# VRF Aware System Message Logging

The VRF Aware System Message Logging (Syslog) feature allows a device to send system logging (syslog) messages to a syslog server host connected through a Virtual Private Network (VPN) routing and forwarding (VRF) interface.

You can use logging information for network monitoring and troubleshooting. This feature extends this capability to network traffic connected through VRFs.



## 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.

## Prerequisites for VRF Aware System Message Logging

You must configure a Virtual Private Network (VPN) routing and forwarding (VRF) instance on a routing device and associate the VRF with an interface before you can configure the VRF Aware System Message Logging feature.

# Restrictions for VRF Aware System Message Logging

You cannot specify a source address for virtual routing and forwarding (VRF) system logging messages. The VRF Aware System Message Logging feature uses the VRF interface address as the source address for all VRF-aware system logging messages.

# Information About VRF Aware System Message Logging

## VRF Aware System Message Logging Benefit

A Virtual Private Network (VPN) routing and forwarding (VRF) instance is an extension of IP routing that provides multiple routing instances. A VRF provides a separate IP routing and forwarding table to each VPN. You must configure a VRF on a routing device before you configure the VRF Aware System Message Logging feature.

After you configure the VRF Aware System Message Logging feature on a routing device, the device can send syslog messages to a syslog host through a VRF interface. Then you can use logging messages to monitor and troubleshoot network traffic connected through a VRF. Without the VRF Aware System Message Logging feature on a routing device, you do not have this benefit; the routing device can send syslog messages to the syslog host only through the global routing table.

You can receive system logging messages through a VRF interface on any device where you can configure a VRF, that is:

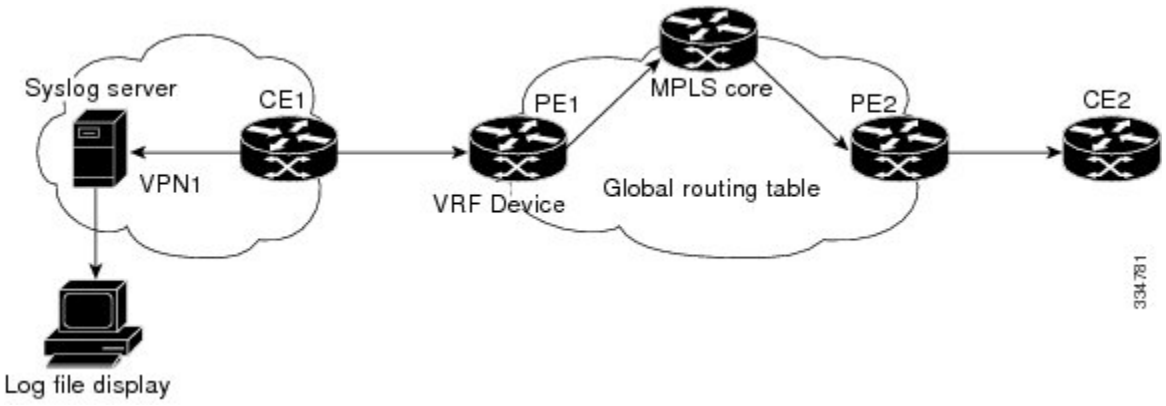
- On a provider edge (PE) device that is used with Multiprotocol Label Switching (MPLS) and multiprotocol Border Gateway Protocol (BGP) to provide a Layer 3 MPLS VPN network service.
- On a customer edge (CE) device that is configured for VRF-Lite, which is a VRF implementation without multiprotocol BGP.

## VRF Aware System Message Logging on a Provider Edge Device in an MPLS VPN Network

You can configure the VRF Aware System Message Logging feature on a provider edge (PE) device in a Layer 3 Multiprotocol Label Switching (MPLS) Virtual Private Network (VPN) network. The PE device can then send syslog messages through a virtual routing and forwarding (VRF) interface to a syslog server located in the VPN.

The figure below shows an MPLS VPN network and the VRF Aware System Message Logging feature configured on a PE device associated with VRF VPN1. The PE device sends log messages through a VRF interface to a syslog server located in VPN1. You can display the messages from the syslog server on a terminal.

*Figure 1: MPLS VPN and VRF Aware System Message Logging Configured on a Customer Edge Device*

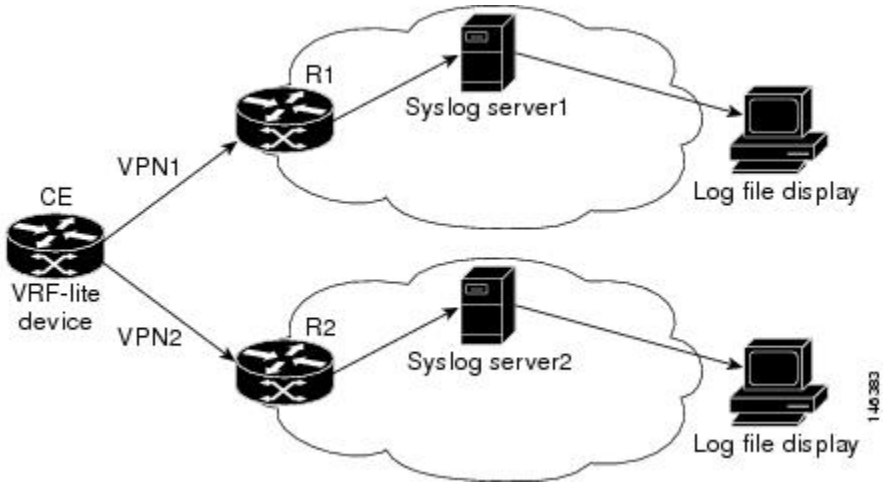



# VRF Aware System Message Logging on a Customer Edge Device with VRF-Lite Configured

You can configure the VRF Aware System Message Logging feature on a customer edge (CE) device where you have configured the VRF-Lite feature. The CE device can then send syslog messages through a virtual routing and forwarding (VRF) interface to syslog servers in multiple Virtual Private Networks (VPNs). The CE device can be either a router or a switch.

The figure below shows the VRF Aware System Message Logging feature configured on a VRF-Lite CE device. The CE device can send VRF syslog messages to syslog servers in VPN1 or VPN2 or to servers in both VPN1 and VPN2. You can configure multiple VRFs on a VRF-Lite CE device, and the device can serve many customers.

*Figure 2: VRF Aware System Message Logging Configured on a VRF-Lite Customer Edge Device*




# Message Levels for Logging Commands

The table below lists message levels for **logging** commands that you can use when you configure the VRF Aware System Message Logging feature. Information provided by the table below includes keyword level

names and numbers, their description, and the associated syslog definitions. You can use either the level keyword name or number with the **logging trap** *level* and **logging buffered** *severity-level* commands.

***Table 1: Message Levels for logging Commands***

| Level Name | Level Number | Description | Syslog Definition |
|---|---|---|---|
| **emergencies** | **0** | System unusable | LOG_EMERG |
| **alerts** | **1** | Immediate action needed | LOG_ALERT |
| **critical** | **2** | Critical conditions | LOG_CRIT |
| **errors** | **3** | Error conditions | LOG_ERR |
| **warnings** | **4** | Warning conditions | LOG_WARNING |
| **notifications** | **5** | Normal but significant condition | LOG_NOTICE |
| **informational** | **6** | Informational messages only | LOG_INFO |
| **debugging** | **7** | Debugging messages | LOG_DEBUG |

# How to Configure and Verify VRF Aware System Message Logging

## Configuring a VRF on a Routing Device

Configuring a virtual routing and forwarding (VRF) instance on a routing device helps provides customer connectivity to a Virtual Private Network (VPN). The routing device can be a provider edge (PE) device connected to a Multiprotocol Label Switching (MPLS) VPN network or a customer edge (CE) device that is configured for VRF-Lite.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip vrf** *vrf-name*
4. **rd** *route-distinguisher*
5. **route-target** {**import** | **export** | **both**} *route-target-ext-community*
6. **end**

### DETAILED STEPS

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

| | Command or Action | Purpose |
|---|---|---|
| | `Device> enable` | |
| **Step 2** | **configure terminal**<br>**Example:**<br>`Device# configure terminal` | Enters global configuration mode. |
| **Step 3** | **ip vrf** *vrf-name*<br>**Example:**<br>`Device(config)# ip vrf vpn1` | Defines a VRF instance and enters VRF configuration mode.<br>• The *vrf-name* argument is a name assigned to the VRF. |
| **Step 4** | **rd** *route-distinguisher*<br>**Example:**<br>`Device(config-vrf)# rd 100:1` | Creates routing and forwarding tables for a VRF.<br>• The *route-distinguisher* argument adds an 8-byte value to an IPv4 prefix to create a VPN IPv4 prefix.<br>• The route distinquisher (RD) is either an autonomous system number (ASN)-relative RD, in which case it is composed of an autonomous system number and an arbitrary number, or it is an IP-address-relative RD, in which case it is composed of an IP address and an arbitrary number.<br>• You can enter an RD in either of these formats:<br>  • 16-bit autonomous system number: your 32-bit number For example, 101:3.<br>  • 32-bit IP address: your 16-bit number For example, 10.0.0.1:1. |
| **Step 5** | **route-target** {**import** \| **export** \| **both**} *route-target-ext-community*<br>**Example:**<br>`Device(config-vrf)# route-target both 100:1` | Creates a route-target extended community for a VRF.<br>• The **import** keyword imports routing information from the target VPN extended community.<br>• The **export** keyword exports routing information to the target VPN extended community.<br>• The **both** keyword imports routing information from and exports routing information to the target VPN extended community.<br>• The *route-target-ext-community* argument adds the route-target extended community attributes to the VRF's list of import, export, or both (import and export) route-target extended communities.<br>The route target specifies a target VPN extended community. Like a route distinguisher, an extended community is composed of either an autonomous system number and an arbitrary number or an IP address and an |

| | Command or Action | Purpose |
|---|---|---|
| | | arbitrary number. You can enter the numbers in either of these formats:<br>• 16-bit autonomous system 1 32-bit number For example, 101:3.<br>• 32-bit IP address: your 16-bit number For example, 10.0.0.2.15: 1. |
| **Step 6** | **end**<br>**Example:**<br>`Device(config-vrf)# end` | Returns to privileged EXEC mode. |

# Associating a VRF with an Interface

Perform this task to associate a virtual routing and forwarding (VRF) instance with an interface. A VRF must be associated with an interface before you can forward Virtual Private Network (VPN) traffic.

**Note** You cannot configure a source address for VRF system logging messages. The VRF Aware System Message Logging feature uses the VRF interface address as the source address for all VRF-aware system logging messages.

After configuring the VRF and associating it with an interface, you can configure the VRF Aware System Message Logging feature on the routing device.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip vrf forwarding** *vrf-name*
5. **end**
6. **copy running-config startup-config**

### DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **enable**<br>**Example:**<br>`Device> enable` | Enables privileged EXEC mode.<br>• Enter your password if prompted. |
| **Step 2** | **configure terminal**<br>**Example:** | Enters global configuration mode. |

| | Command or Action | Purpose |
|---|---|---|
| | `Device# configure terminal` | |
| **Step 3** | **interface** *type number*<br>**Example:**<br>`Device(config)# interface FastEthernet 0/0/0` | Configures an interface type and enters interface configuration mode.<br>• The *type* argument is the type of interface to be configured.<br>• The *number* argument is the port, connector, or interface card number. The numbers are assigned at the factory at the time of installation or when the port, connector, or interface card is added to a system, and can be displayed with the **show interfaces** command. |
| **Step 4** | **ip vrf forwarding** *vrf-name*<br>**Example:**<br>`Device(config-if)# ip vrf forwarding vpn1` | Associates a VRF with an interface or subinterface.<br>• The *vrf-name* argument associates the interface with the specified VRF. |
| **Step 5** | **end**<br>**Example:**<br>`Device(config-if)# end` | Returns to privileged EXEC mode. |
| **Step 6** | **copy running-config startup-config**<br>**Example:**<br>`Device# copy running-config startup-config` | (Optional) Saves configuration changes to NVRAM. |

# Configuring VRF Aware System Message Logging on a Routing Device

Configure the VRF Aware System Message Logging feature on a routing device so that logging messages can be used to monitor and troubleshoot network traffic connected through VRF instances.

### Before you begin

You must perform the following tasks before you perform this task:

- Configure a virtual routing and forwarding (VRF) instance on a routing device.
- Associate a VRF with an interface.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **logging host** {*ip-address* | *hostname*} [**vrf** *vrf-name*]
4. **logging trap** *level*

5. **logging facility** *facility-type*
6. **logging buffered** [*buffer-size* | *severity-level*]
7. **end**

**DETAILED STEPS**

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **enable**<br>**Example:**<br>`Device> enable` | Enables privileged EXEC mode.<br>• Enter your password if prompted. |
| **Step 2** | **configure terminal**<br>**Example:**<br>`Device# configure terminal` | Enters global configuration mode. |
| **Step 3** | **logging host** {*ip-address* \| *hostname*} [**vrf** *vrf-name*]<br>**Example:**<br>`Device(config)# logging host 10.0.150.63 vrf vpn1` | Specifies a host to receive syslog messages.<br>• The *ip-address* argument is the IP address of the syslog server host.<br>• The *hostname* argument is the name of the IP or IPv6 host that receives the syslog messages.<br>• The **vrf** *vrf-name* keyword and argument specifies a VRF that connects to the syslog server host. |
| **Step 4** | **logging trap** *level*<br>**Example:**<br>`Device(config)# logging trap debugging` | Limits messages logged to the syslog servers based on severity.<br>• The *level* argument limits the logging of messages to the syslog servers to a specified level. You can enter the level number or level name. See the "Message Levels for Logging Commands" section for a description of acceptable keywords. |
| **Step 5** | **logging facility** *facility-type*<br>**Example:**<br>`Device(config)# logging facility local6` | (Optional) Configures the syslog facility in which error messages are sent.<br>• The *facility-type* argument names the syslog facility type keyword. For locally defined messages, the range of acceptable keywords is local0 to local7. The default is **local7**. |
| **Step 6** | **logging buffered** [*buffer-size* \| *severity-level*]<br>**Example:**<br>`Device(config)# logging buffered debugging` | (Optional) Limits messages logged to an internal buffer on the device based on severity.<br>• The*buffer-size* argument is the size of the buffer from 4096 to 4,294,967,295 bytes. The default size varies by platform. |

| | Command or Action | Purpose |
|---|---|---|
| | | • The *severity-level* argument limits the logging of messages to the buffer to a specified level. You can enter the level name or level number. See the "Message Levels for Logging Commands" section for a list of the acceptable level name or level number keywords. The default logging level varies by platform, but is generally 7, meaning that messages at all levels (0–7) are logged to the buffer. |
| **Step 7** | **end**<br>**Example:**<br>`Device(config)# end` | (Optional) Returns to privileged EXEC mode. |

# Verifying VRF Aware System Message Logging Operation

### SUMMARY STEPS

1. **enable**
2. **show running-config | include logging**
3. **show ip vrf interfaces**
4. **show running-config** [**interface** *type number*]
5. **ping vrf** *vrf-name target-ip-address*
6. **exit**

### DETAILED STEPS

**Step 1** **enable**

Enables privileged EXEC mode. Enter your password if prompted.

**Example:**

```
Device> enable
Device#
```

**Step 2** **show running-config | include logging**

Displays the logging configuration for the device and the logging host for a virtual routing and forwarding (VRF) instance.

**Example:**

```
Device# show running-config | include logging

logging queue-limit 100
logging buffered 100000 debugging
mpls ldp logging neighbor-changes
logging trap debugging
logging facility local6
```

```
logging host vrf vpn1 10.0.0.3
Device#
```

This example shows the configuration of a syslog server in VRF vpn1 with a server host address of 10.0.0.3.

**Step 3** **show ip vrf interfaces**

Displays the interfaces associated with the VRF that links to a syslog server host. The following example displays a list of VRF interfaces and their associated IP addresses that are configured on the device:

**Example:**

```
Device# show ip vrf interfaces

Interface              IP-Address       VRF                              Protocol
FastEthernet0/0/0      10.0.0.0         vpn1                              up
Loopback1              10.0.0.6         vpn1                              up
```

**Step 4** **show running-config** [**interface** *type number*]

Displays interface specific configuration information for an interface associated with a VRF.

**Example:**

```
Device# show running-config interface FastEthernet 0/0/0

Building configuration...
Device#
.
.
.
!
Current configuration : 116 bytes
!
interface FastEthernet0/0/0
 ip vrf forwarding vpn1
 ip address 10.0.0.98 255.0.0.0
 duplex half
 no cdp enable
end
```

This example displays configuration information for Fast Ethernet interface 0/0/0 in VRF vpn1.

**Step 5** **ping vrf** *vrf-name target-ip-address*

Verifies that you can reach the syslog server host, the *target-ip-address*, through the specified VRF.

**Example:**

```
Device# ping vrf vpn1 10.3.0.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.3.0.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/1/1 ms
```

In this example, the syslog server has an IP address of 10.3.0.1 and the VRF is named vpn1. The server is reached successfully four of five times.

**Step 6** **exit**

Returns to privileged EXEC mode.

**Example:**

```
Device# exit
Device>
```

# Configuration Examples for VRF Aware System Message Logging

## Example: Configuring a VRF on a Routing Device

```
enable
configure terminal
!
ip vrf vpn1
 rd 100:1
 route-target both 100:1
 end
```

## Example: Associating a VRF with an Interface

```
enable
configure terminal
!
interface FastEthernet 0/0/0
 ip vrf forwarding vpn1
 end
```

## Examples: Configuring VRF Aware System Message Logging on a Routing Device

The following example shows how to configure the VRF Aware System Message Logging feature on a routing device. The IP address of the syslog server host is 10.0.1.3 and the VRF is vpn1.

```
enable
configure terminal
!
 logging host 10.0.1.3 vrf vpn1
 logging trap debugging
 logging facility local6
 logging buffered 10000
 logging buffered debugging
 end
```

The following example shows how to turn off logging to the syslog server:

```
enable
configure terminal
!
```

```
no logging 10.0.1.3
end
```

# Additional References

### Related Documents

| Related Topic | Document Title |
|---|---|
| Cisco IOS commands | Cisco Master Command List, All Releases |
| MPLS and MPLS applications commands | Cisco IOS Multiprotocol Label Switching Command Reference |
| Concepts and tasks for configuring VRF-lite on a Catalyst 4500 switch | “Configuring VRF-lite" chapter in the *Catalyst 4500 Series Switch Cisco IOS Software Configuration Guide* |
| Concepts and tasks for configuring VRF Lite on ML-Series Ethernet cards | “Configuring VRF-lite" chapter in the *Ethernet Card Software Feature and Configuration Guide* for the Cisco ONS 15454 SDH, ONS 15454, and ONS 15327 |

### 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 VRF Aware System Message Logging

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 2: Feature Information for VRF Aware System Message Logging*

| Feature Name | Releases | Feature Information |
|---|---|---|
| VRF Aware System Message Logging | 12.2(31)SB2<br>12.2(33)SRA<br>12.2(33)SXH<br>12.4(13)<br>15.1(1)SG<br>Cisco IOS XE Release 2.2<br>Cisco IOS XE Release 3.3SG | The VRF Aware System Message Logging feature allows a device to send syslog messages to a syslog server host connected through a VPN VRF interface.<br>In Cisco IOS Release 12.2(31)SB2, this feature was introduced on the Cisco 10000 series routers.<br>In Cisco IOS Release 12.2(33)SRA, this feature was integrated.<br>In Cisco IOS Release 12.2(33)SXH, this feature was integrated.<br>In Cisco IOS Release 12.4(13), this feature was integrated.<br>In Cisco IOS Release 15.1(1)SG, this feature was integrated.<br>In Cisco IOS XE Release 2.2, this feature was implemented on the Cisco ASR 1000 Series Aggregation Services Routers.<br>In Cisco IOS XE Release 3.3SG, this feature was integrated.<br>The following command was modified: **logging host**. |

# Glossary

**CE device**—customer edge device. A device on the border between a VPN provider and a VPN customer that belongs to the customer.

**LSR**—label switching router. A device that forwards MPLS packets based on the value of a fixed-length label encapsulated in each packet.

**MPLS**—Multiprotocol Label Switching. A method for forwarding packets (frames) through a network. It enables devices at the edge of a network to apply labels to packets (frames). ATM switches or existing devices in the network core can switch packets according to the labels with minimal lookup overhead.

**MPLS VPN**—Multiprotocol Label Switching Virtual Private Network. An IP network infrastructure delivering private network services over a public infrastructure using a Layer 3 backbone. Using MPLS VPNs in a Cisco network provides the capability to deploy and administer scalable Layer 3 VPN backbone services including applications, data hosting network commerce, and telephony services to business customers.

**PE device**—provider edge device. A device on the border between a VPN provider and a VPN customer that belongs to the provider.

**VPN**—Virtual Private Network. A group of sites that, as the result of a set of administrative policies, are able to communicate with each other over a shared backbone network. A VPN is a secure IP-based network that shares resources on one or more physical networks. A VPN contains geographically dispersed sites that can communicate securely over a shared backbone. *See also* MPLS VPN.

**VRF**—VPN routing and forwarding instance. A VRF consists of an IP routing table, a derived forwarding table, a set of interfaces that use the forwarding table, and a set of rules and routing protocols that determine what goes into the forwarding table. In general, a VRF includes the routing information that defines a customer VPN site that is attached to a PE device.