BGP — mVPN BGP sAFI 129 - IPv4

The BGP—mVPN BGP sAFI 129 IPv4 feature provides the capability to support multicast routing in the service provider's core IPv4 network. This feature is needed to support BGP-based MVPNs. BGP MVPN provides a means for service providers to use different encapsulation methods (generic routing encapsulation [GRE], Multicast Label Distribution Protocol [MPDP], and ingress replication) for forwarding MVPN multicast data traffic in the service provider network.

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Information About BGP--mVPN BGP sAFI 129 - IPv4

BGP — mVPN BGP sAFI 129 - IPv4 Overview

The Cisco BGP Address Family Identifier (AFI) model was introduced with multiprotocol BGP and is designed to be modular and scalable and to support multiple AFI and Subsequent Address Family Identifier (SAFI) configurations. SAFI provides additional information about the type of Network Layer Reachability Information (NLRI) that is used to describe a route and how to connect to a destination.

SAFI 129 provides the capability to support multicast routing in the service provider's core IPv4 network. This feature is needed to support BGP-based MVPNs. The addition of SAFI 129 allows multicast to select an upstream multicast hop that may be independent of the unicast topology. Multicast routes learned from the customer edge (CE) router or multicast VPN routes learned from remote provider edge (PE) routers are installed into the multicast Routing Information Base (RIB), whereas previously unicast routes in the unicast RIB were replicated into the multicast RIB.

The **address-family ipv4** command has been updated to support IP version 4 (IPv4) multicast address prefixes for a VPN routing and forwarding (VRF) instance, and the **address-family vpnv4** command has been updated to support VPN version 4 (VPNv4) multicast address prefixes.

How to Configure BGP -- mVPN BGP sAFI 129 - IPv4

Configure BGP — mVPN BGP sAFI 129 - IPv4

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 ipv4**
8. **mdt default** *group-address*
9. **exit**
10. **router bgp** *autonomous-system-number*
11. **address-family vpnv4 multicast**
12. **neighbor** *peer-group-name* **send-community extended**
13. **neighbor** *peer-group-name* **route-reflector-client**
14. **exit-address-family**
15. **address-family ipv4 vrf** *vrf-name*
16. **no synchronization**
17. **exit-address-family**
18. **address-family ipv4 multicast vrf** *vrf-name*
19. **no synchronization**
20. **exit-address-family**
21. **end**
22. **show running-config | b router bgp**

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:**	Defines a VRF instance and enters VRF configuration mode.

	Command or Action	Purpose
	`Device(config)# vrf definition vrf1`	
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 ipv4** **Example:** `Device(config-router)# address-family ipv4`	Configures a routing session using IPv4 address prefixes and enters address family configuration mode.
Step 8	**mdt default** *group-address* **Example:** `Device(config-vrf)# mdt default 239.0.0.1`	Configures a default multicast distribution tree (MDT) group for a VRF instance.
Step 9	**exit** **Example:** `Device(config-vrf)# exit`	Exits VRF configuration mode and returns to global configuration mode.
Step 10	**router bgp** *autonomous-system-number* **Example:** `Device(config)# router bgp 50000`	Configures the BGP routing process and enters router configuration mode.
Step 11	**address-family vpnv4 multicast** **Example:** `Device(config-router)# address-family vpnv4 multicast`	Configures a routing session using VPN Version 4 multicast address prefixes and enters address family configuration mode.
Step 12	**neighbor** *peer-group-name* **send-community extended** **Example:**	Specifies that a communities attribute should be sent to a BGP neighbor.

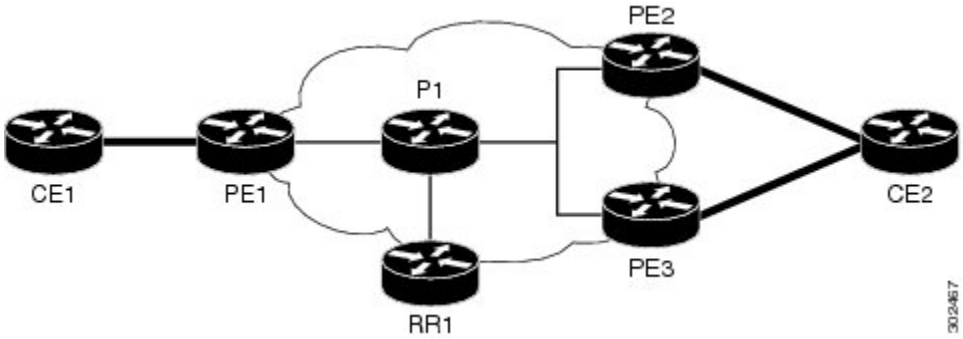
	Command or Action	Purpose
	`Device(config-router-af)# neighbor client1 send-community extended`	
Step 13	**neighbor** *peer-group-name* **route-reflector-client** **Example:** `Device(config-router-af)# neighbor client1 route-reflector-client`	(Optional) Configures the router as a BGP route reflector and configures the specified neighbor as its client.
Step 14	**exit-address-family** **Example:** `Device(config-router-af)# exit-address-family`	Exits address family configuration mode and enters router configuration mode.
Step 15	**address-family ipv4 vrf** *vrf-name* **Example:** `Device(config-router)# address-family ipv4 vrf vrf1`	Places the router in address family configuration mode and specifies the name of the VRF instance to associate with subsequent IPv4 address family configuration mode commands.
Step 16	**no synchronization** **Example:** `Device(config-router-af)# no synchronization`	Enables the Cisco software to advertise a network route without waiting for the Interior Gateway Protocol (IGP) system.
Step 17	**exit-address-family** **Example:** `Device(config-router-af)# exit-address-family`	Exits address family configuration mode and enters router configuration mode.
Step 18	**address-family ipv4 multicast vrf** *vrf-name* **Example:** `Device(config-router)# address-family ipv4 multicast vrf vrf1`	Configures a routing session using IPv4 multicast address prefixes for a VRF instance and enters address family configuration mode.
Step 19	**no synchronization** **Example:** `Device(config-router-af)# no synchronization`	Enables the Cisco software to advertise a network route without waiting for the IGP system.
Step 20	**exit-address-family** **Example:** `Device(config-router-af)# exit-address-family`	Exits address family configuration mode and enters router configuration mode.
Step 21	**end** **Example:**	Exits router configuration mode and returns to privileged EXEC mode.

	Command or Action	Purpose
	`Device(config)# end`	
Step 22	**show running-config | b router bgp** **Example:** `Device# show running-config | b router bgp`	(Optional) Displays the running configuration for specified device.

Configuration Examples for BGP--mVPN BGPsAFI 129 - IPv4

Example: Configuring BGP - mVPN BGP sAFI 129 - IPv4

This example uses the topology illustrated in the figure below.



The following example configures BGP SAFI 129 on the route reflector (RR):

```
!
ip multicast-routing
!
!<<< Define BGP update-source loopback0
!<<< on RR as 192.0.2.10
interface loopback0
 ip pim sparse-dense-mode
 ip address 192.0.2.10 255.255.255.255
!
.
.
.
router bgp 65000
 no synchronization
 neighbor 192.0.2.1 remote-as 65000
 neighbor 192.0.2.1 update-source loopback0
 neighbor 192.0.2.2 remote-as 65000
 neighbor 192.0.2.2 update-source loopback0
 neighbor 192.0.2.3 remote-as 65000
 neighbor 192.0.2.3 update-source loopback0
 !
 .
 .
 address-family vpnv4 unicast
  neighbor 192.0.2.1 activate
```

```
  neighbor 192.0.2.1 send-community extended
  neighbor 192.0.2.1 route-reflector-client
  neighbor 192.0.2.2 activate
  neighbor 192.0.2.2 send-community extended
  neighbor 192.0.2.2 route-reflector-client
  neighbor 192.0.2.3 activate
  neighbor 192.0.2.3 send-community extended
  neighbor 192.0.2.3 route-reflector-client
  exit-address-family
 !
 address-family vpnv4 multicast
  !<<< want route from CE1 with nexthop
  !<<< through PE3 in multicast routing table
  neighbor 192.0.2.1 activate
  neighbor 192.0.2.1 send-community extended
  neighbor 192.0.2.1 route-reflector-client
  neighbor 192.0.2.3 activate
  neighbor 192.0.2.3 send-community extended
  neighbor 192.0.2.3 route-reflector-client
 exit-address-family
!
.
.
```

The following example configures BGP SAFI 129 on the PE1 router (PE2 and PE3 will have a similar configuration):

```
Hostname PE1
!
vrf definition vrf1
 rd 1:1
 route-target export 1:1
 route-target import 1:1
 !
 address-family ipv4
  mdt default 239.0.0.1
 exit-address-family
!
ip multicast-routing
ip multicast-routing vrf vrf1
!
.
.
.
!<<< Define BGP update-source on Loopback0
!<<< on PE1
inteface loopback0
 ip pim sparse-dense-mode
 ip address 192.0.2.1 255.255.255.255
!
.
.
.
!<<< Define vrf vrf1 interface on PE1 to CE1
interface ethernet0/0
 vrf forwarding vrf1
 ip pim sparse-dense-mode
 ip address 192.0.2.1 255.255.255.0
!
.
.
,
router bgp 65000
```

```
 !<<<< PE peer neighbor with RR
 neighbor 192.0.2.10 remote-as 65000
 neighbor 192.0.2.10 update-source loopback0
 no synchronization
 .
 .
 .
 address-family vpnv4
  neighbor 192.0.2.10 activate
  neighbor 192.0.2.10 send-community extended
 exit-address-family
 !
 !<<< Define vpnv4 safi129 with neighbor
 !<<< to RR
 address-family vpnv4 multicast
  neighbor 192.0.2.10 activate
  neighbor 192.0.2.10 send-community extended
 exit-address-family
 !
 .
 .
 .
 !<<< Define unicast address-family vrf vrf1.
 !<<< PE-CE is eBGP in this case.
 !<<< If PE-CE is not eBGP, please use
 !<<< redistribute cli, instead of
 !<<< neighbor cli below.
 address-family ipv4 vrf vrf1
  no synchronization
  redistribute connected
  neighbor 192.0.2.5 remote-as 65011
 exit-address-family
 !
 !<<< Define multicast address-family vrf vrf1
 !<<< (safi2. PE-CE is eBGP in this case.
 !<<< If PE-CE is not eBGP, please use
 !<<< redistribute cli, instead of
 !<<< neighbor cli below.
 address-family ipv4 multicast vrf vrf1
  no synchronization
  redistribute connected
  neighbor 192.0.2.5 remote-as 65011
 exit-address-family
 !
```

The following example configures BGP SAFI 129 on the CE1 router. (In this case, PE-CE routing is eBGP. CE2 will have a similar configuration):

```
interface ethernet0/0
 ip address 192.0.2.5 255.255.255.0
 ip pim sparse-dense-mode
!
.
.
.
router bgp 65011
 bgp router-id 192.0.2.5
 bgp log-neighbor-changes
 !
 address-family ipv4
  redistribute connected
  neighbor 192.0.2.1 remote-as 65000
 exit-address-family
```

```
 !
 address-family ipv4 multicast
  redistribute connected
  neighbor 192.0.2.1 remote-as 65000
 exit-address-family
!
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
BGP commands	Cisco IOS IP Routing: BGP Command Reference

Standards and RFCs

Standard/RFC	Title
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 BGP sAFI 129 - IPv4

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 BGP - mVPN BGP sAFI 129 - IPv4

Feature Name	Releases	Feature Information
BGP - mVPN BGP sAFI 129 - IPv4	15.2(2)S 15.2(4)S Cisco IOS XE Release 3.6S	The BGP - mVPN BGP sAFI 129 IPv4 feature provides the capability to support multicast routing in the service provider's core IPv4 network. This feature is needed to support BGP-based MVPNs. BGP MVPN provides a means for service providers to use different encapsulation methods (generic route encapsulation (GRE), Multicast Label Distribution Protocol (MLDP), and ingress replication) for forwarding MVPN multicast data traffic in the service provider network. In Cisco IOS Release 15.2(4)S, support was added for the Cisco 7200 series router. The following commands were modified: **address-family ipv4**, **address-family vpnv4**.