

使用外部路由器設定 InterVLAN 路由

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簡介

本文說明如何建立組態結構，以使用外部思科路由器來設定 Inter VLAN 路由。

必要條件

需求

思科建議您瞭解以下主題：

- [基本路由知識](#)

採用元件

本檔案中的資訊是根據以下軟體版本：

- Catalyst交換器Cisco IOS® 15.2E
- Cisco路由器Cisco IOS 17.3

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除（預設）的組態來啟動。如果您的網路運作中，請確保您瞭解任何指令可能造成的影響。

慣例

如需文件慣例的詳細資訊，請參閱[思科技術提示慣例](#)。

背景資訊

本檔案介紹使用外部Cisco路由器設定Inter VLAN路由的組態，並說明802.1Q中繼上的範例組態；每個命令的結果在執行時顯示。不同的Cisco系列路由器和任何Catalyst交換器都可用於本文所提出的方案以獲得相同的結果。

主幹連線是在兩個裝置之間，透過點對點連結，從多個VLAN攜帶流量的方式。最初，乙太網中繼的實施方式有兩種：

- InterSwitch Link(ISL)Cisco專有協定
- 電氣電子工程師協會(IEEE)802.1Q標準

建立主干連結並用於在Catalyst交換器和/或Cisco路由器之間的單一連結中傳輸來自兩個或多個VLAN (例如VLAN1和VLAN2) 的流量。

Cisco路由器用於在VLAN-X和VLAN-Y之間執行VLAN間路由。當Catalyst系列交換器僅是第2層(L2)，且無法在VLAN之間路由或通訊時，此組態會很有用。

對於802.1Q中繼，一個VLAN未標籤。此VLAN稱為本地VLAN。當連線埠處於802.1Q主幹模式時，原生VLAN用於未標籤的流量。配置802.1Q中繼時，請記住，在中繼鏈路的兩端，本地VLAN的配置必須相同。在路由器和交換機之間配置了802.1Q中繼時，不匹配本徵VLAN是一個常見的錯誤。

在此範例組態中，預設情況下，Cisco路由器和Catalyst交換器上的原生VLAN都是VLAN1。根據您的網路需求，您可以使用除預設VLAN VLAN1之外的本徵VLAN。有關如何更改這些裝置上的本徵VLAN的本文檔的[配置](#)部分中提到了命令。

本文檔中提供的示例配置可用於支援802.1Q VLAN中繼的不同思科路由器系列。

 附註：支援的最低版本不一定就是推薦的版本。若要判斷您思科產品的最佳維護版本，請在Bug工具包中搜尋按產品元件列出的錯誤。

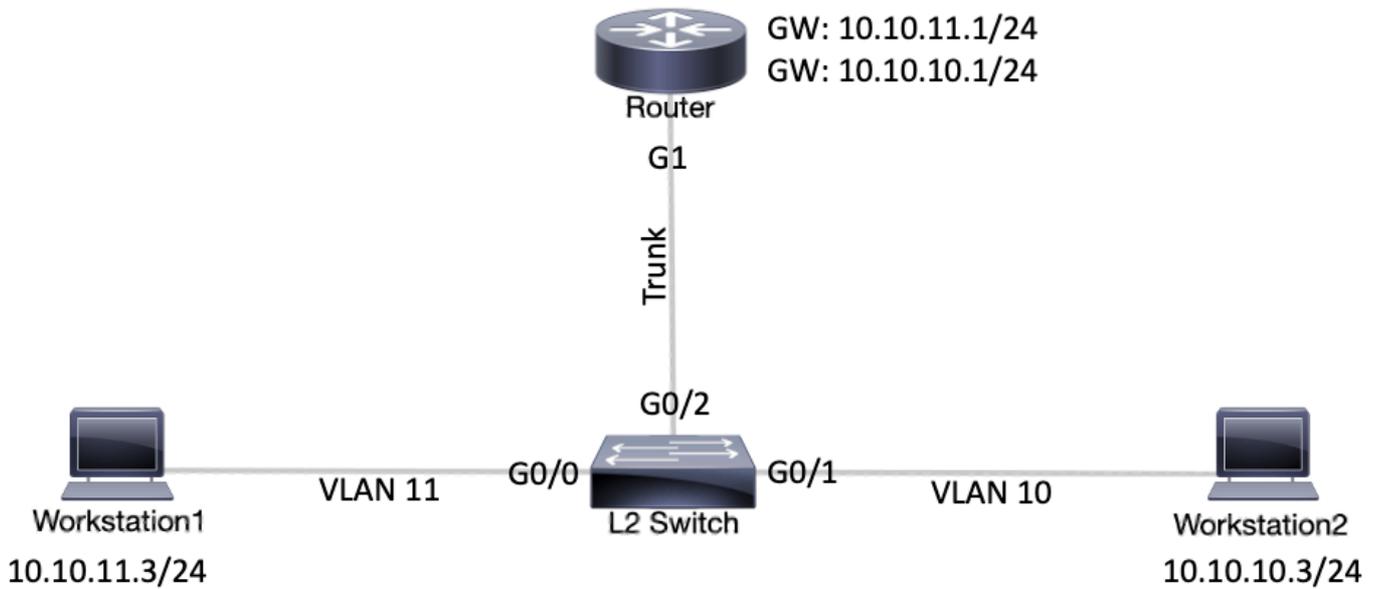
 附註：只有註冊的思科使用者才能訪問內部文檔、工具和資訊。

設定

本節提供用於設定本文件中所述功能的資訊。

網路圖表

本檔案會使用下圖中所示的網路設定。



網路圖表

組態

Catalyst L2交換器

```
<#root>
```

```
!-- (Optional) Set the IP address and default gateway for VLAN1 for management purposes.
```

```
L2_Switch#
```

```
configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
L2_Switch(config)#
```

```
interface vlan 1
```

```
L2_Switch(config-if)#
```

```
ip address 10.10.0.2 255.255.255.0
```

```
L2_Switch(config-if)#no ip directed-broadcast
```

```
L2_Switch(config-if)#no ip route-cache
```

```
L2_Switch(config-if)#exit
```

```
L2_Switch(config-if)#
```

```
ip default-gateway 10.10.0.1
```

```
!-- (Optional) Set the VTP Mode. In our example, we have set the mode to be transparent.
```

```
!-- Depending on your network, set the VTP Mode accordingly.
```

```
L2_Switch(config)#
```

```
vtp mode transparent
```

```
Setting device to VTP Transparent mode for VLANS.
```

```
L2_Switch(config)#
```

```
!-- Adding VLAN10 and VLAN11.
L2_Switch(config)#
vlan 10-11
L2_Switch(config-vlan)#exit
L2_Switch(config)#

!-- Enable trunking on the interface GigabitEthernet 0/2.
!-- Enter the trunking encapsulation as dot1q.
L2_Switch(config)#
interface gigabitEthernet 0/2
L2_Switch(config-if)#
switchport trunk encapsulation dot1q
L2_Switch(config-if)#
switchport mode trunk

!-- In case of dot1q, you need to make sure that the native VLAN matches across the link.
!-- On Catalyst Switches, by default, the native VLAN is 1.
!-- It is very important that you change the native VLAN on the router accordingly.

!-- The following set of commands can place on the interfaces connecting to the workstations.
L2_Switch(config)#
interface gigabitEthernet 0/0
L2_Switch(config-if)#
switchport mode access
L2_Switch(config-if)#
switchport access vlan 11
L2_Switch(config-if)#exit
L2_Switch(config)#
interface gigabitEthernet 0/1
L2_Switch(config-if)#
switchport mode access
L2_Switch(config-if)#
switchport access vlan 10
L2_Switch(config-if)#exit

!-- Remember to save the configuration.
L2_Switch#
write memory
```

Building configuration...

路由器

 附註：下一個畫面會顯示在Cisco路由器上輸入的命令。命令之間的註釋以斜體形式新增，以解釋某些命令和步驟。

```
<#root>
```

```
Router#
```

```
configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
!-- Select GigabitEthernet 1 for the trunk configuration.
```

```
!-- No Layer 3 (L3) configuration is done here.
```

```
Router(config)#
```

```
interface GigabitEthernet 1
```

```
Router(config-if)#
```

```
no shut
```

```
Router(config-if)#
```

```
exit
```

```
!-- Enable dot1q on the sub-interface one for each VLAN.
```

```
!-- Configure L3 information on the sub-interface for each gateway.
```

```
Router(config)#
```

```
interface gigabitEthernet 1.10
```

```
Router(config-subif)#
```

```
encapsulation dot1Q 10
```

```
Router(config-subif)#
```

```
ip address 10.10.10.1 255.255.255.0
```

```
Router(config-subif)#
```

```
exit
```

```
Router(config)#
```

```
interface gigabitEthernet 1.11
```

```
Router(config-subif)#
```

```
encapsulation dot1Q 11
Router(config-subif)#
ip address 10.10.11.1 255.255.255.0
Router(config-subif)#
exit

!-- (Optional) For the management VLAN 1 make sure that the native VLAN matches across the link.
!-- On the switch, by default, the native VLAN is 1.
!-- On the router, configure VLAN1 as the native VLAN.

Router(config)#
interface gigabitEthernet 1.1
Router(config-subif)#
encapsulation dot1Q 1 native

Router(config-subif)#
ip address 10.10.0.1 255.255.255.0
Router(config-subif)#
end

!-- Remember to save the configuration.

Router#write memory
Building configuration...
[OK]
Router#
```

 附註：要使此設定正常工作並在工作站1和工作站2之間成功ping，您需要確保工作站上的預設網關設定正確。對於workstation1，預設網關必須為10.10.11.1；對於workstation2，預設網關必須為10.10.10.1。

有用的命令

此部分幫助您確認您的配置是否按預期工作。

在Catalyst交換器上，您可以使用以下命令來協助驗證：

- show interface {FastEthernet | GigabitEthernet} <module/port> switchport
- 顯示 VLAN
- show vtp status

在思科路由器上，使用以下命令：

- show ip route
- 顯示介面

命令輸出示例

Catalyst交換器

下一個命令用於檢查埠的管理狀態和運行狀態。它還可以用來確保本徵VLAN與TRUNK兩端匹配。當連線埠處於802.1Q主幹模式時，原生VLAN用於未標籤的流量。

對於802.1Q中繼，輸出命令顯示：

```
<#root>
```

```
L2_Switch#
```

```
show interfaces gigabitEthernet 0/2 switchport
```

```
Name: Gi0/2
```

```
Switchport: Enabled
```

```
Administrative Mode: trunk
```

```
Operational Mode: trunk
```

```
Administrative Trunking Encapsulation: dot1q
```

```
Operational Trunking Encapsulation: dot1q
```

```
Negotiation of Trunking: On
```

```
Access Mode VLAN: 1 (default)
```

```
Trunking Native Mode VLAN: 1 (default)
```

```
Administrative Native VLAN tagging: enabled
```

```
Voice VLAN: none
```

```
Administrative private-vlan host-association: none
```

```
Administrative private-vlan mapping: none
```

```
Administrative private-vlan trunk native VLAN: none
```

```
Administrative private-vlan trunk Native VLAN tagging: enabled
```

```
Administrative private-vlan trunk encapsulation: dot1q
```

```
Administrative private-vlan trunk normal VLANs: none
```

```
Administrative private-vlan trunk associations: none
```

```
Administrative private-vlan trunk mappings: none
```

```
Operational private-vlan: none
```

```
Trunking VLANs Enabled: ALL
```

```
Pruning VLANs Enabled: 2-1001
```

```
Capture Mode Disabled
```

```
Capture VLANs Allowed: ALL
```

```
Protected: false
```

```
Appliance trust: none
```

下一個命令用於驗證介面 (埠) 是否屬於正確的VLAN。在本例中，介面Gi0/1屬於VLAN10,Gi0/0屬於VLAN11。其餘是VLAN1的成員。

```
<#root>
```

```
L2_Switch#
```

```
show vlan brief
```

VLAN Name	Status	Ports
1 default	active	Gi0/3
10 VLAN0010	active	Gi0/1
11 VLAN0011	active	Gi0/0
1002 fddi-default	act/unsup	
1003 token-ring-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trnet-default	act/unsup	

```
L2_Switch#
```

下一個命令用於檢查交換機上的VLAN中繼協定(VTP)配置。在此範例中，使用透明模式。正確的VTP模式取決於網路的拓撲。

```
<#root>
```

```
L2_Switch#
```

```
show vtp status
```

```
VTP Version capable      : 1 to 3
VTP version running      : 1
VTP Domain Name          :
VTP Pruning Mode         : Disabled
VTP Traps Generation     : Disabled
Device ID                 : 5254.0000.8000
Configuration last modified by 0.0.0.0 at 3-1-24 15:21:18
```

```
Feature VLAN:
```

```
-----
```

```
VTP Operating Mode       : Transparent
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 7
Configuration Revision     : 0
MD5 digest                 : 0x9F 0x7D 0x8D 0x10 0xB1 0x22 0x2F 0xE7
                           0x29 0x77 0x42 0xA7 0x95 0xE7 0x68 0x1C
```

思科路由器

下一個命令將告訴第3層路由有關路由器上配置的子介面的資訊。

```
<#root>
```

```
Router#
```

```
show ip route
```

```
Codes: L - local, C - connected, S - static, 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, m - OMP
n - NAT, Ni - NAT inside, No - NAT outside, Nd - NAT DIA
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
H - NHRP, G - NHRP registered, g - NHRP registration summary
o - ODR, P - periodic downloaded static route, l - LISP
a - application route
+ - replicated route, % - next hop override, p - overrides from PfR
& - replicated local route overrides by connected
```

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

```
10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
C    10.10.0.0/24 is directly connected, GigabitEthernet1.1
L    10.10.0.1/32 is directly connected, GigabitEthernet1.1

C    10.10.10.0/24 is directly connected, GigabitEthernet1.10
L    10.10.10.1/32 is directly connected, GigabitEthernet1.10
C    10.10.11.0/24 is directly connected, GigabitEthernet1.11
L    10.10.11.1/32 is directly connected, GigabitEthernet1.11
```

下一個命令用於檢查介面的管理狀態和運行狀態。對於路由器介面狀態，輸出命令顯示：

```
<#root>
```

```
Router#
```

```
show interfaces
```

```
GigabitEthernet1 is up, line protocol is up
```

```
Hardware is CSR vNIC, address is 5254.0000.004d (bia 5254.0000.004d)
MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
Full Duplex, 1000Mbps, link type is auto, media type is Virtual
output flow-control is unsupported, input flow-control is unsupported
ARP type: ARPA, ARP Timeout 04:00:00
Last input 00:00:00, output 00:14:10, output hang never
Last clearing of "show interface" counters never
Input queue: 0/375/0/0 (size/max/drops/flushes); Total output drops: 0
```

```
Queueing strategy: fifo
Output queue: 0/40 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  5338 packets input, 361563 bytes, 0 no buffer
  Received 0 broadcasts (0 IP multicasts)
  0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
  0 watchdog, 0 multicast, 0 pause input
  13 packets output, 1248 bytes, 0 underruns
  Output 0 broadcasts (0 IP multicasts)
  0 output errors, 0 collisions, 2 interface resets
  57 unknown protocol drops
  0 babbles, 0 late collision, 0 deferred
  1 lost carrier, 0 no carrier, 0 pause output
  0 output buffer failures, 0 output buffers swapped out
GigabitEthernet1.1 is up, line protocol is up
  Hardware is CSR vNIC, address is 5254.0000.004d (bia 5254.0000.004d)
  Internet address is 10.10.0.1/24
  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation 802.1Q Virtual LAN, Vlan ID 1.
  ARP type: ARPA, ARP Timeout 04:00:00
  Keepalive set (10 sec)
  Last clearing of "show interface" counters never

GigabitEthernet1.10 is up, line protocol is up
  Hardware is CSR vNIC, address is 5254.0000.004d (bia 5254.0000.004d)
  Internet address is 10.10.10.1/24

  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation 802.1Q Virtual LAN, Vlan ID 10.
  ARP type: ARPA, ARP Timeout 04:00:00
  Keepalive set (10 sec)
  Last clearing of "show interface" counters never

GigabitEthernet1.11 is up, line protocol is up
  Hardware is CSR vNIC, address is 5254.0000.004d (bia 5254.0000.004d)
  Internet address is 10.10.11.1/24

  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation 802.1Q Virtual LAN, Vlan ID 11.
  ARP type: ARPA, ARP Timeout 04:00:00
  Keepalive set (10 sec)
  Last clearing of "show interface" counters never
GigabitEthernet2 is administratively down, line protocol is down
  Hardware is CSR vNIC, address is 5254.0000.004e (bia 5254.0000.004e)
  MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full Duplex, 1000Mbps, link type is auto, media type is Virtual
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/375/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
```

相關資訊

- [在Catalyst 3550/3750和Catalyst交換機之間配置802.1q中繼](#)
- [使用 Catalyst 交換器設定 InterVLAN 路由](#)
- [技術支援與下載 — Cisco Systems](#)

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）。