



## BGP — mVPN BGP sAFI 129 - IPv4

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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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## 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](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

## 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
<b>Step 1</b>	<b>enable</b>  <b>Example:</b> Device> enable	Enables privileged EXEC mode.  <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>vrf definition</b> <i>vrf1</i>  <b>Example:</b> Device(config)# vrf definition vrf1	Defines a VRF instance and enters VRF configuration mode.
<b>Step 4</b>	<b>rd</b> <i>route-distinguisher</i>  <b>Example:</b> Device(config-vrf)# rd 1:1	Specifies a route distinguisher (RD) for a VRF instance.
<b>Step 5</b>	<b>route-target export</b> <i>route-target-ext-community</i>  <b>Example:</b> Device(config-vrf)# route-target export 1:1	Creates a route target export extended community for a VRF instance.
<b>Step 6</b>	<b>route-target import</b> <i>route-target-ext-community</i>  <b>Example:</b> Device(config-vrf)# route-target import 1:1	Creates a route target import extended community for a VRF instance.
<b>Step 7</b>	<b>address-family</b> <b>ipv4</b>  <b>Example:</b> Device(config-router)# address-family ipv4	Configures a routing session using IPv4 address prefixes and enters address family configuration mode.
<b>Step 8</b>	<b>mdt default</b> <i>group-address</i>  <b>Example:</b> Device(config-vrf)# mdt default 239.0.0.1	Configures a default multicast distribution tree (MDT) group for a VRF instance.

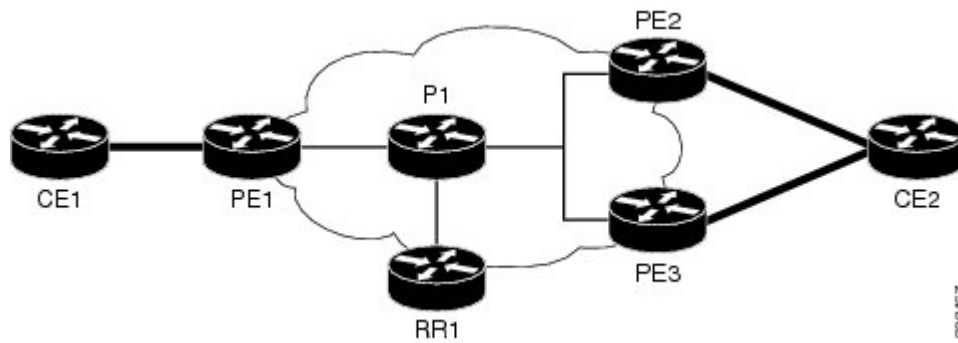
	Command or Action	Purpose
<b>Step 9</b>	<b>exit</b>  <b>Example:</b> Device(config-vrf)# exit	Exits VRF configuration mode and returns to global configuration mode.
<b>Step 10</b>	<b>router bgp <i>autonomous-system-number</i></b>  <b>Example:</b> Device(config)# router bgp 50000	Configures the BGP routing process and enters router configuration mode.
<b>Step 11</b>	<b>address-family <i>vpn4</i> multicast</b>  <b>Example:</b> Device(config-router)# address-family vpnv4 multicast	Configures a routing session using VPN Version 4 multicast address prefixes and enters address family configuration mode.
<b>Step 12</b>	<b>neighbor <i>peer-group-name</i> send-community extended</b>  <b>Example:</b> Device(config-router-af)# neighbor client1 send-community extended	Specifies that a communities attribute should be sent to a BGP neighbor.
<b>Step 13</b>	<b>neighbor <i>peer-group-name</i> route-reflector-client</b>  <b>Example:</b> 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.
<b>Step 14</b>	<b>exit-address-family</b>  <b>Example:</b> Device(config-router-af)# exit-address-family	Exits address family configuration mode and enters router configuration mode.
<b>Step 15</b>	<b>address-family <i>ipv4</i> vrf <i>vrf-name</i></b>  <b>Example:</b> 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.
<b>Step 16</b>	<b>no synchronization</b>  <b>Example:</b> Device(config-router-af)# no synchronization	Enables the Cisco software to advertise a network route without waiting for the Interior Gateway Protocol (IGP) system.

	Command or Action	Purpose
<b>Step 17</b>	<b>exit-address-family</b>  <b>Example:</b> Device(config-router-af)# exit-address-family	Exits address family configuration mode and enters router configuration mode.
<b>Step 18</b>	<b>address-family ipv4 multicast vrf vrf-name</b>  <b>Example:</b> 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.
<b>Step 19</b>	<b>no synchronization</b>  <b>Example:</b> Device(config-router-af)# no synchronization	Enables the Cisco software to advertise a network route without waiting for the IGP system.
<b>Step 20</b>	<b>exit-address-family</b>  <b>Example:</b> Device(config-router-af)# exit-address-family	Exits address family configuration mode and enters router configuration mode.
<b>Step 21</b>	<b>end</b>  <b>Example:</b> Device(config)# end	Exits router configuration mode and returns to privileged EXEC mode.
<b>Step 22</b>	<b>show running-config   b router bgp</b>  <b>Example:</b> Device# show running-config   b router bgp	(Optional) Displays the running configuration for specified device.

## Configuration Examples for BGP--mVPN BGP sAFI 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
interface 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 vrfl
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	<a href="#">Cisco IOS Master Command List, All Releases</a>
BGP commands	<a href="#">Cisco IOS IP Routing: BGP Command Reference</a>

### Standards and RFCs

Standard/RFC	Title
RFC 2547	<i>BGP/MPLS VPNs</i>



**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.	<a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a>

## 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.

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**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: <b>address-family ipv4</b> , <b>address-family vpnv4</b> .

