

Static Routing

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address-family (static)

To enter various address family configuration modes while configuring static routes, use the **address-family** command in the appropriate configuration mode. To disable support for an address family, use the **no** form of this command.

address-family { **ipv4** | **ipv6** } { **unicast** }
no address-family { **ipv4** | **ipv6** } { **unicast** }

Syntax Description

ipv4	Specifies IP Version 4 address prefixes.
ipv6	Specifies IP Version 6 address prefixes. This option is available only in static router configuration mode.
unicast	Specifies unicast address prefixes.

Command Modes

Router static configuration

Usage Guidelines

Use the **address-family** command to enter various address family configuration modes while configuring static routing sessions. From address family configuration mode, you can configure static routes using the **route** command.

Examples

The following example shows how to enter IPv6 unicast address family mode:

```
Router(config)# router static
Router(config-static)# address-family ipv6 unicast
Router(config-static-afi)#
```

Related Commands

Command	Description
Route Static	Establishes a static route.

address-family ipv4 unicast (static)

To enter IPv4 address family configuration mode while configuring static routes, use the **address-family ipv4 unicast** command in the appropriate configuration mode. To disable support for IPv4 address family, use the **no** form of this command.

address-family ipv4 unicast *prefix mask* **remote-next-hop** *ip4-address* **tunnel** *gue-v1* **source-ip** *ip-address* [**dscp** *value*] [**ttl** *value*]

Syntax Description

prefix mask	Specifies the destination prefix (A.B.C.D/length or X:X::X/length).
remote-next-hop	Specifies the remote tunnel IP4 endpoint address in default VRF.
tunnel *gue-v1*	Specifies the encapsulation type.
source-ip *ip-address*	Specifies the IPv4 source IP address.
dscp *value*	(Optional) Specified the DSCP value to be set in GUE encapsulation IP header. Ranges between 0 and 63.
ttl *value*	(Optional) TTL value to be set in GUE encapsulation IP header. Ranges between 0 and 255.

Table 1: Command History:

Release	Modification
Release 25.4.1	This command was modified to include these keywords: **remote-next-hop**, **tunnel**, **source-ip**, **dscp**, and **ttl**.
Release 7.0.14	This command was introduced.

Command Modes

Router static configuration

Usage Guidelines

IPv4 option in **source-ip** is visible only for IPv4 next-hop.

Examples

This example shows how to configure IPv4 GUEv1 static tunnel:

```
  Router(config)# router static
  Router(config-static)# address-family ipv4 unicast
  Router(config-static-afi)# 9.8.7.6/32 remote-next-hop 5.5.5.6 tunnel gue-v1 source-ip
1.1.1.1 dscp 46 ttl 250
```

Related Commands

Command	Description
Route Static	Establishes a static route.

address-family ipv6 unicast (static)

To enter IPv6 address family configuration mode while configuring static routes, use the **address-family ipv6 unicast** command in the appropriate configuration mode. To disable support for IPv6 address family, use the **no** form of this command.

address-family ipv6 unicast *prefix mask* **remote-next-hop** *ip4-address* **tunnel** *gue-v1* **source-ip** *ip-address* [**dscp** *value*] [**ttl** *value*]

Syntax Description

prefix mask	Specifies the destination prefix (A.B.C.D/length or X:X::X/length).
remote-next-hop	Specifies the remote tunnel IPv6 endpoint address in default VRF.
tunnel *gue-v1*	Specifies the encapsulation type.
source-ip *ip-address*	Specifies the IPv6 source IP address.
dscp *value*	(Optional) Specifies the DSCP value to be set in GUE encapsulation IP header. Ranges between 0 and 63.
ttl *value*	(Optional) Specifies the TTL value to be set in GUE encapsulation IP header. Ranges between 0 and 255.

Table 2: Command History:

Release	Modification
Release 25.4.1	This command was modified to include these keywords: **remote-next-hop**, **tunnel**, **source-ip**, **dscp**, and **ttl**.
Release 7.0.14	This command was introduced.

Command Modes

Router static configuration

Usage Guidelines

IPv6 option in **source-ip** is visible only for IPv6 next-hop.

Examples

This example shows how to configure IPv6 GUEv1 static tunnel:

```
  Router(config)# router static
  Router(config-static)# address-family ipv6 unicast
  CPU0:router(config-static-afi)# 11:1:1::1/128 remote-next-hop 10.10.10.11 tunnel gue-v1
source-ip 2.2.2.2 dscp 8 ttl 250
```

Related Commands

Command	Description
Route Static	Establishes a static route.

maximum path (static)

To change the maximum number of allowable static routes, use the **maximum path** command in static router configuration mode. To remove the **maximum path** command from the configuration file and restore the system to its default condition, use the **no** form of this command.

maximum path { **ipv4** | **ipv6** } *value*
no maximum path { **ipv4** | **ipv6** } *value*

Syntax Description

ipv4 | **ipv6**	Specifies IP Version 4 (IPv4) or IP Version 6 (IPv6) address prefixes.
value	Maximum number of static routes for the given AFI. The range is 1 to 140000.

Command Default

value : 4000

Command Modes

Static router configuration

Usage Guidelines

If you use the **maximum path** command to reduce the configured maximum allowed number of static routes for a given table below the number of static routes currently configured, the change is rejected. In addition, if you commit a batch of routes that would, when grouped, push the number of static routes configured above the maximum allowed, the first *n* routes in the batch and the number previously configured are accepted, and the remainder rejected. The *n* argument is the difference between the maximum number allowed and the number previously configured.

Examples

The following example shows how to set the maximum number of static IPv4 routes to 100000:

```
Router(config-static)# maximum path ipv4 100000
```

The following example shows how to remove the preceding configuration and set the maximum number of static IPv4 routes back to the default:

```
Router(config-static)# no maximum path ipv4 100000
```

Related Commands

Command	Description
route static	Enters static router configuration mode.
show route static	Displays the static routes in a routing table.

router static address-family ipv4 unicast

Use this command to allow an IPv6 address to be entered as a next-hop for an IPv4 prefix.

router static address-family ipv4 unicast *ipv4-prefix/mask interface ipv6-next-hop*

Syntax Description

ipv4-prefix mask	Specifies the IPv4 destination prefix (A.B.C.D/length or X:X::X/length).
interface	Specifies the interface that must be paired with an IPv6 next-hop address.
ipv6-next-hop	Specifies the IPv6 gateway address of the next router in the path toward the destination.

Table 3: Command History:

Release	Modification
Release 26.1.1	This command was introduced.

Command Default

All static routes belong to the default VRF in the address family configuration mode.

Command Modes

Router static configuration

Examples

This example shows how to configure recursive path. Use this option when the IPv6 next-hop is reachable via another route in the routing table.

```
  Router(config)# router static
  Router(config-static)# address-family ipv4 unicast
  Router(config-static-afi)# 1.1.0.0/16 1:1:1::1
Router(config-static-afi)# commit
```

This example shows how to configure IPv6 next-hop via an interface . Use this option to specify exactly which interface must be used to reach the IPv6 next-hop.

```
  Router(config)# router static
  Router(config-static)# address-family ipv4 unicast
  Router(config-static-afi)# 1.1.0.0/16 GigabitEthernet0/0/0/0 1:1:1::1
Router(config-static-afi)# commit
```

Related Commands

Command	Description
Route Static	Establishes a static route.

route (static)

To establish static routes, use the **route** command in address family configuration mode. To remove the **route** command from the configuration, use the **no** form of this command.

prefix / mask { *ip-address* | *type* *interface-path-id* [*ip-address* | *type* *interface-path-id*] [**behavior** | *utef*] [**track** *track-object-name*] [**tunnel-id**] [**vrflabel** *vrf-label*] [*distance*] [**description** *text*] [**tag** *tag*] [**permanent**] }

Syntax Description

prefix / *mask*	IP route prefix and prefix mask for the destination. The network mask can be specified in either of two ways: • The network mask can be a four-part, dotted-decimal address. For example, 255.0.0.0 indicates that each bit equal to 1 means the corresponding address bit is a network address. • The network mask can be indicated as a slash (/) and number. For example, /8 indicates that the first 8 bits of the mask are 1s, and the corresponding bits of the address are the network address.
ip-address	IP address of the next hop that can be used to reach that network. • For IPv4 address–the IP address is required, not optional, if the interface type and interface-path-id arguments are not specified. You can specify an IP address and an interface type and interface path. • For IPv6 link-local address–the interface type and interface-path-id arguments are required. The route is not valid, if the interface type and interface-path-id arguments are not specified. **Note** A forwarding router's IP address or an interface or virtual interface path ID can be configured, in any order.
behavior	Define the behavior by selecting the appropriate option.
utef	Static programs the utef SID with the context of controller address.
type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function. **Note** A forwarding router's IP address or an interface or virtual interface path ID can be configured, in any order.

distance	(Optional) Administrative distance. Range is 1 to 254.
description *text*	(Optional) Specifies a description of the static route.
tag *tag*	(Optional) Specifies a tag value that can be used as a match for controlling redistribution using route policies. Range is 1 to 4294967295.
permanent	(Optional) Specifies that the route is not removed from the routing table, even if the next-hop interface shuts down or next-hop IP address is not reachable.
track *track-object-name*	Installs static routes in RIB only if track is UP.
tunnel-id *tunnel-id*	Specifies a Tunnel ID.
vrflabel *vrf-label*	Specifies a VRF label.

Command Default

No static route is established.

Command Modes

Address family configuration

Table 4: Command History:

Release	Modification
Release 24.1.1	The *utef* keyword was introduced.
Release 7.0.14	This command was introduced.
Release 7.3.15	The conditional installation of static route in routing table (RIB) based on object state functionality has been enhanced to use event driven notification, instead of the polling mechanism used earlier.

Usage Guidelines

A static route is appropriate when the software cannot dynamically build a route to the destination.

Static routes have a default administrative distance of 1, in which a low number indicates a preferred route. By default, static routes are preferred to routes learned by routing protocols. You can configure an administrative distance with a static route if you want the static route to be overridden by dynamic routes. For example, you could have routes installed by the Open Shortest Path First (OSPF) protocol with an administrative distance of 120. To have a static route that would be overridden by an OSPF dynamic route, specify an administrative distance greater than 120.

The routing table considers the static routes that point to an interface as “directly connected.” Directly connected networks are advertised by IGP routing protocols if a corresponding **interface** command is contained under the router configuration stanza of that protocol.

A static route is always associated with a VPN routing and forwarding (VRF) instance. The VRF can be the default VRF or a specified VRF. Specifying a VRF allows you to enter VRF configuration mode where you can configure a static route. If you do not specify a VRF you can configure a default VRF static route.

Use the **router static** command to configure static routes. To configure a static route, you must enter router static configuration mode and then enter an address family configuration mode or VRF configuration mode. See the **vrf (static)** command for information on configuring a static route in VRF configuration mode. After

you enter an address family mode, you can enter multiple static routes. The following example shows how to configure multiple static routes in IPv4 and IPv6 address family configuration modes:

Note You cannot create a VRF named default, but you can reference the default VRF.

Note The conditional installation of static route in routing table (RIB) based on object state functionality has been enhanced to use event driven notification, instead of the polling mechanism used earlier. This event driven approach allows faster detection and notification of object state changes.

The following example shows how to configure the Sink node:

```
Router(config)#router static
Router(config-static)# address-family ipv6 unicast
Router(config-static-afi)#fccc:cc00:9000:fef1::/64 segment-routing srv6 endpoint behavior
utef controller-address fccc:cc00:7::
```

Examples

The following example shows how to configure IPv6 unicast address family static routes:

```
Router(config)# router static
Router(config-static)# address-family ipv6 unicast
Router(config-static-afi)# 2b11::327a:7b00/120 GigabitEthernet0/2/0/7
Router(config-static-afi)# 2b11::327a:7b00/120 GigabitEthernet0/6/0/0
Router(config-static-afi)# 2b11::327a:7b00/120 2b11::2f01:4c
Router(config-static-afi)# 2b11::327a:7b00/120 2b11::2f01:4d
Router(config-static-afi)# 2b11::327a:7b00/120 2b11::2f01:4e
Router(config-static-afi)# 2b11::327a:7b00/120 2b11::2f01:4f
Router(config-static-afi)# 2b11::327a:7b00/120 2b11::2f01:50
```

router static

To enter static router configuration mode, use the **router static** command in mode. To remove all static route configurations and terminate the static routing process, use the **no** form of this command.

router static
no router static

Syntax Description

This command has no arguments or keywords.

Command Default

No static routing process is enabled.

Command Modes

Examples

The following example shows how to enter static router configuration mode:

```
Router(config)# router static
Router(config-static)#
```

Related Commands

Command	Description
Address family static	Enters address family configuration mode.
show route	Displays the current contents of the routing table.
show route static	Displays the static routes in a routing table.
show route summary	Displays the current contents of the routing table in summary format.
Route Static	Establishes a static route.

show static interfaces

Use this command to display a specific notification indicating if an interface is being tracked for forwarding cross-afi IPv6 traffic.

show static interfaces

Table 5: Command History:

Release	Modification
Release 26.1.1	This command was introduced.

Command Default

All static routes belong to the default VRF in the address family configuration mode.

Command Modes

Router static configuration

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

This example displays the interface state is **Up** and tracked for cross-afi traffic.

```
Router# show static interfaces
```

show static vrf

Use this command to display IPv6 next-hops and the topology table that lists IPv4 prefixes.

show static vrf default ipv4 *next-hops topology*

Syntax Description

next-hop	Displays IPv6 next-hops and their resolution state, Resolved or Unresolved specifically for the IPv4 routing process.
topology	Displays the topology table, listing IPv4 prefixes alongside their corresponding IPv6 next-hops and interfaces.

Table 6: Command History:

Release	Modification
Release 26.1.1	This command was introduced.

Command Default

Not applicable.

Command Modes

Router static configuration

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

This example shows how to verify if the static routing process has successfully resolved the IPv6 next-hop. Look for the status **Resolved** next to the IPv6 address.

```
Router# show static vrf default ipv4 next-hops
```

This example shows how tcheck the Routing Table (RIB) and verify that the IPv4 prefix is present and shows the IPv6 next-hop.

```
Router# show route ipv4 unicast 1.1.0.0/16
```

vrf (static)

To configure a VPN routing and forwarding (VRF) instance and enter VRF configuration mode, use the **vrf** command in router configuration mode. To remove the VRF instance from the configuration file and restore the system to its default condition, use the **no** form of this command.

vrf *vrf-name* **vrf RED urpf-lookup-ipv4** | **urpf-lookup-ipv6**
no vrf *vrf-name*

Syntax Description

vrf-name	Name of the VRF instance. The following names cannot be used: all, default, and global.
vrf RED urpf-lookup-ipv4	Introduced in IOS XR Release 26.2.1, it enables the IPv4 URPF lookup bit for the VRF.
vrf RED urpf-lookup-ipv6	Introduced in IOS XR Release 26.2.1, it enables the IPv6 URPF lookup bit for the VRF.

Command Default

No default behavior or values

Command Modes

Static router configuration

Usage Guidelines

Use the **vrf** command to configure a VRF instance. A VRF instance is a collection of VPN routing and forwarding tables maintained at the provider edge (PE) router.

A static route is always associated with a VRF, which is entirely user configurable. Static route is unique within a VRF. A static route can point to a next-hop interface, next-hop IP address, or both, which can be resided in the same VRF configured for the static route or in a different VRF. For example, routes 172.168.40.0/24 and 172.168.50.0/24 are configured as follows:

```
router static
vrf vrf_A
address ipv4 unicast
172.168.40.0/24 loopback 1
172.168.50.0/24 vrf vrf_B 192.168.1.2
```

Routes 172.168.40.0/24 and 172.168.50.0/24 belong to vrf_A. Route 172.168.50.0/24 is not installed in vrf_A until next-hop 192.168.1.2 (a vrf_B route) is reachable.

If you are configuring a default VRF route, you do not need to enter VRF configuration mode. For example, routes 192.168.1.0/24 and 192.168.2.0/24 are configured as follows:

```
router static
 address ipv4 unicast
  192.168.1.0/24 loopback 5
  192.168.2.0/24 10.1.1.1
```

Routes 192.168.1.0/24 and 192.168.2.0/24 are default VRF routes.

Note You cannot create a VRF named default, but you can reference the default VRF.

Examples

The following example shows how to configure a VRF instance and enter VRF configuration mode:

```
Router(config)# router static
Router(config-static)# vrf vrf-1
Router(config-static-vrf)#
```

This example shows how to configure URPF lookup on a specific VRF:

```
Router# configure
Router(config)# vrf RED
Router(config-vrf)# urpf-lookup-ipv4
Router(config-vrf)# urpf-lookup-ipv6
Router(config-vrf)# commit
```

Related Commands

Command	Description
Address family static	Enters address family configuration mode and allows you to configure a static route.