# IPv6 Routing: Multiprotocol BGP Link-Local Address Peering



# Information About IPv6 Routing: Multiprotocol BGP Link-Local Address Peering

## IPv6 Multiprotocol BGP Peering Using a Link-Local Address

The IPv6 multiprotocol BGP can be configured between two IPv6 devices (peers) using link-local addresses.

Boarder Gateway Protocol (BGP) uses third-party next hops for peering with multiple peers over IPv6 link-local addresses on the same interface. Peering over link-local addresses on different interfaces cannot use third party next hops. The neighbors peering using link-local addresses are split into one update group per interface. BGP splits update group membership for neighbors with link-local addresses based on the interface used to communicate with that neighbor.

# How to Configure IPv6 Routing: Multiprotocol BGP Link-Local Address Peering

## Configuring an IPv6 Multiprotocol BGP Peer Using a Link-Local Address

**Note**

- By default, neighbors that are defined using the **neighbor remote-as** command in router configuration mode exchange only IPv4 unicast address prefixes. To exchange other address prefix types, such as IPv6 prefixes, neighbors must also be activated using the **neighbor activate** command in address family configuration mode for the other prefix types, as shown for IPv6 prefixes.
- By default, route maps that are applied in router configuration mode using the **neighbor route-map** command are applied to only IPv4 unicast address prefixes. Route maps for other address families must be applied in address family configuration mode using the **neighbor route-map** command, as shown for the IPv6 address family. The route maps are applied either as the inbound or outbound routing policy for neighbors under the specified address family. Configuring separate route maps under each address family type simplifies managing complicated or different policies for each address family.
- The route-map used to modify the next hop needs to be applied outbound only. Inbound route-map to modify next-hop ipv6 address is not supported. Inbound route-map is supported only for IPV4 address family.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router bgp** *autonomous-system-number*
4. **neighbor** *ipv6-address* **%** *interface-name* **remote-as** *autonomous-system-number* [**alternate-as** *autonomous-system-number ...*]
5. **address-family ipv6** [**vrf** *vrf-name*] [**unicast** | **multicast** | **vpnv6**]
6. **neighbor** {*ip-address* | *peer-group-name* | *ipv6-address* **%** *interface-name*} **activate**
7. **neighbor** {*ip-address* | *peer-group-name* | *ipv6-address*[**%** *interface-name*]} **route-map** *map-name* {**in** | **out**}
8. **exit**
9. Repeat Step 8.
10. **route-map** *map-tag* [**permit** | **deny**] [*sequence-number*]
11. **match ipv6 address** {**prefix-list** *prefix-list-name* | *access-list-name*}
12. **set ipv6 next-hop** *ipv6-address* [*link-local-address*] [**peer-address**]

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **enable** | Enables privileged EXEC mode. |

| | Command or Action | Purpose |
|---|---|---|
| | **Example:**<br>`Device> enable` | • Enter your password if prompted. |
| **Step 2** | **configure terminal**<br>**Example:**<br>`Device# configure terminal` | Enters global configuration mode. |
| **Step 3** | **router bgp** *autonomous-system-number*<br>**Example:**<br>`Device(config)# router bgp 65000` | Enters router configuration mode for the specified routing process. |
| **Step 4** | **neighbor** *ipv6-address* **%** *interface-name* **remote-as** *autonomous-system-number* [**alternate-as** *autonomous-system-number* ...]<br>**Example:**<br>`Device(config-router)# neighbor FE80::1234:BFF:FE0E:A471% remote-as 64600` | Adds the link-local IPv6 address of the neighbor in the specified remote autonomous system to the IPv6 multiprotocol BGP neighbor table of the local router.<br>**Note** Interface for BGP Link-Local neighbor addresses must be configured as part of the address, for example:<br>`FE80::1234:BFF:FE0E:A471%GigabitEthernet0/0/0`<br>This configuration allows you to have the same local link peering address in multiple interfaces. |
| **Step 5** | **address-family ipv6** [**vrf** *vrf-name*] [**unicast** \| **multicast** \| **vpnv6**]<br>**Example:**<br>`Device(config-router)# address-family ipv6` | Specifies the IPv6 address family, and enters address family configuration mode.<br>• The **unicast** keyword specifies the IPv6 unicast address family. By default, the router is placed in configuration mode for the IPv6 unicast address family if the **unicast** keyword is not specified with the **address-family ipv6** command.<br>• The **multicast** keyword specifies IPv6 multicast address prefixes. |
| **Step 6** | **neighbor** {*ip-address* \| *peer-group-name* \| *ipv6-address* **%** *interface-name*} **activate**<br>**Example:**<br>`Device(config-router-af)# neighbor FE80::1234:BFF:FE0E:A471% activate` | Enables the neighbor to exchange prefixes for the IPv6 address family with the local router using the specified link-local addresses.<br>• The optional **%** keyword is the IPv6 link-local address identifier. This keyword needs to be added whenever a link-local IPv6 address is used outside the context of its interface. |
| **Step 7** | **neighbor** {*ip-address* \| *peer-group-name* \| *ipv6-address*[**%** *interface-name*]} **route-map** *map-name* {**in** \| **out**}<br>**Example:** | Applies a route map to incoming or outgoing routes.<br>• The optional **%** keyword is the IPv6 link-local address identifier. This keyword needs to be added |

| | Command or Action | Purpose |
|---|---|---|
| | `Device(config-router-af)# neighbor FE80::1234:BFF:FE0E:A471% route-map nh6 out` | whenever a link-local IPv6 address is used outside the context of its interface. |
| **Step 8** | **exit**<br>**Example:**<br>`Device(config-router-af)# exit` | Exits address family configuration mode, and returns the device to router configuration mode. |
| **Step 9** | Repeat Step 8.<br>**Example:**<br>`Device(config-router)# exit` | Exits router configuration mode, and returns the device to global configuration mode. |
| **Step 10** | **route-map** *map-tag* [**permit** \| **deny**] [*sequence-number*]<br>**Example:**<br>`Device(config)# route-map nh6 permit 10` | Defines a route map and enters route-map configuration mode. |
| **Step 11** | **match ipv6 address** {**prefix-list** *prefix-list-name* \| *access-list-name*}<br>**Example:**<br>`Device(config-route-map)# match ipv6 address prefix-list cisco` | Distributes any routes that have a destination IPv6 network number address permitted by a prefix list, or performs policy routing on packets. |
| **Step 12** | **set ipv6 next-hop** *ipv6-address* [*link-local-address*] [**peer-address**]<br>**Example:**<br>`Device(config-route-map)# set ipv6 next-hop 2001:DB8::1` | Overrides the next hop advertised to the peer for IPv6 packets that pass a match clause of a route map for policy routing.<br>• The *ipv6-address* argument specifies the IPv6 global address of the next hop. It need not be an adjacent router.<br>• The *link-local-address* argument specifies the IPv6 link-local address of the next hop. It must be an adjacent router.<br>**Note** The route map sets the IPv6 next-hop addresses (global and link-local) in BGP updates. If the route map is not configured, the next-hop address in the BGP updates defaults to the unspecified IPv6 address (::), which is rejected by the peer. |

# Configuration Examples for IPv6 Routing: Multiprotocol BGP Link-Local Address Peering

## Example: Configuring an IPv6 Multiprotocol BGP Peer Using a Link-Local Address

The following example configures the IPv6 multiprotocol BGP peer FE80::1234:BFF:FE0E:A471 over Gigabitethernet interface 0/0 and sets the route map named nh6 to include the IPv6 next-hop global address of Gigabitethernet interface 0/0 in BGP updates.

```
Device> enable
Device# configure terminal
Device(config)# router bgp 5
Device(config-router)# neighbor internal peer-group
Device(config-router)# neighbor  FE80::1234:BFF:FE0E:A471% peer-group
Device(config-router)# neighbor internal remote-as 100
Device(config-router)# neighbor FE80::1234:BFF:FE0E:A471% remote-as 64600
Device(config-router)# neighbor FE80::1234:BFF:FE0E:A471% update-source Gigabitethernet 0/0

Device(config-router)# address-family ipv6
Device(config-router-af)# neighbor FE80::1234:BFF:FE0E:A471% activate
Device(config-router-af)# neighbor FE80::1234:BFF:FE0E:A471% route-map nh6 out
Device(config-router-af)# exit
Device(config-router)# exit
Device(config)# route-map nh6permit 10
Device(config-router-map)# match ipv6 address prefix-list cisco
Device(config-router-map)# set ipv6 next-hop 2001:DB8:526::1
Device(config-router-map)# exit
Device(config)# ipv6 prefix-list cisco permit 2001:DB8:2F22::/48 le 128
Device(config)# ipv6 prefix-list cisco deny ::/0
Device(config)# end
```

The following example configures the IPv6 multiprotocol BGP peer FE80::1234:BFF:FE0E:A471 over GigabitEthernetinterface 0/0/0 and sets the route map named nh6 to include the IPv6 next-hop global address of GigabitEthernet interface 0/0/0 in BGP updates.

```
Device> enable
Device# configure terminal
Device(config)# router bgp 5
Device(config-router)# neighbor FE80::1234:BFF:FE0E:A471%GigabitEthernet0/0/0 remote-as
64600
Device(config-router)# address-family ipv6
Device(config-router-af)# neighbor FE80::1234:BFF:FE0E:A471%GigabitEthernet0/0/0 activate
Device(config-router-af)# neighbor FE80::1234:BFF:FE0E:A471%GigabitEthernet0/0/0 route-map
 nh6 out
Device(config-router-af)# exit

Device(config-router)# exit
Device(config)# route-map nh6permit 10
Device(config-router-map)# match ipv6 address prefix-list cisco
Device(config-router-map)# set ipv6 next-hop 2001:DB8:526::1
Device(config-router-map)# exit
Device(config)# ipv6 prefix-list cisco permit 2001:DB8:2F22::/48 le 128
```

```
Device(config)# ipv6 prefix-list cisco deny ::/0
Device(config)# end
```

# Additional References

### Related Documents

| Related Topic | Document Title |
|---|---|
| IPv6 addressing and connectivity | *IPv6 Configuration Guide* |
| Cisco IOS commands | Cisco IOS Master Command List, All Releases |
| IPv6 commands | Cisco IOS IPv6 Command Reference |
| Cisco IOS IPv6 features | Cisco IOS IPv6 Feature Mapping |

### Standards and RFCs

| Standard/RFC | Title |
|---|---|
| RFCs for IPv6 | *IPv6 RFCs* |

### MIBs

| MIB | MIBs Link |
|---|---|
| — | To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:<br>http://www.cisco.com/go/mibs |

### Technical Assistance

| Description | Link |
|---|---|
| The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password. | http://www.cisco.com/cisco/web/support/index.html |

# Feature Information for IPv6 Routing Multiprotocol BGP Link-Local Address Peering

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

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

***Table 1: Feature Information for IPv6 Routing: Multiprotocol BGP Link-Local Address Peering***

| Feature Name | Releases | Feature Information |
|---|---|---|
| IPv6 Routing: Multiprotocol BGP Link-Local Address Peering | Cisco IOS XE Release 2.1 | This feature is supported. |