BGP-MVPN SAFI 129 IPv6

Subsequent Address Family Identifier (SAFI) 129, known as VPN Multicast SAFI, provides the capability to support multicast routing in the service provider's core IPv6 network.

Border Gateway Protocol (BGP) Multicast Virtual Private Network (MVPN) provides a means for service providers to use different encapsulation methods (generic routing encapsulation [GRE], Multicast Label Distribution Protocol [MLDP], and ingress replication) for forwarding MVPN multicast data traffic in the service provider network.

The BGP-MVPN SAFI 129 IPv6 feature is required to support BGP-based MVPNs.

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.

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.

Prerequisites for BGP-MVPN SAFI 129 IPv6

- Before you configure a SAFI 129 IPv6-related address family, the **ipv6 unicast-routing** command must be configured on the device.
- To create a multicast IPv6 VRF address family under BGP, IPv6 must first be activated on the VRF itself.

Note There is no separate multicast configuration on the VRF. Configuring the **address-family ipv6** command on the VRF will enable both unicast and multicast topologies.

- If you want prefixes to be installed into the Routing Information Base (RIB), you must configure the **pim** command on a VRF interface.

Information About BGP-MVPN SAFI 129 IPv6

Overview of BGP-MVPN SAFI 129 IPv6

MVPN utilizes the existing VPN infrastructure to allow multicast traffic to pass through the provider space. Information derived from VPN routes is one of the components needed to set up tunnels within the core. Currently, multicast traffic will derive this information from the unicast VPNv6 tables, which forces multicast traffic to be dependent on unicast topologies.

For scenarios in which multicast and unicast traffic would be better suited with separate topologies, the customer edge (CE) router may advertise a special set of routes to be used exclusively for multicast VPNs. Multicast routes learned from the CE router can be propagated to remote provider edge (PE) routers via SAFI 129. Multicast routes learned from the CE router or multicast VPN routes learned from remote PE routers can now be installed directly into the multicast RIB, instead of using replicated routes from the unicast RIB. Maintaining separate routes and entries for unicast and multicast allows you to create differing topologies for each service within the core.

How to Configure BGP-MVPN SAFI 129 IPv6

Configuring BGP-MVPN SAFI 129 IPv6

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **vrf definition** *vrf1*
4. **rd** *route-distinguisher*
5. **route-target export** *route-target-ext-community*
6. **route-target import** *route-target-ext-community*
7. **address-family ipv6**
8. **mdt default** *group-address*
9. **exit**
10. **exit**
11. **router bgp** *autonomous-system-number*
12. **address-family vpnv6 multicast**

13. **neighbor** *peer-group-name* **send-community extended**
14. **neighbor** {*ip-address* | *peer-group-name* | *ipv6-address* **%**} **activate**
15. **address-family ipv6 multicast vrf** *vrf-name*
16. **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	**vrf definition** *vrf1* **Example:** `Device(config)# vrf definition vrf1`	Defines a VRF instance and enters VRF configuration mode.
Step 4	**rd** *route-distinguisher* **Example:** `Device(config-vrf)# rd 1:1`	Specifies a route distinguisher (RD) for a VRF instance.
Step 5	**route-target export** *route-target-ext-community* **Example:** `Device(config-vrf)# route-target export 1:1`	Creates a route target export extended community for a VRF instance.
Step 6	**route-target import** *route-target-ext-community* **Example:** `Device(config-vrf)# route-target import 1:1`	Creates a route target import extended community for a VRF instance.
Step 7	**address-family ipv6** **Example:** `Device(config-vrf)# address-family ipv6`	Configures a routing session using IPv6 address prefixes and enters address family configuration mode.
Step 8	**mdt default** *group-address* **Example:** `Device(config-vrf-af)# mdt default 239.0.0.1`	Configures a default multicast distribution tree (MDT) group for a VRF instance.

	Command or Action	Purpose
Step 9	**exit** **Example:** `Device(config-vrf-af)# exit`	Exits address family configuration mode and enters VRF configuration mode.
Step 10	**exit** **Example:** `Device(config-vrf)# exit`	Exits VRF configuration mode and enters global configuration mode.
Step 11	**router bgp** *autonomous-system-number* **Example:** `Device(config)# router bgp 50000`	Configures a BGP routing process and enters router configuration mode.
Step 12	**address-family vpnv6 multicast** **Example:** `Device(config-router)# address-family vpnv6 multicast`	Configures a routing session using VPN Version 6 multicast address prefixes and enters address family configuration mode.
Step 13	**neighbor** *peer-group-name* **send-community extended** **Example:** `Device(config-router-af)# neighbor client1 send-community extended`	Specifies that a communities attribute should be sent to a BGP neighbor.
Step 14	**neighbor** {*ip-address* | *peer-group-name* | *ipv6-address* **%**} **activate** **Example:** `Router(config-router-af)# neighbor 2001:DB8:0:CC00::1 % activate`	Enables the neighbor to exchange prefixes for the specified family type with the neighbor and the local router.
Step 15	**address-family ipv6 multicast vrf** *vrf-name* **Example:** `Device(config-router-af)# address-family ipv6 multicast vrf vrf1`	Configures a routing session using IPv6 multicast address prefixes for a VRF instance.
Step 16	**end** **Example:** `Device(config-router-af)# end`	Exits address family configuration mode and returns to privileged EXEC mode.

Configuration Examples for BGP-MVPN SAFI 129 IPv6

Example: Configuring BGP-MVPN SAFI 129 IPv6

The example below shows the configuration for a PE router:

```
hostname PE1
!
!
vrf definition blue
 rd 55:1111
 route-target export 55:1111
 route-target import 55:1111
 !
 address-family ipv6
  mdt default 232.1.1.1
  mdt data 232.1.200.0 0.0.0.0
 exit-address-family
!
!ip multicast-routing
ip multicast-routing vrf blue
ip cef
!
ipv6 unicast-routing
ipv6 multicast-routing
ipv6 multicast-routing vrf blue
ipv6 cef
!
!interface Loopback0
 ip address 205.1.0.1 255.255.255.255
 ip pim sparse-dense-mode
 ipv6 address FE80::205:1:1 link-local
 ipv6 address 205::1:1:1/64
 ipv6 enable
!
interface Ethernet0/0
 ! interface connect to the core vpn
 bandwidth 1000
 ip address 30.3.0.1 255.255.255.0
 ip pim sparse-dense-mode
 delay 100
 ipv6 address FE80::70:1:1 link-local
 ipv6 address 70::1:1:1/64
 ipv6 enable
 mpls ip
!
interface Ethernet1/1
 ! interface connect to CE (vrf interface)
 bandwidth 1000
 vrf forwarding blue
 ip address 10.1.0.1 255.255.255.0
 ip pim sparse-dense-mode
 delay 100
 ipv6 address FE80::20:1:1 link-local
 ipv6 address 20::1:1:1/64
 ipv6 enable
!
router ospf 200
```

```
 redistribute connected subnets
 redistribute bgp 55 metric 10
 passive-interface Loopback0
 network 30.3.0.0 0.0.255.255 area 1
!
router bgp 55
 bgp log-neighbor-changes
 no bgp default route-target filter
 ! neighbor to another PE in core
 neighbor 205.3.0.3 remote-as 55
 neighbor 205.3.0.3 update-source Loopback0
 !
 address-family ipv4 mdt
  ! neighbor to another PE in core
  neighbor 205.3.0.3 activate
  neighbor 205.3.0.3 send-community extended
 exit-address-family
 !
 address-family vpnv6
  ! neighbor to another PE in core
  neighbor 205.3.0.3 activate
  neighbor 205.3.0.3 send-community extended
 exit-address-family
 !
 address-family vpnv6 multicast
  ! neighbor to another PE in core
  ! this address-family is added to enable
  ! safi129 between two PEs
  neighbor 205.3.0.3 activate
  neighbor 205.3.0.3 send-community extended
 exit-address-family
 !
 address-family ipv6 vrf blue
  ! neighbor to CE1 in vrf
  redistribute connected
  redistribute static
  neighbor FE80::20:1:6%Ethernet1/1 remote-as 56
  neighbor FE80::20:1:6%Ethernet1/1 activate
 exit-address-family
 !
 address-family ipv6 multicast vrf blue
  !  neighbor to CE1 in vrf
  ! this address-family is added to enable
  ! safi2 on PE-CE
  redistribute connected
  redistribute static
  neighbor FE80::20:1:6%Ethernet1/1 remote-as 56
  neighbor FE80::20:1:6%Ethernet1/1 activate
 exit-address-family
!
ipv6 pim vrf blue rp-address 201::1:1:7 blue_bidir_acl bidir
ipv6 pim vrf blue rp-address 202::1:1:6 blue_sparse_acl
!
ipv6 access-list black_bidir_acl
 permit ipv6 any FF06::/64
!
ipv6 access-list black_sparse_acl
 permit ipv6 any FF04::/64
!
ipv6 access-list blue_bidir_acl
 permit ipv6 any FF05::/64
!
ipv6 access-list blue_sparse_acl
 permit ipv6 any FF03::/64
```

```
!
end
```

The example below shows the configuration for a CE router:

```
hostname CE1
!
ip multicast-routing
ip cef
ipv6 unicast-routing
ipv6 multicast-routing
ipv6 multicast rpf use-bgp
ipv6 cef
!
interface Ethernet1/1
 bandwidth 1000
 ip address 10.1.0.6 255.255.255.0
 no ip redirects
 no ip proxy-arp
 ip pim sparse-dense-mode
 delay 100
 ipv6 address FE80::20:1:6 link-local
 ipv6 address 20::1:1:6/64
 ipv6 enable
 no keepalive
!
router bgp 56
 bgp log-neighbor-changes
 neighbor FE80::20:1:1%Ethernet1/1 remote-as 55
 !
 address-family ipv6
  redistribute connected
  redistribute static
  neighbor FE80::20:1:1%Ethernet1/1 activate
 exit-address-family
 !
 address-family ipv6 multicast
  redistribute connected
  redistribute static
  neighbor FE80::20:1:1%Ethernet1/1 activate
 exit-address-family
!
ipv6 pim rp-address 201::1:1:7 blue_bidir_acl bidir
ipv6 pim rp-address 202::1:1:6 blue_sparse_acl
!
ipv6 access-list blue_bidir_acl
 permit ipv6 any FF05::/64
!
ipv6 access-list blue_sparse_acl
 permit ipv6 any FF03::/64
!
end
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	*Cisco IOS Master Command List, All Releases*
BGP commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	*Cisco IOS IP Routing: BGP Command Reference*

Standards and RFCs

Standard/RFC	Title
MDT SAFI	*Subsequent Address Family Identifiers (SAFI) Parameters*
RFC 2547	*BGP/MPLS VPNs*

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 BGP-MVPN SAFI 129 IPv6

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 BGP—MVPN SAFI 129 IPv6

Feature Name	Releases	Feature Information
BGP—MVPN SAFI 129 IPv6	15.2(4)S Cisco IOS XE Release 3.7S 15.3(1)T	SAFI 129 , known as VPN Multicast SAFI, provides the capability to support multicast routing in the service provider's core IPv6 network. The following commands were introduced or modified: **address-family ipv6**, **address-family vpnv6**, and **show bgp vpnv6 multicast**.