在 Cisco GSR 上配置 POS、SRP 及 ATM 上的 VPN MPLS

目录

简介

本文档提供了Cisco 12000千兆位交换路由器(GSR)上ATM多协议标签交换(MPLS)虚拟专用网(VPN)、SONET/SDH分组(POS)和空间复用协议(SRP)的示例配置。

本文档中使用了这些首字母缩略词。

- CE -客户边缘路由器
- PE — 提供商边缘路由器
- P — 提供商核心路由器
- VRF — 虚拟路由和转发

先决条件

要求

尝试此配置之前，请确保满足以下要求：

- MPLS和MPLS VPN功能的基本知识。

使用的组件

本文档中的信息基于以下软件和硬件版本：

- P 和 PE 路由器所有路由器上的思科IOS®软件版本12.0(28)S思科GSR 12000系列路由器
- CE路由器所有路由器上的思科IOS软件版本12.0(28)S思科7200VXR路由器

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

相关产品

此配置还可用于提供商(P)核心支持的以下路由器平台：

- Cisco7200
- Cisco 7500
- Cisco 7600
- Cisco 8500
- Cisco 10000
- Cisco 10700
- Cisco 12000

此配置还可用于提供商边缘(PE)支持的以下路由器平台：

- Cisco 3600
- Cisco 3700
- Cisco7200
- Cisco 7500
- Cisco 7600
- Cisco 8500
- Cisco 10000
- Cisco 10700
- Cisco 12000

注意：Cisco 3700/3600路由器不支持POS和SRP模块。3600以下的任何平台都不支持MPLS配置。

规则

有关文档规则的详细信息，请参阅 Cisco 技术提示规则。

背景信息

MPLS可用于支持多个物理接口。这些接口包括ATM、POS和SRP。由于这些接口支持高带宽，因此通常用于主干连接。MPLS VPN功能使服务提供商无需在客户端使用ATM、POS或SRP，即可互联多个站点。

MPLS over ATM有两种实施方式。一种是使用虚拟路径标识符(VPI)和虚拟信道标识(VCI)作为标签，也称为基于信元的MPLS over ATM。此实施在RFC 3035下记录 。第二个ATM实施是使用MPLS“shim header”，也称为基于数据包的MPLS over ATM。此填充码报头插入在第2层和第3层报头之间。填充码报头的格式记录在RFC 3032下 。此示例配置基于ATM接口的“填充报头”实施。

同步光纤网络/同步数字层次结构(SONET/SDH)上的数据包是一种将IP层直接置于SONET层之上的

技术。它消除了在SONET上通过ATM运行IP所需的开销。POS支持多种封装格式。这些是PPP、HDLC和帧中继。填充报头用于提供MPLS支持。此示例配置在Cisco POS接口上使用默认的HDLC封装。

空间重用协议(SRP)是第2层技术，在第2层级别提供恢复能力。它还在SONET/SDH上运行。MPLS支持由填充报头实施提供。

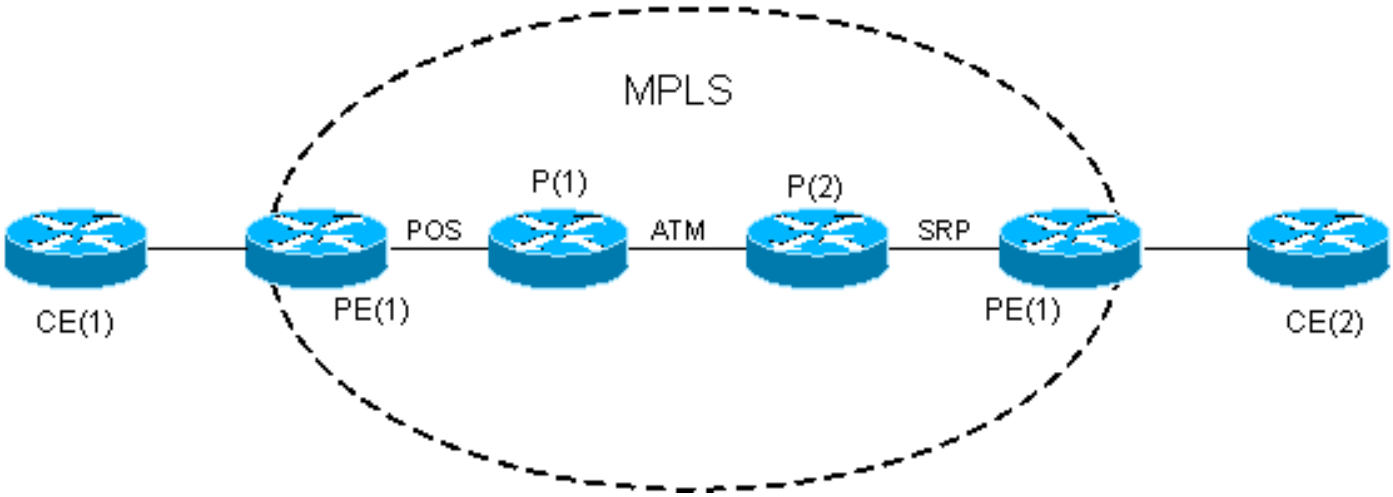
配置

本部分提供有关如何配置本文档所述功能的信息。

注：要查找有关本文档中使用的命令的其他信息，请使用命令查找工具(仅注册客户)。

网络图

本文档使用以下网络设置：



配置

下面列出了在示例配置中考虑的一些事项：

- MPLS VPN配置服务示例EIGRP路由来自CE。Cisco Bug ID CSCds09932(仅限注册客户)引入了对MPLS VPN的EIGRP支持，Cisco IOS软件版本为12.0(22)S。从Cisco IOS软件版本12.2(15)T开始，已通过Cisco Bug ID CSCdx26186(仅注册客户)将此漏洞移植到Cisco IOS软件版本12.2(15)T。不支持将同一VRF应用到多个EIGRP实例，因此可能导致路由器崩溃。此问题的检查后来与Cisco Bug ID CSCdz40426(仅限注册客户)集成在一起。 有关对EIGRP的MPLS VPN支持的详细信息，请参阅MPLS VPN支持在提供商边缘和客户边缘之间实现EIGRP。
- 两台CE路由器上的EIGRP自治系统相同。两台PE路由器上的BGP自治系统相同。
- MPLS主干基于POS、ATM和SRP接口，并配置了开放最短路径优先(OSPF)和MP-BGP。PE和CE之间的连接是快速以太网。

本文档使用以下配置：

- 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 vpnv4
 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 !
```

验证

本部分所提供的信息可用于确认您的配置是否正常工作。

命令输出解释程序工具（仅限注册用户）支持某些 **show 命令，使用此工具可以查看对 show 命令输出的分析。**

- **show ip vrf — 验证是否存在正确的 VRF。**
- **show ip route vrf Customer_A — 验证关于 PE 路由器的路由信息。**
- **ping vrf Customer_A <ip address>** — 通过发送ICMP数据包验证连接。
- **traceroute vrf Customer_A <ip address>** — 验证PE路由器上的路由信息。
- **show ip eigrp vrf Customer_A neighbors** — 验证VRF实例内的EIGRP邻居。
- **show ip eigrp vrf Customer_A topology** — 检验VRF实例内的EIGRP拓扑。
- **show ip bgp vpnv4 vrf Customer_A** — 验证VRF实例内的BGP表。
- **show ip cef vrf Customer_A <ip address> detail** — 验证VRF实例内的CEF表。
- **show tag-switching forwarding-table** — 验证是否存在用于目标前缀的路由/标记。
- **show ip route** — 检验CE是否交换路由。

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 Uptime   SRTT   RTO  Q  Seq Type
                                           (sec)         (ms)       Cnt Num
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  Outgoing    Prefix            Bytes tag  Outgoing   Next Hop
tag    tag or VC   or Tunnel Id      switched   interface
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  Outgoing    Prefix            Bytes tag  Outgoing   Next Hop
tag    tag or VC   or Tunnel Id      switched   interface
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  Outgoing    Prefix            Bytes tag  Outgoing   Next Hop
tag    tag or VC   or Tunnel Id      switched   interface
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
```

故障排除

目前没有针对此配置的故障排除信息。

相关信息

- MPLS 虚拟专用网
- 配置基本 MPLS VPN
- MPLS VPN 环境里中的信息包流
- 更多基于ATM的MPLS信息
- 技术支持 - Cisco Systems