# 在Cat9500和ISR4K之间配置VPLS

## 目录



## 简介

VPLS是第2层扩展技术，大多数客户在ISP和第三方供应商的借用/租用服务中都使用它。VPLS的使用范围已超出本配置指南的范围。这是一份基本配置指南，旨在帮助客户在现有ISR4K平台和新的Cat9500交换机之间配置L2VPN。

## 先决条件

您应了解基本的L2VPN概念和配置用于配置L2 VFI情景的伪线模板

### 要求

ISR4K路由器（任何ISR4400/ISR4300）、Cat9500交换机和两台用作CE设备的设备

### 使用的组件

ISR4451-X

C9500-40X-A

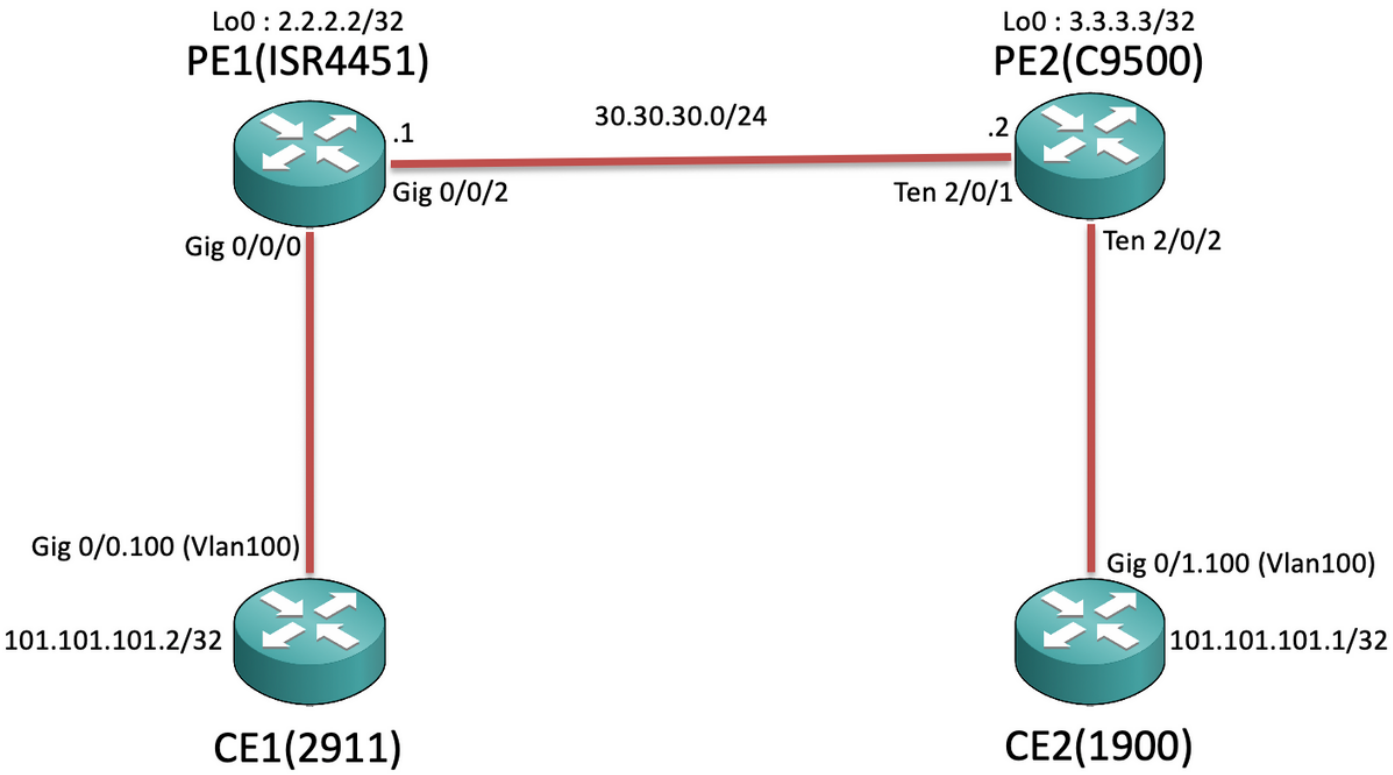
CISCO1921

CISCO2911

## 配置

配置告知VPLS上下文的使用情况和支持的VC类型/详细信息

### 网络图




## 配置

### 在CE1和CE2上：

**CE1#sh run**
```
Building configuration...

Current configuration : 105 bytes
!
interface GigabitEthernet0/0
no ip address
duplex auto
speed auto
!
interface GigabitEthernet0/0.100
encapsulation dot1Q 100
ip address 101.101.101.2 255.255.255.0
!
```

**CE2#sh run**
```
Building configuration...

Current configuration : 1718 bytes
!
interface GigabitEthernet0/1
no ip address
duplex auto
speed auto
!
interface GigabitEthernet0/1.100
encapsulation dot1Q 100
ip address 101.101.101.1 255.255.255.0
!
```

### 在PE1和PE2上：

**PE1#sh run**
```
Building configuration...
Current configuration : 5049 bytes
!
pseudowire-class VPLS100
encapsulation mpls
no control-word
!
l2 vfi 100 manual
vpn id 100
bridge-domain 100
mtu 9180
neighbor 3.3.3.3 pw-class VPLS100
```

**PE2#sh run**
```
Building configuration...

Current configuration : 10722 bytes
!
ip routing
!
pseudowire-class VPLS100
encapsulation mpls
no control-word
!
l2 vfi 100 manual
vpn id 100
```

```
!
interface Loopback0
ip address 2.2.2.2 255.255.255.255
!
interface GigabitEthernet0/0/0
mtu 9180
no ip address
negotiation auto
service instance 100 ethernet
  encapsulation dot1q 100
  rewrite ingress tag pop 1 symmetric
  bridge-domain 100
!
!
interface GigabitEthernet0/0/2
ip address 30.30.30.1 255.255.255.0
negotiation auto
mpls ip
!
ip route 3.3.3.3 255.255.255.255 30.30.30.2
!
mpls ldp router-id Loopback0 force
!
```

```
neighbor 2.2.2.2 pw-class VPLS100
!
interface Loopback0
ip address 3.3.3.3 255.255.255.255
!
interface TenGigabitEthernet2/0/1
no switchport
ip address 30.30.30.2 255.255.255.0
mpls ip
!
interface TenGigabitEthernet2/0/2
switchport trunk allowed vlan 100
switchport mode trunk
!
interface Vlan100
no ip address
xconnect vfi 100
!
ip route 2.2.2.2 255.255.255.255 30.30.30.1
!
mpls ldp router-id Loopback0 force
!
```

**注意**：在运行于EFP（以太网流点）服务实例的ISR4K和ASR1000设备上，确保我们在要扩展子网/广播域的各个SI（服务实例）下配置“rewrite ingress tag pop 1 symmetric”命令，以便ISR4K/ASR1k能够接收标记的(802.1Q Vlan Tag)从CE端发送的数据包。

# 验证

迄今为止，Cat9500平台在VPLS下支持与“以太网”互联。因此，首先检查VC类型是以太网（默认）：

```
PE1#show mpls l2transport binding
  Destination Address: 3.3.3.3,VC ID: 100
    Local Label:  19
        Cbit: 0,    VC Type: Ethernet,    GroupID: n/a
        MTU: 9180,   Interface Desc: n/a
        VCCV: CC Type: RA [2], TTL [3]
              CV Type: LSPV [2]
    Remote Label: 17
        Cbit: 0,    VC Type: Ethernet,    GroupID: 0
        MTU: 9180,   Interface Desc: n/a
        VCCV: CC Type: RA [2], TTL [3]
              CV Type: LSPV [2]

PE2#show mpls l2transport binding
  Destination Address: 2.2.2.2,VC ID: 100
    Local Label:  17
        Cbit: 0,    VC Type: Ethernet,    GroupID: n/a
        MTU: 9180,   Interface Desc: n/a
        VCCV: CC Type: RA [2], TTL [3]
              CV Type: LSPV [2]
    Remote Label: 19
        Cbit: 0,    VC Type: Ethernet,    GroupID: 0
        MTU: 9180,   Interface Desc: n/a
        VCCV: CC Type: RA [2], TTL [3]
```

```
              CV Type: LSPV [2]
```

现在，其余命令将类似于验证L2VPN VC的方式。但是，了解Cat9500具有系统mtu非常重要，因此您无法修改面向LAN端的单个接口MTU值。因此，您需要在ISR4K平台的l2 vfi环境下明确配置“mtu <>”，以便根据Cat9500交换机上配置的系统mtu协商MTU值：

## PE2:

```
PE2#show system mtu
Global Ethernet MTU is 9180 bytes.
```

## PE1:

```
PE1#show mpls l2transport vc detail
Local interface: VFI 100 vfi up
  Interworking type is Ethernet
  Destination address: 3.3.3.3, VC ID: 100, VC status: up
    Output interface: Gi0/0/2, imposed label stack {17}
    Preferred path: not configured
    Default path: active
    Next hop: 30.30.30.2
  Create time: 00:02:10, last status change time: 00:02:10
    Last label FSM state change time: 00:02:10
  Signaling protocol: LDP, peer 3.3.3.3:0 up
    Targeted Hello: 2.2.2.2(LDP Id) -> 3.3.3.3, LDP is UP
    Graceful restart: not configured and not enabled
    Non stop routing: not configured and not enabled
    Status TLV support (local/remote)   : enabled/supported
      LDP route watch                   : enabled
      Label/status state machine        : established, LruRru
      Last local dataplane   status rcvd: No fault
      Last BFD dataplane     status rcvd: Not sent
      Last BFD peer monitor  status rcvd: No fault
      Last local AC  circuit status rcvd: No fault
      Last local AC  circuit status sent: No fault
      Last local PW i/f circ status rcvd: No fault
      Last local LDP TLV     status sent: No fault
      Last remote LDP TLV    status rcvd: No fault
      Last remote LDP ADJ    status rcvd: No fault
    MPLS VC labels: local 19, remote 17
    Group ID: local n/a, remote 0
    MTU: local 9180, remote 9180
    Remote interface description:
  Sequencing: receive disabled, send disabled
  Control Word: Off
  SSO Descriptor: 3.3.3.3/100, local label: 19
  Dataplane:
    SSM segment/switch IDs: 8387/4289 (used), PWID: 4
  VC statistics:
    transit packet totals: receive 0, send 0
    transit byte totals:   receive 0, send 0
    transit packet drops:  receive 0, seq error 0, send 0
```

## PE2:

```
PE2#show mpls l2transport vc detail
Local interface: VFI 100 vfi up
  Interworking type is Ethernet
  Destination address: 2.2.2.2, VC ID: 100, VC status: up
    Output interface: Te2/0/1, imposed label stack {19}
    Preferred path: not configured
```

```
    Default path: active
    Next hop: 30.30.30.1
  Create time: 01:02:03, last status change time: 00:03:09
    Last label FSM state change time: 00:03:09
  Signaling protocol: LDP, peer 2.2.2.2:0 up
    Targeted Hello: 3.3.3.3(LDP Id) -> 2.2.2.2, LDP is UP
    Graceful restart: not configured and not enabled
    Non stop routing: not configured and not enabled
    Status TLV support (local/remote)   : enabled/supported
      LDP route watch                   : enabled
      Label/status state machine        : established, LruRru
      Last local dataplane   status rcvd: No fault
      Last BFD dataplane     status rcvd: Not sent
      Last BFD peer monitor  status rcvd: No fault
      Last local AC  circuit status rcvd: No fault
      Last local AC  circuit status sent: No fault
      Last local PW i/f circ status rcvd: No fault
      Last local LDP TLV     status sent: No fault
      Last remote LDP TLV    status rcvd: No fault
      Last remote LDP ADJ    status rcvd: No fault
    MPLS VC labels: local 17, remote 19
    Group ID: local n/a, remote 0
    MTU: local 9180, remote 9180
    Remote interface description:
  Sequencing: receive disabled, send disabled
  Control Word: Off
  SSO Descriptor: 2.2.2.2/100, local label: 17
  Dataplane:
    SSM segment/switch IDs: 12297/8194 (used), PWID: 1
  VC statistics:
    transit packet totals: receive 0, send 0
    transit byte totals:   receive 0, send 0
    transit packet drops:  receive 0, seq error 0, send 0
```

现在，当我们尝试从CE1向CE2发起ping时：

```
CE1#ping 101.101.101.1 source 101.101.101.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 101.101.101.1, timeout is 2 seconds:
Packet sent with a source address of 101.101.101.2
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
```

然后，当我们检查VC统计信息以确保数据包通过VPLS传输时：

### PE1:

```
PE1#show mpls l2transport vc detail | sec statistics
  VC statistics:
    transit packet totals: receive 5, send 5
    transit byte totals:   receive 660, send 660
    transit packet drops:  receive 0, seq error 0, send 0
```

### PE2:

```
PE2#show mpls l2transport vc detail | sec statistics
  VC statistics:
    transit packet totals: receive 5, send 5
    transit byte totals:   receive 680, send 680
    transit packet drops:  receive 0, seq error 0, send 0
```

# 故障排除

本文档旨在强调在ISR/ASR路由器和用作PE节点的Cat9500交换机之间配置VPLS VC时的兼容性问题，因此目前没有故障排除步骤。