



Configuring Static Routing

This chapter describes how to configure static routing on the switch.

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Information About Static Routing

Routers forward packets using either route information from route table entries that you manually configure or the route information that is calculated using dynamic routing algorithms.

Static routes, which define explicit paths between two routers, cannot be automatically updated; you must manually reconfigure static routes when network changes occur. Static routes use less bandwidth than dynamic routes. No CPU cycles are used to calculate and analyze routing updates.

You can supplement dynamic routes with static routes where appropriate. You can redistribute static routes into dynamic routing algorithms but you cannot redistribute routing information calculated by dynamic routing algorithms into the static routing table.

You should use static routes in environments where network traffic is predictable and where the network design is simple. You should not use static routes in large, constantly changing networks because static routes cannot react to network changes. Most networks use dynamic routes to communicate between routers but may have one or two static routes configured for special cases. Static routes are also useful for specifying a gateway of last resort (a default router to which all unroutable packets are sent).

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Administrative Distance

An administrative distance is the metric used by routers to choose the best path when there are two or more routes to the same destination from two different routing protocols. An administrative distance guides the selection of one routing protocol (or static route) over another, when more than one protocol adds the same route to the unicast routing table. Each routing protocol is prioritized in order of most to least reliable using an administrative distance value.

Static routes have a default administrative distance of 1. A router prefers a static route to a dynamic route because the router considers a route with a low number to be the shortest. If you want a dynamic route to override a static route, you can specify an administrative distance for the static route. For example, if you have two dynamic routes with an administrative distance of 120, you would specify an administrative distance that is greater than 120 for the static route if you want the dynamic route to override the static route.

Directly Connected Static Routes

You need to specify only the output interface (the interface on which all packets are sent to the destination network) in a directly connected static route. The router assumes the destination is directly attached to the output interface and the packet destination is used as the next hop address. The next hop can be an interface, only for point-to-point interfaces. For broadcast interfaces, the next-hop must be an IPv4 or IPv6 address.

Fully Specified Static Routes

You must specify either the output interface (the interface on which all packets are sent to the destination network) or the next-hop address in a fully specified static route. You can use a fully specified static route when the output interface is a multi-access interface and you need to identify the next-hop address. The next-hop address must be directly attached to the specified output interface.

Floating Static Routes

A floating static route is a static route that the router uses to back up a dynamic route. You must configure a floating static route with a higher administrative distance than the dynamic route that it backs up. In this instance, the router prefers a dynamic route to a floating static route. You can use a floating static route as a replacement if the dynamic route is lost.

**Note**

By default, a router prefers a static route to a dynamic route because a static route has a smaller administrative distance than a dynamic route.

Remote Next Hops for Static Routes

You can specify the next-hop address of a neighboring router that is not directly connected to the router for static routes with remote (nondirectly attached) next hops. If a static route has remote next hops during data-forwarding, the next hops are recursively used in the unicast routing table to identify the corresponding directly attached next hop(s) that have reachability to the remote next hops.

BFD

Bidirectional forwarding detection (BFD) is supported for static routes. BFD is a detection protocol that provides fast forwarding-path failure detection times. BFD provides subsecond failure detection between two adjacent devices and can be less CPU-intensive than protocol hello messages because some of the BFD load can be distributed onto the data plane on supported modules. See the *Cisco Nexus 6000 Series NX-OS Interfaces Configuration Guide, Release 7.x* for more information.

Virtualization Support

Static routes support Virtual Routing and Forwarding instances (VRFs).

Licensing Requirements for Static Routing

The following table shows the licensing requirements for this feature:

| Product | License Requirement |
|-------------|---|
| Cisco NX-OS | Static routing requires no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the Cisco NX-OS licensing scheme, see the <i>Cisco NX-OS Licensing Guide</i> . |
| | Note Make sure the LAN Base Services license is installed on the switch to enable Layer 3 interfaces. |

Prerequisites for Static Routing

Static routing has the following prerequisites:

- The next-hop address for a static route must be reachable or the static route will not be added to the unicast routing table.

Guidelines and Limitations

Static routing has the following configuration guidelines and limitations:

- You can specify an interface as the next-hop address for a static route only for point-to-point interfaces such as GRE tunnels.

Default Settings

Table 11-1 lists the default settings for static routing parameters.

Table 11-1 Default Static Routing Parameters

| Parameters | Default |
|-------------------------|---------|
| administrative distance | 1 |

Configuring Static Routing

This section includes the following topics:

- [Configuring a Static Route, page 11-4](#)
- [Configuring Virtualization, page 11-5](#)



Note

If you are familiar with the Cisco IOS CLI, be aware that the Cisco NX-OS commands for this feature might differ from the Cisco IOS commands that you would use.

Configuring a Static Route

You can configure a static route on the router.

SUMMARY STEPS

1. **configure terminal**
2. **ip route** {*ip-prefix* | *ip-addr ip-mask*} {[*next-hop* | *nh-prefix*] | [*interface next-hop* | *nh-prefix*]} [**tag** *tag-value* [*pref*]]
3. (Optional) **show ip static-route**
4. (Optional) **copy running-config startup-config**

DETAILED STEPS

| | Command | Purpose |
|--------|---|---|
| Step 1 | configure terminal Example: switch# configure terminal switch(config)# | Enters configuration mode. |
| Step 2 | ip route { <i>ip-prefix</i> <i>ip-addr ip-mask</i> } {[<i>next-hop</i> <i>nh-prefix</i>] [<i>interface next-hop</i> <i>nh-prefix</i>]} [tag <i>tag-value</i> [<i>pref</i>]] Example: switch(config)# ip route 192.0.2.0/8 ethernet 1/2 192.0.2.4 | Configures a static route and the interface for this static route. You can optionally configure the next-hop address. The <i>preference</i> value sets the administrative distance. The range is from 1 to 255. The default is 1. |

| | Command | Purpose |
|--------|--|--|
| Step 3 | show {ip static-route} Example: switch(config)# show ip static-route | (Optional) Displays information about static routes. |
| Step 4 | copy running-config startup-config Example: switch(config)# copy running-config startup-config | (Optional) Saves this configuration change. |

This example shows how to configure a static route:

```
switch# configure terminal
switch(config)# ip route 192.0.2.0/8 192.0.2.10
switch(config)# copy running-config startup-config
```

Use the **no ip static-route** command to remove the static route.

Configuring Virtualization

You can configure a static route in a VRF.

SUMMARY STEPS

1. **configure terminal**
2. **vrf context** *vrf-name*
3. **ip route** {*ip-prefix* | *ip-addr ip-mask*} {*next-hop* | *nh-prefix* | *interface*} [**tag** *tag-value* [*pref*]]
4. (Optional) **show ip static-route vrf** *vrf-name*
5. (Optional) **copy running-config startup-config**

DETAILED STEPS

| | Command | Purpose |
|--------|--|---|
| Step 1 | configure terminal Example: switch# configure terminal switch(config)# | Enters configuration mode. |
| Step 2 | vrf context <i>vrf-name</i> Example: switch(config)# vrf context StaticVrf | Creates a VRF and enters VRF configuration mode. |
| Step 3 | ip route { <i>ip-prefix</i> <i>ip-addr ip-mask</i> } { <i>next-hop</i> <i>nh-prefix</i> <i>interface</i> } [tag <i>tag-value</i> [<i>pref</i>]] Example: switch(config-vrf)# ip route 192.0.2.0/8 ethernet 1/2 | Configures a static route and the interface for this static route. You can optionally configure the next-hop address. The <i>preference</i> value sets the administrative distance. The range is from 1 to 255. The default is 1. |

| | Command | Purpose |
|--------|--|---|
| Step 4 | show ip static-route vrf vrf-name Example: switch(config-vrf)# show ip static-route | (Optional) Displays information on static routes. |
| Step 5 | copy running-config startup-config Example: switch(config-vrf)# copy running-config startup-config | (Optional) Saves this configuration change. |

This example shows how to configure a static route:

```
switch# configure terminal
switch(config)# vrf context StaticVrf
switch(config-vrf)# ip route 192.0.2.0/8 192.0.2.10
switch(config-vrf)# copy running-config startup-config
```

Verifying the Static Routing Configuration

To display the static routing configuration information, use this command:

| Command | Purpose |
|-----------------------------|--|
| show ip static-route | Displays the configured static routes. |

Configuration Examples for Static Routing

This example shows how to configure static routing:

```
configure terminal
ip route 192.0.2.0/8 192.0.2.10
copy running-config startup-config
```

This example shows how to configure static routing for IPv6:

```
configure terminal
ipv6 route 43::/64 42::2
copy running-config startup-config
```

Additional References

For additional information related to implementing static routing, see the following sections:

- [Related Documents, page 11-7](#)

Related Documents

| Related Topic | Document Title |
|--------------------|--|
| Static Routing CLI | <i>Cisco Nexus 6000 Series Command Reference, Cisco NX-OS Releases 7.x</i> |

