

ENUM Enhancement per Kaplan Draft RFC

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Overview

The Cisco Unified Border Element (CUBE) facilitates the mapping of E.164 called numbers to Session Initiation Protocol (SIP) Uniform Resource Identifiers (URIs). The SIP ENUM technology allows the traditional telephony part of the network (using E.164 numbering to address destinations) to interwork with the SIP telephony part of the network, generally using SIP URIs. From the Public Switched Telephone Network (PSTN) network, if an end user dials an E.164 called party, the number can be translated by an ENUM gateway into the corresponding SIP URI. This SIP URI is then used to look up the Domain Name System (DNS) Naming Authority Pointer (NAPTR) Resource Records (RR). The NAPTR RR (as defined in RFC 2915) describes how the call should be forwarded or terminated and records information, such as email addresses, a fax number, a personal website, a VoIP number, mobile phone numbers, voicemail systems, IP-telephony addresses, and web pages. Alternately, when the calling party is a VoIP endpoint and dials an E.164 number, then the originator's SIP user agent (UA) converts it into a SIP URI to be used to look up at the ENUM gateway DNS and fetch the NAPTR RR.

The ENUM enhancement per Kaplan draft RFC provides source-based routing, that is, SIP-to-SIP calls can be routed based on the source SIP requests. To provide source-based routing and to interact with the Policy Server, an EDNS0 OPT pseudo resource record with source URI, incoming SIP call ID, outbound SIP call ID, and Call Session Identification are added to the ENUM DNS query, according to **draft-kaplan-enum-sip-routing-04**. The incoming SIP call ID, outbound SIP call ID, and Call Session Identification are automatically included with an EDNS0 OPT pseudo resource record in the ENUM DNS query only if “source-uri no-cache” is enabled and XCC service is registered. This feature also provides the flexibility to disable route caching.

SIP-to-SIP calls can be routed based on the source SIP requests, using the ENUM enhancement feature. To provide source-based routing and to interact with Policy Server, an EDNS0 OPT pseudo resource record with source URI, incoming SIP call ID, outbound SIP call ID, and Call session Identification are added to the ENUM DNS query. The DNS server filters its response based on the source URI and call ID information and returns the appropriate NAPTR entries. To enable this feature, you must use the **source-uri** option in the **voice enum-match-table** <*table-number*> command. In addition, you can use the **no-cache** option to disable caching.

Refer to RFC 3761 and **draft-kaplan-enum-sip-routing-04** for more information about routing SIP requests with ENUM.

Feature Information for ENUM Enhancement per Kaplan Draft RFC

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for ENUM Enhancement per Kaplan Draft RFC

Feature Name	Releases	Feature Information
ENUM Enhancement per Kaplan Draft RFC	Cisco IOS XE 3.14S Cisco IOS 15.5(1)T	The ENUM enhancement per Kaplan draft RFC provides source-based routing, that is, SIP-to-SIP calls can be routed based on the source SIP requests. To provide this source-based routing, an EDNS0 OPT pseudo resource record with source URI is added to the ENUM DNS query, according to **draft-kaplan-enum-sip-routing-04**. This feature also provides the flexibility to disable route caching.
Support to include inbound call ID, outbound call ID and Call Session Identification to ENUM DNS query	Cisco IOS 15.5(2)T Cisco IOS XE 3.15S	This feature allows you to add incoming SIP call ID, outbound SIP call ID, and Call Session Identification to an EDNS0 OPT pseduo resource record in the ENUM DNS query.

Restrictions

- Supported only for SIP-to-SIP calls.
- The full command of **voice enum-match-table**, including the options, needs to be specified whenever being referenced by its subcommand. If not, the defaults, **no source-uri** and no no-cached (or caching) will take effect.
- As the maximum number of characters of the host shown in the **show host** command is 25, the source URI may not be displayed completely.
- The source URI is displayed in a separate line below, starting with “source-uri=”. Refer to the **show** command outputs in this chapter.
- If **no-cache** is configured in the **voice enum-match-table**, no cache table look-up would be made and hence an ENUM query would be made regardless of what is in the cache table.
- Both the target and source, where the source can be null/undefined or defined, need to be matched when looking up the cache table.
- The OPT RR will be added to the query for a SIP-to-SIP call only if the **source-uri** is configured for the outbound **enum-match-table**.

- The route will not be cached if the server does not support the OPT RR (it is recommended to remove the **source-uri** for this scenario if caching is preferred).
- The source URL can be prefixed with a host/target in the host name field in a double quote in the **show host** *host* command to display routes for the host specific with this source.
- A wild card, "*", can be used to denote "all" hosts in the **show host** command. It can be by itself or any host matched with its prefix. The prefix can be a host name, partial or complete, or a domain name with partial or complete source URL.

Refer to the document titled Cisco Unified Border Element ENUM Support Configuration Example for a detailed message format.

Configure ENUM

Enable Source-Based Routing

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice enum-match-table** *match-table-index* [**source-uri**] [**no-cache**]
4. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**voice enum-match-table** *match-table-index* [**source-uri**] [**no-cache**] **Example:** `Device(config)# voice enum-match-table 5 source-uri no-cache`	Enables source URI filtering for the enum match table entry. You can use the **no-cache** option to disable the caching to the **voice enum** command.
Step 4	**end** **Example:** `Device(config-enum)# end`	Returns to privileged EXEC mode.

Test the ENUM Request

To test the ENUM request, you can use the **source-url** option so that the source-based routing enum can be tested.

SUMMARY STEPS

1. **enable**
2. **test enum** *match-table-index input -pattern* **source-url** *source-url* **more** *parameter*
3. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**test enum** *match-table-index input -pattern* **source-url** *source-url* **more** *parameter* **Example:** `Device# test enum 1117777 source sip:1116666@10.1.50.16 more "ibcall-id=1-23735@10.1.50.16; obcall-id=7190DF-F1AA3CF1@10.1.110.222;sbc-id=1`	Tests the source-based routing ENUM. • The source routing or no caching features depend on the **voice enum-match-table** command. If the **source-uri** command is not configured, the **source-url** *source-url* in the test command is ignored.
Step 3	**end** **Example:** `Device# end`	Returns to privileged EXEC mode.

Verify the ENUM Request

Use the following show commands to verify your network setup. You can compare the output of these commands to the output of the ENUM test in order to verify that ENUM is working.

SUMMARY STEPS

1. **show host ***
2. **show host 1.0.9.3.e164-test***
3. **show host 1***
4. **show host "1.0.9.3.e164-test sip*"**

DETAILED STEPS

Procedure

Step 1 **show host ***

Example:

```
Device# show host *

Host                        Port     Flags    Age Type  Address(es)
ns.e164-test                None   (temp, OK)  0  IP    127.0.0.1
1.0.9.3.e164-test sip:540 NA     (temp, OK)  0  NAPTR 0 0 U sip+E2U /^.*$/sip:3901@10.1.18.28/
Source-uri="sip:5403@1.4.65.5"
1.1.9.3.e164-test sip:540 NA     (temp, OK)  0  NAPTR 0 0 U sip+E2U /^.*$/sip:3901@10.1.18.28/
Source-uri="sip:5403@1.4.65.5"
1.0.9.3.e164-test sip:540 NA     (temp, OK)  0  NAPTR 0 0 U sip+E2U /^.*$/sip:3901@10.1.18.28/
Source-uri="sip:3401@1.4.65.5"
```

Step 2 **show host 1.0.9.3.e164-test***

Example:

```
Device# show host  1.0.9.3.e164-test*

Host                                 Port     Flags          Age Type       Address(es)
1.0.9.3.e164-test sip:540 NA      (temp, OK)  0     NAPTR 0 0 U sip+E2U /^.*$/sip:3901@10.1.18.28/
Source-uri="sip:5403@1.4.65.5"
1.0.9.3.e164-test sip:540 NA      (temp, OK)  0     NAPTR 0 0 U sip+E2U /^.*$/sip:3901@10.1.18.28/
Source-uri="sip:3401@1.4.65.5"
```

Step 3 **show host 1***

Example:

```
Device# show host 1*

Host                                 Port     Flags          Age Type       Address(es)
1.0.9.3.e164-test sip:540 NA      (temp, OK)  0     NAPTR 0 0 U sip+E2U /^.*$/sip:3901@10.1.18.28/
Source-uri="sip:5403@1.4.65.5"
1.1.9.3.e164-test sip:540 NA      (temp, OK)  0     NAPTR 0 0 U sip+E2U /^.*$/sip:3901@10.1.18.28/
Source-uri="sip:5403@1.4.65.5"
1.0.9.3.e164-test sip:540 NA      (temp, OK)  0     NAPTR 0 0 U sip+E2U /^.*$/sip:3901@10.1.18.28/
Source-uri="sip:3401@1.4.65.5"
```

Step 4 **show host "1.0.9.3.e164-test sip*"**

Example:

```
Device# show host “1.0.9.3.e164-test sip*”

Host                                 Port     Flags          Age Type       Address(es)
ns.e164-test                      None   (temp, OK)  0     IP          127.0.0.1
1.0.9.3.e164-test sip:540 NA      (temp, OK)  0     NAPTR 0 0 U sip+E2U /^.*$/sip:3901@10.1.18.28/
Source-uri="sip:5403@1.4.65.5"
```

```
1.0.9.3.e164-test sip:540 NA      (temp, OK)  0     NAPTR 0 0 U sip+E2U /^.*$/sip:3901@10.1.18.28/
Source-uri="sip:3401@1.4.65.5"
```

Troubleshooting Tips

Use the following commands for debugging information:

- **debug voip enum detail**
- **debug ip domain**
- **debug ccsip message**
- **debug voip ccapi inout**
- **clear voip fpi session** *correlator-id*—This command is used to clear the hung FPI sessions. After the hung session is identified using the existing **show** commands and its correlator is obtained, the **clear voip fpi session** *correlator-id* command can be used to clear the session.

Use the following **show** command that is helpful for debugging:

- **show host** [**all** | ***** | *host-name* | *partial -host -name**]

Below is an extract of a sample ENUM DNS query containing the EDNS0 OPT psedo resource record fields as per Kaplan Draft that is helpful in debugging. In the below query the values corresponding to ibcall-id, obcall-id, and sbc-id represent the incoming SIP call ID, outbound SIP call ID and Call Session Identification respectively.

```
7.7.7.7.1.1.1.e164.arpa sip:1116666@10.1.50.16enum_dns_query: name = 7.7.7.7.1.1.1.e164.arpa
sip:1116666@10.1.50.16 type = 35, ns_server = 0x0 no_cache 1 more_data
;ibcall-id=1-23735@10.1.50.16;
obcall-id=7190DF-39DD11E4-8008EDAD-F1AA3CF1@10.1.110.222;sbc-id=1
```

Configuration Examples for ENUM Enhancement per Kaplan Draft RFC

```
voice enum-match-table 1 source-uri //The source URI is sent to the DNS server to filter
the route.//
  description enable source-uri
  rule 2 1 /^\(.*\)$/ /\1/ e164.arpa

voice enum-match-table 2 source-uri no-cache
rule 1 1 /^\(.*\)$/ /\1/ e164-test

voice enum-match-table 3 no-cache //The cache table is not looked up and the route is not
cached.//
 rule 1 1 /^\(.*\)$/ /\1/ e164-test
```

The following is a sample configuration for the ENUM enhancement feature:

```
dial-peer voice 1 voip
```

```
 description ENUM Inbound dialpeer
 session protocol sipv2
 incoming called-number 1116666

dial-peer voice 2 voip
 description ENUM Outbound dialpeer
 destination-pattern 1117777
 session protocol sipv2
 session target enum:1 //Session target configured to look up ENUM table 1.//
```