

使用SEAL示例配置的IOS路由器之間的站點到站點隧道

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簡介

軟體加密演演算法(SEAL)是資料加密標準(DES)、三重DES(3DES)和進階加密標準(AES)的替代演演算法。SEAL加密使用160位加密金鑰，與其他基於軟體的演算法相比，對CPU的影響較小。本文說明如何使用SEAL設定LAN到LAN (站點到站點) IPSec通道。

必要條件

需求

本文件沒有特定需求。

採用元件

本文中的資訊係根據以下軟體和硬體版本：

- 運行Cisco IOS®軟體版本12.3(7)T的Cisco 7200系列路由器

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除 (預設) 的組態來啟動。如果您的網路正在作用，請確保您已瞭解任何指令可能造成的影響。

慣例

如需文件慣例的詳細資訊，請參閱[思科技術提示慣例](#)。

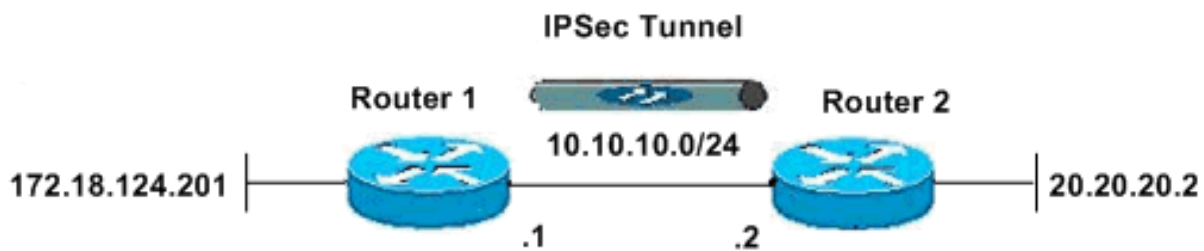
設定

本節提供用於設定本文件中所述功能的資訊。

註：使用[Command Lookup Tool](#)(僅限註冊客戶)查詢有關本文檔中使用的命令的更多資訊。

網路圖表

本檔案會使用以下網路設定：



組態

本檔案會使用以下設定：

- [路由器1](#)
- [路由器2](#)

路由器1

```
version 12.3
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R1
!
boot-start-marker
boot-end-marker
!
!
clock timezone EST -5
no aaa new-model
ip subnet-zero
no ip domain lookup
!
!
ip cef
ip audit po max-events 100
no ftp-server write-enable
!
!
!
```

```

!--- ISAKMP policy configuration. crypto isakmp policy 1
encr aes 256 hash md5 authentication pre-share group 2
crypto isakmp key cisco123 address 10.10.10.2 ! !---
Define a transform set with SEAL. !--- If you use the
esp-seal transform set and a crypto !--- accelerator is
present, you receive a warning. !--- The configuration
is accepted, but it !--- is ignored as long as the
accelerator is present. !--- If you use the esp-seal
transform set with either of !--- the other two
limitations, you receive an error !--- and the
configuration is rejected. crypto ipsec transform-set
cisco esp-seal esp-sha-hmac ! !--- Define a transform
set with SEAL. crypto map cisco 10 ipsec-isakmp set peer
10.10.10.2 set transform-set cisco match address 100 ! !
! interface Ethernet0/0 ip address 172.18.124.201
255.255.255.0 ! !--- Apply crypto-map to the public
interface. interface Ethernet1/0 ip address 10.10.10.1
255.255.255.0 crypto map cisco ! ip classless ip route
0.0.0.0 0.0.0.0 10.10.10.2 no ip http server no ip http
secure-server ! ! !--- Access Control List (ACL) that
defines the networks to encrypt. access-list 100 permit
ip 172.18.124.0 0.0.0.255 20.20.20.0 0.0.0.255 ! ! !
control-plane ! ! line con 0 exec-timeout 0 0 line aux 0
line vty 0 4 password ww login ! ! end

```

路由器2

```

version 12.3
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R2
!
boot-start-marker
boot-end-marker
!
!
clock timezone EST -5
no aaa new-model
ip subnet-zero
no ip domain lookup
!
!
ip cef
ip audit po max-events 100
no ftp-server write-enable
!
!
!
!
!--- ISAKMP policy configuration. crypto isakmp policy 1
encr aes 256 hash md5 authentication pre-share group 2
crypto isakmp key cisco123 address 10.10.10.1 ! !---
Define a transform set with SEAL. !--- If you use the
esp-seal transform set and a crypto !--- accelerator is
present, you receive a warning. !--- The configuration
is accepted, but it !--- is ignored as long as the
accelerator is present. !--- If you use the esp-seal
transform set with either of !--- the other two
limitations, you receive an error !--- and the
configuration is rejected. crypto ipsec transform-set
cisco esp-seal esp-sha-hmac ! !--- Define a transform

```

```
set with SEAL. crypto map cisco 10 ipsec-isakmp set peer
10.10.10.1 set transform-set cisco match address 100 ! !
! ! !--- Apply crypto-map to the public interface.
interface Ethernet0/0 ip address 10.10.10.2
255.255.255.0 crypto map cisco ! interface Ethernet0/0
ip address 20.20.20.2 255.255.255.0 ! ip classless ip
route 0.0.0.0 0.0.0.0 10.10.10.1 no ip http server no ip
http secure-server ! ! !--- ACL defines the networks to
encrypt. access-list 100 permit ip 20.20.20.0 0.0.0.255
172.18.124.0 0.0.0.255 ! ! ! control-plane ! ! line con
0 exec-timeout 0 0 line aux 0 line vty 0 4 password ww
login ! ! end
```

驗證

本節提供的資訊可用於確認您的組態是否正常運作。

[輸出直譯器工具](#)(僅供註冊客戶使用)支援某些show命令，此工具可讓您檢視show命令輸出的分析。

- **show crypto map** — 驗證路由器上的配置。此輸出來自Router 1。

```
R1#show crypto map
Crypto Map "cisco" 10 ipsec-isakmp
Peer = 10.10.10.2
Extended IP access list 100
access-list 100 permit ip 172.18.124.0 0.0.0.255 20.20.20.0 0.0.0.255
Current peer: 10.10.10.2
Security association lifetime: 4608000 kilobytes/3600 seconds
PFS (Y/N): N
Transform sets={
cisco,
}
Interfaces using crypto map cisco:
Ethernet1/0
```

疑難排解

本節提供的資訊可用於對組態進行疑難排解。

疑難排解指令

[輸出直譯器工具](#)(僅供註冊客戶使用)支援某些show命令，此工具可讓您檢視show命令輸出的分析。

注意：發出debug命令之前，請參閱[有關Debug命令的重要資訊](#)。

ISAMP和IPSec調試

- **show debugging** — 顯示有關為路由器啟用的調試型別的資訊。

```
R1#show debugging
Cryptographic Subsystem:
Crypto ISAKMP debugging is on
Crypto IPSEC debugging is on
```

R1#

```
*Apr 18 05:59:20.491: ISAKMP (0:0): received packet
from 10.10.10.2 dport 500 sport 500 Global (N) NEW SA
*Apr 18 05:59:20.491: ISAKMP: Created a peer struct for
10.10.10.2, peer port 500
*Apr 18 05:59:20.491: ISAKMP: Locking peer struct 0x25F0BD8,
IKE refcount 1 for crypto_isakmp_process_block
*Apr 18 05:59:20.491: ISAKMP: local port 500, remote port 500
*Apr 18 05:59:20.519: insert sa successfully sa = 2398188
*Apr 18 05:59:20.519: ISAKMP:(0:1:SW:1):Input = IKE_MESG_FROM_PEER, IKE_MM_EXCH
*Apr 18 05:59:20.519: ISAKMP:(0:1:SW:1):Old State = IKE_READY
New State = IKE_R_MM1

*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): processing SA payload. message ID = 0
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): processing vendor id payload
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): vendor ID seems Unity/DPD
but major 157 mismatch
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): vendor ID is NAT-T v3
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): processing vendor id payload
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): vendor ID seems Unity/DPD
but major 123 mismatch
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): vendor ID is NAT-T v2
*Apr 18 05:59:20.579: ISAKMP: Looking for a matching key for
10.10.10.2 in default : success
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1):found peer pre-shared key
matching 10.10.10.2
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): local preshared key found
*Apr 18 05:59:20.579: ISAKMP : Scanning profiles for xauth ...
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1):Checking ISAKMP transform 1
against priority 1 policy
*Apr 18 05:59:20.579: ISAKMP: encryption AES-CBC
*Apr 18 05:59:20.579: ISAKMP: keylength of 256
*Apr 18 05:59:20.579: ISAKMP: hash MD5
*Apr 18 05:59:20.579: ISAKMP: default group 2
*Apr 18 05:59:20.579: ISAKMP: auth pre-share
*Apr 18 05:59:20.579: ISAKMP: life type in seconds
*Apr 18 05:59:20.579: ISAKMP: life duration (VPI) of 0x0 0x1 0x51 0x80
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1):atts are acceptable. Next payload is 0
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): processing vendor id payload
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): vendor ID seems Unity/DPD
but major 157 mismatch
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): vendor ID is NAT-T v3
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): processing vendor id payload
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): vendor ID seems Unity/DPD
but major 123 mismatch
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1): vendor ID is NAT-T v2
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_MAIN_MODE
*Apr 18 05:59:20.579: ISAKMP:(0:1:SW:1):Old State = IKE_R_MM1 New
State = IKE_R_MM1

*Apr 18 05:59:20.619: ISAKMP:(0:1:SW:1): constructed NAT-T vendor-03 ID
*Apr 18 05:59:20.619: ISAKMP:(0:1:SW:1): sending packet to 10.10.10.2
my_port 500 peer_port 500 (R) MM_SA_SETUP
*Apr 18 05:59:20.619: ISAKMP:(0:1:SW:1):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_COMPLETE
*Apr 18 05:59:20.619: ISAKMP:(0:1:SW:1):Old State = IKE_R_MM1 New
State = IKE_R_MM2

*Apr 18 05:59:20.911: ISAKMP (0:134217729): received packet from
10.10.10.2 dport 500 sport 500 Global (R) MM_SA_SETUP
*Apr 18 05:59:20.911: ISAKMP:(0:1:SW:1):Input = IKE_MESG_FROM_PEER,
IKE_MM_EXCH
*Apr 18 05:59:20.911: ISAKMP:(0:1:SW:1):Old State = IKE_R_MM2
```

New State = IKE_R_MM3

```
*Apr 18 05:59:20.939: ISAKMP:(0:1:SW:1): processing KE payload. message ID = 0
*Apr 18 05:59:20.939: ISAKMP:(0:1:SW:1): processing NONCE
payload. message ID = 0
*Apr 18 05:59:20.991: ISAKMP: Looking for a matching key for
10.10.10.2 in default : success
*Apr 18 05:59:20.991: ISAKMP:(0:1:SW:1):found peer pre-shared
key matching 10.10.10.2
*Apr 18 05:59:20.991: ISAKMP:(0:1:SW:1):SKEYID state generated
*Apr 18 05:59:20.991: ISAKMP:(0:1:SW:1): processing vendor id payload
*Apr 18 05:59:20.991: ISAKMP:(0:1:SW:1): vendor ID is Unity
*Apr 18 05:59:20.991: ISAKMP:(0:1:SW:1): processing vendor id payload
*Apr 18 05:59:20.991: ISAKMP:(0:1:SW:1): vendor ID is DPD
*Apr 18 05:59:20.991: ISAKMP:(0:1:SW:1): processing vendor id payload
*Apr 18 05:59:20.991: ISAKMP:(0:1:SW:1): speaking to another IOS box!
*Apr 18 05:59:20.991: ISAKMP:received payload type 17
*Apr 18 05:59:20.991: ISAKMP:received payload type 17
*Apr 18 05:59:20.991: ISAKMP:(0:1:SW:1):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_MAIN_MODE
*Apr 18 05:59:20.991: ISAKMP:(0:1:SW:1):Old State = IKE_R_MM3 New
State = IKE_R_MM3

*Apr 18 05:59:21.051: ISAKMP:(0:1:SW:1): sending packet to
10.10.10.2 my_port 500 peer_port 500 (R) MM_KEY_EXCH
*Apr 18 05:59:21.051: ISAKMP:(0:1:SW:1):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_COMPLETE
*Apr 18 05:59:21.051: ISAKMP:(0:1:SW:1):Old State = IKE_R_MM3
New State = IKE_R_MM4

*Apr 18 05:59:21.279: ISAKMP (0:134217729): received packet
from 10.10.10.2 dport 500 sport 500 Global (R) MM_KEY_EXCH
*Apr 18 05:59:21.279: ISAKMP:(0:1:SW:1):Input = IKE_MESG_FROM_PEER,
IKE_MM_EXCH
*Apr 18 05:59:21.279: ISAKMP:(0:1:SW:1):Old State = IKE_R_MM4
New State = IKE_R_MM5

*Apr 18 05:59:21.311: ISAKMP:(0:1:SW:1): processing ID payload. message ID = 0
*Apr 18 05:59:21.311: ISAKMP (0:134217729): ID payload
next-payload : 8
type : 1
address : 10.10.10.2
protocol : 17
port : 500
length : 12
*Apr 18 05:59:21.311: ISAKMP:(0:1:SW:1):: peer matches *none* of the profiles
*Apr 18 05:59:21.311: ISAKMP:(0:1:SW:1): processing HASH
payload. message ID = 0
*Apr 18 05:59:21.311: ISAKMP:(0:1:SW:1): processing NOTIFY
INITIAL_CONTACT protocol 1
spi 0, message ID = 0, sa = 2398188
*Apr 18 05:59:21.311: ISAKMP:(0:1:SW:1):SA authentication status:
authenticated
*Apr 18 05:59:21.311: ISAKMP:(0:1:SW:1): Process initial contact,
bring down existing phase 1 and 2 SA's with local 10.10.10.1
remote 10.10.10.2 remote port 500
*Apr 18 05:59:21.311: ISAKMP:(0:1:SW:1):SA authentication status:
authenticated
*Apr 18 05:59:21.311: ISAKMP:(0:1:SW:1):SA has been authenticated
with 10.10.10.2
*Apr 18 05:59:21.311: ISAKMP: Trying to insert a peer
10.10.10.1/10.10.10.2/500/, and inserted successfully.
*Apr 18 05:59:21.311: ISAKMP:(0:1:SW:1):: peer matches
*none* of the profiles
```

```
*Apr 18 05:59:21.311: ISAKMP:(0:1:SW:1):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_MAIN_MODE
*Apr 18 05:59:21.311: ISAKMP:(0:1:SW:1):Old State =
IKE_R_MM5 New State = IKE_R_MM5

*Apr 18 05:59:21.331: IPSEC(key_engine): got a queue event with 1 kei messages
*Apr 18 05:59:21.391: ISAKMP:(0:1:SW:1):SA is doing
pre-shared key authentication using id type ID_IPV4_ADDR
*Apr 18 05:59:21.391: ISAKMP (0:134217729): ID payload
next-payload : 8
type : 1
address : 10.10.10.1
protocol : 17
port : 500
length : 12
*Apr 18 05:59:21.391: ISAKMP:(0:1:SW:1):Total payload length: 12
*Apr 18 05:59:21.391: ISAKMP:(0:1:SW:1): sending packet to
10.10.10.2 my_port 500 peer_port 500 (R) MM_KEY_EXCH
*Apr 18 05:59:21.391: ISAKMP:(0:1:SW:1):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_COMPLETE
*Apr 18 05:59:21.391: ISAKMP:(0:1:SW:1):Old State = IKE_R_MM5
New State = IKE_P1_COMPLETE

*Apr 18 05:59:21.439: ISAKMP:(0:1:SW:1):Input = IKE_MESG_INTERNAL,
IKE_PHASE1_COMPLETE
*Apr 18 05:59:21.439: ISAKMP:(0:1:SW:1):Old State = IKE_P1_COMPLETE
New State = IKE_P1_COMPLETE

*Apr 18 05:59:21.779: ISAKMP (0:134217729): received packet from
10.10.10.2 dport 500 sport 500 Global (R) QM_IDLE
*Apr 18 05:59:21.779: ISAKMP: set new node 1056009800 to QM_IDLE
*Apr 18 05:59:21.779: ISAKMP:(0:1:SW:1): processing HASH payload.
message ID = 1056009800
*Apr 18 05:59:21.779: ISAKMP:(0:1:SW:1): processing SA payload.
message ID = 1056009800
*Apr 18 05:59:21.779: ISAKMP:(0:1:SW:1):Checking IPsec proposal 1
*Apr 18 05:59:21.779: ISAKMP: transform 1, ESP_SEAL
*Apr 18 05:59:21.779: ISAKMP: attributes in transform:
*Apr 18 05:59:21.779: ISAKMP: encaps is 1 (Tunnel)
*Apr 18 05:59:21.779: ISAKMP: SA life type in seconds
*Apr 18 05:59:21.779: ISAKMP: SA life duration (basic) of 3600
*Apr 18 05:59:21.779: ISAKMP: SA life type in kilobytes
*Apr 18 05:59:21.779: ISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0
*Apr 18 05:59:21.779: ISAKMP: authenticator is HMAC-SHA
*Apr 18 05:59:21.779: ISAKMP:(0:1:SW:1):atts are acceptable.
*Apr 18 05:59:21.779: IPSEC(validate_proposal_request): proposal part #1,
(key eng. msg.) INBOUND local= 10.10.10.1, remote= 10.10.10.2,
local_proxy= 172.18.124.0/255.255.255.0/0/0 (type=4),
remote_proxy= 20.20.20.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-seal esp-sha-hmac (Tunnel),
lifedur= 0s and 0kb,
spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x2
*Apr 18 05:59:21.779: IPSEC(kei_proxy): head = cisco,
map->ivrf = , kei->ivrf =
*Apr 18 05:59:21.779: ISAKMP:(0:1:SW:1): processing NONCE
payload. message ID = 1056009800
*Apr 18 05:59:21.779: ISAKMP:(0:1:SW:1): processing ID
payload. message ID = 1056009800
*Apr 18 05:59:21.779: ISAKMP:(0:1:SW:1): processing ID
payload. message ID = 1056009800
*Apr 18 05:59:21.779: ISAKMP:(0:1:SW:1): asking for 1 spis from ipsec
*Apr 18 05:59:21.779: ISAKMP:(0:1:SW:1):Node 1056009800,
Input = IKE_MESG_FROM_PEER, IKE_QM_EXCH
*Apr 18 05:59:21.779: ISAKMP:(0:1:SW:1):Old State =
```

IKE_QM_READY New State = IKE_QM_SPI_STARVE
*Apr 18 05:59:21.799: IPSEC(key_engine): got a queue event with 1 kei messages
*Apr 18 05:59:21.799: IPSEC(spi_response): getting spi 3711321544 for SA
from 10.10.10.1 to 10.10.10.2 for prot 3
*Apr 18 05:59:21.811: ISAKMP: received ke message (2/1)
*Apr 18 05:59:22.079: IPsec: Flow_switching Allocated flow
for flow_id 134217729
*Apr 18 05:59:22.079: IPsec: Flow_switching Allocated flow
for flow_id 134217730
*Apr 18 05:59:22.199: %CRYPTO-5-SESSION_STATUS: Crypto tunnel
is UP . Peer 10.10.10.2:500 Id: 10.10.10.2
*Apr 18 05:59:22.199: ISAKMP: Locking peer struct 0x25F0BD8,
IPSEC refcount 1 for for stuff_ke
*Apr 18 05:59:22.199: ISAKMP:(0:1:SW:1): Creating IPsec SAs
*Apr 18 05:59:22.199: inbound SA from 10.10.10.2 to 10.10.10.1 (f/i) 0/ 0
(proxy 20.20.20.0 to 172.18.124.0)
*Apr 18 05:59:22.199: has spi 0xDD3645C8 and conn_id 2000 and flags 2
*Apr 18 05:59:22.199: lifetime of 3600 seconds
*Apr 18 05:59:22.199: lifetime of 4608000 kilobytes
*Apr 18 05:59:22.199: has client flags 0x0
*Apr 18 05:59:22.199: outbound SA from 10.10.10.1 to 10.10.10.2 (f/i) 0/0
(proxy 172.18.124.0 to 20.20.20.0)
*Apr 18 05:59:22.199: has spi 1918479069 and conn_id 2001 and flags A
*Apr 18 05:59:22.199: lifetime of 3600 seconds
*Apr 18 05:59:22.199: lifetime of 4608000 kilobytes
*Apr 18 05:59:22.199: has client flags 0x0
*Apr 18 05:59:22.199: ISAKMP:(0:1:SW:1): sending packet to
10.10.10.2 my_port 500 peer_port 500 (R) QM_IDLE
*Apr 18 05:59:22.199: ISAKMP:(0:1:SW:1):Node 1056009800,
Input = IKE_MESG_FROM_IPSEC, IKE_SPI_REPLY
*Apr 18 05:59:22.199: ISAKMP:(0:1:SW:1):Old State = IKE_QM_SPI_STARVE
New State = IKE_QM_R_QM2
*Apr 18 05:59:22.211: IPSEC(key_engine): got a queue event with 2 kei messages
*Apr 18 05:59:22.211: IPSEC(initialize_sas): ,
(key eng. msg.) INBOUND local= 10.10.10.1, remote= 10.10.10.2,
local_proxy= 172.18.124.0/255.255.255.0/0/0 (type=4),
remote_proxy= 20.20.20.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= **esp-seal** esp-sha-hmac (Tunnel),
lifedur= 3600s and 4608000kb,
spi= 0xDD3645C8(3711321544), conn_id= 134219728, keysize= 0, flags= 0x2
*Apr 18 05:59:22.211: IPSEC(initialize_sas): ,
(key eng. msg.) OUTBOUND local= 10.10.10.1, remote= 10.10.10.2,
local_proxy= 172.18.124.0/255.255.255.0/0/0 (type=4),
remote_proxy= 20.20.20.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= **esp-seal** esp-sha-hmac (Tunnel),
lifedur= 3600s and 4608000kb,
spi= 0x7259AADD(1918479069), conn_id= 134219729, keysize= 0, flags= 0xA
*Apr 18 05:59:22.211: IPSEC(kei_proxy): head = cisco,
map->ivrf = , kei->ivrf =
*Apr 18 05:59:22.211: IPSEC(crypto_ipsec_sa_find_ident_head):
reconnecting with the same proxies and 10.10.10.2
*Apr 18 05:59:22.211: IPSEC(mtree_add_ident): src 172.18.124.0,
dest 20.20.20.0, dest_port 0

*Apr 18 05:59:22.211: IPSEC(create_sa): sa created,
(sa) sa_dest= 10.10.10.1, sa_prot= 50,
sa_spi= 0xDD3645C8(3711321544),
sa_trans= esp-seal esp-sha-hmac , sa_conn_id= 134219728
*Apr 18 05:59:22.211: IPSEC(create_sa): sa created,
(sa) sa_dest= 10.10.10.2, sa_prot= 50,
sa_spi= 0x7259AADD(1918479069),
sa_trans= esp-seal esp-sha-hmac , sa_conn_id= 134219729
*Apr 18 05:59:22.339: ISAKMP (0:134217729): received packet
from 10.10.10.2 dport 500 sport 500 Global (R) QM_IDLE


```
*Apr 18 05:59:22.339: ISAKMP:(0:1:SW:1):deleting node 1056009800
error FALSE reason "quick mode done (await)"
*Apr 18 05:59:22.339: ISAKMP:(0:1:SW:1):Node 1056009800, Input =
IKE_MSG_FROM_PEER, IKE_QM_EXCH
*Apr 18 05:59:22.339: ISAKMP:(0:1:SW:1):Old State = IKE_QM_R_QM2
New State = IKE_QM_PHASE2_COMPLETE
```

[show命令](#)

- **show crypto isakmp sa** — 顯示對等體之間構建的網際網路安全關聯管理協定(ISAKMP)安全關聯(SA)。

```
R1#show crypto isakmp sa
dst src state conn-id slot
10.10.10.1 10.10.10.2 QM_IDLE 1 0
```

```
R2#show crypto isakmp sa
dst src state conn-id slot
10.10.10.1 10.10.10.2 QM_IDLE 1 0
```

- **show crypto ipsec sa** — 顯示對等體之間構建的IPSec SA。

```
R1#show crypto ipsec sa
interface: Ethernet1/0
Crypto map tag: cisco, local addr. 10.10.10.1

protected vrf:
local ident (addr/mask/prot/port): (172.18.124.0/255.255.255.0/0/0)
remote ident (addr/mask/prot/port): (20.20.20.0/255.255.255.0/0/0)
current_peer: 10.10.10.2:500
PERMIT, flags={origin_is_acl,}
#pkts encaps: 776, #pkts encrypt: 776, #pkts digest: 776
#pkts decaps: 776, #pkts decrypt: 776, #pkts verify: 776
#pkts compressed: 0, #pkts decompressed: 0
#pkts not compressed: 0, #pkts compr. failed: 0
#pkts not decompressed: 0, #pkts decompress failed: 0
#send errors 0, #recv errors 0

local crypto endpt.: 10.10.10.1, remote crypto endpt.: 10.10.10.2
path mtu 1500, media mtu 1500
current outbound spi: 7259AADD
```

```
inbound esp sas:
spi: 0xDD3645C8(3711321544)
transform: esp-seal esp-sha-hmac ,
in use settings ={Tunnel, }
slot: 0, conn id: 2000, flow_id: 1, crypto map: cisco
crypto engine type: Software, engine_id: 1
sa timing: remaining key lifetime (k/sec): (4565513/3382)
ike_cookies: 67432FCF F809B638 B84C0CD6 B0BCFFC3
IV size: 0 bytes
replay detection support: Y
```

```
inbound ah sas:
```

```
inbound pcp sas:
```

```
outbound esp sas:
spi: 0x7259AADD(1918479069)
transform: esp-seal esp-sha-hmac ,
in use settings ={Tunnel, }
slot: 0, conn id: 2001, flow_id: 2, crypto map: cisco
crypto engine type: Software, engine_id: 1
sa timing: remaining key lifetime (k/sec): (4565518/3382)
ike_cookies: 67432FCF F809B638 B84C0CD6 B0BCFFC3
```

IV size: 0 bytes
replay detection support: Y

outbound ah sas:

outbound pcp sas:

R1#

R2#**show crypto ipsec sa**

interface: Ethernet0/0
Crypto map tag: cisco, local addr. 10.10.10.2

protected vrf:
local ident (addr/mask/prot/port): (20.20.20.0/255.255.255.0/0/0)
remote ident (addr/mask/prot/port): (172.18.124.0/255.255.255.0/0/0)
current_peer: 10.10.10.1:500
PERMIT, flags={origin_is_acl,}
#pkts encaps: 776, #pkts encrypt: 776, #pkts digest: 38
#pkts decaps: 776, #pkts decrypt: 776, #pkts verify: 38
#pkts compressed: 0, #pkts decompressed: 0
#pkts not compressed: 0, #pkts compr. failed: 0
#pkts not decompressed: 0, #pkts decompress failed: 0
#send errors 1, #recv errors 0

local crypto endpt.: 10.10.10.2, remote crypto endpt.: 10.10.10.1
path mtu 1500, media mtu 1500
current outbound spi: DD3645C8

inbound esp sas:
spi: 0x7259AADD(1918479069)
transform: esp-seal esp-sha-hmac ,
in use settings = {Tunnel, }
slot: 0, conn id: 2000, flow_id: 3, crypto map: cisco
crypto engine type: Software, engine_id: 1
sa timing: remaining key lifetime (k/sec): (4536995/3410)
ike_cookies: B84C0CD6 B0BCFFC3 67432FCF F809B638
IV size: 0 bytes
replay detection support: Y

inbound ah sas:

inbound pcp sas:

outbound esp sas:
spi: 0xDD3645C8(3711321544)
transform: **esp-seal** esp-sha-hmac ,
in use settings = {Tunnel, }
slot: 0, conn id: 2001, flow_id: 4, crypto map: cisco
crypto engine type: Software, engine_id: 1
sa timing: remaining key lifetime (k/sec): (4537000/3409)
ike_cookies: B84C0CD6 B0BCFFC3 67432FCF F809B638
IV size: 0 bytes
replay detection support: Y

outbound ah sas:

outbound pcp sas:

[esp-seal轉換集的限制](#)

esp-seal轉換集的使用有三個限制：

- 只有在不存在加密加速器的情況下，才能使用**esp-seal**轉換集。存在此限制是因為當前沒有加密加速器實施SEAL加密轉換集，並且如果存在加密加速器，它將處理與IKE協商的所有IPSec連線。如果存在加密加速器，Cisco IOS軟體將允許配置轉換集，但會發出警告：只要啟用了加密加速器，就不會使用該轉換集。
- **esp-seal**轉換集只能與身份驗證轉換集結合使用，即以下其中之一：**esp-md5-hmac**、**esp-sha-hmac**、**ah-md5-hmac**或**ah-sha-hmac**。之所以存在這種限制，是因為SEAL加密在針對加密資料包的修改提供保護時特別脆弱。因此，為了防止這種弱點，需要身份驗證轉換集（身份驗證轉換集旨在阻止此類攻擊）。如果嘗試使用SEAL配置IPSec轉換集而不配置身份驗證轉換集，則會生成錯誤，並且會拒絕轉換集。
- **esp-seal**轉換集不能與手動加密對映一起使用。存在此限制，因為這樣的配置會在每次重新啟動時重複使用相同的金鑰流，這會危害安全性。因為存在安全問題，所以禁止進行此類配置。如果嘗試使用基於SEAL的轉換集配置手動金鑰加密對映，則會生成錯誤，並且轉換集會被拒絕。

[相關資訊](#)

- [IPSec支援頁面](#)
- [技術支援與文件 - Cisco Systems](#)