



# OSPF Support for Unlimited Software VRFs per PE Router

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In a Multiprotocol Label Switching--Virtual Private Network (MPLS-VPN) deployment, each VPN routing and forwarding instance (VRF) needs a separate Open Shortest Path First (OSPF) process when configured to run OSPF. The OSPF Support for Unlimited Software VRFs per Provider Edge (PE) Router feature addresses the scalability issue for OSPF VPNs by eliminating the OSPF VPN limit of 32 processes.

## History for the OSPF Support for Unlimited Software VRFs per Provider Edge Router Feature

| Release     | Modification  |
|-------------|---|
| 12.3(4)T    | This feature was introduced.                                    |
| 12.0(27)S   | This feature was integrated into Cisco IOS Release 12.0(27)S.   |
| 12.2(25)S   | This feature was integrated into Cisco IOS Release 12.2(25)S.   |
| 12.2(18)SXE | This feature was integrated into Cisco IOS Release 12.2(18)SXE. |
| 12.2(27)SBC | This feature was integrated into Cisco IOS Release 12.2(27)SBC. |

## Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn> . You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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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 OSPF Support for Unlimited Software VRFs per PE Router

You must have OSPF configured in your network.

## Restrictions for OSPF Support for Unlimited Software VRFs per PE Router

Only 32 processes per VRF can be supported. For different VRF processes, there is no limit.

## Information About OSPF Support for Unlimited Software VRFs per PE Router

Before Cisco IOS Releases 12.3(4)T and 12.0(27)S, a separate OSPF process was necessary for each VRF that receives VPN routes via OSPF. When VPNs are deployed, an MPLS Provider Edge (PE) router will be running both multiprotocol Border Gateway Protocol (BGP) for VPN distribution, and Interior Gateway Protocol (IGP) for PE-P connectivity. It is a common scenario when OSPF is used as the IGP between a customer edge (CE) router and a PE router. OSPF was not scalable in VPN deployment because of the limit of 32 processes. By default one process is used for connected routes and another process is used for static routes, therefore only 28 processes can be created for VRFs.

The OSPF Support for Unlimited Software VRFs per Provider Edge Router feature allows for an approximate range of 300 to 10,000 VRFs, depending on the particular platform and on the applications, processes, and protocols that are currently running on the platform.

# How to Configure OSPF Support for Unlimited Software VRFs per PE Router

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## Configuring and Verifying Unlimited Software VRFs per Provider Edge Router

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router ospf** *process-id* [**vrf** *vpn-name*]
4. **end**
5. **show ip ospf** [*process-id*]

### DETAILED STEPS

| Command or Action   | Purpose   |
|---|---|
| <b>Step 1</b> <b>enable</b><br><br><b>Example:</b><br>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><br><br><b>Example:</b><br>Router# configure terminal  | Enters global configuration mode.   |
| <b>Step 3</b> <b>router ospf</b> <i>process-id</i> [ <b>vrf</b> <i>vpn-name</i> ]<br><br><b>Example:</b><br>Router(config)# router ospf 1 vrf crf-1 | Enables OSPF routing. <ul style="list-style-type: none"> <li>• The <i>process-id</i> argument identifies the OSPF process.</li> <li>• Use the <b>vrf</b> keyword and <i>vpn-name</i> argument to identify a VPN.</li> </ul> <b>Note</b> You now can configure as many OSPF VRF processes as needed. |
| <b>Step 4</b> <b>end</b><br><br><b>Example:</b><br>Router(config-router)# end   | Returns to privileged EXEC mode.  |

| Command or Action   | Purpose  |
|---|--|
| <b>Step 5</b> <code>show ip ospf [process-id]</code><br><br><b>Example:</b><br><br>Router# show ip ospf 1 | Displays general information about OSPF routing processes. |

## Configuration Examples for OSPF Support for Unlimited Software VRFs per PE Router

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- [Example Verifying OSPF Support for Unlimited Software VRFs per PE Router, page 4](#)

### Example Configuring OSPF Support for Unlimited Software VRFs per PE Router

This example shows a basic OSPF configuration using the **router ospf** command to configure OSPF VRF processes for the VRFs first, second, and third:

```
Router> enable
Router# configure terminal
Router(config)# router ospf 12 vrf first
Router(config)# router ospf 13 vrf second
Router(config)# router ospf 14 vrf third
Router(config)#
exit
```

### Example Verifying OSPF Support for Unlimited Software VRFs per PE Router

This example illustrates the output display from the **show ip ospf** command to verify that the OSPF VRF process 12 has been created for the VRF named first. The output that relates to the VRF first appears in bold.

```
Router# show ip ospf 12
main ID type 0x0005, value 0.0.0.100
Supports only single TOS(TOS0) routes
Supports opaque LSA
Supports Link-local Signaling (LLS)
Supports area transit capability
Connected to MPLS VPN Superbackbone, VRF first
It is an area border router
Initial SPF schedule delay 5000 msec
Minimum hold time between two consecutive SPF 10000 msec
Maximum wait time between two consecutive SPF 10000 msec
Incremental-SPF disabled
Minimum LSA interval 5 secs
Minimum LSA arrival 1000 msec
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msec
Retransmission pacing timer 66 msec
Number of external LSA 0. Checksum Sum 0x0
```

```

Number of opaque AS LSA 0. Checksum Sum 0x0
Number of DCbitless external and opaque AS LSA 0
Number of DoNotAge external and opaque AS LSA 0
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Number of areas transit capable is 0
External flood list length 0
  Area BACKBONE(0)
    Number of interfaces in this area is 1
    Area has no authentication
    SPF algorithm last executed 00:00:15.204 ago
    SPF algorithm executed 2 times
    Area ranges are
    Number of LSA 1. Checksum Sum 0xD9F3
    Number of opaque link LSA 0. Checksum Sum 0x0
    Number of DCbitless LSA 0
    Number of indication LSA 0
    Number of DoNotAge LSA 0
    Flood list length 0

```

## Additional References

The following sections provide references related to the OSPF Support for Unlimited Software VRFs per Provider Edge Router feature.

### Related Documents

| Related Topic    | Document Title  |
|------------------|---|
| Configuring OSPF | <i>Cisco IOS IP Routing: OSPF Configuration Guide</i> |

### Standards

| Standards | Title |
|-----------|-------|
| None      | --    |

### MIBs

| MIBs | MIBs Link  |
|------|--|
| None | To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:<br><a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a> |

### RFCs

| RFCs | Title |
|------|-------|
| None | --    |

## 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> |

## Glossary

**multiprotocol BGP** --Border Gateway Protocol (BGP) can be used as an interdomain routing protocol in networks that use Connectionless Network Service (CLNS) as the network-layer protocol.

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