IPv6 Routing: Multiprotocol BGP Link-Local Address Peering

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

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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. For this function to work, you must identify the interface for the neighbor by using the **neighbor update-source** command, and you must configure a route map to set an IPv6 global next hop.

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

Configuring IPv6 multiprotocol BGP between two IPv6 devices (peers) using link-local addresses requires that you identify the interface for the neighbor by using the **neighbor update-source** command and that a you configure a route map to set an IPv6 global next hop.

Note

- By default, neighbors that are defined using the **neighbor remote-as** command in router configuration mode exchange only IPv4 unicast address prefixes. To be able 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** {*ip-address* | *ipv6-address* | *peer-group-name*} **peer-group**
5. **neighbor** {*ip-address* | *ipv6-address* [**%**] **peer-group**}
6. **neighbor** {*ip-address* | *ipv6-address %*| *peer-group-name*} **remote-as** *autonomous-system-number* [**alternate-as** *autonomous-system-number...*]
7. **neighbor** {*ip-address* | *ipv6-address* [**%**] | *peer-group-name*} **remote-as** *autonomous-system-number* [**alternate-as** *autonomous-system-number ...*]
8. **neighbor** {*ip-address* | *ipv6-address* [**%**] | *peer-group-name*} **update-source** *interface-type interface-number*
9. **address-family ipv6** [**vrf** *vrf-name*] [**unicast** | **multicast** | **vpnv6**]
10. **neighbor** {*ip-address* | *peer-group-name* | *ipv6-address* **%**} **activate**
11. **neighbor** {*ip-address* | *peer-group-name* | *ipv6-address* [**%**]} **route-map** *map-name* {**in** | **out**}
12. **exit**
13. **exit**
14. **route-map** *map-tag* [**permit** | **deny**] [*sequence-number*]
15. **match ipv6 address** {**prefix-list** *prefix-list-name* | *access-list-name*}
16. **set ipv6 next-hop** *ipv6-address* [*link-local-address*] [**peer-address**]
17. **exit**
18. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**router bgp** *autonomous-system-number* **Example:** `Device(config)# router bgp 65000`	Enters router configuration mode for the specified routing process.
Step 4	**neighbor** {*ip-address* | *ipv6-address* | *peer-group-name*} **peer-group**	Creates a BGP or multiprotocol BGP peer group.

	Command or Action	Purpose
	Example: `Device(config-router)# neighbor internal peer-group`	
Step 5	**neighbor** {*ip-address* | *ipv6-address* [**%**] **peer-group**} **Example:** `Device(config-router)# neighbor FE80::1234:BFF:FE0E:A471% peer-group`	Configures a BGP neighbor to member of a peer group. **Note** **%** 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 6	**neighbor** {*ip-address* | *ipv6-address %*| *peer-group-name*} **remote-as** *autonomous-system-number* [**alternate-as** *autonomous-system-number...*] **Example:** `Device(config-router)# neighbor internal remote-as 100`	Adds an entry to the BGP or multiprotocol BGP neighbor table.
Step 7	**neighbor** {*ip-address* | *ipv6-address* [**%**] | *peer-group-name*} **remote-as** *autonomous-system-number* [**alternate-as** *autonomous-system-number ...*] **Example:** `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 device. **Note** **%** 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 8	**neighbor** {*ip-address* | *ipv6-address* [**%**] | *peer-group-name*} **update-source** *interface-type interface-number* **Example:** `Device(config-router)# neighbor FE80::1234:BFF:FE0E:A471% update-source Gigabitethernet 0/0`	Specifies the link-local address over which the peering is to occur. • 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. • If there are multiple connections to the neighbor and you do not specify the neighbor interface by using the *interface-type* and *interface-number* arguments in the **neighbor update-source** command, a TCP connection cannot be established with the neighbor using link-local addresses.
Step 9	**address-family ipv6** [**vrf** *vrf-name*] [**unicast** | **multicast** | **vpnv6**] **Example:** `Device(config-router)# address-family ipv6`	Specifies the IPv6 address family, and enters address family configuration mode. • The **unicast** keyword specifies the IPv6 unicast address family. By default, the device is placed in configuration mode for the IPv6 unicast address family if the **unicast** keyword is not specified with the **address-family ipv6** command.

	Command or Action	Purpose
		• The **multicast** keyword specifies IPv6 multicast address prefixes.
Step 10	**neighbor** {*ip-address* | *peer-group-name* | *ipv6-address* **%**} **activate** **Example:** `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 device using the specified link-local addresses. • 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 11	**neighbor** {*ip-address* | *peer-group-name* | *ipv6-address* [**%**]} **route-map** *map-name* {**in** | **out**} **Example:** `Device(config-router-af)# neighbor FE80::1234:BFF:FE0E:A471% route-map nh6 out`	Applies a route map to incoming or outgoing routes. • 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 12	**exit** **Example:** `Device(config-router-af)# exit`	Exits address family configuration mode, and returns the device to router configuration mode.
Step 13	**exit** **Example:** `Device(config-router)# exit`	Exits router configuration mode, and returns the device to global configuration mode.
Step 14	**route-map** *map-tag* [**permit** | **deny**] [*sequence-number*] **Example:** `Device(config)# route-map nh6 permit 10`	Defines a route map and enters route-map configuration mode.
Step 15	**match ipv6 address** {**prefix-list** *prefix-list-name* | *access-list-name*} **Example:** `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 16	**set ipv6 next-hop** *ipv6-address* [*link-local-address*] [**peer-address**] **Example:** `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. • The *ipv6-address* argument specifies the IPv6 global address of the next hop. It need not be an adjacent device. • The *link-local-address* argument specifies the IPv6 link-local address of the next hop. It must be an adjacent device. If you do not specify this optional argument, the link-local address of

	Command or Action	Purpose
		the interface specified with the *interface-type* argument (in the **neighbor update-source** command in Step 5) is included as the next-hop in the BGP updates. Therefore, only one route map that sets the global IPv6 next-hop address in BGP updates is required for multiple BGP peers that use link-local addresses. • 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.
Step 17	**exit** **Example:** `Device(config-router-map)# exit`	Exits router map configuration mode, and returns the device to router configuration mode.
Step 18	**end** **Example:** `Device(config-router)# end`	Exits router configuration mode, and enters privileged EXEC mode.

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. The IPv6 next-hop link-local address can be set by the nh6 route map (not shown in the following example) or from the interface specified by the **neighbor update-source** command (as shown in this example).

```
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
```

Note If you specify only the global IPv6 next-hop address (the *ipv6-address* argument) with the **set ipv6 next-hop** command after specifying the neighbor interface (the *interface-type* argument) with the **neighbor update-source** command, the link-local address of the interface specified with the *interface-type* argument is included as the next hop in the BGP updates. Therefore, only one route map that sets the global IPv6 next-hop address in BGP updates is required for multiple BGP peers that use link-local addresses.

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: 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.

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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		IPv6 supports multiprotocol BGP link-local address peering.