

Tekelec EAGLE[®] 5 Integrated Signaling System

Release 40.0

Numbering Plan Processor (NPP) Overview

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February 2009



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Patents

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

U.S. Patent Numbers:

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

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Chapter 1

Introduction

Topics:

- [Introduction Page 2](#)
- [Scope and Audience Page 2](#)
- [Manual Organization Page 2](#)
- [Related Publications Page 3](#)
- [Documentation Availability, Packaging, and Updates Page 3](#)
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- [Emergency Response Page 7](#)
- [Locate Product Documentation on the Customer Support Site Page 7](#)

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 Tekelec 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 RTDB lookup
- Digit string encoding, 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) Overview 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 EAGLE 5 ISS users who will benefit from an overall understanding of NPP and the concept of NPP relative to EAGLE 5 ISS features. Users of this document are expected to have a working knowledge of telecommunications in general and EAGLE 5 ISS specifically.

Manual Organization

This document is organized into the following chapters:

- [Introduction](#) on page 1, 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 Tekelec for assistance.
- [NPP Overview](#) on page 9, describes the overall structure and operation of NPP.
- [Filters](#) on page 13 describes how to define and use Filters to identify incoming digit strings for NPP processing.
- [Action Sets](#) on page 21, 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](#) on page 37, describes how Filters and Action Sets combine to form Rules, and how Rules form Service Rule Sets.
- [NPP Provisioning and NPP Test Service](#) on page 43, 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.

Related Publications

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

Documentation Availability, Packaging, and Updates

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

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

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

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

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

Note:

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

Documentation is updated when significant changes are made that affect system operation. Updates resulting from Severity 1 and 2 PRs are made to existing manuals. Other changes are included in the documentation for the next scheduled release. Updates are made by re-issuing an electronic file to the customer support site. Customers with printed documentation should contact their Sales Representative for an addendum. Occasionally, changes are communicated first with a Documentation Bulletin to provide customers with an advanced notice of the issue until officially released in the documentation. Documentation Bulletins are posted on the Customer Support site and can be viewed per product and release.

Documentation Admonishments

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

Table 1: Admonishments

	<p>DANGER: (This icon and text indicate the possibility of <i>personal injury</i>.)</p>
	<p>WARNING: (This icon and text indicate the possibility of <i>equipment damage</i>.)</p>
	<p>CAUTION: (This icon and text indicate the possibility of <i>service interruption</i>.)</p>

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

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

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

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

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

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- **Dominican Republic**

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Phone:

001-888-367-8552

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

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

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

Locate Product Documentation on the Customer Support Site

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

1. Log into the Tekelec **new** Customer Support site at support.tekelec.com.

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

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

Chapter 2

NPP Overview

Topics:

- [NPP Overview Page 10](#)

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

NPP Overview

EAGLE 5 ISS features and functions (referred to as "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.

EAGLE 5 ISS 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](#) on page 43.

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:

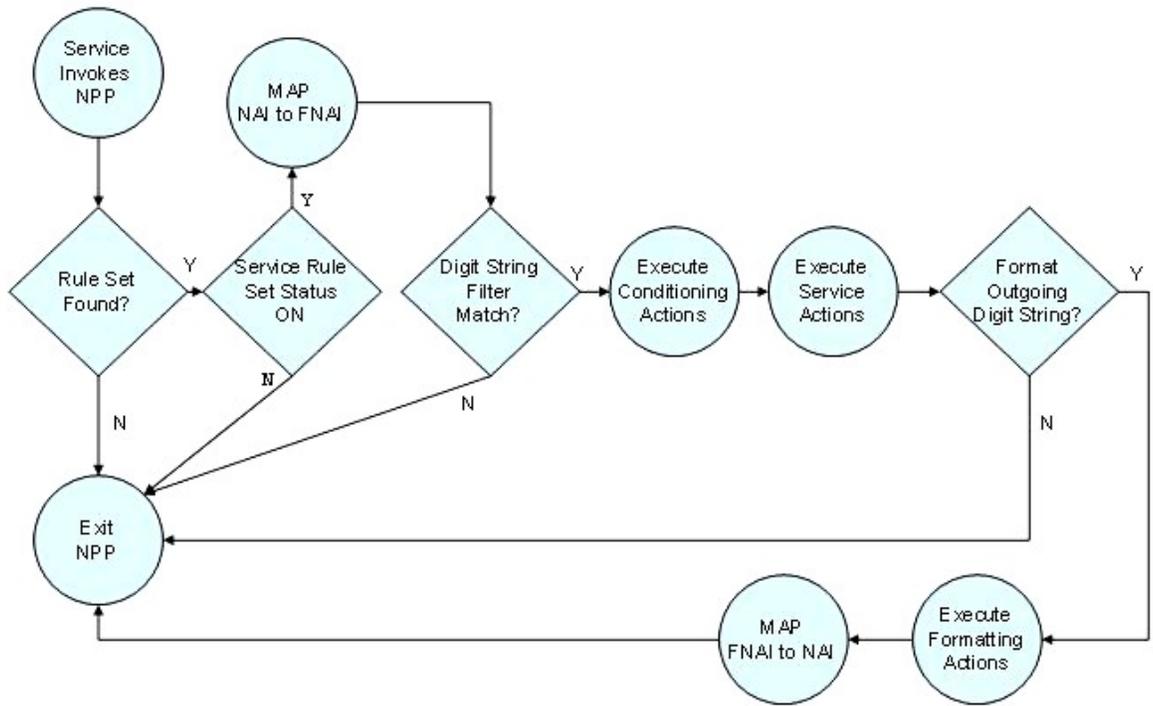
- **Action Sets** (consisting of Conditioning Actions for the digit string, Service Actions for feature-specific logic, and Formatting Actions for digit string formatting)
- **Filters** (to classify a digit string based on NAI, digit string patterns, and length of digit string)
- **Rules** (to associate 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](#) on page 10 shows the high-level events and sequence of NPP operation.

Figure 1: NPP Operation Overview



Chapter 3

Filters

Topics:

- [Filters Page 14](#)
- [Filter Search Execution Page 16](#)

This chapter provides a high level description of NPP Filters.

When NPP is called by an EAGLE 5 ISS feature or service 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. Can be a wildcard (*) value to indicate that all digits match the filter. 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. See section [Searching NPP Filters with Wildcard Values](#) on page 17 for more information about wildcard values.
- 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](#) on page 16 and [Filter Search Execution](#) on page 16.

Filter Nature of Address Indicator (FNAI) Class

Many EAGLE 5 ISS 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.

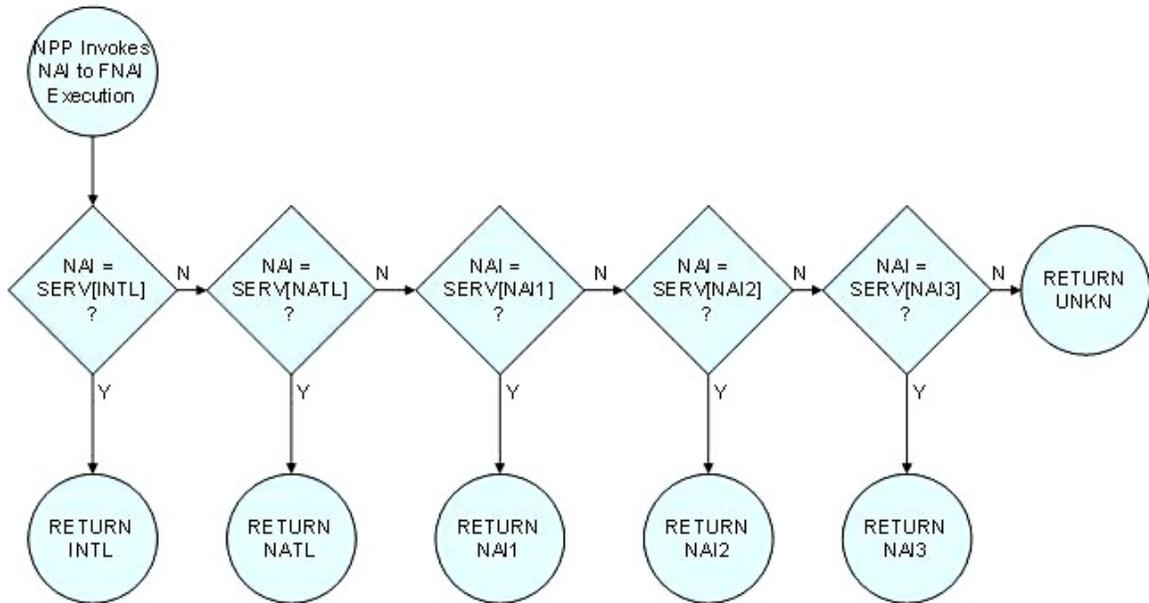
Services that invoke NPP processing provide an incoming NAI value along with the incoming digit string. NPP maps the incoming service-specific NAI value to an appropriate NPP FNAI Class mnemonic value.

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](#) on page 14. 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 5 ISS 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.

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. For example, the incoming digit strings 00152559776925 and 00252559886925 would match a Filter Prefix of 00?525.

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](#) on page 17 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.

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 on page 16 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 on page 16 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	*

Filter Nature of Address Indicator (FNAI) Class	Filter Prefix (FPFX)	Filter Digit Length (FDL)
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+XXXXXXXX
 - 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 on page 18 indicates the example Filter that is selected for each Filterer selection scenario shown in *Table 4: NPP Provisioned Filter Examples for Categorical Wildcarding* on page 18.

Table 4: NPP Provisioned Filter Examples for Categorical Wildcarding

Provisioned Filter	FNAI	FPEX	FDL	NOTES
1	INTL	abc	16	Specific, Specific, Specific
2	INTL	abc123	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

Based on the presence of the single digit wildcard value “?” in the Filter Prefix (FPEX), 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 FPEX values of 12345678 and 12?45?78. An incoming digit string of 123456789 would be filtered by FPEX=123456789. An incoming digit string of 12a456789 would be filtered by FPEX=12?4.

Table 7: NPP Filter Search for Single Digit Wildcard Example Filters on page 19 indicates the example rule that is selected for each filter selection scenario from *Table 7: NPP Filter Search for Single Digit Wildcard Example Filters* on page 19.

Table 6: NPP Provisioned Filter Examples for Single Digit Wildcarding

Provisioned Filter	FNAI	FPMX	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	abcdef1234567890	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 Page 22](#)
- [Conditioning Actions Page 24](#)
- [Service Actions Page 27](#)
- [Formatting Actions Page 30](#)
- [Outgoing FNAI Class Page 36](#)

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

Action Sets

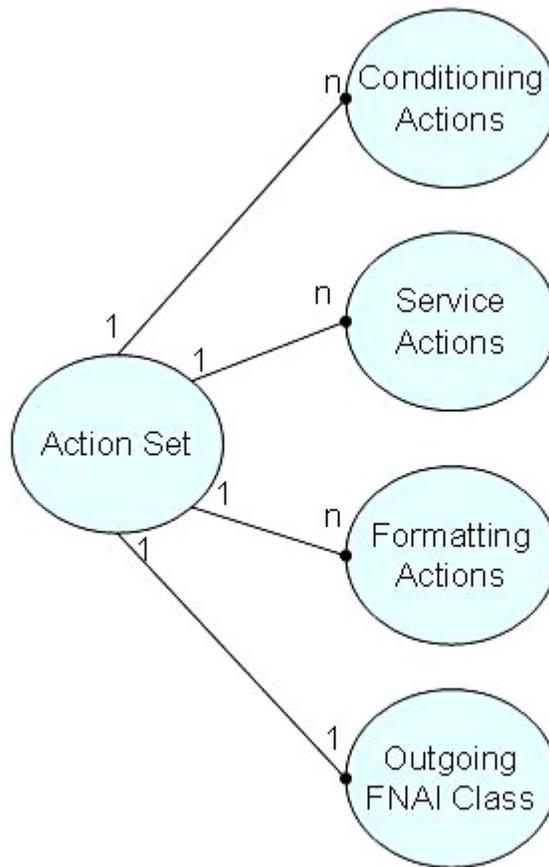
NPP allows customized numbering plan processing behavior to be provisioned as an Action Set. Up to 1024 Action Sets are supported by an EAGLE 5 ISS.

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 on page 22 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](#) on page 24:

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
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.

CAs are executed in the sequence in which they are provisioned in the Action Set, to process all of the digits in the incoming digit string from the beginning to the end of the string.

CAs 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" (refer to [Table 9: Generic and Specific Conditioning Actions](#) on page 24 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.

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

[Table 9: Generic and Specific Conditioning Actions](#) on page 24 lists CAs and their purpose.

Table 9: Generic and Specific Conditioning Actions

CA	Purpose
IGN[1...10]	Ignore or delete 1 to 10 digits
FPEX	Define the Filter Prefix
PFXA[1...8], PFXB[1...8] ... PFXF[1...8]	Define up to 6 different digit string prefixes (A... F) of 1 to 8 digits in length
CC[1...3]	Define the next 1 to 3 digits as the Country Code

CA	Purpose
CCDEF	Insert the Default Country Code (provisioned STP option value; see Provisioning Conditioning Actions on page 46).
AC[1...8]	Define the next 1 to 8 digits as the Area Code
SN[1-15]	Define the next 1 to 15 digits as the Subscriber Number
SNX	Define the remainder of the digits as the Subscriber Number
DN[1...15]	Define the next 1 to 15 digits as the Directory Number (AC+SN)
DNX	Define the remainder of the digits as the Directory Number
ZNX	Define the remainder of the digits as the internationally-formatted Dialed Number (ZN); useful when dealing with non-dial plan codes
ACLAC	Specific, used by the Prepaid IDP Query Relay feature to get the Area Code from the Location Area Code (LAC) of the Location Area Information (LAI) parameter
ACDEF	Insert Default Network Destination Code (provisioned STP option value; see Provisioning Conditioning Actions on page 46.)
ACCGPN	Specific; used by TIF to extract the Area Code from the CgPN

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 + XXXXXXXXXXXX

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 10: Conditioning Actions for Collect Calls with Operator Code](#) on page 26.

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

Table 10: Conditioning Actions for Collect Calls with Operator Code

Conditioning Action...	Consisting of Tokens...	Resulting Digit String
		[incoming digit string = b33909087654321]
IGN1	[no token, just ignore first digit]	33909087654321
AC2	A =33	909087654321
PFXA4	AC=33, PFXA=9090	87654321
SNZ	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 5 ISS 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](#) on page 28).

Service Action behavior is determined by the EAGLE 5 ISS 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, and simple number substitution, and use of Additional Subscriber Data (ASD).

[Table 24: Service Actions](#) on page 52 describes valid Service Actions, the precedence for each Service Action, and EAGLE 5 ISS 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.

Service Action Execution

Each service can define 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 Formatting Action values can be populated during Service Action execution (see [Provisioning Formatting Actions](#) on page 54).

Upon execution completion, the Service Action indicates whether to continue executing another Service Action and whether to execute Formatting Actions.

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 that the Service Actions are provisioned.

Service Action Precedence

Multiple service actions (SAs) can be associated with an NPP Action Set. In order 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 that they are provisioned in consecutively numbered SA parameters.

Table 11: Service Action Precedence Example on page 28 shows an example group of SAs and their precedence values.

Table 11: Service Action Precedence Example

Example Service Action Name	Precedence	Notes
EXSA1	100	Always executed first regardless of provisioning order
EXSA2	50	Always executed after SA1 and prior to SA4. SA2 and SA3 execution order is dependent on the order provisioned.
EXSA3	50	Always executed after SA1 and prior to SA4. SA2 and SA3 execution order is dependent on the order provisioned in consecutively numbered SA parameters.
EXSA4	10	Always executed last.

Given the SA precedence values defined in *Table 11: Service Action Precedence Example* on page 28, the SA groups defined in *Table 12: Valid Service Action Group Examples* on page 28 are allowed and the SA groups defined in *Table 13: Invalid Service Action Group Examples* on page 30 are prevented.

Table 12: Valid Service Action Group Examples

Service Action Group	Validity	Notes
:sa1=EXSA1	Valid	Single Service Actions always execute in the correct order [100]
:sa1=EXSA2	Valid	Single Service Actions always execute in the correct order [50]

Service Action Group	Validity	Notes
:sa1=EXSA3	Valid	Single Service Actions always execute in the correct order [50]
:sa1=EXSA4	Valid	Single Service Actions always execute in the correct order [10]
:sa1=EXSA1:sa2=EXSA2	Valid	Service Actions executed in order of precedence [100, 50]
:sa1=EXSA1:sa2=EXSA3	Valid	Service Actions executed in order of precedence [100, 50]
:sa1=EXSA1:sa2=EXSA4	Valid	Service Actions executed in order of precedence [100, 10]
:sa1=EXSA1:sa2=EXSA2:sa3=EXSA3	Valid	Service Actions executed in order of precedence [100,50,50] – Service Actions of equal precedence execute in the order provisioned (SA2 then SA3).
:sa1=EXSA1:sa2=EXSA2:sa3=EXSA4	Valid	Service Actions executed in order of precedence [100,50, 10]
:sa1=EXSA1:sa2=EXSA3:sa3=EXSA2	Valid	Service Actions executed in order of precedence [100,50,50] – Service Actions of equal precedence execute in the order provisioned (SA3 then SA2).
:sa1=EXSA1:sa2=EXSA3:sa3=EXSA4	Valid	Service Actions executed in order of precedence [100,50,10]
:sa1=EXSA1:sa2=EXSA2:sa3=EXSA3:sa4=EXSA4	Valid	Service a \ Actions executed in order of precedence [100,50,50,10] – Service Actions of equal precedence execute in the order provisioned (SA2 then SA3).
:sa1=EXSA1:sa2=EXSA3:sa3=EXSA2:sa4=EXSA4	Valid	Service Actions executed in order of precedence [100,50,50,10] – Service Actions of equal precedence execute in the order provisioned (SA3 then SA2)
:sa1=EXSA2:sa2=EXSA3	Valid	Service Actions executed in order of precedence [50,50] – Service Actions of equal precedence execute in the order provisioned (SA2 then SA3)
:sa1=EXSA2:sa23=EXSA3:sa3=EXSA4	Valid	Service Actions executed in order of precedence [50,50, 10] – Service Actions of equal precedence execute

Service Action Group	Validity	Notes
		in the order provisioned (SA2 then SA3)
:sa1=EXSA2:sa2=EXSA4	Valid	Service Actions executed in order of precedence [50,10]
:sa1=EXSA3:sa2=EXSA2	Valid	Service Actions executed in order of precedence [50,50] – Service Actions of equal precedence execute in the order provisioned (SA3 then SA2).
:sa1=EXSA3:sa2=EXSA2:sa3=EXSA4	Valid	Service Actions executed in order of precedence [50,50,10] – Service Actions of equal precedence execute in the order provisioned (SA3 then SA2)
:sa1=EXSA3:sa2=EXSA4	Valid	Execution follows Service Action precedence in decreasing order [50, 10]

Table 13: Invalid Service Action Group Examples

Service Action Group	Validity	Notes
:sa1=EXSA4:sa2=EXSA1	Invalid	Violated Service Action precedence (10 < 100)
:sa1=EXSA4:sa2=EXSA2	Invalid	Violated service action precedence (10 < 50)
:sa1=EXSA4:sa2=EXSA3	Invalid	Violated Service Action precedence (10 < 50)
:sa1=EXSA2:sa2=EXSA1	Invalid	Violated Service Action precedence (50 < 100)
:sa1=EXSA3:sa2=EXSA1	Invalid	Violated Service Action precedence (50 < 100)
:sa1=EXSA1:sa2=EXSA4:sa3=EXSA2	Invalid	Violated Service Action precedence (10 < 50)
:sa1=EXSA1:sa2=EXSA4:sa3=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 FA 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.

The behavior of an FA does not differ between services; however, each service defines the Formatting Actions that it supports. NPP allows up to 12 FAs to be associated with one Action Set. FAs are executed in the order of consecutively numbered provisioned parameters.

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.

The parameters of an outgoing digit string are in the form of tokens. If tokens are empty (have no digit value assigned), they are skipped. Valid tokens are listed in [Table 14: Formatting Action Tokens](#) on page 31.

Table 14: Formatting Action Tokens

Token	Definition
SN	Subscriber Number (DN + AC)
DN	Directory Number (AC + SN)
ZN	Internationally formatted Dialed Number (defined during Conditioning Action provisioning)
AC	Area Code
RN	Routing Number
SP	Service Provider
CC	Country Code
FPEX	Filter Prefix
PEX[A...F]	Prefixes [defined during Conditioning Action provisioning]
DLM[A...P]	Delimiters [service-defined]
ORIG	Original incoming digit string
GRN	Generic Routing Number
VMID	Voicemail Identifier
SRFIMSI	Signaling Relay Function International Mobile Subscriber Identity
ASD	Additional Subscriber Data

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 consecutively number 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* on page 36 with the outgoing digit string to the calling service.

Formatting Actions Examples

The effects of Formatting Actions on digit strings are shown in *Table 15: FA Example 1* on page 32, *Table 16: FA Example 2* on page 33, *Table 17: FA Example 3* on page 34, and *Table 18: FA Example 4* on page 35. The examples include assumptions for required Conditioning Actions and Service Actions.

Table 15: FA Example 1

Example 1: Standard national calls all receive the same handling		
Assumptions: <ul style="list-style-type: none"> • NAI=NATL XXXXXXXXXXX • To condition this number to international format, the Country Code must be prefixed, CA1=CCDEF • Example digit string is 87654321 before Conditioning Action • Example digit string after Conditioning Action (CA1) 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 = {FA1=RN, FA2=DN}		
Formatting Action	==>	Resulting Outgoing Digit String
Begin	==>	
RN	==>	7777
DN	==>	7777559192252645

Table 16: FA Example 2

Example 2: International calls with International Escape Code		
<p>Assumptions:</p> <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). 		
<p>Formatting Action set = {FA1=ORIG}</p>		
Formatting Action	==>	Resulting Outgoing Digit String
Begin	==>	
ORIG	==>	011449192252645

Table 17: FA Example 3

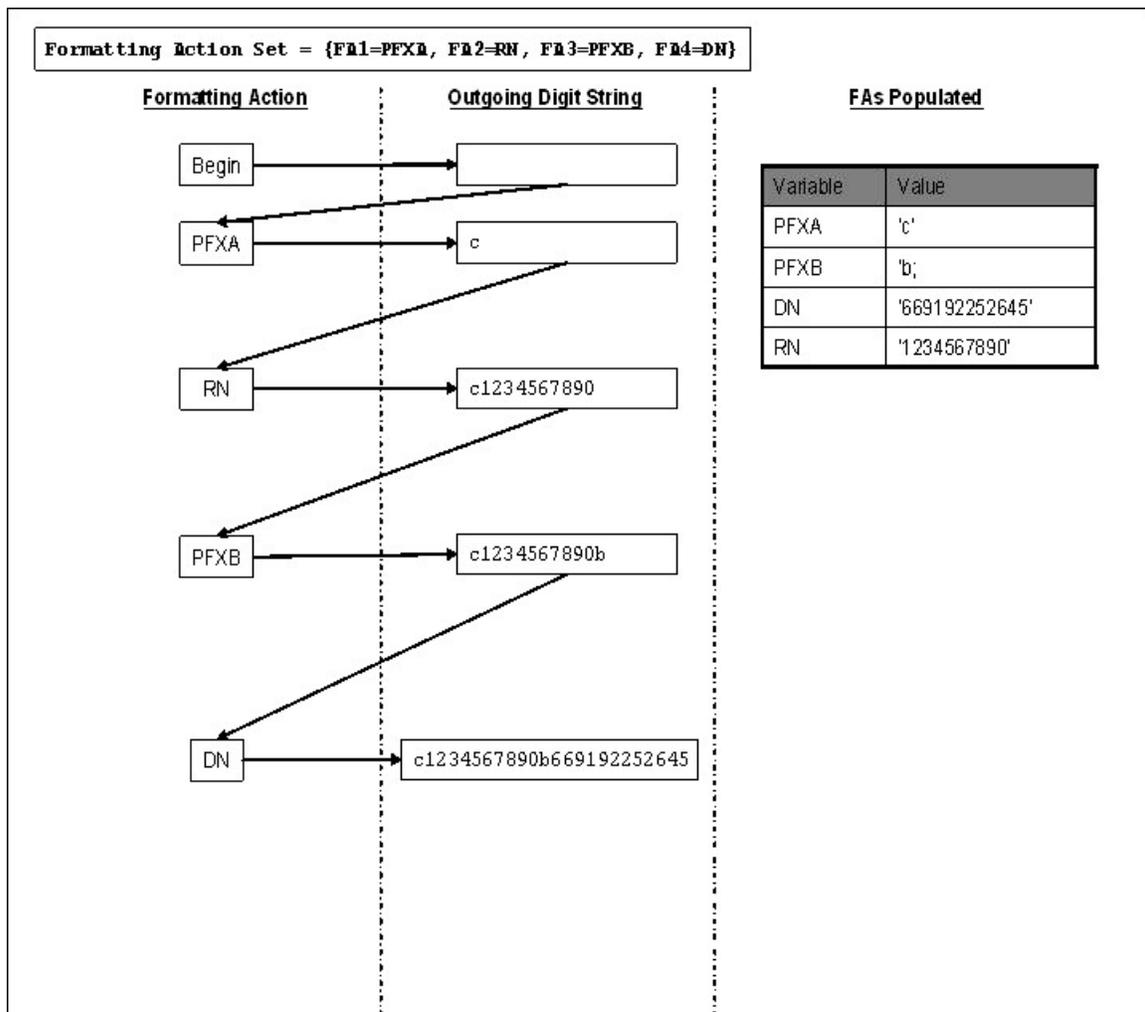
Example 3: Collect calls with Operator Code, Area Code in-between		
<p>Assumptions:</p> <ul style="list-style-type: none"> • NAI=Unknown 'b' + AC + 9090 + XXXXXXXX • Assume the digit string is b33909087654321 • If the desired outgoing format is to replace the 'b' with a 'd', and to insert the number 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 = {FA1=DLMA, FA2=AC, FA3=PFX3, FA4=RN, FA5=SN}		
Formatting Action	==>	Resulting Outgoing Digit String
Begin	==>	
DLMA	==>	d
AC	==>	d33
PFX4	==>	d339090
RN	==>	d3390905555
SN	==>	d339090555587654321

Figure 4: Formatting Action Execution Example on page 35 shows the Formatting Action Execution for FA Example 4.

Table 18: 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 = {FA1=PFXA, FA2=RN, FA3=PFXB, FA4=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 Page 38](#)
- [Service Rule Sets Page 39](#)

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.

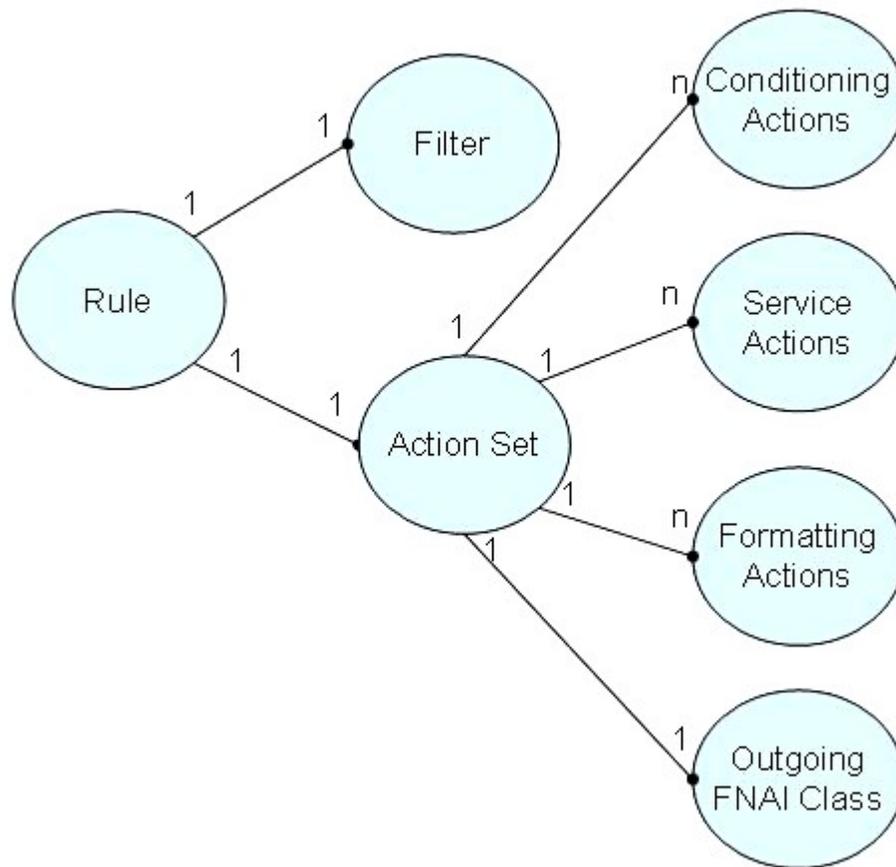
A set of Rules with different Filters and Action Sets can be created in a Service Rule Set for each service that calls NPP.

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](#) on page 38.

Figure 5: Rule, Filter, and Action Set Relationship



A simple representation of Rule definition is shown in [Table 19: Rule Definition Criteria](#) on page 39

Table 19: 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)

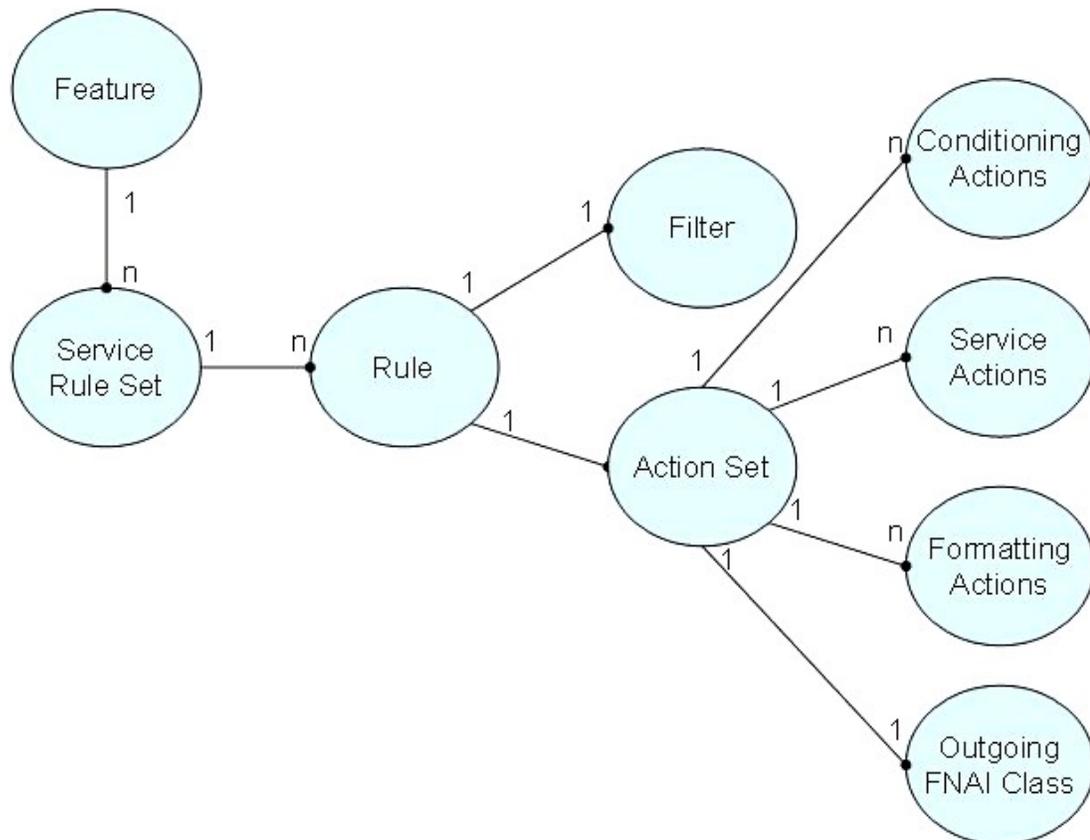
Service Rule Sets

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 5 ISS is 8192.

An NPP service is an EPAP-based 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).

The relationship between services, Service Rule Sets, and Action Sets is shown in [Figure 6: Service Rule Set and Rule Relationship](#) on page 39.

Figure 6: Service Rule Set and Rule Relationship



Service Rule Set Example

A simple example of a Service Rule Set is shown in [Table 20: Service Rule Set Example](#) on page 40.

Table 20: Service Rule Set Example

:srvn = NPPT		
:fnai = NATL	:fnai = INTL	:fnai = UNKN
:fpfx = 060	:fpfx = *	:fpfx = *
:fdl = 10	:fdl = 15	:fdl = *
:asn = ACTSET1	:asn = ACTSET2	:asn = ACTSET3

Multiple Services

An NPP service is used by EAGLE 5 ISS EPAP-based 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 21: *Sample NPP Configuration* on page 41 illustrates a sample NPP configuration containing Service Rule Sets.

Table 21: Sample NPP Configuration

		Rule					
	Filter	Action Set					
Service Rule Set	NAI	FPFX	FDL	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
IDPRCGPN	UNKN	9090	12	FPFX, CCDEF DN8	CgPNNP	RN, DN	NATL
IDPRCDPN	UNKN	*	*	NONE	NONE	ORIG	UNKN

Chapter 6

NPP Provisioning and NPP Test Service

Topics:

- [NPP Provisioning Page 44](#)
- [Provisioning Action Sets Page 44](#)
- [Action Set Provisioning Procedures Page 59](#)
- [Provisioning Service Rule Sets Page 63](#)
- [Service Rule Set Provisioning Procedures Page 67](#)
- [Provisioning Service Data Page 70](#)
- [Service State Provisioning Procedures Page 72](#)
- [NPP Test Service Page 73](#)

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 5 ISS 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 the *Commands Manual*; the command information includes parameter descriptions and valid values, provisioning dependencies, output examples, and notes for the correct use of each command.

EAGLE 5 ISS 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. Procedures 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
- Outgoing FNAI Class

The following commands are used to provision NPP Action Sets:

Table 22: NPP Action Set Commands

Command	Description	Parameter(s)	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	ca1,ca2,...,ca12	See Table 23: Conditioning Actions on page 47. Default: The value for any unspecified ca(x) parameter defaults to NONE.
	Service Actions	sa1,sa2,...,sa8	See Table 24: Service Actions on page 52. Default: The value for any unspecified sa(x) parameter defaults to NONE.
	Formatting Action	fa1	See Table 25: Formatting Actions on page 55. Default = ORIG
	Formatting Actions	fa2,fa3,...,fa12	See Table 25: Formatting Actions on page 55. Default: The value for any unspecified fa(2-12) parameter defaults to NONE.
	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		
	Action Set Name	asn	Ten-character string that uniquely identifies the Action Set.
rtrv-npp-as	Retrieve one or all NPP Action Sets		

Command	Description	Parameter(s)	Parameter Values
	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.

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](#) on page 54.
- Populate a Formatting Action 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](#) on page 54.

[Table 23: Conditioning Actions](#) on page 47 describes Conditioning Action parameters, lists populated Formatting Actions, and indicates provisioning considerations. Up to 12 Conditioning Actions (command parameters ca1 through ca12) can be provisioned per Action Set.

- 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.
- 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

The ca1 Conditioning Action parameter must be specified. Any additional Conditioning Action parameters in the command must be consecutively numbered following ca1. For example,

- :ca1=x:ca2=y is allowed (ca2 is the next consecutively numbered parameter after ca1)
- :ca1=y:ca5=x is not allowed (parameters ca2, ca3, and ca4 must be specified if ca5 is specified)
- :ca2=y:ca3=w is not allowed (ca1 was not specified).

The consecutively numbered Conditioning Action parameters must specify the Conditioning Actions in the order in which they are executed by NPP. The ca1 parameter value must be the first Conditioning Action that will be executed by NPP in the Conditioning Action group; the ca2

parameter value must be the second Conditioning Action that will be executed by NPP in the Conditioning Action group; and so on.

The Conditioning Action parameters can be specified in any position in the command, and the parameter numbers do not need to be consecutive in the command. For example,

- ent-npp-as:ca2=x:fa1=cc:ca1=y is allowed (the fa1 parameter can be specified between the ca2 and ca1 parameters)
- ent-npp-as:ca2=x:ca1=y is allowed (ca1 and ca2 are consecutively numbered parameters, but do not need to be specified consecutively in the command).

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 23: Conditioning Actions

Conditioning Action	Formatting Action Populated	Description
AC[1..8]	AC	<p>Area Code digits</p> <p>Use the specified number of digits (1-8) as the AC Formatting Action value.</p> <p>Provisioning Considerations:</p> <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	<p>Area Code digits</p> <p>Remove the TIFOPTS:ACLen number of digits from the beginning of the CgPN and use those digits as the Area Code for the Called Party. If 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> <p>Used only for TIF services</p>
ACDEF	AC	<p>Default Area Code digits</p> <p>Use the provisioned Default Network Destination Code (STPOPTS:DEFNDC parameter value) as the AC Formatting Action value.</p> <p>Provisioning Considerations:</p>

Conditioning Action	Formatting Action Populated	Description
		<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 Service Action.</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"> Only one CC[1..3] Conditioning Action can be specified in an Action set. 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"> The STPOPTS:DEFCC parameter value must be provisioned before the service state is set to On to allow NPP processing for the service. CCDEF can be specified only once in an Action Set. 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.
DN[1..15]	DN	Dialed Number digits

Conditioning Action	Formatting Action Populated	Description
		<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.
DNX	DN	<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.
FPEX	FPEX	<p>Filter Prefix digits</p> <p>Use the provisioned Filter Prefix (FPEX) digits as the FPEX Formatting Action value. See Provisioning Service Rule Sets.</p> <p>Provisioning Considerations:</p> <ol style="list-style-type: none"> 1. Must be the first Conditioning Action specified for the Action Set (ca1 parameter value) 2. FPEX can be specified only once in an Action set 3. Conditioning Action FPEX cannot be used when the NPP filter value is FPEX="*"
IGN[1..10]	N/A	<p>Number of digits to ignore:</p> <p>Ignores 1 to 10 digits.</p> <p>Provisioning Considerations: None.</p>
PFXA[1..8], PFXB[1..8], PFXC[1..8],	PFXA, PFXB, PFXC,	<p>Prefix A-F digits</p> <p>Use the next number of specified digits [1..8] as the corresponding Formatting Action value.</p>

Conditioning Action	Formatting Action Populated	Description
PFXD[1..8], PFXE[1..8], PFXF[1..8]	PFXD, PFXE, PFXF	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	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.
SNX	SN	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.
ZNX	ZN	Remaining digits Use the remaining digits as the ZN Formatting Action value. Provisioning Considerations: <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.

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 consecutively numbered parameters to which they are assigned in provisioning.

Table 24: Service Actions on page 52 describes Service Actions, lists their precedence values, and indicates the calling services that support each Service Action. Up to 8 Service Actions (command parameters sa1 through sa8) can be provisioned per Action Set.

The sa1 Service Action parameter must be specified. Any additional Service Action parameters in the command must be consecutively numbered following sa1. For example,

- :sa1=x:sa2=y is allowed (sa2 is the next consecutively numbered parameter after sa1)
- :sa1=y:sa5=x is not allowed (parameters :sa2, sa3, and sa4 must be specified if sa5 is specified)
- sa2=y:sa3=w is not allowed (sa1 was not specified)

The Service Action parameters can be specified in any position in the command, and the parameter numbers do not need to be consecutive in the command. For example,

- ent-npp-as:sa2=x:fa1=cc:sa1=y is allowed (the fa1 parameter can be specified between the sa2 and sa1 parameters)
- ent-npp-as:sa2=x:sa1=y is allowed (sa1 and sa2 are consecutively numbered parameters, but do not need to be specified consecutively in the command).

Consecutively numbered Service Action parameters must specify the Service Actions in the order in which they will be executed. Service Actions must execute in order from highest precedence value to lowest precedence value. See *Service Action Precedence* on page 28 for examples of Service Action execution that depend on provisioning sequence.

- The sa1 parameter must specify the Service Action that has the highest precedence value in the Service Action group in the Action Set.
- The parameters with numbers consecutively following the sa1 parameter must specify the additional Service Actions in descending precedence value sequence.
- The parameters that specify Service Actions that have the same precedence values must be specified in the consecutively numbered parameter sequence in which the Service Actions will be executed. For example, if Service Action A and Service Action B have the same precedence value,
 - Specifying :sa2=A:sa3=B results in executing Service Action A first, followed by executing Service Action B.
 - Specifying :sa2=B:sa3=A results in executing Service Action B first, followed by executing Service Action A.

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](#) on page 54.

Table 24: Service Actions

Service Action	Precedence	Service	Description
CCNCCHK	100	IDP Relay IDPRCDPN	Verifies that the conditioned number is available under CSL CCNDC screening list. Note: Used ONLY for upgrade.
CRP	92	TIF NP	Circular Route Prevention
NPNRLS	91	TIF NP	Number Portability Release on No Match
ASDLKUP	90	TIF ASD	Use of CdPN Additional Subscriber Data when formatting CdPN.
CGPNASDRQD	90	TIF ASD	Use of CgPN Additional Subscriber Data when formatting CdPN.
CGPNGRNRQD	90	TIF GRN	Use of CgPN Generic Routing Number when formatting CdPN.
GRNLKUP	90	TIF GRN	Use of CdPN Generic Routing Number when formatting CdPN.
CDPNNP	80	IDP Relay IDPRCDPN	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 be replaced by DFLTRN. If RTDB lookup finds a Network Entity, then the SRFIMSI digits from the Network Entity populate the SRFIMSI Formatting Action.
CGPNNP	80	IDP Relay IDPRCGPN	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.

Service Action	Precedence	Service	Description
			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.
CGPNNPRQD	80	TIF NP	Calling Number Lookup
NPRELAY	80	TIF NP	Number Portability Relay
NPRLS	80	TIF NP	Number Portability Release on Match
SNSCgPN	75	TIF SNS	Simple Number Substitution
CGPNNPRQD	60	IDP Relay IDPRCDPN	Indicates whether the IDPRCGPN service is to be invoked. This implies that CgPN number conditioning, Service Actions, and formatting are done based on the configured CgPN Rules.
LACCK	60	IDP Relay IDPRCDPN	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	50	IDP Relay IDPRCDPN	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.
ASDLKUP	50	IDP Relay IDPRCGPN	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 CGPNASDRQD SA to format outgoing CDPN based on CgPN ASD lookup. This SA can be used with CGPNNP SA.

Service Action	Precedence	Service	Description
CGPNASDRQD	50	IDP Relay IDPRCDPN	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.
CGPNGRNRQD	50	IDP Relay IDPRCDPN	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.
GRNLKUP	50	IDP Relay IDPRCDPN	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 CGPNGRNRQD SA to format the outgoing CDPN based on CgPN GRN lookup. This SA can be used with CGPNNP SA.
GRNLKUP	50	IDP Relay IDPRCGPN	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 CGPNGRNRQD SA to format the outgoing CDPN based on CgPN GRN lookup. This SA can be used with CGPNNP SA.
CDIAL	10	Any TIF Feature	Corrective Dialing
FWDSGS	5	TIF SCS	Forward to SCS

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](#) on page 46 and [Provisioning Service Actions](#) on page 51.

[Table 25: Formatting Actions](#) on page 55 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 (fa1 through fa12). The fa1 Formatting Action parameter must be specified. Any additional Formatting Action parameters in the command must be consecutively numbered following fa1. For example,

- :fa1=x:fa2=y is allowed (fa2 is the next consecutively numbered parameter after fa1)
- :fa1=y:fa5=x is not allowed (parameters fa2, fa3, and fa4 must be specified if fa5 is specified)
- :fa2=y:fa3=w is not allowed (fa1 was not specified).

The Formatting Action parameters can be specified in any position in the command, and the parameter numbers do not need to be consecutive in the command. For example,

- ent-npp-as:fa2=x:ca1=cc:fa1=y is allowed (the ca1 parameter can be specified between the fa2 and fa1 parameters)
- ent-npp-as:fa2=x:fa1=y is allowed (fa1 and fa2 are consecutively numbered parameters, but do not need to be specified consecutively in the command).
- ent-npp-as:fa2=x:fa3=y is not allowed (fa1 was not specified).

Consecutively numbered Formatting Action parameters must specify the Formatting Actions in the order in which they will be executed.

- The fa1 parameter must specify the first Formatting Action that will be executed in constructing the outgoing digit string.
- The parameters with numbers consecutively following the fa1 parameter must specify the additional Formatting Actions in the order in which they will be executed.

Table 25: Formatting Actions

Formatting Action	Populated By	Description
AC	CA AC[1...3] or ACDEF	<p>Area Code digits</p> <p>Adds the AC Formatting Action value to the outgoing digit string.</p> <p>Provisioning Considerations:</p> <ol style="list-style-type: none"> 1. The EAGLE 5 ISS prevents the AC Formatting Action from being provisioned if the AC is not populated during Conditioning Action execution (by AC[1..3] or ACDEF or some other AC-loading Conditioning Action). 2. The AC Formatting Action cannot be specified with (is mutually exclusive with) the DN and ZN Formatting Actions in the same Action Set.
ASD	Service Action execution	Additional Subscriber Data

Formatting Action	Populated By	Description
		<p>Adds the ASD Formatting Action value to the outgoing 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>
CC	CA CC[1..3] or CCDEF	<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 5 ISS 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, DLMF, DLMG, DLMH, DLMI, DLMJ, DLMK, DLMM, DLMN, DLMO, DLMP	Default Delimiter digits Service Action execution	<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

Formatting Action	Populated By	Description
		<p>must be specified in the corresponding Conditioning Action group.</p> <p>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.</p>
FPEX	CA FPEX	<p>Filter Prefix digits</p> <p>Adds the FPEX Formatting Action value to the outgoing digit string.</p> <p>Provisioning Considerations:</p> <p>When the FPEX Formatting Action is specified, the FPEX Conditioning Action must be specified in the Action Set to populate FPEX during Conditioning Action execution.</p>
GRN	Service Action execution	<p>Generic Routing Number</p> <p>Adds the Generic Routing Number digit string to the outgoing 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>
NONE	Default Formatting Action value	<p>Do not perform any formatting for this Formatting Action.</p> <p>Provisioning Considerations:</p> <p>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.</p>
ORIG		<p>Original incoming digit string</p> <p>Adds the incoming digit string (unmodified) to the outgoing digit string. The ORIG Formatting Action is always available.</p> <p>Provisioning Considerations: None.</p>
PFXA, PFXB, PFXC, PFXD, PFXE, PFXF	CA PFX[A..F]	<p>Prefix digits (1-8 digits)</p> <p>Adds the PFX[A..F] Formatting Action value to the outgoing digit string.</p> <p>Provisioning Considerations:</p>

Formatting Action	Populated By	Description
		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	<p>Routing Number digits</p> <p>Adds the RN Formatting Action value to the outgoing digit string.</p> <p>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.</p> <p>Provisioning Considerations: None.</p>
SN	CA SN[1..15] or SNX	<p>Subscriber Number</p> <p>Adds the SN Formatting Action value to the outgoing digit string.</p> <p>Provisioning Considerations:</p> <ol style="list-style-type: none"> 1. The EAGLE 5 ISS 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	<p>Service Provider digits</p> <p>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.</p> <p>Provisioning Considerations None.</p>
SRFIMSI	Service Action execution	<p>Signaling Relay Function International Mobile Subscriber Identity</p> <p>Adds the SRFIMSI Formatting Action value to the outgoing digit string.</p> <p>The SRFIMSI Formatting Action value is populated during Service Action execution. If the SRFIMSI Formatting Action is not populated during Service Action execution, the</p>

Formatting Action	Populated By	Description
		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. Provisioning Considerations: None.
ZN	CA ZNX	Internationally formatted Dialed Number Adds the ZN Formatting Action value to the outgoing digit string. Provisioning Considerations: <ol style="list-style-type: none"> 1. The EAGLE 5 ISS 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.

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](#) on page 36.

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 for a group) do not need to be entered sequentially in the command or in consecutive parameter number order in the

command. The steps just 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.

For example, an Action Set named ACTSETINTL 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 Conditioning Actions; the command line contains
`ent-npp-as:ca1=cc2:ca2=ac3:ca3=sn7`
3. Enter the Service Action; the command line contains
`ent-npp-as:ca1=cc2:ca2=ac3:ca3=sn7:sal=cdpnp`
4. Enter the Formatting Actions; the command line contains
`ent-npp-as:ca1=cc2:ca2=ac3:ca3=sn7:sal=cdpnp:fa1=cc:fa2=ac:fa3=sn`
5. Enter the OFNAI value; the command line contains the complete command to create the Action Set:
`ent-npp-as::ca1=cc2:ca2=ac3:ca3=sn7:sal=cdpnp:fa1=cc:fa2=ac:fa3=sn:ofnai=intl`
6. 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](#) on page 59.

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](#) on page 46, and refer to the command description in the Commands Manual.
4. Enter the Service Actions for the Action Set. See the provisioning considerations in [Provisioning Service Actions](#) on page 51, and refer to the command description in the Commands Manual.
5. Enter the Formatting Actions for the Action Set. See the provisioning considerations in [Provisioning Formatting Actions](#) on page 54, and refer to the command description in the Commands Manual.
6. Enter the OFNAI parameter. See the provisioning considerations in [Provisioning the Outgoing FNAI](#) on page 59, and refer to the command description in the Commands Manual.
7. Press **Enter** to execute the command.
8. Enter the `rtv-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](#) on page 59.

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 consecutively numbered parameters.
- For Service Actions, a new Service Action must be in the correct high-to-low precedence sequence in the consecutively numbered parameters.
- 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](#) on page 44, and refer to the command description in the *Commands Manual*.

Include a parameter for each new Action in the group, in the correct consecutively numbered parameter position for Action execution.

Renumber existing parameters if needed to maintain the correct consecutively numbered parameter sequence.

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, Service, 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, Service, 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.

For example, (Conditioning Actions are shown; ;the consideration is the same for Service and Formatting Actions)

- Conditioning Actions :ca1=ign1:ca2=ac1:ca3=cc3:ca4=sn2 are specified in the existing Conditioning Action group.
- To change “ca2=ac1” to “ca2=ac3”, the following command can be entered:

```
chg-npp-as:asn=asn7:ca1=ign1:ca2=ac3:ca3=cc3:ca4=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 consecutively numbered parameter.
 - For Service Actions, the new Service Action must be in the correct high-to-low precedence sequence in the consecutively numbered parameters.
 - 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](#) on page 62.

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, Service, 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.

For example, (Conditioning Actions are shown; the consideration is the same for Service and Formatting Actions)

- An Action Set contains Conditioning Actions ca1=x, ca2=y and ca3=w.
- To delete the ca3=w Conditioning Action from the Action Set, enter the following Conditioning Actions in the command:

```
chg-npp-as:ca1=x:ca2=y
```

When the ca3=w parameter is omitted from the command; 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 not the last one that is executed, the entire group of Action parameters must specified in the command – except for the parameter for the Action that is to be removed. The parameters that are consecutively numbered following the removed parameter must be renumbered, so that the entire group of Action parameters is again consecutively numbered.

For example,

- An Action Set contains Conditioning Actions ca1=x, ca2=y and ca3=w.
- To delete the ca2=y Conditioning Action from the Action Set, enter the following command:
chg-npp-as:ca1=x:ca2=w

When the ca2 parameter is omitted from the command and the ca3 parameter is changed to ca2, 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 Action parameters in the group for the Action Set., except for the Action or Actions that are removed. See the provisioning considerations in [Provisioning Action Sets](#) on page 44, and refer to the command description in the *Commands Manual*.

Renumber any parameters that follow the removed parameters, to maintain the consecutively numbered parameter sequence.

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.

Table 26: NPP Service Rule Set Commands

Command	Description	Parameter(s)	Parameter Values
ent-npp-srs	Create an NPP Rule in a Service Rule Set		
chg-npp-srs	Change the Action Set name in a Rule		
	Service Name	srvn	TTR, TIF, TIF2, TIF3, IDPRCDPN, IDPRCGPN, 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	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.
dlt-npp-srs	Delete a Rule from an NPP Service Rule Set		
	Service Name	srvn	TTR, TIF, TIF2, TIF3, IDPRCDPN, IDPRCGPN, NPPT

Command	Description	Parameter(s)	Parameter Values
	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 [*].
rttrv-npp-srs	Retrieve all NPP Service Rule Sets or the Rules with the specified content		
	Service Name	srvn	TTR, TIF, TIF2, TIF3, IDPRCDPN, IDPRCGPN, NPPT
	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 (Refer to the command descriptions in the *Commands Manual* for detailed dependencies and valid parameter values 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.

The provisioned FPFX digits can contain up to 3 single digit wildcard characters (?) in the first 6 digits of the value. The single digit wildcard character cannot be in the last position in the filter prefix.

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 the *Commands Manual* 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.

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](#) on page 67.

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 \(FNAI Class\)](#) on page 66, and refer to the command description in the Commands Manual.
4. Enter the Filter Prefix parameter. See the provisioning considerations in [Provisioning the Filter Prefix \(FPFX\)](#) on page 66, and refer to the command description in the Commands Manual.
5. Enter the Filter Digit Length parameter. See the provisioning considerations in [Provisioning the Filter Digit Length \(FDL\)](#) on page 67, and refer to the command description in the Commands Manual.
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](#) on page 67.

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 `srvn` parameter to specify the name of the calling service that uses the Rule.
4. Enter the `fnai` parameter, with the existing value. See the provisioning considerations in [Provisioning the Filter NAI Class \(FNAI Class\)](#) on page 66, and refer to the command description in the Commands Manual.
5. Enter the `fpx` parameter, with the existing value. See the provisioning considerations in [Provisioning the Filter Prefix \(FPFX\)](#) on page 66, and refer to the command description in the Commands Manual.
6. Enter the `fdl` parameter, with the existing value. See the provisioning considerations in [Provisioning the Filter Digit Length \(FDL\)](#) on page 67, and refer to the command description in the Commands Manual.
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](#) on page 67.

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 `fnai` parameter, with the existing value. See the provisioning considerations in [Provisioning the Filter NAI Class \(FNAI Class\)](#) on page 66, and refer to the command description in the Commands Manual.
5. Enter the `fpx` parameter, with the existing value. See the provisioning considerations in [Provisioning the Filter Prefix \(FPFX\)](#) on page 66, and refer to the command description in the Commands Manual.
6. Enter the `fdl` parameter, with the existing value. See the provisioning considerations in [Provisioning the Filter Digit Length \(FDL\)](#) on page 67, and refer to the command description in the Commands Manual.

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.

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, IDPRCDPN, IDPRCGPN
	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.

Command	Description	Parameter(s)	Parameter Values
	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, IDPRCDPN, IDPRCGPN
	Output mode	mode	Output is for all services if the Service Name is not specified. FULL: Full output contains Service Name, service status, Service Actions, Service Action precedence, 6 NAI values, and Delimiter values. DEFAULT: Output contains service name, status, Service Actions, and Service Action precedence.

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, 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 5 ISS release.)

Service State Provisioning Procedures

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 .

1. Enter the `rtrv-npp-srs` command with the `srn` 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](#) on page 72.
3. If no Rules for the service are shown in the output from [Step 1](#) on page 72, use the procedure described in [Create a New Rule in a Service Rule Set](#) on page 68 to provision at least one Rule for the service. Then continue with [Step 4](#) on page 72.
4. Enter `chg-npp-serv` (the command keyword).
5. Enter the `srn` 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 `srn` 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.

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.

1. Enter the `rtrv-npp-serv` command with the `srvn` parameter to display the Delimiter values for the service.
2. Enter `chg-npp-serv` command, and specify one or more Delimiter values with the new value for each parameter.
3. Press ENTER to execute the command.
4. 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 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 5 ISS 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.

NPPT Provisioning

NPPT uses the Service Actions, precedences, and behavior shown in [Table 28: NPPT Service Actions](#) on page 74.

An EPAP-based feature must be enabled in the system before an NPPT Service Action can be provisioned in an Action Set.

Table 28: NPPT Service Actions

Service Action Name	Precedence	Behavior
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
RTDBTRNSP	100	Looks for DN in RTDB; looks for SP or RN in found DN; checks for Formatting Action processing
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 the *Commands Manual* 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=lkuprelease:ca1=IGN4:ca2=CC2:ca3=DN10:sa1=RTDBTRN
:fa1=CC:fa2=RN:fa3=DN:ofnai=INTL
```

- Provision the NPP Rule:
ent-npp-srs:svrn=nppt:fnaI=INTL:fpfx=9090:fdiglen=16:asn=lkuprelease
- 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

Test message output:

```

      1           2           3           4           5           6           7
8
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
SERVICE NAME = NPPT           SERVICE STATUS = ON
      INC DIGITS = 9090209192252645
      NAI = 7   FNAI = INTL FDL = 16

MATCHING RULE
      FNAI = INTL FDL = 16 FPFX = 9090
      ACTION SET NAME = LKUPRELEASE

CONDITIONING RESULT = SUCCESS/FAIL
      CA1 = IGN4           EXECUTED = Y RESULT = PASS
      CA2 = CC2           EXECUTED = Y RESULT = PASS
      CA3 = DN10          EXECUTED = Y RESULT = PASS
      INC DIGITS = 9090209192252645
      COND DIGITS = 209192252645

SERVICE APPLICATION
      SA1 = RTDBTRN           EXECUTED = Y   FORMAT IND = Y

FORMATING RESULT = SUCCESS
      FA1 = CC           EXECUTED = Y RESULT = PASS
      FA2 = RN           EXECUTED = Y RESULT = PASS
      FA3 = DN           EXECUTED = Y RESULT = PASS
      OUTG DIGITS = 20<RN>9192252645
      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=lkuprelay:ca1=CCDEF:ca2=IGN3:ca3=DN7:sa1=RTDBTRNSP:
fa1=RN:fa2=SP:fa3=ORIG:ofnai=NATL
```

- Provision the NPP Rule:

```
ent-npp-srs:svrn=nppt:fnai=NATL:fpfx=060:fdiglen=13:asn=lkuprelay
```

- 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
```

Test message output:

```

      1          2          3          4          5          6          7
8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
SERVICE NAME = NPPT          SERVICE STATUS = ON
      INC DIGITS = 0609192252645
      NAI = 5   FNAI = NATL FDL = 13

MATCHING RULE
      FNAI = NATL FDL = 13 FPFX = 060
      ACTION SET NAME = LKUPRELAY

CONDITIONING RESULT = SUCCESS/FAIL
      CA1 = CCDEF          EXECUTED = Y RESULT = PASS
      CA2 = IGN3          EXECUTED = Y RESULT = PASS
      CA3 = DN10         EXECUTED = Y RESULT = PASS
      INC DIGITS = 0609192252645
      COND DIGITS = 209192252645

SERVICE APPLICATION
      SA1 = RTDBTRNSP    EXECUTED = Y   FORMAT IND = Y

FORMATING RESULT = SUCCESS
      FA1 = RN          EXECUTED = Y RESULT = PASS
      FA2 = SP          EXECUTED = Y RESULT = PASS
      FA3 = ORIG        EXECUTED = Y RESULT = PASS
      OUTG DIGITS = [<RN>][<SP>]0609192252645
      OUTG FNAI = NATL
```

Glossary

A

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

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

C

CA
Conditioning Action
CAs indicate what digit conditioning actions to execute when processing a digit string.

E

EPAP
EAGLE Provisioning Application Processor

F

FA
Framework Advisory
Formatting Action
FAs determine how the outgoing digit string is formatted.

FNAI
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.

FPEX
Filter Prefix

G

	G	
GRN		Generic Routing Number
	L	
LAC		Location Area Code
LAI		Location Area Information
	N	
NAI		Nature of Address Indicator Standard method of identifying users who request access to a network.
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
	P	
Prepaid IDP Query Relay		A feature (IDP Relay) that provides a mechanism to insure correct charging for calls from prepaid subscribers in a portability environment.
	R	
RN		Routing Number
	S	
SA		Service Action

S

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

Service Rule Set

A collection of rules associated with a service.

SP

Service Provider
Signaling Point

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