在 Cat9500 和 ISR4K 之間設定 VPLS

目錄

簡介

VPLS 是第 2 層擴充技術，大多數客戶將其搭配 ISP，並透過與第三方供應商借用/租賃的服務一起使用。VPLS的使用超出本配置指南的範圍。本基本配置指南旨在幫助客戶在現有ISR4K平台和新的Cat9500交換機之間配置L2VPN。

必要條件

您應該瞭解基本的L2VPN概念，並配置用於配置L2 VFI上下文的偽線模板

需求

ISR4K路由器（任何ISR4400/ISR4300）、Cat9500交換機和兩個裝置用作CE裝置

採用元件

ISR4451-X

C9500-40X-A

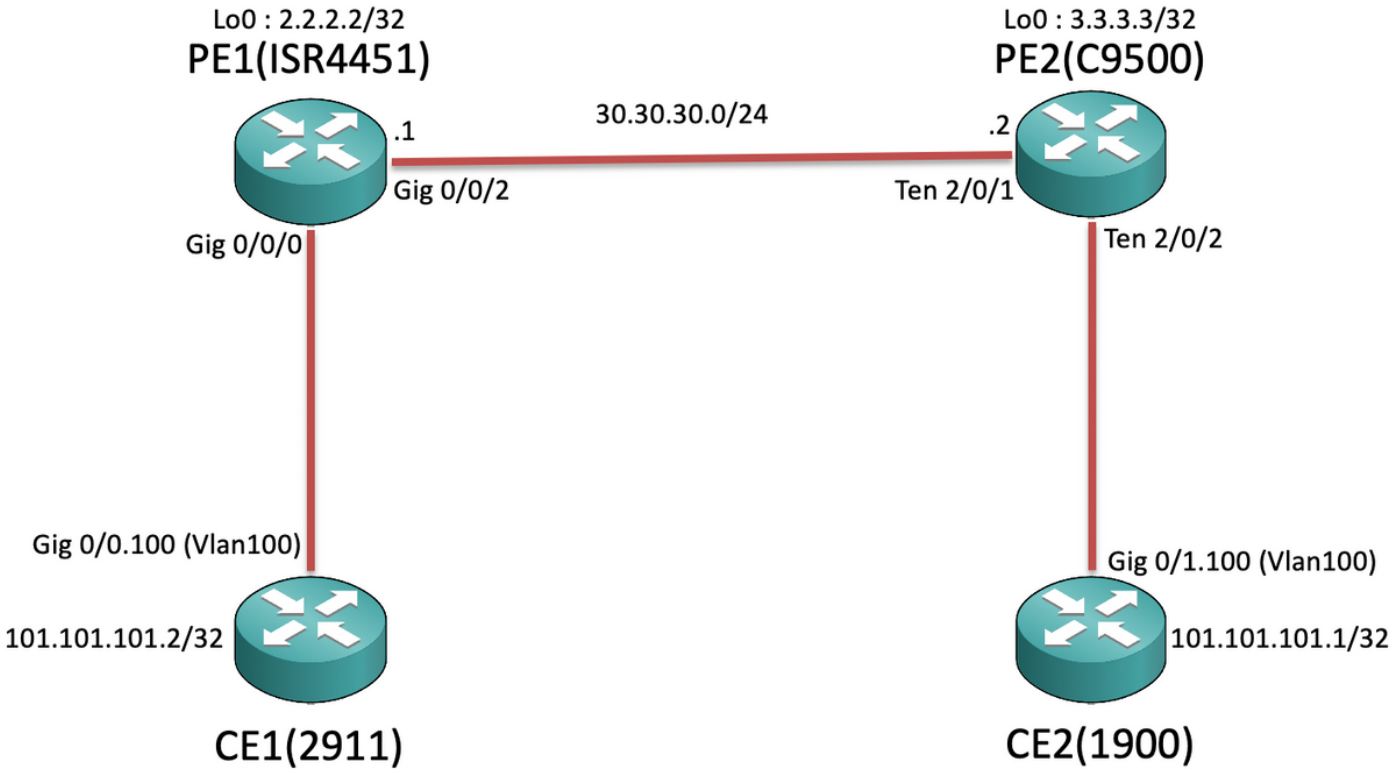
CISCO1921

CISCO2911

設定

該配置說明VPLS上下文的使用情況和支援的VC型別/詳細資訊

網路圖表



組態

在CE1和CE2上：

<#root>

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
!
```

<#root>

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：

<#root>

PE1#sh run

```
Building configuration...
```

<#root>

PE2#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
!
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
!
```

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

附註：在運行EFP（乙太網流點）服務例項的ISR4K和ASR1000裝置上，確保我們在要擴展子網/廣播域的各個SI（服務例項）下配置「rewrite ingress tag pop 1 symmetric」命令，以便ISR4K/ASR1k能夠接收從CE端傳送的已標籤(802.1Q Vlan Tag)資料包。

驗證

到目前為止，Cat9500平台在VPLS下支援與「乙太網」的互聯。因此首先檢查VC型別是否為ethernet（這是預設設定）：

<#root>

```
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]
```

<#root>

```
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]
```

現在，其餘命令與驗證L2VPN VC的方式類似。但是瞭解Cat9500具有系統mtu非常重要，因此您將無法修改面向LAN端的各個介面MTU值。因此，您需要在ISR4K平台上的l2 vfi上下文中明確配置「mtu **<>**」，以便根據Cat9500交換機上配置的系統mtu來協商MTU值：

PE2:

<#root>

```
PE2#show system mtu
```

Global Ethernet MTU is 9180 bytes.

PE1 :

<#root>

```
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:

<#root>

```
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
```

現在，當我們嘗試從CE1向CE2發出ping命令時：

```
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
```

然後檢查VC統計資訊以確保資料包通過VPLS:

PE1：

<#root>

```
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:

<#root>

```
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
```

疑難排解

本文檔旨在強調在ISR/ASR路由器與充當PE節點的Cat9500交換機之間配置VPLS VC時的相容性問題，因此目前沒有故障排除步驟。

關於此翻譯

思科已使用電腦和人工技術翻譯本文件，讓全世界的使用者能夠以自己的語言理解支援內容。請注意，即使是最佳機器翻譯，也不如專業譯者翻譯的內容準確。Cisco Systems, Inc. 對這些翻譯的準確度概不負責，並建議一律查看原始英文文件（提供連結）。