



# MPLS Multi-VRF (VRF-Lite)

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The MPLS Multi-VRF feature allows you to configure and maintain more than one instance of a routing and forwarding table within the same customer edge (CE) router.

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## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see 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 document.

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.

## Prerequisites for MPLS Multi-VRF

The network's core and provider edge routers must be configured for MPLS Virtual Private Network (VPN) operation.

## Restrictions for MPLS Multi-VRF

You can configure the MPLS Multi-VRF feature only on Layer 3 interfaces.



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The MPLS Multi-VRF feature is not supported by Interior Gateway Routing Protocol (IGRP) nor IS-IS.

Label distribution for a given VPN routing and forwarding (VRF) instance on a given router can be handled by either Border Gateway Protocol (BGP) or Label Distribution Protocol (LDP), but not by both protocols at the same time.

Multicast cannot operate on a Layer 3 interface that is configured with the MPLS Multi-VRF feature.

Multicast cannot be configured at the same time on the same layer 3 interface as the MPLS Multi-VRF feature.

## Information About MPLS Multi-VRF

- [How the MPLS Multi-VRF Feature Works, page 2](#)
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## How the MPLS Multi-VRF Feature Works

The MPLS Multi-VRF feature enables a service provider to support two or more VPNs, where the IP addresses can overlap several VPNs. The MPLS Multi-VRF feature uses input interfaces to distinguish routes for different VPNs and forms virtual packet-forwarding tables by associating one or more Layer 3 interfaces with each VRF. Interfaces in a VRF can be either physical, such as FastEthernet ports, or logical, such as VLAN Switched Virtual Interfaces (SVIs), but a Layer 3 interface cannot belong to more than one VRF at any one time. The Multi-VRF feature allows an operator to support two or more routing domains on a CE router, with each routing domain having its own set of interfaces and its own set of routing and forwarding tables. The MPLS Multi-VRF feature makes it possible to extend the Label Switched Paths (LSPs) to the CE and into each routing domain that the CE supports.

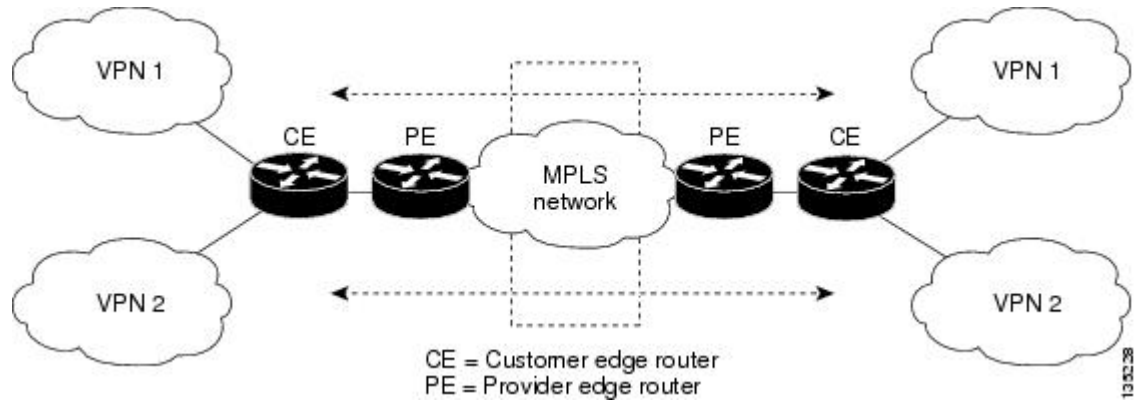
The MPLS Multi-VRF feature works as follows:

- Each CE router advertises its site's local routes to a provider edge (PE) router and learns the remote VPN routes from that PE router.
- PE routers exchange routing information with CE routers by using static routing or a routing protocol such as BGP, RIPv1, or RIPv2.
- PE routers exchange MPLS label information with CE routers through LDP or BGP.
- The PE router needs to maintain VPN routes only for those VPNs to which it is directly attached, eliminating the requirement that the PE maintain all of the service provider's VPN routes. Each PE router maintains a VRF for each of its directly connected sites. Two or more interfaces on a PE router can be associated with a single VRF if all the sites participate in the same VPN. Each VPN is mapped to a specified VRF. After learning local VPN routes from CE routers, the PE router exchanges VPN routing information with other PE routers through internal BGP (iBGP).

With the MPLS Multi-VRF feature, two or more customers can share one CE router, and only one physical link is used between the CE and the PE routers. The shared CE router maintains separate VRF tables for each customer and routes packets for each customer based on that customer's own routing table. The MPLS Multi-VRF feature extends limited PE router functionality to a CE router, giving it the ability, through the maintenance of separate VRF tables, to extend the privacy and security of a VPN to the branch office.

The figure below shows a configuration where each CE router acts as if it were two CE routers. Because the MPLS Multi-VRF feature is a Layer 3 feature, each interface associated with a VRF must be a Layer 3 interface.

**Figure 1** Each CE Router Acting as Several Virtual CE Routers



## How Packets Are Forwarded in a Network Using the MPLS Multi-VRF Feature

Following is the packet-forwarding process in an MPLS Multi-VRF CE-enabled network, as illustrated in the figure above :

- When the CE receives a packet from a VPN, it looks up the routing table based on the input interface. When a route is found, the CE imposes the MPLS label it received from the PE for that route and forwards the packet to the PE.
- When the ingress PE receives a packet from the CE, it swaps the incoming label with the corresponding label stack and sends it to the MPLS network.
- When an egress PE receives a packet from the network, it swaps the VPN label with the label it earlier had received for the route from the CE, and forwards it to the CE.
- When a CE receives a packet from an egress PE, it uses the incoming label on the packet to forward the packet to the correct VPN.

To configure Multi-VRF, you create a VRF table and then specify the Layer 3 interface associated with that VRF. Next, you configure the routing protocols within the VPN, and between the CE and the PE. BGP is the preferred routing protocol for distributing VPN routing information across the provider's backbone. For more information, see the [How to Configure MPLS Multi-VRF, page 4](#).

The Multi-VRF network has three major components:

- VPN route target communities: These are lists of all other members of a VPN community. You need to configure VPN route targets for each VPN community member.
- Multiprotocol BGP peering of VPN community PE routers: This propagates VRF reachability information to all members of a VPN community. You need to configure BGP peering in all PE routers within a VPN community.
- VPN forwarding: This transports all traffic between VPN community members across a VPN service-provider network.

## Considerations for Configuring MPLS Multi-VRF

When BGP is used as the routing protocol, it can also be used for MPLS label exchange between the PE and CE routers. By contrast, if Open Shortest Path First (OSPF), Enhanced Interior Gateway Routing Protocol (EIGRP), RIP, or static routing is used, LDP must be used to signal labels.

To configure the MPLS Multi-VRF feature, create a VRF table, specify the Layer 3 interface associated with that VRF, and then configure the routing protocols within the VPN and between the CE and the PE routers.

Consider these points when configuring the MPLS Multi-VRF feature in your network:

- A router with the MPLS Multi-VRF feature is shared by several customers, and each customer has its own routing table.
- Because each customer uses a different VRF table, the same IP addresses can be reused. Overlapping IP addresses are allowed in different VPNs.
- The MPLS Multi-VRF feature lets several customers share the same physical link between the PE and CE routers. Trunk ports with several VLANs separate packets among the customers. Each customer has its own VLAN.
- For the PE router, there is no difference between using the MPLS Multi-VRF feature or using several CE routers. In the figure above, for example, four virtual Layer 3 interfaces are connected to the MPLS Multi-VRF CE router.
- The MPLS Multi-VRF feature does not affect the packet switching rate.

## How to Configure MPLS Multi-VRF

- [Configuring VRFs, page 4](#)
- [Configuring BGP as the Routing Protocol, page 7](#)
- [Configuring PE-to-CE MPLS Forwarding and Signaling with BGP, page 9](#)
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## Configuring VRFs

Perform the following task to configure VRFs on both the PE and CE routers:

If a VRF has not been configured, the router has the following default configuration:

- No VRFs have been defined.
- No import maps, export maps, or route maps have been defined.
- No VRF maximum routes exist.
- Only the global routing table exists on the interface.

**SUMMARY STEPS**

1. **enable**
2. **configure terminal**
3. **ip routing**
4. **ip vrf** *vrf-name*
5. **rd** *route-distinguisher*
6. **route-target** {**export** | **import** | **both**} *route-target-ext-community*
7. **import map** *route-map*
8. **exit**
9. **interface** *type-number*
10. **ip vf forwarding** *vrf-name*
11. **end**
12. **show ip vrf**

**DETAILED STEPS**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>enable</b>  <b>Example:</b> Router> 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> Router# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>ip routing</b>  <b>Example:</b> Router(config)# ip routing	Enables IP routing.
<b>Step 4</b>	<b>ip vrf</b> <i>vrf-name</i>  <b>Example:</b> Router(config)# ip vrf v1	Names the VRF and enters VRF configuration mode.

Command or Action	Purpose
<p><b>Step 5</b> <code>rd route-distinguisher</code></p> <p><b>Example:</b></p> <pre>Router(config-vrf)# rd 100:1</pre>	<p>Creates a VRF table by specifying a route distinguisher.</p> <ul style="list-style-type: none"> <li>Enter either an autonomous system number and an arbitrary number (xxx:y), or an IP address and an arbitrary number (A.B.C.D:y).</li> </ul>
<p><b>Step 6</b> <code>route-target {export   import   both} route-target-ext-community</code></p> <p><b>Example:</b></p> <pre>Router(config-vrf)# route-target export 100:1</pre>	<p>Creates a list of import, export, or import and export route target communities for the specified VRF.</p> <ul style="list-style-type: none"> <li>Enter either an autonomous system number and an arbitrary number (xxx:y), or an IP address and an arbitrary number (A.B.C.D:y).</li> </ul> <p><b>Note</b> This command works only if BGP is running.</p>
<p><b>Step 7</b> <code>import map route-map</code></p> <p><b>Example:</b></p> <pre>Router(config-vrf)# import map importmap1</pre>	<p>(Optional) Associates a route map with the VRF.</p>
<p><b>Step 8</b> <code>exit</code></p> <p><b>Example:</b></p> <pre>Router(config-vrf)# exit</pre>	<p>Returns to global configuration mode.</p>
<p><b>Step 9</b> <code>interface type-number</code></p> <p><b>Example:</b></p> <pre>Router(config)# interface fastethernet3/0.10</pre>	<p>Specifies the Layer 3 interface to be associated with the VRF and enters interface configuration mode.</p> <ul style="list-style-type: none"> <li>The interface can be a routed port or an SVI.</li> </ul>
<p><b>Step 10</b> <code>ip vrf forwarding vrf-name</code></p> <p><b>Example:</b></p> <pre>Router(config-if)# ip vrf forwarding v1</pre>	<p>Associates the VRF with the Layer 3 interface.</p>
<p><b>Step 11</b> <code>end</code></p> <p><b>Example:</b></p> <pre>Router(config-if)# end</pre>	<p>Exits interface configuration mode and returns to privileged EXEC mode.</p>

Command or Action	Purpose
<b>Step 12</b> <code>show ip vrf</code>  <b>Example:</b>  <code>Router# show ip vrf</code>	Displays the settings of the VRFs.

## Configuring BGP as the Routing Protocol

Most routing protocols can be used between the CE and the PE routers. However, external BGP (eBGP) is recommended, because:

- - BGP does not require more than one algorithm to communicate with many CE routers.
  - BGP is designed to pass routing information between systems run by different administrations.
  - BGP makes it easy to pass attributes of the routes to the CE router.

When BGP is used as the routing protocol, it can also be used to handle the MPLS label exchange between the PE and CE routers. By contrast, if OSPF, EIGRP, RIP, or static routing is used, LDP must be used to signal labels.

To configure a BGP PE-to-CE routing session, perform the following steps on the CE and on the PE routers.

### SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `router bgp autonomous-system-number`
4. `network ip-address mask network-mask`
5. `redistribute ospf process-id match internal`
6. `network ip-address area area-id`
7. `address-family ipv4 vrf vrf-name`
8. `neighbor {ip-address | peer-group-name} remote-as as-number`
9. `neighbor address activate`

### DETAILED STEPS

Command or Action	Purpose
<b>Step 1</b> <code>enable</code>  <b>Example:</b>  <code>Router&gt; enable</code>	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>

Command or Action	Purpose
<p><b>Step 2</b> <code>configure terminal</code></p> <p><b>Example:</b></p> <pre>Router# configure terminal</pre>	Enters global configuration mode.
<p><b>Step 3</b> <code>router bgp <i>autonomous-system-number</i></code></p> <p><b>Example:</b></p> <pre>Router(config)# router bgp 100</pre>	Configures the BGP routing process with the autonomous system number passed to other BGP routers, and enters router configuration mode.
<p><b>Step 4</b> <code>network <i>ip-address</i> <i>mask</i> <i>network-mask</i></code></p> <p><b>Example:</b></p> <pre>Router(config-router)# network 10.0.0.0 mask 255.255.255.0</pre>	Specifies a network and mask to announce using BGP.
<p><b>Step 5</b> <code>redistribute ospf <i>process-id</i> match internal</code></p> <p><b>Example:</b></p> <pre>Router(config-router)# redistribute ospf 2 match internal</pre>	Sets the router to redistribute OSPF internal routes.
<p><b>Step 6</b> <code>network <i>ip-address</i> <i>area</i> <i>area-id</i></code></p> <p><b>Example:</b></p> <pre>Router(config-router)# network 10.0.0.0 255.255.255.0 area 0</pre>	Identifies the network address and mask on which OSPF is running, and the area ID of that network address.
<p><b>Step 7</b> <code>address-family ipv4 vrf <i>vrf-name</i></code></p> <p><b>Example:</b></p> <pre>Router(config-router)# address-family ipv4 vrf v12</pre>	Identifies the name of the VRF instance that will be associated with the next two commands, and enters VRF address-family mode.
<p><b>Step 8</b> <code>neighbor {<i>ip-address</i>   <i>peer-group-name</i>} remote-as <i>as-number</i></code></p> <p><b>Example:</b></p> <pre>Router(config-router-af)# neighbor 10.0.0.3 remote- as 100</pre>	Informs this router's BGP neighbor table of the neighbor's address (or peer group name) and the neighbor's autonomous system number.



Command or Action	Purpose
<p><b>Step 9</b> <code>neighbor address activate</code></p> <p><b>Example:</b></p> <pre>Router(config-router-af)# neighbor 10.0.0.3 activate</pre>	<p>Activates the advertisement of the IPv4 address-family neighbors.</p>

## Configuring PE-to-CE MPLS Forwarding and Signaling with BGP

If BGP is used for routing between the PE and CE routers, configure BGP to signal the labels on the VRF interfaces of both the CE and PE routers. You must globally enable signaling at the router-configuration level and for each interface:

- To enable MPLS label signaling via BGP at the router-configuration level, use the **neighbor send-label** command.
- To enable MPLS forwarding on the interface used for the PE-to-CE eBGP session at the interface level, use the **mpls bgp forwarding** command.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router bgp** *autonomous-system-number*
4. **address-family ipv4 vrf** *vrf-name*
5. **neighbor** {*ip-address* | *peer-group-name*} **remote-as** *as-number*
6. **neighbor address send-label** [**explicit-null**]
7. **neighbor address activate**
8. **end**
9. **configure terminal**
10. **interface** *type number*
11. **mpls bgp forwarding**

### DETAILED STEPS

Command or Action	Purpose
<p><b>Step 1</b> <code>enable</code></p> <p><b>Example:</b></p> <pre>Router&gt; enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>

	Command or Action	Purpose
Step 2	<b>configure terminal</b>  <b>Example:</b> <pre>Router# configure terminal</pre>	Enters global configuration mode.
Step 3	<b>router bgp <i>autonomous-system-number</i></b>  <b>Example:</b> <pre>Router(config)# router bgp 100</pre>	Configures the BGP routing process with the autonomous system number passed to other BGP routers and enters router configuration mode.
Step 4	<b>address-family ipv4 vrf <i>vrf-name</i></b>  <b>Example:</b> <pre>Router(config-router)# address-family ipv4 vrf v12</pre>	Identifies the name of the VRF instance that will be associated with the next two commands and enters address family configuration mode.
Step 5	<b>neighbor {<i>ip-address</i>   <i>peer-group-name</i>} remote-as <i>as-number</i></b>  <b>Example:</b> <pre>Router(config-router-af)# neighbor 10.0.0.3 remote-as 100</pre>	Informs this router's BGP neighbor table of the neighbor's address (or peer group name) and the neighbor's autonomous system number.
Step 6	<b>neighbor <i>address</i> send-label [explicit-null]</b>  <b>Example:</b> <pre>Router(config-router-af)# neighbor 10.0.0.3 send-label</pre>	Enables the router to use BGP to distribute MPLS labels along with the IPv4 routes to the peer routers. <ul style="list-style-type: none"> <li>If a BGP session is running when you issue this command, the BGP session flaps immediately after the command is issued.</li> </ul>
Step 7	<b>neighbor <i>address</i> activate</b>  <b>Example:</b> <pre>Router(config-router-af)# neighbor 10.0.0.3 activate</pre>	Activates the advertisement of the IPv4 address-family neighbors.
Step 8	<b>end</b>  <b>Example:</b> <pre>Router(config-router-af)# end</pre>	Exits address family configuration mode and returns to privileged EXEC mode.

	Command or Action	Purpose
<b>Step 9</b>	<b>configure terminal</b>  <b>Example:</b>  Router# configure terminal	Enters global configuration mode.
<b>Step 10</b>	<b>interface <i>type number</i></b>  <b>Example:</b>  Router(config)# interface fastethernet3/0.10	Enters interface configuration mode for the interface to be used for the BGP session. <ul style="list-style-type: none"> <li>The interface can be a routed port or an SVI.</li> </ul>
<b>Step 11</b>	<b>mpls bgp forwarding</b>  <b>Example:</b>  Router(config-if)# mpls bgp forwarding	Enables MPLS forwarding on the interface.

## Configuring a Routing Protocol Other than BGP

You can use RIP, EIGRP, OSPF or with static routing. This configuration uses OSPF, but the process is the same for other protocols.

If you use OSPF as the routing protocol between the PE and the CE routers, issue the **capability vrf-lite** command in router configuration mode. See *OSPF Support for Multi-VRF in CE Routers* for more information.



### Note

If OSPF, EIGRP, RIP, or static routing is used, LDP must be used to signal labels.

The MPLS Multi-VRF feature is not supported by IGRP nor IS-IS.

Multicast cannot be configured on the same Layer 3 interface as the MPLS Multi-VRF feature is configured.

>

**SUMMARY STEPS**

1. **enable**
2. **configure terminal**
3. **router ospf** *process-id* [**vrf** *vpn-name*]
4. **log-adjacency-changes**
5. **redistribute bgp** *autonomous-system-number* **subnets**
6. **network** *ip-address subnet-mask* **area** *area-id*
7. **end**
8. **show ip ospf**

**DETAILED STEPS**

Command or Action	Purpose
<b>Step 1</b> <b>enable</b>  <b>Example:</b> <pre>Router&gt; enable</pre>	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> <pre>Router# configure terminal</pre>	Enters global configuration mode.
<b>Step 3</b> <b>router ospf</b> <i>process-id</i> [ <b>vrf</b> <i>vpn-name</i> ]  <b>Example:</b> <pre>Router(config)# router ospf 100 vrf v1</pre>	Enables OSPF routing, specifies a VRF table, and enters router configuration mode.
<b>Step 4</b> <b>log-adjacency-changes</b>  <b>Example:</b> <pre>Router(config-router)# log-adjacency-changes</pre>	(Optional) Logs changes in the adjacency state. This is the default state.
<b>Step 5</b> <b>redistribute bgp</b> <i>autonomous-system-number</i> <b>subnets</b>  <b>Example:</b> <pre>Router(config-router)# redistribute bgp 800 subnets</pre>	Sets the router to redistribute information from the BGP network to the OSPF network.

Command or Action	Purpose
<p><b>Step 6</b> <code>network ip-address subnet-mask area area-id</code></p> <p><b>Example:</b></p> <pre>Router(config-router)# network 10.0.0.0 255.255.255.0 area 0</pre>	Indicates the network address and mask on which OSPF runs, and the area ID of that network address.
<p><b>Step 7</b> <code>end</code></p> <p><b>Example:</b></p> <pre>Router(config-router)# end</pre>	Exits router configuration mode and returns to privileged EXEC mode.
<p><b>Step 8</b> <code>show ip ospf</code></p> <p><b>Example:</b></p> <pre>Router# show ip ospf</pre>	Displays information about the OSPF routing processes.

## Configuring PE-to-CE MPLS Forwarding and Signaling with LDP

If OSPF, EIGRP, RIP, or static routing is used, LDP must be used to signal labels. Perform the following steps to configure PE-to-CE MPLS forwarding and signaling with LDP.

### SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `interface type number`
4. `mpls ip`

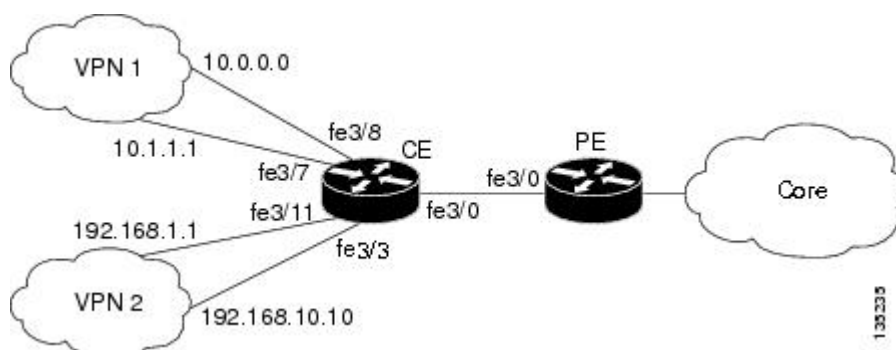
### DETAILED STEPS

Command or Action	Purpose
<p><b>Step 1</b> <code>enable</code></p> <p><b>Example:</b></p> <pre>Router&gt; enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<p><b>Step 2</b> <code>configure terminal</code></p> <p><b>Example:</b></p> <pre>Router# configure terminal</pre>	Enters global configuration mode.

Command or Action	Purpose
<b>Step 3</b> <code>interface type number</code>  <b>Example:</b> Router(config)# interface fastethernet3/0.10	Enters subinterface configuration mode for the interface associated with the VRF. <ul style="list-style-type: none"> <li>The interface can be a routed port or an SVI.</li> </ul>
<b>Step 4</b> <code>mpls ip</code>  <b>Example:</b> Router(config-subif)# mpls ip	Enables MPLS forwarding of IPv4 packets along normally routed paths for this interface.

## Configuration Examples for MPLS Multi-VRF

The figure below shows an example MPLS Multi-VRF configuration.



- [Example Configuring MPLS Multi-VRF on the PE Router, page 14](#)
- [Example Configuring MPLS Multi-VRF on the CE Router, page 15](#)

## Example Configuring MPLS Multi-VRF on the PE Router

### Configuring VRFs

```

configure terminal
ip vrf v1
 rd 100:1
 route-target export 100:1
 route-target import 100:1
 exit
ip vrf v2
 rd 100:2
 route-target export 100:2
 route-target import 100:2
 exit

```

**Configuring PE-to-CE Connections Using BGP for Both Routing and Label Exchange**

```

router bgp 100
 address-family ipv4 vrf v2
  neighbor 10.0.0.8 remote-as 800
  neighbor 10.0.0.8 send-label
  neighbor 10.0.0.8 activate
  exit
 address-family ipv4 vrf v1
  neighbor 10.0.0.8 remote-as 800
  neighbor 10.0.0.8 send-label
  neighbor 10.0.0.8 activate
  end
configure terminal
 interface fastethernet3/0.10
  ip vrf forwarding v1
  ip address 10.0.0.3 255.255.255.0
  mpls bgp forwarding
  exit
 interface fastethernet3/0.20
  ip vrf forwarding v2
  ip address 10.0.0.3 255.255.255.0
  mpls bgp forwarding
  exit

```

**Configuring PE-to-CE Connections Using OSPF for Routing and LDP for Label Exchange**

```

router ospf 100 vrf v1
 network 10.0.0.0 255.255.255.0 area 0
 exit
router ospf 101 vrf v2
 network 10.0.0.0 255.255.255.0 area 0
 exit
interface fastethernet3/0.10
 ip vrf forwarding v1
 ip address 10.0.0.3 255.255.255.0
 mpls ip
 exit
interface fastethernet3/0.20
 ip vrf forwarding v2
 ip address 10.0.0.3 255.255.255.0
 mpls ip
 exit

```

**Example Configuring MPLS Multi-VRF on the CE Router****Configuring VRFs**

```

configure terminal
 ip routing
 ip vrf v11
  rd 800:1
  route-target export 800:1
  route-target import 800:1
  exit
 ip vrf v12
  rd 800:2
  route-target export 800:2
  route-target import 800:2
  exit

```

**Configuring CE Router VPN Connections**

```

interface fastethernet3/8
 ip vrf forwarding v11

```

```

ip address 10.0.0.8 255.255.255.0
exit
interface fastethernet3/11
ip vrf forwarding v12
ip address 10.0.0.8 255.255.255.0
exit
  router ospf 1 vrf v11
network 10.0.0.0 255.255.255.0 area 0
network 10.0.0.0 255.255.255.0 area 0
exit
  router ospf 2 vrf v12
network 10.0.0.0 255.255.255.0 area 0
network 10.0.0.0 255.255.255.0 area 0
exit

```

**Note**

If BGP is used for routing between the PE and CE routers, the BGP-learned routes from the PE router can be redistributed into OSPF using the commands in the following example.

```

  router ospf 1 vrf v11
redistribute bgp 800 subnets
exit
  router ospf 2 vrf v12
redistribute bgp 800 subnets
exit

```

**Configuring PE-to-CE Connections Using BGP for Both Routing and Label Exchange**

```

  router bgp 800
address-family ipv4 vrf v12
neighbor 10.0.0.3 remote-as 100
neighbor 10.0.0.3 send-label
neighbor 10.0.0.3 activate
exit
address-family ipv4 vrf v11
neighbor 10.0.0.3 remote-as 100
neighbor 10.0.0.3 send-label
neighbor 10.0.0.3 activate
end
  interface fastethernet3/0.10
ip vrf forwarding v11
ip address 10.0.0.8 255.255.255.0
mpls bgp forwarding
exit
  interface fastethernet3/0.20
ip vrf forwarding v12
ip address 10.0.0.8 255.255.255.0
mpls bgp forwarding
exit

```

**Configuring PE-to-CE Connections Using OSPF for Routing and LDP for Label Exchange**

```

  router ospf 1 vrf v11
network 10.0.0.0 255.255.255.0 area 0
exit
  router ospf 2 vrf v12
network 10.0.0.0 255.255.255.0 area 0
exit
  interface fastethernet3/0.10
ip vrf forwarding v11
ip address 10.0.0.3 255.255.255.0
mpls ip
exit
  interface fastethernet3/0.20
ip vrf forwarding v12
ip address 10.0.0.3 255.255.255.0

```



```
mpls ip
exit
```

## Additional References

### Related Documents

Related Topic	Document Title
Cisco IOS commands	<a href="#">Cisco IOS Master Commands List, All Releases</a>
Description of commands associated with MPLS and MPLS application	<i>Cisco IOS Multiprotocol Label Switching Command Reference</i>
OSPF with Multi-VRF	<i>OSPF Support for Multi-VRF in CE Routers</i>

### Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	--

### MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

### RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	--

### 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 MPLS Multi-VRF

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

**Table 1**      **Feature Information for MPLS Multi-VRF**

Feature Name	Releases	Feature Information
MPLS Multi-VRF	12.1(11)EA1 12.1(20)EW 12.2(4)T 12.2(8)YN 12.2(18)SXD 12.2(25)EWA 12.2(28)SB	<p>The MPLS Multi-VRF feature allows you to configure and maintain more than one instance of a routing and forwarding table within the same CE router.</p> <p>In Cisco IOS Release 12.1(11)EA1, the Multi-VRF feature was introduced.</p> <p>The feature was integrated into Cisco IOS Release 12.1(20)EW.</p> <p>The feature was integrated into Cisco IOS Release 12.2(4)T.</p> <p>The feature was integrated into Cisco IOS Release 12.2(8)YN.</p> <p>The feature was integrated into Cisco IOS Release 12.2(18)SXD.</p> <p>The feature was integrated into Cisco IOS Release 12.2(25)EWA.</p> <p>Multiprotocol Label Switching support was added in Cisco IOS Release 12.2(28)SB.</p>

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