Configurazione di IPSec con EIGRP e IPX con il tunneling GRE

Sommario

Introduzione

Nelle normali configurazioni IPSec non è possibile trasferire protocolli di routing, ad esempio EIGRP (Enhanced Interior Gateway Routing Protocol) e OSPF (Open Shortest Path First), né traffico non IP, ad esempio IPX (Internetwork Packet Exchange), AppleTalk e così via. In questo documento viene spiegato come effettuare il routing tra diverse reti utilizzando un protocollo di routing e il traffico non IP con IPSec. Per questa tecnica viene usato il metodo GRE (Generic Routing Encapsulation).

Prerequisiti

Requisiti

Prima di provare la configurazione, verificare che siano soddisfatti i seguenti requisiti:

- Verificare che il tunnel funzioni prima di applicare le mappe crittografiche.
- Per autorizzare l'elenco degli accessi crittografati, è necessario che il protocollo sia GRE: access-list 101 consente all'host gre x.x.x.x host y.y.y x.x.x.x = <origine_tunnel> y.y.y = <destinazione_tunnel>
- Utilizzare gli indirizzi IP di loopback per identificare i peer IKE (Internet Key Exchange) e l'origine e la destinazione del tunnel per migliorare la disponibilità.
- Per una descrizione dei possibili problemi relativi alla MTU (Maximum Transmission Unit), consultare il documento sulla regolazione della MTU IP, del valore TCP MSS e della

funzionalità PMTUD sui sistemi Windows e Sun.

Componenti usati

Le informazioni fornite in questo documento si basano sulle seguenti versioni software e hardware:

- Software Cisco IOS® release 12.1.8 e 12.2.1

Le informazioni discusse in questo documento fanno riferimento a dispositivi usati in uno specifico ambiente di emulazione. Su tutti i dispositivi menzionati nel documento la configurazione è stata ripristinata ai valori predefiniti. Se la rete è operativa, valutare attentamente eventuali conseguenze derivanti dall'uso dei comandi.

Convenzioni

Per ulteriori informazioni sulle convenzioni usate, consultare il documento Cisco sulle convenzioni nei suggerimenti tecnici.

Configurazione

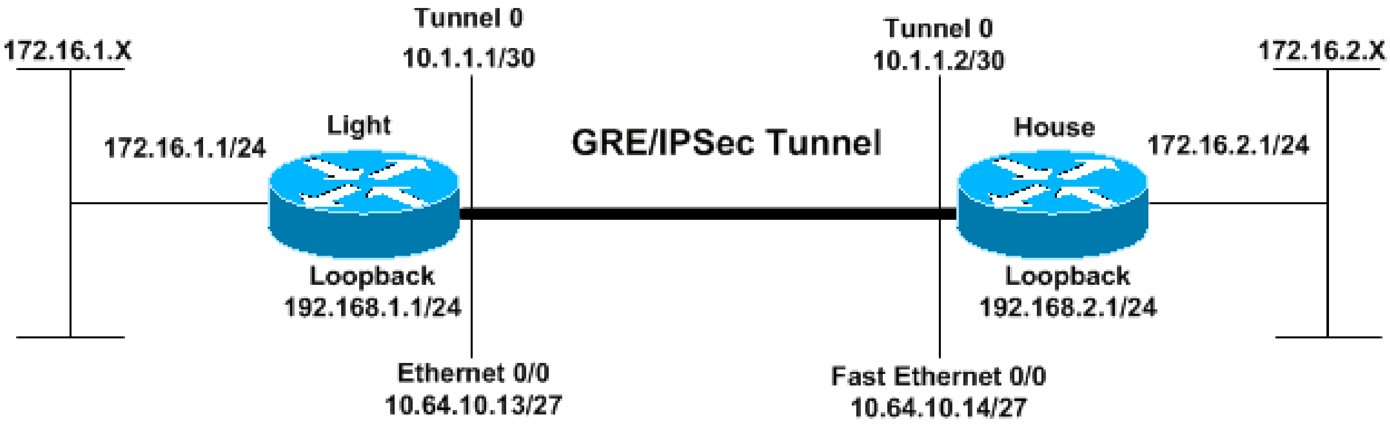
In questa sezione vengono presentate le informazioni necessarie per configurare le funzionalità descritte più avanti nel documento.

Nota: per ulteriori informazioni sui comandi menzionati in questo documento, usare lo strumento di ricerca dei comandi (solo utenti registrati).

Nota sulla configurazione di IOS: Con il software Cisco IOS versione 12.2(13)T e successive (codici T-train con numerazione superiore, software Cisco IOS versione 12.3 e successive), la "mappa crittografica" IPSec configurata deve essere applicata solo all'interfaccia fisica. Non è più necessario applicarlo sull'interfaccia del tunnel GRE. Mantenere la "mappa crittografica" sull'interfaccia fisica e sull'interfaccia del tunnel quando si usa il software Cisco IOS versione 12.2.2(13)T e successive funziona ancora. Tuttavia, si consiglia di applicarlo solo sull'interfaccia fisica.

Esempio di rete

Nel documento viene usata l'impostazione di rete mostrata nel diagramma.



Configurazioni

- Luce
- Casa

Luce

```
Current configuration:
!
version 12.2
no service single-slot-reload-enable
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Light
!
logging rate-limit console 10 except errors
!
ip subnet-zero
!
!
no ip finger
!
no ip dhcp-client network-discovery
ipx routing 00e0.b06a.40fc
!
!--- IKE policies. crypto isakmp policy 25
hash md5
authentication pre-share
crypto isakmp key cisco123 address 192.168.2.1
!
!--- IPSec policies. crypto ipsec transform-set WWW esp-des esp-md5-hmac
mode transport
!
crypto map GRE local-address Loopback0
crypto map GRE 50 ipsec-isakmp
set peer 192.168.2.1
set transform-set WWW
!--- What to encrypt? match address 101
!
call rsvp-sync
!
fax interface-type modem
mta receive maximum-recipients 0
!
interface Loopback0
ip address 192.168.1.1 255.255.255.0
!
interface Tunnel0
ip address 10.1.1.1 255.255.255.252
ip mtu 1440
ipx network CC
tunnel source Loopback0
tunnel destination 192.168.2.1
crypto map GRE
!
interface FastEthernet0/0
ip address 10.64.10.13 255.255.255.224
no ip route-cache
no ip mroute-cache
duplex auto
speed auto
crypto map GRE
!
interface FastEthernet0/1
ip address 172.16.1.1 255.255.255.0
duplex auto
speed auto
ipx network AA
!
router eigrp 10
network 10.1.1.0 0.0.0.3
network 172.16.1.0 0.0.0.255
network 192.168.1.0
no auto-summary
no eigrp log-neighbor-changes
!
ip kerberos source-interface any
ip classless
ip route 192.168.2.0 255.255.255.0 10.64.10.14
ip http server
!
!--- What to encrypt? access-list 101 permit gre host
192.168.1.1 host 192.168.2.1
!
dial-peer cor custom
!
line con 0
transport input none
line aux 0
line vty 0 4
login
!
end

Light#!
```

Casa

```

Current configuration:
version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname House
!
ip subnet-zero
!
ipx routing 00e0.b06a.4114
!
!--- IKE policies. crypto isakmp policy 25
hash md5
authentication pre-share
crypto isakmp key cisco123 address 192.168.1.1
!
!--- IPSec policies. crypto ipsec transform-set WWW esp-
des esp-md5-hmac
mode transport
!
crypto map GRE local-address Loopback0
crypto map GRE 50 ipsec-isakmp
```

```
set peer 192.168.1.1
set transform-set WWW
!--- What to encrypt? match address 101
!
!
interface Loopback0
ip address 192.168.2.1 255.255.255.0
!
interface Tunnel0
ip address 10.1.1.2 255.255.255.252
ip mtu 1440
ipx network CC
tunnel source Loopback0
tunnel destination 192.168.1.1
crypto map GRE
!
interface FastEthernet0/0
ip address 10.64.10.14 255.255.255.224
no ip route-cache
no ip mroute-cache
duplex auto
speed auto
crypto map GRE
!
interface FastEthernet0/1
ip address 172.16.2.1 255.255.255.0
duplex auto
speed auto
ipx network BB
!
interface FastEthernet4/0
no ip address
shutdown
duplex auto
speed auto
!
router eigrp 10
network 10.1.1.0 0.0.0.3
network 172.16.2.0 0.0.0.255
network 192.168.2.0
no auto-summary
no eigrp log-neighbor-changes
!
ip classless
ip route 192.168.1.0 255.255.255.0 10.64.10.13
ip http server
!--- What to encrypt? access-list 101 permit gre host
192.168.2.1 host 192.168.1.1
!
line con 0
line aux 0
line vty 0 4
login
!
end

House#
```

Verifica

Le informazioni contenute in questa sezione permettono di verificare che la configurazione funzioni correttamente.

Alcuni comandi **show sono supportati dallo** strumento Output Interpreter (solo utenti registrati); lo strumento permette di visualizzare un'analisi dell'output del comando **show.**

- **show crypto engine connections active**: visualizza i pacchetti crittografati e decrittografati tra peer IPSec.
- **show crypto isakmp sa**: visualizza le associazioni di sicurezza della fase 1.
- **show crypto ipsec sa**: visualizza le associazioni di sicurezza della fase 2.
- **show ipx route [network] [default] [detail]**: visualizza il contenuto della tabella di routing IPX.

Mostra output comando con tunnel attivi

```
Light#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 not set

     172.16.0.0/24 is subnetted, 2 subnets
C       172.16.1.0 is directly connected, FastEthernet0/1
D       172.16.2.0 [90/297246976] via 10.1.1.2, 00:00:31, Tunnel0
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.1.1.0/30 is directly connected, Tunnel0
C       10.64.10.0/27 is directly connected, FastEthernet0/0
C    192.168.1.0/24 is directly connected, Loopback0
S    192.168.2.0/24 [1/0] via 10.64.10.14
Light#ping
Protocol [ip]:
Target IP address: 172.16.2.1
Repeat count [5]:
Datagram size [100]:
Timeout in seconds [2]:
Extended commands [n]: y
Source address or interface: 172.16.1.1
Type of service [0]:
Set DF bit in IP header? [no]:
Validate reply data? [no]:
Data pattern [0xABCD]:
Loose, Strict, Record, Timestamp, Verbose[none]:
Sweep range of sizes [n]:
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
Light#

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 not set

     172.16.0.0/24 is subnetted, 2 subnets
D       172.16.1.0 [90/297246976] via 10.1.1.1, 00:00:36, Tunnel0
C       172.16.2.0 is directly connected, FastEthernet0/1
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.1.1.0/30 is directly connected, Tunnel0
C       10.64.10.0/27 is directly connected, FastEthernet0/0
S    192.168.1.0/24 [1/0] via 10.64.10.13
C    192.168.2.0/24 is directly connected, Loopback0
House#ping
Protocol [ip]:
Target IP address: 172.16.1.1
Repeat count [5]:
Datagram size [100]:
Timeout in seconds [2]:
Extended commands [n]: y
Source address or interface: 172.16.2.1
Type of service [0]:
Set DF bit in IP header? [no]:
Validate reply data? [no]:
Data pattern [0xABCD]:
Loose, Strict, Record, Timestamp, Verbose[none]:
Sweep range of sizes [n]:
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms

Light#show ipx route
Codes: C - Connected primary network,    c - Connected secondary network
       S - Static, F - Floating static, L - Local (internal), W - IPXWAN
       R - RIP, E - EIGRP, N - NLSP, X - External, A - Aggregate
       s - seconds, u - uses, U - Per-user static

3 Total IPX routes. Up to 1 parallel paths and 16 hops allowed.

No default route known.

C         AA (NOVELL-ETHER),  Fa0/1
C         CC (TUNNEL),        Tu0
R         BB [151/01] via       CC.00e0.b06a.4114,   17s, Tu0

House#show ipx route
Codes: C - Connected primary network,    c - Connected secondary network
       S - Static, F - Floating static, L - Local (internal), W - IPXWAN
       R - RIP, E - EIGRP, N - NLSP, X - External, A - Aggregate
       s - seconds, u - uses, U - Per-user static

3 Total IPX routes. Up to 1 parallel paths and 16 hops allowed.

No default route known.

C         BB (NOVELL-ETHER),  Fa0/1
C         CC (TUNNEL),        Tu0
R         AA [151/01] via       CC.00e0.b06a.40fc,   59s, Tu0

Light#ping ipx BB.0004.9af2.8261

Type escape sequence to abort.
Sending 5, 100-byte IPX Novell Echoes to BB.0004.9af2.8261, timeout is 2 second:
!!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms

House#ping ipx AA.0004.9af2.8181

Type escape sequence to abort.
Sending 5, 100-byte IPX Novell Echoes to AA.0004.9af2.8181, timeout is 2 second:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms

Light#show crypto isa sa
    dst           src          state        conn-id   slot
192.168.2.1    192.168.1.1    QM_IDLE           1       0
192.168.1.1    192.168.2.1    QM_IDLE           2       0

House#show crypto isa sa
    dst           src          state        conn-id   slot
192.168.1.1    192.168.2.1    QM_IDLE           1       0
192.168.2.1    192.168.1.1    QM_IDLE           2       0


Light#show crypto engine connections active

  ID Interface       IP-Address      State  Algorithm          Encrypt  Decrypt
   1 <none>          <none>          set    HMAC_MD5+DES_56_CB       0        0
   2 <none>          <none>          set    HMAC_MD5+DES_56_CB       0        0
2000 FastEthernet0/0 10.64.10.13     set    HMAC_MD5+DES_56_CB       0      161
2001 FastEthernet0/0 10.64.10.13     set    HMAC_MD5+DES_56_CB     161        0
2002 FastEthernet0/0 10.64.10.13     set    HMAC_MD5+DES_56_CB       0        0
2003 FastEthernet0/0 10.64.10.13     set    HMAC_MD5+DES_56_CB       0        0
2004 FastEthernet0/0 10.64.10.13     set    HMAC_MD5+DES_56_CB       0        0
2005 FastEthernet0/0 10.64.10.13     set    HMAC_MD5+DES_56_CB       0        0

House#show crypto engine connections active

  ID Interface       IP-Address      State  Algorithm          Encrypt  Decrypt
   1 <none>          <none>          set    HMAC_MD5+DES_56_CB       0        0
   2 <none>          <none>          set    HMAC_MD5+DES_56_CB       0        0
2000 FastEthernet0/0 10.64.10.14     set    HMAC_MD5+DES_56_CB       0      159
2001 FastEthernet0/0 10.64.10.14     set    HMAC_MD5+DES_56_CB     159        0
2002 FastEthernet0/0 10.64.10.14     set    HMAC_MD5+DES_56_CB       0        0
2003 FastEthernet0/0 10.64.10.14     set    HMAC_MD5+DES_56_CB       0        0
2004 FastEthernet0/0 10.64.10.14     set    HMAC_MD5+DES_56_CB       0        0
2005 FastEthernet0/0 10.64.10.14     set    HMAC_MD5+DES_56_CB       0        0

House#show crypto ipsec sa detail

interface: Tunnel0
    Crypto map tag: GRE, local addr. 192.168.2.1

   local  ident (addr/mask/prot/port): (192.168.2.1/255.255.255.255/47/0)
   remote ident (addr/mask/prot/port): (192.168.1.1/255.255.255.255/47/0)
   current_peer: 192.168.1.1
     PERMIT, flags={origin_is_acl,transport_parent,}
    #pkts encaps: 192, #pkts encrypt: 192, #pkts digest 192
    #pkts decaps: 190, #pkts decrypt: 190, #pkts verify 190
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0, #pkts decompress failed: 0
    #pkts no sa (send) 12, #pkts invalid sa (rcv) 0
    #pkts encaps failed (send) 0, #pkts decaps failed (rcv) 0
    #pkts invalid prot (recv) 0, #pkts verify failed: 0
    #pkts invalid identity (recv) 0, #pkts invalid len (rcv) 0
    #pkts replay rollover (send): 0, #pkts replay rollover (rcv) 0
    ##pkts replay failed (rcv): 0
    #pkts internal err (send): 0, #pkts internal err (recv) 0
     local crypto endpt.: 192.168.2.1, remote crypto endpt.: 192.168.1.1
     path mtu 1514, media mtu 1514
     current outbound spi: 1FA721CA

     inbound esp sas:
      spi: 0xEE52531(249898289)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        slot: 0, conn id: 2000, flow_id: 1, crypto map: GRE
        sa timing: remaining key lifetime (k/sec): (4607961/2797)
        IV size: 8 bytes
        replay detection support: Y
      spi: 0xFEE24F3(267265267)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        slot: 0, conn id: 2002, flow_id: 3, crypto map: GRE
        sa timing: remaining key lifetime (k/sec): (4608000/2826)
        IV size: 8 bytes
        replay detection support: Y
      spi: 0x19240817(421791767)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        slot: 0, conn id: 2004, flow_id: 5, crypto map: GRE
        sa timing: remaining key lifetime (k/sec): (4608000/2759)
        IV size: 8 bytes
        replay detection support: Y

     inbound ah sas:

     inbound pcp sas:

     outbound esp sas:
      spi: 0x1FA721CA(531046858)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        slot: 0, conn id: 2001, flow_id: 2, crypto map: GRE
        sa timing: remaining key lifetime (k/sec): (4607972/2797)
        IV size: 8 bytes
        replay detection support: Y
      spi: 0x12B10EB0(313593520)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        slot: 0, conn id: 2003, flow_id: 4, crypto map: GRE
        sa timing: remaining key lifetime (k/sec): (4608000/2826)
        IV size: 8 bytes
        replay detection support: Y
      spi: 0x1A700242(443548226)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        slot: 0, conn id: 2005, flow_id: 6, crypto map: GRE
        sa timing: remaining key lifetime (k/sec): (4608000/2759)
        IV size: 8 bytes
        replay detection support: Y

     outbound ah sas:

     outbound pcp sas:


   local  ident (addr/mask/prot/port): (192.168.2.1/255.255.255.255/0/0)
   remote ident (addr/mask/prot/port): (192.168.1.1/255.255.255.255/0/0)
   current_peer: 192.168.1.1
     PERMIT, flags={transport_parent,}
```

```
    #pkts encaps: 0, #pkts encrypt: 0, #pkts digest 0
    #pkts decaps: 0, #pkts decrypt: 0, #pkts verify 0
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0, #pkts decompress failed: 0
    #pkts no sa (send) 0, #pkts invalid sa (rcv) 0
    #pkts encaps failed (send) 0, #pkts decaps failed (rcv) 0
    #pkts invalid prot (recv) 0, #pkts verify failed: 0
    #pkts invalid identity (recv) 0, #pkts invalid len (rcv) 0
    #pkts replay rollover (send): 0, #pkts replay rollover (rcv) 0
    ##pkts replay failed (rcv): 0
    #pkts internal err (send): 0, #pkts internal err (recv) 0

     local crypto endpt.: 192.168.2.1, remote crypto endpt.: 192.168.1.1
     path mtu 1514, media mtu 1514
     current outbound spi: 0

     inbound esp sas:

     inbound ah sas:

     inbound pcp sas:

     outbound esp sas:

     outbound ah sas:

     outbound pcp sas:



interface: FastEthernet0/0
    Crypto map tag: GRE, local addr. 192.168.2.1

   local  ident (addr/mask/prot/port): (192.168.2.1/255.255.255.255/47/0)
   remote ident (addr/mask/prot/port): (192.168.1.1/255.255.255.255/47/0)
   current_peer: 192.168.1.1
     PERMIT, flags={origin_is_acl,transport_parent,}
    #pkts encaps: 193, #pkts encrypt: 193, #pkts digest 193
    #pkts decaps: 192, #pkts decrypt: 192, #pkts verify 192
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0, #pkts decompress failed: 0
    #pkts no sa (send) 12, #pkts invalid sa (rcv) 0
    #pkts encaps failed (send) 0, #pkts decaps failed (rcv) 0
    #pkts invalid prot (recv) 0, #pkts verify failed: 0
    #pkts invalid identity (recv) 0, #pkts invalid len (rcv) 0
    #pkts replay rollover (send): 0, #pkts replay rollover (rcv) 0
    ##pkts replay failed (rcv): 0
    #pkts internal err (send): 0, #pkts internal err (recv) 0

     local crypto endpt.: 192.168.2.1, remote crypto endpt.: 192.168.1.1
     path mtu 1514, media mtu 1514
     current outbound spi: 1FA721CA

     inbound esp sas:
      spi: 0xEE52531(249898289)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        slot: 0, conn id: 2000, flow_id: 1, crypto map: GRE
        sa timing: remaining key lifetime (k/sec): (4607961/2789)
        IV size: 8 bytes
        replay detection support: Y
      spi: 0xFEE24F3(267265267)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
     slot: 0, conn id: 2002, flow_id: 3, crypto map: GRE
     sa timing: remaining key lifetime (k/sec): (4608000/2817)
     IV size: 8 bytes
     replay detection support: Y
   spi: 0x19240817(421791767)
     transform: esp-des esp-md5-hmac ,
     in use settings ={Transport, }
     slot: 0, conn id: 2004, flow_id: 5, crypto map: GRE
     sa timing: remaining key lifetime (k/sec): (4608000/2750)
     IV size: 8 bytes
     replay detection support: Y

  inbound ah sas:

  inbound pcp sas:

  outbound esp sas:
   spi: 0x1FA721CA(531046858)
     transform: esp-des esp-md5-hmac ,
     in use settings ={Transport, }
     slot: 0, conn id: 2001, flow_id: 2, crypto map: GRE
     sa timing: remaining key lifetime (k/sec): (4607972/2789)
     IV size: 8 bytes
     replay detection support: Y
   spi: 0x12B10EB0(313593520)
     transform: esp-des esp-md5-hmac ,
     in use settings ={Transport, }
     slot: 0, conn id: 2003, flow_id: 4, crypto map: GRE
     sa timing: remaining key lifetime (k/sec): (4608000/2817)
     IV size: 8 bytes
     replay detection support: Y
   spi: 0x1A700242(443548226)
     transform: esp-des esp-md5-hmac ,
     in use settings ={Transport, }
     slot: 0, conn id: 2005, flow_id: 6, crypto map: GRE
     sa timing: remaining key lifetime (k/sec): (4608000/2750)
     IV size: 8 bytes
     replay detection support: Y

  outbound ah sas:

  outbound pcp sas:


local  ident (addr/mask/prot/port): (192.168.2.1/255.255.255.255/0/0)
remote ident (addr/mask/prot/port): (192.168.1.1/255.255.255.255/0/0)
current_peer: 192.168.1.1
  PERMIT, flags={transport_parent,}
 #pkts encaps: 0, #pkts encrypt: 0, #pkts digest 0
 #pkts decaps: 0, #pkts decrypt: 0, #pkts verify 0
 #pkts compressed: 0, #pkts decompressed: 0
 #pkts not compressed: 0, #pkts compr. failed: 0, #pkts decompress failed: 0
 #pkts no sa (send) 0, #pkts invalid sa (rcv) 0
 #pkts encaps failed (send) 0, #pkts decaps failed (rcv) 0
 #pkts invalid prot (recv) 0, #pkts verify failed: 0
 #pkts invalid identity (recv) 0, #pkts invalid len (rcv) 0
 #pkts replay rollover (send): 0, #pkts replay rollover (rcv) 0
 ##pkts replay failed (rcv): 0
 #pkts internal err (send): 0, #pkts internal err (recv) 0

  local crypto endpt.: 192.168.2.1, remote crypto endpt.: 192.168.1.1
  path mtu 1514, media mtu 1514
  current outbound spi: 0
```

```
     inbound esp sas:

     inbound ah sas:

     inbound pcp sas:

     outbound esp sas:

     outbound ah sas:

     outbound pcp sas:
```

Risoluzione dei problemi

Le informazioni contenute in questa sezione permettono di risolvere i problemi relativi alla configurazione.

Comandi per la risoluzione dei problemi

Alcuni comandi **show sono supportati dallo** strumento Output Interpreter (solo utenti registrati); lo strumento permette di visualizzare un'analisi dell'output del comando **show.**

Nota: prima di usare i comandi di **debug**, consultare le informazioni importanti sui comandi di debug.

- **debug crypto isakmp**: visualizza gli errori durante la fase 1.
- **debug crypto ipsec**: visualizza gli errori durante la fase 2.
- **debug crypto engine**: visualizza le informazioni provenienti dal crypto engine.
- **debug ip *your routing protocol***: visualizza le informazioni sulle transazioni di routing del protocollo di routing.
- **clear crypto connection-id *[slot]*** *| RSM | vip]* - Termina una sessione crittografata in corso. Le sessioni crittografate in genere terminano quando si verifica il timeout della sessione. Per informazioni sul valore connection-id, usare il comando **show crypto cisco connections**.
- **clear crypto isakmp**: cancella le associazioni di sicurezza della fase 1.
- **clear crypto sa**: cancella le associazioni di sicurezza della fase 2.

Informazioni correlate

- Pagina di supporto per IPSec
- Introduzione alla crittografia IP Security (IPSec)
- Configurazione di IPSec Network Security
- Configurazione del protocollo di protezione di Internet Key Exchange
- Strumento di ricerca dei comandi (solo utenti registrati)
- Supporto tecnico – Cisco Systems