



# Multiprotocol Label Switching Load Balancing

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The Cisco ME 3800 and ME 3600 switches support IPv4 and IPv6 load balancing at the LER and LSR. Effective with Cisco IOS Release 15.3(3)S, the following features are supported:

- Layer 2 VPN load balancing at LER and LSR
- Layer 3 VPN load balancing at LER and LSR
- Load balancing over port channel at LER and LSR

## 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 for MPLS Load Balancing, page 22](#).

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

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## Prerequisites for MPLS Load Balancing

- MPLS should be enabled on the Cisco ME3600/ME3800 switches.
- For MPLS load balancing over port channel, the port channel should be configured and MPLS should be enabled on the port channel interface.

## Restrictions for MPLS Load Balancing

- The **show mpls forwarding-table counters** command does not display the switched packets for all interfaces. It displays the number of packets only for that label. To view switched packets on each interface, use the **show interface interface-name counter** command.
- Only four load balancing paths are supported.

### Layer 2 VPN Load Balancing

- To get an evenly-distributed load balancing experience over virtual circuits (VC), it is recommended to have more number of VCs.

### Layer 3 VPN Load Balancing

- Load balancing is supported only on homogeneous paths, that is, all MPLS adjacencies or all IP adjacencies.

## Information About MPLS Load Balancing

Load balancing is a technique to distribute traffic evenly across various links to obtain optimal resource utilization.

MPLS load balancing occurs at the LER and LSR.

## How to Configure MPLS Load Balancing




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**Note** Ensure that MPLS is configured.

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**Note** No other specific command needs to be enabled for MPLS Load Balancing to work.

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- Step 1** Understand MPLS VPN. For more information, see the "Understanding MPLS VPNs" section in the [Configuring MPLS, MPLS VPN, MPLS OAM, and EoMPLS](#) document.
- Step 2** Configure MPLS VPN. For more information, see the "Configuring MPLS VPNs" section in the [Configuring MPLS, MPLS VPN, MPLS OAM, and EoMPLS](#) document.

- Step 3** Enable MPLS. For more information, see the "Enabling MPLS" section in the *Configuring MPLS, MPLS VPN, MPLS OAM, and EoMPLS* document.
- Step 4** Define VPN. For more information, see the "Defining VPNs" section in the *Configuring MPLS, MPLS VPN, MPLS OAM, and EoMPLS* document.
- Step 5** Configure BGP Routing Sessions. For more information, see the "Configuring BGP Routing Sessions" section in the *Configuring MPLS, MPLS VPN, MPLS OAM, and EoMPLS* document.
- Step 6** Configure the Provider-Edge-to-Provider-Edge Routing Sessions. For more information, see the "Configuring the Provider-Edge-to-Provider-Edge Routing Sessions" section in the *Configuring MPLS, MPLS VPN, MPLS OAM, and EoMPLS* document.

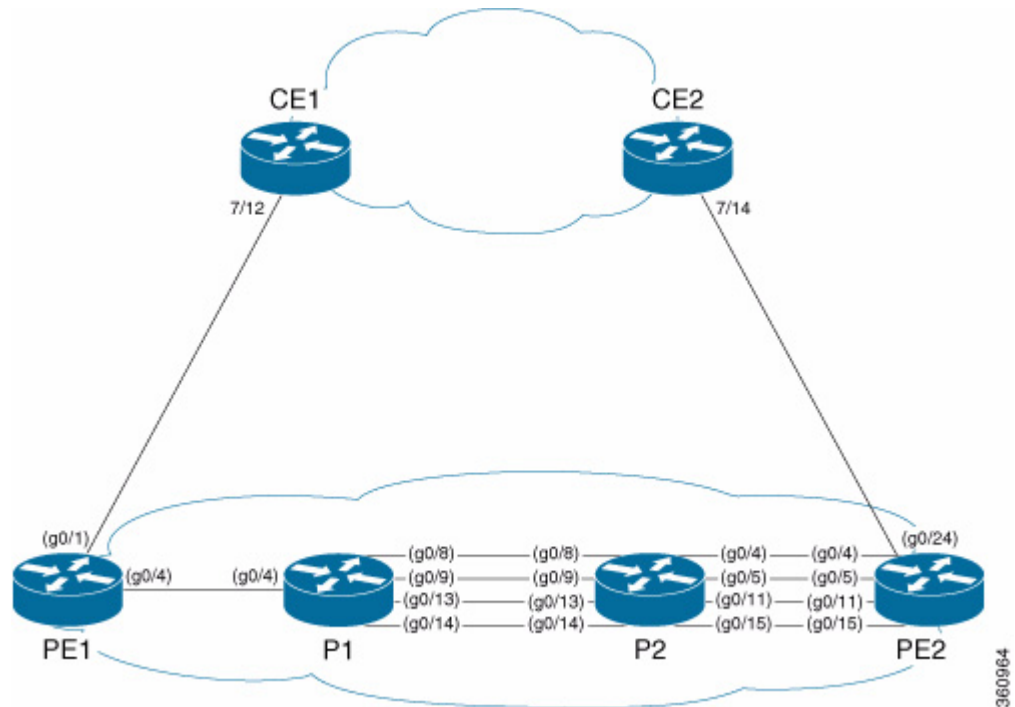
## Where to Go Next?

Configure MPLS Load Balancing. For more information, see [Configuration Examples for MPLS Load Balancing, page 3](#).

## Configuration Examples for MPLS Load Balancing

Consider the following topology:

**Figure 1**      *Topology for MPLS Load Balancing*



where,

- CE—customer edge router that is located at the customer premises. The CE provides an Ethernet interface between the customer's LAN and the provider's core network.

- PE—provider edge router is a router that is located at the edge of a service provider’s network. A PE router is any component capable of a broad range of routing protocol, such as:
  - Border Gateway Protocol (BGP)
  - Open Shortest Path First (OSPF)
  - Multi-Protocol Label Switching (MPLS)
- P—provider router located in the core of the service provider’s network.

## Layer 2 VPN Configuration Example

This example depicts configuration for 129 virtual circuits. See [Figure 1](#) for the following configuration:

At PE1:

```
interface loopback0
no shut
ip address 1.1.1.1 255.255.255.255

mpls ip
mpls label protocol ldp
mpls ldp advertise-labels
interface gig0/4
no switchport
no shut
no keepalive
ip address 5.5.5.1 255.255.0.0
mpls ip
mpls label protocol ldp
mpls ldp advertise-labels

router ospf 10
network 5.5.5.1 0.0.0.0 area 0
network 1.1.1.1 0.0.0.0 area 0
```

- Configure the service instance from 2 to 129



### Note

There are multiple MPLS links in the core. The packets are load balanced across the core links based on the L2VPN labels.

```
interface g0/1
no shut
switchport
switchport trunk allowed vlan none
switchport mode trunk
service instance 2 ethernet
  encapsulation dot1q 2
  rewrite ingress tag pop 1 symmetric
  xconnect 2.2.2.2 2 encapsulation mpls
!
!
service instance 129 ethernet
  encapsulation dot1q 129
  rewrite ingress tag pop 1 symmetric
  xconnect 2.2.2.2 129 encapsulation mpls
```

At P1:

```
interface loopback0
no shut
```

```
ip address 4.4.4.4 255.255.255.255

mpls ip
mpls label protocol ldp
mpls ldp advertise-labels
interface g0/4
no switchport
no shut
no keepalive
ip address 5.5.5.2 255.255.0.0
mpls ip
mpls label protocol ldp
mpls ldp advertise-labels

interface port-channel1
no switchport
no keepalive
ip address 90.0.0.1 255.255.0.0
mpls ip
mpls label protocol ldp

router ospf 10
network 4.4.4.4 0.0.0.0 area 0
network 90.0.0.1 0.0.0.0 area 0
network 5.5.5.2 0.0.0.0 area 0

interface gig0/8
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/9
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/13
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/14
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active
```

At P2:

```
interface loopback0
no shut
ip address 3.3.3.3 255.255.255.255
```

```
interface port-channel1
no switchport
no keepalive
ip address 90.0.0.2 255.255.0.0
mpls ip
mpls label protocol ldp

interface port-channel2
no switchport
no keepalive
ip address 100.0.0.2 255.255.0.0
mpls ip
mpls label protocol ldp

router ospf 10
network 90.0.0.2 0.0.0.0 area 0
network 100.0.0.2 0.0.0.0 area 0
network 3.3.3.3 0.0.0.0 area 0

interface gig0/8
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/9
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/13
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/14
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/4
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/5
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/11
no switchport
```

```
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/15
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active
```

At PE2:

```
interface loopback0
no shut
ip address 2.2.2.2 255.255.255.255

interface port-channel2
no switchport
no keepalive
ip address 100.0.0.1 255.255.0.0
mpls ip
mpls label protocol ldp

router ospf 10
network 100.0.0.1 0.0.0.0 area 0
network 2.2.2.2 0.0.0.0 area 0

interface gig0/4
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/5
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/11
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/15
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active
```

- Configure the service instance from 2 to 129

```
interface gig0/24
no shut
switchport
```

```

switchport trunk allowed vlan none
switchport mode trunk
service instance 2 ethernet
    encapsulation dot1q 2
    rewrite ingress tag pop 1 symmetric
    xconnect 1.1.1.1 2 encapsulation mpls
!
!
service instance 129 ethernet
    encapsulation dot1q 129
    rewrite ingress tag pop 1 symmetric
    xconnect 1.1.1.1 129 encapsulation mpls

```

This configuration enables load balancing in g0/4, g0/5, g0/11, g0/15 in P2 and PE2.

## Layer 3 VPN Configuration Example

This example depicts configuration for 129 VPN Routing and Forwarding (VRF) instances. See [Figure 1](#) for this configuration:

At PE1:

```

ip routing
ip cef
interface loopback0
no shut
ip address 1.1.1.1 255.255.255.255

```

- Configure EFP from 2 to 129

```

interface g0/1
no shut
switchport
switchport trunk allowed vlan none
switchport mode trunk
service instance 2 ethernet
    encapsulation dot1q 2
    rewrite ingress tag pop 1 symmetric
    bridge-domain 2
!
service instance 129 ethernet
    encapsulation dot1q 129
    rewrite ingress tag pop 1 symmetric
    bridge-domain 129

```

- Configure VRF from 2 to 129

```

ip vrf vrf2
rd 2:2
route-target export 2:2
route-target import 2:2
!
ip vrf vrf129
rd 129:129
route-target export 129:129
route-target import 129:129

```

- Add address-family from 2 to 129

```

router bgp 10
bgp router-id 1.1.1.1

```



```

bgp log-neighbor-changes
bgp deterministic-med
no bgp default ipv4-unicast
neighbor 2.2.2.2 remote-as 10
neighbor 2.2.2.2 update-source Loopback0
!
address-family ipv4
redistribute connected
exit-address-family
!
address-family vpnv4
neighbor 2.2.2.2 activate
neighbor 2.2.2.2 s-community both
exit-address-family
!
address-family ipv4 vrf vrf2
redistribute connected
exit-address-family
!
address-family ipv4 vrf vrf3
redistribute connected
exit-address-family
!
address-family ipv4 vrf vrf129
redistribute connected
exit-address-family
!

```

- Configure VLAN from 2 to 129

```

interface Vlan2
 ip vrf forwarding vrf2
 ip address 172.16.0.1 255.255.255.240
!
interface Vlan3
 ip vrf forwarding vrf3
 ip address 172.16.0.17 255.255.255.240
!
interface Vlan129
 ip vrf forwarding vrf129
 ip address 172.16.7.241 255.255.255.240

```

At P1:

```

ip routing
ip cef
interface loopback0
no shut
ip address 4.4.4.4 255.255.255.255

interface port-channel1
no switchport
no keepalive
ip address 90.0.0.1 255.255.0.0
mpls ip
mpls label protocol ldp

interface gig0/8
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

```

```
interface gig0/9
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active
```

```
interface gig0/13
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active
```

```
interface gig0/14
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active
```

At P2:

```
ip routing
ip cef
interface loopback0
no shut
ip address 3.3.3.3 255.255.255.255
```

```
interface port-channel1
no switchport
no keepalive
ip address 90.0.0.2 255.255.0.0
mpls ip
mpls label protocol ldp
```

```
interface port-channel2
no switchport
no keepalive
ip address 100.0.0.2 255.255.0.0
mpls ip
mpls label protocol ldp
```

```
interface gig0/8
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active
```

```
interface gig0/9
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active
```

```
interface gig0/13
no switchport
no shut
```

```

no keepalive
no ip address
channel-group 1 mode active

interface gig0/14
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/4
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/5
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/11
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/15
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

```

At PE2:

```

ip routing
ip cef
interface loopback0
no shut
ip address 2.2.2.2 255.255.255.255

```

- Configure EFP from 2 to 129

```

interface gig0/24
no shut
switchport
switchport trunk allowed vlan none
switchport mode trunk
service instance 2 ethernet
encapsulation dot1q 2
rewrite ingress tag pop 1 symmetric
bridge-domain 2

!

service instance 129 ethernet
encapsulation dot1q 129
rewrite ingress tag pop 1 symmetric
bridge-domain 129

```

- Configure VRF from 2 to 129

```
ip vrf vrf2
 rd 2:2
 route-target export 2:2
 route-target import 2:2

!

ip vrf vrf129
 rd 129:129
 route-target export 129:129
 route-target import 129:129
```

- Configure vlan from 2 to 129

```
interface Vlan2
 ip vrf forwarding vrf2
 ip address 172.26.0.1 255.255.255.240
!
interface Vlan3
 ip vrf forwarding vrf3
 ip address 172.26.0.17 255.255.255.240
!
interface Vlan129
 ip vrf forwarding vrf129
 ip address 172.26.7.241 255.255.255.240
```

- Add address family 2 to 129

```
router bgp 10
 bgp router-id 2.2.2.2
 bgp log-neighbor-changes
 bgp deterministic-med
 no bgp default ipv4-unicast
 neighbor 1.1.1.1 remote-as 10
 neighbor 1.1.1.1 update-source Loopback0
!
 address-family ipv4
 redistribute connected
 exit-address-family
!
 address-family vpnv4
 neighbor 1.1.1.1 activate
 neighbor 1.1.1.1 s-community both
 exit-address-family
!
 address-family ipv4 vrf vrf2
 redistribute connected
 exit-address-family
!
 address-family ipv4 vrf vrf3
 redistribute connected
 exit-address-family
!
 address-family ipv4 vrf vrf129
 redistribute connected
 exit-address-family
!

interface port-channel2
 no switchport
 no keepalive
 ip address 100.0.0.1 255.255.0.0
 mpls ip
```

```

mpls label protocol ldp

interface gig0/4
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/5
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/11
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/15
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

```

This configuration enables load balancing on g0/4, g0/5, g0/11, g0/15 in P2 and PE2.

## Load Balancing Over Port Channel: Configuration Example

To configure load balancing over port channel, use the following command:

```

port-channel load-balance [dst-ip destination-ip-address | dst-mac destination-mac-address |
src-dst-ip source-XOR-destination-ip-address | src-dst-mac source-XOR-destination-mac-address |
src-ip source-ip-address | src-mac source-mac-address]

```

**Table 1** Syntax Description of the port-channel load balance command

Syntax	Description
<b>dst-ip</b> <i>destination-ip-address</i>	Loads distribution on the destination IP address. Option to exclude VLAN in the distribution is provided using the <b>excludevlan</b> keyword along with this method.
<b>dst-mac</b> <i>destination-mac-address</i>	Loads distribution on the destination MAC address.
<b>src-dst-ip</b> <i>source-XOR-destination-ip-address</i>	Loads distribution on the source transfer or XOR-destination IP address. Option to exclude VLAN in the distribution is provided using the <b>excludevlan</b> keyword along with this method.
<b>src-dst-mac</b> <i>source-XOR-destination-mac-address</i>	Loads distribution on the source XOR-destination MAC address.

**Table 1** Syntax Description of the port-channel load balance command (continued)

Syntax	Description
<b>src-ip</b> <i>source-ip-address</i>	Loads distribution on the source IP address. Option to exclude VLAN in the distribution is provided using the <b>excludevlan</b> keyword along with this method.
<b>src-mac</b> <i>source-mac-address</i>	Loads distribution on the source MAC address.

**Note**

Refer to [Figure 1](#) for this configuration.

At PE1:

```

interface loopback0
no shut
ip address 1.1.1.1 255.255.255.255

mpls ip
mpls label protocol ldp
mpls ldp advertise-labels
interface gig0/4
no switchport
no shut
no keepalive
ip address 5.5.5.1 255.255.0.0
mpls ip
mpls label protocol ldp
mpls ldp advertise-labels

router ospf 10
network 5.5.5.1 0.0.0.0 area 0
network 1.1.1.1 0.0.0.0 area 0

```

- Configure the service instance from 2 to 129

```

interface g0/1
no shut
switchport
switchport trunk allowed vlan none
switchport mode trunk
service instance 2 ethernet
    encapsulation dot1q 2
    rewrite ingress tag pop 1 symmetric
    xconnect 2.2.2.2 2 encapsulation mpls
!
!
service instance 129 ethernet
    encapsulation dot1q 129
    rewrite ingress tag pop 1 symmetric
    xconnect 2.2.2.2 129 encapsulation mpls

```

At P1:

```

interface loopback0
no shut
ip address 4.4.4.4 255.255.255.255

mpls ip
mpls label protocol ldp

```

```
mpls ldp advertise-labels
interface g0/4
no switchport
no shut
no keepalive
ip address 5.5.5.2 255.255.0.0
mpls ip
mpls label protocol ldp
mpls ldp advertise-labels

interface port-channel1
no switchport
no keepalive
ip address 90.0.0.1 255.255.0.0
mpls ip
mpls label protocol ldp

router ospf 10
network 4.4.4.4 0.0.0.0 area 0
network 90.0.0.1 0.0.0.0 area 0
network 5.5.5.2 0.0.0.0 area 0

interface gig0/8
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/9
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/13
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/14
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active
```

At P2

```
interface loopback0
no shut
ip address 3.3.3.3 255.255.255.255

interface port-channel1
```

```
no switchport
no keepalive
ip address 90.0.0.2 255.255.0.0
mpls ip
mpls label protocol ldp

interface port-channel2
no switchport
no keepalive
ip address 100.0.0.2 255.255.0.0
mpls ip
mpls label protocol ldp

router ospf 10
network 90.0.0.2 0.0.0.0 area 0
network 100.0.0.2 0.0.0.0 area 0
network 3.3.3.3 0.0.0.0 area 0

interface gig0/8
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/9
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/13
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/14
no switchport
no shut
no keepalive
no ip address
channel-group 1 mode active

interface gig0/4
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

interface gig0/5
no switchport
no shut
no keepalive
no ip address
```



```
channel-group 2 mode active
```

```
interface gig0/11
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active
```

```
interface gig0/15
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active
```

At PE2:

```
interface loopback0
no shut
ip address 2.2.2.2 255.255.255.255
```

```
interface port-channel2
no switchport
no keepalive
ip address 100.0.0.1 255.255.0.0
mpls ip
mpls label protocol ldp
```

```
router ospf 10
network 100.0.0.1 0.0.0.0 area 0
network 2.2.2.2 0.0.0.0 area 0
```

```
interface gig0/4
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active
```

```
interface gig0/5
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active
```

```
interface gig0/11
no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active
```

```
interface gig0/15
```

```

no switchport
no shut
no keepalive
no ip address
channel-group 2 mode active

```

- Configure the service instance from 2 to 129

```

interface gig0/24
no shut
switchport
switchport trunk allowed vlan none
switchport mode trunk
service instance 2 ethernet
    encapsulation dot1q 2
    rewrite ingress tag pop 1 symmetric
    xconnect 1.1.1.1 2 encapsulation mpls
!
!
service instance 129 ethernet
    encapsulation dot1q 129
    rewrite ingress tag pop 1 symmetric
    xconnect 1.1.1.1 129 encapsulation mpls

```

Load balancing should be enabled at g0/4, g0/5, g0/11, and dg0/15 in P2 and PE2.

## Verifying the MPLS Load Balancing Configuration

The output of the following commands provides details of the MPLS load balancing configuration:

```
Switch# show l2vpn bridge-domain detail
```

```
List of Access PWs:
```

```
List of VFIs:
```

```
VFI 1
```

```
PW: neighbor 3.3.3.3, PW ID 200, state is up ( established )
```

```
PW class not set, XC ID 0xc0000001
```

```
Encapsulation MPLS, protocol LDP
```

```
PW type Ethernet, control word disabled, interworking none
```

MPLS	Local	Remote
Label	16000	16001
Group ID	0x0	0x1
Interface	1	1
MTU	1500	1500
Control word	disabled	disabled
PW type	Ethernet	Ethernet
VCCV CV type	0x2	0x2
VCCV CC type	0x6	0x6

- Enabling load balance hashing:

```
Switch# show l2vpn xconnect detail
```

```
PW: neighbor 3.3.3.3, PW ID 300, state is down ( provisioned )
```

```
PW class not set, XC ID 0x40008
```

```
Encapsulation MPLS, protocol LDP
```

```
PW type Ethernet, control word disabled, interworking none
```

MPLS	Local	Remote
Label	16001	unknown
Group ID	0x200	0x0
Interface	GigabitEthernet0/0/0/6	unknown

```

MTU          1500          unknown
Control word disabled          unknown
PW type      Ethernet     unknown
VCCV CV type 0x2              0x0
VCCV CC type 0x6              0x0
                                   (none)

```

- The following are sample outputs for the MPLS load balancing:

```
Switch# show ip route 10.255.17.42
```

```

Routing entry for 10.255.17.42/32
  Known via "ospf 1", distance 110, metric 101, type intra area
  Last update from 192.168.207.170 on GigabitEthernet0/11, 1w3d ago
  Routing Descriptor Blocks:
    192.168.207.182, from 10.255.17.42, 1w3d ago, via GigabitEthernet0/14
      Route metric is 101, traffic share count is 1
    192.168.207.178, from 10.255.17.42, 1w3d ago, via GigabitEthernet0/13
      Route metric is 101, traffic share count is 1
    * 192.168.207.174, from 10.255.17.42, 1w3d ago, via GigabitEthernet0/12
      Route metric is 101, traffic share count is 1
    192.168.207.170, from 10.255.17.42, 1w3d ago, via GigabitEthernet0/11
      Route metric is 101, traffic share count is 1

```

```
Switch# show ip cef 10.255.17.42
```

```

10.255.17.42/32
  nexthop 192.168.207.170 GigabitEthernet0/11
  nexthop 192.168.207.174 GigabitEthernet0/12
  nexthop 192.168.207.178 GigabitEthernet0/13
  nexthop 192.168.207.182 GigabitEthernet0/14

```

```
Switch# show ip cef 10.255.17.42 internal
```

```

10.255.17.42/32, epoch 0, RIB[I], refcount 5, per-destination sharing
sources: RIB
feature space:
  LFD: 10.255.17.42/32 1 local label
  local label info: global/243
    contains path extension list
    disposition chain 0x08E9B0B4
    label switch chain 0x08E9B2D8
  IPRM: 0x00038000
ifnums:
  GigabitEthernet0/11(64): 192.168.207.170
  GigabitEthernet0/12(65): 192.168.207.174
  GigabitEthernet0/13(66): 192.168.207.178
  GigabitEthernet0/14(67): 192.168.207.182
  path 08EB8068, path list 08EAF274, share 1/1, type attached nexthop, for IPv4
    MPLS short path extensions: MOI flags = 0x0 label implicit-null
  nexthop 192.168.207.170 GigabitEthernet0/11, adjacency IP adj out of
  GigabitEthernet0/11, addr 192.168.207.170 0950B0E0
  path 08EB80DC, path list 08EAF274, share 1/1, type attached nexthop, for IPv4
    MPLS short path extensions: MOI flags = 0x0 label implicit-null
  nexthop 192.168.207.174 GigabitEthernet0/12, adjacency IP adj out of
  GigabitEthernet0/12, addr 192.168.207.174 0950B540
  path 08EB9EC4, path list 08EAF274, share 1/1, type attached nexthop, for IPv4
    MPLS short path extensions: MOI flags = 0x0 label implicit-null
  nexthop 192.168.207.178 GigabitEthernet0/13, adjacency IP adj out of
  GigabitEthernet0/13, addr 192.168.207.178 0950AC80
  path 08EB912C, path list 08EAF274, share 0/1, type attached nexthop, for IPv4
    MPLS short path extensions: MOI flags = 0x0 label implicit-null

```

```

nexthop 192.168.207.182 GigabitEthernet0/14, adjacency IP adj out of
GigabitEthernet0/14, addr 192.168.207.182 0950A3C0
output chain:
  loadinfo 08E9AE90, per-session, 4 choices, flags 0003, 5 locks
  flags: Per-session, for-rx-IPv4
  16 hash buckets
    < 0 > IP adj out of GigabitEthernet0/11, addr 192.168.207.170 0950B0E0
    < 1 > IP adj out of GigabitEthernet0/12, addr 192.168.207.174 0950B540
    < 2 > IP adj out of GigabitEthernet0/13, addr 192.168.207.178 0950AC80
    < 3 > IP adj out of GigabitEthernet0/14, addr 192.168.207.182 0950A3C0
    < 4 > IP adj out of GigabitEthernet0/11, addr 192.168.207.170 0950B0E0
    < 5 > IP adj out of GigabitEthernet0/12, addr 192.168.207.174 0950B540
    < 6 > IP adj out of GigabitEthernet0/13, addr 192.168.207.178 0950AC80
    < 7 > IP adj out of GigabitEthernet0/14, addr 192.168.207.182 0950A3C0
    < 8 > IP adj out of GigabitEthernet0/11, addr 192.168.207.170 0950B0E0
    < 9 > IP adj out of GigabitEthernet0/12, addr 192.168.207.174 0950B540
    <10 > IP adj out of GigabitEthernet0/13, addr 192.168.207.178 0950AC80
    <11 > IP adj out of GigabitEthernet0/14, addr 192.168.207.182 0950A3C0
    <12 > IP adj out of GigabitEthernet0/11, addr 192.168.207.170 0950B0E0
    <13 > IP adj out of GigabitEthernet0/12, addr 192.168.207.174 0950B540
    <14 > IP adj out of GigabitEthernet0/13, addr 192.168.207.178 0950AC80
    <15 > IP adj out of GigabitEthernet0/14, addr 192.168.207.182 0950A3C0
  Subblocks:
    None

```

```
Switch# show mpls forwarding-table 10.255.17.42
```

Local Label	Outgoing Label or VC	Prefix or Tunnel Id	Bytes Switched	Label	Outgoing interface	Next Hop
243	Pop Label	10.255.17.42/32	252677583293010		Gi0/11	192.168.207.170
	Pop Label	10.255.17.42/32	0		Gi0/12	192.168.207.174
	Pop Label	10.255.17.42/32	0		Gi0/13	192.168.207.178
	Pop Label	10.255.17.42/32	0		Gi0/14	192.168.207.182

**Note**

The **show mpls forwarding-table counters** command does not display the switched packets for all interfaces. To view switched packets on each interface, use the **show interface interface-name counter** command.

```
Switch# show mpls ldp neighbor
```

```

Peer LDP Ident: 10.255.17.42:0; Local LDP Ident 10.255.17.32:0
TCP connection: 10.255.17.42.18853 - 10.255.17.32.646
State: Oper; Msgs sent/rcvd: 186413/186396; Downstream
Up time: 15w6d
LDP discovery sources:
  GigabitEthernet0/12, Src IP addr: 192.168.207.174
  GigabitEthernet0/11, Src IP addr: 192.168.207.170
  GigabitEthernet0/13, Src IP addr: 192.168.207.178
  GigabitEthernet0/14, Src IP addr: 192.168.207.182
Addresses bound to peer LDP Ident:
  10.255.17.42 192.168.207.174 192.168.207.170 192.168.207.178
  192.168.207.182
Peer LDP Ident: 10.255.10.3:0; Local LDP Ident 10.255.17.32:0
TCP connection: 10.255.10.3.646 - 10.255.17.32.11542
State: Oper; Msgs sent/rcvd: 18328/18297; Downstream
Up time: 1w3d
LDP discovery sources:
  Targeted Hello 10.255.17.32 -> 10.255.10.3, active, passive
Addresses bound to peer LDP Ident:
  10.255.10.3 172.31.10.3 192.168.190.61 192.168.190.57
  10.11.11.1 10.255.4.1 192.168.190.65 192.168.190.70

```

```

Peer LDP Ident: 10.255.10.97:0; Local LDP Ident 10.255.17.32:0
TCP connection: 10.255.10.97.646 - 10.255.17.32.16411
State: Oper; Msgs sent/rcvd: 18318/18329; Downstream
Up time: 1w3d
LDP discovery sources:
  GigabitEthernet0/22, Src IP addr: 192.168.207.130
Addresses bound to peer LDP Ident:
  10.255.10.97 172.31.10.97 192.168.191.149 192.168.191.193
  192.168.191.205 192.168.191.157 192.168.191.209 192.168.191.201
  192.168.191.213 192.168.191.217 192.168.191.229 192.168.191.225
  192.168.191.233 192.168.191.221 192.168.191.161 192.168.191.134
  192.168.191.138 192.168.207.130 192.168.191.130

```

## Additional References

### Related Documents

Related Topic	Document Title
Configuring MPLS, MPLS VPN, MPLS OAM, and EoMPLS	<a href="http://www.cisco.com/en/US/docs/switches/metro/me3600x_3800x/software/release/15.3_3_S/configuration/guide/swmpls.html">http://www.cisco.com/en/US/docs/switches/metro/me3600x_3800x/software/release/15.3_3_S/configuration/guide/swmpls.html</a>

### Standards

Standard	Title
—	There are no new standards.

### MIBs

MIB	MIBs Link
• —	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
—	There are no new RFC.

## 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 Load Balancing

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.


**Note**

[Table 2](#) 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.

**Table 2** *Feature Information for MPLS Load Balancing*

Feature Name	Releases	Feature Information
MPLS Load Balancing	15.3(3)S	This feature was introduced.

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