使用帶有EIGRP、NAT和CBAC的GRE Over IPSec配置動態多點VPN

目錄

簡介

本檔案將提供使用具有增強型內部閘道路由通訊協定(EIGRP)、網路位址轉譯(NAT)和內容型存取控制(CBAC)的透過IPSec的通用路由封裝(GRE)的集中型動態多點VPN(DMVPN)組態範例。

必要條件

需求

在可以建立多點GRE(mGRE)和IPSec隧道之前，必須使用**crypto isakmp policy**命令定義網際網路金鑰交換(IKE)策略。

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)。

採用元件

本文中的資訊係根據以下軟體和硬體版本：

- 中心路由器上的Cisco IOS®軟體版本12.2(15)T1和分支路由器上的12.3(1.6)
- Cisco 3620作為中心路由器、2台Cisco 1720路由器和1台Cisco 3620路由器作為分支路由器

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。如果您在即時網路中工作，請確保在使用任何命令之前瞭解其潛在影響。

慣例

如需文件慣例的詳細資訊，請參閱思科技術提示慣例。

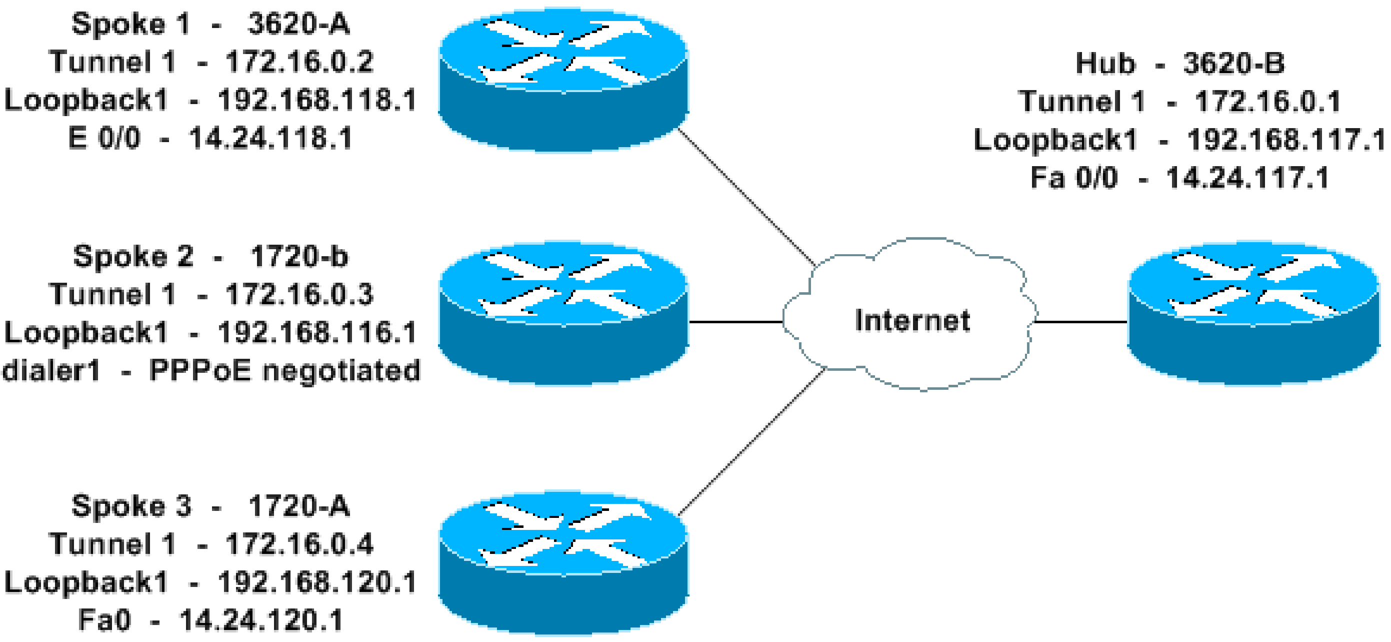
設定

本節提供用於設定本文件中所述功能的資訊。

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

本文檔使用下圖所示的網路設定。



組態

本文檔使用如下所示的配置。

- 集線器 — 3620-B
- 輻條1 - 3620-A
- 分支2 - 1720-b
- 輻條3 - 1720-A

集線器 — 3620-B

```
3620-B#write terminal
Building configuration...

Current configuration : 2607 bytes
!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
```

```
no service password-encryption
!
hostname 3620-B
!
logging queue-limit 100
!
memory-size iomem 10
ip subnet-zero
!
!
ip cef
no ip domain lookup
!
!--- This is the CBAC configuration and what to inspect.
!--- This will be 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. !---
Here "dmvpn" is the word that is used as the 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 inside
interface. interface Loopback1 ip address 192.168.117.1
255.255.255.0 ip nat inside ! !--- This is the mGRE
interface for dynamic 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 1400 ip nhrp authentication dmvpn ip
nhrp map multicast dynamic ip nhrp network-id 99 ip nhrp
holdtime 300 no ip split-horizon eigrp 1 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 outside
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 over the tunnels. router eigrp 1 network
172.16.0.0 0.0.0.255 network 192.168.117.0 no auto-
summary ! !--- Perform NAT on local traffic !--- going
directly out FastEthernet0/0. ip nat inside source list
110 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.
!--- CBAC will open other inbound access as needed.
access-list 100 permit udp any host 14.24.117.1 eq 500
access-list 100 permit 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 access-list 110 permit ip 192.168.117.0
0.0.0.255 any ! ! 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 3620-
B#
```

輻條1 - 3620-A

```

3620-A#write terminal
Building configuration...

Current configuration : 2559 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 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 CBAC configuration and what to inspect.
!--- This will be 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 inside
interface. interface Loopback1 ip address 192.168.118.1
255.255.255.0 ip nat inside ! !--- This is the mGRE
interface for dynamic 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
1400 ip nhrp authentication dmvpn 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 mroute-cache delay 1000 tunnel source
Ethernet0/0 tunnel mode gre multipoint tunnel key 100000
tunnel protection ipsec profile dmvpnprof ! !--- This is
the outside interface. interface Ethernet0/0 ip address
14.24.118.1 255.255.0.0 ip nat outside ip inspect in2out
out ip access-group 100 in 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 over the tunnel. router eigrp 1 network
172.16.0.0 0.0.0.255 network 192.168.118.0 no auto-
summary ! !--- Perform NAT on local traffic !--- going
directly out Ethernet0/0. ip nat inside source list 110
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 ! ! !--- Allow ISAKMP, ESP, and GRE traffic
inbound. !--- CBAC will open inbound access as needed.
access-list 100 permit udp any host 14.24.118.1 eq 500
access-list 100 permit 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 access-list 110 permit ip 192.168.118.0
0.0.0.255 any ! ! 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 3620-
A#
```

分支2 - 1720-b

```

1720-b#write terminal
Building configuration...

Current configuration : 2543 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 1720-b
!
boot system flash flash:c1700-ny-mz.122-8.YJ
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 CBAC configuration and what to inspect.
!--- This will be 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 inside interface. interface Loopback1 ip address
192.168.116.1 255.255.255.0 ip nat inside ! !--- This is
the mGRE interface for dynamic 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 1400 ip nhrp authentication dmvpn 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 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 outside 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 eigrp 1
network 172.16.0.0 0.0.0.255 network 192.168.116.0 no
auto-summary ! !--- Perform NAT on local traffic !---
going directly out Dialer1. ip nat inside source list
110 interface Dialer1 overload ip classless 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. !--- CBAC will open inbound access as
needed. access-list 100 permit udp any host 14.24.116.1
eq 500 access-list 100 permit 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
192.168.116.0 0.0.0.255 any dialer-list 1 protocol ip
permit ! ! ! line con 0 exec-timeout 0 0 line aux 0 line
vty 0 4 login ! no scheduler allocate end 1720-b#
```

輻條3 - 1720-A

```

1720-A#write terminal
Building configuration...

Current configuration : 1770 bytes
!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname 1720-A
!
logging queue-limit 100
!
memory-size iomem 25
ip subnet-zero
!
!
!
ip cef
!--- This is the CBAC configuration and what to inspect.
!--- This will be 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 ! ! !--- This is
the inside interface. interface Loopback1 ip address
192.168.120.1 255.255.255.0 ip nat inside ! !--- This is
the mGRE interface for dynamic 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 1400 ip nhrp authentication dmvpn 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 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 outside 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 eigrp 1
network 172.16.0.0 0.0.0.255 network 192.168.120.0 no
auto-summary ! !--- Perform NAT on local traffic !---
going directly out FastEthernet0. ip nat inside source
list 110 interface FastEthernet0 overload ip classless
ip route 0.0.0.0 0.0.0.0 14.24.1.1 no ip http server no
ip http secure-server ! ! ! !--- Allow ISAKMP, ESP, and
GRE traffic inbound. !--- CBAC will open inbound access
as needed. access-list 100 permit udp any host
14.24.116.1 eq 500 access-list 100 permit 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 ! ! ! line con
0 exec-timeout 0 0 line aux 0 line vty 0 4 login ! no
scheduler allocate end 1720-A#
```

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 crypto isakmp sa** — 顯示ISAKMP安全關聯(SA)的狀態。
- **show crypto engine connections active** — 顯示每個SA的加密/解密總數。
- **show crypto ipsec sa** — 顯示活動隧道的統計資訊。
- **show ip route** — 顯示路由表。
- **show ip eigrp neighbor** — 顯示EIGRP鄰居。
- **show ip nhrp** — 顯示IP下一跳解析協定(NHRP)快取，可選擇僅限於特定介面的動態或靜態快取條目。
- **show crypto socket** — 顯示NHRP和IPSec之間的加密套接字表。

疑難排解

本節提供的資訊可用於對組態進行疑難排解。

疑難排解指令

注意：發出**debug指令之前，請先參閱**有關Debug指令的重要資訊。

- **debug crypto ipsec** — 顯示IPSec事件。
- **debug crypto isakmp** — 顯示有關IKE事件的消息。
- **debug crypto engine** — 顯示來自加密引擎的資訊。
- **debug crypto socket** — 顯示有關NHRP和IPSec之間的套接字表的資訊。
- **debug nhrp** — 顯示有關NHRP事件的資訊。
- **debug nhrp packet** — 顯示有關NHRP資料包的資訊。
- **debug tunnel protection** — 顯示有關動態GRE通道的資訊。

有關IPSec故障排除的其他資訊，請參閱IP安全故障排除 — 瞭解和使用debug命令。

相關資訊

- DMVPN和Cisco IOS概述
- IPSec支援頁面
- 技術支援與文件 - Cisco Systems