

# Configuring VPN MPLS over POS, SRP and ATM on Cisco GSRs

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## Introduction

This document provides a sample configuration for Multiprotocol Label Switching (MPLS) virtual private network (VPN) over ATM, packet over SONET/SDH (POS), and spatial reuse protocol (SRP) on Cisco 12000 Gigabit Switch Routers (GSRs).

These acronyms are used in this document.

- **CE** Customer Edge router
- **PE** Provider Edge router
- **P** Provider core router
- **VRF** Virtual Routing and Forwarding

## Prerequisites

### Requirements

Before you attempt this configuration, ensure these requirements are met:

- Basic knowledge of MPLS and the MPLS VPN feature.

### Components Used

The information in this document is based on these software and hardware versions:

- P and PE routers
  - ◆ Cisco IOS® Software Release 12.0(28)S on all routers
  - ◆ Cisco GSR 12000 series routers
- CE routers

- ◆ Cisco IOS Software Release 12.0(28)S on all routers
- ◆ Cisco 7200VXR routers

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

## Related Products

This configuration can also be used with these router platforms supported at the provider (P) core:

- Cisco 7200
- Cisco 7500
- Cisco 7600
- Cisco 8500
- Cisco 10000
- Cisco 10700
- Cisco 12000

This configuration can also be used with these router platforms supported at the provider edge (PE):

- Cisco 3600
- Cisco 3700
- Cisco 7200
- Cisco 7500
- Cisco 7600
- Cisco 8500
- Cisco 10000
- Cisco 10700
- Cisco 12000

**Note:** Cisco 3700/3600 routers do not have support for POS and SRP modules. Any platform below the 3600 does not support MPLS configuration.

## Conventions

For more information on document conventions, refer to Cisco Technical Tips Conventions.

## Background Information

MPLS is made available to support multiple physical interfaces. These interfaces includes ATM, POS and SRP. These interfaces are typically used for backbone connections due to their high bandwidth support. The MPLS VPN feature allows service providers to interconnect multiple sites without the need for ATM, POS or SRP at the customer side.

There are two implementations of MPLS over ATM. One is the use of virtual path identifier (VPI) and virtual channel identified (VCI) as the label which is also known as "cell-based" MPLS over ATM. This implementation is documented under RFC 3035 [\[3\]](#). The second ATM implementation is the use of the MPLS "shim header" which is also known as packet-based MPLS over ATM. This shim header is inserted between the Layer 2 and Layer 3 headers. The format of the shim header is documented under RFC 3032 [\[4\]](#). This sample configuration is based on the "shim header" implementation for the ATM interface.

Packet over Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH), is a technology that places the IP layer directly above the SONET layer. It eliminates the overhead needed to run IP over ATM over SONET. POS supports multiple encapsulation format. These are PPP, HDLC and Frame Relay. The shim header is used to provide MPLS support. This sample configuration uses the default HDLC encapsulation on Cisco POS interfaces.

Spatial Reuse Protocol (SRP) is a Layer 2 technology that provides resiliency at the Layer 2 level. It also runs on top of SONET/SDH. MPLS support is provided by the shim header implementation.

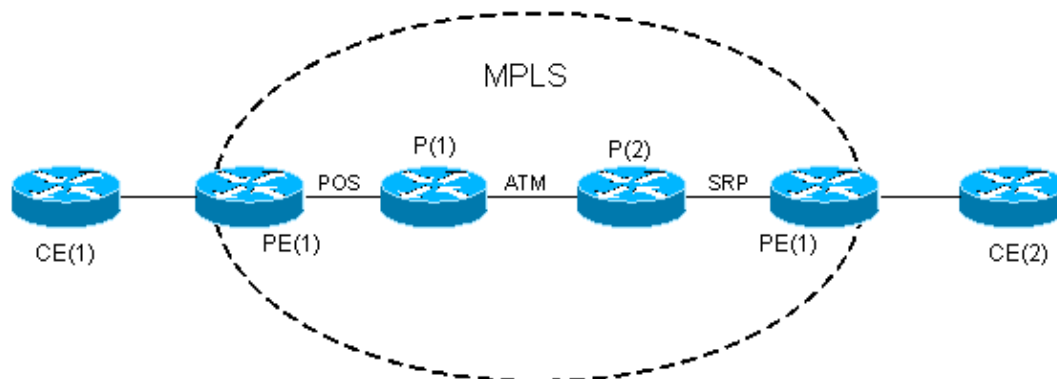
## Configure

In this section, you are presented with the information to configure the features described in this document.

**Note:** To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only) .

## Network Diagram

This document uses this network setup:



## Configurations

This lists some considerations made on the sample configuration:

- The MPLS VPN sample configuration service EIGRP routes from the CEs. Cisco bug ID CSCds09932 (registered customers only) has introduced EIGRP support for MPLS VPN with Cisco IOS Software Release 12.0(22)S. This has been ported to Cisco IOS Software Release 12.2T via Cisco bug ID CSCdx26186 (registered customers only) starting on Cisco IOS Software Release 12.2(15)T. The application of the same VRF to multiple EIGRP instances is not supported and can crash the router. A check on this issue was later integrated with Cisco bug ID CSCdz40426 (registered customers only) . Refer to MPLS VPN Support for EIGRP Between Provider Edge and Customer Edge to learn more about the MPLS VPN support for EIGRP.
- The EIGRP autonomous system is the same on both CE routers. The BGP autonomous system is the same on both PE routers.
- The MPLS backbone is based on POS, ATM and SRP interfaces and configured with Open Shortest Path First (OSPF) and MP-BGP. The connection between PE and CE is Fast Ethernet.

This document uses these configurations:

- CE(1)
- PE(1)

- P(1)
- P(2)
- PE(2)
- CE(2)

### CE(1)

```
!  
version 12.0  
!  
  
ip cef  
  
!--- CEF is not required on the CE because there is no MPLS configuration.  
!--- CEF is the fastest switching algorithm on Cisco routers  
!--- and it is best to leave it enabled.  
  
!  
!  
  
interface Loopback0  
 ip address 11.1.1.1 255.255.255.0  
!  
interface Loopback1  
 ip address 11.2.1.1 255.255.255.0  
!  
interface Loopback2  
 ip address 11.3.1.1 255.255.255.0  
!  
interface FastEthernet2/0  
 ip address 192.168.2.2 255.255.255.252  
!  
  
router eigrp 100  
 network 11.0.0.0  
 network 192.168.2.0  
 no auto-summary  
!  
ip classless
```

### PE(1)

```
!  
version 12.0  
!  
  
!--- CEF is enabled by default on GSR.  
.  
!  
  
ip vrf Customer_A  
 rd 100:1  
 route-target export 100:1  
 route-target import 100:1  
  
!--- Enables the VPN routing and forwarding (VRF) routing table.
```

```

!
interface Loopback0
 ip address 1.1.1.1 255.255.255.255
!
interface FastEthernet0/0
 ip vrf forwarding Customer_A

!---- Associates a VRF instance with an interface or subinterface.

 ip address 192.168.2.1 255.255.255.252
!
interface POS4/0
 ip address 10.0.0.1 255.255.255.252
 tag-switching ip

!---- Enables dynamic Label Switching of IPv4 packets on an interface.
!---- At minimum, this is all you need to configure MPLS over POS.
!---- Note the default encapsulation of POS interfaces is HDLC.
!---- An mpls ip command can also be used instead of tag-switching ip.

 crc 32
 clock source internal
!
!
router eigrp 1
!
address-family ipv4 vrf Customer_A
 redistribute bgp 100 metric 10000 1 255 1 1500
 network 192.168.2.0
 no auto-summary
 autonomous-system 100

!---- The autonomous-system 100 must match the AS used on the CE.
!---- The bgp must be redistributed with metric. The default-metric
!---- command can also be used.

 exit-address-family
!
router ospf 1
 log-adjacency-changes
 network 1.1.1.1 0.0.0.0 area 0
 network 10.0.0.1 0.0.0.0 area 0
!
router bgp 100
 bgp log-neighbor-changes
 neighbor 4.4.4.4 remote-as 100
 neighbor 4.4.4.4 update-source Loopback0
!
address-family vpv4
 neighbor 4.4.4.4 activate
 neighbor 4.4.4.4 send-community both
 exit-address-family
!
address-family ipv4 vrf Customer_A
 redistribute eigrp 100

!---- The EIGRP AS 100 must be redistributed to the BGP vrf instance.

```

```
no auto-summary
no synchronization
exit-address-family
!
ip classless
```

### P(1)

```
!
version 12.0
!
!
interface Loopback0
 ip address 2.2.2.2 255.255.255.255
!
interface POS2/0
 ip address 10.0.0.2 255.255.255.252
 tag-switching ip

!--- This enables MPLS over POS.

 crc 32
!
!
interface ATM6/0
 no ip address
!
interface ATM6/0.100 point-to-point
 ip address 10.1.1.1 255.255.255.252
 tag-switching ip
 pvc 0/100
!

!--- This enables "packet-based" MPLS over ATM.

!
router ospf 1
 log-adjacency-changes
 network 2.2.2.2 0.0.0.0 area 0
 network 10.0.0.2 0.0.0.0 area 0
 network 10.1.1.1 0.0.0.0 area 0
!
ip classless
```

### P(2)

```
!
version 12.0
!
!
interface Loopback0
 ip address 3.3.3.3 255.255.255.255
!
interface ATM4/0
 no ip address
!
interface ATM4/0.100 point-to-point
 ip address 10.1.1.2 255.255.255.252
 tag-switching ip
```

```

pvc 0/100

!--- This enables "packet-based" MPLS over ATM.

!
!
interface SRP5/0
ip address 10.2.2.1 255.255.255.252
no ip directed-broadcast
tag-switching ip

!--- This enables MPLS over SRP.

!
router ospf 1
log-adjacency-changes
network 3.3.3.3 0.0.0.0 area 0
network 10.1.1.2 0.0.0.0 area 0
network 10.2.2.1 0.0.0.0 area 0
!
ip classless

```

## PE(2)

```

!
version 12.0
!
!
ip vrf Customer_A
rd 100:1
route-target export 100:1
route-target import 100:1
!
!
interface Loopback0
ip address 4.4.4.4 255.255.255.255
!
interface SRP4/0
ip address 10.2.2.2 255.255.255.252
tag-switching ip

!--- This enables MPLS over SRP.

!
interface FastEthernet6/0
ip vrf forwarding Customer_A

!--- Associates a VRF instance with an interface or subinterface.

ip address 192.168.1.1 255.255.255.252
!
!
router eigrp 1
!
address-family ipv4 vrf Customer_A
redistribute bgp 100 metric 10000 1 255 1 1500
network 192.168.1.0

```

```

no auto-summary
autonomous-system 100
exit-address-family

!--- The autonomous-system 100 must match the AS used on the CE.
!--- The bgp must be redistributed with metric. The default-metric
!--- command can also be used.

!
router ospf 1
  log-adjacency-changes
  network 4.4.4.4 0.0.0.0 area 0
  network 10.2.2.2 0.0.0.0 area 0
!
router bgp 100
  bgp log-neighbor-changes
  neighbor 1.1.1.1 remote-as 100
  neighbor 1.1.1.1 update-source Loopback0
!
address-family vpnv4
  neighbor 1.1.1.1 activate
  neighbor 1.1.1.1 send-community both
exit-address-family
!
address-family ipv4 vrf Customer_A
  redistribute eigrp 100

!--- The EIGRP AS 100 must be redistributed to the BGP vrf instance.

no auto-summary
no synchronization
exit-address-family
!
ip classless

```

## CE(2)

```

!
version 12.0
!
ip cef

!--- CEF is not required on the CE because there is no MPLS configuration.
!--- CEF is the fastest switching algorithm on Cisco routers so it is
!--- best to leave it enabled.

!

!
interface Loopback0
  ip address 22.1.1.1 255.255.255.0
!
interface Loopback1
  ip address 22.2.1.1 255.255.255.0
!
interface Loopback2
  ip address 22.3.1.1 255.255.255.0
!

```



```

interface FastEthernet2/0
 ip address 192.168.1.2 255.255.255.252
!
!
router eigrp 100
 network 22.0.0.0
 network 192.168.1.0
 no auto-summary
!

```

## Verify

This section provides information you can use to confirm your configuration is working properly.

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) , which allows you to view an analysis of **show** command output.

- **show ip vrf** Verifies that the correct VRF exists.
- **show ip route vrf Customer\_A** Verifies the routing information on the PE routers.
- **ping vrf Customer\_A <ip address>** Verifies connectivity by sending ICMP packets.
- **traceroute vrf Customer\_A <ip address>** Verifies the routing information on the PE routers.
- **show ip eigrp vrf Customer\_A neighbors** Verifies the EIGRP neighbor inside the VRF instance.
- **show ip eigrp vrf Customer\_A topology** Verifies EIGRP topology inside the VRF instance.
- **show ip bgp vpnv4 vrf Customer\_A** Verifies the BGP table inside the VRF instance.
- **show ip cef vrf Customer\_A <ip address> detail** Verifies the CEF table inside the VRF instance.
- **show tag-switching forwarding-table** Verifies if there is a route/tag for the destination prefix.
- **show ip route** Verifies that CEs exchange routes.

### PE(1)

```

PE(1)#show ip vrf

```

Name	Default RD	Interfaces
Customer_A	100:1	FastEthernet0/0

```

PE(1)#show ip route vrf Customer_A

```

```

Routing Table: Customer_A

```

```

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR

```

```

Gateway of last resort is not set

```

```

      22.0.0.0/24 is subnetted, 3 subnets
B       22.3.1.0 [200/156160] via 4.4.4.4, 01:12:28
B       22.2.1.0 [200/156160] via 4.4.4.4, 01:12:28
B       22.1.1.0 [200/156160] via 4.4.4.4, 01:12:28
      11.0.0.0/24 is subnetted, 3 subnets
D       11.2.1.0 [90/156160] via 192.168.2.2, 01:12:50, FastEthernet0/0
D       11.3.1.0 [90/156160] via 192.168.2.2, 01:12:50, FastEthernet0/0
D       11.1.1.0 [90/156160] via 192.168.2.2, 01:12:50, FastEthernet0/0
      192.168.1.0/30 is subnetted, 1 subnets
B       192.168.1.0 [200/0] via 4.4.4.4, 01:16:14
      192.168.2.0/30 is subnetted, 1 subnets

```

C 192.168.2.0 is directly connected, FastEthernet0/0

PE(1)#ping vrf Customer\_A 192.168.1.2

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.1.2, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms

D-GSR-12012-2A#ping vrf Customer\_A ip ?

WORD Ping destination address or hostname

<cr>

PE(1)#ping vrf Customer\_A ip

Target IP address: 192.168.1.2

Repeat count [5]: 100

Datagram size [100]: 1500

Timeout in seconds [2]:

Extended commands [n]:

Sweep range of sizes [n]:

Type escape sequence to abort.

Sending 100, 1500-byte ICMP Echos to 192.168.1.2, timeout is 2 seconds:

!!

!!

Success rate is 100 percent (100/100), round-trip min/avg/max = 1/2/4 ms

PE(1)#traceroute vrf Customer\_A 192.168.1.2

Type escape sequence to abort.

Tracing the route to 192.168.1.2

```
 1 10.0.0.2 [MPLS: Labels 18/28 Exp 0] 0 msec 0 msec 0 msec
 2 10.1.1.2 [MPLS: Labels 19/28 Exp 0] 0 msec 0 msec 0 msec
 3 192.168.1.1 4 msec 0 msec 0 msec
 4 192.168.1.2 4 msec 0 msec *
```

PE(1)#show ip eigrp vrf Customer\_A neighbors

IP-EIGRP neighbors for process 100

H	Address	Interface	Hold (sec)	Uptime	SRTT (ms)	RTO	Q Cnt	Seq Num	Type
0	192.168.2.2	Fa0/0	11	10:51:41	10	200	0	8	

PE(1)#show ip eigrp vrf Customer\_A topology

IP-EIGRP Topology Table for AS(100)/ID(192.168.2.1) Routing Table: Customer\_A

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,  
r - Reply status

```
P 11.2.1.0/24, 1 successors, FD is 156160
  via 192.168.2.2 (156160/128256), FastEthernet0/0
P 11.3.1.0/24, 1 successors, FD is 156160
  via 192.168.2.2 (156160/128256), FastEthernet0/0
P 11.1.1.0/24, 1 successors, FD is 156160
  via 192.168.2.2 (156160/128256), FastEthernet0/0
P 22.3.1.0/24, 1 successors, FD is 156160
  via VPNv4 Sourced (156160/0)
P 22.2.1.0/24, 1 successors, FD is 156160
  via VPNv4 Sourced (156160/0)
P 22.1.1.0/24, 1 successors, FD is 156160
  via VPNv4 Sourced (156160/0)
P 192.168.1.0/30, 1 successors, FD is 28160
  via VPNv4 Sourced (28160/0)
P 192.168.2.0/30, 1 successors, FD is 28160
  via Connected, FastEthernet0/0
```

PE(1)#show ip bgp vpnv4 vrf Customer\_A

BGP table version is 17, local router ID is 1.1.1.1

Status codes: s suppressed, d damped, h history, \* valid, > best, i - internal,  
r RIB-failure, S Stale

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	Next Hop	Metric	LocPrf	Weight	Path
Route Distinguisher: 100:1 (default for vrf Customer_A)					
*> 11.1.1.0/24	192.168.2.2	156160		32768	?
*> 11.2.1.0/24	192.168.2.2	156160		32768	?
*> 11.3.1.0/24	192.168.2.2	156160		32768	?
*>i22.1.1.0/24	4.4.4.4	156160	100	0	?
*>i22.2.1.0/24	4.4.4.4	156160	100	0	?
*>i22.3.1.0/24	4.4.4.4	156160	100	0	?
*>i192.168.1.0/30	4.4.4.4	0	100	0	?
*> 192.168.2.0/30	0.0.0.0	0		32768	?

PE(1)#show ip cef vrf Customer\_A

Prefix	Next Hop	Interface
0.0.0.0/0	drop	Null0 (default route handler entry)
0.0.0.0/32	receive	
11.1.1.0/24	192.168.2.2	FastEthernet0/0
11.2.1.0/24	192.168.2.2	FastEthernet0/0
11.3.1.0/24	192.168.2.2	FastEthernet0/0
22.1.1.0/24	10.0.0.2	POS4/0
22.2.1.0/24	10.0.0.2	POS4/0
22.3.1.0/24	10.0.0.2	POS4/0
192.168.1.0/30	10.0.0.2	POS4/0
192.168.2.0/30	attached	FastEthernet0/0
192.168.2.0/32	receive	
192.168.2.1/32	receive	
192.168.2.2/32	192.168.2.2	FastEthernet0/0
192.168.2.3/32	receive	
224.0.0.0/4	drop	
224.0.0.0/24	receive	
255.255.255.255/32	receive	

PE(1)#show ip cef vrf Customer\_A 11.1.1.0 detail

11.1.1.0/24, version 16, epoch 0, cached adjacency 192.168.2.2  
0 packets, 0 bytes  
tag information set, all rewrites owned  
local tag: 27  
via 192.168.2.2, FastEthernet0/0, 0 dependencies  
next hop 192.168.2.2, FastEthernet0/0  
valid cached adjacency  
tag rewrite with Fa0/0, 192.168.2.2, tags imposed {}

PE(1)#show tag-switching forwarding-table

Local	Outgoing	Prefix	Bytes tag	Outgoing	Next Hop
tag	tag or VC	or Tunnel Id	switched	interface	
16	Pop tag	2.2.2.2/32	0	PO4/0	point2point
17	17	3.3.3.3/32	0	PO4/0	point2point
18	18	4.4.4.4/32	0	PO4/0	point2point
19	19	10.2.2.0/30	0	PO4/0	point2point
20	Pop tag	10.1.1.0/30	0	PO4/0	point2point
22	Untagged	11.2.1.0/24[V]	0	Fa0/0	192.168.2.2
26	Untagged	11.3.1.0/24[V]	0	Fa0/0	192.168.2.2
27	Untagged	11.1.1.0/24[V]	0	Fa0/0	192.168.2.2
28	Aggregate	192.168.2.0/30[V]	255132		

PE(1)#show tag-switching forwarding-table vrf Customer\_A

Local	Outgoing	Prefix	Bytes tag	Outgoing	Next Hop
tag	tag or VC	or Tunnel Id	switched	interface	
22	Untagged	11.2.1.0/24[V]	0	Fa0/0	192.168.2.2
26	Untagged	11.3.1.0/24[V]	0	Fa0/0	192.168.2.2
27	Untagged	11.1.1.0/24[V]	0	Fa0/0	192.168.2.2
28	Aggregate	192.168.2.0/30[V]	255132		

## P(1)

P(1)A#show tag-switching forwarding-table

Local tag	Outgoing tag or VC	Prefix or Tunnel Id	Bytes tag switched	Outgoing interface	Next Hop
16	Pop tag	1.1.1.1/32	260843	PO2/0	point2point
17	Pop tag	3.3.3.3/32	0	AT6/0.100	point2point
18	19	4.4.4.4/32	269131	AT6/0.100	point2point
19	Pop tag	10.2.2.0/30	0	AT6/0.100	point2point

## P(2)

P(2)#show tag-switching forwarding-table

Local tag	Outgoing tag or VC	Prefix or Tunnel Id	Bytes tag switched	Outgoing interface	Next Hop
16	Pop tag	10.0.0.0/30	0	AT4/0.100	point2point
17	Pop tag	2.2.2.2/32	0	AT4/0.100	point2point
18	16	1.1.1.1/32	269930	AT4/0.100	point2point
19	Pop tag	4.4.4.4/32	276490	SR5/0	10.2.2.2

## PE(2)

PE(2)#show tag-switching forwarding-table

Local tag	Outgoing tag or VC	Prefix or Tunnel Id	Bytes tag switched	Outgoing interface	Next Hop
16	18	1.1.1.1/32	0	SR4/0	10.2.2.1
17	17	2.2.2.2/32	0	SR4/0	10.2.2.1
18	Pop tag	3.3.3.3/32	0	SR4/0	10.2.2.1
19	16	10.0.0.0/30	0	SR4/0	10.2.2.1
20	Pop tag	10.1.1.0/30	0	SR4/0	10.2.2.1
25	Untagged	22.1.1.0/24[V]	2280	Fa6/0	192.168.1.2
26	Untagged	22.2.1.0/24[V]	570	Fa6/0	192.168.1.2
27	Untagged	22.3.1.0/24[V]	570	Fa6/0	192.168.1.2
28	Aggregate	192.168.1.0/30[V]	251808		

## CE(1)

CE(1)#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP  
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area  
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2  
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP  
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2  
ia - IS-IS inter area, \* - candidate default, U - per-user static route  
o - ODR

Gateway of last resort is not set

```
22.0.0.0/24 is subnetted, 3 subnets
D    22.3.1.0 [90/158720] via 192.168.2.1, 00:35:45, FastEthernet2/0
D    22.2.1.0 [90/158720] via 192.168.2.1, 00:35:45, FastEthernet2/0
D    22.1.1.0 [90/158720] via 192.168.2.1, 00:35:45, FastEthernet2/0
11.0.0.0/24 is subnetted, 3 subnets
C    11.2.1.0 is directly connected, Loopback1
C    11.3.1.0 is directly connected, Loopback2
C    11.1.1.0 is directly connected, Loopback0
192.168.1.0/30 is subnetted, 1 subnets
D    192.168.1.0 [90/30720] via 192.168.2.1, 00:35:46, FastEthernet2/0
192.168.2.0/30 is subnetted, 1 subnets
C    192.168.2.0 is directly connected, FastEthernet2/0
```

CE(1)#ping 22.1.1.1

Type escape sequence to abort.

```
Sending 5, 100-byte ICMP Echos to 22.1.1.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
```

## CE(2)

```
D-R7206-5A#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR
```

```
Gateway of last resort is not set
```

```
      22.0.0.0/24 is subnetted, 3 subnets
C      22.3.1.0 is directly connected, Loopback2
C      22.2.1.0 is directly connected, Loopback1
C      22.1.1.0 is directly connected, Loopback0
      11.0.0.0/24 is subnetted, 3 subnets
D      11.2.1.0 [90/158720] via 192.168.1.1, 00:36:32, FastEthernet2/0
D      11.3.1.0 [90/158720] via 192.168.1.1, 00:36:32, FastEthernet2/0
D      11.1.1.0 [90/158720] via 192.168.1.1, 00:36:32, FastEthernet2/0
      192.168.1.0/30 is subnetted, 1 subnets
C      192.168.1.0 is directly connected, FastEthernet2/0
      192.168.2.0/30 is subnetted, 1 subnets
D      192.168.2.0 [90/30720] via 192.168.1.1, 00:36:33, FastEthernet2/0
```

```
CE(2)#ping 11.1.1.1
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 11.1.1.1, timeout is 2 seconds:
```

```
!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
```

## Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

## Related Information

- [MPLS Virtual Private Networks](#)
- [Configuring a Basic MPLS VPN](#)
- [Packet Flow in an MPLS VPN Environment](#)
- [More MPLS over ATM information](#)
- [Technical Support – Cisco Systems](#)

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