be populated to the FPFX Formatting Action value when the FPFX Conditioning Action is provisioned in the associated Action Set in the Rule. The FPFX digit string will provide the first digits to be inserted in the outgoing digit string by the Formatting Action processing. The FPFX value in the Rule cannot be a wildcard (*) when the FPFX Conditioning Action is provisioned.

Provisioning the Filter Digit Length (FDL)

The Filter Digit Length specifies how many digits the incoming digit string must have to match the filter and continue NPP processing. The FDL value can be a wildcard (*) to allow any number of digits to match the filter.

For Rules with FDL=*, the associated Conditioning Action group must contain the ZNX, DNX, or SNX Conditioning Action. For Rules with specific FDL values (not wildcard) the associated Conditioning Action group must process the entire number of digits (by ignoring digits with the IGN Conditioning Actions, by other Conditioning Action processing, or both).

Validating Conditioning Actions during Rule Provisioning

During NPP Rule provisioning, NPP validates that Conditioning Action execution can be successful with the Conditioning Actions provisioned in the Action Set and the filter values associated with the Rule. Refer to *Commands User's Guide* for provisioning considerations for Rules, including the following considerations:

- The Action Set must contain Conditioning Actions, Service Actions in correct precedence sequence, and Formatting Actions that are supported by the calling service that uses the Rule.

- For Rules with FDL=*, the associated Conditioning Action group must contain the ZNX, DNX, or SNX Conditioning Action for Conditioning Action execution to be considered successful.
- For Rules with specific FDL values (not wildcard) the associated Conditioning Action group must process the entire number of digits (by ignoring digits with the IGN Conditioning Actions, by other Conditioning Action processing, or both). For example, if the NPP Rule filter consists of FPFx='0123', FNAI=INTL and FDL=16, the associated Conditioning Action Set would need to process all 16 digits of the incoming digit string for Conditioning Action execution to be considered successful.

Service Rule Set Provisioning Procedures

Use the following procedures to create, change, and delete a Rule in a Service Rule Set for the specified service. The entry of one command operates on one Rule in the Service Rule Set.

Although there is a step to enter each component of the Rule, the parameters for a Rule do not need to be entered in the command in the sequence shown in the procedure. The steps just indicate the types of components that must be provisioned.

Each procedure builds one command. Do not press ENTER to execute the command until a procedure step instructs you to press ENTER. Refer to *Commands User's Guide* for complete descriptions of the commands used in these procedures.

For example, a Rule for the TIF service contains a Filter of FNAI=INTL, match any prefix, and match variable digit lengths. The Rule uses the ACTSET1 Action Set. The following procedure steps could be used to enter the complete command to create the Rule; the last step indicates that ENTER can be pressed to execute the command.

1. Enter the command keyword; the command line contains `ent-npp-srs`
2. Enter the name of the calling service; the command line contains `ent-npp-srs:svrn=tif`
3. Enter the FNAI value; the command line contains `ent-npp-srs:svrn=tif:fnai=intl`
4. Enter the Filter Prefix value; the command line contains `ent-npp-srs:svrn=tif:fnai=int:fpfx=*`
5. Enter the Filter digit Length value; the command line contains `ent-npp-srs:svrn=tif:fnai=int:fpfx=*.fdl=*`
6. Enter the Action Set name to be associated with the Filter; the command line contains `ent-npp-srs:svrn=tif:fnai=int:fpfx=*.fdl=*.asn=actset1`
7. Press ENTER to execute the command.

Create a New Rule in a Service Rule Set

Use the following procedure to provision a new Rule in a Service Rule Set for the specified service. The Rule provisioning validates that the Conditioning Actions in the associated Action Set can execute successfully for the incoming digit string selected by the Rule filter (see Validating Conditioning Actions during Rule Provisioning).

Enter each part of one command as described in each step of the procedure. A step near the end of the procedure instructs you to press ENTER to execute the command when the complete command has been entered. See an example in [Service Rule Set Provisioning Procedures](#).

1. Enter `ent-npp-srs` (the command keyword).
2. Enter the `svrn` parameter to specify the name of the calling service that will use the Rule.

3. Enter the FNAI filter parameter. See the provisioning considerations in [Provisioning the Filter NAI Class \(FNAI Class\)](#).
4. Enter the Filter Prefix parameter. See the provisioning considerations in [Provisioning the Filter Prefix \(FPFX\)](#).
5. Enter the Filter Digit Length parameter. See the provisioning considerations in [Provisioning the Filter Digit Length \(FDL\)](#).
6. Enter the Action Set Name parameter to specify the Action Set that is associated with this Rule.
7. Press **Enter** to execute the command.
8. Enter the `rtrv-npp-srs` command with the calling service name and verify the Rule entry in the output.

Change the Action Set Name in a Rule

Use the following procedure to change the Action Set Name in a Rule. All of the parameters must be specified in the command. Specify the new Action Set Name in the `asn` parameter. The Rule provisioning validates that the Conditioning Actions in the associated Action Set can execute successfully for the incoming digit string selected by the Rule Filter (see Validating Conditioning Actions during Rule Provisioning).

Enter each part of one `chg-npp-srs` command as described in each step of the procedure. A step near the end of the procedure instructs you to press ENTER to execute the command when the complete command has been entered. See an example in [Service Rule Set Provisioning Procedures](#).

Note: Only the Action Set Name can be changed in a Rule. If any Filter values need to be changed for use with the same Action Set, a new Rule must be created with the new Filter values and the same Action Set Name. The existing Rule can be deleted, or it can remain in the Service Rule Set if it does not adversely affect the filtering process for the service.

1. Enter the `rtrv-npp-srs` command with the service name to display the existing values for the Rule that needs to change for the service, and press ENTER.
2. Enter `chg-npp-srs` (the command keyword).
3. Enter the `srn` parameter to specify the name of the calling service that uses the Rule.
4. Enter the `fna` parameter, with the existing value. See the provisioning considerations in [Provisioning the Filter NAI Class \(FNAI Class\)](#).
5. Enter the `fpfx` parameter, with the existing value. See the provisioning considerations in [Provisioning the Filter Prefix \(FPFX\)](#).
6. Enter the `fdl` parameter, with the existing value. See the provisioning considerations in [Provisioning the Filter Digit Length \(FDL\)](#).
7. Enter the `asn` parameter to specify the name of the new Action Set that is to be associated with this Rule.
8. Press ENTER to execute the command.
9. Enter the `rtrv-npp-srs` command with the calling service name and verify the Rule entry in the output.

Remove a Rule from a Service Rule Set

Use the following procedure to remove a Rule from a Service Rule Set. Note: This procedure builds one `dlt-npp-srs` command. DO NOT PRESS ENTER to execute the command until a procedure step instructs you to press **Enter**.

Enter each part of one `dlt-npp-srs` command as described in each step of the procedure. A step near the end of the procedure instructs you to press ENTER to execute the command when the complete command has been entered. See an example in [Service Rule Set Provisioning Procedures](#).

1. Enter the `rtrv-npp-srs` command with the service name to display the existing values for the Rule that needs to be removed for the service, and press ENTER.
2. Enter `dlt-npp-srs` (the command keyword).
3. Enter the `srvn` parameter to specify the name of the calling service that uses the Rule.
4. Enter the `fnaid` parameter, with the existing value. See the provisioning considerations in [Provisioning the Filter NAI Class \(FNAI Class\)](#).
5. Enter the `fpfx` parameter, with the existing value. See the provisioning considerations in [Provisioning the Filter Prefix \(FPFX\)](#).
6. Enter the `fdl` parameter, with the existing value. See the provisioning considerations in [Provisioning the Filter Digit Length \(FDL\)](#).
7. Press ENTER to execute the command.
8. Enter the `rtrv-npp-srs` command with the calling service name and verify that the Rule was removed for the service.

Provisioning Service Data

The procedures in this section describe how to change the On or Off status of the specified service, define Delimiter values to use in formatting the outgoing digit string, and define the FNAI Class mapping value for the outgoing NAI.

Note: For the IDPRCDPN, IDPRCDPN2, IDPRCDPN3, and IDPRCDPN4 services, the TTROPTS SNAI option value is not INCOMING.

- For the IDPRCDPN, IDPRCDPN2, IDPRCDPN3, and IDPRCDPN4 services, the TTROPTS SNAI option value is not INCOMING.
- For the IDPRCGPN service, the FNAI mapping parameter values in the Service Data commands should not be changed from the default values if the TTROPTS CGSNAI option value is not INCOMING.

The following commands are used to provision Service Data:

Table 27: NPP Service Data Commands

Command	Description	Parameter(s)	Parameter Values
chg-npp-serv	Change Service State, NAI-to-FNAI class mappings, and Delimiter values.		
	Service Name	srvn	NPPT, TIF, TIF2, TIF3, TIFCGPN, TIFCGPN2, TIFCGPN3, IARCDPN, IARCGPN, IDPRCDPN,

Command	Description	Parameter(s)	Parameter Values
			IDPRCDPN2, IDPRCDPN3, IDPRCDPN4, IDPRCGPN, MOSMSGCDPN, MOSMSGCGPN, MOSMSICDPN, MOSMSICGPN
	Service On/Off Status	status	OFF: disable ON: enable
	Delimiter digits used in NPP Formatting Action execution	dlma, dlmb, dlmc, dlmd, dlme, dlmf, dlmg, dlmh, dlmi, dlmj, dlmk, dlml, dlmm, dlmn, dlmo, dlmp	1 to 16 hexadecimal digits or NONE Default value for all services is NONE. Note: If a TIF or IDP Relay service has DLMA-DLMC values that are not NONE in the TIFOPTS or TTROPTS table, those values from TIFOPTS or TTROPTS will be used by Formatting Action execution. The TIFOPTS and TTROPTS delimiter values are set by the <code>chg-tifopts</code> and <code>chg-ttropts</code> commands.
	FNAI=INTL NAI mapping	intl	Decimal value [0..255] or NONE.
	FNAI=NATL NAI mapping	natl	Decimal value [0..255] or NONE.
	FNAI=NAI1 NAI mapping	nai1	Decimal value [0..255] or NONE.
	FNAI=NAI2 NAI mapping	nai2	Decimal value [0..255] or NONE.
	FNAI=NAI3 NAI mapping	nai3	Decimal value [0..255], or NONE.
	Outgoing NAI mapping value for OFNAI-Class =UNKN.	unkn	Decimal value [0.255].
rtrv-npp-serv	Retrieve service Status for one or all services, NAI to FNAI-class mappings, Delimiter values, and Service Action precedence.		
	Service name	srvn	NPPT, TIF, TIF2, TIF3, TIFCGPN, TIFCGPN2, TIFCGPN3, IARCDPN, IARCGPN, IDPRCDPN, IDPRCDPN2, IDPRCDPN3, IDPRCDPN4, IDPRCGPN, MOSMSGCDPN, MOSMSGCGPN, MOSMSICDPN, MOSMSICGPN
	Output mode	mode	Output is for all services if the Service Name is not specified.

Command	Description	Parameter(s)	Parameter Values
			<p>FULL: Full output contains Service Name, service status, Service Actions, Service Action precedence, 6 NAI values, and Delimiter values.</p> <p>DEFAULT: Output contains service name, status, Service Actions, and Service Action precedence.</p>

Provisioning the Service Status

The status for a service must be set to On before NPP will process incoming digit strings from the service:

Before the service status can be set to On, at least one Rule must be provisioned in the Service Rule Set for the service.

The service status should be Off until all service provisioning is complete and NPP is ready to receive and process digit strings for the service.

Provisioning FNAI Class Mnemonic Values

NPP maps the incoming service-specific NAI value to an FNAI Class mnemonic (NATL, INTL, NAI1, NAI2, NAI3, UNKN). Each mnemonic is assigned a number value. The incoming NAI value is mapped to the mnemonic with the matching number. For example, if the incoming NAI of 4 indicates an internationally formatted incoming digit string, the INTL mnemonic must be provisioned with the value 4.

Any NAI value that is not mapped to an FNAI-Class is interpreted as UNKN (Unknown). The UNKN (Unknown) mnemonic cannot have a value of NONE.

If the service does not need support for an FNAI Class, the mnemonic value is provisioned to NONE. (The digit string formatting is inferred based on a protocol-specific NAI value.)

A Rule cannot specify an FNAI Class mnemonic that has a value of NONE in the FNAI filter parameter value.

Provisioning an FNAI Class mnemonic value to NONE for a service can be done only if the Service Rule Set for the service is empty.

Provisioning Delimiter Digits

TIF and IDP Relay feature-specific delimiters (DLMA through DLMC) can be provisioned in the TIFOPTS table or TTROPTS table.

NPP initializes 16 delimiters (DLMA through DLMP) by extracting data values from the NPP service delimiters, and replaces the NPP DLMA thru DLMC values with feature-specific DLMA through DLMC delimiter values that are not none from the TIFOPTS table and the TTROPTS table. This replacement applies only to TIF services (TIF, TIF2, TIF3) and IDP Relay services (IDPRCDPN, IDPRCDPN2, IDPRCDPN3, IDPRCDPN4, IDPRCGPN). The DLMA through DLMC values from the TIFOPTS or TTROPTS tables will be used in NPP processing. (The feature-specific provisioning of DLMA through DLMC will be removed in a future EAGLE release.)

Service Data Provisioning Procedures

Use the following procedures to change the On or Off status of the specified service, define Delimiter values to use in formatting the outgoing digit string, and define FNAI Class mnemonic mapping values for the outgoing NAI.

Each procedure builds one command. Do not press ENTER to execute the command until a procedure step instructs you to press ENTER.

For example, the following procedure steps could be used to enter FNAI mnemonic values for the TIF service; the last step indicates that ENTER can be pressed to execute the command.

- Enter the command keyword; the command line contains `chg-npp-serv`
- Enter the name of the calling service; the command line contains `chg-npp-serv:svrn=tif`
- Enter each FNAI mnemonic parameter; the command line contains `chg-npp-serv:svrn=tif:intl=3:natl=4`
- Press ENTER to execute the command.

Change the Status of a Service

The service Status cannot be changed to on if the Service Rule Set contains no Rules for the service.

Enter each part of one `chg-npp-serv` command as described in each step of the procedure. A step near the end of the procedure instructs you to press ENTER to execute the command when the complete command has been entered. See an example in [Service Data Provisioning Procedures](#).

1. Enter the `rtrv-npp-srs` command with the `svrn` parameter to display the Service Rule Set for the service.
2. If at least one Rule is listed in the Service Rule Set for the service, go to [Step 4](#).
3. If no Rules for the service are shown in the output from [Step 1](#), use the procedure described in [Create a New Rule in a Service Rule Set](#) to provision at least one Rule for the service. Then continue with [Step 4](#).
4. Enter `chg-npp-serv` (the command keyword).
5. Enter the `svrn` parameter to specify the name of the calling service.
6. Enter the status parameter and specify the new status of the service (on or off).
7. Press ENTER to execute the command.
8. Enter the `rtrv-npp-serv` command with the name of the service in the `svrn` parameter, and verify the new Status of the service in the output.

Change FNAI Class Mnemonic Values

Use this procedure to change FNAI Class mnemonic values for a calling service.

The value of an FNAI Class mnemonic cannot be changed to NONE if the Service Rule Set contains any Rules for the service.

Enter each part of one command as described in each step of the procedure. A step near the end of the procedure instructs you to press ENTER to execute the command when the complete command has been entered. See an example in [Service Data Provisioning Procedures](#).

1. Enter the `rtrv-npp-serv` command with the `srvn` parameter to display the FNAI Class mnemonic values for the service.
2. Enter `chg-npp-serv` (the command keyword).
3. Enter the `srvn` parameter to specify the name of the calling service.
4. Enter one or more FNAI Class mnemonic parameters with the new value for each changing parameter.
5. Press ENTER to execute the command.
6. Enter the `rtrv-npp-serv` command with the name of the service in the `srvn` parameter, and verify the changes in the output.

Change Delimiter Values

Use this procedure to change the value of one or more Delimiter digit strings (DLMA-DLMP parameters) for a service.

Enter each part of one command as described in each step of the procedure. A step near the end of the procedure instructs you to press ENTER to execute the command when the complete command has been entered. See an example in [Service Data Provisioning Procedures](#).

1. Enter the `rtrv-npp-serv` command with the `srvn` parameter to display the Delimiter values for the service.
2. Enter `chg-npp-serv` (the command keyword).
3. Enter the `srvn` parameter to specify the name of the calling service.
4. Enter one or more Delimiter parameters with the new value for each parameter.
5. Press ENTER to execute the command.
6. Enter the `rtrv-npp-serv` command with the name of the service in the `srvn` parameter, and verify the new values in the output.

NPP Unlimited SDWC Chars Feature Configuration Procedures

Use the following procedures to configure the NPP Unlimited SDWC Chars feature for use in controlling the available capability of single digit wildcard characters (?) provisioned in the NPP Filter Prefix (see [Searching NPP Filters with Wildcard Values](#)):

- [Enabling the NPP Unlimited SDWC Chars Feature](#)
- [Turning On the NPP Unlimited SDWC Chars Feature](#)
- [Turning Off the NPP Unlimited SDWC Chars Feature](#)

When the feature is enabled, it is turned off by default. The feature can be turned on, and can be turned off after it has been turned on, if there are no services provisioned with more than 25 single digit wildcard characters per service.

Enabling the NPP Unlimited SDWC Chars Feature

This procedure is used to enable the NPP Unlimited SDWC Chars feature in the EAGLE.

After the feature is enabled, it can be turned on and off to control the capability of using single digit wildcard characters in the Filter Prefix (see [Searching NPP Filters with Wildcard Values](#)).

1. Display the enabled control features in the system. Enter the `rtrv-ctrl-feat` command.
 - If the entry for the NPP Unlimited SDWC Chars feature appears in the command output, this procedure is not necessary.
 - If the entry for the NPP Unlimited SDWC Chars feature does not appear in the output, continue with [Step 2](#).
2. Enable the NPP Unlimited SDWC Chars feature. Enter the `enable-ctrl-feat` command with the NPP Unlimited SDWC Chars feature part number 893039301.

```
enable-ctrl-feat:partnum=893039301
```

3. Verify the feature status. Enter the `rtrv-ctrl-feat` command with part number 893039301.

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

```
rlghncxa03w 11-05-30 21:16:37 GMT EAGLE5 44.0.0
The following features have been permanently enabled:
Feature Name          Partnum  Status  Quantity
HC-MIM SLK Capacity   893012707  on      64
NPP Unlimited SDWC Chars 893039301  off     -----
```

4. Back up the changes using the `chg-db:action=backup:dest=fixed` command.

These messages should appear; the active Maintenance and Administration Subsystem Processor (MASP) appears first:

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

Turning On the NPP Unlimited SDWC Chars Feature

This procedure is used to turn on the NPP Unlimited SDWC Chars feature in the EAGLE, using the feature part number 893039301.

Before the NPP Unlimited SDWC Chars feature can be turned on, the feature must be enabled in the EAGLE.

If any NPP Service Rules have more than 3 single digit wildcard characters (?) specified for the FPFX parameter, then the feature cannot be turned on.

If any NPP Service Rules have a single digit wildcard character (?) specified after the sixth digit in the FPFX parameter, then the feature cannot be turned on.

The feature must be turned on before a single digit wildcard character can be specified as a value for the FPFX parameter more than 25 time across all of the rules for an NPP service.

1. Verify the status of the NPP Unlimited SDWC Chars feature in the system. Enter the `rtrv-ctrl-feat` command.

- If the entry for the feature appears in the `rtrv-ctrl-feat` output with status on, performing this procedure is not necessary.
 - If the entry for the feature appears in the `rtrv-ctrl-feat` output with status off, continue with [Step 2](#).
 - If the entry for the feature does not appear in the `rtrv-ctrl-feat` output, go to the x procedure to enable the feature. Then continue with [Step 2](#).
2. Turn on the NPP Unlimited SDWC Chars feature, by entering the `chg-ctrl-feat` command.
`chg-ctrl-feat:partnum=893039301:status=on`

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

```
rlghncxa03w 11-05-29 16:40:40 EST EAGLE5 44.0.0
The following features have been permanently enabled:
Feature Name          Partnum  Status  Quantity
HC-MIM SLK Capacity   893012707 on      64
NPP Unlimited SDWC Chars 893039301 on      ----
;
```

3. Verify the feature status. Enter the `rtrv-ctrl-feat` command.
The entry for the feature should appear in the output, with status of on.
4. Back up the database changes, by entering the following command.
`chg-db:action=backup:dest=fixed`

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

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

Turning Off the NPP Unlimited SDWC Chars Feature

This procedure is used to turn off the NPP Unlimited SDWC Chars feature in the EAGLE, using the feature part number 893039301.

The NPP Unlimited SDWC Chars feature can be turned off after it has been turned on only if there are no NPP services provisioned with more than 25 single digit wildcard characters per service.

1. Verify the status of the NPP Unlimited SDWC Chars feature in the system. Enter the `rtrv-ctrl-feat` command.
 - If the entry for the feature appears in the `rtrv-ctrl-feat` output with status off, performing this procedure is not necessary.
 - If the entry for the feature appears in the `rtrv-ctrl-feat` output with status on, continue with [Step 2](#).
2. Turn off the NPP Unlimited SDWC Chars feature, by entering the `chg-ctrl-feat` command.
`chg-ctrl-feat:partnum=893039301:status=off`

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

```
rlghncxa03w 11-05-29 16:40:40 EST EAGLE5 44.0.0
The following features have been permanently enabled:
Feature Name          Partnum      Status  Quantity
HC-MIM SLK Capacity  893012707   on      64
NPP Unlimited SDWC Chars 893039301   off     ----
;
```

3. Verify the feature status. Enter the `rtrv-ctrl-feat` command.

The entry for the feature should appear in the output, with status of off.

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

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

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

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

NPP Test Service

The NPP Test Service is a function that provides provisioning and testing of NPP Action Sets and Rules associated with the NPPT Service Rule Set. Execution of an NPPT `tst-npp-msg` command injects a test message through an interface to validate the provisioned NPPT Service Rule Set, without affecting live traffic.

The test message execution produces EAGLE terminal output that contains the following information:

- The service
- The Rule in the Service Rule Set that NPP selected as a match (if any)
- The Conditioning Actions executed (if any)
- The Service Actions executed (if any)
- The Formatting Actions executed (if any)
- The original digit string
- The conditioned digit string
- The outgoing digit string
- The continuation indicators from each executed Service Action
- The formatting indicators from each executed Service Action

When Action Sets and Rules have been validated using NPPT, they can be used in production processing by provisioning the same Action Sets and Rules for "real" services, but including the supported Service Actions and FNAI values for the calling services.

Note: Each feature or function that uses NPP has its own test message provisioning and use of the `tst-msg` command to validate service-specific NPP provisioning. Refer to the Feature Manual for each feature for more information.

NPPT Provisioning

NPPT uses the Service Actions, precedences, and behavior shown in [Table 28: NPPT Service Actions](#).

An EPAP-related feature must be enabled in the system before an NPPT Service Action (except CDIAL) can be provisioned in an Action Set.

Table 28: NPPT Service Actions

Service Action Name	Precedence	Behavior
RTDBTRNSP	100	Looks for DN in RTDB; looks for SP or RN in found DN; checks for Formatting Action processing
RTDBTSP	50	Looks for DN in RTDB; looks for SP in found DN
RTDBTRN	50	Looks for DN in RTDB; looks for RN in found DN
CDIAL	10	Corrective Dialing Checks for Formatting Action processing

NPPT Provisioning Examples

The following examples for a given numbering plan show the difference between provisioning for incoming calls starting with '9090' and those that start with '060'. Refer to the command descriptions, parameter values, and output examples and descriptions in *Commands User's Guide* for more information about the commands used for NPPT and the test message output.

SCENARIO 1: PREFIX '9090'

DESCRIPTION:

- Incoming digit strings contain a Country Code (CC), an Area Code (AC) and a Subscriber Number (SN).
- Incoming digit strings beginning with '9090' will have the FNAI Class set to international and the Filter Digit Length set to 16 digits.

RULES TO APPLY:

- Provision an Action Set that conditions the incoming digits, applies the Service Action RTDBTRN, and formats the outgoing digits according to an international format.
- Provision an NPP rule with FPFX='9090', FDL=16 and FNAI=INTL.

PROVISIONING PROCESS:

- Provision the NPP Action Set:

```
ent-npp-as:asn=set1:ca=IGN4,CC2, DN10:sa=RTDBTRN:fa=CC,RN, DN:ofnai=INTL
```
- Provision the NPP Rule:

```
ent-npp-srs:svn=nppt:fnoi=INTL:fpfx=9090:fdl=16:asn=set1
```

- Provision the NPP Service State:
 chg-npp-serv:svrn=nppt:intl=7:natl=5:nai1=12:nai2=13:nai3=14
 chg-npp-serv:svrn=nppt:status=ON
- Send an NPPT test message:
 tst-npp-msg:loc=<Service Module card location>:digs=9090920292252645:nai=7:mode=full

The following results assume that the RTDB contains the following entry:

- DN 209192252645 with an RN entity containing the digits abcd

Test message output:

```

      1           2           3           4           5           6           7
8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
SERVICE NAME = nppt SERVICE STATUS = ON
  INC DIGITS = 9090920292252645
  NAI = 7 FNAI = intl FDIGLEN = 16

MATCHING RULE
  FNAI = intl FDIGLEN = 16 FPFX = 9090
  ACTION SET NAME = set1

CONDITIONING RESULT
  CA1 = ign4          EXECUTED = Y RESULT = PASS
  CA2 = cc2           EXECUTED = Y RESULT = PASS
  CA3 = dn10          EXECUTED = Y RESULT = PASS
  INC DIGITS = 9090920292252645
  COND DIGITS = 920292252645

SERVICE APPLICATION
  SA1 = rtdbtrn      EXECUTED = Y FORMAT = Y

FORMATING RESULT
  FA1 = cc           EXECUTED = Y RESULT = PASS
  FA2 = rn           EXECUTED = Y RESULT = PASS
  FA3 = dn           EXECUTED = Y RESULT = PASS
  OUTG DIGITS = 92abcd0292252645
  OUTG FNAI = intl
;

```

SCENARIO 2: PREFIX '060'

DESCRIPTION:

- Incoming digit string contains an Area Code (AC) and a Subscriber Number (SN).
- Incoming digit strings starting with '060' will have FNAI Class set to National and Filter Digit Length set to 16 digits.

RULES TO APPLY:

- Provision an Action Set that conditions the incoming digits, applies the Service Action RTDBTRNSP, and formats the outgoing digits by pre-pending the RN or the SP to the original digits.
- Provision an NPP rule with FPFX='060', FDL=13 and FNAI=NATL

PROVISIONING PROCESS:

- Provision the NPP Action Set:


```
ent-npp-as:asn=set2:ca=CCDEF,IGN3, DN7:sa=RTDBTRNSP:fa=RN,SP,ORIG:ofnai=NATL
```

- Provision the NPP Rule:

```
ent-npp-srs:svrn=nppt:fnai=NATL:fpfx=060:fdl=13:asn=set2
```

- Provision the NPP service state:

```
chg-npp-serv:svrn=nppt:intl=7:natl=5:nai1=12:nai2=13:nai3=14
```

```
chg-npp-serv:svrn=nppt:status=ON
```

- Send an NPPT test message:

```
tst-npp-msg:loc=<Service Module card location>:digs=0609192252645:nai=5
```

The following results assume that the RTDB contains the following entry:

- DN 989192252645 with an SP entity containing the digits 1

Test message output:

```

      1           2           3           4           5           6           7
8
1234567890123456789012345678901234567890123456789012345678901234567890
SERVICE NAME = nppt SERVICE STATUS = ON
  INC DIGITS = 0609192252645
  NAI = 5 FNAI = natl FDIGLEN = 13

MATCHING RULE
  FNAI = natl FDIGLEN = 13 FPFX = 060
  ACTION SET NAME = set2

CONDITIONING RESULT
  CA1 = ccdef          EXECUTED = Y RESULT = PASS
  CA2 = ign3           EXECUTED = Y RESULT = PASS
  CA3 = dn10           EXECUTED = Y RESULT = PASS
  INC DIGITS = 0609192252645
  COND DIGITS = 989192252645

SERVICE APPLICATION
  SA1 = rtdbtrnsp     EXECUTED = Y FORMAT = Y

FORMATING RESULT
  FA1 = rn            EXECUTED = Y RESULT = PASS
  FA2 = sp            EXECUTED = Y RESULT = PASS
  FA3 = orig          EXECUTED = Y RESULT = PASS
  OUTG DIGITS = 1bce0609192252645
  OUTG FNAI = natl

```

A

AC	Alternating Current Application Context Area Code Authentication Center
----	--

Action Set	A collection of NPP CAs, FAs, and SAs.
------------	--

E

EPAP-related features	Features that require EPAP connection and use the Real Time Database (RTDB) for lookup of subscriber information. <ul style="list-style-type: none">• ANSI Number Portability Query (AINPQ)• ANSI-41 AnalyzedInformation Query – no EPAP/ELAP (ANSI41 AIQ)• Anytime Interrogation Number Portability (ATI Number Portability, ATINP)• AINPQ, INP, G-Port SRI Query for Prepaid, GSM MAP SRI Redirect, IGM, and ATINP Support for ROP• A-Port Circular Route Prevention (A-Port CRP)• Equipment Identity Register (EIR)• G-Flex C7 Relay (G-Flex)• G-Flex MAP Layer Routing (G-Flex MLR)• G-Port SRI Query for Prepaid• GSM MAP SRI Redirect to Serving HLR (GSM MAP SRI Redirect)• GSM Number Portability (G-Port)
-----------------------	--

E

- IDP A-Party Blacklist
- IDP A-Party Routing
- IDP Relay Additional Subscriber Data (IDPR ASD)
- IDP Relay Generic Routing Number (IDPR GRN)
- IDP Service Key Routing (IDP SK Routing)
- IDP Screening for Prepaid
- INAP-based Number Portability (INP)
- Info Analyzed Relay Additional Subscriber Data (IAR ASD)
- Info Analyzed Relay Base (IAR Base)
- Info Analyzed Relay Generic Routing Number (IAR GRN)
- Info Analyzed Relay Number Portability (IAR NP)
- INP Circular Route Prevention (INP CRP)
- IS41 Mobile Number Portability (A-Port)
- IS41 GSM Migration (IGM)
- MNP Circular Route Prevention (MNPCR)
- MO-based GSM SMS NP
- MO-based IS41 SMS NP
- MO SMS Generic Routing Number (MO SMS GRN)
- MO- SMS B-Party Routing
- MO SMS IS41-to-GSM Migration
- MT-based GSM SMS NP
- MT-based GSM MMS NP
- MT-based IS41 SMS NP
- MTP Routed Messages for SCCP Applications (MTP Msgs for SCCP Apps)
- MTP Routed Gateway Screening Stop Action (MTPRTD GWS Stop Action)
- Portability Check for MO SMS
- Prepaid IDP Query Relay (IDP Relay, IDPR)

E

- Prepaid SMS Intercept Phase 1 (PPSMS)
- Service Portability (S-Port)
- S-Port Subscriber Differentiation
- Triggerless ISUP Framework Additional Subscriber Data (TIF ASD)
- Triggerless ISUP Framework Generic Routing Number (TIF GRN)
- Triggerless ISUP Number Portability (TIF NP)
- Triggerless ISUP Framework Number Substitution (TIF NS)
- Triggerless ISUP Framework SCS Forwarding (TIF SCS Forwarding)
- Triggerless ISUP Framework Simple Number Substitution (TIF SNS)
- Voice Mail Router (V-Flex)

F

FA	<p>Framework Advisory NPP Formatting Action FAs determine how the outgoing digit string is formatted.</p>
FDL	Filter Digit Length
FNAI	<p>Filter Nature of Address Indicator Class values depicted as mnemonics for specifying a filter, represented by an enumerated type as NATL, INTL, NAI1, NAI2, NAI3, UNKN.</p>
FPFX	<p>Filter Prefix Digit string used to classify incoming digit strings.</p>

N

NAI

Nature of Address Indicator

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

Network Access Identifier

The user identity submitted by the client during network authentication.

NPP

Numbering Plan Processor

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

O

OFNAI

Outgoing FNAI

R

RTDB

Real Time Database

S

SA

Security Administration

Service Action

Indicates what service-specific behaviors to execute when processing a digit string.