Configurando o VPN multiponto dinâmico usando o GRE sobre o IPsec com OSPF, NAT, e Cisco IOS Firewall

Índice

Introdução

Este documento fornece uma configuração de exemplo para Dynamic Multipoint VPN (DMVPN) que usa Generic Routing Encapsulation (GRE) sobre a IPsec com Open Shortest Path First (OSPF), Tradução de Endereço de Rede (NAT) e Cisco IOS® Firewall.

Pré-requisitos

Requisitos

Antes de um GRE multiponto (mGRE) e do túnel de IPsec pode ser estabelecido, você deve definir uma política do Internet Key Exchange (IKE) usando o **comando crypto isakmp policy**.

Nota: Use a Command Lookup Tool (somente clientes registrados) para obter mais informações sobre os comandos usados nesta seção.

Componentes Utilizados

As informações neste documento são baseadas nestas versões de software e hardware:

- Software Release 12.2(15)T1 de Cisco IOS® no roteador de hub e no Cisco IOS Software Release 12.3(1.6) no Roteadores do spoke

- Cisco 3620 como roteador de hub, dois Cisco 1720 Routers e um Cisco 3620 Router como roteadores spoke

As informações neste documento foram criadas a partir de dispositivos em um ambiente de laboratório específico. Todos os dispositivos utilizados neste documento foram iniciados com uma configuração (padrão) inicial. Se a sua rede estiver ativa, certifique-se de que entende o impacto potencial de qualquer comando.

Convenções

Consulte as Convenções de Dicas Técnicas da Cisco para obter mais informações sobre convenções de documentos.

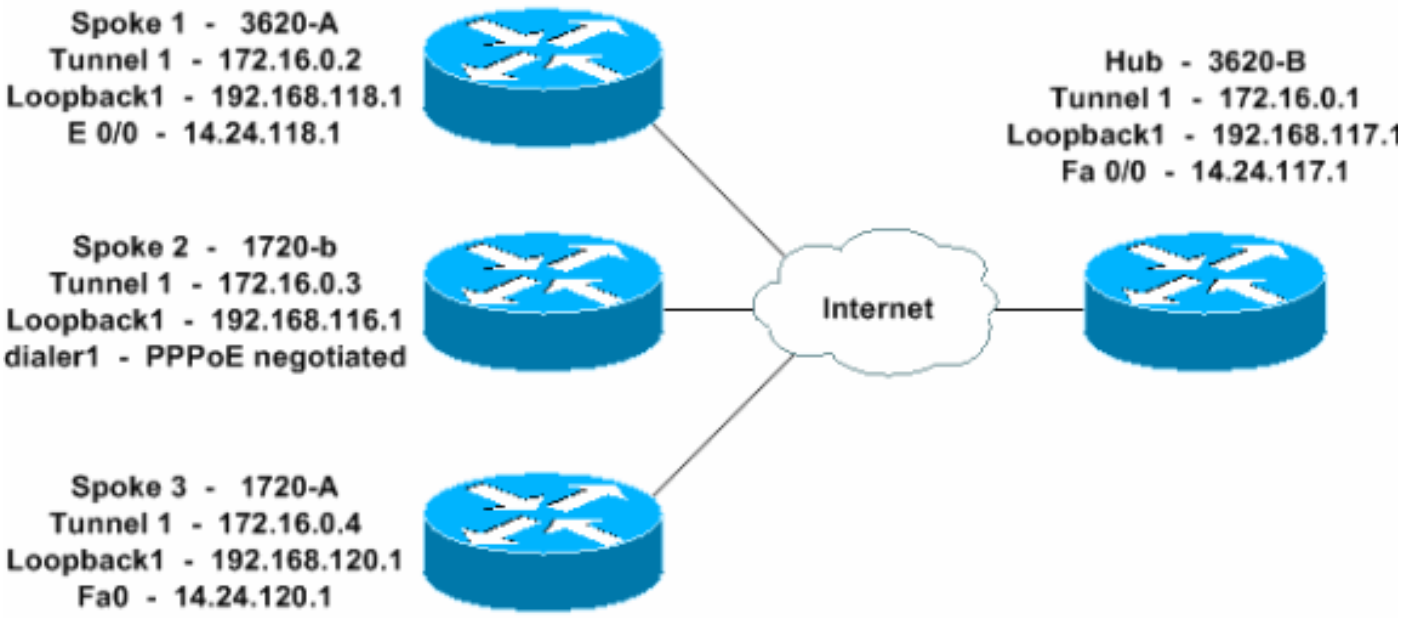
Configurar

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

Nota: Use a Command Lookup Tool (somente clientes registrados) para obter mais informações sobre os comandos usados nesta seção.

Diagrama de Rede

Este documento utiliza a seguinte configuração de rede.



Configurações

Este documento utiliza estas configurações.

- Hub - 3620-B
- Spoke 1 - 3620-A
- Spoke 2 - 1720-b
- Pontos remotos 3 - 1720-A

Hub - 3620-B

```
W2N-6.16-3620-B#write terminal Building configuration...
Current configuration : 2613 bytes ! version 12.2
service timestamps debug datetime msec service
timestamps log datetime msec no service password-
encryption ! hostname W2N-6.16-3620-B ! logging queue-
limit 100 ! memory-size iomem 10 ip subnet-zero ! ! ip
cef no ip domain lookup ! !--- This is the Cisco IOS
Firewall configuration and what to inspect. !--- This is
applied outbound on the external interface. ip inspect
name in2out rcmd ip inspect name in2out ftp ip inspect
name in2out tftp ip inspect name in2out tcp timeout
43200 ip inspect name in2out http ip inspect name in2out
udp ip audit po max-events 100 ! ! ! !--- Create an
Internet Security Association and Key Management !---
Protocol (ISAKMP) policy for Phase 1 negotiations.
crypto isakmp policy 5 authentication pre-share group 2
!--- Add dynamic pre-shared key. crypto isakmp key
dmvpnkey address 0.0.0.0 0.0.0.0 crypto isakmp nat
keepalive 20 ! ! !--- Create the Phase 2 policy for
actual data encryption. crypto ipsec transform-set
dmvpnset esp-3des esp-sha-hmac ! !--- Create an IPsec
profile to be applied dynamically !--- to the GRE over
IPsec tunnels. crypto ipsec profile dmvpnprof set
transform-set dmvpnset ! ! ! ! ! ! ! ! ! ! no voice
hpi capture buffer no voice hpi capture destination ! !
mta receive maximum-recipients 0 ! ! ! !--- This is the
inbound interface. interface Loopback1 ip address
192.168.117.1 255.255.255.0 ip nat inside ! !--- Create
a GRE tunnel template to be applied !--- to all the
dynamically created GRE tunnels. interface Tunnel1
description MULTI-POINT GRE TUNNEL for BRANCHES
bandwidth 1000 ip address 172.16.0.1 255.255.255.0 no ip
redirects ip mtu 1416 ip nhrp authentication dmvpn ip
nhrp map multicast dynamic ip nhrp network-id 99 ip nhrp
holdtime 300 no ip route-cache ip ospf network broadcast
no ip mroute-cache delay 1000 tunnel source
FastEthernet0/0 tunnel mode gre multipoint tunnel key
100000 tunnel protection ipsec profile dmvpnprof ! !---
This is the outbound interface. interface
FastEthernet0/0 ip address 14.24.117.1 255.255.0.0 ip
nat outside ip access-group 100 in ip inspect in2out out
no ip mroute-cache duplex auto speed auto ! interface
Serial0/0 no ip address shutdown clockrate 2000000 no
fair-queue ! interface FastEthernet0/1 no ip address no
ip mroute-cache duplex auto speed auto ! !--- Enable a
routing protocol to send/receive dynamic !--- updates
about the private networks. router ospf 1 log-adjacency-
changes network 172.16.0.0 0.0.0.255 area 0 network
192.168.117.0 0.0.0.255 area 0 ! !--- Except the private
network traffic from the NAT process. ip nat inside
source route-map nonat interface FastEthernet0/0
overload ip http server no ip http secure-server ip
classless ip route 0.0.0.0 0.0.0.0 14.24.1.1 ip route
2.0.0.0 255.0.0.0 14.24.121.1 ! ! ! !--- Allow ISAKMP,
ESP, and GRE traffic inbound. !--- Cisco IOS Firewall
opens other inbound access as needed. access-list 100
permit udp any host 14.24.117.1 eq 500 access-list 100
premit esp any host 14.24.117.1 access-list 100 permit
gre any host 14.24.117.1 access-list 100 deny ip any any
!--- Except the private network traffic from the NAT
process. access-list 110 deny ip 192.168.117.0 0.0.0.255
192.168.118.0 0.0.0.255 access-list 110 deny ip
```

```
192.168.117.0 0.0.0.255 192.168.116.0 0.0.0.255 access-
list 110 deny ip 192.168.117.0 0.0.0.255 192.168.120.0
0.0.0.255 access-list 110 permit ip 192.168.117.0
0.0.0.255 any ! !--- Except the private network traffic
from the NAT process. route-map nonat permit 10 match ip
address 110 ! call rsvp-sync ! ! mgcp profile default !
dial-peer cor custom ! ! ! ! ! line con 0 exec-timeout 0
0 line aux 0 line vty 0 4 login ! ! end W2N-6.16-3620-B#
```

Spoke 1 - 3620-A

```
W2N-6.16-3620-A#write terminal Building configuration...
Current configuration : 2678 bytes ! version 12.2
service timestamps debug uptime service timestamps log
uptime no service password-encryption ! hostname W2N-
6.16-3620-A ! boot system flash slot0:c3620-ik9o3s7-
mz.122-15.T1.bin logging queue-limit 100 ! memory-size
iomem 15 ip subnet-zero ! ! ip cef no ip domain lookup !
!--- This is the Cisco IOS Firewall configuration and
what to inspect. !--- This is applied outbound on the
external interface. ip inspect name in2out rcmd ip
inspect name in2out tftp ip inspect name in2out udp ip
inspect name in2out tcp timeout 43200 ip inspect name
in2out realaudio ip inspect name in2out vdolive ip
inspect name in2out netshow ip audit po max-events 100 !
! ! !--- Create an ISAKMP policy for !--- Phase 1
negotiations. crypto isakmp policy 5 authentication pre-
share group 2 !--- Add dynamic pre-shared key. crypto
isakmp key dmvpnkey address 0.0.0.0 0.0.0.0 ! ! !---
Create the Phase 2 policy for actual data encryption.
crypto ipsec transform-set dmvpnset esp-3des esp-sha-
hmac ! !--- Create an IPsec profile to be applied
dynamically !--- to the GRE over IPsec tunnels. crypto
ipsec profile dmvpnprof set transform-set dmvpnset ! ! !
! ! ! ! ! ! ! no voice hpi capture buffer no voice hpi
capture destination ! ! mta receive maximum-recipients 0
! ! ! !--- This is the inbound interface. interface
Loopback1 ip address 192.168.118.1 255.255.255.0 ip nat
inside ! !--- Create a GRE tunnel template to be applied
to !--- all the dynamically created GRE tunnels.
interface Tunnel1 description HOST DYNAMIC TUNNEL
bandwidth 1000 ip address 172.16.0.2 255.255.255.0 no ip
redirects ip mtu 1416 ip nhrp authentication dmvpn ip
nhrp map multicast dynamic ip nhrp map 172.16.0.1
14.24.117.1 ip nhrp map multicast 14.24.117.1 ip nhrp
network-id 99 ip nhrp holdtime 300 ip nhrp nhs
172.16.0.1 no ip route-cache ip ospf network broadcast
no ip mroute-cache delay 1000 tunnel source Ethernet0/0
tunnel mode gre multipoint tunnel key 100000 tunnel
protection ipsec profile dmvpnprof ! !--- This is the
outbound interface. interface Ethernet0/0 ip address
14.24.118.1 255.255.0.0 ip nat outside ip access-group
100 in ip inspect in2out out no ip mroute-cache half-
duplex ! interface Ethernet0/1 no ip address half-duplex
! interface Ethernet0/2 no ip address shutdown half-
duplex ! interface Ethernet0/3 no ip address shutdown
half-duplex ! !--- Enable a routing protocol to
send/receive dynamic !--- updates about the private
networks. router ospf 1 log-adjacency-changes
redistribute connected network 172.16.0.0 0.0.0.255 area
0 network 192.168.118.0 0.0.0.255 area 0 ! !--- Except
the private network traffic from the NAT process. ip nat
inside source route-map nonat interface Ethernet0/0
overload ip http server no ip http secure-server ip
classless ip route 0.0.0.0 0.0.0.0 14.24.1.1 ip route
```

```
2.0.0.0 255.0.0.0 14.24.121.1 ! ! ! !--- Allow ISAKMP, ESP, and GRE traffic inbound. !--- Cisco IOS Firewall opens inbound access as needed. access-list 100 permit udp any host 14.24.118.1 eq 500 access-list 100 premit esp any host 14.24.118.1 access-list 100 permit gre any host 14.24.118.1 access-list 100 deny ip any any !--- Except the private network traffic from the NAT process. access-list 110 deny ip 192.168.118.0 0.0.0.255 192.168.117.0 0.0.0.255 access-list 110 deny ip 192.168.118.0 0.0.0.255 192.168.116.0 0.0.0.255 access-list 110 deny ip 192.168.118.0 0.0.0.255 192.168.120.0 0.0.0.255 access-list 110 permit ip 192.168.118.0 0.0.0.255 any ! !--- Except the private network traffic from the NAT process. route-map nonat permit 10 match ip address 110 ! call rsvp-sync ! ! mgcp profile default ! dial-peer cor custom ! ! ! ! ! line con 0 exec-timeout 0 0 line aux 0 line vty 0 4 login ! ! end W2N-6.16-3620-A#
```

Spoke 2 - 1720-b

```
1720-b#write terminal Building configuration... Current configuration : 2623 bytes ! version 12.2 service timestamps debug uptime service timestamps log uptime no service password-encryption ! hostname 1720-b ! logging queue-limit 100 enable password cisco ! username 7206-B password 0 cisco ip subnet-zero ! ! no ip domain lookup ! ip cef !--- This is the Cisco IOS Firewall configuration and what to inspect. !--- This is applied outbound on the external interface. ip inspect name in2out rcmd ip inspect name in2out tftp ip inspect name in2out udp ip inspect name in2out tcp timeout 43200 ip inspect name in2out realaudio ip inspect name in2out vdolive ip inspect name in2out netshow ip audit po max-events 100 vpdn-group 1 request-dialin protocol pppoe ! ! ! ! ! !--- Create an ISAKMP policy for !--- Phase 1 negotiations. crypto isakmp policy 5 authentication pre-share group 2 !--- Add dynamic pre-shared key. crypto isakmp key dmvpnkey address 0.0.0.0 0.0.0.0 ! ! !--- Create the Phase 2 policy for actual data encryption. crypto ipsec transform-set dmvpnset esp-3des esp-sha-hmac ! !--- Create an IPsec profile to be applied dynamically !--- to the GRE over IPsec tunnels. crypto ipsec profile dmvpnprof set transform-set dmvpnset ! ! ! ! ! !--- This is the inbound interface. interface Loopback1 ip address 192.168.116.1 255.255.255.0 ip nat inside ! !--- Create a GRE tunnel template to be applied to !--- all the dynamically created GRE tunnels. interface Tunnel1 description HOST DYNAMIC TUNNEL bandwidth 1000 ip address 172.16.0.3 255.255.255.0 no ip redirects ip mtu 1416 ip nhrp authentication dmvpn ip nhrp map multicast dynamic ip nhrp map 172.16.0.1 14.24.117.1 ip nhrp map multicast 14.24.117.1 ip nhrp network-id 99 ip nhrp holdtime 300 ip nhrp nhs 172.16.0.1 no ip route-cache ip ospf network broadcast no ip mroute-cache delay 1000 tunnel source Dialer1 tunnel mode gre multipoint tunnel key 100000 tunnel protection ipsec profile dmvpnprof ! interface Ethernet0 no ip address half-duplex ! interface FastEthernet0 no ip address no ip mroute-cache speed auto pppoe enable pppoe-client dial-pool-number 1 ! !--- This is the outbound interface. interface Dialer1 ip address 2.2.2.10 255.255.255.0 ip inspect in2out out ip access-group 100 in encapsulation ppp dialer pool 1 dialer-group 1 ppp authentication pap chap callin ! !--- Enable a routing protocol to send/receive dynamic !--- updates
```

```
about the private networks. router ospf 1 log-adjacency-
changes redistribute connected network 172.16.0.0
0.0.0.255 area 0 network 192.168.116.0 0.0.0.255 area 0
! !--- Except the private network traffic from the NAT
process. ip nat inside source route-map nonat interface
Dialer1 overload ip classless ip route 0.0.0.0 0.0.0.0
14.24.1.1 ip route 0.0.0.0 0.0.0.0 Dialer1 no ip http
server no ip http secure-server ! ! ! !--- Allow ISAKMP,
ESP, and GRE traffic inbound. !--- Cisco IOS Firewall
opens inbound access as needed. access-list 100 permit
udp any host 14.24.116.1 eq 500 access-list 100 premit
esp any host 14.24.116.1 access-list 100 permit gre any
host 14.24.116.1 access-list 100 deny ip any any !---
Except the private network traffic from the NAT process.
access-list 110 deny ip 192.168.116.0 0.0.0.255
192.168.117.0 0.0.0.255 access-list 110 deny ip
192.168.116.0 0.0.0.255 192.168.118.0 0.0.0.255 access-
list 110 deny ip 192.168.116.0 0.0.0.255 192.168.120.0
0.0.0.255 access-list 110 permit ip 192.168.116.0
0.0.0.255 any dialer-list 1 protocol ip permit ! !---
Except the private network traffic from the NAT process.
route-map nonat permit 10 match ip address 110 ! ! line
con 0 exec-timeout 0 0 line aux 0 line vty 0 4 login !
no scheduler allocate end 1720-b#
```

Pontos remotos 3 - 1720-A

```
W2N-6.16-1720-A#write terminal Building configuration...
Current configuration : 2303 bytes ! version 12.2
service timestamps debug datetime msec service
timestamps log datetime msec no service password-
encryption ! hostname W2N-6.16-1720-A ! logging queue-
limit 100 ! memory-size iomem 25 ip subnet-zero ! ! no
ip domain lookup ! ip cef !--- This is the Cisco IOS
Firewall configuration and what to inspect. !--- This is
applied outbound on the external interface. ip inspect
name in2out rcmd ip inspect name in2out tftp ip inspect
name in2out udp ip inspect name in2out tcp timeout 43200
ip inspect name in2out realaudio ip inspect name in2out
vdolive ip inspect name in2out netshow ip audit notify
log ip audit po max-events 100 ! ! ! ! !--- Create an
ISAKMP policy for !--- Phase 1 negotiations. crypto
isakmp policy 5 authentication pre-share group 2 !---
Add dynamic pre-shared key. crypto isakmp key dmvpnkey
address 0.0.0.0 0.0.0.0 ! ! !--- Create the Phase 2
policy for actual data encryption. crypto ipsec
transform-set dmvpnset esp-3des esp-sha-hmac ! !---
Create an IPsec profile to be applied dynamically !---
to the GRE over IPsec tunnels. crypto ipsec profile
dmvpnprof set transform-set dmvpnset ! ! ! ! ! !--- This
is the inbound interface. interface Loopback1 ip address
192.168.120.1 255.255.255.0 ip nat inside ! !--- Create
a GRE tunnel template to be applied to !--- all the
dynamically created GRE tunnels. interface Tunnel1
description HOST DYNAMIC TUNNEL bandwidth 1000 ip
address 172.16.0.4 255.255.255.0 no ip redirects ip mtu
1416 ip nhrp authentication dmvpn ip nhrp map multicast
dynamic ip nhrp map 172.16.0.1 14.24.117.1 ip nhrp map
multicast 14.24.117.1 ip nhrp network-id 99 ip nhrp
holdtime 300 ip nhrp nhs 172.16.0.1 ip ospf network
broadcast no ip mroute-cache delay 1000 tunnel source
FastEthernet0 tunnel mode gre multipoint tunnel key
100000 tunnel protection ipsec profile dmvpnprof !
interface Ethernet0 no ip address no ip mroute-cache
half-duplex ! !--- This is the outbound interface.
```

```
interface FastEthernet0 ip address 14.24.120.1
255.255.0.0 ip nat outside ip inspect in2out out ip
access-group 100 in no ip mroute-cache speed auto ! !---
Enable a routing protocol to send/receive dynamic !---
updates about the private networks. router ospf 1 log-
adjacency-changes redistribute connected network
172.16.0.0 0.0.0.255 area 0 network 192.168.120.0
0.0.0.255 area 0 ! !--- Except the private network
traffic from the NAT process. ip nat inside source
route-map nonat interface FastEthernet0 overload ip
classless ip route 0.0.0.0 0.0.0.0 14.24.1.1 ip route
2.0.0.0 255.0.0.0 14.24.121.1 no ip http server no ip
http secure-server ! ! ! !--- Allow ISAKMP, ESP, and GRE
traffic inbound. !--- Cisco IOS Firewall opens inbound
access as needed. access-list 100 permit udp any host
14.24.116.1 eq 500 access-list 100 premit esp any host
14.24.116.1 access-list 100 permit gre any host
14.24.116.1 access-list 100 deny ip any any access-list
110 permit ip 192.168.120.0 0.0.0.255 any !--- Except
the private network traffic from the NAT process.
access-list 110 deny ip 192.168.120.0 0.0.0.255
192.168.116.0 0.0.0.255 access-list 110 deny ip
192.168.120.0 0.0.0.255 192.168.117.0 0.0.0.255 access-
list 110 deny ip 192.168.120.0 0.0.0.255 192.168.118.0
0.0.0.255 access-list 110 permit ip 192.168.120.0
0.0.0.255 any ! !--- Except the private network traffic
from the NAT process. route-map nonat permit 10 match ip
address 110 ! ! line con 0 exec-timeout 0 0 line aux 0
line vty 0 4 login ! end W2N-6.16-1720-A#
```

Verificar

Use esta seção para confirmar se a sua configuração funciona corretamente.

A Output Interpreter Tool (apenas para clientes registrados) (OIT) suporta determinados comandos show. Use a OIT para exibir uma análise da saída do comando show.

- **mostre isakmp cripto sa** — Indica o estado para a associação de segurança ISAKMP (SA).
- **active do show crypto engine connections** — Indica o total cifra/decifra pelo SA.
- show crypto ipsec sa — Exibe as estatísticas nos túneis ativos.
- show ip route - Exibe a tabela de roteamento .
- **mostre o vizinho OSPF IP** — Informação do vizinho de OSPF dos indicadores em uma base da interface per.
- show ip nhrp — Exibe o cache NHRP (Next Hop Resolution Protocol) de IP, opcionalmente limitado a entradas de cache dinâmico ou estático para uma interface específica.

Troubleshooting

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

Comandos para Troubleshooting

Nota: Consulte Informações Importantes sobre Comandos de Debugação antes de usar

comandos **debug**.

- **debug crypto ipsec** — Exibe eventos de IPSec.
- debug crypto isakmp - Exibe mensagens sobre eventos IKE.
- debug crypto engine — Exibe informações a partir do cripto mecanismo.

A informação adicional no IPsec do Troubleshooting pode ser encontrada no Troubleshooting de Segurança IP - compreendendo e usando comandos debug.

Informações Relacionadas

- Pesquisando defeitos configurações do Cisco IOS Firewall
- Visão geral de DMVPN e Cisco IOS
- Negociação IPsec/Protocolos IKE
- Suporte Técnico e Documentação - Cisco Systems