# EIGRP, NAT 및 CBAC를 사용하여 GRE Over IPSec을 사용하여 동적 멀티포인트 VPN 구성

## 목차



## 소개

이 문서에서는 EIGRP(Enhanced Interior Gateway Routing Protocol), NAT(Network Address Translation) 및 CBAC(Context-Based Access Control)를 통해 IPSec을 통한 GRE(Generic Routing Encapsulation)를 사용하는 DMVPN(Hub and-Spoke Dynamic Multipoint VPN)에 대한 샘플 컨피그레이션을 제공합니다.

## 사전 요구 사항

### 요구 사항

mGRE(Multipoint GRE) 및 IPSec 터널을 설정하려면 먼저 crypto isakmp **policy** 명령을 사용하여 IKE(Internet Key Exchange) 정책을 정의해야 합니다.

**참고:** 이 문서에 사용된 명령에 대한 추가 정보를 찾으려면 명령 조회 도구(등록된 고객만 해당)를 사용합니다.

### 사용되는 구성 요소

이 문서의 정보는 다음 소프트웨어 및 하드웨어 버전을 기반으로 합니다.

- 허브 라우터의 Cisco IOS® 소프트웨어 릴리스 12.2(15)T1 및 스포크 라우터의 12.3(1.6)
- 허브 라우터로 Cisco 3620, Cisco 1720 라우터 2개 및 스포크 라우터로 Cisco 3620 라우터 1개

이 문서의 정보는 특정 랩 환경의 디바이스를 토대로 작성되었습니다. 이 문서에 사용된 모든 디바

이스는 초기화된(기본) 컨피그레이션으로 시작되었습니다. 라이브 네트워크에서 작업하는 경우, 사용하기 전에 모든 명령의 잠재적인 영향을 이해해야 합니다.

## 표기 규칙

문서 표기 규칙에 대한 자세한 내용은 Cisco 기술 팁 표기 규칙을 참조하십시오.

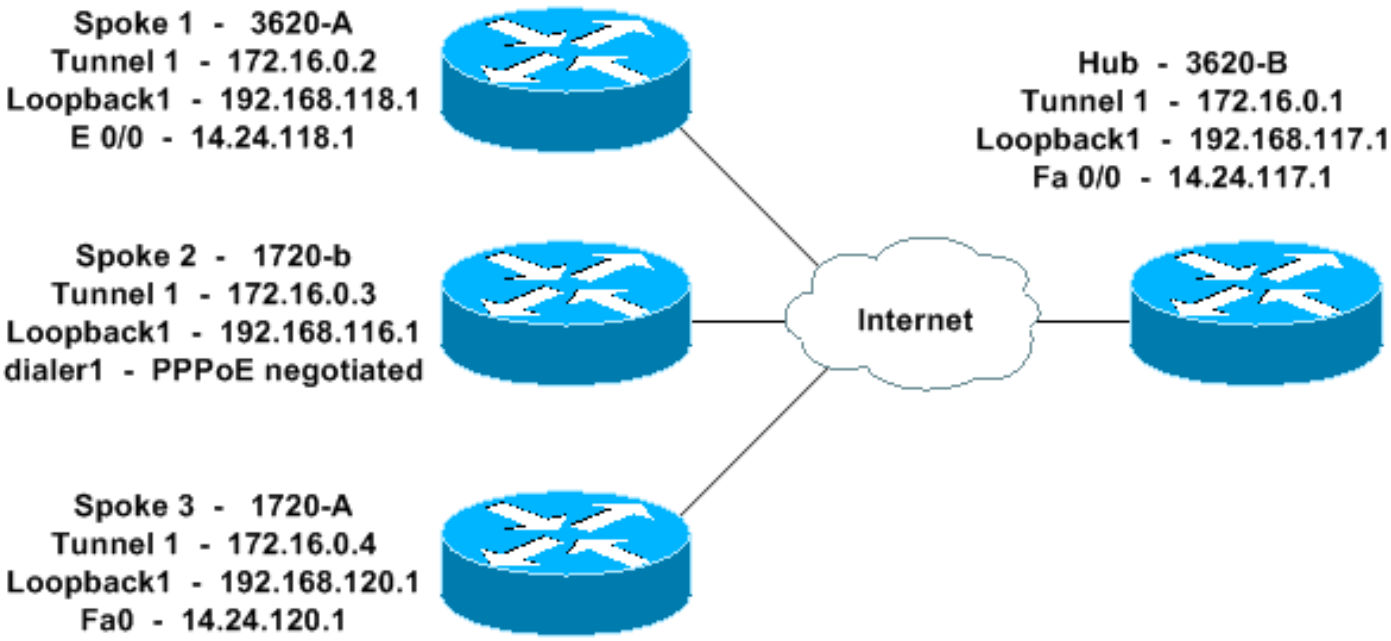
# 구성

이 섹션에는 이 문서에서 설명하는 기능을 구성하기 위한 정보가 표시됩니다.

**참고:** 이 문서에 사용된 명령에 대한 추가 정보를 찾으려면 명령 조회 도구(등록된 고객만 해당)를 사용합니다.

## 네트워크 다이어그램

이 문서에서는 아래 다이어그램에 표시된 네트워크 설정을 사용합니다.




## 구성

이 문서에서는 아래 표시된 구성을 사용합니다.

- 허브 - 3620-B
- 스포크 1 - 3620-A
- 스포크 2 - 1720-b
- 스포크 3 - 1720-A

**허브 - 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#
```

## 스포크 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#
```

## 스포크 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#
```

## 스포크 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#
```

# 다음을 확인합니다.

이 섹션에서는 컨피그레이션이 제대로 작동하는지 확인하는 데 사용할 수 있는 정보를 제공합니다.

일부 **show 명령은** 출력 인터프리터 툴 에서 지원되는데(등록된 고객만), 이 툴을 사용하면 **show 명령 출력의 분석 결과를 볼 수 있습니다.**

- **show crypto isakmp sa** - ISAKMP SA(Security Association)의 상태를 표시합니다.
- **show crypto engine connections active(암호화 엔진 연결 활성** 표시) - SA당 총 암호화/해독 정보를 표시합니다.
- **show crypto ipsec sa** - 활성 터널의 통계를 표시합니다.
- **show ip route** - 라우팅 테이블을 표시합니다.

- **show ip eigrp neighbor** - EIGRP 인접 디바이스를 표시합니다.
- **show ip nhrp** - 특정 인터페이스에 대한 동적 또는 정적 캐시 엔트리로 선택적으로 제한된 IP NHRP(Next Hop Resolution Protocol) 캐시를 표시합니다.
- **show crypto socket** - NHRP와 IPSec 간의 암호화 소켓 테이블을 표시합니다.

# 문제 해결

이 섹션에서는 컨피그레이션 문제를 해결하는 데 사용할 수 있는 정보를 제공합니다.

## 문제 해결 명령

**참고:** debug 명령을 실행하기 전에 디버그 명령에 대한 중요 정보를 참조하십시오.

- **debug crypto ipsec** - IPSec 이벤트를 표시합니다.
- **debug crypto isakmp** - IKE 이벤트에 대한 메시지를 표시합니다.
- **debug crypto engine** - 암호화 엔진의 정보를 표시합니다.
- **debug crypto socket** - NHRP와 IPSec 간의 소켓 테이블에 대한 정보를 표시합니다.
- **debug nhrp** - NHRP 이벤트에 대한 정보를 표시합니다.
- **debug nhrp packet** - NHRP 패킷에 대한 정보를 표시합니다.
- **debug tunnel protection** - 동적 GRE 터널에 대한 정보를 표시합니다.

IPSec 문제 해결에 대한 자세한 내용은 IP Security Troubleshooting - Understanding and Using debug 명령을 참조하십시오.

# 관련 정보

- DMVPN 및 Cisco IOS 개요
- IPSec 지원 페이지
- 기술 지원 및 문서 – Cisco Systems