Configurando um Túnel GRE via IPSec com OSPF

Contents

Introduction

As configurações de segurança IP (IPsec) normais não podem transferir protocolos de roteamento, como o Enhanced Interior Gateway Routing Protocol (EIGRP) e o Open Shortest Path First (OSPF) ou tráfego não IP, como Internetwork Packet Exchange (IPX) e Appletalk. Este documento ilustra como rotear entre diferentes redes que usam um protocolo de roteamento e tráfego não IP com IPsec. Este exemplo usa o Generic Routing Encapsulation (GRE) para realizar o roteamento entre as diferentes redes.

Consulte o PIX/ASA 7.x ou posterior: Exemplo de Configuração de VPN/IPsec com OSPF para obter mais informações sobre como configurar um VPN/IPsec com OSPF (Open Shortest Path First) sem um túnel GRE no Cisco PIX Security Appliance Software versão 7.x ou Cisco Adaptive Security Appliance (ASA).

Consulte Configurando Hub e Spoke de Roteador para Roteador IPsec com Comunicação entre os Spokes para obter informações sobre como configurar um design IPsec de hub e spoke entre três roteadores.

Consulte Configurando IPSec de Roteador para Roteador (Chaves Pré-compartilhadas) no Túnel GRE com Firewall IOS e NAT para obter informações sobre como configurar a configuração básica do Cisco IOS® Firewall em um túnel GRE com Tradução de Endereço de Rede (NAT - Network Address Translation).

Prerequisites

Requirements

Certifique-se de atender a estes requisitos antes de tentar esta configuração:

- Certifique-se de que o túnel funcione antes de aplicar os mapas de criptografia.
- Consulte Ajustando MTU de IP, MSS de TCP e PMTUD em sistemas Windows e Sun para obter informações sobre possíveis problemas de MTU (Maximum Transmission Unit, Unidade Máxima de Transmissão).

Componentes Utilizados

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

- Cisco 3600 que executa o Cisco IOS Software Release 12.4(8)
- Cisco 2600 que executa o Cisco IOS Software Release 12.4(8)
- Software PIX Firewall (Lion) versão 6.3(5)
- Software PIX Firewall (Tiger) versão 6.3(5)

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

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

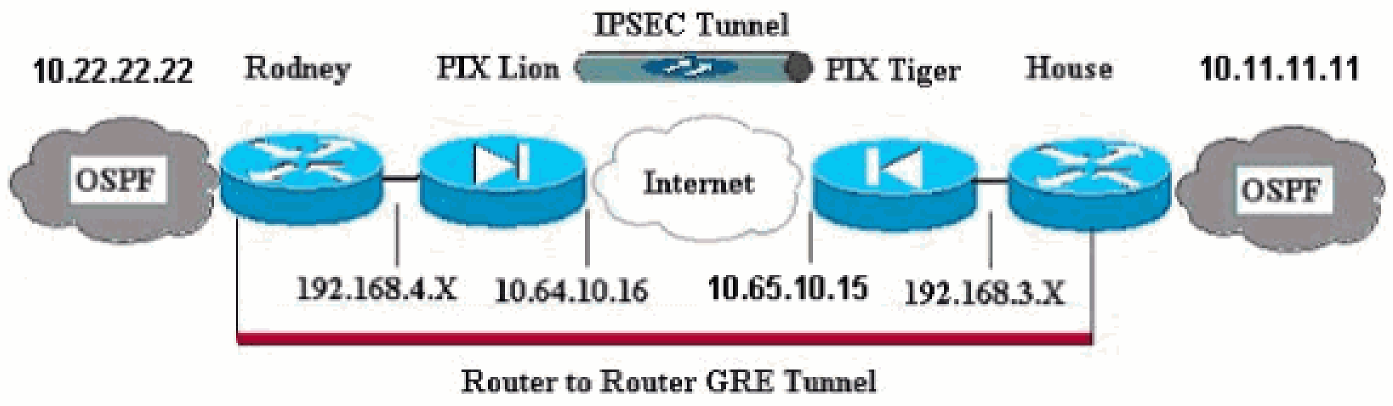
Configurar

Nesta seção, você verá as informações usadas para configurar os recursos descritos neste documento.

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

Diagrama de Rede

Este documento utiliza a seguinte configuração de rede:



Observação: os esquemas de endereçamento IP usados nesta configuração não são legalmente roteáveis na Internet. Esses são endereços RFC 1918 que foram usados em um ambiente de laboratório.

Observação: o Crypto não suporta o Cisco 7600 Series Router. Talvez seja necessário instalar o módulo VPN para que isso funcione.

Configurações

Este documento utiliza as seguintes configurações:

- PIX Lion
- PIX Tiger
- Roteador Rodney
- Companhia do Roteador

PIX Lion

```
PIX Version 6.3(5)
interface ethernet0 auto
interface ethernet1 auto
interface ethernet2 auto shutdown
interface ethernet3 auto shutdown
interface ethernet4 auto shutdown
interface ethernet5 auto shutdown
nameif ethernet0 outside security0
nameif ethernet1 inside security100
nameif ethernet2 intf2 security4
nameif ethernet3 intf3 security6
nameif ethernet4 intf4 security8
nameif ethernet5 intf5 security10
enable password 8Ry2YjIyt7RRXU24 encrypted
passwd 2KFQnbNIdI.2KYOU encrypted
hostname Lion
fixup protocol dns maximum-length 512
fixup protocol ftp 21
fixup protocol h323 h225 1720
fixup protocol h323 ras 1718-1719
fixup protocol http 80
fixup protocol rsh 514
fixup protocol rtsp 554
fixup protocol sip 5060
fixup protocol sip udp 5060
fixup protocol skinny 2000
fixup protocol smtp 25
fixup protocol sqlnet 1521
fixup protocol tftp 69
names
!--- Defines interesting traffic that is protected by
the IPsec tunnel. access-list 101 permit gre 192.168.4.0
255.255.255.0 192.168.3.0 255.255.255.0

!--- Do not perform NAT for traffic to other PIX
Firewall. access-list nonat permit ip 192.168.4.0
255.255.255.0 192.168.3.0 255.255.255.0
pager lines 24
mtu outside 1500
mtu inside 1500
mtu intf2 1500
mtu intf3 1500
mtu intf4 1500
mtu intf5 1500
ip address outside 10.64.10.16 255.255.255.224
ip address inside 192.168.4.1 255.255.255.0
!--- Output suppressed. global (outside) 1 interface !--
- Do not Network Address Translate (NAT) traffic. nat
(inside) 0 access-list nonat
nat (inside) 1 0.0.0.0 0.0.0.0 0 0
route outside 0.0.0.0 0.0.0.0 10.64.10.1 1
timeout xlate 3:00:00
timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 rpc
0:10:00 h323 0:05:00 s0
timeout h323 0:05:00 mgcp 0:05:00 sip 0:30:00 sip_media
0:02:00
timeout sip-disconnect 0:02:00 sip-invite 0:03:00
timeout uauth 0:05:00 absolute
aaa-server TACACS+ protocol tacacs+
aaa-server TACACS+ max-failed-attempts 3
aaa-server TACACS+ deadtime 10
aaa-server RADIUS protocol radius
aaa-server RADIUS max-failed-attempts 3
aaa-server RADIUS deadtime 10
aaa-server LOCAL protocol local
no snmp-server location
no snmp-server contact
snmp-server community public
no snmp-server enable traps
floodguard enable
!--- Trust IPSec traffic and avoid going through !---
access control lists (ACLs)/NAT. sysopt connection
permit-ipsec

!--- IPsec configuration. crypto ipsec transform-set
pixset esp-des esp-md5-hmac
crypto map pixmap 20 ipsec-isakmp
crypto map pixmap 20 match address 101
crypto map pixmap 20 set peer 10.65.10.15
crypto map pixmap 20 set transform-set pixset
crypto map pixmap interface outside
isakmp enable outside
!--- IKE parameters. isakmp key ******** address
10.65.10.15 netmask 255.255.255.255
isakmp identity address
isakmp policy 20 authentication pre-share
isakmp policy 20 encryption des
isakmp policy 20 hash md5
isakmp policy 20 group 1
isakmp policy 20 lifetime 3600
telnet timeout 5
ssh 10.104.205.124 255.255.255.255 outside
ssh timeout 5
terminal width 80
Cryptochecksum:d39b3d449563c7cd434b43f82f0f0a21
: end
```

PIX Tiger

```
PIX Version 6.3(5)
interface ethernet0 auto
interface ethernet1 auto
interface ethernet2 auto shutdown
interface ethernet3 auto shutdown
interface ethernet4 auto shutdown
interface ethernet5 auto shutdown
nameif ethernet0 outside security0
nameif ethernet1 inside security100
nameif ethernet2 intf2 security4
nameif ethernet3 intf3 security6
nameif ethernet4 intf4 security8
nameif ethernet5 intf5 security10
enable password 8Ry2YjIyt7RRXU24 encrypted
passwd 2KFQnbNIdI.2KYOU encrypted
hostname Tiger
fixup protocol dns maximum-length 512
fixup protocol ftp 21
fixup protocol h323 h225 1720
fixup protocol h323 ras 1718-1719
fixup protocol http 80
fixup protocol rsh 514
fixup protocol rtsp 554
fixup protocol sip 5060
fixup protocol sip udp 5060
fixup protocol skinny 2000
fixup protocol smtp 25
fixup protocol sqlnet 1521
fixup protocol tftp 69
names
access-list 101 permit gre 192.168.3.0 255.255.255.0
192.168.4.0 255.255.255.0

access-list nonat permit ip 192.168.3.0 255.255.255.0
192.168.4.0 255.255.255.0
mtu outside 1500
mtu inside 1500
mtu intf2 1500
mtu intf3 1500
mtu intf4 1500
mtu intf5 1500
ip address outside 10.65.10.15 255.255.255.224
ip address inside 192.168.3.1 255.255.255.0
!--- Output suppressed. global (outside) 1 interface !--
- Do not NAT traffic. nat (inside) 0 access-list nonat
nat (inside) 1 0.0.0.0 0.0.0.0 0 0
route outside 0.0.0.0 0.0.0.0 10.64.10.1 1
timeout xlate 3:00:00
timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 rpc
0:10:00 h323 0:05:00 s0
timeout h323 0:05:00 mgcp 0:05:00 sip 0:30:00 sip_media
0:02:00
timeout sip-disconnect 0:02:00 sip-invite 0:03:00
timeout uauth 0:05:00 absolute
aaa-server TACACS+ protocol tacacs+
aaa-server TACACS+ max-failed-attempts 3
aaa-server TACACS+ deadtime 10
aaa-server RADIUS protocol radius
aaa-server RADIUS max-failed-attempts 3
aaa-server RADIUS deadtime 10
aaa-server LOCAL protocol local
no snmp-server location
no snmp-server contact
snmp-server community public
no snmp-server enable traps
floodguard enable
sysopt connection permit-ipsec
!--- IPsec parameters. crypto ipsec transform-set pixset
```

```
esp-des esp-md5-hmac
crypto map pixmap 20 ipsec-isakmp
crypto map pixmap 20 match address 101
crypto map pixmap 20 set peer 10.64.10.16
crypto map pixmap 20 set transform-set pixset
crypto map pixmap interface outside
!--- IKE parameters. isakmp enable outside
isakmp key ******** address 10.64.10.16 netmask
255.255.255.255
isakmp identity address
isakmp policy 20 authentication pre-share
isakmp policy 20 encryption des
isakmp policy 20 hash md5
isakmp policy 20 group 1
isakmp policy 20 lifetime 3600
telnet timeout 5
ssh timeout 5
terminal width 80
Cryptochecksum:a0a7ac847b05d9d080d1c442ef053a0b
: end
```

Roteador Rodney

```

version 12.4
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname rodney
!
memory-size iomem 15
ip subnet-zero
!
ip audit notify log
ip audit po max-events 100
!
!
interface Loopback1
ip address 10.22.22.22 255.255.255.0
!
interface Tunnel0
ip address 10.1.1.2 255.255.255.0
!--- Tunnel source. tunnel source Ethernet0/1
!--- Tunnel destination. tunnel destination 192.168.3.2
!
interface Ethernet0/0
no ip address
!
interface Serial0/0
no ip address
shutdown
!
interface Ethernet0/1
ip address 192.168.4.2 255.255.255.0
!
interface Serial0/1
no ip address
shutdown
!
router ospf 22
log-adjacency-changes
network 10.1.1.0 0.0.0.255 area 0
network 10.22.22.0 0.0.0.255 area 0
```

```
!
ip classless
ip route 0.0.0.0 0.0.0.0 192.168.4.1
!--- The 10.11.11.0 traffic is passed through !--- the
GRE tunnel. ip route 10.11.11.0 255.255.255.0 Tunnel0 no
ip http server ! line con 0 line aux 0 line vty 0 4
login ! end! End
```

Companhia do Roteador

```

version 12.4
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname house
!
ip subnet-zero
no ip domain-lookup
!

!
interface Loopback1
ip address 10.11.11.11 255.255.255.0
!
interface Tunnel0
ip address 10.1.1.1 255.255.255.0
!--- Tunnel source. tunnel source FastEthernet0/1
!--- Tunnel destination. tunnel destination 192.168.4.2
!
interface FastEthernet0/0
no ip address
shutdown
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 192.168.3.2 255.255.255.0
duplex auto
speed auto
!
interface FastEthernet4/0
no ip address
shutdown
duplex auto
speed auto
!
router ospf 11
log-adjacency-changes
network 10.1.1.0 0.0.0.255 area 0
network 10.11.11.0 0.0.0.255 area 0
!
ip classless
ip route 0.0.0.0 0.0.0.0 192.168.3.1
!--- The 10.22.22.0 traffic is passed through !--- the
GRE tunnel. ip route 10.22.22.0 255.255.255.0 Tunnel0
ip http server
!
line con 0
line aux 0
line vty 0 4
```

Verificar

No momento, não há procedimento de verificação disponível para esta configuração.

Troubleshoot

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

Consulte Troubleshooting do PIX para Passar o Tráfego de Dados em um Túnel IPSec Estabelecido para obter informações adicionais sobre como solucionar problemas de um PIX e de um túnel IPsec.

Comandos para Troubleshooting

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

Nota:Consulte Informações Importantes sobre Comandos de Depuração antes de usar comandos debug.

Boa depuração de IPSec do PIX

- **show crypto isakmp sa** — Mostra a Associação de Segurança (SA - Security Association Management Protocol) do Internet Security (ISAKMP - Internet Security Association Management Protocol) criada entre pares.
  ```
  Lion#show crypto isakmp sa
  Total : 1
  Embryonic : 0
  dst src state pending created
  10.65.10.15 10.64.10.16 QM_IDLE 0 1


  Tiger#show crypto isakmp sa
  Total SAs : 1
  Embryonic : 0
  dst src state pending created
  10.65.10.15 10.64.10.16 QM_IDLE 0 1
  ```
- **show crypto engine connection ative** —Mostra cada SA da Fase 2 criado e a quantidade de tráfego enviado.
  ```
  Lion#show crypto engine connection active
  Crypto Engine Connection Map:
  size = 8, free = 6, used = 2, active = 2


  Tiger#show crypto engine connection active
  Crypto Engine Connection Map:
  size = 8, free = 6, used = 2, active = 2
  ```
- **show debug** — Exibe a saída da depuração.
  ```
  Lion#show debug
  debug crypto ipsec
  debug crypto isakmp
  debug crypto engine
  crypto_isakmp_process_block: src 10.65.10.15, dest 10.64.10.16
  ```

```
OAK_MM exchange
ISAKMP (0): processing SA payload. message ID = 0

ISAKMP (0): Checking ISAKMP transform 1 against priority 20 policy
ISAKMP: encryption DES-CBC
ISAKMP: hash MD5
ISAKMP: default group 1
ISAKMP: auth pre-share
ISAKMP: life type in seconds
ISAKMP: life duration (basic) of 3600
ISAKMP (0): atts are acceptable. Next payload is 0
ISAKMP (0): SA is doing pre-shared key authentication using id type ID_IPV4_ADDR
return status is IKMP_NO_ERROR#
crypto_isakmp_process_block: src 10.65.10.15, dest 10.64.10.16
OAK_MM exchange
ISAKMP (0): processing KE payload. message ID = 0

ISAKMP (0): processing NONCE payload. message ID = 0

ISAKMP (0): processing vendor id payload

ISAKMP (0): speaking to another IOS box!

ISAKMP (0): ID payload
next-payload : 8
type : 1
protocol : 17
port : 500
length : 8
ISAKMP (0): Total payload length: 12
return status is IKMP_NO_ERROR
crypto_isakmp_process_block: src 10.65.10.15, dest 10.64.10.16
OAK_MM exchange
ISAKMP (0): processing ID payload. message ID = 0
ISAKMP (0): processing HASH payload. message ID = 0
ISAKMP (0): SA has been authenticated

ISAKMP (0): beginning Quick Mode exchange, M-ID of 1220019031:48b80357IPSEC(key.
IPSEC(spi_response): getting spi 0xa67177c5(2792454085) for SA
from 10.65.10.15 to 10.64.10.16 for prot 3

return status is IKMP_NO_ERROR
crypto_isakmp_process_block: src 10.65.10.15, dest 10.64.10.16
OAK_QM exchange
oakley_process_quick_mode:
OAK_QM_IDLE
ISAKMP (0): processing SA payload. message ID = 1220019031

ISAKMP : Checking IPSec proposal 1

ISAKMP: transform 1, ESP_DES
ISAKMP: attributes in transform:
ISAKMP: encaps is 1
ISAKMP: SA life type in seconds
ISAKMP: SA life duration (basic) of 28800
ISAKMP: SA life type in kilobytes
ISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0
ISAKMP: authenticator is HMAC-MD5
ISAKMP (0): atts are acceptable.IPSEC(validate_proposal_request): proposal part,
(key eng. msg.) dest= 10.65.10.15, src= 10.64.10.16,
dest_proxy= 192.168.3.0/255.255.255.0/0/0 (type=4),
src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 0s and 0kb,
spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x4

ISAKMP (0): processing NONCE payload. message ID = 1220019031

ISAKMP (0): processing ID payload. message ID = 1220019031
ISAKMP (0): processing ID payload. message ID = 1220019031map_alloc_entry: allo2
map_alloc_entry: allocating entry 1

ISAKMP (0): Creating IPSec SAs
inbound SA from 10.65.10.15 to 10.64.10.16 (proxy 192.168.3)
has spi 2792454085 and conn_id 2 and flags 4
lifetime of 28800 seconds
lifetime of 4608000 kilobytes
outbound SA from 10.64.10.16 to 10.65.10.15 (proxy 192.168.)
has spi 285493108 and conn_id 1 and flags 4
lifetime of 28800 seconds
lifetime of 4608000 kilobytesIPSEC(key_engine): got a queue event...
IPSEC(initialize_sas): ,
(key eng. msg.) dest= 10.64.10.16, src= 10.65.10.15,
dest_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
src_proxy= 192.168.3.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 28800s and 4608000kb,
spi= 0xa67177c5(2792454085), conn_id= 2, keysize= 0, flags= 0x4
IPSEC(initialize_sas): ,
(key eng. msg.) src= 10.64.10.16, dest= 10.65.10.15,
src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
dest_proxy= 192.168.3.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 28800s and 4608000kb,
spi= 0x11044774(285493108), conn_id= 1, keysize= 0, flags= 0x4

return status is IKMP_NO_ERROR
```

Roteamento e ping de passagem GRE do roteador

- **show ip route** — Exibe entradas da tabela de roteamento IP.

```
rodney#show ip route
Codes: C - connected, S - static, I - IGRP, 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, E - EGP
i - IS-IS, 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 192.168.4.1 to network 0.0.0.0

10.0.0.0/24 is subnetted, 1 subnets
C 10.1.1.0 is directly connected, Tunnel0
10.0.0.0/24 is subnetted, 1 subnets
C 10.20.20.0 is directly connected, Loopback0
10.0.0.0/24 is subnetted, 1 subnets
C 10.22.22.0 is directly connected, Loopback1
C 192.168.4.0/24 is directly connected, Ethernet0/1
10.0.0.0/24 is subnetted, 1 subnets
S 10.10.10.0 is directly connected, Tunnel0
10.0.0.0/32 is subnetted, 1 subnets
O 10.11.11.11 [110/11112] via 10.1.1.1, 03:34:01, Tunnel0
S* 0.0.0.0/0 [1/0] via 192.168.4.1
rodney#
rodney#ping 10.11.11.11

Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 10.11.11.11, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms



house#show ip route
Codes: C - connected, S - static, I - IGRP, 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, E - EGP
i - IS-IS, 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 192.168.3.1 to network 0.0.0.0

10.0.0.0/24 is subnetted, 1 subnets
C 1.1.1.0 is directly connected, Tunnel0
10.0.0.0/24 is subnetted, 1 subnets
S 10.20.20.0 is directly connected, Tunnel0
10.0.0.0/32 is subnetted, 1 subnets
O 10.22.22.22 [110/11112] via 10.1.1.2, 03:33:39, Tunnel0
10.0.0.0/24 is subnetted, 1 subnets
C 10.10.10.0 is directly connected, Loopback0
10.0.0.0/24 is subnetted, 1 subnets
C 10.11.11.0 is directly connected, Loopback1
C 192.168.3.0/24 is directly connected, FastEthernet0/1
S* 0.0.0.0/0 [1/0] via 192.168.3.1

house#ping 10.22.22.22

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.22.22.22, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/3/4 ms
```

Informações Relacionadas

- Negociação IPsec/Protocolos IKE
- Referências do comando Cisco Secure PIX Firewall
- Suporte de produto PIX
- Suporte Técnico e Documentação - Cisco Systems