



# NDE for VRF Interfaces

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The NetFlow data export (NDE) for VRF Interfaces feature enables the creation and export of hardware NetFlow cache entries for traffic entering a router on the last multi-protocol label switching (MPLS) hop of an IPv4 MPLS virtual private network (VPN). The NDE for VRF Interfaces feature also ensures that the data collected in the hardware NetFlow cache for traffic that is received on an IPv4 interface configured for a per-site forwarding table (VRF) contains the routing information specific to the VRF.

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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 NDE for VRF Interfaces

Your router must be running Cisco IOS release 12.2(33)SRB or later to configure the NDE for VRF Interfaces feature.



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## Restrictions for NDE for VRF Interfaces

The NDE for VRF Interfaces feature supports only IPv4 traffic.

When you configure the NDE for VRF Interfaces feature for a MPLS VPN, the router assigns a reserved VLAN ID to the MPLS VPN. This will limit the number of VLAN IDs available for other features that you configure on the router and that require VLAN IDs.

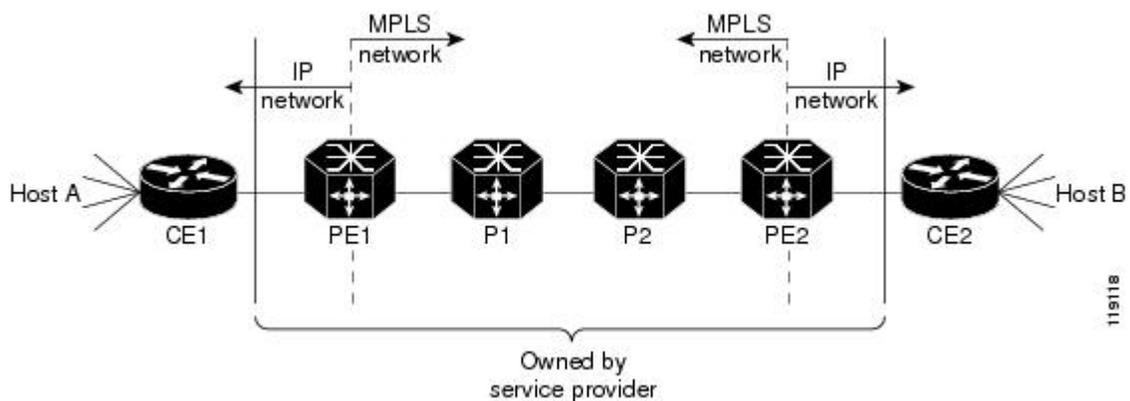
## Information About NDE for VRF Interfaces

- [Example of an MPLS VPN Network, page 2](#)
- [Analysis of Traffic Exiting the MPLS VPN Network with NetFlow, page 2](#)
- [MPLS Aggregate Labels, page 3](#)
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## Example of an MPLS VPN Network

The figure below is an example of a simple MPLS virtual private network (VPN). Routers PE1 and PE2 are configured to support an MPLS VPN to carry the customer's traffic between the sites where routers CE1 and CE2 are located. Routers PE1 and PE2 use multi-protocol iBGP peers for routing traffic on the MPLS VPNs. The NDE for VRF Interfaces feature is applicable to routers PE1 and PE2 in this example.

**Figure 1** Example of a simple MPLS VPN network



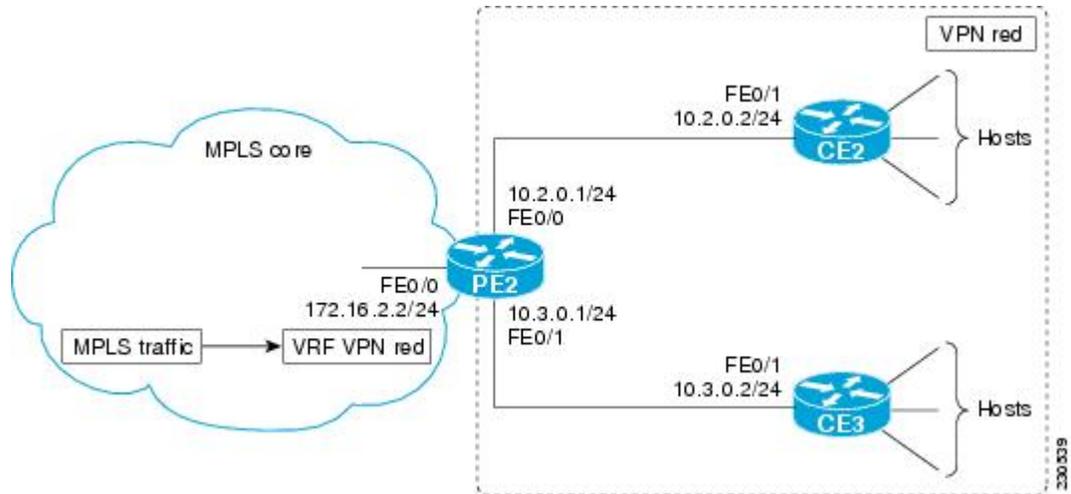
For more information about configuring MPLS on Cisco 7600 series routers, see the chapter Configuring PFC3BXL and PFC3B Multiprotocol Label Switching (MPLS) in the *Cisco 7600 Series Cisco IOS Software Configuration Guide*.

## Analysis of Traffic Exiting the MPLS VPN Network with NetFlow

The NDE for VRF Interfaces feature captures traffic received by the router on the MPLS VPN VRF interface as it exits the MPLS network. For example, when you configure the NDE for VRF Interfaces

feature on VPN Red on PE2 as shown in the figure below, and the traffic to and from CE2 is assigned to VRF Red, the traffic is added to the NetFlow cache and shown as being received on VPN Red.

**Figure 2** Example of a Router (PE2) Receiving Traffic over a MPLS VPN VRF Interface



## MPLS Aggregate Labels

There are two types of VPN MPLS labels:

- Aggregate labels for traffic on which a routing decision must be made
- Non aggregate (specific) labels.

When you configure a MPLS VPN on a PE router the router allocates an aggregate MPLS label for the VPN.

Since aggregate MPLS labels correspond to the VRF to which a packet belongs, the router must consult the routing table for a VRF to determine the correct next hop IP address within the VPN domain in order to forward the packet. The next-hop IP address is required before the router can forward the packet because VPN domains are capable of supporting multiple next hop routers. For example, in [MPLS Aggregate Labels, page 3](#) there are two CE routers: CE2 and CE3. MPLS traffic arriving on VPN Red on PE1 could be destined to hosts attached to either CE2 or CE3. PE2 must perform another lookup to identify the correct CE router to which the traffic must be forwarded. The method that PE2 uses to perform the next-hop IP address lookup depends on the number of MPLS aggregate labels that the router has stored.

- [Stored MPLS Aggregate Labels, page 3](#)
- [More Than 511 Stored MPLS Aggregate Labels, page 4](#)

## Stored MPLS Aggregate Labels

Traffic that uses one of the first 511 aggregate MPLS labels is forwarded by the router based on the entry for the MPLS VPN label in the VPN content addressable memory (CAM).

The following steps are performed by a PE router to forward MPLS traffic that uses one of the first 511 aggregate MPLS labels:

- 1 An MPLS packet carrying an aggregation label arrives at the egress PE router.
- 2 A lookup in the VPN CAM is performed for the MPLS aggregation label.

- 3 The MPLS aggregation label is removed and the corresponding VPN ID for the packet is identified.
- 4 The index from the VPN CAM is used to reference the MPLS VPN routing table.
- 5 A lookup is performed for the destination IP prefix in the VPN VRF that was derived from the MPLS VPN table. The lookup result contains the next hop IP address and all other rewrite information needed for forwarding the packet to the correct CE router.

## More Than 511 Stored MPLS Aggregate Labels

When the number of MPLS aggregate labels in the network exceeds 511, the router can no longer store some MPLS aggregate labels in its VPN CAM. In this situation the router consults the MPLS FIB, strips off the label to reveal the IPv4 packet encapsulated inside, and recirculates the packet, at which point the VRF FIB determines the next hop.



### Note

The first 511 MPLS aggregate labels remain in the VPN CAM and are processed based on the steps in the [Stored MPLS Aggregate Labels, page 3](#).

The following steps are performed by a PE router to forward MPLS traffic when the aggregate MPLS label is not in the VPN CAM:

- 1 A lookup is performed in the TCAM and FIB.
- 2 The MPLS label is popped and the reserved VLAN associated with the MPLS aggregation label is assigned to the packet.



### Note

When the number of MPLS aggregate labels exceeds 511, a reserved VLAN interface is assigned for each new MPLS aggregate label.

- 1 The VPN ID for the reserved VLAN ID is derived from the VLAN RAM. The VPN ID is used as a part of the lookup key for the IP VRF Cisco express forwarding (CEF) lookup.
- 2 The IP VRF CEF lookup result contains the next hop IP address and all other rewrite information needed for forwarding the packet to the correct CE router.

## NetFlow Cache Population

When the NDE for VRF Interfaces feature is configured for an MPLS VPN, a VLAN interface is reserved and NetFlow is enabled on the VLAN interface. The method used by the router to process the MPLS VPN IPv4 traffic and populate the NetFlow cache depends on the number of MLS aggregate labels that the router has stored.

- [MPLS Aggregate Labels in VPN CAM, page 4](#)
- [MPLS Aggregate Labels Not in VPN CAM, page 5](#)
- [MPLS-Specific Labels, page 5](#)
- [Configuring MPLS VPN Netflow Capture and Export, page 5](#)

## MPLS Aggregate Labels in VPN CAM

When there are fewer than 512 VPN aggregate MPLS labels, the label and associated VPN are programmed in the MPLS VPN CAM, and packet recirculation is not required. The policy feature card

(PFC) receives the packet as an IP packet. The PFC NetFlow function sees flows as sourced at the MPLS VPN not at the interface on which the traffic was received.

When there are fewer than 512 VPN aggregate MPLS labels (all MPLS aggregate labels are stored in the VPN CAM), the NetFlow cache is populated for the MPLS traffic that is using the MPLS aggregate labels by enabling NetFlow on the MPLS interface with the **ip flow ingress** command. For example, to enable NetFlow for the traffic that is being forwarded based on the MPLS aggregation labels in the VPN CAM in router PE2 in [MPLS Aggregate Labels in VPN CAM, page 4](#), you must configure the **ip flow ingress** command on interface FastEthernet0/0. This is sufficient to populate the cache. To cause the router to export the NetFlow data to a collector, the **flow hardware mpls-vpn ip vrf-id** command must be issued in global configuration mode.

## MPLS Aggregate Labels Not in VPN CAM

When the number of MPLS aggregate labels in the network exceeds 511, the VPN CAM is full. Traffic must be recirculated if it does not use one of the MPLS aggregate labels stored in the VPN CAM. The packets are processed by the policy feature card (PFC) once to strip the MPLS label, and processed by the PFC a second time with the VLAN specified as the reserved VPN VLAN that was assigned when the NDE for VRF Interfaces feature was enabled. The VLAN RAM maps this VLAN to the VPN for use in routing. The PFC netflow function sees flows as sourced at the reserved VRF VLAN. The ternary content addressable memory (TCAM) entry for the reserved VLAN interface provides the flow mask to NetFlow.

Flows for MPLS VPN traffic received with aggregate label that is not in the VPN CAM are populated in the NetFlow cache by configuring the **flow hardware mpls-vpn ip vrf-id** command for each VPN VRF on the router in global configuration mode.

## MPLS-Specific Labels

For the nonaggregate label case, by definition, the router does not need to examine the underlying IP packet to determine where to route the packet. In order to cause the IP flows to populate the cache, the **flow hardware mpls-vpn ip vrf-id** configuration command must be entered. This causes the specific label flow traffic to be stripped of its label and recirculated to the reserved VPN VLAN prior to being forwarded to the exit interface. This introduces more delay in forwarding the traffic than would otherwise be experienced.

## Configuring MPLS VPN Netflow Capture and Export

To ensure that you have enabled the capturing and export of NetFlow data for all of the traffic that you want to analyze, regardless of the MPLS aggregate label it is using, you should configure the **ip flow ingress** command on the MPLS interface and configure the **flow hardware mpls-vpn ip vrf-id** command for each VPN VRF on the router in global configuration mode.



### Note

The steps required to configure NetFlow data export (NDE) for data in the NetFlow cache are provided in the [How to Configure NDE for VRF Interfaces for an MPLS VPN, page 6](#).

## VRF Name as the Source Interface in the NetFlow Cache

For traffic received for an MPLS VPN on an MPLS interface, the source interface for the traffic in the NetFlow cache is listed as the VPN name, not the physical interface on which the traffic was received. For example, traffic being received on FastEthernet0/0 on PE2 in [VRF Name as the Source Interface in the](#)

NetFlow Cache, page 5 will be displayed in the NetFlow cache on the router as being received over VPN Red, not interface FastEthernet0/0.

## How to Configure NDE for VRF Interfaces for an MPLS VPN

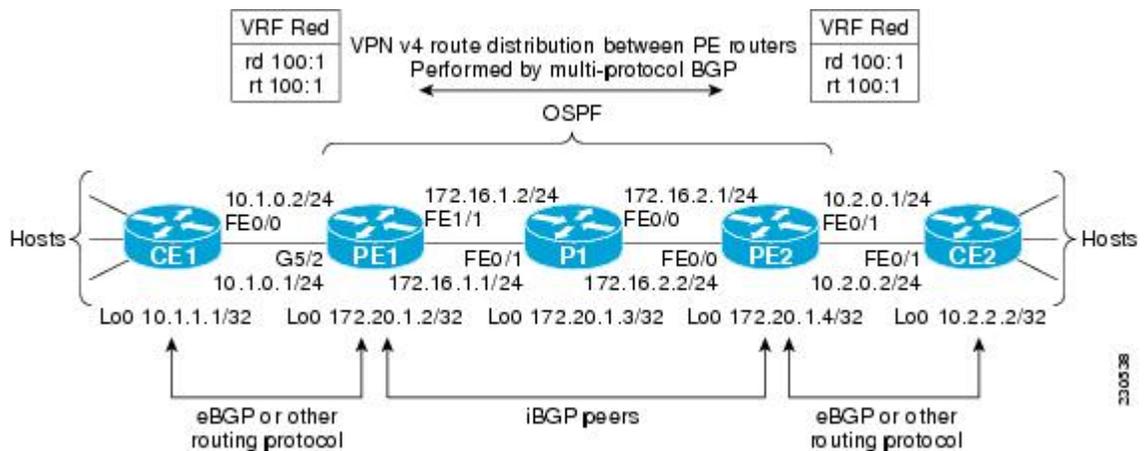
Perform this task to configure the NDE for VRF Interfaces feature on an MPLS VPN. This configuration is appropriate for the router named PE1 in the figure below. Repeat this task on router PE2 but remember to change the interface references to the appropriate interfaces for PE2.



### Note

This task does not include the commands to configure open shortest path first (OSPF) and border gateway protocol (BGP) that are required to activate the MPLS VPN between routers PE1 and PE2. See the [Configuration Examples for NDE for VRF Interfaces, page 12](#) for the complete configurations for all of the devices in the example network in the figure below.

**Figure 3** Example Network with One MPLS VPN



**SUMMARY STEPS**

1. **enable**
2. **configure terminal**
3. **ip vrf *vrf-id***
4. **rd *route-distinguisher***
5. **route-target {import | export | both} *route-target-ext-community***
6. **interface *type number***
7. **ip address *ip-address mask***
8. **exit**
9. **mpls label {ldp | tdp}**
10. **mpls ldp router-id *type number***
11. **interface *type number***
12. **ip address *ip-address mask***
13. **mpls ip**
14. **ip flow ingress**
15. **interface *type number***
16. **ip vrf forwarding *vrf-id***
17. **ip address *ip-address mask***
18. **exit**
19. **mls nde sender**
20. **mls flow ip {interface-destination-source | interface-full}**
21. **ip flow-export version 9**
22. **ip flow-export destination {*ip-address* | *hostname*} *udp-port***
23. **flow hardware mpls-vpn ip *vrf-id***

**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.

Command or Action	Purpose
<p><b>Step 3</b> <code>ip vrf vrf-id</code></p> <p><b>Example:</b></p> <pre>Router(config)# ip vrf red</pre>	<p>Defines a VPN routing and forwarding (VRF) instance and enters VRF configuration mode.</p>
<p><b>Step 4</b> <code>rd route-distinguisher</code></p> <p><b>Example:</b></p> <pre>Router(config)# rd 200:2</pre>	<p>Creates a routing and forwarding table for a Virtual Private Network (VPN) routing/forwarding instance (VRF).</p>
<p><b>Step 5</b> <code>route-target {import   export   both} route-target-extended-community</code></p> <p><b>Example:</b></p> <pre>Router(config)# route-target both 200:20</pre>	<p>Creates a route-target extended community for a VPN VRF.</p>
<p><b>Step 6</b> <code>interface type number</code></p> <p><b>Example:</b></p> <pre>Router(config)# interface loopback 0</pre>	<p>Specifies the interface type and number to configure and enters interface configuration mode.</p>
<p><b>Step 7</b> <code>ip address ip-address mask</code></p> <p><b>Example:</b></p> <pre>Router(config-if)# ip address 172.20.1.2 255.255.255.0</pre>	<p>Configure an IP address on the interface.</p>
<p><b>Step 8</b> <code>exit</code></p> <p><b>Example:</b></p> <pre>Router(config-if)# exit</pre>	<p>Exits interface configuration mode and returns to global configuration mode.</p>
<p><b>Step 9</b> <code>mpls label {ldp   tdp}</code></p> <p><b>Example:</b></p> <pre>Router(config)# mpls label protocol ldp</pre>	<p>Specifies the MPLS label distribution protocol.</p>

Command or Action	Purpose
<p><b>Step 10</b> <code>mpls ldp router-id type number</code></p> <p><b>Example:</b></p> <pre>Router(config)# mpls ldp router-id loopback0</pre>	<p>Specifies a preferred interface for determining the Label Distribution Protocol (LDP) router ID.</p>
<p><b>Step 11</b> <code>interface type number</code></p> <p><b>Example:</b></p> <pre>Router(config-if)# interface fastethernet1/1</pre>	<p>Specifies the interface type and number to configure and enters interface configuration mode.</p>
<p><b>Step 12</b> <code>ip address ip-address mask</code></p> <p><b>Example:</b></p> <pre>Router(config-if)# ip address 172.16.1.2 255.255.255.0</pre>	<p>Configures an IP address on the interface.</p>
<p><b>Step 13</b> <code>mpls ip</code></p> <p><b>Example:</b></p> <pre>Router(config-if)# mpls ip</pre>	<p>Enables MPLS forwarding of IPv4 packets along normally routed paths for a particular interface.</p>
<p><b>Step 14</b> <code>ip flow ingress</code></p> <p><b>Example:</b></p> <pre>Router(config-if)# ip flow ingress</pre>	<p>Enables NetFlow on the interface to capture traffic that is being received by the interface.</p>
<p><b>Step 15</b> <code>interface type number</code></p> <p><b>Example:</b></p> <pre>Router(config)# interface GigabitEthernet5/2</pre>	<p>Specifies the interface type and number to configure and enters interface configuration mode.</p>
<p><b>Step 16</b> <code>ip vrf forwarding vrf-id</code></p> <p><b>Example:</b></p> <pre>Router(config-if)# ip vrf forwarding red</pre>	<p>Associates a VPN VRF with an interface or subinterface.</p>

Command or Action	Purpose
<p><b>Step 17</b> <code>ip address ip-address mask</code></p> <p><b>Example:</b></p> <pre>Router(config-if)# ip address 10.1.0.1 255.255.255.0</pre>	Configure an IP address on the interface.
<p><b>Step 18</b> <code>exit</code></p> <p><b>Example:</b></p> <pre>Router(config-if)# exit</pre>	Exits interface configuration mode and returns to global configuration mode.
<p><b>Step 19</b> <code>mls nde sender</code></p> <p><b>Example:</b></p> <pre>Router(config)# mls nde sender</pre>	Enables NetFlow on the PFC.
<p><b>Step 20</b> <code>mls flow ip {interface-destination-source   interface-full}</code></p> <p><b>Example:</b></p> <pre>Router(config)# mls flow ip interface-destination-source</pre>	Specifies the NetFlow flow mask for IP traffic.
<p><b>Step 21</b> <code>ip flow-export version 9</code></p> <p><b>Example:</b></p> <pre>Router(config)# ip flow-export version 9</pre>	Configures NetFlow data export to use the version 9 export format.
<p><b>Step 22</b> <code>ip flow-export destination {ip-address   hostname} udp-port</code></p> <p><b>Example:</b></p> <pre>Router(config)# ip flow-export destination 172.16.2.6 99</pre>	Configures the IP address or hostname of the workstation to which you want to send the NetFlow information and the number of the UDP port on which the workstation is listening for this input.
<p><b>Step 23</b> <code>flow hardware mpls-vpn ip vrf-id</code></p> <p><b>Example:</b></p> <pre>Router(config)# flow hardware mpls-vpn ip red</pre>	Enables the NDE for VRF Interfaces feature for the VRF.

- [Examples, page 11](#)

## Examples

The following output of the **show mls nde** command displays the NDE configuration and statistics.

```
PE1# show mls nde
Netflow Data Export enabled
Exporting flows to 172.16.2.6 (99)
Exporting flows from 172.16.1.2 (51203)
Version: 9
Layer2 flow creation is disabled
Layer2 flow export is disabled
Include Filter not configured
Exclude Filter not configured
Total Netflow Data Export Packets are:
  4 packets, 0 no packets, 19 records
Total Netflow Data Export Send Errors:
  IPWRITE_NO_FIB = 0
  IPWRITE_ADJ_FAILED = 0
  IPWRITE_PROCESS = 0
  IPWRITE_ENQUEUE_FAILED = 0
  IPWRITE_IPC_FAILED = 0
  IPWRITE_OUTPUT_FAILED = 0
  IPWRITE_MTU_FAILED = 0
  IPWRITE_ENCAPFIX_FAILED = 0
Netflow Aggregation Disabled
PE1#
```

The following output of the **show mls netflow ip module** command displays the Netflow entries in the PFC. The first row of output shows traffic on VPN red.



### Note

Module 5 is the active supervisor 720 on this Cisco 7600 series router.

```
Router# show mls netflow ip module 5
Displaying Netflow entries in module 5
-----
DstIP          SrcIP          Prot:SrcPort:DstPort  Src i/f          :AdjPtr
-----
Pkts          Bytes          Age   LastSeen  Attributes
-----
10.1.1.1      10.2.0.2      0    :0        :0          vpn:red
:0x0
504          398020        1    23:20:48  L3 - Dynamic
224.0.0.5    172.16.1.1    89   :0        :0          Fal/1          :0x0
1            84            7    23:20:42  L2 - Dynamic
0.0.0.0      0.0.0.0       0    :0        :0          --            :0x0
2238        1582910       33   23:20:48  L3 - Dynamic
224.0.0.2    172.16.1.1    udp :646    :646        Fal/1          :0x0
5            310           21   23:20:46  L2 - Dynamic
172.16.2.6   172.16.1.2    0    :0        :0          Fal/1          :0x0
1            140           22   23:20:27  L2 - Dynamic
Router#
```

The following output of the **show ip cache flow** command displays the data in the NetFlow cache. The last line of data in the output shows that the source interface for this traffic is VPN Red.

```
PE1# show ip cache flow
-----
MSFC:
IP packet size distribution (3139 total packets):
  1-32  64  96  128  160  192  224  256  288  320  352  384  416  448  480
  .000 .685 .309 .000 .000 .000 .000 .003 .000 .000 .000 .000 .000 .000 .000
  512  544  576  1024 1536 2048 2560 3072 3584 4096 4608
  .000 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000
IP Flow Switching Cache, 278544 bytes
  2 active, 4094 inactive, 56 added
  20904 ager polls, 0 flow alloc failures
```

```

Active flows timeout in 30 minutes
Inactive flows timeout in 15 seconds
IP Sub Flow Cache, 33992 bytes
0 active, 1024 inactive, 4 added, 4 added to flow
0 alloc failures, 0 force free
1 chunk, 2 chunks added
last clearing of statistics never
Protocol          Total      Flows      Packets Bytes   Packets Active(Sec) Idle(Sec)
-----          -
Flows             /Sec      /Flow  /Pkt   /Sec   /Flow   /Flow
TCP-BGP           10        0.0        1     49    0.0    0.0    15.3
TCP-other         6         0.0        2     49    0.0    4.5    15.5
UDP-other         28        0.0        74    63    0.1    320.5  12.7
IP-other          6         0.0       153    80    0.0   1488.3  1.7
Total:            50        0.0        60    68    0.2   358.6  12.2
SrcIf             SrcIPAddress  DstIf          DstIPAddress   Pr  SrcP  DstP  Pkts
Fal/1             172.16.1.1   Null           224.0.0.2     11 0286 0286   74
Fal/1             172.16.1.1   Null           224.0.0.5     59 0000 0000   33
-----
PFC:
Displaying Hardware entries in Module 5
SrcIf             SrcIPAddress  DstIPAddress   Pr      SrcP      Dss
Fal/1             172.20.1.2   172.20.1.3     0       0         0
Fal/1             172.20.1.3   172.20.1.2     0       0         0
Fal/1             172.16.1.2   172.16.2.6     0       0         0
Fal/1             172.16.1.1   224.0.0.2     udp     646      64
--               0.0.0.0     0.0.0.0       0       0         0
vpn:red          10.2.0.2     10.1.1.1       0       0         0
.
.
.
PE1#

```

## Configuration Examples for NDE for VRF Interfaces

- [Configurations for the Example Network with One MPLS VPN Example, page 12](#)
- [Configuring the NDE for VRF Interfaces Feature on a VRF Example, page 15](#)

## Configurations for the Example Network with One MPLS VPN Example

This section contains the configurations for all of the devices in the figure above. The NDE for VRF Interfaces feature is configured on routers PE1 and PE2.

### CE1

```

!
hostname CE1
!
ip cef
!
interface Loopback0
no shutdown
ip address 10.1.1.1 255.255.255.255
!
interface FastEthernet0/0
no shutdown
ip address 10.1.0.2 255.255.255.0
!
ip default-network 0.0.0.0
ip route 0.0.0.0 0.0.0.0 10.1.0.1
!
end

```

**PE1**

```

!
hostname PE1
!
ip cef distributed
!
mls nde sender
mls flow ip interface-destination-source
ip flow-export destination 172.16.2.6 99
ip flow-export version 9
!
ip vrf red
  rd 200:2
  route-target export 200:20
  route-target import 200:20
!
flow hardware mpls-vpn ip red
!
multilink bundle-name authenticated
mpls label protocol ldp
!
interface Loopback0
  ip address 172.20.1.2 255.255.255.255
!
interface gigabitEthernet5/2
  no shutdown
  ip vrf forwarding red
  ip address 10.1.0.1 255.255.255.0
!
interface FastEthernet1/1
  no shutdown
  interface FastEthernet1/1
  ip address 172.16.1.2 255.255.255.0
  ip flow ingress
  mpls ip
!
router ospf 100
  router-id 172.20.1.2
  log-adjacency-changes
  network 172.16.0.0 0.0.255.255 area 0
  network 172.20.1.2 0.0.0.0 area 0
!
router bgp 200
  no synchronization
  bgp log-neighbor-changes
  network 172.0.0.0 mask 255.0.0.0
  neighbor as200 peer-group
  neighbor as200 remote-as 200
  neighbor as200 description as200
  neighbor as200 update-source Loopback0
  neighbor as200 route-reflector-client
  neighbor 172.20.1.4 remote-as 200
  neighbor 172.20.1.4 description iBGP with r4
  neighbor 172.20.1.4 update-source Loopback0
  no auto-summary
!
  address-family vpnv4
  neighbor 172.20.1.4 activate
  neighbor 172.20.1.4 send-community both
  exit-address-family
!
  address-family ipv4 vrf red
  no synchronization
  network 10.1.0.0 mask 255.255.255.0
  network 10.1.1.1 mask 255.255.255.255
  exit-address-family
!
ip route 172.0.0.0 255.0.0.0 Null0
ip route vrf red 10.1.1.1 255.255.255.255 10.1.0.2
!
mpls ldp router-id Loopback0

```

```
!
end
```

**P1**

```
!
hostname P1
!
ip cef
!
no ip domain lookup
!
mpls label protocol ldp
!
interface Loopback0
  no shutdown
  ip address 172.20.1.3 255.255.255.255
!
interface FastEthernet0/0
  no shutdown
  ip address 172.16.2.1 255.255.255.0
  mpls ip
!
interface FastEthernet0/1
  no shutdown
  ip address 172.16.1.1 255.255.255.0
  mpls ip
!
router ospf 100
  router-id 172.20.1.3
  log-adjacency-changes
  network 172.16.0.0 0.0.255.255 area 0
  network 172.20.1.3 0.0.0.0 area 0
!
mpls ldp router-id Loopback0
!
end
```

**PE2**

```
!
hostname PE2
!
ip cef distributed
!
mls nde sender
mls flow ip interface-destination-source
ip flow-export destination 172.16.2.6 99
ip flow-export version 9
!
ip vrf red
  rd 200:2
  route-target export 200:20
  route-target import 200:20
!
flow hardware mpls-vpn ip red
!
multilink bundle-name authenticated
mpls label protocol ldp
!
interface Loopback0
  no shutdown
  ip address 172.20.1.4 255.255.255.255
!
interface FastEthernet0/0
  no shutdown
  ip address 172.16.2.2 255.255.255.0
  mpls ip
  ip flow ingress
!
```

```

interface FastEthernet0/1
 no shutdown
 ip vrf forwarding red
 ip address 10.2.0.1 255.255.255.0
!
router ospf 100
 router-id 172.20.1.4
 log-adjacency-changes
 network 172.16.0.0 0.0.255.255 area 0
 network 172.20.1.4 0.0.0.0 area 0
!
router bgp 200
 no synchronization
 bgp log-neighbor-changes
 network 172.0.0.0 mask 255.0.0.0
 neighbor as200 peer-group
 neighbor as200 remote-as 200
 neighbor as200 description as200
 neighbor as200 update-source Loopback0
 neighbor as200 route-reflector-client
 neighbor 172.20.1.2 remote-as 200
 neighbor 172.20.1.2 description iBGP with r2
 neighbor 172.20.1.2 update-source Loopback0
 no auto-summary
!
 address-family vpnv4
 neighbor 172.20.1.2 activate
 neighbor 172.20.1.2 send-community both
 exit-address-family
!
 address-family ipv4 vrf red
 no synchronization
 network 10.2.0.0 mask 255.255.255.0
 network 10.2.2.2 mask 255.255.255.255
 exit-address-family
!
 ip route 172.0.0.0 255.0.0.0 Null0
 ip route vrf red 10.2.2.2 255.255.255.255 10.2.0.2
!
 mpls ldp router-id Loopback0
!
end

```

## CE2

```

!
hostname CE2
!
ip cef
!
interface Loopback0
 no shutdown
 ip address 10.2.2.2 255.255.255.255
!
interface FastEthernet0/1
 no shutdown
 ip address 10.2.0.2 255.255.255.0
!
 ip default-network 0.0.0.0
 ip route 0.0.0.0 0.0.0.0 10.2.0.1
!
end

```

## Configuring the NDE for VRF Interfaces Feature on a VRF Example

This example configuration shows how to configure the NDE for VRF Interfaces feature for a VRF. When you enable NetFlow on interface GigabitEthernet2/3 with the **ip flow ingress** command, the NetFlow cache will contain information for traffic for VPN vpn1.

**PE1**

```

!
ip vrf vpn1
 rd 100:1
  route-target export 100:1
  route-target import 100:1
!
mls flow ip interface-full
!
interface GigabitEthernet2/3
 ip vrf forwarding vpn1
 ip address 10.0.0.1 255.0.0.0
 ip flow ingress
!
interface GigabitEthernet2/7
 ip vrf forwarding vpn1
 ip address 172.16.20.1 255.255.255.0
!
ip flow-export version 9
ip flow-export destination 192.168.10.2 20000
end

```

## Where to Go Next

- See the Configuring NetFlow and NDE chapter of the *Cisco 7600 Series Cisco IOS Software Configuration Guide*, for more information on configuring NetFlow features on Cisco 7600 series routers.
- See the Configuring PFC3BXL and PFC3B Mode Multiprotocol Label Switching (MPLS) chapter of the *Cisco 7600 Series Cisco IOS Software Configuration Guide*, for more information on configuring MPLS features on Cisco 7600 series routers.

## Additional References

### Related Documents

Related Topic	Document Title
NetFlow commands, complete command syntax, command mode, defaults, command history, usage guidelines, and examples.	<i>Cisco IOS NetFlow Command Reference</i>
Information for configuring NetFlow, MPLS, and other features on Cisco 7600 series routers.	<a href="#">Cisco 7600 Series Cisco IOS Software Configuration Guide</a>

### 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**

<b>MIB</b>	<b>MIBs Link</b>
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 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**

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

**Technical Assistance**

<b>Description</b>	<b>Link</b>
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register on Cisco.com.	<a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a>

## Feature Information for NDE for VRF Interfaces

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 NDE for VRF Interfaces**

Feature Name	Releases	Feature Information
NDE for VRF Interfaces	12.2(33)SRB15.0(1)S	<p>The NDE support for VRF interfaces features enables capturing and exporting NetFlow flow information from VRF interfaces.</p> <p>In 12.2(33)SRB, this feature was introduced on the Cisco 7600 series routers.</p> <p>The following commands were introduced or modified by this feature: <b>flow hardware mpls-vpn ip</b>, <b>show ip cache flow</b>, <b>show ip cache flow aggregation</b>, <b>show mls netflow ip</b>.</p>

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