

# 採用VRF的GRE通道組態範例

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## 簡介

本檔案將提供在通用路由封裝(GRE)通道介面下的VPN路由和轉送(VRF)例項的範例組態。

## 必要條件

### 需求

嘗試此組態之前，請確保符合以下要求：

本文檔的讀者應瞭解以下主題：

- [配置多協定標籤交換](#)
- [MPLS虛擬私人網路](#)
- [通用路由封裝通道IP來源和目的地VRF成員資格](#)

### 採用元件

本檔案中的資訊是根據3725系列路由器上的Cisco IOS®軟體版本12.3(4)T1。

使用[Cisco Feature Navigator II](#)(僅供註冊客戶使用)並搜尋GRE通道IP來源和目的地VRF成員資格功能，以獲得所需的其他軟體和硬體要求。

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。如果您的網路正在作用，請確保您已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](#)。

## 設定

本節提供用於設定本文中所述功能的資訊。

配置按以下方式設定：

- R1-CE和R2-CE位於VRF BLUE中。
- R1-CE也位於VRF GREEN中（通過使用通往R3-PE的GRE隧道）。

R1-CE使用靜態主機路由到達R3-PE（隧道目標），這可確保GRE隧道不會發生遞迴路由（通過隧道學習隧道目標地址）。

VRF BLUE和VRF GREEN由兩個不同的公司擁有，它們之間不會發生路由洩漏。此外，R1-CE和R2-CE之間的介面上的訪問控制清單(ACL)只能用於允許它們之間的GRE流量。

**注意：**要查詢有關本文檔中使用的命令的其他資訊，請使用[命令查詢工具](#)([僅限註冊客戶](#))。

## 網路圖表

本檔案會使用以下網路設定：

圖1 — 物理拓撲

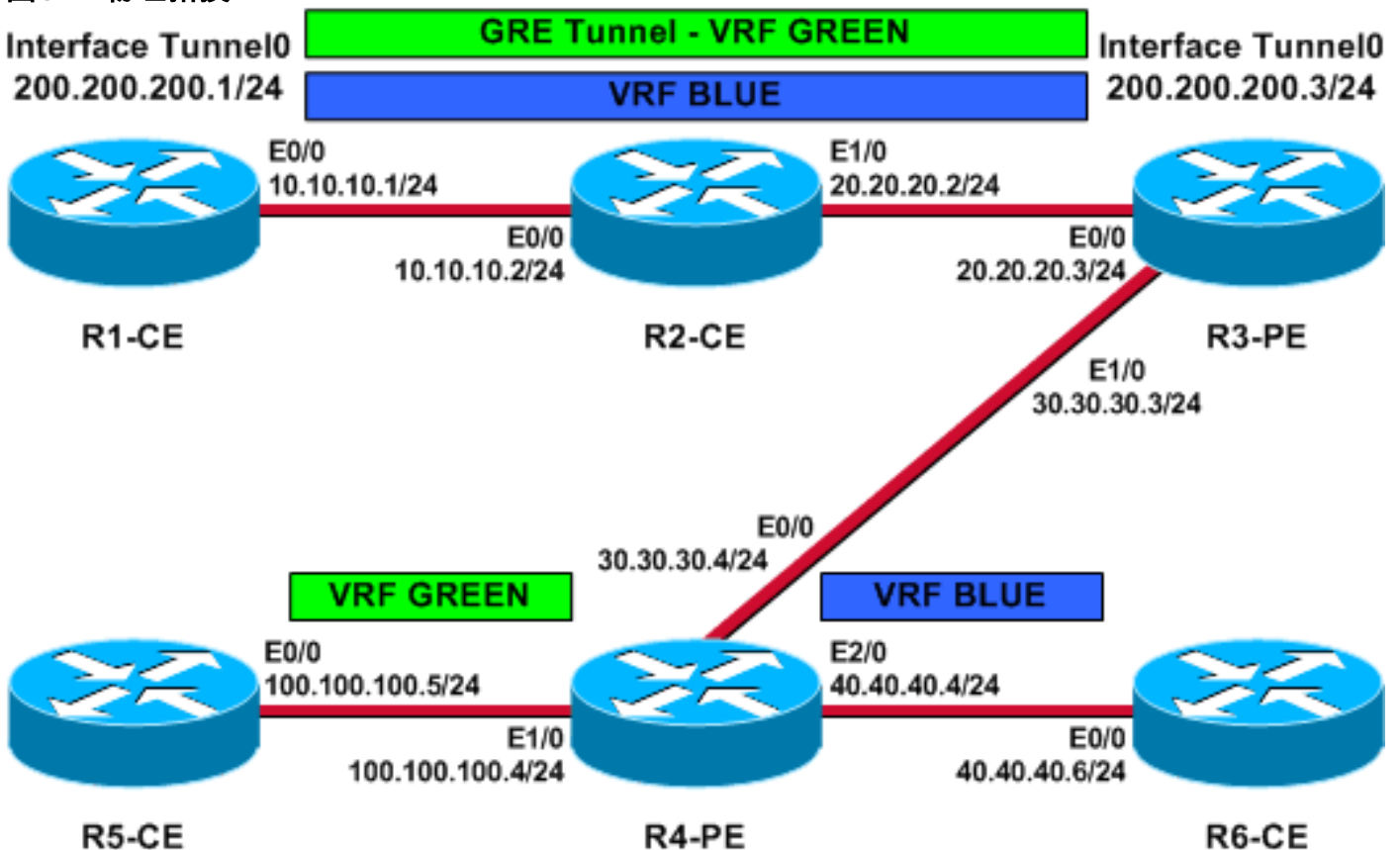
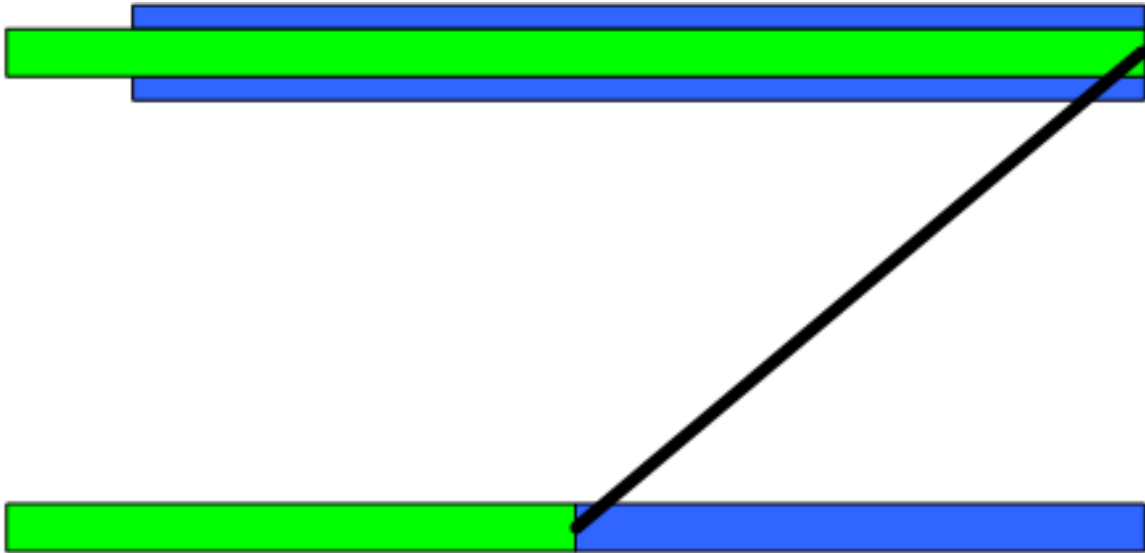


圖2 — 邏輯VRF拓撲



## 組態

本檔案會使用以下設定：

- [R3-PE](#)
- [R4-PE](#)
- [R1-CE](#)
- [R2-CE](#)
- [R5-CE](#)
- [R6-CE](#)

### R3-PE ( 隧道端點 )

```
R3-PE# show running-config

Building configuration...
.
!
no ip domain lookup
!
ip vrf blue
 rd 1:1
 route-target export 311:311
 route-target import 411:411
!
ip vrf green
 rd 2:2
 route-target export 322:322
 route-target import 422:422
!
ip cef
!
interface Tunnel0
 ip vrf forwarding green
 ip address 200.200.200.3 255.255.255.0
 tunnel source Ethernet0/0
 tunnel destination 10.10.10.1
 tunnel vrf blue
!--- Tunnel 0 is part of VRF GREEN; but it uses the
 tunnel !--- destination and source addresses from the
 routing !--- table of VRF BLUE, because of this tunnel
```

```
vrf blue !--- command.

!
interface Ethernet0/0
 ip vrf forwarding blue
 ip address 20.20.20.3 255.255.255.0
 !--- Connection to the VRF BLUE network and the VRF GREEN !--- network using the GRE tunnel. ! interface
Ethernet1/0 ip address 30.30.30.3 255.255.255.0 tag-
switching ip ! router bgp 1 no bgp default ipv4-unicast
bgp log-neighbor-changes neighbor 30.30.30.4 remote-as 1
! address-family vpnv4 neighbor 30.30.30.4 activate
neighbor 30.30.30.4 send-community extended exit-
address-family ! address-family ipv4 vrf green
redistribute connected no auto-summary no
synchronization exit-address-family ! address-family
ipv4 vrf blue redistribute connected no auto-summary no
synchronization exit-address-family ! ip classless ip
route vrf blue 10.10.10.1 255.255.255.255 20.20.20.2 !--
- Static Host route to ensure that recursive routing !--
- does not occur. no ip http server ! . end
```

## R4-PE

```
R4-PE# show running-config

Building configuration...

.
.
.
no ip domain lookup
!
ip vrf blue
 rd 1:1
 route-target export 411:411
 route-target import 311:311
!
ip vrf green
 rd 2:2
 route-target export 422:422
 route-target import 322:322
!
ip cef
!
interface Ethernet0/0
 ip address 30.30.30.4 255.255.255.0
 tag-switching ip
!
interface Ethernet1/0
 ip vrf forwarding green
 ip address 100.100.100.4 255.255.255.0
!
interface Ethernet2/0
 ip vrf forwarding blue
 ip address 40.40.40.4 255.255.255.0
!
router bgp 1
 no bgp default ipv4-unicast
 bgp log-neighbor-changes
 neighbor 30.30.30.3 remote-as 1
!
 address-family vpnv4
 neighbor 30.30.30.3 activate
```

```
neighbor 30.30.30.3 send-community extended
exit-address-family
!
address-family ipv4 vrf green
redistribute connected
no auto-summary
no synchronization
exit-address-family
!
address-family ipv4 vrf blue
redistribute connected
no auto-summary
no synchronization
exit-address-family
!
ip classless
.
.
end
```

## R1-CE ( 隧道端點 )

```
R1-CE# show running-config
Building configuration...
.
.
no ip domain lookup

!
ip cef
!
interface Tunnel0
 ip address 200.200.200.1 255.255.255.0
 tunnel source Ethernet0/0
 tunnel destination 20.20.20.3
!--- Both the tunnel source and destination address are
in !--- the VRF BLUE, to provide transport for the VRF
GREEN !--- network. ! interface Ethernet0/0 description
Connection to R2-CE router ip address 10.10.10.1
255.255.255.0 ip access-group 100 in ip access-group 100
out !--- Access-group to allow only GRE packets through
the !--- R2-CE network. However, R1-CE networks data is
in the !--- GRE packet. ! ! ip classless ip route
0.0.0.0 0.0.0.0 Tunnel0 ip route 20.20.20.3
255.255.255.255 10.10.10.2 !--- Static Host route to
ensure that recursive routing !--- does not occur. no ip
http server ! access-list 100 permit gre host 10.10.10.1
host 20.20.20.3 access-list 100 permit gre host
20.20.20.3 host 10.10.10.1 !--- Permits only GRE packets
between the endpoints. ! . . end
```

## R2-CE

```
R2-CE# show running-config
Building configuration...
.
.
no ip domain lookup

!
ip cef
!
```

```
interface Ethernet0/0
  description Connection to R1-CE router
  ip address 10.10.10.2 255.255.255.0
  ip access-group 100 in
  ip access-group 100 out
!
interface Ethernet1/0
  ip address 20.20.20.2 255.255.255.0
!
ip classless
ip route 0.0.0.0 0.0.0.0 20.20.20.3
no ip http server
!
access-list 100 permit gre host 10.10.10.1 host
20.20.20.3
access-list 100 permit gre host 20.20.20.3 host
10.10.10.1
!--- Permits only GRE packets between the endpoints. . !
end
```

## R5-CE

```
R5-CE# show running-config

Building configuration...
.
.
no ip domain lookup

!
interface Ethernet0/0
  ip address 100.100.100.5 255.255.255.0
!
!
ip classless
ip route 0.0.0.0 0.0.0.0 100.100.100.4
no ip http server
!
.
end
```

## R6-CE

```
R6-CE# show running-config

Building configuration...
.
.
no ip domain lookup

!
interface Ethernet0/0
  ip address 40.40.40.6 255.255.255.0
!
!
ip classless
ip route 0.0.0.0 0.0.0.0 40.40.40.4
no ip http server
!
.
end
```

## 驗證

本節提供的資訊可用於確認您的組態是否正常運作。

[輸出直譯器工具](#) (僅供註冊客戶使用) 支援某些 **show** 命令，此工具可讓您檢視 **show** 命令輸出的分析。

- [show ip route](#) , [show ip route vrf](#) — 在通道端點上發出這些命令，以確保通道目的地可連線。這可確保通道介面將啟動。
- [ping](#) — 從CE的另一端發出此命令，以確保可以從CE訪問隧道。
- [show ip bgp vpnv4 all labels](#) — 在PE裝置上發出此命令，以檢視通過邊界網關協定(BGP)分配給其他PE裝置的VPN標籤。

```
R3-PE# show ip route vrf blue 10.10.10.1
```

```
Routing entry for 10.10.10.1/32
Known via "static", distance 1, metric 0
Routing Descriptor Blocks:
* 20.20.20.2
Route metric is 0, traffic share count is 1
```

```
R3-PE# show ip route vrf green
```

```
Routing Table: green
Codes: 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
       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, P - periodic downloaded static route
```

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

```
C    200.200.200.0/24 is directly connected, Tunnel0
     100.0.0.0/24 is subnetted, 1 subnets
B     100.100.100.0 [200/0] via 30.30.30.4, 01:11:45
```

```
R3-PE# show interfaces tunnel 0
```

```
Tunnel0 is up, line protocol is up
Hardware is Tunnel
Internet address is 200.200.200.3/24
MTU 1514 bytes, BW 9 Kbit, DLY 500000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation TUNNEL, loopback not set
Keepalive not set
Tunnel source 20.20.20.3 (Ethernet0/0), destination 10.10.10.1
Tunnel protocol/transport GRE/IP, key disabled, sequencing disabled
Tunnel TTL 255
Checksumming of packets disabled, fast tunneling enabled
Last input 00:44:05, output 00:26:16, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
Output queue: 0/0 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
105 packets input, 11964 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
```

0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort  
83 packets output, 10292 bytes, 0 underruns  
0 output errors, 0 collisions, 0 interface resets  
0 output buffer failures, 0 output buffers swapped out

R3-PE# **show ip bgp vpnv4 all labels**

Network	Next Hop	In label/Out label
Route Distinguisher: 1:1 (blue)		
<b>20.20.20.0/24</b>	<b>0.0.0.0</b>	<b>16/aggregate(blue)</b>
Route Distinguisher: 2:2 (green)		
100.100.100.0/24	30.30.30.4	nolabel/16
<b>200.200.200.0</b>	<b>0.0.0.0</b>	<b>17/aggregate(green)</b>

R4-PE# **show ip route vrf blue**

Routing Table: blue

Codes: 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  
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, P - periodic downloaded static route

Gateway of last resort is not set

20.0.0.0/24 is subnetted, 1 subnets  
B 20.20.20.0 [200/0] via 30.30.30.3, 01:14:05

R4-PE# **show ip route vrf green**

Routing Table: green

Codes: 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  
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, P - periodic downloaded static route

Gateway of last resort is not set

B 200.200.200.0/24 [200/0] via 30.30.30.3, 01:14:10  
100.0.0.0/24 is subnetted, 1 subnets  
C 100.100.100.0 is directly connected, Ethernet1/0

R1-CE# **show ip route 20.20.20.3**

Routing entry for 20.20.20.3/32  
Known via "static", distance 1, metric 0  
Routing Descriptor Blocks:  
\* 10.10.10.2  
Route metric is 0, traffic share count is 1

R1-CE# **show interfaces tunnel 0**

**Tunnel0 is up, line protocol is up**  
Hardware is Tunnel  
Internet address is 200.200.200.1/24  
MTU 1514 bytes, BW 9 Kbit, DLY 500000 usec,  
reliability 255/255, txload 1/255, rxload 1/255  
Encapsulation TUNNEL, loopback not set  
Keepalive not set



```
Tunnel source 10.10.10.1 (Ethernet0/0), destination 20.20.20.3
Tunnel protocol/transport GRE/IP, key disabled, sequencing disabled
Tunnel TTL 255
Checksumming of packets disabled, fast tunneling enabled
Last input 00:26:57, output 00:26:57, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
Output queue: 0/0 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
83 packets input, 10292 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
106 packets output, 12088 bytes, 0 underruns
0 output errors, 0 collisions, 0 interface resets
0 output buffer failures, 0 output buffers swapped out
```

R5-CE# **ping 200.200.200.1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 200.200.200.1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 40/54/80 ms

R5-CE# **ping 200.200.200.3**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 200.200.200.3, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 20/36/72 ms

## [疑難排解](#)

目前尚無適用於此組態的具體疑難排解資訊。

## [注意事項](#)

這些已知警告針對此功能的配置進行了標識。您可以使用[Bug工具包](#)(僅供[註冊](#)客戶使用)搜尋錯誤。

- [CSCea81266](#)(僅限[註冊](#)客戶) — 已解決(R)GRE:clear ip route \*後流量停止流動。
- [CSCdx74855](#)(僅限[註冊](#)客戶) — 已解決(R)無法ping本地GRE通道介面的IP地址。
- [CSCdx57718](#)(僅限[註冊](#)客戶) — 在傳出介面上停用Cisco Express Forwarding(CEF)時，已解決(R)GRE通道中的IP封包遺失。

## [相關資訊](#)

- [MPLS技術支援頁面](#)
- [技術支援與文件 - Cisco Systems](#)