



IPv6 Multicast Address Family Support for Multiprotocol BGP

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Information About IPv6 Multicast Address Family Support for Multiprotocol BGP

Multiprotocol BGP for the IPv6 Multicast Address Family

The multiprotocol BGP for the IPv6 multicast address family feature provides multicast BGP extensions for IPv6 and supports the same features and functionality as IPv4 BGP. IPv6 enhancements to multicast BGP include support for an IPv6 multicast address family and network layer reachability information (NLRI) and next hop (the next router in the path to the destination) attributes that use IPv6 addresses.

Multicast BGP is an enhanced BGP that allows the deployment of interdomain IPv6 multicast. Multiprotocol BGP carries routing information for multiple network layer protocol address families; for example, IPv6 address family and for IPv6 multicast routes. The IPv6 multicast address family contains routes used for RPF lookup by the IPv6 PIM protocol, and multicast BGP IPv6 provides for interdomain transport of the same. Users must use multiprotocol BGP for IPv6 multicast when using IPv6 multicast with BGP because the unicast BGP learned routes will not be used for IPv6 multicast.

Multicast BGP functionality is provided through a separate address family context. A subsequent address family identifier (SAFI) provides information about the type of the network layer reachability information that is carried in the attribute. Multiprotocol BGP unicast uses SAFI 1 messages, and multiprotocol BGP multicast uses SAFI 2 messages. SAFI 1 messages indicate that the routes are usable only for IP unicast, not IP multicast. Because of this functionality, BGP routes in the IPv6 unicast RIB must be ignored in the IPv6 multicast RPF lookup.

A separate BGP routing table is maintained to configure incongruent policies and topologies (for example, IPv6 unicast and multicast) by using IPv6 multicast RPF lookup. Multicast RPF lookup is very similar to the IP unicast route lookup.

No MRIB is associated with the IPv6 multicast BGP table. However, IPv6 multicast BGP operates on the unicast IPv6 RIB when needed. Multicast BGP does not insert or update routes into the IPv6 unicast RIB.

How to Implement IPv6 Multicast Address Family Support for Multiprotocol BGP

Configuring an IPv6 Peer Group to Perform Multicast BGP Routing

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router bgp** *as-number*
4. **neighbor** *peer-group-name* **peer-group**
5. **neighbor** {*ip-address* | *ipv6-address* | *peer-group-name*} **remote-as** *as-number*
6. **address-family ipv6** [**unicast** | **multicast**]
7. **neighbor** {*ip-address* | *peer-group-name* | *ipv6-address*} **activate**
8. **neighbor** {*ip-address* | *ipv6-address*} **peer-group** *peer-group-name*

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 <i>as-number</i> Example: Device(config)# router bgp 65000 | Enters router configuration mode for the specified BGP routing process. |
| Step 4 | neighbor <i>peer-group-name</i> peer-group Example: Device(config-router)# neighbor group1 peer-group | Creates a BGP peer group. |

| | Command or Action | Purpose |
|--------|---|--|
| Step 5 | <p>neighbor {<i>ip-address</i> <i>ipv6-address</i> <i>peer-group-name</i>}</p> <p>remote-as <i>as-number</i></p> <p>Example:</p> <pre>Device(config-router)# neighbor 2001:DB8:0:CC00::1 remote-as 64600</pre> | <p>Adds the IPv6 address of the neighbor in the specified autonomous system to the IPv6 multicast BGP neighbor table of the local router.</p> <ul style="list-style-type: none"> The <i>ipv6-address</i> argument in the neighbor remote-as command must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons. |
| Step 6 | <p>address-family ipv6 [unicast multicast]</p> <p>Example:</p> <pre>Device(config-router)# address-family ipv6 multicast</pre> | <p>Specifies the IPv6 address family, and enters address family configuration mode.</p> <ul style="list-style-type: none"> 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 a keyword is not specified in the address-family ipv6 command. The multicast keyword specifies IPv6 multicast address prefixes. |
| Step 7 | <p>neighbor {<i>ip-address</i> <i>peer-group-name</i> <i>ipv6-address</i>}</p> <p>activate</p> <p>Example:</p> <pre>Device(config-router-af)# neighbor 2001:DB8:0:CC00::1 activate</pre> | <p>Enables the neighbor to exchange prefixes for the specified family type with the neighbor and the local router.</p> <ul style="list-style-type: none"> To avoid extra configuration steps for each neighbor, use the neighbor activate command with the <i>peer-group-name</i> argument as an alternative in this step. |
| Step 8 | <p>neighbor {<i>ip-address</i> <i>ipv6-address</i>} peer-group <i>peer-group-name</i></p> <p>Example:</p> <pre>Device(config-router-af)# neighbor 2001:DB8:0:CC00::1 peer-group group1</pre> | <p>Assigns the IPv6 address of a BGP neighbor to a peer group.</p> |

Advertising Routes into IPv6 Multiprotocol BGP

By default, networks that are defined in router configuration mode using the **network** command are injected into the IPv4 unicast database. To inject a network into another database, such as the IPv6 BGP database, you must define the network using the **network** command in address family configuration mode for the other database, as shown for the IPv6 BGP database.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router bgp** *as-number*
4. **address-family ipv6** [**vrf** *vrf-name*] [**unicast** | **multicast** | **vpn6**]
5. **network** {*network-number* [**mask** *network-mask*] | *nsap-prefix*} [**route-map** *map-tag*]
6. **exit**

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|---|--|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted. |
| Step 2 | configure terminal Example: Device# configure terminal | Enters global configuration mode. |
| Step 3 | router bgp <i>as-number</i> Example: Device(config)# router bgp 65000 | Enters router configuration mode for the specified BGP routing process. |
| Step 4 | address-family ipv6 [<i>vrf vrf-name</i>] [unicast multicast vpn6] Example: Device(config-router)# address-family ipv6 unicast | Specifies the IPv6 address family, and enters address family configuration mode. <ul style="list-style-type: none"> • 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 a keyword is not specified with the address-family ipv6 command. • The multicast keyword specifies IPv6 multicast address prefixes. |
| Step 5 | network { <i>network-number</i> [mask <i>network-mask</i>] <i>nsap-prefix</i> } [route-map <i>map-tag</i>] Example: Device(config-router-af)# network 2001:DB8::/24 | Advertises (injects) the specified prefix into the IPv6 BGP database (the routes must first be found in the IPv6 unicast routing table). <ul style="list-style-type: none"> • The prefix is injected into the database for the address family specified in the previous step. • Routes are tagged from the specified prefix as “local origin.” • The <i>ipv6-prefix</i> argument in the network command must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons. • The <i>prefix-length</i> argument is a decimal value that indicates how many of the high-order contiguous bits of the address comprise the prefix (the network portion of the address). A slash mark must precede the decimal value. |

| | Command or Action | Purpose |
|---------------|---|--|
| Step 6 | exit Example: <pre>Device(config-router-af)# exit</pre> | Exits address family configuration mode, and returns the device to router configuration mode. <ul style="list-style-type: none"> • Repeat this step to exit router configuration mode and return the device to global configuration mode. |

Redistributing Prefixes into IPv6 Multiprotocol BGP

Redistribution is the process of redistributing, or injecting, prefixes from one routing protocol into another routing protocol. This task explains how to inject prefixes from a routing protocol into IPv6 multiprotocol BGP. Specifically, prefixes that are redistributed into IPv6 multiprotocol BGP using the **redistribute** router configuration command are injected into the IPv6 unicast database.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router bgp** *as-number*
4. **address-family ipv6** [*vrf vrf-name*] [**unicast** | **multicast** | **vpn6**]
5. **redistribute bgp** [*process-id*] [**metric** *metric-value*] [**route-map** *map-name*] [*source-protocol-options*]
6. **exit**

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|--|--|
| Step 1 | enable Example: <pre>Device> enable</pre> | Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted. |
| Step 2 | configure terminal Example: <pre>Device# configure terminal</pre> | Enters global configuration mode. |
| Step 3 | router bgp <i>as-number</i> Example: <pre>Device(config)# router bgp 65000</pre> | Enters router configuration mode for the specified BGP routing process. |
| Step 4 | address-family ipv6 [<i>vrf vrf-name</i>] [unicast multicast vpn6] Example: <pre>Device(config-router)# address-family ipv6</pre> | Specifies the IPv6 address family, and enters address family configuration mode. <ul style="list-style-type: none"> • 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 a keyword |

| | Command or Action | Purpose |
|---------------|--|---|
| | | <p>is not specified with the address-family ipv6 command.</p> <ul style="list-style-type: none"> The multicast keyword specifies IPv6 multicast address prefixes. |
| Step 5 | <p>redistribute bgp [<i>process-id</i>] [metric <i>metric-value</i>] [route-map <i>map-name</i>] [<i>source-protocol-options</i>]</p> <p>Example:</p> <pre>Device(config-router-af)# redistribute bgp 64500 metric 5</pre> | Redistributes IPv6 routes from one routing domain into another routing domain. |
| Step 6 | <p>exit</p> <p>Example:</p> <pre>Device(config-router-af)# exit</pre> | <p>Exits address family configuration mode, and returns the device to router configuration mode.</p> <ul style="list-style-type: none"> Repeat this step to exit router configuration mode and return the device to global configuration mode. |

Assigning a BGP Administrative Distance



Caution

Changing the administrative distance of BGP internal routes is not recommended. One problem that can occur is the accumulation of routing table inconsistencies, which can break routing.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router bgp** *as-number*
4. **address-family ipv6** [**unicast** | **multicast**]
5. **distance bgp** *external-distance internal-distance local-distance*

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|---|---|
| Step 1 | <p>enable</p> <p>Example:</p> <pre>Device> enable</pre> | <p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> Enter your password if prompted. |
| Step 2 | <p>configure terminal</p> <p>Example:</p> <pre>Device# configure terminal</pre> | Enters global configuration mode. |

| | Command or Action | Purpose |
|---------------|---|--|
| Step 3 | router bgp <i>as-number</i> Example: Device(config)# router bgp 100 | Enters router configuration mode for the specified routing process. |
| Step 4 | address-family ipv6 [unicast multicast] Example: Device(config-router)# address-family ipv6 multicast | Enters address family configuration mode for configuring routing sessions such as BGP that use standard IPv6 address prefixes. |
| Step 5 | distance bgp <i>external-distance internal-distance local-distance</i> Example: Device(config-router)# distance bgp 20 20 200 | Assigns a BGP administrative distance. |

Generating Translate Updates for IPv6 Multicast BGP

The multicast BGP translate-update feature generally is used in a multicast BGP-capable router that peers with a customer site that has only a BGP-capable router; the customer site has not or cannot upgrade its router to a multicast BGP-capable image. Because the customer site cannot originate multicast BGP advertisements, the router with which it peers will translate the BGP prefixes into multicast BGP prefixes, which are used for multicast-source RPF lookup.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router bgp** *as-number*
4. **address-family ipv6** [**unicast** | **multicast**]
5. **neighbor** *ipv6-address* **translate-update ipv6 multicast** [**unicast**]

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|--|--|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted. |
| Step 2 | configure terminal Example: Device# configure terminal | Enters global configuration mode. |

| | Command or Action | Purpose |
|---------------|--|--|
| Step 3 | router bgp <i>as-number</i> Example: Device(config)# router bgp 100 | Enters router configuration mode for the specified routing process. |
| Step 4 | address-family ipv6 [unicast multicast] Example: Device(config-router)# address-family ipv6 multicast | Enters address family configuration mode for configuring routing sessions such as BGP that use standard IPv6 address prefixes. |
| Step 5 | neighbor <i>ipv6-address</i> translate-update ipv6 multicast [unicast] Example: Device(config-router)# neighbor 2001:DB8:7000::2 translate-update ipv6 multicast | Generates multiprotocol IPv6 BGP updates that correspond to unicast IPv6 updates received from a peer. |

Resetting IPv6 BGP Sessions

SUMMARY STEPS

1. enable
2. **clear bgp ipv6** {**unicast** | **multicast**} {***** | *autonomous-system-number* | *ip-address* | *ipv6-address* | *peer-group peer-group-name*} [**soft**] [**in** | **out**]

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|---|--|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted. |
| Step 2 | clear bgp ipv6 { unicast multicast } { * <i>autonomous-system-number</i> <i>ip-address</i> <i>ipv6-address</i> <i>peer-group peer-group-name</i> } [soft] [in out] Example: Device# clear bgp ipv6 unicast peer-group marketing soft out | Resets IPv6 BGP sessions. |

Clearing External BGP Peers

SUMMARY STEPS

1. `enable`
2. `clear bgp ipv6 {unicast | multicast} external [soft] [in | out]`
3. `clear bgp ipv6 {unicast | multicast} peer-group name`

DETAILED STEPS

| | Command or Action | Purpose |
|--------|--|--|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted. |
| Step 2 | clear bgp ipv6 {unicast multicast} external [soft] [in out] Example: Device# clear bgp ipv6 unicast external soft in | Clears external IPv6 BGP peers. |
| Step 3 | clear bgp ipv6 {unicast multicast} peer-group name Example: Device# clear bgp ipv6 unicast peer-group marketing | Clears all members of an IPv6 BGP peer group. |

Clearing IPv6 BGP Route Dampening Information

SUMMARY STEPS

1. `enable`
2. `clear bgp ipv6 {unicast | multicast} dampening [ipv6-prefix/prefix-length]`

DETAILED STEPS

| | Command or Action | Purpose |
|--------|--|--|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted. |
| Step 2 | clear bgp ipv6 {unicast multicast} dampening [ipv6-prefix/prefix-length] Example: | Clears IPv6 BGP route dampening information and unsuppresses the suppressed routes. |

| | Command or Action | Purpose |
|--|---|---------|
| | Device# clear bgp ipv6 unicast dampening 2001:DB8::/64 | |

Clearing IPv6 BGP Flap Statistics

SUMMARY STEPS

1. enable
2. clear bgp ipv6 {unicast | multicast} flap-statistics [*ipv6-prefix/prefix-length* | **regexp** *regexp* | **filter-list** *list*]

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|---|---|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. • Enter your password if prompted. |
| Step 2 | clear bgp ipv6 {unicast multicast} flap-statistics [<i>ipv6-prefix/prefix-length</i> regexp <i>regexp</i> filter-list <i>list</i>] Example: Device# clear bgp ipv6 unicast flap-statistics filter-list 3 | Clears IPv6 BGP flap statistics. |

Configuration Examples for IPv6 Multicast Address Family Support for Multiprotocol BGP

Example: Configuring an IPv6 Multiprotocol BGP Peer Group

The following example configures the IPv6 multiprotocol BGP peer group named group1:

```
router bgp 65000
no bgp default ipv4-unicast
neighbor group1 peer-group
neighbor 2001:DB8:0:CC00::1 remote-as 64600
address-family ipv6 unicast
neighbor group1 activate
neighbor 2001:DB8:0:CC00::1 peer-group group1
```

Example: Advertising Routes into IPv6 Multiprotocol BGP

The following example injects the IPv6 network 2001:DB8::/24 into the IPv6 unicast database of the local device. (BGP checks that a route for the network exists in the IPv6 unicast database of the local device before advertising the network.)

```
router bgp 65000
 no bgp default ipv4-unicast
 address-family ipv6 unicast
  network 2001:DB8::/24
```

Example: Redistributing Prefixes into IPv6 Multiprotocol BGP

The following example redistributes RIP routes into the IPv6 unicast database of the local device:

```
router bgp 64900
 no bgp default ipv4-unicast
 address-family ipv6 unicast
  redistribute rip
```

Example: Generating Translate Updates for IPv6 Multicast BGP

The following example shows how to generate IPv6 multicast BGP updates that correspond to unicast IPv6 updates:

```
router bgp 64900
 no bgp default ipv4-unicast
 address-family ipv6 multicast
  neighbor 2001:DB8:7000::2 translate-update ipv6 multicast
```

Additional References

Related Documents

| Related Topic | Document Title |
|----------------------------------|---|
| IPv6 addressing and connectivity | <i>IPv6 Configuration Guide</i> |
| 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 Multicast Address Family Support for Multiprotocol BGP

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 <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

Table 1: Feature Information for IPv6 Multicast: Address Family Support for Multiprotocol BGP

| Feature Name | Releases | Feature Information |
|--|--------------------------|---|
| IPv6 Multicast: Address Family Support for Multiprotocol BGP | Cisco IOS XE Release 2.1 | This feature provides multicast BGP extensions for IPv6 and supports the same features and functionality as IPv4 BGP. |