Túnel GRE com exemplo de configuração de VRF

Contents

Introduction

Este documento fornece uma configuração de exemplo para uma instância de roteamento e encaminhamento da VPN (VRF) em uma interface de túnel de encapsulamento de roteamento genérico (GRE).

Prerequisites

Requirements

Antes de você tentar esta configuração, verifique se estes requisitos são atendidos:

Os leitores deste documento devem estar cientes destes tópicos:

- [Configurando a switching de rótulo multiprotocolo](#)
- [Virtual Private Networks de MPLS](#)
- [Encapsulamento de roteamento genérico Encapsulamento IP Origem e Destino Membros de VRF](#)

Componentes Utilizados

As informações neste documento são baseadas no Cisco IOS® Software Release 12.3(4)T1 em 3725 Series Routers.

Use o [Cisco Feature Navigator II](#) (somente clientes [registrados](#)) e procure o **recurso de participação VRF de origem e destino do túnel GRE** para obter os requisitos adicionais de software e hardware necessários.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

For more information on document conventions, refer to the [Cisco Technical Tips Conventions](#).

Configurar

Nesta seção, você encontrará informações para configurar os recursos descritos neste documento.

A configuração é configurada desta maneira:

- R1-CE e R2-CE estão localizados no VRF BLUE.
- O R1-CE também está localizado no VRF GREEN usando um túnel GRE para R3-PE.

O R1-CE usa uma rota de host estática para chegar ao R3-PE (destino do túnel), o que garante que o roteamento recursivo não ocorra para o túnel GRE (aprendendo o endereço de destino do túnel através do túnel).

O VRF BLUE e o VRF GREEN pertencem a duas empresas diferentes, e nenhum vazamento de rota ocorre entre elas. Além disso, a lista de controle de acesso (ACL) na interface entre R1-CE e R2-CE pode ser usada somente para permitir o tráfego GRE entre eles.

Observação: para encontrar informações adicionais sobre os comandos usados neste documento, use a [ferramenta Command Lookup Tool](#) (somente clientes [registrados](#)).

Diagrama de Rede

Este documento utiliza a seguinte configuração de rede:
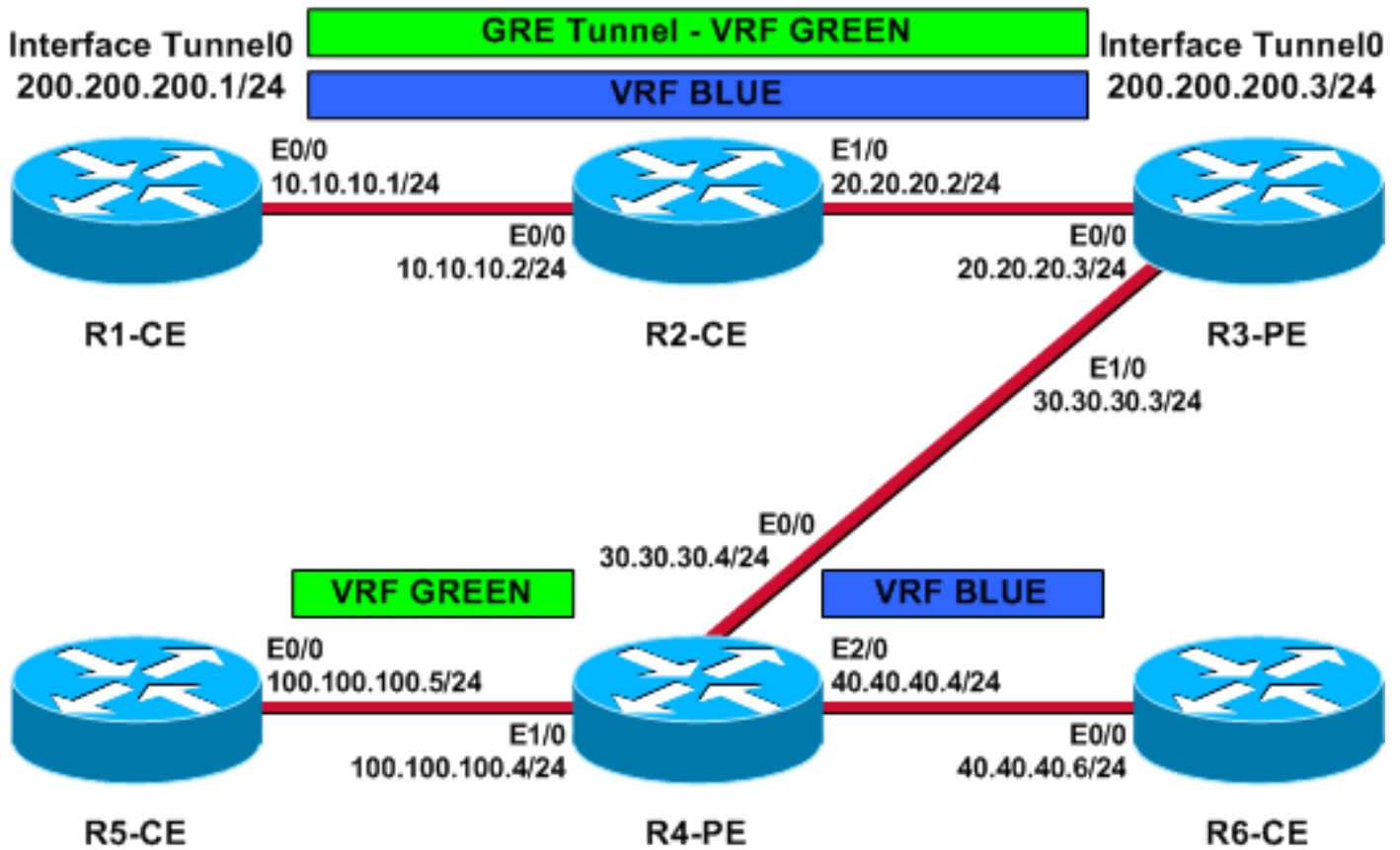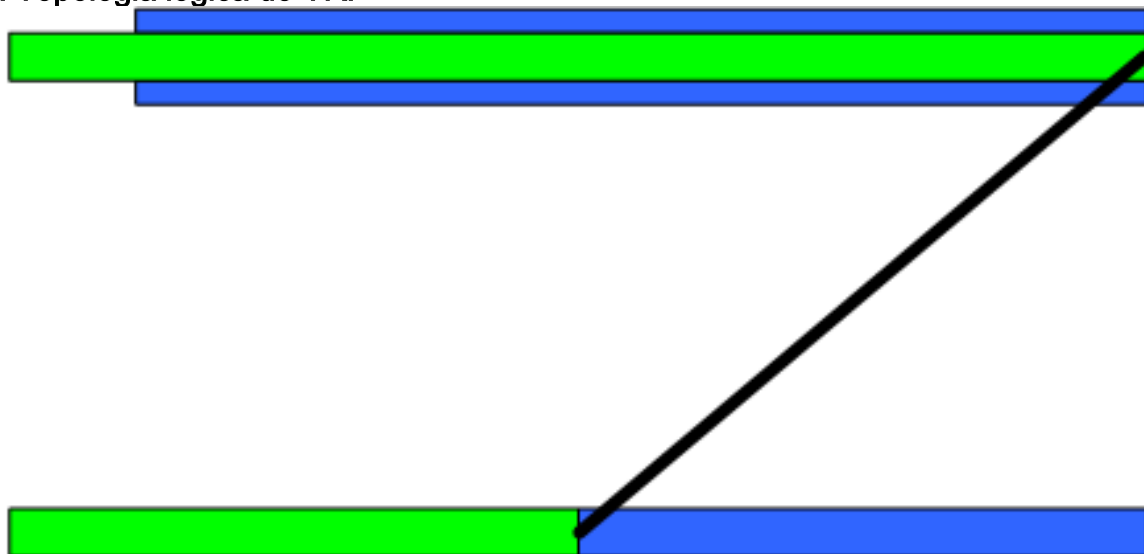
Figura 1 - Topologia física

Figura 2: Topologia lógica do VRF

Configurações

Este documento utiliza as seguintes configurações:

- R3-PE
- R4-PE
- R1-CE
- R2-CE
- R5-CE
- R6-CE

R3-PE (Endpoint de túnel)

```
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 (Endpoint de túnel)

```
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
```

Verificar

Esta seção fornece informações que você pode usar para confirmar se sua configuração está funcionando adequadamente.

A Output Interpreter Tool (somente clientes registrados) oferece suporte a determinados comandos show, o que permite exibir uma análise da saída do comando show.

- show ip route , show ip route vrf —Emita esses comandos nos pontos finais do túnel para garantir que o destino do túnel esteja acessível. Isso garante que a interface do túnel aparecerá.
- ping —Emita este comando da outra extremidade do CE para garantir que os túneis estejam acessíveis do CE.
- show ip bgp vpnv4 all label —Emita este comando nos dispositivos PE para exibir os rótulos de VPN distribuídos para cada prefixo via Border Gateway Protocol (BGP) para outros dispositivos PE.

```
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)
   20.20.20.0/24    0.0.0.0         16/aggregate(blue)
Route Distinguisher: 2:2 (green)
   100.100.100.0/24 30.30.30.4      nolabel/16
   200.200.200.0    0.0.0.0         17/aggregate(green)


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
```

Troubleshoot

Atualmente, não existem informações disponíveis específicas sobre Troubleshooting para esta configuração.

Caveats

Esses avisos conhecidos são identificados para a configuração desse recurso. Você pode usar o Bug Toolkit (somente clientes registrados) para procurar bugs.

- CSCea81266 (apenas clientes registrados) — *Resolvido (R)* GRE: O tráfego pára de fluir após limpar a rota de IP *.
- CSCdx74855 (somente clientes registrados) — *Resolvido (R)* Não é possível fazer ping no endereço IP da interface de túnel GRE local.
- CSCdx57718 (somente clientes registrados) — Perda de pacotes IP resolvida (R) no túnel GRE quando o Cisco Express Forwarding (CEF) é desabilitado na interface de saída.

Informações Relacionadas

- Página de suporte à tecnologia MPLS
- Suporte Técnico e Documentação - Cisco Systems