Túnel LAN a LAN IPSec entre um Catalyst 6500 com o módulo de serviço VPN e um exemplo de configuração de firewall PIX

Contents

Introduction

Este documento descreve como criar um túnel de LAN para LAN de IPSec entre um switch Cisco Catalyst 6500 Series com o módulo de serviço VPN IPSec (W) e um Cisco PIX Firewall.

Prerequisites

Requirements

Não existem requisitos específicos para este documento.

Componentes Utilizados

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

- Software Cisco IOS® versão 12.2(14)SY2 para o Supervisor Engine da Série Catalyst 6000, com o módulo de serviço VPN IPSec
- Software Cisco PIX Firewall versão 6.3(3)

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

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

Informações de Apoio

O módulo de serviço de VPN do Catalyst 6500 tem duas portas Gigabit Ethernet (GE) sem conectores visíveis externamente. Essas portas são endereçáveis apenas para fins de configuração. A porta 1 é sempre a porta interna. Esta porta lida com todo o tráfego de e para a rede interna. A segunda porta (porta 2) trata todo o tráfego de e para a WAN ou redes externas. Essas duas portas são sempre configuradas no modo de entroncamento 802.1Q. O módulo de serviço VPN usa uma técnica chamada Bump In The Wire (BITW) para fluxo de pacote.

Os pacotes são processados por um par de VLANs, uma camada 3 dentro da VLAN e uma camada 2 fora da VLAN. Os pacotes, de dentro para fora, são roteados por meio de um método chamado de Lógica de Reconhecimento de Endereço Codificado (EARL - Encoded Address Recognition Logic) para a VLAN interna. Depois de criptografar os pacotes, o módulo de serviço VPN usa a VLAN externa correspondente. No processo de descriptografia, os pacotes de fora para dentro são ligados ao módulo de serviço VPN usando a VLAN externa. Depois que o módulo de serviço VPN descriptografa o pacote e mapeia a VLAN para a VLAN interna correspondente, o EARL encaminha o pacote para a porta LAN apropriada. A Camada 3 dentro da VLAN e as VLANs externas da Camada 2 são unidas com o comando **crypto connect vlan**. Há três tipos de portas nos switches da série Catalyst 6500:

- **Portas roteadas** —Por padrão, todas as portas Ethernet são portas roteadas no Cisco IOS. Essas portas têm uma VLAN oculta associada a elas.
- **Portas de acesso** —Essas portas têm uma VLAN externa ou VLAN Trunk Protocol (VTP) associada a elas. Você pode associar mais de uma porta a uma VLAN definida.
- **Portas de tronco**—Essas portas transportam muitas VLANs externas ou VTP, nas quais todos os pacotes são encapsulados com um cabeçalho 802.1Q.

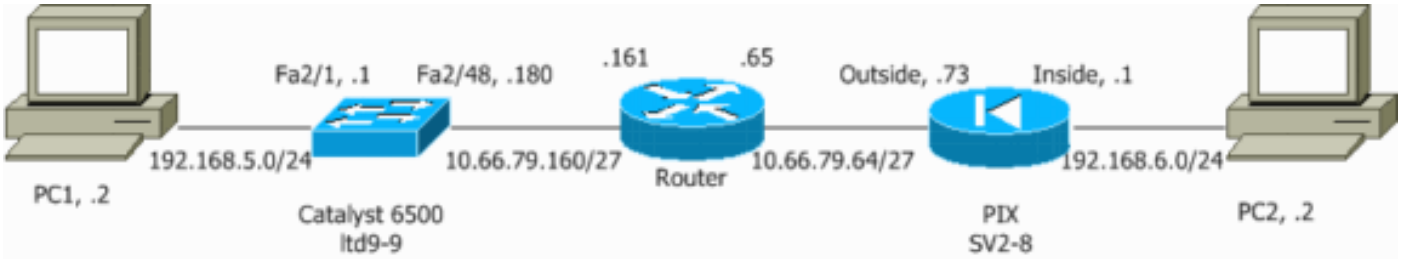
Configurar

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 neste documento.

Diagrama de Rede

Este documento utiliza a seguinte configuração de rede:



Configuração de IPSec usando um acesso de camada 2 ou porta de tronco

Execute estas etapas para configurar o IPSec com a ajuda de uma porta de tronco ou de acesso de Camada 2 para a interface física externa.

1. Adicione as VLANs internas à porta interna do módulo de serviço VPN.Suponha que o módulo de serviço VPN esteja no slot 4. Use a VLAN 100 como a VLAN interna e a VLAN 209 como a VLAN externa. Configure as portas GE do módulo de serviço VPN como esta:

```
interface GigabitEthernet4/1
 no ip address
 flowcontrol receive on
 flowcontrol send off
 switchport
 switchport trunk encapsulation dot1q
 switchport trunk allowed vlan 1,100,1002-1005
 switchport mode trunk
 cdp enable

interface GigabitEthernet4/2
 no ip address
 flowcontrol receive on
 flowcontrol send off
 switchport
 switchport trunk encapsulation dot1q
 switchport trunk allowed vlan 1,209,1002-1005
 switchport mode trunk
 cdp enable
 spanning-tree portfast trunk
```

2. Adicione a interface VLAN 100 e a interface onde o túnel é terminado (que, neste caso, é a `interface Vlan 209`, como mostrado aqui).

```
interface Vlan100
 ip address 10.66.79.180 255.255.255.224

interface Vlan209
 no ip address
 crypto connect vlan 100
```

3. Configure a porta física externa como uma porta de tronco ou de acesso (nesse caso, `FastEthernet 2/48`, como mostrado aqui).

```
!--- This is the configuration that uses an access port. interface FastEthernet2/48
 no ip address
 switchport
 switchport access vlan 209
 switchport mode access

!--- This is the configuration that uses a trunk port. interface FastEthernet2/48
 no ip address switchport
```

```
switchport trunk encapsulation dot1q
switchport mode trunk
```

4. Crie o NAT de desvio. Adicione estas entradas à instrução no nat para isentar a nação entre estas redes:
```
access-list inside_nat0_outbound permit ip 192.168.5.0 0.0.0.255
192.168.6.0 0.0.0.255
global (outside) 1 interface
nat (inside) 0 access-list inside_nat0_outbound
nat (inside) 1 192.168.5.0 255.255.255.0
```
5. Crie sua configuração de criptografia e a lista de controle de acesso (ACL) que define o tráfego a ser criptografado.Crie uma ACL de criptografia (neste caso, ACL 100 - Tráfego interessante) que defina o tráfego da rede interna 192.168.5.0/24 para a rede remota 192.168.6.0/24, assim:

   ```
   access-list 100 permit ip 192.168.5.0 0.0.0.255 192.168.6.0 0.0.0.255
   ```

   Defina suas propostas de política de Internet Security Association and Key Management Protocol (ISAKMP), como esta:

   ```
   crypto isakmp policy 1
   hash md5
   authentication pre-share
   group 2
   ```

   Emita este comando (neste exemplo) para usar e definir chaves pré-compartilhadas:

   ```
   crypto isakmp key cisco address 10.66.79.73
   ```

   Defina suas propostas de IPSec, como esta:

   ```
   crypto ipsec transform-set cisco esp-des esp-md5-hmac
   ```

   Crie sua instrução de mapa de criptografia, como esta:

   ```
   crypto map cisco 10 ipsec-isakmp
    set peer 10.66.79.73
    set transform-set cisco
    match address 100
   ```

6. Aplique o mapa de criptografia à interface da VLAN 100, assim:

   ```
   interface vlan100
   crypto map cisco
   ```

Essas configurações são usadas:

- Catalyst 6500
- Firewall de PIX

Catalyst 6500
`!--- Define the Phase 1 policy.` **`crypto isakmp policy 1`** **`hash md5`**

```
 authentication pre-share
 group 2
crypto isakmp key cisco address 10.66.79.73
!
!
!--- Define the encryption policy for this setup. crypto
ipsec transform-set cisco esp-des esp-md5-hmac
!
!--- Define a static crypto map entry for the peer !---
with mode ipsec-isakmp. !--- This indicates that
Internet Key Exchange (IKE) !--- is used to establish
the IPSec !--- security associations (SAs) to protect
the traffic !--- specified by this crypto map entry.
crypto map cisco 10 ipsec-isakmp
 set peer 10.66.79.73
 set transform-set cisco
 match address 100
!
!
no spanning-tree vlan 100
!
!
!
interface FastEthernet2/1
 ip address 192.168.5.1 255.255.255.0
!
!--- This is the outside Layer 2 port that allows !---
VLAN 209 traffic to enter. interface FastEthernet2/48 no
ip address switchport switchport trunk encapsulation
dot1q switchport mode trunk ! interface
GigabitEthernet4/1 no ip address flowcontrol receive on
flowcontrol send off switchport switchport trunk
encapsulation dot1q !--- VLAN 100 is defined as the
Interface VLAN (IVLAN).  switchport trunk allowed vlan
1,100,1002-1005
 switchport mode trunk
 cdp enable
!
interface GigabitEthernet4/2
 no ip address
 flowcontrol receive on
 flowcontrol send off
 switchport
 switchport trunk encapsulation dot1q
!--- The Port VLAN (PVLAN) configuration is handled
transparently by !--- the VPN service module without
user configuration !--- or involvement. It also is not
shown in the configuration. !--- Note: For every IVLAN,
a corresponding PVLAN exists.

 switchport trunk allowed vlan 1,209,1002-1005
 switchport mode trunk
 cdp enable
 spanning-tree portfast trunk
!
interface Vlan1
no ip address
shutdown
!
!--- This is the IVLAN that is configured to intercept
the traffic !--- destined to the secure port on which
the inside port !--- of the VPN service module is the
only port present. interface Vlan100 ip address
10.66.79.180 255.255.255.224  crypto map cisco
```

```
!--- This is the secure port that is a virtual Layer 3
interface. !--- This interface purposely does not have a
Layer 3 IP address !--- configured. This is normal for
the BITW process. !--- The IP address is moved from this
interface to the VLAN 100 to !--- accomplish BITW. This
brings the VPN service module into !--- the packet path.
interface Vlan209 no ip address  crypto connect vlan 100
!
ip classless

global (outside) 1 interface
!--- NAT 0 prevents NAT for networks specified in the
ACL inside_nat0_outbound. nat (inside) 0 access-list
inside_nat0_outbound nat (inside) 1 192.168.5.0
255.255.255.0 !--- Configure the routing so that the
device !--- is directed to reach its destination
network. ip route 0.0.0.0 0.0.0.0 10.66.79.161
!--- This access list (inside_nat0_outbound) is used
with the nat zero command. !--- This prevents traffic
which matches the access list from undergoing !---
network address translation (NAT). The traffic specified
by this ACL is !--- traffic that is to be encrypted and
!--- sent across the VPN tunnel. This ACL is
intentionally !--- the same as (100). !--- Two separate
access lists should always be used in this
configuration. access-list inside_nat0_outbound permit
ip 192.168.5.0 0.0.0.255 192.168.6.0 0.0.0.255

!--- This is the crypto ACL. access-list 100 permit ip
192.168.5.0 0.0.0.255 192.168.6.0 0.0.0.255
```

Firewall de PIX

```
SV2-8(config)# show run
: Saved
:
PIX Version 6.3(3)
interface ethernet0 auto
interface ethernet1 auto
interface ethernet2 auto shutdown
interface ethernet3 auto shutdown
interface ethernet4 auto shutdown
interface ethernet5 auto shutdown
interface ethernet6 auto shutdown
nameif ethernet0 outside security0
nameif ethernet1 inside security100
nameif ethernet2 intf2 security10
nameif ethernet3 intf3 security15
nameif ethernet4 intf4 security20
nameif ethernet5 intf5 security25
nameif ethernet6 intf6 security30
enable password 8Ry2YjIyt7RRXU24 encrypted
passwd 2KFQnbNIdI.2KYOU encrypted
hostname SV2-8
domain-name cisco.com
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 ils 389
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
!--- This is the traffic to the router. access-list 100
permit ip 192.168.6.0 255.255.255.0 192.168.5.0
255.255.255.0
access-list nonat permit ip 192.168.6.0 255.255.255.0
192.168.5.0 255.255.255.0
pager lines 24
mtu outside 1500
mtu inside 1500
mtu intf2 1500
mtu intf3 1500
mtu intf4 1500
mtu intf5 1500
mtu intf6 1500
ip address outside 10.66.79.73 255.255.255.224
ip address inside 192.168.6.1 255.255.255.0
ip address intf2 127.0.0.1 255.255.255.255
no ip address intf3
no ip address intf4
no ip address intf5
no ip address intf6
ip audit info action alarm
ip audit attack action alarm
no failover
failover timeout 0:00:00
failover poll 15
no failover ip address outside
no failover ip address inside
no failover ip address intf2
no failover ip address intf3
no failover ip address intf4
no failover ip address intf5
no failover ip address intf6
pdm history enable
arp timeout 14400
global (outside) 1 interface
nat (inside) 0 access-list nonat
nat (inside) 1 192.168.6.0 255.255.255.0 0 0
route outside 0.0.0.0 0.0.0.0 10.66.79.65 1
timeout xlate 3:00:00
timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 rpc
0:10:00 h225 1:00:00
timeout h323 0:05:00 mgcp 0:05:00 sip 0:30:00 sip_media
0:02:00
timeout uauth 0:05:00 absolute
aaa-server TACACS+ protocol tacacs+
aaa-server RADIUS protocol radius
aaa-server LOCAL protocol local
no snmp-server location
no snmp-server contact
snmp-server community public
no snmp-server enable traps
floodguard enable
!--- These are IPSec policies. sysopt connection permit-
ipsec
crypto ipsec transform-set cisco esp-des esp-md5-hmac
crypto map cisco 10 ipsec-isakmp
crypto map cisco 10 match address 100
```

```
crypto map cisco 10 set peer 10.66.79.180
crypto map cisco 10 set transform-set cisco
crypto map cisco interface outside
!--- These are IKE policies. isakmp enable outside
isakmp key ******** address 10.66.79.180 netmask
255.255.255.255
isakmp policy 1 authentication pre-share
isakmp policy 1 encryption des
isakmp policy 1 hash md5
isakmp policy 1 group 2
isakmp policy 1 lifetime 86400
telnet timeout 5
ssh timeout 5
console timeout 0
terminal width 80
Cryptochecksum:244c86c9beab00bda8f790502ca74db9
: end
```

Configuração de IPSec usando uma porta roteada

Execute estas etapas para configurar o IPSec com a ajuda de uma porta roteada de Camada 3 para a interface física externa.

1. Adicione as VLANs internas à porta interna do módulo de serviço VPN.Suponha que o módulo de serviço VPN esteja no slot 4. Use a VLAN 100 como a VLAN interna e a VLAN 209 como a VLAN externa. Configure as portas GE do módulo de serviço VPN como esta:

```
interface GigabitEthernet4/1
 no ip address
 flowcontrol receive on
 flowcontrol send off
 switchport
 switchport trunk encapsulation dot1q
 switchport trunk allowed vlan 1,100,1002-1005
 switchport mode trunk
 cdp enable

interface GigabitEthernet4/2
 no ip address
 flowcontrol receive on
 flowcontrol send off
 switchport
 switchport trunk encapsulation dot1q
 switchport trunk allowed vlan 1,209,1002-1005
 switchport mode trunk
 cdp enable
 spanning-tree portfast trunk
```

2. Adicione a interface VLAN 100 e a interface onde o túnel é terminado (que, neste caso, é `FastEthernet2/48`, como mostrado aqui).

```
interface Vlan100
 ip address 10.66.79.180 255.255.255.224

interface FastEthernet2/48
 no ip address
 crypto connect vlan 100
```

3. Crie o NAT de desvio. Adicione estas entradas à instrução no nat para isentar a nação entre estas redes:

```
access-list inside_nat0_outbound permit ip 192.168.5.0 0.0.0.255
192.168.6.0 0.0.0.255
global (outside) 1 interface
nat (inside) 0 access-list inside_nat0_outbound
nat (inside) 1 192.168.5.0 255.255.255.0
```

4. Crie sua configuração de criptografia e a ACL que define o tráfego a ser criptografado.Crie uma ACL (neste caso, ACL 100) que defina o tráfego da rede interna 192.168.5.0/24 para a rede remota 192.168.6.0/24, como esta:

   ```
   access-list 100 permit ip 192.168.5.0 0.0.0.255 192.168.6.0 0.0.0.255
   ```

   Defina suas propostas de política ISAKMP, como esta:

   ```
   crypto isakmp policy 1
   hash md5
   authentication pre-share
   group 2
   ```

   Emita este comando (neste exemplo) para usar e definir chaves pré-compartilhadas:

   ```
   crypto isakmp key cisco address 10.66.79.73
   ```

   Defina suas propostas de IPSec, como esta:

   ```
   crypto ipsec transform-set cisco esp-des esp-md5-hmac
   ```

   Crie sua instrução de mapa de criptografia, como esta:

   ```
   crypto map cisco 10 ipsec-isakmp
    set peer 10.66.79.73
    set transform-set cisco
    match address 100
   ```

5. Aplique o mapa de criptografia à interface da VLAN 100, assim:

   ```
   interface vlan100
   crypto map cisco
   ```

Essas configurações são usadas:

- Catalyst 6500
- Firewall de PIX

Catalyst 6500

```
!--- Define the Phase 1 policy. crypto isakmp policy 1
 hash md5
 authentication pre-share
 group 2
crypto isakmp key cisco address 10.66.79.73
!
!
!--- Define the encryption policy for this setup. crypto
ipsec transform-set cisco esp-des esp-md5-hmac
!
!--- Define a static crypto map entry for the peer !---
```

```
with mode ipsec-isakmp. !--- This indicates that IKE is
used to establish the !--- IPSec SAs to protect the
traffic !--- specified by this crypto map entry. crypto
map cisco 10 ipsec-isakmp
 set peer 10.66.79.73
 set transform-set cisco
 match address 100
!
!
no spanning-tree vlan 100
!
!
!
interface FastEthernet2/1
 ip address 192.168.5.1 255.255.255.0
!
!--- This is the secure port that is configured in
routed port mode. !--- This routed port mode does not
have a Layer 3 IP address !--- configured. This is
normal for the BITW process. !--- The IP address is
moved from this interface to the VLAN 100 to !---
accomplish BITW. This brings the VPN service module into
!--- the packet path. This is the Layer 2 port VLAN on
which the !--- outside port of the VPN service module
also belongs. ! interface FastEthernet2/48 no ip address
crypto connect vlan 100
!
interface GigabitEthernet4/1
 no ip address
 flowcontrol receive on
 flowcontrol send off
 switchport
 switchport trunk encapsulation dot1q
!--- VLAN 100 is defined as the IVLAN.  switchport trunk
allowed vlan 1,100,1002-1005
 switchport mode trunk
 cdp enable
!
interface GigabitEthernet4/2
 no ip address
 flowcontrol receive on
 flowcontrol send off
 switchport
 switchport trunk encapsulation dot1q
!--- The PVLAN configuration is handled transparently by
the !--- VPN service module without user configuration
!--- or involvement. It also is not shown in the
configuration. !--- Note: For every IVLAN, a
corresponding PVLAN exists.

 switchport trunk allowed vlan 1,209,1002-1005
 switchport mode trunk
 cdp enable
 spanning-tree portfast trunk
!
interface Vlan1
no ip address
shutdown
!
!--- This is the IVLAN that is configured to intercept
the traffic !--- destined to the secure port on which
the inside port of the !--- VPN service module is the
only port present. interface Vlan100 ip address
10.66.79.180 255.255.255.224  crypto map cisco
```

```
!--- This is the secure port that is a virtual Layer 3
interface. !--- This interface purposely does not have a
Layer 3 IP address !--- configured. This is normal for
the BITW process. !--- The IP address is moved from this
interface to the VLAN 100 to !--- accomplish BITW. This
brings the VPN service module into !--- the packet path.
! ip classless global (outside) 1 interface !--- NAT 0
prevents NAT for networks specified in the ACL
inside_nat0_outbound. nat (inside) 0 access-list
inside_nat0_outbound nat (inside) 1 192.168.6.0
255.255.255.0 !--- Configure the routing so that the
device !--- is directed to reach its destination
network. ip route 0.0.0.0 0.0.0.0 10.66.79.161
!
!--- This access list (inside_nat0_outbound) is used
with the nat zero command. !--- This prevents traffic
which matches the access list from undergoing !---
network address translation (NAT). The traffic specified
by this ACL is !--- traffic that is to be encrypted and
!--- sent across the VPN tunnel. This ACL is
intentionally !--- the same as (100). !--- Two separate
access lists should always be used in this
configuration.



access-list inside_nat0_outbound permit ip 192.168.5.0
0.0.0.255 192.168.6.0 0.0.0.255

!--- This is the crypto ACL. access-list 100 permit ip
192.168.5.0 0.0.0.255 192.168.6.0 0.0.0.255
```

Firewall de PIX

```
SV2-8(config)# show run
: Saved
:
PIX Version 6.3(3)
interface ethernet0 auto
interface ethernet1 auto
interface ethernet2 auto shutdown
interface ethernet3 auto shutdown
interface ethernet4 auto shutdown
interface ethernet5 auto shutdown
interface ethernet6 auto shutdown
nameif ethernet0 outside security0
nameif ethernet1 inside security100
nameif ethernet2 intf2 security10
nameif ethernet3 intf3 security15
nameif ethernet4 intf4 security20
nameif ethernet5 intf5 security25
nameif ethernet6 intf6 security30
enable password 8Ry2YjIyt7RRXU24 encrypted
passwd 2KFQnbNIdI.2KYOU encrypted
hostname SV2-8
domain-name cisco.com
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 ils 389
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
!--- This is the traffic to the router. access-list 100
permit ip 192.168.6.0 255.255.255.0 192.168.5.0
255.255.255.0
access-list nonat permit ip 192.168.6.0 255.255.255.0
192.168.5.0 255.255.255.0
pager lines 24
mtu outside 1500
mtu inside 1500
mtu intf2 1500
mtu intf3 1500
mtu intf4 1500
mtu intf5 1500
mtu intf6 1500
ip address outside 10.66.79.73 255.255.255.224
ip address inside 192.168.6.1 255.255.255.0
ip address intf2 127.0.0.1 255.255.255.255
no ip address intf3
no ip address intf4
no ip address intf5
no ip address intf6
ip audit info action alarm
ip audit attack action alarm
no failover
failover timeout 0:00:00
failover poll 15
no failover ip address outside
no failover ip address inside
no failover ip address intf2
no failover ip address intf3
no failover ip address intf4
no failover ip address intf5
no failover ip address intf6
pdm history enable
arp timeout 14400
global (outside) 1 interface
nat (inside) 0 access-list nonat
nat (inside) 1 192.168.6.0 255.255.255.0 0 0
route outside 0.0.0.0 0.0.0.0 10.66.79.65 1
timeout xlate 3:00:00
timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 rpc
0:10:00 h225 1:00:00
timeout h323 0:05:00 mgcp 0:05:00 sip 0:30:00 sip_media
0:02:00
timeout uauth 0:05:00 absolute
aaa-server TACACS+ protocol tacacs+
aaa-server RADIUS protocol radius
aaa-server LOCAL protocol local
no snmp-server location
no snmp-server contact
snmp-server community public
no snmp-server enable traps
floodguard enable
!--- These are IPSec policies. sysopt connection permit-
ipsec
crypto ipsec transform-set cisco esp-des esp-md5-hmac
crypto map cisco 10 ipsec-isakmp
```

```
crypto map cisco 10 match address 100
crypto map cisco 10 set peer 10.66.79.180
crypto map cisco 10 set transform-set cisco
crypto map cisco interface outside
!--- These are IKE policies. isakmp enable outside
isakmp key ******** address 10.66.79.180 netmask
255.255.255.255
isakmp policy 1 authentication pre-share
isakmp policy 1 encryption des
isakmp policy 1 hash md5
isakmp policy 1 group 2
isakmp policy 1 lifetime 86400
telnet timeout 5
ssh timeout 5
console timeout 0
terminal width 80
Cryptochecksum:244c86c9beab00bda8f790502ca74db9
: end
```

Verificar

Esta seção fornece as informações para confirmar que sua configuração funciona adequadamente.

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.

- **show crypto ipsec sa** —Mostra as configurações usadas pelas SAs IPSec atuais.
- **show crypto isakmp sa** — Mostra todas as SAs IKE atuais em um peer.
- **show crypto vlan** — Mostra a VLAN associada à configuração de criptografia.
- **show crypto eli** — Mostra as estatísticas do módulo de serviço VPN.

Para obter informações adicionais sobre como verificar e solucionar problemas de IPSec, consulte IP Security Troubleshooting - Understanding and Using debug Commands.

Troubleshoot

Esta seção fornece as informações para solucionar problemas de configuração.

Comandos de solução de problemas

Observação: antes de emitir comandos **debug**, consulte Informações Importantes sobre Comandos Debug.

- **debug crypto ipsec** —Mostra as negociações de IPSec da Fase 2.
- **debug crypto ipsec - Exibe as negociações ISAKMP da fase 1.**
- **debug crypto engine** —Mostra o tráfego que está criptografado.
- **clear crypto isakmp** — Limpa as SAs relacionadas à Fase 1.
- **clear crypto sa** —Limpa as SAs relacionadas à Fase 2.

Para obter informações adicionais sobre como verificar e solucionar problemas de IPSec, consulte IP Security Troubleshooting - Understanding and Using debug Commands.

Informações Relacionadas

- Página de suporte do IPSec
- Configuração da segurança de rede IPSec
- Configurando o protocolo de segurança do intercâmbio chave de Internet
- Suporte Técnico - Cisco Systems