# Managing Zones

DNS is a distributed database for objects in a computer network. By using a nameserver approach, the network consists of a hierarchy of autonomous domains and zones. The namespace is organized as a tree that often resembles the organizations that are responsible for the administration boundaries. For an introduction to the protocol, see Introduction to the Domain Name System.

The basic function of DNS nameservers is to provide data about network objects by answering queries. You can configure the Cisco Prime Network Registrar DNS server and zones by accepting the system defaults or changing them.

DNS also supports creation of the Internationalized Domain Names (IDN). The full set of Unicode characters are supported to name DNS domains in the web UI, web-services (REST), and Java SDK with limited sort and search capabilities. For more information, see *Cisco Prime Network Registrar 11.3 Release Notes*.

**Note** You must set the locale parameters on UNIX to en_US.UTF-8 when running Java tools that use Java SDK, such as cnr_rules. For more information, see the *"Running Data Consistency Rules" section in the Cisco Prime Network Registrar 11.3 Administration Guide.*

This chapter describes the basics of configuring the Cisco Prime Network Registrar DNS servers, and their primary and secondary zones. Managing Resource Records describes how to manage DNS resource records (RRs) and hosts, and Managing Authoritative DNS Server describes how to set some of the more advanced zone and DNS server properties.


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# Managing Primary DNS Servers

Adding a zone involves creating a domain name. You can also define an owner and use a zone template. If you do not use a template, you must also define the Start of Authority (SOA) and Name Server (NS) properties for the zone.

**Note** You do not need to create a loopback zone for the local host, because Cisco Prime Network Registrar automatically creates one. A loopback zone is a reverse zone that a host uses to resolve its loopback address, 127.0.0.1, to localhost so that it can direct network traffic to itself. The loopback zone is 127.in-addr.arpa, which appears on the list of reverse zones.

## Related Topics

Configuring Primary Forward Zones, on page 5

Configuring Primary Reverse Zones, on page 12

Getting Zone Counts on the Server, on page 14

# Creating and Applying Zone Templates

A zone template is a convenient way to create a boilerplate for primary zones that share many of the same attributes. You can apply a zone template to any zone, and override the zone attributes with those of the template. You can create zone templates in the local and regional cluster web UIs and in the CLI.

**Caution** Be careful while applying a template to an existing zone. The template overwrites all explicitly set attributes for the zone (other than its name), possibly causing severe consequences if the zone is already configured in a network. To make a limited attribute change to multiple zones using a template, be sure to change only that attribute (or attributes), leaving the others unset, before you apply the template to the zones.

## Local Advanced and Regional Advanced Web UI

### Procedure

**Step 1** From the **Design** menu, choose **Zone Templates** under the **Auth DNS** submenu to open the List/Add Zone Templates page.

**Step 2** You can add a zone template at the local and regional clusters, and you can also pull and push zone templates at the regional cluster in the web UI:

- To add a zone template at the local cluster or explicitly add one at the regional cluster, click the **Add Zone Templates** icon in the Zone Templates pane. This opens the Add Zone Template dialog box, enter the name and click **Add Zone Template**.

To make the zone template meaningful, enter the suggested serial number, nameserver, contact e-mail address, and list of nameservers, because they are required for the zone itself. You might also want to specify any zone owners or zone distributions. You do not necessarily need to add these values for the zone template, because you can do so for the zone once it is created from the template. However, the template name and zone default TTL are required. (For a description of the minimally required zone attributes, see Creating Primary Zones, on page 5.

After you enter these values, click **Save** at the bottom of the page.

- At the regional cluster, to pull a zone template from one or more local clusters, click the **Pull Replica** icon in the Zone Templates pane. This opens the Select Replica Zone Template Data to Pull dialog box which shows a tree view of the regional server replica data for the local clusters' zone templates. The tree has two levels, one for the local clusters and one for the templates in each cluster. You can pull individual templates from the clusters, or you can pull all of their templates:
  - To pull individual zone templates, expand the tree for the cluster, choose a pull criterion next to its name, then click **Pull Zone Template**.
  - To pull all the templates from a cluster, choose a pull criterion, then click **Pull All Zone Templates**.
  - To update all the replica data for a cluster, click the **Pull Replica** icon.

  The pull selection criteria are:

  - **Ensure**—Pulls each template, except if an existing template by that name already exists at the regional cluster, in which case it does not overwrite the regional cluster data.
  - **Replace**—Pulls each template and overwrites the data for it if it already exists at the regional cluster, without affecting any additional templates at the regional cluster. This is the default and recommended setting.
  - **Exact**—Pulls each template, overwrites the data for it if it already exists at the regional cluster, and removes any additional templates at the regional cluster.
- At the regional cluster, to push a zone template to one or more local clusters:
  - To push all the zone templates on the page List/Add Zone Templates page—Click the **Push All** icon in the Zone Templates pane.
  - To push individual zone templates on the page List/Add Zone Templates page—Click **Push**.

  Both of these actions open a version of the Push Zone Template Data to Local Clusters page.

  This page provides a choice of the synchronization mode and the destination clusters. Move the desired cluster or clusters from the Available field to the Selected field, then click one of the data synchronization mode radio buttons:

  - **Ensure**—Pushes each template, except if an existing template by that name already exists at the local cluster, in which case it does not overwrite the local cluster data. This is the default and recommended setting.
  - **Replace**—Pushes each template and overwrites the data for it if it already exists at the local cluster, without affecting any additional templates at the local cluster.
  - **Exact**—Available for "push all" operations only, it pushes each template, overwrites the data for it if it already exists at the local cluster, and removes any additional templates at the local cluster.

After making these choices, click **Push Data to Clusters**. This opens the View Push Zone Template Data Report page, where you can view the intended results of the push operation. Click **OK** to implement the push operation.

**Step 3** You can apply the template to a new or existing zone:

**a.** **New zone**—Select the template from the Template drop-down list when you create the zone, as described in Configuring Primary Forward Zones, on page 5.

**b.** **Existing zone**—After you create a zone (see Configuring Primary Forward Zones, on page 5, you can apply the template when you edit the zone on the Edit Zone page. Select the template name from the **Template** drop-down list, then click **Apply Template**.

# CLI Commands

Use **zone-template** *name* **create** to create the zone template. (See Configuring Primary Forward Zones, on page 5 for how to apply the template to a zone.) For example:

```
nrcmd> zone-template zone-template-1 create serial=1
```

To apply a template to a zone, use **zone-template** *name* **apply-to** *zone*. Note that the syntax permits one or more comma-separated zones and also the **all** keyword for all zones. You can also clone a template from an existing template by using **zone-template** *clone-name* **create clone=***template*, and then make adjustments to the clone. For example:

```
nrcmd> zone-template zone-template-1 apply-to example.com,boston.example.com
nrcmd> zone-template cloned-template create clone=zone-template-1 owner=owner-1
```

When connected to a regional cluster, you can use the following pull, push, and reclaim commands. For push and reclaim, a list of clusters or "all" may be specified.

**zone-template** <*name* | **all**> **pull** <**ensure** | **replace** | **exact**> *cluster-name* [**-report-only** | **-report**]

**zone-template** <*name* | **all**> **push** <**ensure** | **replace** | **exact**> *cluster-list* [**-report-only** | **-report**]

**zone-template** *name* **reclaim** *cluster-list* [**-report-only** | **-report**]

# Staged and Synchronous Modes

You can perform additions or edits to DNS zones, RRs, and hosts in one of two modes in regional cluster—staged or synchronous:

- **Staged (or CCM)**—Changes to zones (and their hosts and protected server RRs) are written to the CCM database, but not immediately propagated to the DNS server until a synchronization is requested.
- **Synchronous (or DNS)**—After committing changes to CCM, hosts and protected RRs are immediately propagated to the DNS server. If propagation cannot occur because of an unreachable server, RRs are propagated at the next synchronization.

Synchronizations can occur on a zone basis or by creating a zone distribution. In synchronous mode, changes are written to the DNS server right away, even though a server reload is necessary for the zone to be published on the network.

To choose the mode, select **Session Settings** from the **Settings** drop-down list at the top of the web UI.

**Note** Synchronous mode is the only DNS edit mode at the local cluster level. RR edits performed at the local cluster are immediately available via DNS.

## Local and Regional Web UI

Staged or synchronous modes are preset based on the Session Edit Modes setting in **Session Settings** on the web UI main page under the **Settings** drop-down menu:

- The regional web UI is preset to **staged**.
- The local web UI is preset to **synchronous**.

## CLI Commands

Set the session *dns-edit-mode* attribute to staged or synchronous. For example:

```
nrcmd> session set dns-edit-mode=sync
```

# Configuring Primary Forward Zones

This section explains how to configure a primary nameserver with a primary forward zone. When you are done with this procedure, follow the procedure in the Configuring Primary Reverse Zones, on page 12 to configure a reverse zone for each network that you use.

**Tip** For an example of adding a forward zone, see the *"Create the Zone Infrastructure" section in Cisco Prime Network Registrar 11.3 Administration Guide*.

## Creating Primary Zones

Creating a primary zone requires, at a minimum, adding certain key SOA attributes and nameservers for the zone. The advantage of Basic mode in the web UI is that many of these settings are already done for you.

### Local Basic Web UI

#### Procedure

**Step 1** From the **Design** menu, choose **Forward Zones** under the **Auth DNS** submenu to open the List/Add Forward Zones page.

**Step 2** Click the **Add Forward Zone** icon in the Forward Zones pane, enter the zone name (in domain name format).

**Step 3** Enter the name of the nameserver host, such as **ns1**.

**Step 4** Enter the contact e-mail name, such as **hostadmin**.

**Step 5** Click **Add DNS Zone**. Basic mode creates the zone with preset values:

- Zone default TTL—**24h**
- Start of Authority (SOA) serial number—**1**
- SOA secondary refresh time—**3h**
- SOA secondary retry time—**60m**

- SOA secondary expiration time—**1w**
- SOA minimum TTL—**10m**

## Local Advanced and Regional Web UI

### Procedure

**Step 1** From the **Design** menu, choose **Forward Zones** under the **Auth DNS** submenu to open the List/Add Forward Zones page.

**Step 2** Click the Add Forward Zone icon in the Forward Zones pane, enter the zone name (in domain name format).

**Step 3** Enter the name of the nameserver host, such as **ns1**.

**Step 4** Enter the contact e-mail name, such as **hostadmin**.

**Step 5** Enter the serial number.

**Step 6** Click **Add Zone**.

**Step 7** Choose an owner or region, if necessary, from the drop-down list.

**Step 8** Apply an existing zone template, if necessary (see Creating and Applying Zone Templates, on page 2). Click the name of the configured template in the drop-down list.

**Caution**
Be careful applying a template to a zone that is already live. Explicitly defined attributes on the template replace the existing ones defined for the zone.

**Step 9** Modify the top attributes, if necessary:

a) Owner and region
b) Preconfigured zone distribution (see Managing Zone Distributions, on page 19)
c) Zone default TTL

**Step 10** In the SOA attributes, enter a:

a) Serial number, such as **1**.

A primary DNS server uses a serial number to indicate when its database changes and uses any incrementing of this number to trigger a zone transfer to a secondary server. The serial number you can enter here is the suggested one only, and the DNS server does not always accept it. If you edit the serial number to be less than the actual serial number that the server maintains, the server logs a warning message and ignores the suggested serial number. The actual serial number always equals or is higher than the suggested one. You can get the actual serial number by using **zone** *name* **get serial** (if the DNS server is running; if the server is not running, or listing or showing the zone attributes, it always returns the suggested serial number), or by refreshing the DNS Server Value for the zone Serial Number attribute. You must explicitly enter this suggested serial number when creating a zone.

b) Nameserver host, such as **ns1**.

Enter either just the hostname or its fully qualified name (such as **ns1.example.com.**, but you must end it with a trailing dot). Use the fully qualified name if the primary nameserver is in a different zone. The primary DNS server becomes the ns value in the zone SOA record. You must also specify one or more authoritative nameservers for the zone—these become the Name Server (NS) records for the zone. In the CLI, the primary DNS server automatically becomes the first NS record and also appears as the first entry in the *nameservers* attribute list.

c) Contact e-mail name, such as **hostadmin**.

The fully qualified contact e-mail name becomes a slightly altered version of the e-mail address in that dots (.) are substituted for the at symbol (@). If using the fully qualified value, end the address with a trailing dot (for example, enter hostadmin@example.com as **hostadmin.example.com**).

**Step 11** Enter an authoritative nameserver name under Nameservers further down the page, then click **Add Nameserver**.

Authoritative nameservers validate the data in their zones. Both primary and secondary servers can be authoritative. The crucial difference is where they get their zone data. A primary server obtains its data from an administrator, as stored in the server configuration database, and from DNS updates, typically from a DHCP server. A secondary server obtains the zone data from its designated primary servers by way of a zone transfer.

You must add at least one nameserver for a zone—Cisco Prime Network Registrar does not consider the zone data complete unless you do so. The nameservers you list should be those that you want people outside your domain to query when trying to resolve names in your zone. You must add the authoritative nameservers in addition to the primary server for the zone. If the primary DNS server for the zone is in the zone, you must create a host address for it.

For every DNS internal-to-zone nameserver, you must create an Address (A) resource record (RR) to associate the server domain name with an IP address:

a) Click **Host** to open the List Zones page.
b) Click the zone name to open the List/Add Hosts for Zone page.
c) Enter the hostname of the authoritative server.
d) Enter its IP address.
e) Click **Add Host**. The server hostname and address appear in the list.
f) To edit the host, click its name to open the Edit Host page. Click **Modify** to implement the changes.

**Step 12** Configure additional attributes as needed.

**Step 13** Click **Save**.

## CLI Commands

To create a primary zone, use **zone** *name* **create primary** *nameserver contact*. You must specify a primary DNS server; this server becomes the first authoritative DNS nameserver. For example:

```
nrcmd> zone example.com create primary ns1 hostadmin
```

The serial number defaults to 1. You can get the actual serial number by using **zone** *name* **get serial** (if the DNS server is running; if the server is not running, or listing or showing the zone attributes, it always returns the suggested serial number).

To add additional authoritative nameservers for the zone, enter a comma-separated list of fully qualified domain names using **zone** *name* **set nameservers=***list*. Note that only the first server entered is confirmed by the command. Use **zone** *name* **show** to show all the server names.

Use **zone** *name* **addRR** *hostname* **A** *address* to add the authoritative server hostname and address. To list the host, use **zone** *name* **listHosts**. To remove the host, use **zone** *name* **removeRR** *hostname* **A**.

If you want to apply an existing template while creating a zone, use the *template* attribute. For example:

```
nrcmd> zone example.com create primary ns1 hostadmintemplate=zone-template-1
```

**Note** In this example, even though you need to specify the nameserver and contact as part of the syntax, the template definition (if any) overwrites them.

To apply a template after creating the zone, use **zone** *name* **applyTemplate** *template*. For example:

```
nrcmd> zone example.com applyTemplate zone-template-1
```

# Editing Primary Zones

You can edit a primary zone to modify its properties, apply a template to it, or use the zone definition to create a template from it.

## Local Advanced and Regional Web UI

### Procedure

**Step 1** From the **Design** menu, choose **Forward Zones** under the **Auth DNS** submenu to open the List/Add Forward Zones page.

**Step 2** Select the zone in the Forward Zones pane to open the Edit Zone page.

**Step 3** Make attribute changes as necessary.

**Step 4** To apply a template to the zone, choose a template name from the drop-down list at the bottom of the page, then click **Apply Template**.

**Caution**
Be careful applying a template to a zone that is already live. Explicitly defined attributes on the template replace the existing ones defined for the zone.

**Step 5** To use the zone definitions to create a template from them while modifying the zone, click **Modify Zone and Save Template**. On the Save New Zone Template page, give the template a name in the Value field, then click **Save Zone Template**. You return to the List/Add Zones page.

# Confirming Zone Nameserver Configuration

Confirm your zone NS RR configuration by looking at the RRs that you created.

## Local Advanced and Regional Web UI

Select the zone from the Forward Zones pane, and click the **Resource Records** tab. There should be an A record for each nameserver host in the zone. Edit these records or add more on this page.

See Adding Resource Record to Zone.

## CLI Commands

Use **zone** *name* **listRR** to check the RRs you added.

# Synchronizing Zones

Use manual zone synchronization only when there is an inconsistency between the HA main and HA backup that is not being resolved automatically by the servers. If a zone needs to be synchronized, do the following:

## Regional Advanced Web UI

### Procedure

**Step 1** From the **Design** menu, choose **Forward Zones** under the **Auth DNS** submenu to open the List/Add Forward Zones page.

**Step 2** Select the **Zone Sync** tab for the Primary Forward or Reverse zone.

**Step 3** Click the **Sync Zone - Report** button to open the Synchronize Zone page.

**Step 4** Expert mode includes an additional **Sync CCM Hosts from RR Data - Report** button.

## CLI Commands

The **zone** *name* **sync** <**update** | **complete**> [**-report- only** | **-report**] command is available when connected to a regional cluster.

# Zone Commands

The List/Add Zones (Forward or Reverse zone) page includes a **Commands** button. When clicked, this opens the Commands dialog box. These commands serve specific purposes:

- **Scavenge zone**—See the *"Scavenging Dynamic Records" section in Cisco Prime Network Registrar 11.3 DHCP User Guide.*
- **Get scavenge start time**—See the *"Scavenging Dynamic Records" section in Cisco Prime Network Registrar 11.3 DHCP User Guide.*
- **Synchronize HA Zone (Forward Zones)**—See Synchronizing HA DNS Zones.

**Note** You can see the **Synchronize HA Zone** command only if the server is an HA main server. You cannot see this command if it is an HA backup server.

# Importing and Exporting Zone Data

The easiest and quickest way to create a primary zone is to import an existing BIND format zone file, defined in RFC 1035. You can also export these same kinds of files to another server. BIND 4.*x.x* uses a boot file, called named.boot, to point the server to its database files. You can import your entire BIND 4.*x.x* configuration using the **import** command in the CLI. BIND 8 and BIND 9 use a configuration file, called named.conf, with a different syntax.

You can import and export zone data only by using the CLI.

When a BIND file contains an $INCLUDE directive, BIND searches for the include file relative to the directory that the directory directive in the named.boot file specifies. In contrast, the **nrcmd** program searches for the include file relative to the directory containing the zone file being processed.

To avoid this problem, ensure that the BIND configuration uses absolute paths whenever specifying an include file in a zone file. If your zone files contain relative paths when specifying include files, and the directory containing the zone file is not the same as the directory that the directory directive in the named.boot file specifies, your configuration cannot load properly. You need to convert the relative paths in your zone files to absolute paths so that you can import your BIND configuration into Cisco Prime Network Registrar. Here is an example of a configuration and how to fix paths in directory hierarchy, configuration files, and zone files:

- Directory hierarchy:

```
/etc/named.conf
/etc/named.boot
/usr/local/domain/primary/db.example
/usr/local/domain/primary/db.include
/usr/local/domain/secondary
```

- Configuration file (/etc/named.conf):

```
#BIND searches for zone files and include files relative to /usr/local/domain
option directory /usr/local/domain
#BIND finds zone file in /usr/local/domain/primary
zone example.com {
 type primary ;
 file primary/db.example ;
#end of /etc/named.conf
```

- Configuration file (/etc/named.boot):

```
#BIND searches for zone files and include files relative to /usr/local/domain
directory /usr/local/domain
#BIND finds zone file in /usr/local/domain/primary
primary example.com primary/db.example
#end of /etc/named.boot
```

- Incorrect zone file (/usr/local/domain/primary/db.example):

```
#BIND searches for include file relative to /usr/local/domain
$INCLUDE primary/db.include
#end of /usr/local/domain/primary/db.example
```

To make the configuration loadable, change the relative path ($INCLUDE primary/db.include) in the file db.example to an absolute path ($INCLUDE /usr/local/domain/primary/db.include).

The following table describes the named.boot and named.conf file directives that BIND 4 and BIND 9 support, and the corresponding Cisco Prime Network Registrar user interface location or syntax, if any.

*Table 1: BIND-to-CLI Command Mappings*

| BIND 4 Command | BIND 9 Command | Mapping to User Interface |
|---|---|---|
| — | acl *name* { *addr-match-list* }; | Web UI: List/Add Access Control Lists page fields (see the *"Assigning ACLs on DNS Caching Servers or Zones" section in Cisco Prime Network Registrar 11.3 DHCP User Guide*).<br>CLI: **acl** *name* **create** *value* **match-list**=*addr-match-list* |
| — | key *id* { algorithm *string* ; secret *string* ; }; | Web UI: List/Add Encryption Keys page fields.<br>CLI: **key** *name* **create** *secret* **algorithm**=*alg* |
| **limit transfers-in** *num* | options { transfers-in *num* ;}; | Web UI: Edit DNS Server page, set *xfer-client-concurrent-limit*.<br>CLI: **session set visibility=3 dns set xfer-client-concurrent-limit**=*number* |
| — | options { allow-query *addr-match-list* ;}; | Web UI: Edit DNS Server page, enable *restrict-query-acl*.<br>CLI: **dns set restrict-query-acl** |
| **options listen-on** *port* | options { listen-on *port* {*addr-match-list* } ;}; | Web UI: Edit DNS Server page, set *Listening port*.<br>CLI: **dns set local-port-number**=*port* |
| **options max-cache-ttl** *num* | options { max-cache-ttl *num* ;}; | Web UI: Edit DNS Server, set *Max. RR caching TTL*.<br>CLI: **dns set max-cache-ttl**=*num* |
| **options no-fetch-glue** | options { fetch-glue no ;}; | Web UI: Edit DNS Server page, enable *Don't fetch missing glue records*.<br>CLI: **dns enable no-fetch-glue** |
| **options notify yes** | options { notify yes ;}; | Web UI: Edit DNS Server page, enable *Send zone change notification (NOTIFY)*.<br>CLI: **dns enable notify** |
| *options rrset-order order order ...* | options { rrset-order *order* ; *order* ; ... ;}; | Web UI: Edit DNS Server page, enable *Enable round-robin*.<br>CLI: **dns enable round-robin** |
| **options support-ixfr yes** | options { request-ixfr yes ;}; | Web UI: Edit DNS Server page, enable *Request incremental transfers (IXFR)*.<br>CLI: **dns enable ixfr-enable** |
| **options transfer-format many-answers** | options { transfer-format many-answers ;}; | Web UI: Edit DNS Server page, enable *Use multirec format for zone transfers*.<br>CLI: **dns enable axfr-multirec-default** |

| BIND 4 Command | BIND 9 Command | Mapping to User Interface |
|---|---|---|
| **primary** *zonename file* | zone "*name* " { type primary; }; | Web UI: Add Zone page fields.<br>CLI: **zone** *name* **create primary file**=*file* |
| **secondary** *zonename addr list* [*backupfile* ] | zone "*name* " { type secondary; }; | Web UI: Add Secondary Zone page fields.<br>CLI: **zone** *name* **create secondary** *ip-addr* [**,***ip-addr* ...] |
| — | zone "*name* " { allow-query { *addr* ; ... }}; | Web UI: Edit Zone page, set *restrict-query-acl*.<br>CLI: **zone** *name* **set restrict-query-acl**=*addr* [**,***addr* ...] |
| **tcplist** *addrlist***xfernets** *addrlist* | zone "*name* " { allow-transfer { *addr* ; ... }}; | Web UI: Edit Zone page, enable *restrict-xfer* and set *restrict-xfer-acl*.<br>CLI: **zone** *name* **enable restrict-xfer zone** *name* **set restrict-xfer-acl**=*addr* [**,***addr* ...] |

# Configuring Primary Reverse Zones

For a correct DNS configuration, you must create a reverse zone for each network that you use. A reverse zone is a primary zone that DNS clients use to convert IP addresses back to hostnames, and resides in a special in-addr.arpa domain. You can create a reverse zone manually or import it from BIND. You can also create reverse zones from subnets (see Adding Reverse Zones from Subnets, on page 14).

# Adding Reverse Zones as Zones

You can manually add a reverse zone as a zone.

## Local and Regional Web UI

From the **Design** menu, choose **Reverse Zones** under the **Auth DNS** submenu to open the List/Add Reverse Zones page. This page is almost identical to the List/Add Forward Zones page. Then, add a reverse zone the same way you would add a forward zone, as described in Configuring Primary Forward Zones, on page 5, except use the reverse of the forward zone network number added to the special in-addr.arpa domain as the zone name. Use the same template or SOA and nameserver values as you used for the related forward zone.

You can enter a DHCPv4 subnet or DHCPv6 prefix value in the Name field, which converts the subnet or prefix into an appropriate reverse zone name.

To create a reverse zone by using an IPv4 subnet or an IPv6 prefix, do the following:

### Procedure

**Step 1** From the **Design** menu, choose **Reverse Zones** under the **Auth DNS** submenu to open the List/Add Reverse Zones page.

**Step 2** Click the **Add Reverse Zone** icon in the Reverse Zones pane, enter values in the Name field. For example:

- **209.165.201.1/24**—Creates a reverse zone by using an IPv4 subnet.
- **2001:db8:ff80:ff80::/64**—Creates a reverse zone by using an IPv6 prefix.

**Step 3** Enter the required fields to create the reverse zone:

- **Nameserver**—Enter **ns1.example.com.** (include the trailing dot).
- **Contact E-Mail**—Enter **hostadmin.example.com.** (include the trailing dot).
- **Serial Number** —Enter **1**.

**Step 4** Click **Add Reverse Zone**. The List/Add Reverse Zones page appears.

## Local and Regional Web UI

To create a reverse zone by using the name of an IPv6 prefix, do the following:

### Procedure

**Step 1** From the **Design** menu, choose **Prefixes** under the **DHCPv6** submenu to open the List/Add DHCP v6 Prefixes page.

**Step 2** Click the **Add Prefixes** icon in the Prefixes pane to open the Add IPv6 Prefix dialog box.

**Step 3** Enter a prefix name (for example, **prefix-1**) and address (for example, **2001:db8:ff80:ff80::**).

**Step 4** Choose a prefix length from the drop-down list (for example, **64**).

**Step 5** Click **Add IPv6 Prefix**. The prefix is added to the List/Add DHCP v6 Prefixes page.

To create a reverse zone from the prefix,

a) Click the **Reverse Zone** tab.
b) Select a zone template.
c) Click **Report**, and then click **Run**.

## CLI Commands

Use **zone** *name* **create primary** and **zone** *name* **addRR PTR** to add the primary reverse zone and pointer records for the server. You can also apply a zone template.

To create a reverse zone by using:

- An IPv4 subnet

  For example, you can enter:

  ```
  nrcmd> zone 209.165.201.1/24 create primary ns1.example.com. hostadmin.example.com.
  ```

- An IPv6 prefix

  For example, you can enter:

  ```
  nrcmd> zone 2001:db8::/64 create primary ns1.example.com. hostadmin.example.com.
  ```

- The name of an IPv6 prefix

  For example, you can enter:

```
nrcmd> prefix prefix-1 create 2001:db8:ff80:ff80::/64
nrcmd> zone prefix-1 create primary ns1.example.com. hostadmin.example.com.
```

# Adding Reverse Zones from Subnets

An alternative to creating reverse zones manually is to create them from existing subnets. You can do this in the web UI only.

## Local Advanced and Regional Advanced Web UI

### Procedure

**Step 1** From the **Design** menu, choose **Subnets** under the **DHCPv4** submenu to open the List/Add Subnets page.

**Step 2** Create a subnet for the reverse zone, or use one of the existing subnets.

**Step 3** Click the **Reverse Zone** tab, and choose an existing zone template.

**Step 4** Click **Report** to show the changesets for the creation.

**Step 5** Click **Revert** to return to the List/Add Subnets page.

**Step 6** Confirm the creation by clicking **Run**, then **Reverse Zones** to see the newly created zone on the List/Add Reverse Zones page.

# Getting Zone Counts on the Server

You can view the created zones associated with the DNS server, hence obtain a count, in the web UI.

Using the CLI, you can get an exact count of the total zones for the DNS server by using **dns getZoneCount** [**forward** | **reverse** | **primary** | **secondary** | **all**]. With no options specified, the command returns the total number of published zones only.

# Enabling DNS Updates

DNS Update (RFC 2136) integrates DNS and DHCP, so that they can work together. DNS update automatically records the association between the hosts and their DHCP-assigned addresses. Using DHCP and DNS update, you can configure a host automatically for network access whenever it attaches to the network. You can locate and access the host using its unique DNS hostname.

DNS update is described in detail in the *"Managing DNS Update" chapter in Cisco Prime Network Registrar 11.3 DHCP User Guide*. The chapter includes sections on the following:

- **Update policy (the Update Policies tab)**—Determines what kind of RRs you want updated when name-to-address associations change through DHCP. (See the "*Configuring DNS Update Policies" section in Cisco Prime Network Registrar 11.3 DHCP User Guide*.)
- **Update map (the Update Maps tab)**—Defines an update relationship between a DNS server or HA DNS pair and a DHCP failover pair, DHCP policies, client-class, or access control list. (See the *"Creating DNS Update Maps" section in Cisco Prime Network Registrar 11.3 DHCP User Guide*.)

# Managing Secondary Servers

When you configure a zone, choose at least one secondary server. If you have only one nameserver and it becomes unavailable, there is nothing that can look up names. A secondary server splits the load with the primary or handles the whole load if the primary is unavailable. When a secondary server starts up, it contacts the primary and pulls the zone data over. This is known as a zone transfer.

**Note** Zone transfer in secure mode supports both HMAC-MD5 based TSIG and GSS-TSIG.

**Tip** If the authoritative server for your secondary zones is also running Cisco Prime Network Registrar 6.0 or later, see Managing Zone Distributions, on page 19 for how to avoid entering these zones manually. If you have only one secondary server, remove it geographically from the primary. They should not be on the same network segment, switch, or router, but on a different cluster entirely.

You can configure a secondary DNS server to be responsible for a secondary zone, which makes the server a secondary for that zone. You also need to give the address of the primary server from which to perform zone transfers. Cisco Prime Network Registrar must know about this primary server.

## Adding Secondary Forward Zones

You can add a secondary forward zone at the local cluster.

### Local Web UI

#### Procedure

**Step 1** From **Design** menu, choose **Secondary Zones** under the **Auth DNS** submenu to open the List/Add Secondary Zones page.

**Step 2** Click the **Add Secondary Zone** icon in the Secondary Zones pane to open the Add Secondary Zone dialog box.

A secondary zone requires a name and a list of one or more primary servers. You can also enable restricting zone transfers to a set of hosts, then enter the access control list (ACL) of the restricted hosts in the *restrict-xfer-acl* field. Enter other attribute values as necessary.

**Step 3** Click **Add Secondary Zone**.

Clicking the name of the secondary zone in the Secondary Zones pane opens the Edit Secondary Zone page where you can edit the secondary zone. Click **Save** on this page.

You can add the secondary reverse zone the same way you do a secondary forward zone, except that the address must be a reverse zone address.

## CLI Commands

To create a secondary zone, use **zone** *name* **create secondary** *address*. You must specify the primary DNS server IP address to perform the zone transfer.

For example:

```
nrcmd> zone shark.zone. create secondary 172.18.123.177
```

If you are using HA DNS server pair, the IP addresses must be provided by separating the addresses with comma. The HA DNS backup server will be used when the primary server is unavailable.

For example:

```
nrcmd> zone shark.zone. create secondary 172.18.123.177,172.18.123.45
```

# Enabling Zone Transfers

A secondary server periodically contacts its primary server for changes, called a zone transfer. The interval is defined in the server SOA record as the secondary refresh time. You can restrict zone transfers if the *restrict-xfer* attribute is set to true (the preset value) on the primary server. You have to set the *restrict-xfer-acl* setting accordingly.

**Note** If you restrict zone transfers, the **nslookup** utility **ls** command may fail because it tries to do a full zone transfer, unless you include the IP address that **ls** runs from in the zone *restrict-xfer-acl* list.

## Local Advanced and Regional Web UI

### Procedure

**Step 1** In the Forward Zones pane, click the name of the primary zone to open the Edit Zone page.

**Step 2** In the zone attributes area, you can set the *restrict-xfer* attribute to false. If the attribute is set to **true** (the preset value), you can also specify a list of servers to which to restrict the zone transfers by using the *restrict-xfer-acl* attribute, separating the IP addresses with commas.

Secondary zones can also restrict zone transfers from other secondary zones, so that the *restrict-xfer* and *restrict-xfer-acl* attributes are also available for secondary zone configurations.

**Step 3** Click **Save**.

**Step 4** You can force zone transfers for the DNS server in two ways:

- On the Secondary Zones pane, click the **Full Zone Transfer** button.
- To force all zone transfers from the primary server, on the Manage DNS Authoritative Server page, click the **Commands** button to Force all zone transfers.

### CLI Commands

In the CLI, zone transfers are restricted by default, unless you enable them using **zone** *name* **disable restrict-xfer**. If you want to force a zone transfer, use **zone** *name* **forceXfer secondary**.

# Configuring Subzones

As the zone grows, you might want to divide it into smaller pieces called subzones. You can delegate administrative authority for these subzones, and have them managed there or served by separate servers. This partitioning is called subzone delegation. Establish subzone delegation by performing these tasks:

1. Choose a subzone name.
2. Specify a nameserver name.
3. Specify a nameserver address.

## Choosing Subzone Names and Servers

After you decide to divide the zone into subzones, you must create names for them. Involve the people responsible for the subzones in deciding their names, and try to maintain a consistent naming scheme.

These suggestions can help you avoid subzone naming problems:

- Consider not naming a subzone by its organizational name. In a changing business environment, organizations merge and are renamed. Naming a subzone after an organization could result in a name that is no longer meaningful over time.
- Consider not using geographical names that indicate the subzone location. Geographical names are meaningless to people outside your organization.
- Do not use cryptic names; make them obvious.
- Do not use existing or reserved top-level domain names as subzones. Using existing names can result in routing problems.

After you choose a subzone name, specify its nameservers, the ones the parent domain nameservers use when queried about the subzone. To ensure that the subzone is always reachable, you should specify two nameservers. They must be authoritative for this zone as either primary or secondary.

Whenever a subzone nameserver changes its name or address, the subzone administrator must inform its parent zone so that the parent zone administrator can change the subzone nameserver and *glue records*. A glue record is an A record with the address of a subzone authoritative nameserver. If the subzone administrator fails to inform its parent, the glue records are invalid. The common symptom is that a host cannot reach a host in another domain by its name, only by its address.

**Note** Cisco Prime Network Registrar detects lame delegation by reporting missing subzone NS records in the parent zone, if NS record addresses do not match, and if glue A records are required.

## Creating and Delegating Subzones

You delegate a subzone by creating it in the parent zone. There should be one NS record for each nameserver to which the subzone is delegated. Each NS record requires a corresponding A record describing the address of the nameserver, unless the nameserver is outside the parent zone or subzone. This A record is called a *glue*

record. Such a zone which creates the NS RRs and corresponding A records (glue records) for point of delegation in the parent zone is called a parented zone. A zone that does not create the NS RRs and corresponding A records (glue records) for point of delegation in the parent zone is called an unparented zone.

Consider a zone *example.com* with a parent zone *.com* and a subzone *subdomain.example.com*. If *example.com* is a parented zone, NS RRs for the *example.com* appears in two places; within the *example.com* and within its parent zone *.com*. Within *example.com* are authoritative records for the nameservers for the zone, at the point of delegation for either a subdomain of the zone or in the parent zone. The parent zone *.com* will contain non-authoritative NS RRs for *example.com* at its point of delegation and *subdomain.example.com* will have non-authoritative NS RRs in *example.com* at its point of delegation.

See Choosing Subzone Names and Servers, on page 17.

## Local Web UI

### Procedure

**Step 1** Create a zone as a subdomain of the parent domain on the List/Add Forward Zones page:

- If applying a zone template, go to **Step 2**.
- If not applying a zone template, on the List/Add Forward Zones page, click the **Add Forward Zone** icon and add the SOA records and the nameserver with its address.

**Step 2** If Cisco Prime Network Registrar detects a parent zone based on the subzone name, the Create Subzone in Parent Zone page appears. Click **Create as Subzone** (or **Create as Unparented Zone** if you do not want it to be a subzone) on this page.

Creating as subzone will create the NS RRs and corresponding A records (glue records) for point of delegation in the parent zone.

**Step 3** If you configured a nameserver in the subzone, you need to create a glue Address (A) record for it. In the field provided, enter the IP address of the nameserver, then click **Specify Glue Records**. (If there are multiple subzone nameservers, there are multiple fields for the glue records.)

**Step 4** Click **Report** to show the intended changesets for the added records.

**Step 5** Click **Return** after viewing the actual changesets implemented.

**Step 6** To confirm the added records for the subzone, click the View icon in the RRs column for the subzone. The glue A record or records for the subzone nameserver should appear. Click **Return to Zone List**.

**Step 7** To confirm the added records for the parent zone, click the **View** icon in the RRs column for the parent zone. The subzone nameserver (NS) record or records plus the glue A record or records for them should appear. Click **Return to Zone List**.

## CLI Commands

On the subzone primary nameserver machine, create the subdomain:

```
nrcmd> zone boston.example.com. create primary bostonDNSserv1 hostadmin
```

On the parent zone nameserver machine, add an NS record for the subzone nameserver, then Create a glue A record for the subzone nameserver:

```
nrcmd> zone example.com. addRR boston NS bostonDNSserv1.boston.example.com.
nrcmd> zone example.com. addRR bostonDNSserv1.boston.example.com. A 192.168.40.1
```

# Editing Subzone Delegation

You can edit the subzone RRs.

## Local and Regional Web UI

### Procedure

**Step 1** On the corresponding Edit Zone page, click the **Resource Records** tab, edit the NS RR for the subzone by clicking the **Edit** icon next to the record to open the Edit RR in Zone page.

**Step 2** Edit the NS record data.

**Step 3** Click **Modify Resource Record**.

**Step 4** Edit the glue A RR for the subzone server in the same way as in the previous steps.

## CLI Commands

Use **zone** *name* **removeRR** to delete the NS and glue A records, then use **zone** *name* **addRR** to replace them.

# Undelegating Subzones

If you undelegate a subzone, you need to remove any associated NS and glue A records from the parent zone.

**Note** If you delete the subzone, Cisco Prime Network Registrar cleans up the delegation records automatically.

## Local and Regional Web UI

On the corresponding Edit Zone page, click the **Resource Records** tab, delete the NS record for the subzone, then delete the glue A record for the subzone server host.

## CLI Commands

Use **zone** *name* **removeRR NS** and **zone** *name* **removeRR A** to remove the subzone NS and glue A records.

# Managing Zone Distributions

Creating a zone distribution simplifies creating multiple zones that share the same secondary zone attributes. It simplifies to a great extent the setup and management of multiple clusters sharing zone relationships such as primary to secondary or main to backup in the case of DNS HA.

The zone distribution requires adding one or more predefined secondary servers. Running a zone distribution synchronization adds secondary zones managed by secondary servers for each primary zone managed by a primary server. You can also use zone distributions to synchronize zone data from the CCM database to the local DNS server and regional and local cluster zone data. Synchronizing the zone data will always sync the associated views and named ACLs for both primary and secondary zones.

The distribution must be in a star topology, that is, one primary server and multiple secondary servers. The authoritative server can only be the local primary server where the zone distribution default is defined. You can manage one zone distribution at the local cluster and multiple distributions at the regional clusters.

# Preparing the Zone Distribution Map

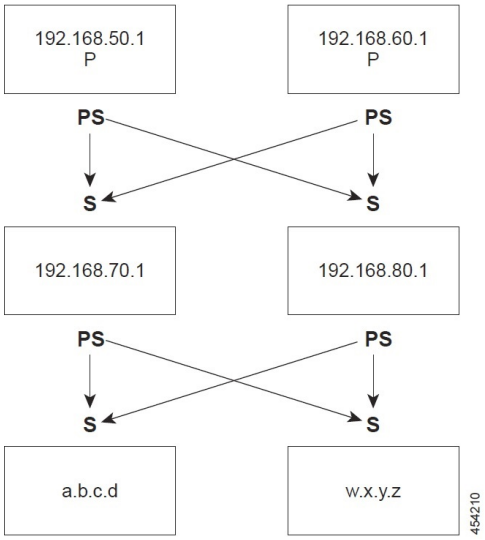
To prepare for creating a zone distribution, draw a zone distribution map diagram on paper.

### Procedure

**Step 1** Start by identifying the HA DNS pair that is primary (or the primary server if HA is not involved) for all the zones that you include in the map:

a) Create a box for each server in the HA DNS pair. For example, the server pair for the Chicago-cluster consists of the servers at 192.168.50.1 and 192.168.60.1.
b) Write the IP addresses of each server in each box.
c) Write a **P** (for Primary) inside each box (see the image below).

***Figure 1: Diagramming a Zone Distribution Map***




**Step 2** Identify the role as "Primary Server of Secondary" for each server by writing an **PS** below the box. In the example, both primary servers are, by definition, also primary servers of secondary that will send copies of their zones to other servers over zone transfers. Even so, write the **PS** below the box to make later steps easier.

**Step 3** Identify all the secondary servers that will receive zone transfers directly from these Primary Servers (PS). Below the Primary Servers boxes on the page, add a box for each secondary, and write its IP address inside the box. For example, the secondary servers at 192.168.70.1 and 192.168.80.1 get zone transfers from the Chicago-cluster primary servers.

**Step 4** Write an **S** above each secondary server box.

**Step 5** Draw arrows from the **PS** to each **S** representing the zone transfer flow (see the diagram). In this HA DNS example, the arrows go from each primary server to both secondary servers.

**Step 6** As you can see from the diagram, you can extend the boxes further so that the original secondary servers can become Primary Servers to another set of servers (a.b.c.d and w.x.y.z).

**Step 7** Enter the IP address in each box with an **PS** below it in the Primary Servers list when creating the zone distribution.

In the CLI, set the *primary-servers* attribute to the list of IP addresses; for example:

```
nrcmd> zone-dist dist-1 create Chicago-cluster primary-servers=192.168.50.1,192.168.60.1
```

**Step 8** From the Secondary Servers drop-down list on the Add or Edit Zone Distribution Secondary Server page, choose the cluster associated with the secondary server IP addresses in the boxes that have an **S** above them.

In the CLI, use **zone-dist** *name* **addSecondary** *cluster*; for example:

```
nrcmd> zone-dist dist-1 addSecondary Boston-cluster
```

# Creating a Zone Distribution

**Note** If you move a zone from one zone distribution to another, synchronize the first zone distribution, move the zone, then synchronize the second zone distribution.

## Local and Regional Web UI

### Procedure

**Step 1** From **Deploy** menu, choose **Zone Distributions** (for the regional cluster) or **Zone Distribution** (for the local cluster) under the **DNS** submenu. The option is available if the server is configured with authoritative service. This opens the regional List/Add Zone Distributions page or the local View Zone Distribution page. Note that the default zone distribution is predefined at both clusters; however, the default cluster is the only one available at the local cluster.

**Step 2** To add a new zone distribution, click the **Add Zone Distribution** icon to open the Add Zone Distribution dialog box. To edit an existing zone distribution, select its name to open the Edit Zone Distribution page.

**Step 3** In the Primary Server field, enter the cluster (or configured HA DNS pair) that has the primary server. This primary server is authoritative for the zones that you will determine further down the page. This selection is subtractive: the next zone distribution you create will no longer have the cluster that you set here as one of the choices.

**Step 4** In the Primary Servers list, add the IP address (and optional key) for each primary server of secondary. This server is generally the primary server. However, you might want to set up a hierarchy of primaries and secondaries where you need to define the primary servers for each of the secondary relationships. You might also want to determine the HA DNS server pairs from the Primary Servers list. You can also add an optional TSIG key or GSS-TSIG keys (see the *"Transaction Security" or "GSS-TSIG" section in the Cisco Prime Network Registrar 11.3 DHCP User Guide*) to the primary server address by hyphenating the entry in the format *address–key*. For each entry, click **Add IP Key**.

**Step 5** For a zone distribution, you need to add at least one secondary server. Click **Add Secondary Server** on the Edit Zone Distribution page. Choose the cluster of the secondary server. Optionally, if the primary servers of secondary are other

than the primary servers indicated for the zone distribution, add the addresses of the secondary's primary servers, separating multiple addresses with commas. After clicking **Add Server** returns you to the Edit page, you can connect to the secondary server cluster, delete it, or edit it to change the primary servers of secondary.

To manage the secondary servers in the zone distribution, click the **View** icon in the Manage Servers column to open the List Secondary Servers page. You can also edit the secondary server on an Edit Zone Distribution Secondary Server page.

**Step 6** Choose the forward and reverse zones for the zone distribution. The default zone distribution includes all the created forward and reverse zones. For all other created zone distributions, you must move the zone or zones into the Selected column.

**Step 7** Click **Save**.

**Step 8** Synchronize the zone distribution with the local cluster DNS servers. A synchronization:

- Pushes staged zone, RR, or host edits to the primary server cluster or HA DNS pair for the regional cluster in Ensure, Replace, or Exact modes, or from the local cluster in Exact mode.
- Creates secondary zones for secondary servers, in Exact mode.

**Step 9** Click the **Synchronize Zone Distribution** tab, and choose a synchronization mode:

- **Update**—Adds new zones, RR sets, and hosts; replaces existing hosts if there are conflicts; and creates new secondary zones.
- **Complete**—Like Ensure mode, except that it always replaces existing RR sets and hosts, and modifies the primary servers list on existing secondary zones.
- **Exact**—Like Complete mode, except that it deletes extra zones, RR sets, hosts, and secondary zones no longer on the primary.

**Step 10** Click **Report** in the Synchronize Zone Distribution tab (or the same icon in the Synchronize All Zone Distributions area of the page at the regional cluster). This opens the Sync Zone Distribution page that shows a preview of the data synchronized.

## CLI Commands

To create the zone distribution, use **zone-dist** *name* **create** *primary-cluster* (The primary cluster can also be the HA DNS pair). For example:

```
nrcmd> zone-dist dist-2 create Chicago-cluster
```

To set the primary servers of secondary, use **zone-dist** *name* **set primary-servers=***addresses*, separating the addresses with commas. For example:

```
nrcmd> zone-dist zone-dist-2 set primary-servers=192.168.50.1,192.168.60.1
```

To add the secondary server, use **zone-dist** *name* **addSecondary** *secondary-cluster*. For example:

```
nrcmd> zone-dist zone-dist-2 AddSecondary Boston-cluster
```

You must associate the zone distribution directly with the zone or zone template. Use **zone** *name* **set dist-map=***zone-dist-list* or **zone-template** *name* **set dist-map=***zone-dist-list*, separating the zone distribution entries with commas. For example:

```
nrcmd> zone example.com set dist-map=zone-dist-2
nrcmd> zone-template zone-template-1 set dist-map=zone-dist-2
```

To synchronize the zone distributions, use **zone-dist** *name* **sync**. You can do a synchronization in update, complete, or exact mode, and you can exclude RRs and secondary zones:

- At the local cluster, this synchronizes staged edits to the DNS server and primary zones to secondaries. Regardless of the synchronization mode, this always synchronizes the exact list of authoritative zones.
- At the regional cluster, this synchronizes primary zones with the local clusters, and primaries to secondaries. This replaces primary zones at the local cluster in Update and Complete modes, and deletes extra primary zones at the local cluster in Exact mode.
- For secondary zones, the same synchronization logic occurs at the local and regional clusters. In Update mode, this ensures that corresponding secondary zones exist on the server. In Complete mode, existing zones are updated to use the Primary Servers list (primary servers of secondary) specified by the zone distribution map. In Exact mode, any zones not matching the distribution map are deleted.

For example:

```
nrcmd> zone-dist zone-dist-1 sync exact no-rrs no-secondaries
```

# Pulling Zone Distributions from Replica Data

You can pull zone distributions from the local replica data instead of explicitly creating them.

**Tip** For an example of pulling local zone data to create a zone distribution, see the *"Pull Zone Data and Create a Zone Distribution" section in Cisco Prime Network Registrar 11.3 Administration Guide*.

## Regional Web UI

### Procedure

**Step 1** From **Deploy** menu, choose **Zone Distribution** under the **DNS** submenu to open the List/Add Zone Distribution page.

**Step 2** On the List/Add Zone Distribution page, click the **Synchronize Zone Distribution** tab.

**Step 3** Choose the zone synchronization mode (**Update**, **Complete**, or **Exact**). These modes are described in the table on that page.

**Step 4** Click **Report** at the top of the dialog box.

**Step 5** Click **Run**.

# Managing DNS ENUM Domain

Creating separate ENUM domains simplifies the management of Naming Authority Pointer (NAPTR) Electronic Numbering (ENUM). It simplifies to a great extent the setup and management of E.164 numbers and how available services are connected to the E.164 numbers. When you create an ENUM zone and add the corresponding E.164 numbers, Cisco Prime Network Registrar automatically creates a forward zone and the respective NAPTR resource records.

# Managing DNS ENUM Defaults

To configure the default ENUM settings, do the following:

## Local Web UI

### Procedure

**Step 1** From the **Design** menu, choose **Defaults** under the **DNS ENUM** submenu to open the Manage DNS ENUM Defaults page.

**Step 2** Enter the Top-level Domain.

**Step 3** Enter the Local Prefix, such as +46.

**Step 4** Enter the Default Services values: Click the **Add** button in the **Services** section, select a service type, enter a URI, and click **Add**.

**Step 5** Select a Zone Template from the drop-down list.

**Step 6** Click **Save**.

## CLI Commands

Use **dns-enum-config set** [**number-prefix prefix** | **zone-template** *name*] to set the default ENUM domain, default top-level domain and local prefix, service, and zone template.

Use **dns-enum-config addService** *type subtype URI* [*order* [*preference*]] to add the default service.

Use **dns-enum-config removeService** *type subtype URI* to remove the default service user.

# Adding DNS ENUM Domains

Adding an ENUM domain involves creating a domain name. You can also define an owner and use a zone template.

When you create an ENUM zone, Cisco Prime Network Registrar automatically creates a forward zone. For example, if you create an ENUM domain for E.164 number prefix 100 and the default top-level domain is set to e164enum.net., a forward zone 0.0.1.e164enum.net. is automatically created and appears in the list of forward zones.

To configure an ENUM domain, do the following:

## Local and Regional Web UI

### Procedure

**Step 1** From the **Design** menu, choose **Domains** under the **DNS ENUM** submenu to open the List/Add DNS ENUM Domains page.

**Step 2** Click the **Add Domains** icon in the Domains pane to open the Add ENUM Domain dialog box.

**Step 3** Enter the E.164 number prefix for the domain, such as 897.

**Step 4** Enter the name of the nameserver host, such as ns1.

**Step 5** Enter the contact e-mail name, such as hostadmin.

**Step 6** Click **Add ENUM Domain**. The domain will be created with the default local prefix such as +4689. The Basic mode creates the zone with the following preset values:

- Zone default TTL-24h
- Start of Authority (SOA) serial number-1
- SOA secondary refresh time-3h
- SOA secondary retry time-60m
- SOA secondary expiration time-1w
- SOA minimum TTL-10m

## CLI Commands

Use **dns-enum-domain** *name* **create** [**zone-template**=*name*] [*nameservers* [**person**]] to create ENUM domain.

Use **dns-enum-domain** *name* **delete** to delete ENUM domain.

When connected to a regional cluster, you can use the following pull, push, and reclaim commands.

**dns-enum-domain** <*name* | **all** > **pull** < **ensure** | **replace** | **exact** > *cluster-name* [**-report-only** | **-report**]

**dns-enum-domain** <*name* | **all** > **push** < **ensure** | **replace** | **exact** > *cluster-list* [**-report-only** | **-report**]

**dns-enum-domain** *name* **reclaim** *cluster-list* [**-report-only** | **-report**]

# Adding DNS ENUM Numbers

Cisco Prime Network Registrar supports NAPTR RRs. These records help with name resolution in a particular namespace and are processed to get to a resolution service.

In addition to the option of adding NAPTR resource records, you can now directly add the E.164 numbers and associate the corresponding services with the numbers. When you add a DNS ENUM number, you need to specify either the E.164 number prefix of the parent domain or the Zone templates, and a NAPTR resource record is created for the E.164 number. This approach uses a reversed E.164 number and treats every digit as a node on the DNS name hierarchy. For example, the E.164 address +4689761234 creates a NAPTR RR 4.3.2.1.6.7.9.8 for the +46 E.164 prefix domain.

For more information on NAPTR resource records, see Name Resolution in a Namespace Using NAPTR Resource Records.

## Local and Regional Web UI

### Procedure

**Step 1** From the **Design** menu, choose **Numbers** under the **DNS ENUM** submenu to open the List/Add DNS ENUM Numbers page.

**Step 2** Click the **Add Numbers** icon in the Numbers pane to open the Add ENUM Number dialog box.

**Step 3** Enter the E.164 number along with the E.164 number prefix, such as 1234.

**Step 4** Click the **Add** button in the **Services** section, select a service type, enter URI, and click **Add**.

**Step 5** Enter the E.164 number prefix for the parent domain.

**Step 6** Select the Zone Template if you have not specified the E.164 prefix.

**Step 7** Select a Ported option and enter the Ported Nameserver FQDN.

**Step 8** Click **Add ENUM Number**. The number will be created and added under the domain +4689.

## CLI Commands

Use **dns-enum-number** *number* **create** *type subtype URI* [**zone-template**=*name*] [**domain-prefix**] to create ENUM number.

When connected to a regional cluster, you can use the following pull, push, and reclaim commands. For push and reclaim, a list of clusters or "all" may be specified.

**dns-enum-number** <*name* | **all** > **pull** < **ensure** | **replace** | **exact** > *cluster-name* [**-report-only** | **-report**]

**dns-enum-number** <*name* | **all** > **push** < **ensure** | **replace** | **exact** > *cluster-list* [**-report-only** | **-report**]

**dns-enum-number** *name* **reclaim** *cluster-list* [**-report- only** | **-report**]

# Pulling and Pushing ENUM Domains

You can push ENUM Domains to and pull ENUM Domains from local clusters on the List/Add DNS ENUM Domains page in the regional cluster web UI.

## Pushing ENUM Domains to Local Clusters

To push ENUM domains to the local cluster, do the following:

### Regional Web UI

### Procedure

**Step 1** From the **Design** menu, choose **Domains** under the **DNS ENUM** submenu to view the List/Add DNS ENUM Domains page in the regional web UI.

**Step 2** Click the **Push All** icon in the Domains pane to push all the ENUM domains listed on the page, or select the ENUM domain on the Domains pane and click the **Push** icon to open the Push ENUM Domain page.

**Step 3** Choose a push mode using one of the Data Synchronization Mode radio buttons.

- If you are pushing all the ENUM Domains, you can choose Ensure, Replace, or Exact.
- If you are pushing an ENUM Domain, you can choose Ensure or Replace.

In both cases, Ensure is the default mode.

Choose Replace only if you want to replace the ENUM domain data at the local cluster. Choose Exact only if you want to create an exact copy of the ENUM domain data at the local cluster, thereby deleting all ENUM domain data that is not defined at the regional cluster.

**Step 4** Click **Push Data to Clusters**.

#### CLI Command

When connected to a regional cluster, you can use **dns-enum-domain** <*name* | **all** > **push** < **ensure** | **replace** | **exact** > *cluster-list* [**-report-only**| **-report**].

## Pulling ENUM Domains from the Replica Database

To pull ENUM domains from the replica database, do the following:

#### Regional Web UI

#### Procedure

**Step 1** From the **Design** menu, choose **Domains** under the **DNS ENUM** submenu to view the List/Add DNS ENUM Domains page in the regional web UI.

**Step 2** Click the **Pull Data** icon in the Domains pane.

**Step 3** Click the **Replica** icon in the Update Replica Data column for the cluster. (For the automatic replication interval, see the *"Replicating Local Cluster Data" section in Cisco Prime Network Registrar 11.3 Administration Guide*.).

**Step 4** Choose a replication mode using one of the Mode radio buttons.

**Step 5** Leave the default Replace mode enabled, unless you want to preserve any existing ENUM domains data at the local cluster by choosing Ensure.

**Step 6** Click the **Pull All ENUM Domains** button to view the pull details.

**Step 7** Click **Ok**.

#### CLI Command

When connected to a regional cluster, you can use **dns-enum-domain** <*name* | **all** > **pull** < **ensure** | **replace** | **exact** > *cluster-name* [**-report-only**| **-report**].

# Pulling and Pushing ENUM Numbers

You can push ENUM numbers to and pull ENUM numbers from local clusters on the List/Add DNS ENUM Numbers page in the regional cluster web UI.

## Pushing ENUM Numbers to Local Clusters

To push ENUM numbers to the local cluster, do the following:

### Regional Web UI

### Procedure

**Step 1** From the **Design** menu, choose **Numbers** under the **DNS ENUM** submenu to view the List/Add DNS ENUM Numbers page in the regional web UI.

**Step 2** Click the **Push All** icon in the Numbers pane to push all the ENUM numbers listed on the page, or select the ENUM number on the Numbers pane and click the **Push** icon to open the Push ENUM Number page.

**Step 3** Choose a push mode using one of the Data Synchronization Mode radio buttons.

- If you are pushing all the ENUM numbers, you can choose Ensure, Replace, or Exact.
- If you are pushing an ENUM number, you can choose Ensure or Replace.

In both cases, Ensure is the default mode.

Choose Replace only if you want to replace the ENUM number data at the local cluster. Choose Exact only if you want to create an exact copy of the ENUM number data at the local cluster, thereby deleting all ENUM number data that is not defined at the regional cluster.

**Step 4** Click **Push Data to Clusters**.

### CLI Commands

When connected to a regional cluster, you can use **dns-enum-number** <*name* | **all** > **push** < **ensure** | **replace** | **exact** > *cluster-list* [**-report-only**| **-report**].

## Pulling ENUM Numbers from the Replica Database

To pull ENUM numbers from the replica database, do the following:

### Regional Web UI

### Procedure

**Step 1** From the **Design** menu, choose **Numbers** under the **DNS ENUM** submenu to view the List/Add DNS ENUM Number page in the regional web UI.

**Step 2** Click the **Pull Data** icon in the Numbers pane.

**Step 3** Click the **Replica** icon in the Update Replica Data column for the cluster. (For the automatic replication interval, see the *"Replicating Local Cluster Data " section in Cisco Prime Network Registrar 11.3 Administration Guide*.).

**Step 4** Choose a replication mode using one of the Mode radio buttons.

**Step 5** Leave the default Replace mode enabled, unless you want to preserve any existing ENUM number data at the local cluster by choosing Ensure.

**Step 6** Click the **Pull all ENUM Numbers** button to view the pull details.

**Step 7** Click **Ok**.

## CLI Commands

When connected to a regional cluster, you can use **dns-enum-number** <*name* | **all** > **pull** < **ensure** | **replace** | **exact** > *cluster-name* [**-report-only**| **-report**].