

# Exemplo de Configuração do Método Estático e do Método de Hairpinning do Protocolo de Encapsulamento da Camada 2 (Versão 3)

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## Introduction

Este documento oferece um exemplo de configuração dos métodos de estática e hairpinning da versão 3 do Protocolo de túnel da camada 2 (L2TPv3).

Esta tabela descreve o suporte à modificação da versão do software Cisco IOS<sup>®</sup> para L2TPv3:

Versão do Cisco IOS Software	Descrição do suporte de L2TPv3
12.0(21)S	O suporte de plano de dados inicial para L2TPv3 foi apresentado nas plataformas das séries Cisco 7200, Cisco 7500, Cisco 10720 e Cisco 12000.
12.0(23)S	O suporte ao plano de controle L2TPv3 foi apresentado nas plataformas das séries Cisco 7200, Cisco 7500, Cisco 10720 e Cisco 12000.
12.3(2)T	Este recurso foi integrado ao Cisco IOS Software Release 12.3(2)T.

É necessário habilitar o CEF (Cisco Express Forwarding) para usar o recurso L2TPv3. O submodo de configuração Xconnect fica bloqueado até que o CEF seja habilitado. Em plataformas distribuídas, como o Cisco 7500 Series, se o CEF for desabilitado enquanto uma sessão é

estabelecida, a sessão será desativada e permanecerá desativada até que o CEF seja reabilitado. Use o comando **ip cef** ou **ip cef distribute** para ativar o CEF.

É altamente recomendável especificar um endereço IP de origem para configurar uma interface de loopback. Se você não configurar uma interface de loopback, o roteador selecionará o melhor endereço local disponível, que pode ser qualquer endereço IP configurado em uma interface voltada para o núcleo. Essa configuração pode impedir o estabelecimento de um canal de controle. O endereço de loopback deve ser alcançável a partir das redes centrais.

## Prerequisites

### Requirements

Antes de tentar esta configuração, verifique se você tem conhecimento de:

- [L2TPv3: Protocolo de Túnel da Camada 2 Versão 3](#)

### Componentes Utilizados

Este documento não se restringe a versões de software e hardware específicas.

### Conventions

Para obter mais informações sobre convenções de documento, consulte as [Convenções de dicas técnicas Cisco](#).

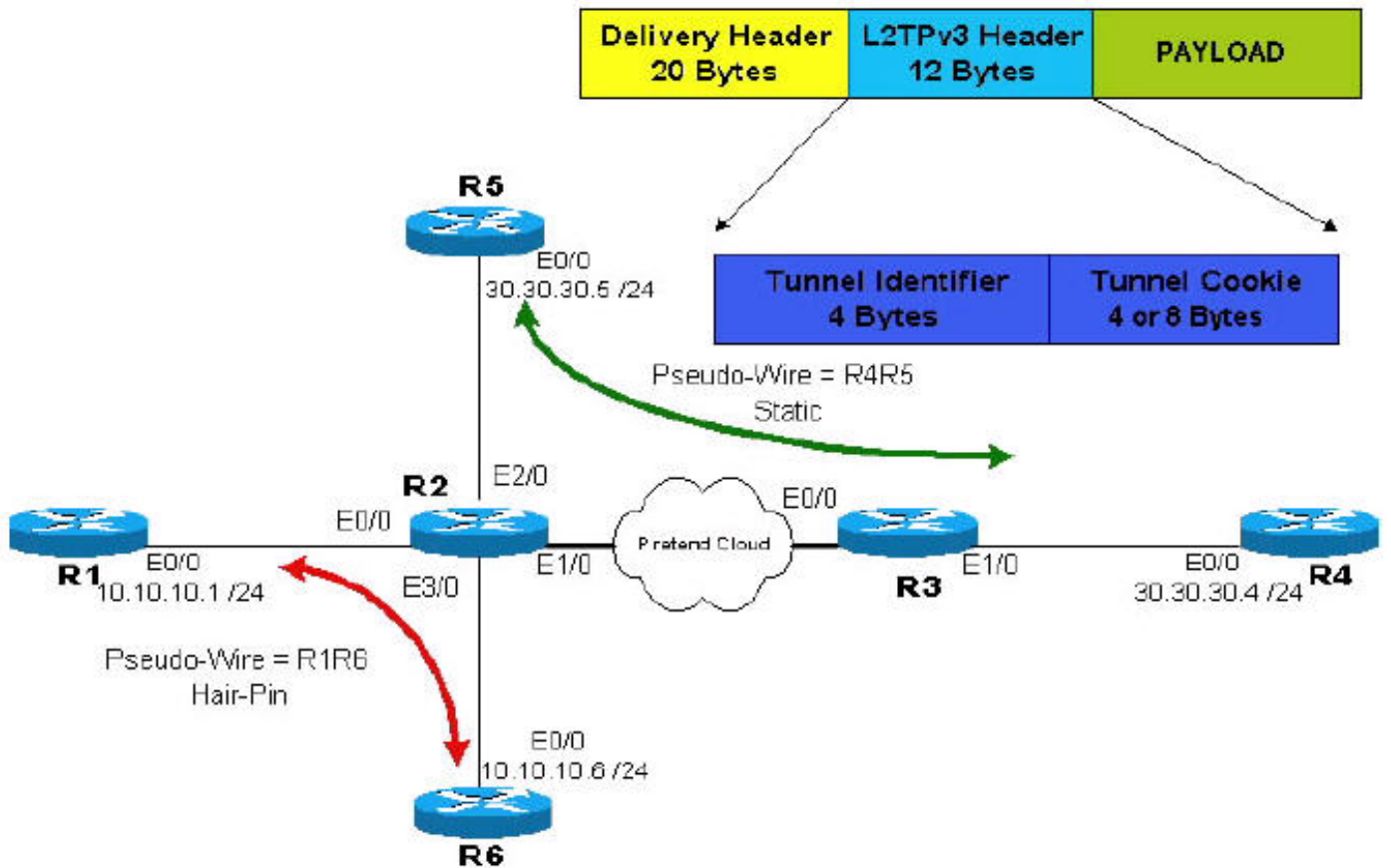
## Configurar

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

**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:



**Observação:** os roteadores R2 e R3 são usados pelo provedor. Os roteadores R1, R4, R5 e R6 são clientes finais. Usando L2TPv3, o roteador R4 parece ter uma conexão direta com R5; isso também é verdade para a conexão entre o roteador R1 e o roteador R6.

## Configurações

Este documento utiliza as seguintes configurações:

- Pseudo-fio estático através de uma nuvem IP. Uma parte relevante da configuração pode ser encontrada em R2 e R3, onde estão configurados dois túneis unidirecionais.
- Comutação local ou pseudo-fio (de uma porta para outra no mesmo roteador). A configuração é feita apenas em R2 e consiste na configuração de dois túneis unidirecionais apontando para dois loopbacks, que estão ambos no roteador R2.

### R2

```
R2# show running-config
Building configuration...
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname R2
!
!
clock timezone EST 10
ip subnet-zero
ip cef
no ip domain-lookup
l2tp-class R2signal
hello 10
```

```
password 0 cisco
cookie size 8
!
pseudowire-class wireR5R4
encapsulation l2tpv3
protocol l2tpv3 R2signal
ip local interface Loopback0
ip dfbit set
!
pseudowire-class wireR6R1
encapsulation l2tpv3
protocol l2tpv3 R2signal
ip local interface Loopback1
ip dfbit set
!
pseudowire-class wireR1R6
encapsulation l2tpv3
protocol l2tpv3 R2signal
ip local interface Loopback2
ip dfbit set
!
interface Loopback0
description Used by wireR5R4 for Static Connection
ip address 2.2.2.2 255.255.255.255
no ip directed-broadcast
!
interface Loopback1
description Used by wireR6R1 for Hair Pinning Connection
ip address 2.2.2.6 255.255.255.255
no ip directed-broadcast
!
interface Loopback2
description Used by wireR1R6 for Hair Pinning Connection
ip address 2.2.2.1 255.255.255.255
no ip directed-broadcast
!
interface Ethernet0/0
description Connection to R1
no ip address
no ip directed-broadcast
xconnect 2.2.2.6 16 encapsulation l2tpv3 pw-class
wireR1R6
!
interface Ethernet1/0
description Connection to Pretend Cloud.
ip address 20.20.20.2 255.255.255.0
no ip directed-broadcast
no cdp enable
!
interface Ethernet2/0
description Connection to R5
no ip address
no ip directed-broadcast
no cdp enable
xconnect 3.3.3.3 12 encapsulation l2tpv3 pw-class
wireR5R4
!
interface Ethernet3/0
description Connection to R6
no ip address
no ip directed-broadcast
xconnect 2.2.2.1 16 encapsulation l2tpv3 pw-class
wireR6R1
!
```

```
ip classless
ip route 3.3.3.3 255.255.255.255 20.20.20.3
!--- The other end of wireR5R4 loopback (3.3.3.3) must
be !--- reachable from this router. Hair Pinning
loopbacks !--- are reachable—there is no need for
additional routes. !! line con 0 exec-timeout 0 0
privilege level 15 line aux 0 line vty 0 4 login ! end
```

## R3

```
R3# show running-config
Building configuration...
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname R3
!
!
clock timezone EST 10
ip subnet-zero
ip cef
!
l2tp-class R3signal
hello 10
password 0 cisco
cookie size 8
!
pseudowire-class wireR4R5
encapsulation l2tpv3
protocol l2tpv3 R3signal
ip local interface Loopback0
ip dfbit set
!
interface Loopback0
description Use by wireR4R5 for static connection
ip address 3.3.3.3 255.255.255.255
no ip directed-broadcast
!
interface Ethernet0/0
ip address 20.20.20.3 255.255.255.0
no ip directed-broadcast
!
interface Ethernet1/0
no ip address
no ip directed-broadcast
no cdp enable
xconnect 2.2.2.2 12 encapsulation l2tpv3 pw-class
wireR4R5
!
ip classless
ip route 2.2.2.2 255.255.255.255 Ethernet0/0
!--- The other end of wireR4R5 loopback (3.3.3.3) must
be !--- reachable from this router. ! line con 0 exec-
timeout 0 0 privilege level 15 line aux 0 line vty 0 4
login ! end
```

Configuração do roteador final do túnel R1R6 (pseudo-fio) do cliente:

## R1

```
R1# show running-config
Building configuration...
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname R1
!
!
clock timezone EST 10
ip subnet-zero
no ip domain-lookup
!
interface Ethernet0/0
 ip address 10.10.10.1 255.255.255.0
 no ip directed-broadcast
!
ip classless
!
line con 0
 exec-timeout 0 0
 privilege level 15
line aux 0
line vty 0 4
 login
!
end
```

## R6

```
R6# show running-config
Building configuration...
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname R6
!
!
clock timezone EST 10
ip subnet-zero
no ip domain-lookup
!
interface Ethernet0/0
 ip address 10.10.10.6 255.255.255.0
 no ip directed-broadcast
!
ip classless
!
line con 0
 exec-timeout 0 0
 privilege level 15
line aux 0
line vty 0 4
 login
!
end
```

Configuração do roteador final do túnel R4R5 (pseudo-fio) do cliente:

## R4

```
R4# show running-config
Building configuration...
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname R4
!
!
ip subnet-zero
!
interface Ethernet0/0
 ip address 30.30.30.4 255.255.255.0
 no ip directed-broadcast
!
router ospf 1
 log-adjacency-changes
 network 30.30.30.0 0.0.0.255 area 0
!
ip classless
!
line con 0
 exec-timeout 0 0
 privilege level 15
line aux 0
line vty 0 4
 login
!
end
```

## R5

```
R5# show running-config
Building configuration...
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname R5
!
!
ip subnet-zero
!
interface Ethernet0/0
 ip address 30.30.30.5 255.255.255.0
 no ip directed-broadcast
!
router ospf 1
 log-adjacency-changes
 network 30.30.30.0 0.0.0.255 area 0
!
ip classless
!
line con 0
 exec-timeout 0 0
 privilege level 15
line aux 0
line vty 0 4
 login
```

```
!  
end
```

## Verificar

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

```
R4# show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
30.30.30.5	1	FULL/DR	00:00:39	30.30.30.5	Ethernet0/0

```
R5# show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
30.30.30.4	1	FULL/BDR	00:00:38	30.30.30.4	Ethernet0/0

```
R1# show cdp neighbors
```

Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge  
S - Switch, H - Host, I - IGMP, r - Repeater

Device ID	Local Intrfce	Holdtme	Capability	Platform	Port ID
R6	Eth 0/0	158	R	7206VXR	Eth 0/0

[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 l2tun tunnel all** — Para exibir o estado atual de uma sessão L2TPv3 e exibir informações sobre sessões configuradas atualmente, incluindo nomes de host L2TP local e remoto, contagens de pacotes agregadas e canais de controle L2TP, use o comando **show l2tun tunnel all** no modo EXEC.

```
R2# show l2tun tunnel all
```

```
Tunnel Information Total tunnels 3 sessions 3
```

```
Tunnel id 54217 is up, remote id is 44186, 1 active sessions  
Tunnel state is established, time since change 00:12:07  
Tunnel transport is IP (115)  
Remote tunnel name is R2  
Internet Address 2.2.2.6, port 0  
Local tunnel name is R2  
Internet Address 2.2.2.1, port 0  
Tunnel domain is  
VPDN group for tunnel is -  
L2TP class for tunnel is R2signal  
88 packets sent, 87 received  
10086 bytes sent, 11092 received  
Control Ns 76, Nr 74  
Local RWS 1024 (default), Remote RWS 1024 (max)  
Tunnel PMTU checking disabled  
Retransmission time 1, max 1 seconds  
Unsent queuesize 0, max 0  
Resend queuesize 0, max 2  
Total resends 0, ZLB ACKs sent 72  
Current nosession queue check 0 of 5  
Retransmit time distribution: 0 0 0 0 0 0 0 0 0  
Sessions disconnected due to lack of resources 0
```

```
Tunnel id 44186 is up, remote id is 54217, 1 active sessions  
Tunnel state is established, time since change 00:12:08  
Tunnel transport is IP (115)
```



Remote tunnel name is R2  
Internet Address 2.2.2.1, port 0  
Local tunnel name is R2  
Internet Address 2.2.2.6, port 0  
Tunnel domain is  
VPDN group for tunnel is -  
L2TP class for tunnel is R2signal  
87 packets sent, 88 received  
11092 bytes sent, 10086 received  
Control Ns 74, Nr 76  
Local RWS 1024 (default), Remote RWS 1024 (max)  
Tunnel PMTU checking disabled  
Retransmission time 1, max 1 seconds  
Unsent queuesize 0, max 0  
Resend queuesize 0, max 1  
Total resends 0, ZLB ACKs sent 74  
Current nosession queue check 0 of 5  
Retransmit time distribution: 0 0 0 0 0 0 0 0 0  
Sessions disconnected due to lack of resources 0

Tunnel id 24124 is up, remote id is 48735, 1 active sessions  
Tunnel state is established, time since change 00:11:00  
Tunnel transport is IP (115)  
Remote tunnel name is R3  
Internet Address 3.3.3.3, port 0  
Local tunnel name is R2  
Internet Address 2.2.2.2, port 0  
Tunnel domain is  
VPDN group for tunnel is -  
L2TP class for tunnel is R2signal  
155 packets sent, 158 received  
15230 bytes sent, 17586 received  
Control Ns 69, Nr 67  
Local RWS 1024 (default), Remote RWS 1024 (max)  
Tunnel PMTU checking disabled  
Retransmission time 1, max 1 seconds  
Unsent queuesize 0, max 0  
Resend queuesize 0, max 2  
Total resends 1, ZLB ACKs sent 65  
Current nosession queue check 0 of 5  
Retransmit time distribution: 0 0 1 0 0 0 0 0 0  
Sessions disconnected due to lack of resources 0

R3# **show l2tun tunnel all**

Tunnel Information Total tunnels 1 sessions 1

Tunnel id 48735 is up, remote id is 24124, 1 active sessions  
Tunnel state is established, time since change 00:12:36  
Tunnel transport is IP (115)  
Remote tunnel name is R2  
Internet Address 2.2.2.2, port 0  
Local tunnel name is R3  
Internet Address 3.3.3.3, port 0  
Tunnel domain is  
VPDN group for tunnel is -  
L2TP class for tunnel is R3signal  
180 packets sent, 176 received  
19766 bytes sent, 17316 received  
Control Ns 77, Nr 79  
Local RWS 1024 (default), Remote RWS 1024 (max)  
Tunnel PMTU checking disabled  
Retransmission time 1, max 1 seconds  
Unsent queuesize 0, max 0  
Resend queuesize 0, max 1

```
Total resends 1, ZLB ACKs sent 78
Current nosession queue check 0 of 5
Retransmit time distribution: 0 0 1 0 0 0 0 0 0
Sessions disconnected due to lack of resources 0
```

- **show l2tun session all** — Para exibir o estado atual de uma sessão de Camada 2 e informações do protocolo de exibição sobre um canal de controle L2TPv3, use o comando **show l2tun session all** no modo EXEC.

```
R2# show l2tun session all
```

```
Session Information Total tunnels 3 sessions 3
Session id 19996 is up, tunnel id 54217
  Call serial number is 1492400000
  Remote tunnel name is R2
  Internet address is 2.2.2.6
  Session is L2TP signalled
  Session state is established, time since change 00:15:37
  112 Packets sent, 111 received
  12309 Bytes sent, 13312 received
  Receive packets dropped:
    out-of-order: 0
    total: 0
  Send packets dropped:
    exceeded session MTU: 0
    total: 0
  Session vcid is 16
  Session Layer 2 circuit, type is Ethernet, name is Ethernet0/0
  Circuit state is UP
  Remote session id is 19999, remote tunnel id 44186
  DF bit on, ToS reflect disabled, ToS value 0, TTL value 255
  Session cookie information:
  local cookie, size 8 bytes, value 6E 47 8C 4A BA BF 7E A4
  remote cookie, size 8 bytes, value 7F 9F 65 C4 C7 5B 57 FF
  FS cached header information:
  encaps size = 32 bytes
  00000000 00000000 00000000 00000000
  00000000 00000000 00000000 00000000
```

```
Sequencing is off
```

```
Session id 19999 is up, tunnel id 44186
  Call serial number is 1492400000
  Remote tunnel name is R2
  Internet address is 2.2.2.1
  Session is L2TP signalled
  Session state is established, time since change 00:15:38
  111 Packets sent, 112 received
  13312 Bytes sent, 12309 received
  Receive packets dropped:
    out-of-order: 0
    total: 0
  Send packets dropped:
    exceeded session MTU: 0
    total: 0
  Session vcid is 16
  Session Layer 2 circuit, type is Ethernet, name is Ethernet3/0
  Circuit state is UP
  Remote session id is 19996, remote tunnel id 54217
  DF bit on, ToS reflect disabled, ToS value 0, TTL value 255
  Session cookie information:
  local cookie, size 8 bytes, value 7F 9F 65 C4 C7 5B 57 FF
  remote cookie, size 8 bytes, value 6E 47 8C 4A BA BF 7E A4
  FS cached header information:
  encaps size = 32 bytes
  00000000 00000000 00000000 00000000
  00000000 00000000 00000000 00000000
```

```
Sequencing is off
Session id 20005 is up, tunnel id 24124
Call serial number is 1492400002
Remote tunnel name is R3
Internet address is 3.3.3.3
Session is L2TP signalled
Session state is established, time since change 00:14:29
200 Packets sent, 204 received
19650 Bytes sent, 22100 received
Receive packets dropped:
  out-of-order: 0
  total: 0
Send packets dropped:
  exceeded session MTU: 0
  total: 0
Session vcid is 12
Session Layer 2 circuit, type is Ethernet, name is Ethernet2/0
Circuit state is UP
Remote session id is 17834, remote tunnel id 48735
DF bit on, ToS reflect disabled, ToS value 0, TTL value 255
Session cookie information:
local cookie, size 8 bytes, value 22 09 F1 E9 BC 8C 00 94
remote cookie, size 8 bytes, value 39 DD CB 00 9C 4B 1C 8C
FS cached header information:
encap size = 32 bytes
00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000

Sequencing is off
```

R3# **show l2tun session all**

```
Session Information Total tunnels 1 sessions 1
Session id 17834 is up, tunnel id 48735
Call serial number is 1492400002
Remote tunnel name is R2
Internet address is 2.2.2.2
Session is L2TP signalled
Session state is established, time since change 00:23:53
327 Packets sent, 322 received
33758 Bytes sent, 31248 received
Receive packets dropped:
  out-of-order: 0
  total: 0
Send packets dropped:
  exceeded session MTU: 0
  total: 0
Session vcid is 12
Session Layer 2 circuit, type is Ethernet, name is Ethernet1/0
Circuit state is UP
Remote session id is 20005, remote tunnel id 24124
DF bit on, ToS reflect disabled, ToS value 0, TTL value 255
Session cookie information:
local cookie, size 8 bytes, value 39 DD CB 00 9C 4B 1C 8C
remote cookie, size 8 bytes, value 22 09 F1 E9 BC 8C 00 94
FS cached header information:
encap size = 32 bytes
00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000

Sequencing is off
```

Esta seção fornece informações que podem ser usadas para o troubleshooting da sua configuração.

É possível utilizar o Bug Tool Kit (apenas clientes registrados) para obter mais informações sobre esses bugs relacionados aos recursos do L2TPv3:

- [CSCdz01467](#) (somente clientes [registrados](#)) — Resolvido (R) L2TPv3: Contador de pacotes de túnel, exibe contagem imprecisa.
- [CSCeb56061](#) (somente clientes [registrados](#)) — Resolvido (R) L2TPv3: L2TPv3oETH gera túneis zombie.
- [CSCeb35497](#) (somente clientes [registrados](#)) — Sequenciamento L2TPv3 resolvido (R): O Seqnum Tx não é finalizado para 1 após 16777215.
- [CSCdz48481](#) (somente clientes [registrados](#)) — A configuração de hairpinning L2TPv3 resolvida (R) não é mais suportada.
- [CSCec00463](#) (somente clientes [registrados](#)) — Resolvido (R) L2TPv3: Falha no decap do modo de porta Ethernet Gig
- [CSCec44356](#) (apenas clientes [registrados](#)) — Resolvido (R) C10720: A correspondência 802.1P no hairpinning L2TPv3 está quebrada.

## [Informações Relacionadas](#)

- [Página de suporte aos protocolos de roteamento IP](#)
- [Página de Suporte do IP Routing](#)
- [Suporte Técnico - Cisco Systems](#)