OSPF Support for Unlimited Software VRFs per PE Router

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.

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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.

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.

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. OSPF is commonly used as the IGP between a customer edge (CE) router and a PE router. OSPF was not scalable in a 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

Configuring Unlimited Software VRFs per PE Router

SUMMARY STEPS

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

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:**	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
	`Router> enable`	
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip vrf** *vpn-name* **Example:** `Router(config)# ip vrf crf-1`	Defines a VPN routing and forwarding (VRF) instance and enters VRP configuration mode.
Step 4	**exit** **Example:** `Router(config-vrf)# exit`	Returns to global configuration mode.
Step 5	**router ospf** *process-id* [**vrf** *vpn-name*] **Example:** `Router(config)# router ospf 1 vrf crf-1`	Enables OSPF routing. • The *process-id* argument identifies the OSPF process. • Use the **vrf** keyword and *vpn-name* argument to identify the VPN already defined in Step 3. **Note** You can now configure as many OSPF VRF processes as needed. Repeat Steps 3-5 as needed.
Step 6	**end** **Example:** `Router(config-router)# end`	Returns to privileged EXEC mode.
Step 7	**show ip ospf** [*process-id*] **Example:** `Router# show ip ospf 1`	Displays general information about OSPF routing processes.

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

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)# ip vrf first
Router(config-vrf)# exit
Router(config)# ip vrf second
Router(config-vrf)# exit
Router(config)# ip vrf third
Router(config-vrf)# exit
Router(config)# router ospf 12 vrf first
Router(config-router)# exit
Router(config)# router ospf 13 vrf second
Router(config-router)# exit
Router(config)# router ospf 14 vrf third
Router(config)# end
```

Example Verifying OSPF Support for Unlimited Software VRFs per PE Router

This example illustrates the output from the **show ip ospf** command to verify that 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 msecs
 Minimum hold time between two consecutive SPFs 10000 msecs
 Maximum wait time between two consecutive SPFs 10000 msecs
 Incremental-SPF disabled
 Minimum LSA interval 5 secs
 Minimum LSA arrival 1000 msecs
 LSA group pacing timer 240 secs
 Interface flood pacing timer 33 msecs
 Retransmission pacing timer 66 msecs
 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	"Configuring OSPF"

Standards

Standard	Title
None	--

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 IOS XE releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	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.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for OSPF Support for Unlimited Software VRFs per PE Router

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 OSPF Support for Unlimited Software VRFs per Provider Edge Router

Feature Name	Releases	Feature Information
OSPF Support for Unlimited Software VRFs per Provider Edge Router	Cisco IOS XE Release 2.1	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 Router feature addresses the scalability issue for OSPF VPNs by eliminating the OSPF VPN limit of 32 processes.