De router-to-router van IPSec configureren en met communicatie tussen de ruimtes praten

Inhoud

Inleiding

Deze voorbeeldconfiguratie toont een hub en het gesproken ontwerp van IPsec tussen drie routers. Deze configuratie verschilt van andere hub en spuitconfiguraties omdat in dit voorbeeld communicatie tussen de spuitsites mogelijk wordt gemaakt door de hub. Met andere woorden, er is geen directe IPsec-tunnel tussen de twee spaakrouters. Alle pakketten worden over de tunnel naar de hub router verzonden waar het hen uit de IPsec-tunnel die met de andere gesproken router wordt gedeeld, herverdeelt. Deze configuratie is mogelijk als resultaat van de resolutie naar Cisco bug-ID CSCdp09904 (alleen geregistreerde klanten). Deze oplossing is geïntegreerd in Cisco IOS® softwarerelease 12.2(5)en deze release is de minimale vereiste voor deze configuratie.

Om de generieke Routing Encapsulation (GRE)-tunnel via IPSec met OSPF te configureren verwijst u naar het configureren van een GRE-Tunnel via IPSec met OSPF.

Om de basisconfiguratie van Cisco IOS® Firewall te configureren op een GRE-tunnel met netwerkadresomzetting (NAT), raadpleegt u Router-naar-router IPSec (Pre-Shared Keys) configureren op GRE-tunnels met IOS-firewall en NAT.

Voorwaarden

Vereisten

Dit document vereist een basisbegrip van IPsec-protocol. Raadpleeg een Inleiding naar IP Security (IPSec) encryptie om meer te weten te komen over IPsec.

Het doel van dit document is ervoor te zorgen dat tussen deze routers versleuteld:

- 172.16.1.0/24 (Spoke 1) tot 10.1.1.0/24 (Hub)
- 192.168.1.0/24 (Spoke 2) tot 10.1.1.0/24 (Hub)
- 172.16.1.0/24 (Spoke 1) t/m 192.168.1.0/24 (Spoke 2)

Gebruikte componenten

De informatie in dit document is gebaseerd op de volgende software- en hardware-versies.

- Cisco IOS-softwarerelease 12.2(24a) (c2500-ik8s-l.122-24a.bin)
- Cisco 2500 routers

De informatie in dit document is gebaseerd op de apparaten in een specifieke laboratoriumomgeving. Alle apparaten die in dit document worden beschreven, hadden een opgeschoonde (standaard)configuratie. Als uw netwerk live is, moet u de potentiële impact van elke opdracht begrijpen.

Conventies

Raadpleeg Cisco Technical Tips Conventions (Conventies voor technische tips van Cisco) voor meer informatie over documentconventies.

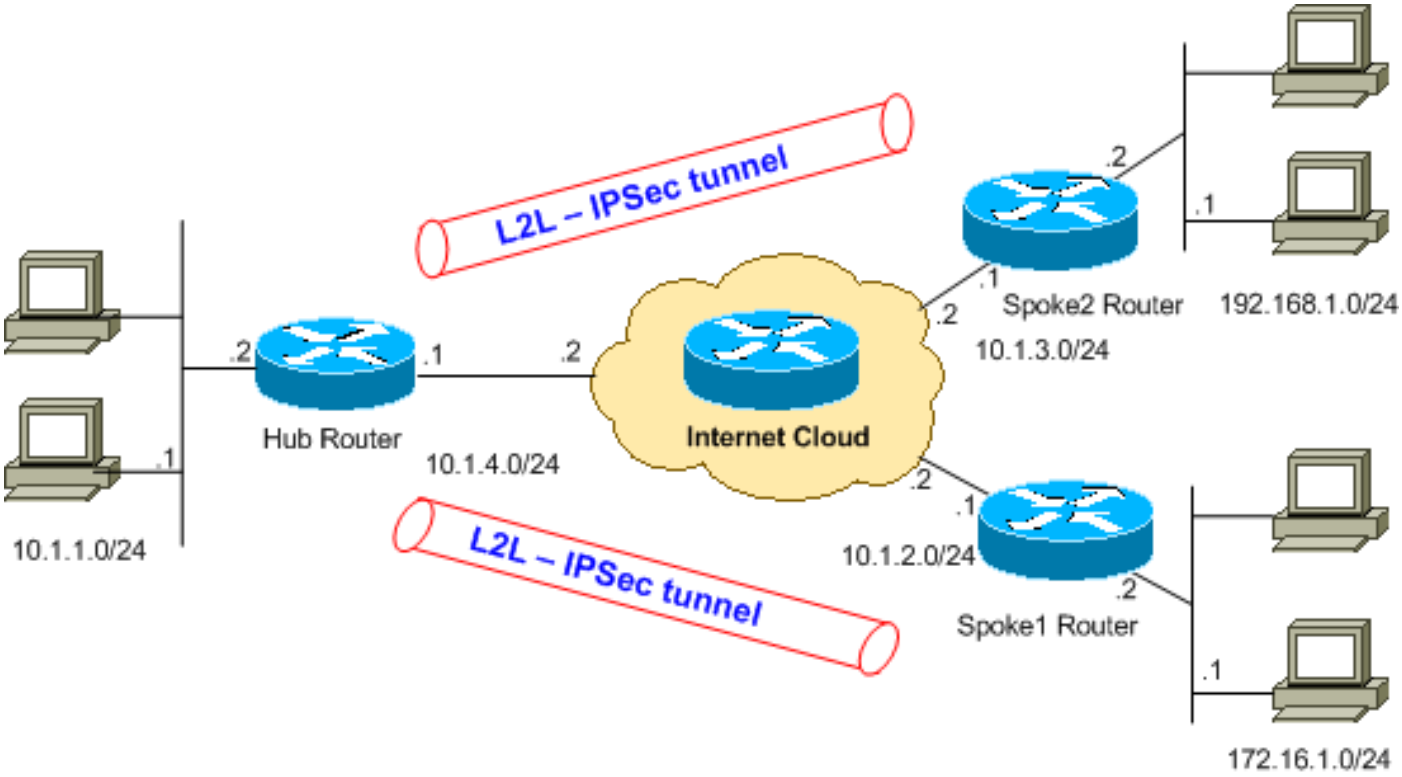
Configureren

Deze sectie bevat informatie over het configureren van de functies die in dit document worden beschreven.

N.B.: Gebruik het Opdrachtupgereedschap (alleen geregistreerde klanten) om meer informatie te vinden over de opdrachten die in dit document worden gebruikt.

Netwerkdiagram

Dit document gebruikt de netwerkinstellingen die in dit diagram worden weergegeven.



Opmerking: de IP-adresseringsschema's die in deze configuratie worden gebruikt, zijn niet wettelijk routeerbaar op het internet. Het zijn RFC 1918 adressen die in een labomgeving gebruikt zijn.

Configuraties

Dit document gebruikt deze configuraties.

Het bevel van de show in werking stellen-in werking stellen -**configuratie** toont de actieve configuratie op de router.

- Hub router
- SPR 1-router
- SPR 2-router

Hub router

```
Hub#show running-config
Building configuration...
Current configuration : 1466 bytes
!
version 12.2

service timestamps debug datetime msec
service timestamps log uptime
no service password-encryption
!
hostname Hub
!


!
ip subnet-zero
!
```

```
!
!--- Configuration for IKE policies. crypto isakmp
policy 10
!--- Enables the IKE policy configuration (config-
isakmp) !--- command mode, where you can specify the
parameters that !--- are used during an IKE negotiation.
hash md5
authentication pre-share
crypto isakmp key cisco123 address 10.1.2.1
crypto isakmp key cisco123 address 10.1.3.1
!--- Specifies the preshared key "cisco123" which should
!--- be identical at both peers. This is a global !---
configuration mode command. ! !--- Configuration for
IPsec policies. crypto ipsec transform-set myset esp-des
esp-md5-hmac
!--- Enables the crypto transform configuration mode, !-
-- where you can specify the transform sets that are
used !--- during an IPsec negotiation. ! crypto map
mymap 10 ipsec-isakmp
!--- Indicates that IKE is used to establish !--- the
IPsec security association for protecting the !---
traffic specified by this crypto map entry. set peer
10.1.2.1
!--- Sets the IP address of the remote end. set
transform-set myset
!--- Configures IPsec to use the transform-set !---
"myset" defined earlier in this configuration. match
address 110
!--- Specifies the traffic to be encrypted. crypto map
mymap 20 ipsec-isakmp
set peer 10.1.3.1
set transform-set myset
match address 120
!
!
!
!
interface Ethernet0
ip address 10.1.1.1 255.255.255.0
!
interface Ethernet1
ip address 10.1.4.1 255.255.255.0
no ip route-cache
!--- You must enable process switching for IPsec !--- to
encrypt outgoing packets. This command disables fast
switching. no ip mroute-cache crypto map mymap
!--- Configures the interface to use the !--- crypto map
"mymap" for IPsec. ! !--- Output suppressed. ip
classless ip route 172.16.1.0 255.255.255.0 Ethernet1
ip route 192.168.1.0 255.255.255.0 Ethernet1
ip route 10.1.0.0 255.255.0.0 Ethernet1
ip http server

!
access-list 110 permit ip 10.1.1.0 0.0.0.255 172.16.1.0
0.0.0.255
access-list 110 permit ip 192.168.1.0 0.0.0.255
172.16.1.0 0.0.0.255
access-list 120 permit ip 10.1.1.0 0.0.0.255 192.168.1.0
0.0.0.255
access-list 120 permit ip 172.16.1.0 0.0.0.255
192.168.1.0 0.0.0.255
!--- This crypto ACL-permit identifies the !--- matching
```

traffic flows to be protected via encryption.

SPR 1-router

```
Spoke1#show running-config
Building configuration...
Current configuration : 1203 bytes
!
version 12.2

service timestamps debug datetime msec
service timestamps log uptime
no service password-encryption
!
hostname Spoke1
!
enable secret 5 $1$DOX3$rIrxEnTVTw/7LNbxi.akz0

!
ip subnet-zero
no ip domain-lookup
!

!
crypto isakmp policy 10
hash md5
authentication pre-share
crypto isakmp key cisco123 address 10.1.4.1
!
!
crypto ipsec transform-set myset esp-des esp-md5-hmac
!
crypto map mymap 10 ipsec-isakmp
set peer 10.1.4.1
set transform-set myset
match address 110
!
!
!
!
interface Ethernet0
ip address 172.16.1.1 255.255.255.0
!
interface Ethernet1
ip address 10.1.2.1 255.255.255.0
no ip route-cache
no ip mroute-cache
crypto map mymap
!

.
.
!--- Output suppressed. . . ip classless
ip route 192.168.1.0 255.255.255.0 Ethernet1
ip route 10.1.0.0 255.255.0.0 Ethernet1
no ip http server

!
access-list 110 permit ip 172.16.1.0 0.0.0.255 10.1.1.0
0.0.0.255
access-list 110 permit ip 172.16.1.0 0.0.0.255
192.168.1.0 0.0.0.255
!
```

```
end
2509a#
```

SPR 2-router

```
Spoke2#show running-config
Building configuration...
Current configuration : 1117 bytes
!
version 12.2

service timestamps debug datetime msec
service timestamps log uptime
service password-encryption
!
hostname Spoke2
!

!
ip subnet-zero
no ip domain-lookup
!

!
crypto isakmp policy 10
hash md5
authentication pre-share
crypto isakmp key cisco123 address 10.1.4.1
!
!
crypto ipsec transform-set myset esp-des esp-md5-hmac
!
crypto map mymap 10 ipsec-isakmp
set peer 10.1.4.1
set transform-set myset
match address 120
!
!
!
!
interface Ethernet0
ip address 192.168.1.1 255.255.255.0
!
interface Ethernet1
ip address 10.1.3.1 255.255.255.0
!--- No ip route-cache. no ip mroute-cache crypto map
mymap
!

.
.
!--- Output suppressed. . . ip classless
ip route 172.16.0.0 255.255.0.0 Ethernet1
ip route 10.1.0.0 255.255.0.0 Ethernet1
no ip http server

!
access-list 120 permit ip 192.168.1.0 0.0.0.255
172.16.1.0 0.0.0.255
access-list 120 permit ip 192.168.1.0 0.0.0.255 10.1.1.0
0.0.0.255
!
```

```
end
VPN2509#
```

Voeg een ander woord toe

Als u een andere SPA-router (sprak3) aan de bestaande hub-router wilt toevoegen naast sprak1 en sprak2, is het enige dat nodig is de creatie van een nieuwe LAN-to-LAN (L2L)-tunnel van het knooppunt tot aan sprak3. Maar aangezien slechts één crypto-kaart per fysieke interface kan worden geconfigureerd, moet u dezelfde crypto-map gebruiken wanneer u deze tunnel toevoegt. Dit is mogelijk wanneer u verschillende lijnnummers gebruikt voor elke externe site.

Opmerking: de crypto-kaart moet mogelijk worden verwijderd en opnieuw op de interface worden toegepast wanneer de nieuwe tunnelingang wordt toegevoegd. Wanneer de crypto kaart wordt verwijderd worden alle actieve tunnels gewist.

Hub router

```
Hub#show running-config
Building configuration...
Current configuration : 1466 bytes
!
version 12.2

service timestamps debug datetime msec
service timestamps log uptime
no service password-encryption
!
hostname Hub
!


!
ip subnet-zero
!

!
crypto isakmp policy 10

hash md5
authentication pre-share
crypto isakmp key cisco123 address 10.1.2.1
crypto isakmp key cisco123 address 10.1.3.1
crypto isakmp key cisco123 address 10.1.5.1
!

crypto ipsec transform-set myset esp-des esp-md5-hmac
!
crypto map mymap 10 ipsec-isakmp
set peer 10.1.2.1
set transform-set myset
match address 110

crypto map mymap 20 ipsec-isakmp
set peer 10.1.3.1
set transform-set myset
match address 120

!--- It is important to specify crypto map line number
```

```
30 for !--- the Spoke 3 router with the same crypto map
name "mymap" crypto map mymap 30 ipsec-isakmp
set peer 10.1.5.1
set transform-set myset
match address 130
!
!
!
!
interface Ethernet0
ip address 10.1.1.1 255.255.255.0
!
interface Ethernet1
ip address 10.1.4.1 255.255.255.0
no ip route-cache
no ip mroute-cache

!--- It is important to remove and re-apply the crypto
!--- map to this interface if it is used for the
termination of other !--- spoke VPN tunnels. crypto map
mymap
!

!--- Output suppressed. ip classless ip route 172.16.1.0
255.255.255.0 Ethernet1 ip route 192.168.1.0
255.255.255.0 Ethernet1 ip route 10.1.0.0 255.255.0.0
Ethernet1 ip route 172.16.2.0 255.255.255.0 Ethernet1 ip
http server ! access-list 110 permit ip 10.1.1.0
0.0.0.255 172.16.1.0 0.0.0.255 access-list 110 permit ip
192.168.1.0 0.0.0.255 172.16.1.0 0.0.0.255 access-list
110 permit ip 172.16.2.0 0.0.0.255 172.16.1.0 0.0.0.255
access-list 120 permit ip 10.1.1.0 0.0.0.255 192.168.1.0
0.0.0.255 access-list 120 permit ip 172.16.2.0 0.0.0.255
192.168.1.0 0.0.0.255 access-list 120 permit ip
172.16.1.0 0.0.0.255 192.168.1.0 0.0.0.255 access-list
130 permit ip 10.1.1.0 0.0.0.255 172.16.2.0 0.0.0.255
access-list 130 permit ip 192.168.1.0 0.0.0.255
172.16.2.0 0.0.0.255
access-list 130 permit ip 172.16.1.0 0.0.0.255
172.16.2.0 0.0.0.255
```

SPR 3-router

```
Spoke3#show running-config
Building configuration...
Current configuration : 1117 bytes
!
version 12.2

service timestamps debug datetime msec
service timestamps log uptime
service password-encryption
!
hostname Spoke3
!

!
ip subnet-zero
no ip domain-lookup
!

!
crypto isakmp policy 10
```

```
hash md5
authentication pre-share
crypto isakmp key cisco123 address 10.1.4.1
!
!
crypto ipsec transform-set myset esp-des esp-md5-hmac
!
crypto map mymap 10 ipsec-isakmp
set peer 10.1.4.1
set transform-set myset
match address 130
!
!
!
!
interface Ethernet0
ip address 172.16.2.1 255.255.255.0
!
interface Ethernet1
ip address 10.1.5.1 255.255.255.0
no ip mroute-cache
crypto map mymap
!


.
.
!--- Output suppressed. . . ip classless
ip route 172.16.0.0 255.255.0.0 Ethernet1
ip route 10.1.0.0 255.255.0.0 Ethernet1
no ip http server

!
access-list 130 permit ip 172.168.2.0 0.0.0.255
172.16.1.0 0.0.0.255
access-list 130 permit ip 172.168.2.0 0.0.0.255 10.1.1.0
0.0.0.255
access-list 130 permit ip 172.168.2.0 0.0.0.255
192.168.1.0 0.0.0.255
!

end
VPN2509#
```

Verifiëren

Gebruik dit gedeelte om te bevestigen dat de configuratie correct werkt.

Het Uitvoer Tolk (uitsluitend geregistreerde klanten) (OIT) ondersteunt bepaalde **show** opdrachten. Gebruik de OIT om een analyse van **tonen** opdrachtoutput te bekijken.

Om deze configuratie te verifiëren, probeer een uitgebreide **ping opdracht** uit het Ethernet1 interfaceadres op Spoke 1, bestemd voor het Ethernet1 interfaceadres in Spoke 2 **te** halen.

- **Ping**-gebruikt om de basisnetwerkconnectiviteit te diagnosticeren.

```
Spoke1#ping
Protocol [ip]:
Target IP address: 192.168.1.1
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 192.168.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 64/64/68 ms
```

- toon crypto ipsec sa-toont de instellingen die worden gebruikt door huidige (IPSec) veiligheidsassociaties (SAs).
- toon crypto isakmp sa - toont alle huidige IKE SAs bij een peer.
- tonen de crypto motor **verbindingen actief**—toont het aantal pakketten die over elke IPSec SA worden verzonden.

Uitvoer voorbeeld

Deze output komt van de **show crypto motor connecties actieve** opdracht die op de Hub router wordt uitgegeven.

```
Hub#show crypto engine connections active

ID Interface IP-Address State Algorithm Encrypt Decrypt
5 Ethernet0 10.1.4.1 set HMAC_MD5+DES_56_CB 0 0
6 <none> <none>  set HMAC_MD5+DES_56_CB 0 0
2000 Ethernet0 10.1.4.1 set HMAC_MD5+DES_56_CB 0 10
2001 Ethernet0 10.1.4.1 set HMAC_MD5+DES_56_CB 10 0
2002 Ethernet0 10.1.4.1 set HMAC_MD5+DES_56_CB 0 10
2003 Ethernet0 10.1.4.1 set HMAC_MD5+DES_56_CB 10 0
```

Uit dit voorbeeld kan je zien dat elke tunnel 10 pakketten versleutelde en decrypteerde, wat bewijst dat het verkeer door de Hub router kwam.

Opmerking: Er worden twee IPsec SA's gemaakt voor elke peer (één in elke richting). In de router hub bijvoorbeeld zijn er vier IPsec SAs gemaakt voor twee peers.

Problemen oplossen

Deze sectie bevat informatie waarmee u problemen met de configuratie kunt oplossen.

Opdrachten voor troubleshooting

Opmerking: Raadpleeg Belangrijke informatie over debug Commands voordat u **debug-**opdrachten gebruikt.

- debug crypto ipsec - toont de IPsec onderhandelingen van fase 2.
- debug crypto isakmp — toont de ISAKMP-onderhandelingen over fase 1.
- debug van crypto motor - toont het verkeer dat is versleuteld.
- duidelijke crypto isakmp - ontruimt de SA's in verband met fase 1.
- duidelijke crypto sa —ontslaat de SA's met betrekking tot fase 2.

Voorbeeld van output van foutopsporing

Dit is de hub router van de **debug crypto ipsec** en **debug crypto isakmp** opdrachten.

```
*Mar  1 00:03:46.887: ISAKMP (0:0): received packet
  from 10.1.2.1 (N) NEW SA
*Mar  1 00:03:46.887: ISAKMP: local port 500, remote port 500
*Mar  1 00:03:46.899: ISAKMP (0:1): processing SA payload. message ID = 0
*Mar  1 00:03:46.899: ISAKMP (0:1): found peer pre-shared key matching 10.1.2.1
*Mar  1 00:03:46.903: ISAKMP (0:1): Checking ISAKMP transform 1 against priority
 10 policy
*Mar  1 00:03:46.903: ISAKMP:      encryption DES-CBC
*Mar  1 00:03:46.907: ISAKMP:      hash MD5
*Mar  1 00:03:46.907: ISAKMP:      default group 1
*Mar  1 00:03:46.911: ISAKMP:      auth pre-share
*Mar  1 00:03:46.911: ISAKMP:      life type in seconds
*Mar  1 00:03:46.911: ISAKMP:      life duration (VPI) of  0x0 0x1 0x51 0x80
*Mar  1 00:03:46.915: ISAKMP (0:1): atts are acceptable. Next payload is 0
!--- The initial IKE parameters have been !--- successfully exchanged between Spoke 1 and Hub.
*Mar 1 00:03:48.367: ISAKMP (0:1): SA is doing pre-shared key authentication using id type
ID_IPV4_ADDR *Mar 1 00:03:48.371: ISAKMP (0:1): sending packet to 10.1.2.1 (R) MM_SA_SETUP *Mar
1 00:03:56.895: ISAKMP (0:1): received packet from 10.1.2.1 (R) MM_SA_SETUP *Mar 1 00:03:56.899:
ISAKMP (0:1): phase 1 packet is a duplicate of a previous packet. *Mar 1 00:03:56.899: ISAKMP
(0:1): retransmitting due to retransmit phase 1 *Mar 1 00:03:56.903: ISAKMP (0:1):
retransmitting phase 1 MM_SA_SETUP... *Mar 1 00:03:57.403: ISAKMP (0:1): retransmitting phase 1
MM_SA_SETUP... *Mar 1 00:03:57.403: ISAKMP (0:1): incrementing error counter on sa: retransmit
phase 1 *Mar 1 00:03:57.407: ISAKMP (0:1): retransmitting phase 1 MM_SA_SETUP *Mar 1
00:03:57.407: ISAKMP (0:1): sending packet to 10.1.2.1 (R) MM_SA_SETUP *Mar 1 00:03:58.923:
ISAKMP (0:1): received packet from 10.1.2.1 (R) MM_SA_SET UP *Mar 1 00:03:58.931: ISAKMP (0:1):
processing KE payload. message ID = 0 *Mar 1 00:04:00.775: ISAKMP (0:1): processing NONCE
payload. message ID = 0 *Mar 1 00:04:00.783: ISAKMP (0:1): found peer pre-shared key matching
10.1.2.1 *Mar 1 00:04:00.795: ISAKMP (0:1): SKEYID state generated *Mar 1 00:04:00.799: ISAKMP
(0:1): processing vendor id payload *Mar 1 00:04:00.803: ISAKMP (0:1): speaking to another IOS
box! *Mar 1 00:04:00.811: ISAKMP (0:1): sending packet to 10.1.2.1 (R) MM_KEY_EXCH *Mar 1
00:04:02.751: ISAKMP (0:1): received packet from 10.1.2.1 (R) MM_KEY_EXCH *Mar 1 00:04:02.759:
ISAKMP (0:1): processing ID payload. message ID = 0 *Mar 1 00:04:02.759: ISAKMP (0:1):
processing HASH payload. message ID = 0 *Mar 1 00:04:02.767: ISAKMP (0:1): SA has been
authenticated with 10.1.2.1 *Mar 1 00:04:02.771: ISAKMP (1): ID payload next-payload : 8 type :
1 protocol : 17 port : 500 length : 8 *Mar 1 00:04:02.775: ISAKMP (1): Total payload length: 12
*Mar 1 00:04:02.783: ISAKMP (0:1): sending packet to 10.1.2.1 (R) QM_IDLE *Mar 1 00:04:02.871:
ISAKMP (0:1): received packet from 10.1.2.1 (R) QM_IDLE
!--- IKE phase 1 SA has been sucessfully negotiated !--- between Spoke 1 and Hub. *Mar 1
00:04:02.891: ISAKMP (0:1): processing HASH payload. message ID = 581713929 *Mar 1 00:04:02.891:
ISAKMP (0:1): processing SA payload. message ID = 581713929 *Mar 1 00:04:02.895: ISAKMP (0:1):
Checking IPSec proposal 1
!--- IKE exchanges IPsec phase 2 parameters !--- between Spoke 1 and Hub. *Mar 1 00:04:02.895:
ISAKMP: transform 1, ESP_DES *Mar 1 00:04:02.899: ISAKMP: attributes in transform: *Mar 1
00:04:02.899: ISAKMP: encaps is 1 *Mar 1 00:04:02.899: ISAKMP: SA life type in seconds *Mar 1
00:04:02.903: ISAKMP: SA life duration (basic) of 3600 *Mar 1 00:04:02.903: ISAKMP: SA life type
in kilobytes *Mar 1 00:04:02.907: ISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0 *Mar 1
00:04:02.911: ISAKMP: authenticator is HMAC-MD5 *Mar 1 00:04:02.915: ISAKMP (0:1): atts are
acceptable.
!--- IPsec phase 2 parameters have been !--- successfully exchanged between Spoke 1 and Hub.
*Mar 1 00:04:02.915: IPSEC(validate_proposal_request): proposal part #1, (key eng. msg.) INBOUND
local= 10.1.4.1, remote= 10.1.2.1, local_proxy= 192.168.1.0/255.255.255.0/0/0 (type=4),
remote_proxy= 172.16.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-
hmac , lifedur= 0s and 0kb, spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x4 *Mar 1 00:04:02.931:
ISAKMP (0:1): processing NONCE payload. message ID = 581713929 *Mar 1 00:04:02.935: ISAKMP
(0:1): processing ID payload. message ID = 581713929 *Mar 1 00:04:02.935: ISAKMP (0:1):
processing ID payload. message ID = 581713929 *Mar 1 00:04:02.939: ISAKMP (0:1): asking for 1
spis from ipsec *Mar 1 00:04:02.943: IPSEC(key_engine): got a queue event... *Mar 1
```

00:04:02.951: IPSEC(spi_response): getting spi 4208568169 for SA from 10.1.4.1 to 10.1.2.1 for prot 3 *Mar 1 00:04:02.955: ISAKMP: received ke message (2/1) *Mar 1 00:04:03.207: ISAKMP (0:1): sending packet to 10.1.2.1 (R) QM_IDLE *Mar 1 00:04:03.351: ISAKMP (0:1): received packet from 10.1.2.1 (R) QM_IDLE *Mar 1 00:04:03.387: ISAKMP (0:1): Creating IPSec SAs *Mar 1 00:04:03.387: inbound SA from 10.1.2.1 to 10.1.4.1 (proxy 172.16.1.0 to 192.168.1.0) *Mar 1 00:04:03.391: has spi 0xFAD9A769 and conn_id 2000 and flags 4 *Mar 1 00:04:03.395: lifetime of 3600 seconds *Mar 1 00:04:03.395: lifetime of 4608000 kilobytes *Mar 1 00:04:03.399: outbound SA from 10.1.4.1 to 10.1.2.1 (proxy 192.168.1.0 to 172.16.1.0) *Mar 1 00:04:03.403: has spi -732960388 and conn_id 2001 and flags C *Mar 1 00:04:03.407: lifetime of 3600 seconds *Mar 1 00:04:03.407: lifetime of 4608000 kilobytes *Mar 1 00:04:03.411: ISAKMP (0:1): deleting node 581713929 error FALSE reason " quick mode done (await()" *Mar 1 00:04:03.415: IPSEC(key_engine): got a queue event... *Mar 1 00:04:03.415: IPSEC(initialize_sas): , (key eng. msg.) INBOUND local= 10.1.4.1, remote= 10.1.2.1, local_proxy= 192.168.1.0/255.255.255.0/0/0 (type=4), remote_proxy= 172.16.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 3600s and 4608000kb, spi= 0xFAD9A769(4208568169), conn_id= 2000, keysize= 0, flags= 0x4 *Mar 1 00:04:03.427: IPSEC(initialize_sas): , (key eng. msg.) OUTBOUND local= 10.1.4.1, remote= 10.1.2.1, local_proxy= 192.168.1.0/255.255.255.0/0/0 (type=4), remote_proxy= 172.16.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 3600s and 4608000kb, spi= 0xD44FE97C(3562006908), conn_id= 2001, keysize= 0, flags= 0xC *Mar 1 00:04:03.443: **IPSEC(create_sa): sa created,**
  (sa) **sa_dest= 10.1.4.1**, sa_prot= 50,
    sa_spi= 0xFAD9A769(4208568169),
    sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2000
*Mar 1 00:04:03.447: **IPSEC(create_sa): sa created,**
  (sa) **sa_dest= 10.1.2.1**, sa_prot= 50,
    sa_spi= 0xD44FE97C(3562006908),
    sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2001
!--- IPsec tunnel has been created between !--- routers Spoke 1 and Hub. *Mar 1 00:05:02.387: IPSEC(sa_request): , *!--- Since an IPsec tunnel is created between Spoke 1 !--- and Spoke 2 through the Hub, the Hub router !--- initializes a new IPsec tunnel between itself and Spoke 2.* (key eng. msg.) OUTBOUND local= 10.1.4.1, remote= 10.1.3.1, local_proxy= 172.16.1.0/255.255.255.0/0/0 (type=4), remote_proxy= 192.168.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 3600s and 4608000kb, spi= 0x1B7A414E(460996942), conn_id= 0, keysize= 0, flags= 0x400C *Mar 1 00:05:02.399: ISAKMP: received ke message (1/1) *Mar 1 00:05:02.403: ISAKMP: local port 500, remote port 500 *Mar 1 00:05:02.411: ISAKMP (0:2): beginning Main Mode exchange *Mar 1 00:05:02.415: ISAKMP (0:2): sending packet to 10.1.3.1 (I) MM_NO_STATE *Mar 1 00:05:12.419: ISAKMP (0:2): retransmitting phase 1 MM_NO_STATE... *Mar 1 00:05:12.419: ISAKMP (0:2): incrementing error counter on sa: retransmit phase 1 *Mar 1 00:05:12.423: ISAKMP (0:2): retransmitting phase 1 MM_NO_STATE *Mar 1 00:05:12.423: ISAKMP (0:2): sending packet to 10.1.3.1 (I) MM_NO_STATE *Mar 1 00:05:22.427: ISAKMP (0:2): retransmitting phase 1 MM_NO_STATE... *Mar 1 00:05:22.427: ISAKMP (0:2): incrementing error counter on sa: retransmit phase 1 *Mar 1 00:05:22.431: ISAKMP (0:2): retransmitting phase 1 MM_NO_STATE *Mar 1 00:05:22.431: ISAKMP (0:2): sending packet to 10.1.3.1 (I) MM_NO_STATE *Mar 1 00:05:22.967: ISAKMP (0:2): received packet from 10.1.3.1 (I) MM_NO_STATE *Mar 1 00:05:22.975: ISAKMP (0:2): processing SA payload. message ID = 0 *Mar 1 00:05:22.975: ISAKMP (0:2): found peer pre-shared key matching 10.1.3.1 *Mar 1 00:05:22.979: ISAKMP (0:2): Checking ISAKMP transform 1 against priority 10 policy *Mar 1 00:05:22.979: ISAKMP: encryption DES-CBC *Mar 1 00:05:22.983: ISAKMP: hash MD5 *Mar 1 00:05:22.983: ISAKMP: default group 1 *Mar 1 00:05:22.987: ISAKMP: auth pre-share *Mar 1 00:05:22.987: ISAKMP: life type in seconds *Mar 1 00:05:22.987: ISAKMP: life duration (VPI) of 0x0 0x1 0x51 0x80 *Mar 1 00:05:22.991: ISAKMP (0:2): **atts are acceptable.**
 Next payload is 0
!--- IKE phase 1 parameters have been successfully !--- exchanged between Hub and Spoke 2. *Mar 1 00:05:24.447: ISAKMP (0:2): SA is doing pre-shared key authentication using id type ID_IPV4_ADDR *Mar 1 00:05:24.455: ISAKMP (0:2): sending packet to 10.1.3.1 (I) MM_SA_SETUP *Mar 1 00:05:26.463: ISAKMP (0:2): received packet from 10.1.3.1 (I) MM_SA_SETUP *Mar 1 00:05:26.471: ISAKMP (0:2): processing KE payload. message ID = 0 *Mar 1 00:05:28.303: ISAKMP (0:2): processing NONCE payload. message ID = 0 *Mar 1 00:05:28.307: ISAKMP (0:2): found peer pre-shared key matching 10.1.3.1 *Mar 1 00:05:28.319: ISAKMP (0:2): SKEYID state generated *Mar 1 00:05:28.323: ISAKMP (0:2): processing vendor id payload *Mar 1 00:05:28.327: ISAKMP (0:2): speaking to another IOS box! *Mar 1 00:05:28.331: ISAKMP (2): ID payload next-payload : 8 type : 1 protocol : 17 port : 500 length : 8 *Mar 1 00:05:28.335: ISAKMP (2): Total payload length: 12 *Mar 1 00:05:28.343: ISAKMP (0:2): sending packet to 10.1.3.1 (I) MM_KEY_EXCH *Mar 1 00:05:28.399: ISAKMP (0:2): received packet from 10.1.3.1 (I) MM_KEY_EXCH *Mar 1 00:05:28.407:

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ISAKMP (0:2): processing ID payload. message ID = 0 *Mar 1 00:05:28.411: ISAKMP (0:2):
processing HASH payload. message ID = 0 *Mar 1 00:05:28.419: ISAKMP (0:2): SA has been
authenticated with 10.1.3.1 *Mar 1 00:05:28.419: ISAKMP (0:2): beginning Quick Mode exchange, M-
ID of -1872859789 *Mar 1 00:05:28.439: ISAKMP (0:2): sending packet to 10.1.3.1 (I) QM_IDLE *Mar
1 00:05:28.799: ISAKMP (0:2): received packet from 10.1.3.1 (I) QM_IDLE
!--- The IKE phase 1 SA has been successfully !--- negotiated between Hub and Spoke 2. *Mar 1
00:05:28.815: ISAKMP (0:2): processing HASH payload. message ID = -1872859789 *Mar 1
00:05:28.815: ISAKMP (0:2): processing SA payload. message ID = -1872859789 *Mar 1 00:05:28.819:
ISAKMP (0:2): Checking IPSec proposal 1
!--- IKE exchanges IPsec phase 2 parameters !--- between Hub and Spoke 2. *Mar 1 00:05:28.819:
ISAKMP: transform 1, ESP_DES *Mar 1 00:05:28.823: ISAKMP: attributes in transform: *Mar 1
00:05:28.823: ISAKMP: encaps is 1 *Mar 1 00:05:28.827: ISAKMP: SA life type in seconds *Mar 1
00:05:28.827: ISAKMP: SA life duration (basic) of 3600 *Mar 1 00:05:28.827: ISAKMP: SA life type
in kilobytes *Mar 1 00:05:28.831: ISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0 *Mar 1
00:05:28.835: ISAKMP: authenticator is HMAC-MD5 *Mar 1 00:05:28.839: ISAKMP (0:2): atts are
acceptable.
!--- IPsec phase 2 parameters have been successfully !--- exchanged between Hub and Spoke 2.
*Mar 1 00:05:28.843: IPSEC(validate_proposal_request): proposal part #1, (key eng. msg.) INBOUND
local= 10.1.4.1, remote= 10.1.3.1, local_proxy= 172.16.1.0/255.255.255.0/0/0 (type=4),
remote_proxy= 192.168.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-
hmac , lifedur= 0s and 0kb, spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x4 *Mar 1 00:05:28.855:
ISAKMP (0:2): processing NONCE payload. message ID = -1872859789 *Mar 1 00:05:28.859: ISAKMP
(0:2): processing ID payload. message ID = -1872859789 *Mar 1 00:05:28.863: ISAKMP (0:2):
processing ID payload. message ID = -1872859789 *Mar 1 00:05:28.891: ISAKMP (0:2): Creating
IPSec SAs *Mar 1 00:05:28.891: inbound SA from 10.1.3.1 to 10.1.4.1 (proxy 192.168.1.0 to
172.16.1.0) *Mar 1 00:05:28.895: has spi 0x1B7A414E and conn_id 2002 and flags 4 *Mar 1
00:05:28.899: lifetime of 3600 seconds *Mar 1 00:05:28.899: lifetime of 4608000 kilobytes *Mar 1
00:05:28.903: outbound SA from 10.1.4.1 to 10.1.3.1 (proxy 172.16.1.0 to 192.168.1.0 ) *Mar 1
00:05:28.907: has spi -385025107 and conn_id 2003 and flags C *Mar 1 00:05:28.911: lifetime of
3600 seconds *Mar 1 00:05:28.911: lifetime of 4608000 kilobytes *Mar 1 00:05:28.915: ISAKMP
(0:2): sending packet to 10.1.3.1 (I) QM_IDLE *Mar 1 00:05:28.919: ISAKMP (0:2): deleting node -
1872859789 error FALSE reason "" *Mar 1 00:05:28.923: IPSEC(key_engine): got a queue event...
*Mar 1 00:05:28.927: IPSEC(initialize_sas): , (key eng. msg.) INBOUND local= 10.1.4.1, remote=
10.1.3.1, local_proxy= 172.16.1.0/255.255.255.0/0/0 (type=4), remote_proxy=
192.168.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 3600s and 4608000kb, spi= 0x1B7A414E(460996942), conn_id= 2002, keysize= 0, flags= 0x4
*Mar 1 00:05:28.939: IPSEC(initialize_sas): , (key eng. msg.) OUTBOUND local= 10.1.4.1, remote=
10.1.3.1, local_proxy= 172.16.1.0/255.255.255.0/0/0 (type=4), remote_proxy=
192.168.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 3600s and 4608000kb, spi= 0xE90CFBAD(3909942189), conn_id= 2003, keysize= 0, flags= 0xC
*Mar 1 00:05:28.951: IPSEC(create_sa): sa created,
  (sa) sa_dest= 10.1.4.1, sa_prot= 50,
    sa_spi= 0x1B7A414E(460996942),
    sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2002
*Mar  1 00:05:28.959: IPSEC(create_sa): sa created,
  (sa) sa_dest= 10.1.3.1, sa_prot= 50,
    sa_spi= 0xE90CFBAD(3909942189),
    sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2003
!--- IPsec tunnel has been created between routers !--- Hub and Spoke 2. This establishes a
tunnel between Spoke 1 !--- and Spoke 2 through Hub.
```

Dit is Spoke 1 routeruitvoer van de **debug crypto isakmp** en **debug crypto ipsec** opdrachten.

```
*Mar  1 00:03:28.771: IPSEC(sa_request): ,
  (key eng. msg.) OUTBOUND local= 10.1.2.1, remote= 10.1.4.1,
    local_proxy= 172.16.1.0/255.255.255.0/0/0 (type=4),
    remote_proxy= 192.168.1.0/255.255.255.0/0/0 (type=4),
    protocol= ESP, transform= esp-des esp-md5-hmac ,
    lifedur= 3600s and 4608000kb,
    spi= 0xD44FE97C(3562006908), conn_id= 0, keysize= 0, flags= 0x400C
!--- Request sent after the ping. *Mar 1 00:03:28.787: ISAKMP: received ke message (1/1) *Mar 1
00:03:28.791: ISAKMP: local port 500, remote port 500 *Mar 1 00:03:28.799: ISAKMP (0:1):
beginning Main Mode exchange
```

!--- Initial IKE phase 1 parameters are exchanged !--- between Spoke 1 and Hub. *Mar 1 00:03:28.803: ISAKMP (0:1): sending packet to 10.1.4.1 (I) MM_NO_STATE. *Mar 1 00:03:38.807: ISAKMP (0:1): retransmitting phase 1 MM_NO_STATE... *Mar 1 00:03:38.807: ISAKMP (0:1): incrementing error counter on sa: retransmit phase 1 *Mar 1 00:03:38.811: ISAKMP (0:1): retransmitting phase 1 MM_NO_STATE *Mar 1 00:03:38.811: ISAKMP (0:1): sending packet to 10.1.4.1 (I) MM_NO_STATE *Mar 1 00:03:48.815: ISAKMP (0:1): retransmitting phase 1 MM_NO_STATE... *Mar 1 00:03:48.815: ISAKMP (0:1): incrementing error counter on sa: retransmit phase 1 *Mar 1 00:03:48.819: ISAKMP (0:1): retransmitting phase 1 MM_NO_STATE *Mar 1 00:03:48.819: ISAKMP (0:1): sending packet to 10.1.4.1 (I) MM_NO_STATE *Mar 1 00:03:49.355: ISAKMP (0:1): received packet from 10.1.4.1 (I) MM_NO_STATE *Mar 1 00:03:49.363: ISAKMP (0:1): processing SA payload. message ID = 0 *Mar 1 00:03:49.363: ISAKMP (0:1): found peer pre-shared key matching 10.1.4.1 *Mar 1 00:03:49.367: ISAKMP (0:1): Checking ISAKMP transform 1 against priority 10 policy *Mar 1 00:03:49.367: ISAKMP: encryption DES-CBC *Mar 1 00:03:49.371: ISAKMP: hash MD5 *Mar 1 00:03:49.371: ISAKMP: default group 1 *Mar 1 00:03:49.375: ISAKMP: auth pre-share *Mar 1 00:03:49.375: ISAKMP: life type in seconds *Mar 1 00:03:49.375: ISAKMP: life duration (VPI) of 0x0 0x1 0x51 0x80 *Mar 1 00:03:49.379: ISAKMP (0:1): **atts are acceptable.**
Next payload is 0
!--- IKE phase 1 parameters have been sucessfully !--- negotiated between Spoke 1 and Hub. *Mar 1 00:03:50.835: ISAKMP (0:1): SA is doing pre-shared key authentication using id type ID_IPV4_ADDR *Mar 1 00:03:50.851: ISAKMP (0:1): sending packet to 10.1.4.1 (I) MM_SA_SETUP *Mar 1 00:03:52.759: ISAKMP (0:1): received packet from 10.1.4.1 (I) MM_SA_SETUP *Mar 1 00:03:52.763: ISAKMP (0:1): processing KE payload. message ID = 0 *Mar 1 00:03:54.635: ISAKMP (0:1): processing NONCE payload. message ID = 0 *Mar 1 00:03:54.639: ISAKMP (0:1): found peer pre-shared key matching 10.1.4.1 *Mar 1 00:03:54.651: ISAKMP (0:1): SKEYID state generated *Mar 1 00:03:54.655: ISAKMP (0:1): processing vendor id payload *Mar 1 00:03:54.663: ISAKMP (0:1): speaking to another IOS box! *Mar 1 00:03:54.663: ISAKMP (1): ID payload next-payload : 8 type : 1 protocol : 17 port : 500 length : 8 *Mar 1 00:03:54.667: ISAKMP (1): Total payload length: 12 *Mar 1 00:03:54.675: ISAKMP (0:1): sending packet to 10.1.4.1 (I) MM_KEY_EXCH *Mar 1 00:03:54.759: ISAKMP (0:1): received packet from 10.1.4.1 (I) MM_KEY_EXCH *Mar 1 00:03:54.767: ISAKMP (0:1): processing ID payload. message ID = 0 *Mar 1 00:03:54.767: ISAKMP (0:1): processing HASH payload. message ID = 0 *Mar 1 00:03:54.775: ISAKMP (0:1): SA has been authenticated with 10.1.4.1 *Mar 1 00:03:54.779: ISAKMP (0:1): beginning Quick Mode exchange, M-ID of 581713929 *Mar 1 00:03:54.799: ISAKMP (0:1): sending packet to 10.1.4.1 (I) QM_IDLE *Mar 1 00:03:55.155: ISAKMP (0:1): received packet from 10.1.4.1 (I) QM_IDLE *Mar 1 00:03:55.171: ISAKMP (0:1): processing HASH payload. message ID = 581713929 *Mar 1 00:03:55.175: ISAKMP (0:1): processing SA payload. message ID = 581713929 *Mar 1 00:03:55.179: ISAKMP (0:1): **Checking IPSec proposal 1**
!--- IKE exchanges the IPsec phase 2 parameters between !--- Spoke 1 and Hub. *Mar 1 00:03:55.179: ISAKMP: transform 1, ESP_DES *Mar 1 00:03:55.183: ISAKMP: attributes in transform: *Mar 1 00:03:55.183: ISAKMP: encaps is 1 *Mar 1 00:03:55.183: ISAKMP: SA life type in seconds *Mar 1 00:03:55.187: ISAKMP: SA life duration (basic) of 3600 *Mar 1 00:03:55.187: ISAKMP: SA life type in kilobytes *Mar 1 00:03:55.191: ISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0 *Mar 1 00:03:55.195: ISAKMP: authenticator is HMAC-MD5 *Mar 1 00:03:55.199: ISAKMP (0:1): **atts are acceptable.**
!--- IKE has successfully negotiated phase 2 IPsec !--- SA between Hub and Spoke 2. *Mar 1 00:03:55.203: IPSEC(validate_proposal_request): proposal part #1, (key eng. msg.) INBOUND local= 10.1.2.1, remote= 10.1.4.1, local_proxy= 172.16.1.0/255.255.255.0/0/0 (type=4), remote_proxy= 192.168.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 0s and 0kb, spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x4 *Mar 1 00:03:55.219: ISAKMP (0:1): processing NONCE payload. message ID = 581713929 *Mar 1 00:03:55.219: ISAKMP (0:1): processing ID payload. message ID = 581713929 *Mar 1 00:03:55.223: ISAKMP (0:1): processing ID payload. message ID = 581713929 *Mar 1 00:03:55.251: ISAKMP (0:1): Creating IPSec SAs *Mar 1 00:03:55.255: inbound SA from 10.1.4.1 to 10.1.2.1 (proxy 192.168.1.0 to 172.16.1.0) *Mar 1 00:03:55.259: has spi 0xD44FE97C and conn_id 2000 and flags 4 *Mar 1 00:03:55.263: lifetime of 3600 seconds *Mar 1 00:03:55.263: lifetime of 4608000 kilobytes *Mar 1 00:03:55.267: outbound SA from 10.1.2.1 to 10.1.4.1 (proxy 172.16.1.0 to 192.168.1.0) *Mar 1 00:03:55.271: has spi -86399127 and conn_id 2001 and flags C *Mar 1 00:03:55.271: lifetime of 3600 seconds *Mar 1 00:03:55.275: lifetime of 4608000 kilobytes *Mar 1 00:03:55.279: ISAKMP (0:1): sending packet to 10.1.4.1 (I) QM_IDLE *Mar 1 00:03:55.283: ISAKMP (0:1): deleting node 581713929 error FALSE reason " " *Mar 1 00:03:55.287: IPSEC(key_engine): got a queue event... *Mar 1 00:03:55.291: IPSEC(initialize_sas): , (key eng. msg.) INBOUND local= 10.1.2.1, remote= 10.1.4.1, local_proxy= 172.16.1.0/255.255.255.0/0/0 (type=4), remote_proxy= 192.168.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 3600s and 4608000kb, spi= 0xD44FE97C(3562006908), conn_id= 2000, keysize= 0, flags= 0x4 *Mar 1 00:03:55.303:

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IPSEC(initialize_sas): , (key eng. msg.) OUTBOUND local= 10.1.2.1, remote= 10.1.4.1,
local_proxy= 172.16.1.0/255.255.255.0/0/0 (type=4), remote_proxy= 192.168.1.0/255.255.255.0/0/0
(type=4), protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 3600s and 4608000kb, spi=
0xFAD9A769(4208568169), conn_id= 2001, keysize= 0, flags= 0xC *Mar 1 00:03:55.319:
IPSEC(create_sa): sa created,
  (sa) sa_dest= 10.1.2.1, sa_prot= 50,
    sa_spi= 0xD44FE97C(3562006908),
    sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2000
*Mar  1 00:03:55.323: IPSEC(create_sa): sa created,
  (sa) sa_dest= 10.1.4.1, sa_prot= 50,
    sa_spi= 0xFAD9A769(4208568169),
    sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2001
!--- The IPsec tunnel between Spoke 1 and Hub is set up.
```

Gerelateerde informatie

- IP-beveiligingsprobleemoplossing - Oplossingen begrijpen en gebruiken van debug-opdrachten
- Configuratievoorbeelden van IPsec
- IPsec-onderhandeling/IKE-protocol
- Technische ondersteuning en documentatie – Cisco Systems