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 inggress 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. 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**

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Device&gt; enable</td>
<td>• Enter your password if prompted.</td>
</tr>
<tr>
<td>Command or Action</td>
<td>Purpose</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td><strong>Step 2</strong> configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Device# configure terminal</td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong> vrf definition vrf1</td>
<td>Defines a VRF instance and enters VRF configuration mode.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Device(config)# vrf definition vrf1</td>
<td></td>
</tr>
<tr>
<td><strong>Step 4</strong> rd route-distinguisher</td>
<td>Specifies a route distinguisher (RD) for a VRF instance.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Device(config-vrf)# rd 1:1</td>
<td></td>
</tr>
<tr>
<td><strong>Step 5</strong> route-target export route-target-ext-community</td>
<td>Creates a route target export extended community for a VRF instance.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Device(config-vrf)# route-target export 1:1</td>
<td></td>
</tr>
<tr>
<td><strong>Step 6</strong> route-target import route-target-ext-community</td>
<td>Creates a route target import extended community for a VRF instance.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Device(config-vrf)# route-target import 1:1</td>
<td></td>
</tr>
<tr>
<td><strong>Step 7</strong> address-family ipv4</td>
<td>Configures a routing session using IPv4 address prefixes and enters address family configuration mode.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Device(config-router)# address-family ipv4</td>
<td></td>
</tr>
<tr>
<td><strong>Step 8</strong> mdt default group-address</td>
<td>Configures a default multicast distribution tree (MDT) group for a VRF instance.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Device(config-vrf)# mdt default 239.0.0.1</td>
<td></td>
</tr>
<tr>
<td><strong>Step 9</strong> exit</td>
<td>Exits VRF configuration mode and returns to global configuration mode.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Device(config-vrf)# exit</td>
<td></td>
</tr>
<tr>
<td><strong>Step 10</strong> router bgp autonomous-system-number</td>
<td>Configures the BGP routing process and enters router configuration mode.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Device(config)# router bgp 50000</td>
<td></td>
</tr>
<tr>
<td>Command or Action</td>
<td>Purpose</td>
</tr>
<tr>
<td>-------------------</td>
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</tr>
<tr>
<td><strong>Step 11</strong></td>
<td>Configures a routing session using VPN Version 4 multicast address prefixes and enters address family configuration mode.</td>
</tr>
<tr>
<td>address-family</td>
<td><strong>vpnv4</strong> multicast</td>
</tr>
<tr>
<td>Example:</td>
<td>Device(config-router)# address-family vpv4 multicast</td>
</tr>
<tr>
<td><strong>Step 12</strong></td>
<td>Specifies that a communities attribute should be sent to a BGP neighbor.</td>
</tr>
<tr>
<td>neighbor</td>
<td>peer-group-name send-community extended</td>
</tr>
<tr>
<td>Example:</td>
<td>Device(config-router-af)# neighbor client1 send-community extended</td>
</tr>
<tr>
<td><strong>Step 13</strong></td>
<td>(Optional) Configures the router as a BGP route reflector and configures the specified neighbor as its client.</td>
</tr>
<tr>
<td>neighbor</td>
<td>peer-group-name route-reflector-client</td>
</tr>
<tr>
<td>Example:</td>
<td>Device(config-router-af)# neighbor client1 route-reflector-client</td>
</tr>
<tr>
<td><strong>Step 14</strong></td>
<td>Exits address family configuration mode and enters router configuration mode.</td>
</tr>
<tr>
<td>exit-address-family</td>
<td></td>
</tr>
<tr>
<td>Example:</td>
<td>Device(config-router-af)# exit-address-family</td>
</tr>
<tr>
<td><strong>Step 15</strong></td>
<td>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.</td>
</tr>
<tr>
<td>address-family</td>
<td>ipv4 vrf vrf-name</td>
</tr>
<tr>
<td>Example:</td>
<td>Device(config-router)# address-family ipv4 vrf vrf1</td>
</tr>
<tr>
<td><strong>Step 16</strong></td>
<td>Enables the Cisco software to advertise a network route without waiting for the Interior Gateway Protocol (IGP) system.</td>
</tr>
<tr>
<td>no</td>
<td>synchronization</td>
</tr>
<tr>
<td>Example:</td>
<td>Device(config-router-af)# no synchronization</td>
</tr>
<tr>
<td><strong>Step 17</strong></td>
<td>Exits address family configuration mode and enters router configuration mode.</td>
</tr>
<tr>
<td>exit-address-family</td>
<td></td>
</tr>
<tr>
<td>Example:</td>
<td>Device(config-router-af)# exit-address-family</td>
</tr>
<tr>
<td><strong>Step 18</strong></td>
<td>Configures a routing session using IPv4 multicast address prefixes for a VRF instance and enters address family configuration mode.</td>
</tr>
<tr>
<td>address-family</td>
<td>ipv4 multicast vrf vrf-name</td>
</tr>
<tr>
<td>Example:</td>
<td>Device(config-router)# address-family ipv4 multicast vrf vrf1</td>
</tr>
<tr>
<td><strong>Step 19</strong></td>
<td>Enables the Cisco software to advertise a network route without waiting for the IGP system.</td>
</tr>
<tr>
<td>no</td>
<td>synchronization</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
</tbody>
</table>
### Purpose

**Command or Action**

Device(config-router-af)# no synchronization

**Step 20**

- **exit-address-family**
  
  **Example:**
  
  Device(config-router-af)# exit-address-family

**Step 21**

- **end**
  
  **Example:**
  
  Device(config)# end

**Step 22**

- **show running-config | b router bgp**
  
  **Example:**
  
  Device# show running-config | b router bgp

### 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.

![Diagram](image)

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

```plaintext
! 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
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

<table>
<thead>
<tr>
<th>Related Topic</th>
<th>Document Title</th>
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<tbody>
<tr>
<td>Cisco IOS commands</td>
<td>Cisco IOS Master Command List, All Releases</td>
</tr>
<tr>
<td>BGP commands</td>
<td>Cisco IOS IP Routing: BGP Command Reference</td>
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Standards and RFCs

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<th>Standard/RFC</th>
<th>Title</th>
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<td>RFC 2547</td>
<td>BGP/MPLS VPNs</td>
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Technical Assistance

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<th>Description</th>
<th>Link</th>
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<tr>
<td>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.</td>
<td><a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a></td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Releases</th>
<th>Feature Information</th>
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<tbody>
<tr>
<td>BGP - mVPN BGP sAFI 129 - IPv4</td>
<td>15.2(2)S</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>15.2(4)S</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cisco IOS XE Release 3.6S</td>
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