Configuring Static Routing

This chapter describes how to configure static routing on the Cisco NX-OS device.

This chapter contains the following sections:

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 might 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).

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 must 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 that 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, but only for point-to-point interfaces. For broadcast interfaces, the next hop must be an IPv4 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 (non-directly 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 hops that have reachability to the remote next hops.

Virtualization Support

Static routes support virtual routing and forwarding (VRF) instances.

Prerequisites for Static Routing

Static routing has the following prerequisites:

• If the next-hop address for a static route is unreachable, the static route is not added to the unicast routing table.

Default Settings

The table lists the default settings for static routing parameters.

Table 1: Default Static Routing Parameters

Parameters	Default
Administrative distance	1
RIP feature	Disabled

Configuring Static Routing

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 device.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	
	Example:
	
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	Enter the following command:
	
	Example:
	
	`switch(config)# ip route 192.0.2.0/8`
	`ethernet 1/2 192.0.2.4`
		ip route {*ip-prefix* | *ip-addr*/*ip-mask*} {[*next-hop* | *nh-prefix*] | [*interface next-hop* | *nh-prefix*]} [**name** *nexthop-name*] [**tag** *tag-value*] [*preference*]
		
		Configures a static route and the interface for this static route. Use **?** to display a list of supported interfaces. You can specify a null interface by using **null 0**.
		
		You can optionally configure the next-hop address.

	Command or Action	Purpose
		The *preference* value sets the administrative distance. The range is from 1 to 255. The default is 1.
		Note Use the **no** {**ip**} **route** command to remove the static route.
Step 3	(Optional) **show** {**ip**} **static-route** **Example:** `switch(config)# show ip static-route`	Displays information about static routes.
Step 4	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Saves this configuration change.

Example

This example shows how to configure a static route for a null interface:

```
switch# configure terminal
switch(config)# ip route 1.1.1.1/32 null 0
switch(config)# copy running-config startup-config
```

Configuring a Static Route Over a VLAN

You can configure a static route without next-hop support over a VLAN.

Before you begin

Ensure that the access port is part of the VLAN.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal` `switch(config)#`	Enters global configuration mode.
Step 2	**feature interface vlan** **Example:** `switch(config)# feature interface-vlan`	Enables VLAN interface mode.
Step 3	**interface-vlan** *vlan-id* **Example:**	Creates an SVI and enters interface configuration mode.

	Command or Action	Purpose
	switch(config)# interface-vlan 10	The range for the **vlan-id** argument is from 1 to 4094, except for the VLANs reserved for the internal switch.
Step 4	**ip address** *ip-addr*/*length* **Example:** switch(config)# ip address 192.0.2.1/8	Configures an IP address for the VLAN.
Step 5	[**no**] **ip route** *ip-addr*/*length vlan-id* **Example:** switch(config)# ip route 209.165.200.224/27 vlan 10	Adds an interface static route without a next hop on the switch virtual interface (SVI). The IP address is the address that is configured on the interface that is connected to the switch. Use the **no** keyword with this command to remove the static route.
Step 6	(Optional) **show ip route** **Example:** switch(config)# show ip route	Displays routes from the Unicast Route Information Base (URIB).
Step 7	(Optional) **copy running-config startup-config** **Example:** switch(config)# copy running-config startup-config	Saves this configuration change.

Example

This example shows how to configure a static route without a next hop over an SVI:

```
switch# configure terminal
switch(config)# feature interface-vlan
swicth(config)# interface vlan 10
switch(config-if)# ip address 192.0.2.1/8
switch(config-if)# ip route 209.165.200.224/27 vlan 10  <===209,165.200.224 is the IP
address of the interface that is configured on the interface that is directly connected to
the switch.
switch(config-if)# copy running-config startup-config
```

Configuring Virtualization

You can configure a static route in a VRF.

Note When a **ip route** command is applied on a VRF context, the **show run vrf** command displays some octets that have changed from the initial configuration.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	
	Example:
	
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**vrf context** *vrf-name*
	
	Example:
	
	`switch(config)# vrf context StaticVrf`
	`switch(config-vrf)#`
		Creates a VRF and enters VRF configuration mode.

Step 3	**ip route** {*ip-prefix* | *ip-addr ip-mask*} {*next-hop* | *nh-prefix* | *interface*} [**name** *nexthop-name*] [**tag** *tag-value*] [*preference*]
	
	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. Use **?** to display a list of supported interfaces. You can specify a null interface by using **null 0**.
		
		You can optionally configure the next-hop address.
		
		The *preference* value sets the administrative distance. The range is from 1 through 255. The default is 1.

Step 4	(Optional) **show** {**ip**} **static-route vrf** *vrf-name* **Example:** `switch(config-vrf)# show ip static-route`	Displays information about static routes.

Step 5	(Optional) **copy running-config startup-config**
	
	Example:
	
	`switch(config-vrf)# copy running-config`
	`startup-config`
		Saves this configuration change.

Example

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
```

Configuration Example 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
```