

# Oracle® Communications Convergent Charging Controller ENUM Control Agent User's and Technical Guide



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The Oracle logo, consisting of the word "ORACLE" in white, uppercase, sans-serif font, positioned on a solid red rectangular background.

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# About This Document

## Scope

The scope of this document includes all the information required to install, configure and administer the ENUM Control Agent application.

## Audience

This guide was written primarily for system administrators and persons installing, configuring and administering the ENUM Control Agent application. However, sections of the document may be useful to anyone requiring an introduction to the application.

## Prerequisites

A solid understanding of UNIX and a familiarity with IN concepts are an essential prerequisite for safely using the information contained in this technical guide. Attempting to install, remove, configure or otherwise alter the described system without the appropriate background skills, could cause damage to the system; including temporary or permanent incorrect operation, loss of service, and may render your system beyond recovery.

Although it is not a prerequisite to using this guide, familiarity with the target platform would be an advantage.

This manual describes system tasks that should only be carried out by suitably trained operators.

## Related Documents

The following documents are related to this document:

- *Oracle Communications Convergent Charging Controller ACS Technical Guide*
- *Oracle Communications Convergent Charging Controller ACS User's Guide*

# Document Conventions

## Typographical Conventions

The following terms and typographical conventions are used in the Oracle Communications Convergent Charging Controller documentation.

Formatting Convention	Type of Information
<b>Special Bold</b>	Items you must select, such as names of tabs. Names of database tables and fields.
<i>Italics</i>	Name of a document, chapter, topic or other publication. Emphasis within text.
<b>Button</b>	The name of a button to click or a key to press. <b>Example:</b> To close the window, either click <b>Close</b> , or press <b>Esc</b> .
<b>Key+Key</b>	Key combinations for which the user must press and hold down one key and then press another. <b>Example:</b> <b>Ctrl+P</b> or <b>Alt+F4</b> .
Monospace	Examples of code or standard output.
<b>Monospace Bold</b>	Text that you must enter.
<i>variable</i>	Used to indicate variables or text that should be replaced with an actual value.
menu option > menu option >	Used to indicate the cascading menu option to be selected. <b>Example:</b> <b>Operator Functions &gt; Report Functions</b>
<a href="#">hypertext link</a>	Used to indicate a hypertext link.

Specialized terms and acronyms are defined in the glossary at the end of this guide.

# System Overview

## Overview

### Introduction

This chapter provides a high-level overview of the application. It explains the basic functionality of the system and lists the main components.

It is not intended to advise on any specific Oracle Communications Convergent Charging Controller network or service implications of the product.

### In this Chapter

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This chapter contains the following topics.

What is the ENUM Control Agent.....	1
Converting Numbers.....	4
Typical Installation and Use .....	5
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## What is the ENUM Control Agent

### Introduction

With the proliferation of IT type systems involved in the call setup path from tier 1 operators to low cost VOIP service providers, a standard low cost method of establishing call routing information was required.

ENUM, which stands for E.164 number mapping, addresses this need by providing a mechanism of establishing routing or/and URI information for a call (or general subscriber query) based on the DNS.

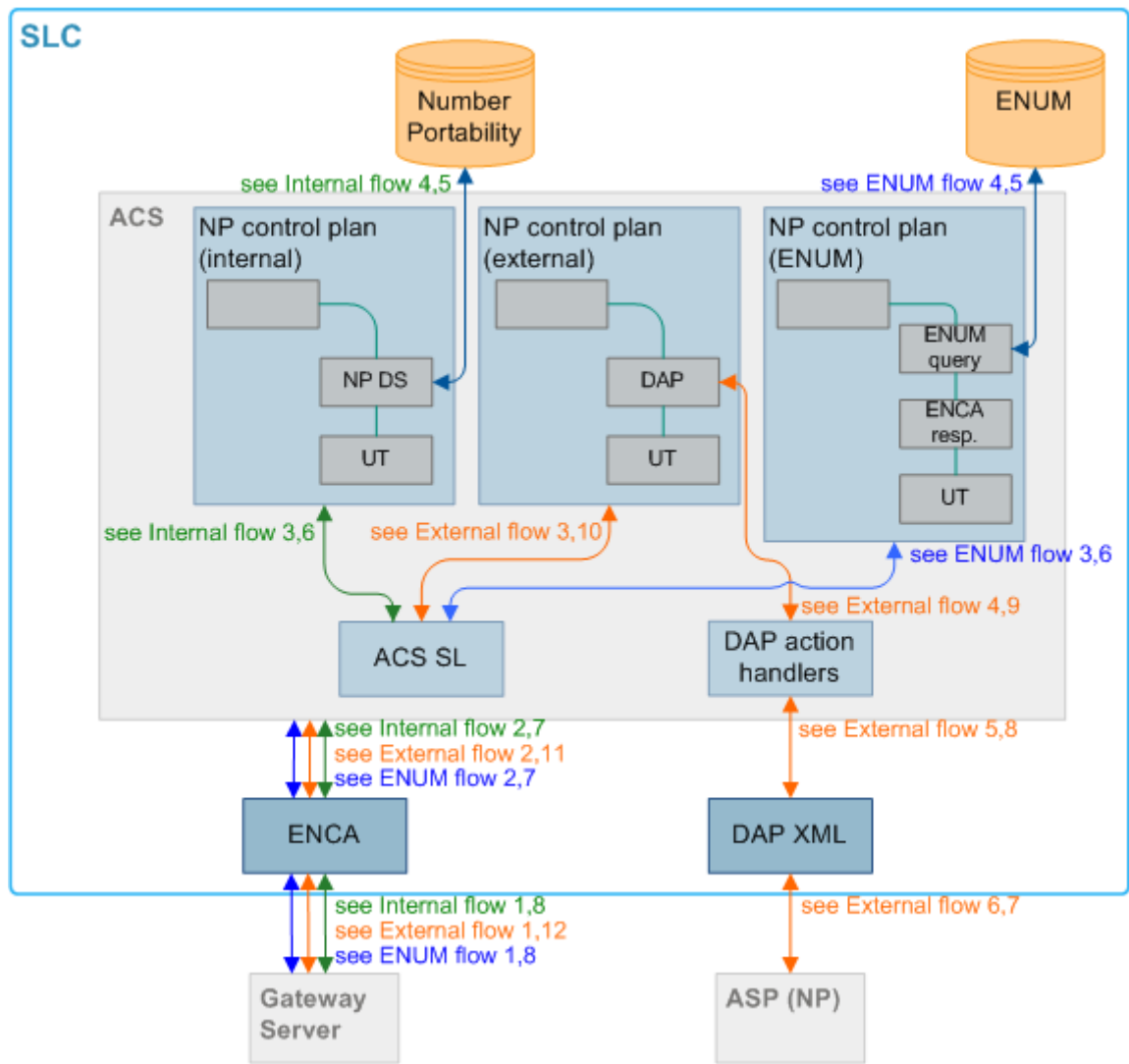
DNS was chosen due to its general availability on IT platforms and its implementation in IP networks.

The ENUM standard also facilitates the mapping of e.164 numbers into general purpose URIs that can be used when establishing a session to a destination.

### Diagram

This diagram shows the Oracle Communications Convergent Charging Controller ENUM interface allowing the SLC to be used as an NP interface for external servers that only have simple DNS query capabilities

**Note:** The ENUM interface/components are not limited to solely NP type deployments.



**Note:** Text and line colors reflect each of the three ways ENCA use has been depicted.

### Internal flow

The internal flow scenario is where ENUM is used with the NP service pack to offer an NP service that is hosted on the SLC.

The following table provides comments on the internal flow shown in the overview diagram (green lines).

Step	Action
1	External Gateway launches a DNS request for ENUM resolution.
2	Request is translated by the ENUM interface, triggering rules activated which results in ACS being triggered.
3	ACS loads an Internal NP control plan (based on SK).
4	Control plan is executed, containing an NP node which results in a DB lookup on the SLC, using e.164 number in called party field.
5	Ported information is returned from the local DB to DS node, the looked up subscriber has an URI associated with them in NP DB, DS node copies the URI to the outgoing profile and marks it as URI.



Step	Action
6	Unconditional Terminate node is used to send a CONNECT, ACS service loader invoked.
7	ACS sends a CONNECT operation to ENCA containing a DRA (as set by DS) and the outgoing profile field (as set by DS with URI).
8	ENCA extracts the URI from the outgoing profile, wraps it in the configured NAPTR record fields and sends the DNS response to the client.

## External flow

The external flow scenario is where ENUM is used in conjunction with DAP components so that an externally hosted NP service can be queried.

The following table provides comments on the external flow shown in the overview diagram (orange lines).

Step	Action
1	External Gateway launches a DNS request for ENUM resolution.
2	Request is translated by the ENUM interface, triggering rules activated which results in ACS being triggered.
3	ACS loads an External NP control plan (based on SK).
4	Control plan is executed, containing a DAP node which uses either e.164 number or FQDN as a substitution parameter in template XML and invokes the DAP action handler.
5	DAP action handler sends a SLEE message to DAP XML interface containing query parameter(s).
6	XML interface builds XML message and sends the appropriate query to external ASP.
7	External ASP processes requests and either sends back one or more URI data blocks or/and one or more NAPT RR data blocks identified within tags.
8	XML interface extracts return data blocks as configured and returns information in SLEE response message.
9	Response information returned from DAP action handlers to the DAP feature node which extracts either URI or NAPTR record data item and places in the outgoing profile.
10	Unconditional Terminate node is used to send a CONNECT, ACS service loader invoked.
11	ACS sends a CONNECT operation to ENCA containing the outgoing profile (as set by).
12	ENCA extracts the URI or NAPTR record from outgoing profile, wraps it in the configured NAPTR record field (if URI form) and sends the DNS response to the client.

## ENUM flow

The following table provides comments on the ENUM flow shown in the overview diagram (orange lines).

Step	Action
1	External Gateway launches a DNS request for ENUM resolution.
2	Request is translated by the ENUM interface, triggering rules activated which results in ACS being triggered.
3	ACS loads an ENUM NP control plan (based on SK).
4	Control plan is executed, containing ENUM Query node which results in a DB lookup on the SLC, using e.164 number in called party field.

Step	Action
5	NAPTR information is returned from the local DB to ENUM Query node, looked up subscriber has several NAPTR records associated with them in ENUM DB, ENUM query node concatenates records into one string and copies resultant string to outgoing profile and marks it as NAPTR – OPTIONALLY ENUM response node can be called in order to try and extract an AUS from a NAPTR record that satisfies search criteria.
6	Unconditional Terminate node used to send a CONNECT, ACS service loader invoked.
7	ACS sends a CONNECT operation to ENCA containing a DRA (could contain original number OR possibly AUS if ENUM response node invoked) and outgoing profile field (as set by ENUM query node with NAPTR).
8	ENCA extracts NAPTR information from the outgoing profile, encodes it into the appropriate network representation and sends a DNS response to the client.

## Converting Numbers

### Introduction

When processing a Fully Qualified Domain Name (FQDN) input string, the subscriber number part must be converted to an e.164 number before any subscriber details can be retrieved.

By the same token, when responding to a FQDN the subscriber number needs to be converted from an e.164 number.

### Converting to e.164 number

The numDigitsRem part of the triggerRules is used as part of the conversion rules.

For example, if the input was:

0.0.9.9.8.2.3.7.4.1.4.4.e164.arpa

and the matching triggerRule was:

```
{ info=".4.4.e164.arpa", numDigsRem=10, trigger=111, noa=4 }
```

The full conversion into an e.164 number is done by:

- The last 10 characters are removed from the string (0.0.9.9.8.2.3.7.4.1.4.4)
- The string is reversed (4.4.1.4.7.3.2.8.9.9.0.0)
- All dots are removed (441473289900)

### Converting to a FQDN

An e.164 Destination Routing Address is converted to FQDN as follows:

- The string of digits (for example. 441473289900) is reversed (009982374144)
- Dots are added after all characters (0.0.9.9.8.2.3.7.4.1.4.4.)
- A configured domain is appended to finish the FQDN.

For example, a default domain is used and configured as:

```
enca = {
    defNoADomain = "e164.arpa"
}
```

This would create the finished FQDN as 0.0.9.9.8.2.3.7.4.1.4.4.e164.arpa.

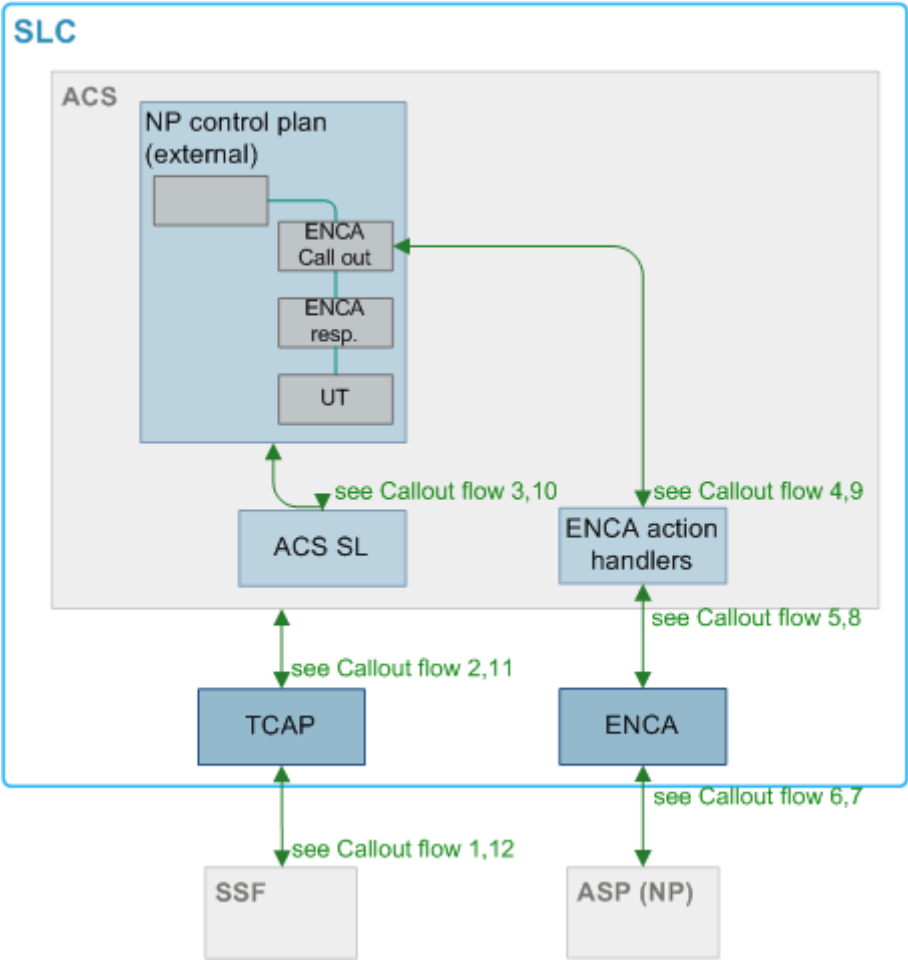
# Typical Installation and Use

## Overview

This topic outlines how the Oracle Communications Convergent Charging Controller ENUM Interface and associated macro nodes are typically deployed when the triggered service on the SLC is configured to use ENUM to retrieve subscriber information (NP) from an external platform.

## Diagram

Here is an example installation.



## Callout flow

The following table provides comments on the callout flow shown in the diagram.

Step	Action
1	SSF launches INAP query to resolve a number (for example, number translation service or/and NP or/and number routing).
2	TCAP i/f sends an IDP to ACS.
3	ACS triggers the appropriate service loader which loads an appropriate control plan.

Step	Action
4	The control plan contains an ENCA Call Out (CO) node, this node allows the number to be specified that the lookup is to be performed on and domain name, this node use action handler to send message.
5	SLEE message is sent to ENCA containing the number that the query should be performed on.
6	ENCA builds the FQDN from information received in SLEE message and launches DNS query.
7	ASP/ENUM server performs lookup and returns one or more NAPTR records back to ENCA in DNS response.
8	NAPTR record(s) is sent back to the action handler in the SLEE response message.
9	Action handler builds response and makes it available to ENCA CO node which stores this in temporary profile block. The NAPTR response node is then invoked, this node is capable of extracting information from NAPTR records, performing string manipulation and then copying information to the stated field. The configuration of the NAPTR response node is such that it searches for "E2U+tel" records.
10	Configuration/operation is performed by NAPTR response node resulting in the DRA being updated with the manipulated result from the ASP. Unconditional Terminate node is invoked resulting in the ACS service loader being invoked.
11	No need for the service loader extender to be invoked (since URI/NAPT RR not being copied into the CONNECT operation since a network element will not be capable of processing it), so a CONNECT INAP operation is sent back to TCAP i/f with a DRA containing the manipulated result from the ASP.
12	CONNECT is returned back from SLC to the SSF.

## SIP Based Solution

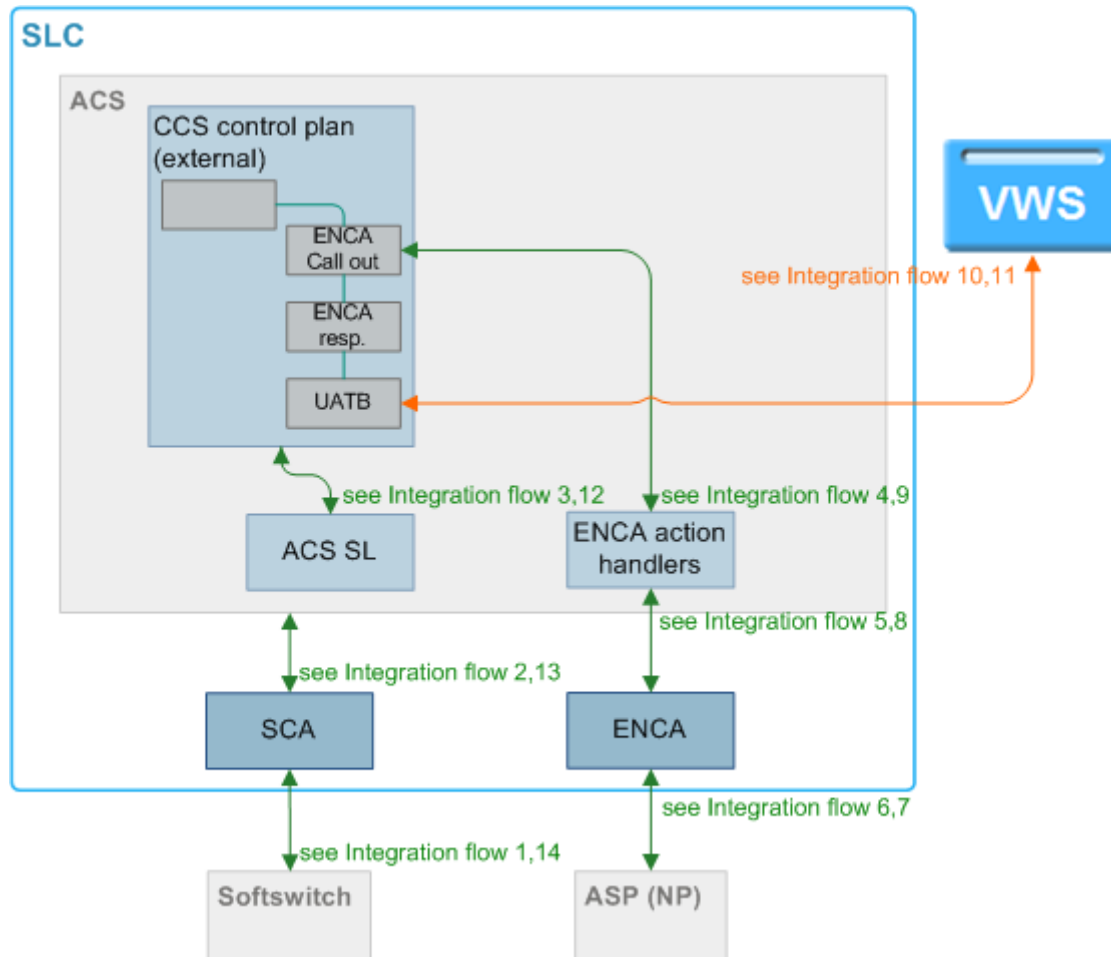
### Overview

Previous topics covered the main requirements for the various modules of an Convergent Charging Controller solution. The Oracle Communications Convergent Charging Controller ENUM components can be used in various deployment models to provide end to end solutions.

This topic shows how the ENUM modules can be used in a SIP based charging solution. This topic is primarily concerned with stating requirements for the ENUM and other Convergent Charging Controller components (for example, DAP) that will allow the ENUM component to be integrated with other Convergent Charging Controller components to provide end to end solutions.

## Diagram

Here is an example showing how the ENUM modules can be used in a SIP based charging solution.



**Note:** Different text and line colors have no inherent meaning, they simply aid readability.

## SIP based flow

The following table provides comments on the SIP based flow shown in the diagram.

Step	Action
1	Call originated from the network subscriber, Softswitch is triggered through routing which in turn uses the AS (SLC with SCA) for call control. Softswitch sends a SIP INVITE to SCA.
2	SCA triggers ACS which in turn loads the CCS service loader resulting in details for calling subscriber being loaded.
3	ACS triggers the appropriate service loader which loads an appropriate control plan.
4	The control plan contains an ENCA Call Out (CO) node, which allows the number to be specified that the lookup is to be performed (destination number) on and domain (e.164 arpa) name; this node uses the action handler to send the message.
5	SLEE message is sent to ENCA containing number that the query should be performed on.

Step	Action
6	ENCA builds FQDN from information received in SLEE message and launches DNS query.
7	ASP/ENUM server performs lookup and returns one or more NAPTR records back to ENCA in DNS response.
8	NAPTR record(s) are sent back to the action handler in the SLEE response message.
9	Action handler builds response and makes available to ENCA CO node which stores this in an outgoing profile block. NAPTR response node is then invoked; this node is capable of extracting information from NAPTR records, performing string manipulation then copying information to the stated field. The configuration of the NAPTR response node is such that it searches for "E2U+sip" records.
10	Configuration/operation is performed by the NAPTR response node results in outgoing profile being updated with the URI. The UATB node invoked results in VWS being contacted. The URI (if VWS supports) or e.164 number in DRA would be used as the destination to determine tariff.
11	Tariff/time information returned from the VWS.
12	CCS service loader is invoked to perform final manipulation of the CONNECT before being sent.
13	ACS sends ACH and CONNECT INAP operations back to SCA.
14	SCA uses URI information in the outgoing profile field of CONNECT as its destination ("TO:" field) when sending the outgoing INVITE back to softswitch.

# Getting Started

## Overview

### Introduction

This chapter explains how to access the Oracle Communications Convergent Charging Controller ENUM application and describes some of the common functionality of the ENUM screens.

### In this chapter

---

This chapter contains the following topics.

Signing on to ENUM ..... 9

## Signing on to ENUM

### SMS Login screen

Here is an example of the SMS Login screen.



The screenshot shows a window titled "SMS Login" with a blue header bar. Inside the window, the Oracle logo is displayed in red, followed by the text "COMMUNICATIONS" in black, and "Network Charging and Control" in red. Below this, there are two input fields: "User Name" and "Password". At the bottom of the window, there are two buttons: "OK" and "Cancel".

ORACLE®

COMMUNICATIONS

Network Charging  
and  
Control

User Name

Password

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OK Cancel

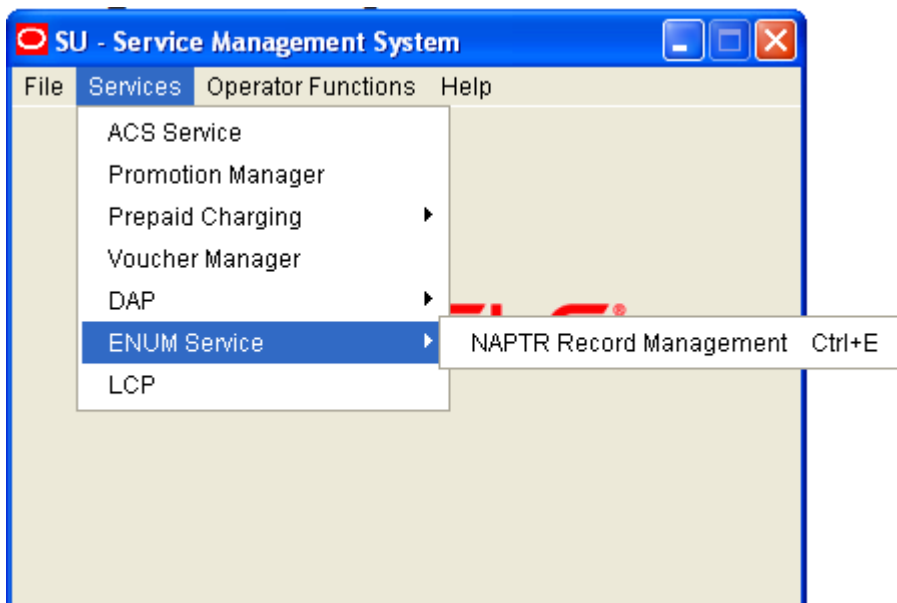
## Logging into SMS

Follow these steps to log into SMS.

Step	Action
1	In the <b>User Name</b> field, type your username.
2	In the <b>Password</b> field, type your password.  <b>Notes:</b> <ul style="list-style-type: none"><li>• Passwords are case sensitive.</li><li>• You have three attempts to enter a correct username and password before the User ID is locked. If this happens, you must see your System Administrator to re-activate it.</li></ul>
3	Click <b>OK</b> . <b>Result:</b> You see the Service Management System main screen.

## SMS main menu

Here is an example of the SMS main menu showing the ENUM menu options.





# NAPTR Record Management

## Overview

### Introduction

This chapter explains how to use the NAPTR screens to manage NAPTR records.

### In this chapter

---

This chapter contains the following topics.

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Find Mode.....	13
Find Results Mode.....	21
New Mode .....	29
Update Mode .....	35

## Introduction

### Screens overview

The NAPTR record management screens comprise of four tabs within each mode of use.

The tabs are:

- Flags
- Service
- Subscriber/Operator
- NAPTR Records

The modes of use are:

- *Find mode* (on page 13)
- *Find Results mode* (on page 21)
- *New mode* (on page 29)
- *Update mode* (on page 35)



# Find Mode

## Overview

### Introduction

This chapter explains how to find records in the ENUM database for editing.

### In this chapter

---

This chapter contains the following topics.

Find Flags .....	13
Find Services .....	14
Find Subscriber or Operator .....	16
Find NAPTR Records .....	17

## Find Flags

### Finding flag records

Follow these steps to find flag records in the database.

Step	Action
1	Select the <b>Flags</b> <i>tab</i> (See example on page 13).
2	Ensure the current mode shown in the screen title is <b>Find Mode</b> . <b>Tip:</b> Click <b>Return</b> until the screen title shows - Find mode.
3	Enter search criteria in any (or none) of the fields in the tab. <b>Tip:</b> Leaving all fields empty will return all flag records in the database.
4	By entering data in the fields at the bottom of the tab, select the filter and sort criteria.
5	Click <b>Find</b> . <b>Result:</b> The database is searched and all matching records are collated and displayed in <i>Find Flag Results</i> (on page 22).

### Flags tab

Here is an example **Flags** tab, for the ENUM/NAPTR Record Management - Find mode screen.

ENUM/NAPTR Record Management - Find mode

Find New Save Delete Clear Help

Flags Service Subscriber/Operator NAPTR Records

Flag

Description

Last Change Data

Last User:

Last Date:

Order By:

Messages:

## Find Services

### Finding service records

Follow these steps to find service records in the database.

Step	Action
1	Select the <b>Service</b> tab (See example on page 15).
2	Ensure the current mode shown in the screen title is <b>Find Mode</b> .
	<b>Tip:</b> Click <b>Return</b> until the screen title shows - Find mode.
3	Enter search criteria in any (or none) of the fields displayed in the tab.

Step	Action
	<b>Tip:</b> Leave all fields empty to return all service records in the database.
4	By entering data in the fields at the bottom of the tab, select the filter and sort criteria.
5	Click <b>Find</b> .
	<b>Result:</b> The database is searched and all matching records are collated and displayed in <i>Find Services Results</i> (on page 23).

## Service tab

Here is an example **Service** tab, for the ENUM/NAPTR Record Management - Find mode screen.

ENUM/NAPTR Record Management - Find mode

Find New Save Delete Clear Help

Flags **Service** Subscriber/Operator NAPTR Records

Service

Description

Last Change Data

Last User:

Last Date:

Order By: Service

Messages:

## Find Subscriber or Operator

### Finding subscriber or operator records

Follow these steps to find subscriber or operator records in the database.

Step	Action
1	Select the <b>Subscriber/Operator</b> tab (See example on page 16).
2	Ensure the current mode shown in the screen title is <b>Find Mode</b> . <b>Tip:</b> Click <b>Return</b> until the screen title shows - Find mode.
3	Enter search criteria in any (or none) of the fields displayed in the tab. <b>Note:</b> Select the <b>Entry Type</b> check box to find operator records, otherwise subscriber records are found. <b>Tip:</b> Leave all fields empty to return all subscriber or operator records in the database.
4	By entering data in the fields at the bottom of the tab, select the filter and sort criteria.
5	Click <b>Find</b> . <b>Result:</b> The database is searched and all matching records are collated and displayed in <i>Find Subscriber or Operator Results</i> (on page 25).

### Subscriber/Operator tab

Here is an example **Subscriber/Operator** tab, for the ENUM/NAPTR Record Management - Find mode screen.

ENUM/NAPTR Record Management - Find mode

Find New Save Delete Clear Help

Flags Service **Subscriber/Operator** NAPTR Records

Entry Type (Tick for Operator) ☒

Name

Number Start

Number End

Last Change Data

Last User:

Last Date:

Order By: Name


Messages:

## Find NAPTR Records

### Finding NAPTR records

Follow these steps to find NAPTR records in the database.

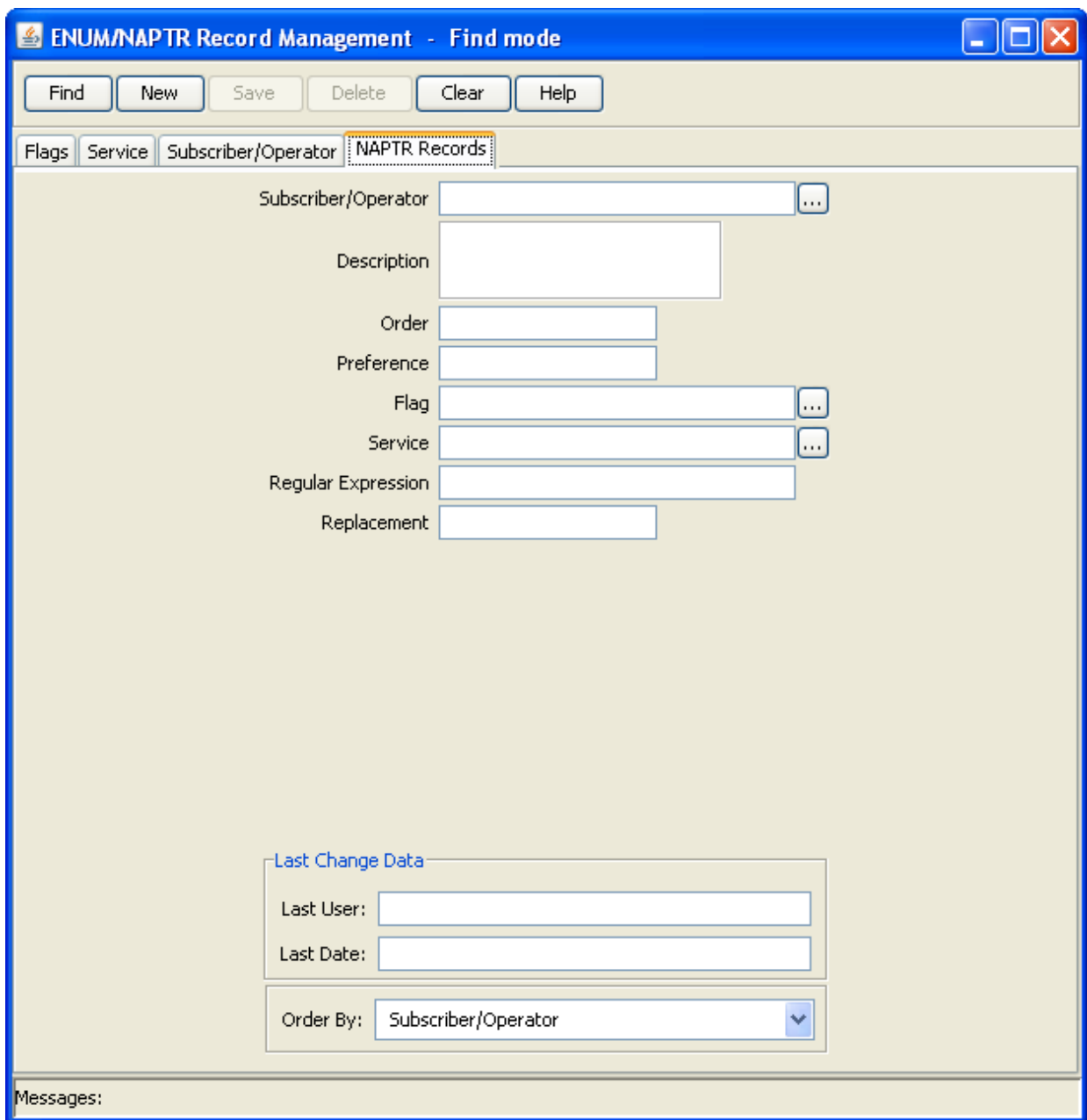
Step	Action
1	Select the <b>NAPTR Records</b> <i>tab</i> (See example on page 18).
2	Ensure the current mode shown in the screen title is <b>Find Mode</b> .
<b>Tip:</b> Click <b>Return</b> until the screen title shows - Find mode.	

Step	Action
3	<p>Enter search criteria in any (or none) of the fields displayed in the tab.</p> <p><b>Tip:</b> Leaving all fields empty will return all NAPTR records in the database.</p> <p>a You can search for the search criteria to include in the following fields:</p> <ul style="list-style-type: none"> <li>• <b>Subscriber/Operator</b></li> <li>• <b>Flag</b></li> <li>• <b>Service</b></li> </ul> <p>To search the field, click  to the right of the corresponding field.</p> <p><b>Result:</b> The <i>Search Dialog</i> (See example on page 19) for that type of record selected displays.</p> <p>b To reduce the number of database records searched, enter in the fields, as required, for:</p> <ul style="list-style-type: none"> <li>• Subscriber/Operator - a <b>Name</b> or <b>Dialed Number</b></li> <li>• Flag - a <b>Flag</b> or <b>Description</b></li> <li>• Service - a <b>Service</b> or <b>Description</b></li> </ul> <p>c Click <b>Find</b>.</p> <p><b>Result:</b> The results are returned in the grid.</p> <p>d Click on the required record and click <b>Select</b>.</p> <p><b>Result:</b> That service is added to the search fields.</p>
4	By entering data in the fields at the bottom of the tab, select the filter and sort criteria.
5	<p>Click <b>Find</b>.</p> <p><b>Result:</b> The database is searched and all matching records are collated and displayed in <i>Find NAPTR Records Results</i> (on page 26).</p>

## NAPTR Records tab

Here is an example **NAPTR Records** tab, for the ENUM/NAPTR Record Management - Find mode screen.





The image shows a software window titled "ENUM/NAPTR Record Management - Find mode". At the top, there is a toolbar with buttons for "Find", "New", "Save", "Delete", "Clear", and "Help". Below the toolbar is a tabbed interface with four tabs: "Flags", "Service", "Subscriber/Operator", and "NAPTR Records". The "NAPTR Records" tab is currently selected. The main area of the dialog contains several input fields for search criteria: "Subscriber/Operator" (with a dropdown arrow), "Description", "Order", "Preference", "Flag" (with a dropdown arrow), "Service" (with a dropdown arrow), "Regular Expression", and "Replacement". At the bottom of the main area, there is a section titled "Last Change Data" containing "Last User:" and "Last Date:" labels with corresponding input fields. Below this is an "Order By:" label with a dropdown menu currently set to "Subscriber/Operator". At the very bottom of the window is a "Messages:" label.

ENUM/NAPTR Record Management - Find mode

Find New Save Delete Clear Help

Flags Service Subscriber/Operator NAPTR Records

Subscriber/Operator ...

Description

Order

Preference

Flag ...

Service ...

Regular Expression

Replacement

Last Change Data

Last User:

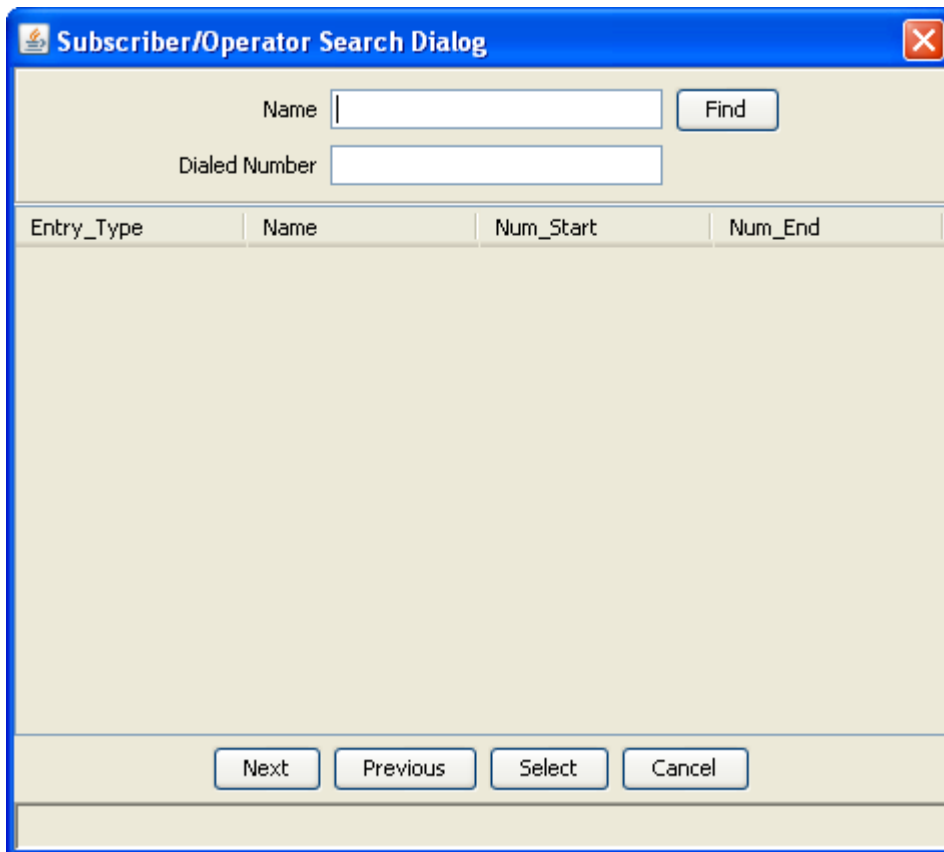
Last Date:

Order By: Subscriber/Operator ▼

Messages:

## Search Dialog

Here is an example Search Dialog.



The image shows a software dialog box titled "Subscriber/Operator Search Dialog". It features a search interface with two input fields: "Name" and "Dialed Number". A "Find" button is positioned to the right of the "Name" field. Below the input fields is a table with four columns: "Entry\_Type", "Name", "Num\_Start", and "Num\_End". The table is currently empty. At the bottom of the dialog, there are four buttons: "Next", "Previous", "Select", and "Cancel".

Subscriber/Operator Search Dialog

Name  Find

Dialed Number

Entry_Type	Name	Num_Start	Num_End
------------	------	-----------	---------

Next Previous Select Cancel

# Find Results Mode

## Overview

### Introduction

This chapter explains how to use the find results.

### In this chapter

---

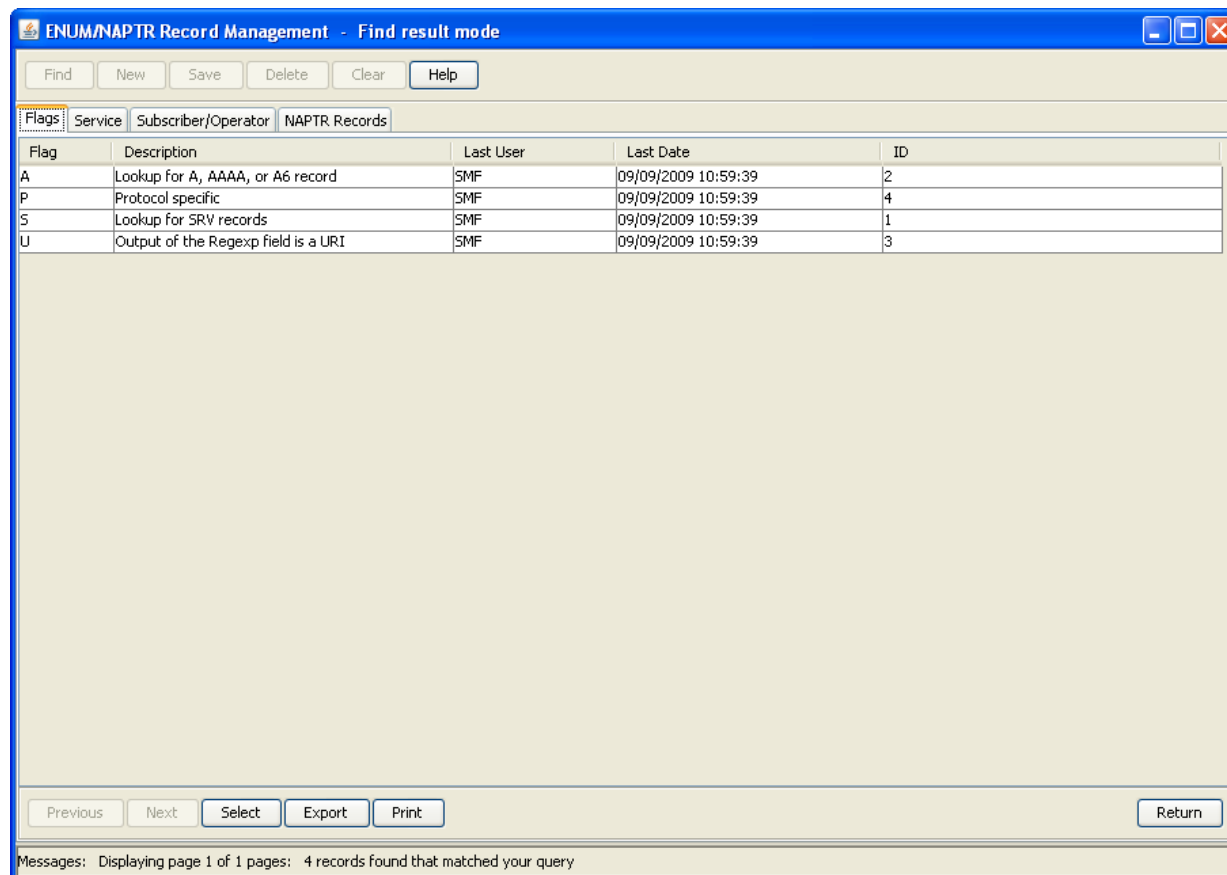
This chapter contains the following topics.

Find Flag Results.....	22
Find Services Results.....	23
Find Subscriber or Operator Results .....	25
Find NAPTR Records Results.....	26

## Find Flag Results

### Flag results list

Here is an example of find flags results list.



### Flag results columns

This table describes the content of each column.

Column	Description
Flag	The unique flag name.
Description	Flag description.
Last User	Name of last user to amend (or add) this record
Last Date	Date when this record was added or amended
ID	Record number within the database table

### Selecting flag for update

To amend any of the records in the results list, click on the row to change, then click **Select**.

**Result:** The record detail is displayed in *Update Mode* (on page 35).

## Exporting results list

The export function downloads all the information displayed in the results list.

To export, click **Export**, then follow the prompts for what to name the file and where to save it to.

You can view the saved file using a text processor.

## Printing flag results list

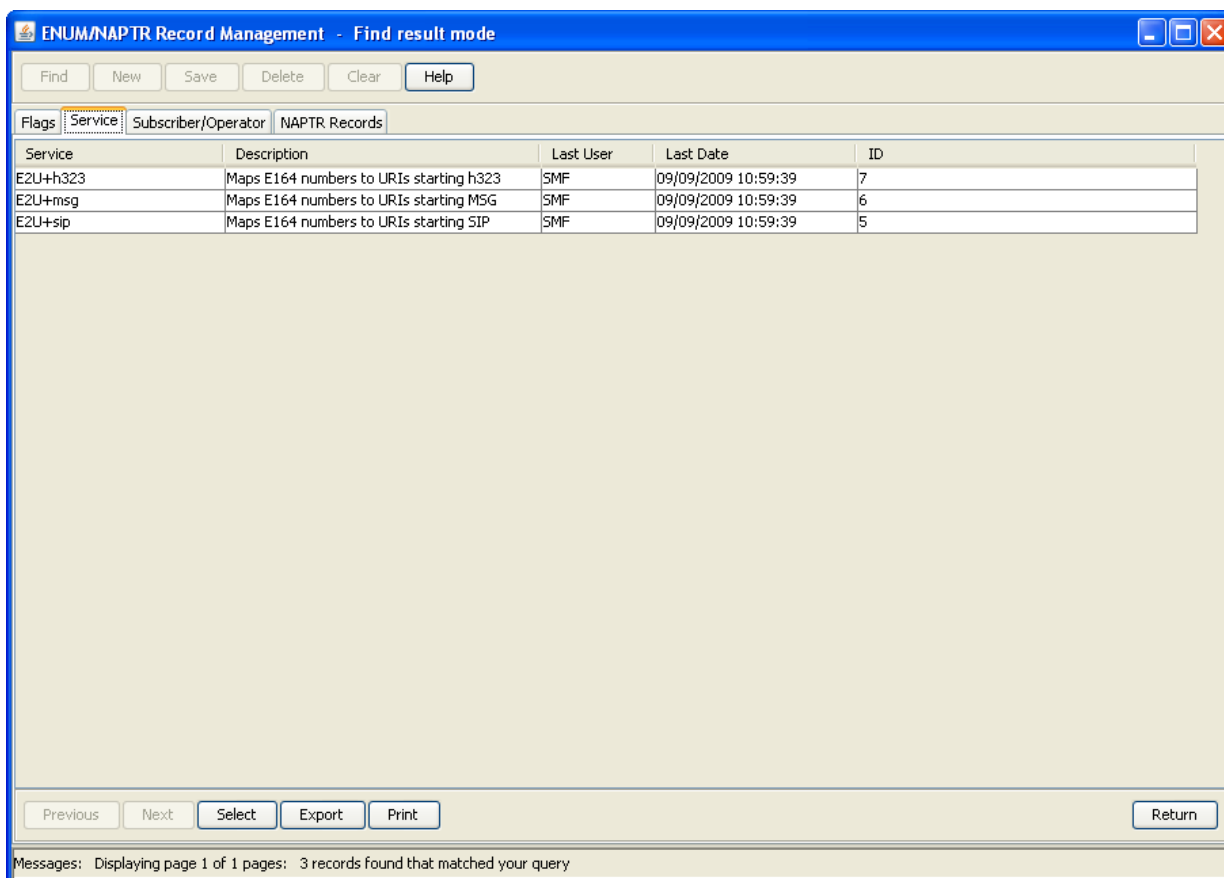
Click **Print** to print the results list.

Page setup and printer selection panels prompt for what and where to print.

## Find Services Results

### Service results list

Here is an example of service find results list.



### Service results columns

This table describes the content of each column.

Column	Description
Service	The unique name of the service.

Column	Description
Description	A brief description of the service.
Last User	Name of last user to amend (or add) this record
Last Date	Date when this record was added or amended
ID	Record number within the database table

### Selecting service for update

To amend any of the records in the results list, click on the row to change, then click **Select**.

**Result:** The record detail is displayed in *Update Mode* (on page 36).

### Exporting service results list

The export function downloads all the information displayed in the results list.

To export, click **Export**, then follow the prompts for what to name the file and where to save it to.

You can view the saved file using a text processor.

### Printing flag results list

Click **Print** to print the results list.

Page setup and printer selection panels prompt for what and where to print.

## Find Subscriber or Operator Results

### Subscriber or operator results list

Here is an example of subscriber or operator find results list.

ENUM/NAPTR Record Management - Find result mode

Find New Save Delete Clear Help

Flags Service **Subscriber/Operator** NAPTR Records

Name	Number Start	Number End	Entry Type (Tick for Operator)
9876543210	9876543210	9876543210	S
MikeSubscriber1	441473	441475	S
Operator1	00001	00002	O
SipSubscriber1	441394111111	441394111111	S
Subscriber1	00001	00005	S

Previous Next Select Export Print Return

Messages: Displaying page 1 of 1 pages: 5 records found that matched your query

### Subscriber or operator results columns

This table describes the content of each column.

Column	Description
Name	The operator or subscriber name, depending on the option selected.
Number Start	The start of number in a range for this operator or subscriber.
Number End	The last number in a range for this operator or subscriber.
Entry Type	Indicator of type of list, either O(perator), or S(ubscriber).
Last User	Name of last user to amend (or add) this record
Last Date	Date when this record was added or amended
ID	Record number within the database table

## Selecting flag for update

To amend any of the records in the results list, click on the row to change, then click **Select**.

**Result:** The record detail is displayed in *Update Mode* (on page 36).

## Exporting subscriber or operator results list

The export function downloads all the information displayed in the results list.

To export, click **Export**, then follow the prompts for what to name the file and where to save it to.

You can view the saved file using a text processor.

## Printing flag results list

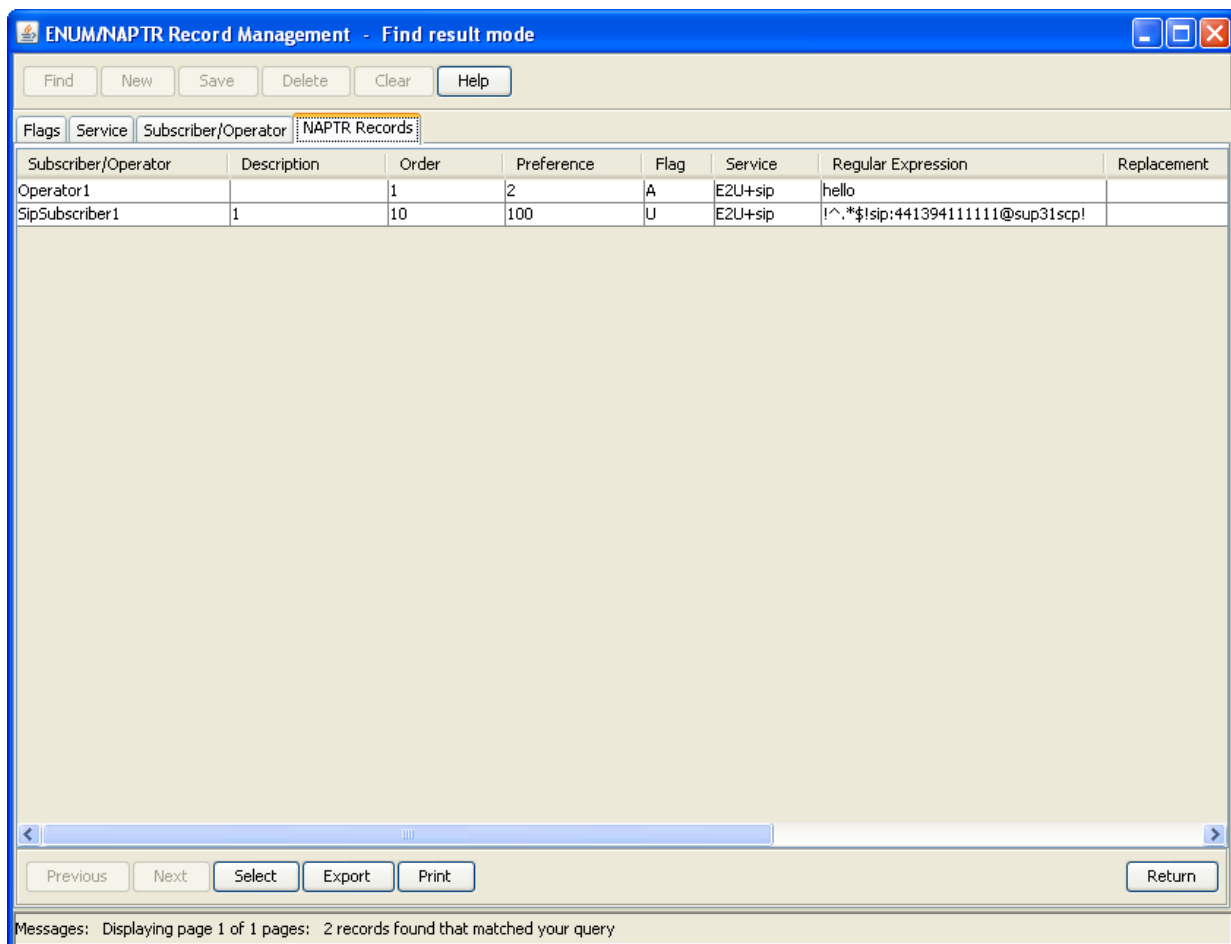
Click **Print** to print the results list.

Page setup and printer selection panels prompt for what and where to print.

# Find NAPTR Records Results

## NAPTR records results list

Here is an example of NAPTR records find results list.





## NAPTR record results columns

This table describes the content of each column.

Column	Description
Subscriber/Operator	The subscriber or operator name
Description	Description of the record.
Order	A 16-bit unsigned integer that specifies the processing order of the NAPTR records, with lower-numbered records processed before higher-numbered records.
Preference	A 16-bit unsigned integer that specifies a processing preference within NAPTR records that have equal order values.  The distinction between the order and preference values is that a client can process records having the same order number but different preference numbers, but cannot process records with a different order number after a match is found.
Flag	A character that governs the interpretation and rewriting of the record's fields. Letters can be either uppercase or lowercase.  Only values S, A, U, and P are defined. The S, A and U flags indicate that the current NAPTR record is the last one and they determine what the next action will be. <ul style="list-style-type: none"> <li>• The letter S specifies that the next lookup is for SRV records.</li> <li>• The letter A specifies that the next lookup is for an A, AAAA, or A6 record.</li> <li>• The letter U specifies that the output of the Regexp field is a URI. Because some applications also lookup aspects of URIs, developers should understand that this can create loop conditions and take appropriate measures.</li> </ul> <p>The letter P specifies that the rest of the application algorithm is executed in a manner that is consistent with a specified protocol. The rules are identified by the protocol specified in the Services field.</p> <p>See the standards documentation for the naming authority pointing dns resource record for more information on these values.</p>
Service	The service name.
Regular Expression	A string that holds a regular expression to apply to the client's original string to create the next domain name to look up. See the standards documentation for the Naming Authority Pointer DNS Resource Record for information on the substitution rules  The regular expression must be applied only to the client's original string and not to a domain name that was produced by a previous NAPTR rewrite.
Replacement	The next name to query for NAPTR, SRV, or address records depending on the value of the Flag field. This must be a fully qualified domain-name
Last User	Name of last user to amend (or add) this record
Last Date	Date when this record was added or amended
ID	Record number within the database table

## Selecting NAPTR record for update

To amend any of the records in the results list, click on the row to change, then click **Select**.

**Result:** The record detail is displayed in *Update Mode* (on page 37).

### Exporting NAPTR records results list

The export function downloads all the information displayed in the results list.

To export, click **Export**, then follow the prompts for what to name the file and where to save it to.

You can view the saved file using a text processor.

### Printing flag results list

Click **Print** to print the results list.

Page setup and printer selection panels prompt for what and where to print.

## Overview

### Introduction

This chapter explains how to add new records to the ENUM database.

### In this chapter

---

This chapter contains the following topics.

New Flags.....	29
New Services.....	30
New Subscriber or Operator.....	30
New NAPTR Records.....	31

## New Flags

### How to add a new flag

Follow these steps to add a new flag record.

Step	Action
1	Ensure the current mode shown in the screen title is <b>Find Mode</b> . <b>Result:</b> The <b>New</b> button becomes available. <b>Tip:</b> Click <b>Return</b> until the screen title shows - Find mode.
2	Select the <b>Flags</b> tab.
3	Click <b>New</b> . <b>Results:</b> <ul style="list-style-type: none"><li>• The screen title changes to New mode.</li><li>• The allowed new mode buttons are active and disallowed buttons grayed out.</li><li>• The last Used Data section is grayed out.</li></ul>
4	Enter the flag name in the <b>Flag</b> field.
5	Enter the flag description in the <b>Description</b> field.
6	Click <b>Save</b> . <b>Result:</b> A saved confirmation message appears at the bottom of the screen.
7	Click one of the following: <ul style="list-style-type: none"><li>• <b>Return</b> - to return to the Find Mode</li><li>• <b>Clear</b> - to add another record</li></ul>

## New Services

### How to add a new service

Follow these steps to add a new service record.

Step	Action
1	<p>Ensure the current mode shown in the screen title is <b>Find Mode</b>.</p> <p><b>Result:</b> The <b>New</b> button becomes available.</p> <p><b>Tip:</b> Click <b>Return</b> until the screen title shows Find Mode.</p>
2	Select the <b>Service</b> tab.
3	<p>Click <b>New</b>.</p> <p><b>Results:</b></p> <ul style="list-style-type: none"> <li>• The screen title changes to New Mode.</li> <li>• The allowed new mode buttons are active and disallowed buttons grayed out.</li> <li>• The last Used Data section is grayed out.</li> </ul>
4	Enter the service name in the <b>Service</b> field.
5	Enter the service description in the <b>Description</b> field.
6	<p>Click <b>Save</b>.</p> <p><b>Result:</b> A saved confirmation message appears at the bottom of the screen.</p>
7	<p>Click one of the following:</p> <ul style="list-style-type: none"> <li>• <b>Return</b> - to return to the Find Mode</li> <li>• <b>Clear</b> - to add another record</li> </ul>

## New Subscriber or Operator

### How to add a new subscriber or operator

Follow these steps to add a new subscriber/operator record.


Step	Action
1	<p>Ensure the current mode shown in the screen title is <b>Find Mode</b>.</p> <p><b>Result:</b> The <b>New</b> button becomes available.</p> <p><b>Tip:</b> Click <b>Return</b> until the screen title shows - Find mode.</p>
2	Select <b>Subscriber/Operator</b> tab.
3	<p>Click <b>New</b>.</p> <p><b>Results:</b></p> <ul style="list-style-type: none"> <li>• The screen title changes to New mode.</li> <li>• The allowed new mode buttons are active and disallowed buttons grayed out.</li> <li>• The last Used Data section is grayed out.</li> </ul>
4	<p>To add:</p> <ul style="list-style-type: none"> <li>• <b>operator</b> record, tick the <b>Entry Type</b> check box.</li> <li>• <b>subscriber</b> record, clear the <b>Entry Type</b> check box</li> </ul>
5	Type the subscriber/operator name in the <b>Name</b> field.
6	Type the start of range number in the <b>Number Start</b> field.

Step	Action
7	Type the End of range number in the <b>Number End</b> field.
8	Click <b>Save</b> . <b>Result:</b> A saved confirmation message appears at the bottom of the screen.
9	Click one of the following: <ul style="list-style-type: none"> <li>• <b>Return</b> - to return to the Find Mode</li> <li>• <b>Clear</b> - to add another record</li> </ul>

## New NAPTR Records

### How to add a new NAPTR record

Follow these steps to add a new NAPTR record.

Step	Action
1	Ensure the current mode shown in the screen title is <b>Find Mode</b> . <b>Result:</b> The <b>New</b> button becomes available. <b>Tip:</b> Click <b>Return</b> until the screen title shows - Find mode.
2	Select the <b>NAPTR</b> tab.
3	Click <b>New</b> . <b>Results:</b> <ul style="list-style-type: none"> <li>• The screen title changes to New mode.</li> <li>• The allowed new mode buttons are active and disallowed buttons grayed out.</li> <li>• The last Used Data section is grayed out.</li> </ul>
4	Select a Subscriber/Operator, by clicking  next to the <b>Subscriber/Operator</b> field. <b>Result:</b> The Subscriber/Operator Search Dialog displays.

Step	Action
------	--------


**Subscriber/Operator Search Dialog**

Name  Find

Dialed Number

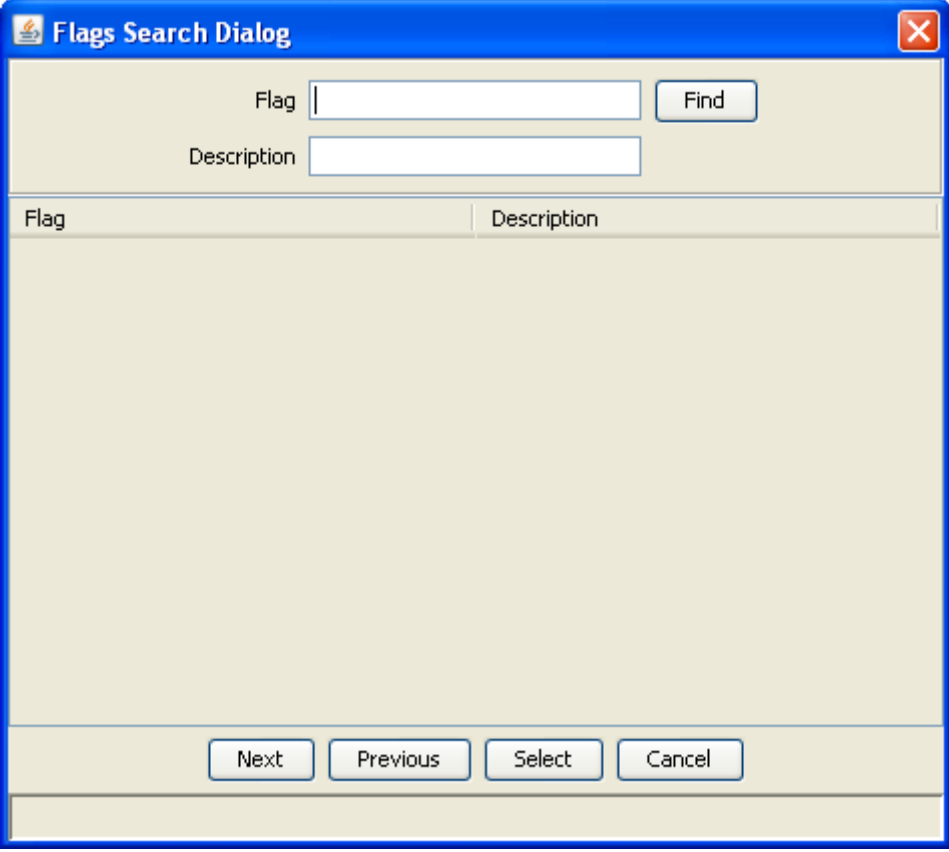
Entry_Type	Name	Num_Start	Num_End
------------	------	-----------	---------

Next Previous Select Cancel

- 5 Enter a **Name** or **Dialed Number** as required to reduce the number of database hits. Click **Find**.
- 6 Click on required record and click **Select**.  
**Result:** That subscriber/operator is added to the NAPTR record.
- 7 Enter a brief description of the record in the **Description** field.
- 8 Enter the NAPTR order in the Order field. This is the order in which records must be processed to ensure the correct ordering of rules. Low numbers are processed before high numbers.
- 9 Enter the NAPTR preference in the Preference field. This is the order in which NAPTR records with equal "order" values should be processed, low numbers being processed before high numbers.
- 10 Select a flag by clicking  next to the **Flag** field.  
**Result:** The Flags Search Dialog displays.

Step

Action



The image shows a 'Flags Search Dialog' window. It has a title bar with a close button. Inside, there are two input fields: 'Flag' and 'Description'. The 'Flag' field has a 'Find' button next to it. Below the input fields is a large empty area for search results. At the bottom, there are four buttons: 'Next', 'Previous', 'Select', and 'Cancel'.

11 Enter a **Flag** or **Description** as required to reduce the number of database hits.  
Click **Find**.

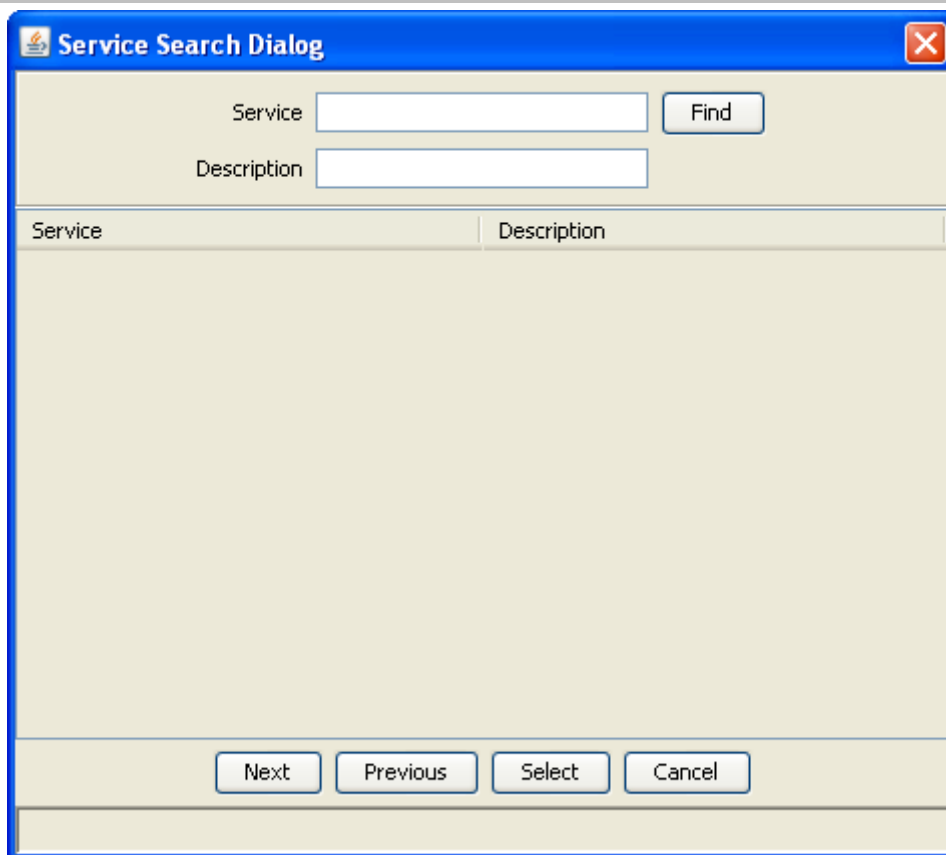
12 Click on required record and click **Select**.

**Result:** That flag is added to the NAPTR record.

13 Select a service by clicking  next to the **Service** field.

**Result:** The Service Search Dialog displays.

Step	Action
------	--------



The image shows a 'Service Search Dialog' window. It has a title bar with a close button (X). Inside, there are two input fields: 'Service' and 'Description'. To the right of the 'Service' field is a 'Find' button. Below the input fields is a table with two columns: 'Service' and 'Description'. The table is currently empty. At the bottom of the dialog, there are four buttons: 'Next', 'Previous', 'Select', and 'Cancel'.

- 14 Enter a **Service** or **Description** as required to reduce the number of database hits.  
Click **Find**.
- 15 Click on required record and click **Select**.  
**Result:** That service is added to the NAPTR record.
- 16 Enter one of the following:
  - The NAPTR regular expression in the Regular Expression field. This is a string containing a substitution expression that is applied to the original string held by the client in order to construct the next domain name to lookup
  - The NAPTR replacement in the Replacement field. This is the next NAME to query for NAPTR, SRV, or address records depending on the value of the flags field.
- 17 Click **Save**.  
**Result:** A saved confirmation message appears at the bottom of the screen.
- 18 Click one of the following:
  - **Return** - to return to the Find Mode
  - **Clear** - to add another record



# Update Mode

## Overview

### Introduction

This chapter explains how to update ENUM records.

### In this chapter

---

This chapter contains the following topics.

Update Flags .....	35
Update Services .....	36
Update Subscriber or Operator .....	36
Update NAPTR Records .....	37

## Update Flags

### How to change or delete a flag

Follow these steps to amend or delete a flag record.

Step	Action
1	List the flag records. See <i>Find Flags</i> (on page 13).
2	Click on the record to amend.
3	Click <b>Select</b> . <b>Result:</b> The record detail is displayed in Update mode.
4	To delete the record, click <b>Delete</b> . <b>Result:</b> The Confirm Delete Record appears. Click one of the following: <ul style="list-style-type: none"> <li>• <b>Yes</b> to delete the record</li> <li>• <b>No</b> to keep the record.</li> </ul>
5	Change fields as required.
6	Click <b>Save</b> . <b>Result:</b> A saved confirmation message appears at the bottom of the screen.
7	If required, click <b>Check Consistency</b> to check that the currently selected record matches those held upon any replication targets.

## Update Services

### How to change or delete a service

Follow these steps to amend or delete a Service record.

Step	Action
1	List the service records. See <i>Find Services</i> (on page 14).
2	Click on the record to amend.
3	Click <b>Select</b> . <b>Result:</b> The record detail is displayed in Update mode.
4	To delete the record, click <b>Delete</b> . <b>Result:</b> The Confirm Delete Record appears. Click one of the following: <ul style="list-style-type: none"> <li>• <b>Yes</b> to delete the record</li> <li>• <b>No</b> to keep the record</li> </ul>
5	Change fields as required.
6	Click <b>Save</b> . <b>Result:</b> A saved confirmation message appears at the bottom of the screen.
7	If required, click <b>Check Consistency</b> to check that the currently selected record matches those held upon any replication targets.

## Update Subscriber or Operator

### How to change or delete a subscriber or operator

Follow these steps to amend or delete a Subscriber or Operator record.

Step	Action
1	List the Subscriber or Operator records. See <i>Find Subscriber or Operator</i> (on page 16).
2	Click on the record to amend.
3	Click <b>Select</b> . <b>Result:</b> The record detail is displayed in Update mode.
4	To delete the record, click <b>Delete</b> . <b>Result:</b> The Confirm Delete Record appears. Click one of the following: <ul style="list-style-type: none"> <li>• <b>Yes</b> to delete the record</li> <li>• <b>No</b> to keep the record</li> </ul>
5	Change fields as required.
6	Click <b>Save</b> . <b>Result:</b> A saved confirmation message appears at the bottom of the screen.
7	If required, click <b>Check Consistency</b> to check that the currently selected record matches those held upon any replication targets.

## Update NAPTR Records

### How to change or delete NAPTR records

Follow these steps to amend or delete a NAPTR record.

Step	Action
1	List the NAPTR records. See <i>Find NAPTR Records</i> (on page 17).
2	Click on the record to amend.
3	Click <b>Select</b> . <b>Result:</b> The record detail is displayed in Update mode.
4	To delete the record, click <b>Delete</b> . <b>Result:</b> The Confirm Delete Record appears. Click one of the following: <ul style="list-style-type: none"><li>• <b>Yes</b> to delete the record</li><li>• <b>No</b> to keep the record.</li></ul>
5	Change fields as required.
6	Click <b>Save</b> . <b>Result:</b> A saved confirmation message appears at the bottom of the screen.
7	If required, click <b>Check Consistency</b> to check that the currently selected record matches those held upon any replication targets.



# Configuration

## Overview

### Introduction

This chapter explains how to configure the Oracle Communications Convergent Charging Controller application.

### In this chapter

---

This chapter contains the following topics.

Configuration Overview .....	39
eserv.config Configuration.....	39
ENUM.conf Configuration.....	41

## Configuration Overview

### Introduction

The Oracle Communications Convergent Charging Controller ENUM Control Agent is configured in both the **eserv.config** and **ENUM.conf** files.

## eserv.config Configuration

### Introduction

The **eserv.config** file is a shared configuration file, from which many Oracle Communications Convergent Charging Controller applications read their configuration. Each Convergent Charging Controller machine (SMS, SLC, and VWS) has its own version of this configuration file, containing configuration relevant to that machine. The **eserv.config** file contains different sections; each application reads the sections of the file that contains data relevant to it.

The **eserv.config** file is located in the `/IN/service_packages/` directory.

The **eserv.config** file format uses hierarchical groupings, and most applications make use of this to divide the options into logical groupings.

### Example eserv.config detail

This configuration is used by the ENUM macro nodes.

The code shows an example of a part of an **eserv.config** file **ENUM** section structure:

```
ENUM = {
    interfaceHandles = [ "enumIF" ]

    maxQueueLength = 500
}
```

## Parameters

Listed below are the parameters in the ENUM section of `eserv.config` file:

### `interfaceHandles`

<b>Syntax:</b>	<code>interfaceHandles = ["handles"]</code>
<b>Description:</b>	A list of the interface handle names that can be used by the ENUMCallOut feature node.
<b>Type:</b>	Array of strings
<b>Optionality:</b>	Mandatory
<b>Allowed:</b>	Any valid handler name
<b>Default:</b>	None
<b>Notes:</b>	Multiple instances are comma separated [ "eIF", "eIF2", "eIF3" ]
<b>Example:</b>	<code>interfaceHandles = [ "enca" ]</code>

### `maxQueueLength`

<b>Syntax:</b>	<code>maxQueueLength = value</code>
<b>Description:</b>	The maximum number of queued ENUM requests allowed
<b>Type:</b>	Integer
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	0 (no maximum queue length)
<b>Notes:</b>	Used to load-balance between ENCA instances
<b>Example:</b>	<code>maxQueueLength = 500</code>

## Configuration File Format

To organize the configuration data within the **eserv.config** file, some sections are nested within other sections. Configuration details are opened and closed using either `{ }` or `[ ]`.

- Groups of parameters are enclosed with curly brackets – `{ }`
- An array of parameters is enclosed in square brackets – `[ ]`
- Comments are prefaced with a `#` at the beginning of the line

To list things within a group or an array, elements must be separated by at least one comma or at least one line break. Any of the following formats can be used, as in this example:

```
{ name="route6", id = 3, prefixes = [ "00000148", "0000473" ] }
{ name="route7", id = 4, prefixes = [ "000001049" ] }
```

or

```
{ name="route6"
  id = 3
  prefixes = [
    "00000148"
    "0000473"
  ]
}
{ name="route7"
  id = 4
  prefixes = [
    "000001049"
  ]
}
```

or

```
{ name="route6"
  id = 3
  prefixes = [ "00000148", "0000473" ]
}
{ name="route7", id = 4
  prefixes = [ "000001049" ]
}
```

## eserv.config Files Delivered

Most applications come with an example **eserv.config** configuration in a file called **eserv.config.example** in the root of the application directory, for example, `/IN/service_packages/eserv.config.example`.

## Editing the File

Open the configuration file on your system using a standard text editor. Do not use text editors, such as Microsoft Word, that attach control characters. These can be, for example, Microsoft DOS or Windows line termination characters (for example, ^M), which are not visible to the user, at the end of each row. This causes file errors when the application tries to read the configuration file.

Always keep a backup of your file before making any changes to it. This ensures you have a working copy to which you can return.

## Loading eserv.config Changes

If you change the configuration file, you must restart the appropriate parts of the service to enable the new options to take effect.

# ENUM.conf Configuration

## Introduction

The following configuration **ENUM.conf** parameters are used by the ENUM Control Agent.

## Example ENUM.conf detail

The code shows an example of the **ENUM.conf** file.

```
enca = {
  enumDns = {
    listeningSockets = [
      {
        address = "IP ADDRESS"
        port = PORTNUM
        protocol = "udp"/"tcp"/"tcp+udp"
      },
      {...}
    ]
    allowedClients = [
      "IP ADDRESS 1",
      "IP ADDRESS N"
    ]
    maxTotalQueries = 0
    triggerRules = [
      {
        info = "e164.arpa"
        numDigitsRem = 9
      }
    ]
  }
}
```

```

        source = "IP ADDRESS"
        trigger = 0
        noa = 4
        dataType = "URI"/"NAPTR"
        dataProfileTag = 0
    },
    {...}
]
idpFQDNProfileTag = 0
idpAUSProfileTag = 0
serviceTimeout = 20
uriNaptrRules = [
    {
        searchURI = "SEARCH STR"
        replaceNAPTR = "NAPTR STR"
        replaceTag = "<INPUT>"
    },
    {
        searchURI = "mailto:"
        replaceNAPTR = "NAPTR 10 100 \"u\" \"E2U+msg\" \"!^.*$!<INPUT>!\" ."
    },
    {...}
]
defUriNaptrRule = {
    replaceNAPTR = "NAPTR 10 100 \"u\" \"E2U+example\" \"!^.*$!<INPUT>!\" ."
    replaceTag = "<INPUT>"
}
noaDomainNameRules = [
    {
        noa = 0
        domain = "DOMAIN"
    },
    {
        noa = 4
        domain = "example.arpa"
    },
    {...}
]
defNoADomain = "e164.arpa"
dnsTTL = 0
}
enumCallOut = {
    maxTotalQueries = 0
    queryWarnSuppress = 1
    timeout = 20
    maxRetries = 2
    servers = [
        {
            address = "IP ADDRESS"
            port = PORTNUM
            protocol = "udp"/"tcp"/"tcp+udp"
        },
        {...}
    ]
}
}

```

## Example triggerRules

The code shows an example of how the `triggerRules` parameter array may be configured.

```

triggerRules = [
    {
        info="e164.arpa"
    }
]

```



```

        numDigsRem=9
        source="192.1.10.103"
        trigger=111
        noa=4
        dataType="URI",
        dataProfileTag=210001
    },
    {
        info="e164.arpa"
        numDigsRem=9
        source="192.1.10.104"
        trigger=112
        noa=4
        dataType="URI"
        dataProfileTag=210001
    },
    {
        info="e164.arpa"
        numDigsRem=9
        trigger=113
        noa=4
        dataType="URI"
        dataProfileTag=210001
    },
    {
        info="4.4.e164.arpa"
        numDigsRem=12
        trigger=114
        noa=4
        dataType="NAPTR"
        dataProfileTag=210001
    }
    {
        info="0.0.9.9.8.2.3.7.4.1.4.4.e164"
        numDigsRem=9
        trigger=114
        noa=4
        dataType="DYNAMIC"
        dataProfileTag=210001
    }
}
]

```

### Example numDigitsRem

The `numDigitsRem` part of the `triggerRules` allows an input string to be converted into a valid e.164 number.

For example, the input was:

0.0.9.9.8.2.3.7.4.1.4.4.e164.arpa

The matching `triggerRule` was:

```
{ info=".4.4.e164.arpa", numDigsRem=10, trigger= ... }
```

This parameter would indicate 10 trailing characters removed, leaving:

0.0.9.9.8.2.3.7.4.1.4.4

### enumDns parameters

Listed below are the Domain Name System (DNS) parameters in the **ENUM.conf** file, `enumDns` subsection:

### listeningSockets

<b>Syntax:</b>	<code>listeningSockets = [{socket1},{...}]</code>
<b>Description:</b>	A list of socket descriptors
<b>Type:</b>	Array
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	Empty (no sockets)
<b>Notes:</b>	
<b>Example:</b>	<pre>listeningSockets = [     {         address =         port =         protocol =     },     {...} ]</pre>

### address

<b>Syntax:</b>	<code>address = &lt;"IP_Address"&gt;</code>
<b>Description:</b>	Interface IP address for this socket
<b>Type:</b>	String
<b>Optionality:</b>	Mandatory
<b>Allowed:</b>	
<b>Default:</b>	None
<b>Notes:</b>	
<b>Example:</b>	

### port

<b>Syntax:</b>	<code>port = Port_Number</code>
<b>Description:</b>	Interface port number for this socket
<b>Type:</b>	Integer
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	53
<b>Notes:</b>	
<b>Example:</b>	<code>port = 99</code>

### protocol

<b>Syntax:</b>	<code>protocol = "protocol"</code>
<b>Description:</b>	Interface protocol for this socket
<b>Type:</b>	String
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	<ul style="list-style-type: none"> <li>• udp</li> <li>• tcp</li> </ul>
<b>Default:</b>	tcp+udp
<b>Notes:</b>	To include both protocols, separate each with a plus (+) sign
<b>Example:</b>	<code>protocol = "tcp+udp"</code>

`allowedClients`

<b>Syntax:</b>	<code>allowedClients = ["IP_Adress1", "..."]</code>
<b>Description:</b>	A comma separated list of acceptable client IP addresses
<b>Type:</b>	Array of string
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	Empty (no clients allowed)
<b>Notes:</b>	When present, must be a fully qualified IP address
<b>Example:</b>	

`maxTotalQueries`

<b>Syntax:</b>	<code>maxTotalQueries = value</code>
<b>Description:</b>	The overall maximum number of concurrent DNS queries
<b>Type:</b>	Integer
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	0 (no limit)
<b>Notes:</b>	
<b>Example:</b>	<code>maxTotalQueries = 600</code>

`triggerRules`

<b>Syntax:</b>	<code>triggerRules = [{rule1},{...}]</code>
<b>Description:</b>	An unlimited list of trigger rules
<b>Type:</b>	Array
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	Empty (no services configured)
<b>Notes:</b>	
<b>Example:</b>	See <i>Example triggerRules</i> (on page 42)

`info`

<b>Syntax:</b>	<code>info = "value"</code>
<b>Description:</b>	Comparison string, to be matched to the end of the input FQDN.
<b>Type:</b>	String
<b>Optionality:</b>	Mandatory
<b>Allowed:</b>	
<b>Default:</b>	None
<b>Notes:</b>	May be blank
<b>Example:</b>	<code>info = "e164.arpa"</code>

`numDigitsRem`

<b>Syntax:</b>	<code>numDigitsRem = value</code>
<b>Description:</b>	Number of digits to remove from end of the input FQDN when this rule matches
<b>Type:</b>	Integer

<b>Optionality:</b>	Mandatory
<b>Allowed:</b>	
<b>Default:</b>	None
<b>Notes:</b>	This parameter is necessary to distinguish between what is and what is not part of the e.164 number, as the trailing domain can contain any valid domain-name characters, including numbers (for example ".9.nonsense.11.net")
<b>Example:</b>	<code>numDigitsRem = 9</code>

### source

<b>Syntax:</b>	<code>source = "IP_Address"</code>
<b>Description:</b>	An IP address to be matched against the client IP address in the <code>allowedClients</code> list.
<b>Type:</b>	String
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	Blank (any client)
<b>Notes:</b>	
<b>Example:</b>	<code>source = "1.2.3.4"</code>

### trigger

<b>Syntax:</b>	<code>trigger = value</code>
<b>Description:</b>	Servicekey to be triggered on a successful match
<b>Type:</b>	Integer
<b>Optionality:</b>	Mandatory
<b>Allowed:</b>	
<b>Default:</b>	None
<b>Notes:</b>	
<b>Example:</b>	<code>trigger = 0</code>

### noa

<b>Syntax:</b>	<code>noa = value</code>
<b>Description:</b>	The NoA (Nature of Address) value to be placed in the IDP on a successful match
<b>Type:</b>	Integer
<b>Optionality:</b>	Mandatory
<b>Allowed:</b>	<ul style="list-style-type: none"> <li>• 1 - Subscriber</li> <li>• 2 - UNKNOWN</li> <li>• 3 - National</li> <li>• 4 - International</li> </ul>
<b>Default:</b>	None
<b>Notes:</b>	
<b>Example:</b>	<code>noa = 4</code>

### dataType

<b>Syntax:</b>	<code>dataType = "type"</code>
<b>Description:</b>	Type of data this service will return
<b>Type:</b>	String

<b>Optionality:</b>	Mandatory
<b>Allowed:</b>	<ul style="list-style-type: none"> <li>• URI</li> <li>• NAPTR</li> <li>• DYNAMIC</li> </ul>
<b>Default:</b>	None
<b>Notes:</b>	When type is DYNAMIC, the type of data (URI/NAPTR) is expected to be part of the response
<b>Example:</b>	<code>dataType = "URI"</code>

#### `dataProfileTag`

<b>Syntax:</b>	<code>dataProfileTag = value</code>
<b>Description:</b>	Profile tag where the data will be returned. This is a Profile Tag's ID value, and is expected to be found in the <b>Outgoing Extensions</b> profile block.
<b>Type:</b>	Integer
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	210001 (Enum NAPTR Temporary Store)
<b>Notes:</b>	
<b>Example:</b>	<code>dataProfileTag = 0</code>

#### `idpFQDNProfileTag`

<b>Syntax:</b>	<code>idpFQDNProfileTag = value</code>
<b>Description:</b>	Location where the DNS query FQDN will be placed
<b>Type:</b>	Integer
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	210002
<b>Notes:</b>	FQDN is from input query
<b>Example:</b>	<code>idpFQDNProfileTag = 5000</code>

#### `idpAUSProfileTag`

<b>Syntax:</b>	<code>idpAUSProfileTag = value</code>
<b>Description:</b>	Location where the AUS will be placed
<b>Type:</b>	Integer
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	210003
<b>Notes:</b>	AUS is derived from FQDN
<b>Example:</b>	<code>idpAUSProfileTag = 50000</code>

#### `serviceTimeout`

<b>Syntax:</b>	<code>serviceTimeout = value</code>
<b>Description:</b>	The maximum number of seconds to wait for a triggered service to respond
<b>Type:</b>	Integer
<b>Optionality:</b>	Optional (default used if not set)

**Allowed:**  
**Default:** 2  
**Notes:**  
**Example:** `serviceTimeout = 4`

### uriNaptrRules

**Syntax:** `uriNaptrRules = [{rule1},{...}]`  
**Description:** A list of URI to NAPTR record templates.  
**Type:** Array  
**Optionality:** Optional (default used if not set)  
**Allowed:**  
**Default:** Empty (always use defUriNaptrRule values)  
**Notes:** Rules must be listed in descending order of preference  
**Example:** Example rule, for "mailto:" URIs using default replaceTag value  

```
uriNaptrRules = [
    {
        searchURI = "mailto:"
        replaceNAPTR = "NAPTR 10 100 \"u\" \"E2U+msg\"
        \"!^.*$!<INPUT>!\" ."
    },
    {...}
]
```

### searchURI

**Syntax:** `searchURI = "value"`  
**Description:** String to search for in the URI  
**Type:** String  
**Optionality:** Mandatory  
**Allowed:**  
**Default:** None  
**Notes:**  
**Example:** `searchURI = "SEARCH STR"`

### replaceNAPTR

**Syntax:** `replaceNAPTR = "value"`  
**Description:** The Output template  
**Type:** String  
**Optionality:** Mandatory  
**Allowed:**  
**Default:** None  
**Notes:**  
**Example:** `replaceNAPTR = "NAPTR STR"`

### replaceTag

**Syntax:** `replaceTag = "value"`  
**Description:** The tag in replaceNAPTR to be replaced by the input URI  
**Type:** String

**Optionality:** Optional (default used if not set)  
**Allowed:**  
**Default:** <INPUT>  
**Notes:**  
**Example:** `replaceTag = "<INPUT>"`

#### defUriNaptrRule

**Syntax:** `defUriNaptrRule = {default_rule}`  
**Description:** The default URI to NAPTR rule template  
**Type:** Parameter group  
**Optionality:** Mandatory  
**Allowed:** See example  
**Default:** None  
**Notes:** This is a standard uriNaptrRule, less its searchURI string because it is inapplicable  
**Example:**

```
defUriNaptrRule = {
    replaceNAPTR = "NAPTR 10 100 \"u\" \"E2U+example\"
    \"!^.*$!<INPUT>!\" ."
    replaceTag = "<INPUT>"
}
```

#### noaDomainNameRules

**Syntax:** `noaDomainNameRules = {rule1},{...}`  
**Description:** A list of NoA to Domain Name rules  
**Type:** Array  
**Optionality:** Optional (default used if not set)  
**Allowed:**  
**Default:** Empty (always use defNoADomain rule)  
**Notes:** Used for manual DRA to FQDN conversion  
**Example:**

```
noaDomainNameRules = [
    {
        noa = 3
        domain = ".4.4.e164.arpa"
    },
    {
        noa = 4
        domain = ".e164.arpa"
    }
]
```

#### noa

**Syntax:** `noa = value`  
**Description:** The NoA value.  
**Type:** Integer  
**Optionality:** Mandatory  
**Allowed:**  
**Default:** None  
**Notes:**  
**Example:** `noa = 0`

### domain

<b>Syntax:</b>	<code>domain = "name"</code>
<b>Description:</b>	The output domain
<b>Type:</b>	String
<b>Optionality:</b>	Mandatory
<b>Allowed:</b>	
<b>Default:</b>	None
<b>Notes:</b>	
<b>Example:</b>	<code>domain = "example.arpa"</code>

### defNoADomain

<b>Syntax:</b>	<code>defNoADomain = "domain"</code>
<b>Description:</b>	The default NoA to Domain value where the NoA is unknown
<b>Type:</b>	String
<b>Optionality:</b>	Mandatory
<b>Allowed:</b>	See example
<b>Default:</b>	None
<b>Notes:</b>	Used for manual DRA to FQDN conversion
<b>Example:</b>	<code>defNoADomain = "e164.arpa"</code>

### dnsTTL

<b>Syntax:</b>	<code>dnsTTL = value</code>
<b>Description:</b>	The Time To Live (TTL) value, in seconds, to be used in all outgoing DNS responses
<b>Type:</b>	Integer
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	0 (use result once)
<b>Notes:</b>	
<b>Example:</b>	<code>dnsTTL = 2</code>

## enumCallOut parameters

Listed below are the CallOut parameters in the **ENUM.conf** file, `enumCallOut` sub-section:

### maxTotalQueries

<b>Syntax:</b>	<code>maxTotalQueries = value</code>
<b>Description:</b>	The maximum number of concurrent call-out requests
<b>Type:</b>	Integer
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	0 (no limit)
<b>Notes:</b>	
<b>Example:</b>	<code>maxTotalQueries = 30</code>



`queryWarnSuppress`

<b>Syntax:</b>	<code>queryWarnSuppress = value</code>
<b>Description:</b>	Suppresses the call out query alarm when a queried number or domain is not found. Instead, the warning is logged to a debug file.
<b>Type:</b>	Integer
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	<ul style="list-style-type: none"> <li>• 0 - A call out alarm is generated.</li> <li>• 1 - A warning is logged to a debug file.</li> </ul>
<b>Default:</b>	0 (the call out alarm is generated)
<b>Notes:</b>	
<b>Example:</b>	<code>queryWarnSuppress = 1</code>

`timeout`

<b>Syntax:</b>	<code>timeout = value</code>
<b>Description:</b>	The maximum time for a DNS server to respond, in seconds
<b>Type:</b>	Integer
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	2
<b>Notes:</b>	This and the <code>maxRetries</code> parameter are used to determine when an alarm is raised, causing the CallOut macro node to branch on the DNS Timeout exit
<b>Example:</b>	<code>timeout = 4</code>

`maxRetries`

<b>Syntax:</b>	<code>maxRetries = value</code>
<b>Description:</b>	The maximum number of DNS retries
<b>Type:</b>	Integer
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	2
<b>Notes:</b>	This and the <code>timeout</code> parameter are used to determine when an alarm is raised, causing the CallOut macro node to branch on the DNS Timeout exit
<b>Example:</b>	<code>maxRetries = 4</code>

`servers`

<b>Syntax:</b>	<code>servers = [{server1},{...}]</code>
<b>Description:</b>	A list of external DNS servers
<b>Type:</b>	Array
<b>Optionality:</b>	Optional (default used if not set)
<b>Allowed:</b>	
<b>Default:</b>	blank (no servers)
<b>Notes:</b>	
<b>Example:</b>	<pre>servers = [   {     address = "IP ADDRESS"     port = PORTNUM   } ]</pre>

```

        protocol = "udp"/"tcp"/"tcp+udp"
    },
    {...}
]

```

### address

**Syntax:** `address = "address"`

**Description:** IP address or host name for this server

**Type:** String

**Optionality:** Mandatory

**Allowed:**

- IP\_Address
- Host

**Default:** None

**Notes:**

**Example:**

### port

**Syntax:** `port = Port_Number`

**Description:** Port number for this server

**Type:** Integer

**Optionality:** Optional (default used if not set)

**Allowed:**

**Default:** 53

**Notes:**

**Example:** `port = 99`

### protocol

**Syntax:** `protocol = "protocol"`

**Description:** Protocol for this server

**Type:** String

**Optionality:** Optional (default used if not set)

**Allowed:**

- udp
- tcp

**Default:** tcp+udp

**Notes:** To include both protocols, separate each with a plus (+) sign

**Example:** `protocol = "tcp+udp"`

# Feature Nodes

## Overview

### Introduction

This chapter lists all the available Oracle Communications Convergent Charging Controller ENUM Control Agent feature nodes.

### In this chapter

This chapter contains the following topics.

Available Feature Nodes .....	53
ENUM Call Out .....	54
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## Available Feature Nodes

### Introduction

This topic lists all the Feature Nodes that may be available for ENUM control plan category. The actual nodes available are dependent on the application in which the Control Plan Editor is operating. In some cases, additional nodes may have been created and installed to fit a specific customer need. These custom nodes do not appear in this list.

### ENUM nodes

Here is an example feature palette for the ENUM nodes.



### ENUM Node descriptions

Here are the nodes in this category.

Node name	Node icon	Node description
<b>ENUM Call Out</b> (on page 54)		The ENUM Call Out node performs an ENUM lookup using the ENCA interface.
<b>ENUM Naptr response</b> (on page 56)		The ENUM NAPTR Response node processes a previously retrieved NAPTR response to extract specific records.
<b>ENUM Query</b> (on page 58)		The ENUM Query node is used to query the ENUM database.

## ENUM Call Out

### Node description

The ENUM Call Out node performs an ENUM lookup using the ENCA interface.

### Node icon



### Restrictions

A control plan may contain as many ENUM Call Out nodes as required.

### Node exits

This node has one entry and ten exits. The number of exits cannot be changed.

Exit	Cause	Description
1	Success	ENCA return code = 0
2	Too Few Parameters	No number was given in the call-out ENCA request (number is blank).
3	Failed Translation	ENCA DNS response translation failed.
4	DNS Timeout	DNS server(s) failed to respond within the configured time-limit.
5	DNS Format Error	DNS served responded with message: "Format Error".
6	DNS Server Failure	DNS served responded with message: "Server Failure".
7	DNS Name Error	DNS served responded with message: "Name Error".
8	DNS Not Implemented	DNS served responded with message: "Not Implemented".
9	DNS Refused	DNS served responded with message: "Refused".
10	ENCA Fail	ENCA failure (out of resources / bad domain name / any other error).

Configuration screen

Here is an example Configure ENUM Call Out screen.

Configure ENUM Call Out

Node nameENUM CallOutHelp

Number Source

☒ Profile ☐ Freeform

Number Location

Number LocationCLI Subscriber Profile

Number FieldAccount Code Policy

Number

Convert to FQDN

Convert to FQDN☒

Domain Name Source

☒ Profile ☐ Freeform

Domain Name

Domain Name LocationCall Context

Domain Name FieldCC Called Imsi

Domain Namee164.arpa

Exit Branches

1	Success	2	Too Few Parameters
3	Failed Translation	4	DNS Timeout
5	DNS Format Error	6	DNS Server Failure
7	DNS Name Error	8	DNS Not Implemented
9	DNS Refused	10	ENCA Fail

CommentsSaveCancel

Configuring the node

Follow these steps to configure the node.

Step	Action
1	Select where the number to convert will be sourced from, one of: <ul style="list-style-type: none"><li>Profile (from a profile block and tag)</li></ul>

Step	Action
	<ul style="list-style-type: none"> <li>• <b>Freeform</b> (from this configuration screen)</li> </ul> <p><b>Result:</b> The relevant Number Location fields are made available.</p>
2	<p>Depending on what was selected at step 1, one of:</p> <ul style="list-style-type: none"> <li>• Select the Number Location from the <b>Number Location</b> and <b>Number Field</b> drop down lists</li> <li>• Enter the number in the <b>Number</b> field</li> </ul>
3	If the number is to be converted to FQDN format, select the <b>Convert to FQDN</b> check box.
4	<p>Select where the domain name will be sourced from, one of:</p> <ul style="list-style-type: none"> <li>• <b>Profile</b> (from a profile block and tag)</li> <li>• <b>Freeform</b> (from this configuration screen)</li> </ul> <p><b>Result:</b> The relevant Domain Name fields are made available.</p>
5	<p>Depending on what was selected at step 4, one of:</p> <ul style="list-style-type: none"> <li>• Select the Domain Name from the <b>Domain Name Location</b> and <b>Domain Name Field</b> drop down lists, or</li> <li>• Enter the domain name in the <b>Domain Name</b> field.</li> </ul>
6	Click <b>Save</b> .

## ENUM Naptr Response

### Node description

The ENUM NAPTR Response node processes a previously retrieved NAPTR response to extract specific records.

When extracting AUS (Application Unique String) type, the presence of the AUS is detected by a '+' character found, followed by one or more numerical characters terminated with '@' (for example "!\^.\*\$!+441473289900@oracle.com!")

### Node icon



### Restrictions

A control plan may contain as many ENUM NAPTR Response nodes as required.

### Node exits

This node has one entry and four exits. The number of exits cannot be changed.

Exit	Cause	Description
1	Success	The record was extracted and saved.
2	No Match NAPTR	The required record could not be found.
3	No Match AUS	An AUS format number could not be found.
4	Error	Any other error situation.

## Configuration screen

Here is an example Configure ENUM NAPTR Response screen.

**Configure ENUM NAPTR Response**

Node name:

**Search String**

Search String:   
Index:

**Active Record Save Location**

Profile Location:    
Profile Field:    
Overwrite NAPTR: ☐

**Regular Expression Substitution**

Perform Substitution: ☒  
Incoming Profile Location:    
Incoming Profile Field:    
Use default profile: ☒  
Outgoing Profile Location:    
Outgoing Profile Field:

**AUS Processing**

Extract AUS: ☒  
Remove +: ☒  
Remove -: ☐

**AUS Save Location**

Profile Location:    
Profile Field:

**Exit Branches**

1	Success	2	No Match NAPTR
3	No Match AUS	4	No Match Regex
5	Error		

## Configuring the node

Follow these steps to configure the node.

Step	Action
1	In the <b>Search String</b> section, set the search criteria to match records against. <ul style="list-style-type: none"> <li>• Enter the record type to extract in the <b>Search String</b> field</li> <li>• Enter the record number to extract in the <b>Index</b> field</li> </ul>
2	In the <b>Active Record Save Location</b> , identify where the found record is to be saved, one of: <ul style="list-style-type: none"> <li>• A new location, select from the <b>Profile Location</b> and <b>Profile Field</b> drop down lists</li> <li>• Same location, select the <b>Overwrite NAPTR</b> check box</li> </ul> <p><b>Note:</b> selecting this check box over-rides any profile selection.</p>
3	In the <b>Regular Expression Substitution</b> section, to invoke the regular expression substitution, check the <b>Perform Substitution</b> check box, then: <ul style="list-style-type: none"> <li>• Identify incoming profile location, one of: Select an incoming AUS value from the <b>Incoming Profile Location</b> and <b>Incoming Profile Field</b> drop down lists Select the <b>Use Default Profile</b> check box</li> <li>• Select a save location from the <b>Outgoing Profile Location</b> and <b>Outgoing Profile Field</b> drop down lists</li> </ul>
4	In the <b>AUS Processing</b> section, for AUS format numbers extracted: <ul style="list-style-type: none"> <li>• Select the <b>Extract AUS</b> check box</li> <li>• If required, select the <b>Remove +</b> check box to remove the preceding +</li> <li>• If required, select the <b>Remove -</b> check box to remove the preceding -</li> </ul>
5	In the <b>AUS Save Location</b> section, for AUS format numbers, select the save location from the <b>Profile Location</b> and <b>Profile Field</b> drop down lists.
6	Click <b>Save</b> .

## ENUM Query

### Node description

The ENUM Query node is used to query the ENUM database.

### Node icon



### Restrictions

A control plan may contain as many ENUM Query nodes as required.



## Node exits

This node has one entry and five exits. The number of exits cannot be changed.

Exit	Cause	Description
1	Subscriber records	Search key found subscriber records that matched the search key (dialed number within a record number range) and may have matched the optional <b>Service</b> criteria.  <b>Note:</b> The search key is used to find subscribers/operators. This is a dialed number (for example, 1234567) that is searched for between a range of numbers.
2	Operator records	Search key did not find any subscriber records, but did find operator records that matched the search key (dialed number within a record number range) and may have matched the optional <b>Service</b> criteria.
3	No NAPTR Records	Search key did find subscriber or operator records that matched the search key but did not find any NAPTR records.
4	No SUB/OP info	Search key did not find any subscriber or operator records that matched the search key.
5	Error	Database or I/O error.

**Note:** The **Service** criteria is an optional delimiter for the NAPTR record returned. By specifying the service you can delimit on the service of a NATPR records (that is, only return records of E2U+sip type). The search key is still the primary search criteria.

## Configuration screen

Here is an example Configure ENUM Query screen.

**Configure ENUM Query**

Node name:

**Search Key Location**

Search Key Location:    
 Search Key Field:    
 Use Default Profile: ☐

**Service**

Service Type:    
 Specify Type: ☐

**Outgoing Destination**

Outgoing Profile Location:    
 Outgoing Profile Field:

**Exit Branches**

1	Subscriber records	2	Operator records
3	No NAPTR Records	4	No SUB/OP info
5	Error		

## Configuring the node

Follow these steps to configure the node.

Step	Action
1	Select the <b>Search Key Location</b> , one of: <ul style="list-style-type: none"> <li>• Select from the <b>drop down lists</b></li> <li>• Select the <b>Use Default Profile</b> check box</li> </ul>
2	To optionally specify a <b>Service Type</b> : <ul style="list-style-type: none"> <li>• Select the <b>Specify Type</b> check box</li> <li>• Select the <b>Service Type</b> from the drop down list</li> </ul> <p><b>Note:</b> The Service Type list is configured in <b>SMS &gt; Services &gt; ENUM service &gt; NAPTR Record Management &gt; Service</b> tab/screens.</p>
3	Select the <b>Outgoing Destination</b> location using the drop down lists.
4	Click <b>Save</b> .





# About Installation and Removal

## Overview

### Introduction

This chapter provides information about the installed components for the Oracle Communications Convergent Charging Controller application described in this guide. It also lists the files installed by the application that you can check for, to ensure that the application installed successfully.

### In this Chapter

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This chapter contains the following topics.

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## Installation and Removal Overview

### Introduction

For information about the following requirements and tasks, see *Installation Guide*:

- Convergent Charging Controller system requirements
- Pre-installation tasks
- Installing and removing Convergent Charging Controller packages

### DCA packages

An installation of Oracle Communications Convergent Charging Controller ENUM Control Agent includes the following packages, on the:

- SMS:
  - enumSms
- SLC:
  - enumScp

## Post-installation Configuration

### Overview

Before Oracle Communications Convergent Charging Controller ENUM Control Agent can be started, several configuration tasks are required.

### Default and `eserv.config` configuration

After installing the packages, both the default configuration file for the ENCA component and the main `eserv.config` will need to be edited after installation.

## Multiple interfaces

The ENCA can be configured as multiple interfaces in the **SLEE.cfg**.

## Configuration file location

The ENCA on startup will, by default, attempt to read a configuration file at:

**/IN/service\_packages/ENUM/etc/enum.conf**

This can be overridden by setting the environment variable **ENUM\_CONFIG\_FILE** to refer to another filename. Where multiple concurrent ENCA interfaces are needed, setting this variable for each instance is essential, and should preferably be done in enca startup shell scripts.