

Configuring Router to VPN Client, Mode–Config, Wild–Card Pre–Shared Key with NAT

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Introduction

Prerequisites

- Requirements

- Components Used

- Conventions

Configure

- Network Diagram

- Configurations

Verify

Troubleshoot

- Troubleshooting Commands

- Sample Debug Output

Related Information

Introduction

This sample configuration illustrates a router configured for mode configuration (user gets an IP address from the pool), wild–card pre–shared keys (all PC clients share a common key), and network address translation (NAT). In this configuration, an off–site user can enter the network and have an internal IP address assigned from the pool. To users, it appears that they are inside the network. Because private addressing, hence NAT, is involved, the router must be told what to translate and what not to translate.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The information in this document is based on these software and hardware versions:

- Cisco IOS® Software Release 12.0.7T or later
- Hardware that supports this software revision
- CiscoSecure VPN Client 1.0/10A or 1.1 (shown as 2.0.7/E or 2.1.12, respectively, go to **Help > About** to check)

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 .

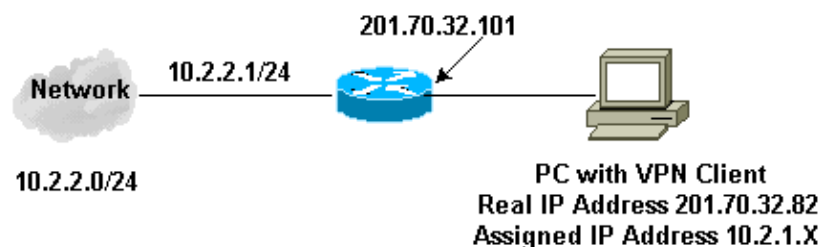
Configure

In this section, you are presented with the information to configure the features described in this document.

Note: To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only) .

Network Diagram

This document uses the network setup shown in this diagram.



Configurations

This document uses these configurations.

- VPN Client
- Router

| VPN Client Configuration |
|---------------------------------------|
| Network Security policy: |
| 1- Myconn |
| My Identity = ip address |
| Connection security: Secure |
| Remote Party Identity and addressing |
| ID Type: IP subnet |
| 10.2.2.0 |
| Port all Protocol all |
| Connect using secure tunnel |
| ID Type: IP address |
| 201.70.32.101 |
| Authentication (Phase 1) |
| Proposal 1 |
| Authentication method: pre-shared key |
| Encryp Alg: DES |
| Hash Alg: MD5 |
| SA life: Unspecified |
| Key Group: DH 1 |
| Key exchange (Phase 2) |
| Proposal 1 |
| Encapsulation ESP |
| Encrypt Alg: DES |
| Hash Alg: MD5 |
| Encap: tunnel |
| SA life: Unspecified |
| no AH |

2- Other Connections

Connection security: Non-secure
Local Network Interface
Name: Any
IP Addr: Any
Port: All

Router Configuration

Current configuration:

```
!  
version 12.0  
service timestamps debug uptime  
service timestamps log uptime  
no service password-encryption  
!  
hostname Router  
!  
enable secret 5 $1$v50P$mPuiEQn8ULa8hVMYVOV1D.  
enable password ww  
!  
ip subnet-zero  
!  
cns event-service server  
!  
  
!--- IKE configuration.  
  
crypto isakmp policy 1  
hash md5  
authentication pre-share  
crypto isakmp key cisco123 address 0.0.0.0  
crypto isakmp client configuration address-pool local ourpool  
!  
  
!--- IPSec configuration.  
  
crypto ipsec transform-set trans1 esp-des esp-md5-hmac  
!  
crypto dynamic-map dynmap 10  
set transform-set trans1  
!  
crypto map intmap client configuration address initiate  
crypto map intmap client configuration address respond  
crypto map intmap 10 ipsec-isakmp dynamic dynmap  
!  
interface Ethernet0  
ip address 201.70.32.101 255.255.255.0  
no ip directed-broadcast  
ip nat outside  
no ip route-cache  
no ip mroute-cache  
crypto map intmap  
!  
interface Serial1  
ip address 10.2.2.1 255.255.255.0  
no ip directed-broadcast  
ip nat inside  
!  
ip local pool ourpool 10.2.1.1 10.2.1.254  
ip nat pool outsidepool 201.70.32.150 201.70.32.160 netmask 255.255.255.0  
  
!--- Except the private network to private network traffic  
!--- from the NAT process.
```

```

ip nat inside source route-map nonat pool outsidepool
 ip classless
ip route 0.0.0.0 0.0.0.0 201.70.32.1
no ip http server

!--- Except the private network to private network traffic
!--- from the NAT process.

access-list 101 deny ip 10.2.2.0 0.0.0.255 10.2.1.0 0.0.0.255
access-list 101 permit ip 10.2.2.0 0.0.0.255 any
route-map nonat permit 10
match ip address 101
!
line con 0
transport input none
line aux 0
line vty 0 4
password ww
login
!
end

```

Verify

This section provides information you can use to confirm your configuration is working properly.

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) , which allows you to view an analysis of **show** command output.

- **show crypto engine connections active** Shows the encrypted and decrypted packets.
- **show crypto ipsec sa** Shows the phase 2 security associations.
- **show crypto isakmp sa** Shows the phase 1 security associations.

Troubleshoot

This section provides information you can use to troubleshoot your configuration.

Troubleshooting Commands

Note: Before issuing **debug** commands, refer to Important Information on Debug Commands.

These debugs must run on both IPSec routers (peers). Clearing security associations must be done on both peers.

- **debug crypto ipsec** Displays the IPSec negotiations of phase 2.
- **debug crypto isakmp** Displays the ISAKMP negotiations of phase 1.
- **debug crypto engine** Displays the traffic that is encrypted.
- **clear crypto isakmp** Clears the security associations related to phase 1.
- **clear crypto sa** Clears the security associations related to phase 2.

Sample Debug Output

| Router Debugs |
|-----------------------------------------------------------------------------------|
| Apr 18 15:17:59: ISAKMP (4): received packet from 201.70.32.82 (R) MM_NO_STATE |

```
Apr 18 15:17:59: ISAKMP (4): received packet from
201.70.32.82 (R) MM_NO_STATE
Apr 18 15:18:03: ISAKMP (0): received packet from
201.70.32.82 (N) NEW SA
Apr 18 15:18:03: ISAKMP (0:5): processing SA payload.
message ID = 0
Apr 18 15:18:03: ISAKMP (0:5): Checking ISAKMP transform 1
against priority 1 policy
Apr 18 15:18:03: ISAKMP: encryption DES-CBC
Apr 18 15:18:03: ISAKMP: hash MD5
Apr 18 15:18:03: ISAKMP: default group 1
Apr 18 15:18:03: ISAKMP: auth pre-share
Apr 18 15:18:03: ISAKMP (0:5): atts are acceptable.
Next payload is 0
Apr 18 15:18:03: CryptoEngine0: generate alg parameter
Apr 18 15:18:05: CRYPTO_ENGINE: Dh phase 1 status: 0
Apr 18 15:18:05: CRYPTO_ENGINE: Dh phase 1 status: 0
Apr 18 15:18:05: ISAKMP (0:5): SA is doing pre-shared
key authentication
Apr 18 15:18:05: ISAKMP (5): SA is doing pre-shared
key authentication using id type ID_IPV4_ADDR
Apr 18 15:18:05: ISAKMP (5): sending packet to
201.70.32.82 (R) MM_SA_SETUP
Apr 18 15:18:05: ISAKMP (5): received packet from
201.70.32.82 (R) MM_SA_SETUP
Apr 18 15:18:05: ISAKMP (0:5): processing KE payload.
message ID = 0
Apr 18 15:18:05: CryptoEngine0: generate alg parameter
Apr 18 15:18:05: CRYPTO_ENGINE: Dh phase 1 status: 0
Apr 18 15:18:05: CRYPTO_ENGINE: Dh phase 1 status: 0
Apr 18 15:18:05: ISAKMP (0:5): SA is doing pre-shared
key authentication
Apr 18 15:18:05: ISAKMP (5): SA is doing pre-shared
key authentication using id
type ID_IPV4_ADDR
Apr 18 15:18:05: ISAKMP (5): sending packet to
201.70.32.82 (R) MM_SA_SETUP
Apr 18 15:18:05: ISAKMP (5): received packet from
201.70.32.82 (R) MM_SA_SETUP
Apr 18 15:18:05: ISAKMP (0:5): processing KE payload.
message ID = 0
Apr 18 15:18:05: CryptoEngine0: generate alg parameter
Apr 18 15:18:07: ISAKMP (0:5): processing NONCE payload.
message ID = 0
Apr 18 15:18:07: CryptoEngine0: create ISAKMP SKEYID for
conn id 5
Apr 18 15:18:07: ISAKMP (0:5): SKEYID state generated
Apr 18 15:18:07: ISAKMP (0:5): processing vendor id payload
Apr 18 15:18:07: ISAKMP (0:5): processing vendor id payload
Apr 18 15:18:07: ISAKMP (5): sending packet to 201.70.32.82
(R) MM_KEY_EXCH
Apr 18 15:18:07: ISAKMP (0:4): purging SA.
Apr 18 15:18:07: ISAKMP (0:4): purging node -1412157317
Apr 18 15:18:07: ISAKMP (0:4): purging node 1875403554
Apr 18 15:18:07: CryptoEngine0: delete connection 4
Apr 18 15:18:08: ISAKMP (5): received packet from
201.70.32.82 (R) MM_KEY_EXCH
Apr 18 15:18:08: ISAKMP (0:5): processing ID payload.
message ID = 0
Apr 18 15:18:08: ISAKMP (0:5): processing HASH payload.
message ID = 0
Apr 18 15:18:08: CryptoEngine0: generate hmac context
for conn id 5
Apr 18 15:18:08: ISAKMP (5): processing NOTIFY payload
24578 protocol 1 spi 0, message ID = 0
Apr 18 15:18:08: ISAKMP (0:5): SA has been authenticated
```

```
with 201.70.32.82
Apr 18 15:18:08: ISAKMP (5): ID payload
    next-payload : 8
    type         : 1
    protocol     : 17
    port         : 500
    length       : 8
Apr 18 15:18:08: ISAKMP (5): Total payload length: 12
Apr 18 15:18:08: CryptoEngine0: generate hmac context
for conn id 5
Apr 18 15:18:08: CryptoEngine0: clear dh number
for conn id 1
Apr 18 15:18:08: ISAKMP (5): sending packet to
201.70.32.82 (R) QM_IDLE
Apr 18 15:18:08: ISAKMP (5): received packet from
201.70.32.82 (R) QM_IDLE
Apr 18 15:18:08: ISAKMP (0:5): Locking struct 14D0DC
on allocation
Apr 18 15:18:08: ISAKMP (0:5): allocating address
10.2.1.1
Apr 18 15:18:08: CryptoEngine0: generate hmac context
for conn id 5
Apr 18 15:18:08: ISAKMP (0:5): initiating peer config to
201.70.32.82. message ID = 1226793520
Apr 18 15:18:08: ISAKMP (5): sending packet to 201.70.32.82
(R) QM_IDLE
Apr 18 15:18:09: ISAKMP (5): received packet from 201.70.32.82
(R) QM_IDLE
Apr 18 15:18:09: ISAKMP (0:5): processing transaction payload
from 201.70.32.82. message ID = 1226793520
Apr 18 15:18:09: ISAKMP: recieved config from 201.70.32.82
Apr 18 15:18:09: CryptoEngine0: generate hmac context
for conn id 5
Apr 18 15:18:09: ISAKMP: Config payload type: 4
Apr 18 15:18:09: ISAKMP (0:5): peer accepted the address!
Apr 18 15:18:09: ISAKMP (0:5): adding static route for 10.2.1.1
Apr 18 15:18:09: ISAKMP (0:5): deleting node 1226793520
Apr 18 15:18:09: CryptoEngine0: generate hmac context for
conn id 5
Apr 18 15:18:09: ISAKMP (0:5): processing SA payload.
message ID = -617682048
Apr 18 15:18:09: ISAKMP (0:5): Checking IPsec proposal 1
Apr 18 15:18:09: ISAKMP: transform 1, ESP_DES
Apr 18 15:18:09: ISAKMP: attributes in transform:
Apr 18 15:18:09: ISAKMP: authenticator is HMAC-MD5
Apr 18 15:18:09: ISAKMP: encaps is 1
Apr 18 15:18:09: validate proposal 0
Apr 18 15:18:09: ISAKMP (0:5): atts are acceptable.
Apr 18 15:18:09: IPSEC(validate_proposal_request):
proposal part #1, (key eng. msg.) dest= 201.70.32.101,
src= 201.70.32.82, dest_proxy= 10.2.2.0/255.255.255.0/0/0
(type=4), src_proxy= 10.2.1.1/255.255.255.255/0/0 (type=1),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 0s and 0kb, spi= 0x0(0), conn_id= 0, keysize= 0,
flags= 0x4
Apr 18 15:18:09: validate proposal request 0
Apr 18 15:18:09: ISAKMP (0:5): processing NONCE payload.
message ID = -617682048
Apr 18 15:18:09: ISAKMP (0:5): processing ID payload.
message ID = -617682048
Apr 18 15:18:09: ISAKMP (5): ID_IPV4_ADDR src 10.2.1.1
prot 0 port 0
Apr 18 15:18:09: ISAKMP (0:5): processing ID payload.
message ID = -617682048
Apr 18 15:18:09: ISAKMP (5): ID_IPV4_ADDR_SUBNET dst
10.2.2.0/255.255.255.0 prot 0 port 0
```

```
Apr 18 15:18:09: IPSEC(key_engine): got a queue event...
Apr 18 15:18:09: IPSEC(spi_response): getting spi
153684796 for SA from 201.70.32.82 to 201.70.32.101
for prot 3
Apr 18 15:18:09: CryptoEngine0: generate hmac context
for conn id 5
Apr 18 15:18:09: ISAKMP (5): sending packet to 201.70.32.82
(R) QM_IDLE
Apr 18 15:18:09: ISAKMP (5): received packet from 201.70.32.82
(R) QM_IDLE
Apr 18 15:18:09: CryptoEngine0: generate hmac context
for conn id 5
Apr 18 15:18:09: ISAKMP (0:5): processing SA payload.
message ID = -1078114754
Apr 18 15:18:09: ISAKMP (0:5): Checking IPsec proposal 1
Apr 18 15:18:10: ISAKMP: transform 1, ESP_DES
Apr 18 15:18:10: ISAKMP: attributes in transform:
Apr 18 15:18:10: ISAKMP: authenticator is HMAC-MD5
Apr 18 15:18:10: ISAKMP: encaps is 1
Apr 18 15:18:10: validate proposal 0
Apr 18 15:18:10: ISAKMP (0:5): atts are acceptable.
Apr 18 15:18:10: IPSEC(validate_proposal_request):
proposal part #1, (key eng. msg.) dest= 201.70.32.101,
src= 201.70.32.82, dest_proxy= 10.2.2.0/255.255.255.0/0/0
(type=4), src_proxy= 10.2.1.1/255.255.255.255/0/0 (type=1),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 0s and 0kb, spi= 0x0(0), conn_id= 0, keysize= 0,
flags= 0x4
Apr 18 15:18:10: validate proposal request 0
Apr 18 15:18:10: ISAKMP (0:5): processing NONCE payload.
message ID = -1078114754
Apr 18 15:18:10: ISAKMP (0:5): processing ID payload.
message ID = -1078114754
Apr 18 15:18:10: ISAKMP (5): ID_IPV4_ADDR src 10.2.1.1
prot 0 port 0
Apr 18 15:18:10: ISAKMP (0:5): processing ID payload.
message ID = -1078114754
Apr 18 15:18:10: ISAKMP (5): ID_IPV4_ADDR_SUBNET dst
10.2.2.0/255.255.255.0 prot 0 port 0
Apr 18 15:18:10: IPSEC(key_engine): got a queue event...
Apr 18 15:18:10: IPSEC(spi_response): getting spi 224008976
for SA from 201.70.32.82 to 201.70.32.101
for prot 3
Apr 18 15:18:10: CryptoEngine0: generate hmac context
for conn id 5
Apr 18 15:18:10: ISAKMP (5): sending packet to 201.70.32.82
(R) QM_IDLE
Apr 18 15:18:10: ISAKMP (5): received packet from 201.70.32.82
(R) QM_IDLE
Apr 18 15:18:10: CryptoEngine0: generate hmac context
for conn id 5
Apr 18 15:18:10: ipsec allocate flow 0
Apr 18 15:18:10: ipsec allocate flow 0
Apr 18 15:18:10: ISAKMP (0:5): Creating IPsec SAs
Apr 18 15:18:10: inbound SA from 201.70.32.82
to 201.70.32.101 (proxy 10.2.1.1 to 10.2.2.0)
Apr 18 15:18:10: has spi 224008976 and conn_id 2000
and flags 4
Apr 18 15:18:10: outbound SA from 201.70.32.101
to 201.70.32.82 (proxy 10.2.2.0 to 10.2.1.1)
Apr 18 15:18:10: has spi -1084694986 and conn_id 2001
and flags 4
Apr 18 15:18:10: ISAKMP (0:5): deleting node -1078114754
Apr 18 15:18:10: IPSEC(key_engine): got a queue event...
Apr 18 15:18:10: IPSEC(initialize_sas): ,
(key eng. msg.) dest= 201.70.32.101, src= 201.70.32.82,
```

```
dest_proxy= 10.2.2.0/255.255.255.0/0/0 (type=4),
src_proxy= 10.2.1.1/0.0.0.0/0/0 (type=1),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 0s and 0kb,
spi= 0xD5A1B10(224008976), conn_id= 2000, keysize= 0,
flags= 0x4
Apr 18 15:18:10: IPSEC(initialize_sas): ,
(key eng. msg.) src= 201.70.32.101, dest= 201.70.32.82,
src_proxy= 10.2.2.0/255.255.255.0/0/0 (type=4),
dest_proxy= 10.2.1.1/0.0.0.0/0/0 (type=1),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 0s and 0kb,
spi= 0xBF58DE36(3210272310), conn_id= 2001, keysize= 0,
flags= 0x4
Apr 18 15:18:10: IPSEC(create_sa): sa created,
(sa) sa_dest= 201.70.32.101, sa_prot= 50,
sa_spi= 0xD5A1B10(224008976),
sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2000
Apr 18 15:18:10: IPSEC(create_sa): sa created,
(sa) sa_dest= 201.70.32.82, sa_prot= 50,
sa_spi= 0xBF58DE36(3210272310),
sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2001
Apr 18 15:18:10: ISAKMP: Locking struct 14D0DC for IPSEC
Apr 18 15:18:24: ISAKMP (0:5): retransmitting
phase 2 -617682048 ...
Apr 18 15:18:24: ISAKMP (5): sending packet to 201.70.32.82
(R) QM_IDLE
```

Router#**show crypto ipsec**

```
Apr 18 15:18:39: ISAKMP (0:5): retransmitting
phase 2 -617682048 ...
Apr 18 15:18:39: ISAKMP (5): sending packet to 201.70.32.82
(R) QM_IDLE sa
```

interface: Ethernet0

Crypto map tag: intmap, local addr. 201.70.32.101

```
local ident (addr/mask/prot/port):
(10.2.2.0/255.255.255.0/0/0)
remote ident (addr/mask/prot/port):
(10.2.1.1/255.255.255.255/0/0)
current_peer: 201.70.32.82
PERMIT, flags={}
#pkts encaps: 7, #pkts encrypt: 7, #pkts digest 7
#pkts decaps: 7, #pkts decrypt: 7, #pkts verify 7
#pkts compressed: 0, #pkts decompressed: 0
#pkts not compressed: 0, #pkts compr. failed: 0,
#pkts decompress failed: 0
#send errors 0, #recv errors 0
```

```
local crypto endpt.: 201.70.32.101, remote
crypto endpt.: 201.70.32.82
path mtu 1500, media mtu 1500
current outbound spi: BF58DE36
```

inbound esp sas:

```
spi: 0xD5A1B10(224008976)
transform: esp-des esp-md5-hmac ,
in use settings ={Tunnel, }
slot: 0, conn id: 2000, flow_id: 1,
crypto map: intmap
sa timing: remaining key lifetime
(k/sec): (4607999/3500)
IV size: 8 bytes
replay detection support: Y
```

inbound ah sas:

inbound pcg sas:

outbound esp sas:

```
spi: 0xBF58DE36(3210272310)
transform: esp-des esp-md5-hmac ,
in use settings ={Tunnel, }
slot: 0, conn id: 2001, flow_id: 2,
crypto map: intmap
sa timing: remaining key lifetime
(k/sec): (4607999/3500)
IV size: 8 bytes
replay detection support: Y
```

outbound ah sas:

outbound pcg sas:

Router#**sho crypto engine connections active**

| ID | Interface | IP-Address | State | Algorithm | Encrypt | Decrypt |
|------|-----------|---------------|--------------------|--------------------|---------|---------|
| 5 | | set | HMAC_MD5+DES_56_CB | | 0 | 0 |
| 2000 | Ethernet0 | 201.70.32.101 | set | HMAC_MD5+DES_56_CB | 0 | 7 |
| 2001 | Ethernet0 | 201.70.32.101 | set | HMAC_MD5+DES_56_CB | 7 | 0 |

Crypto adjacency count : Lock: 0, Unlock: 0

VPN Client Information

Client configuration:

```
C:\>ping -t 10.2.2.5
```

```
Reply from 10.2.2.5: bytes=32 time<0ms TTL=352
```

```
Reply from 10.2.2.5: bytes=32 time<10ms TTL=352
```

From Logview:

```
14:25:34.044 New Connection - Initiating IKE
Phase 1 (IP ADDR=201.70.32.101)
```

```
14:25:34.144 New Connection - SENDING>>>> ISAKMP
OAK MM (SA)
```

```
14:25:35.886 New Connection - RECEIVED<<< ISAKMP
OAK MM (SA)
```

```
14:25:36.067 New Connection - SENDING>>>> ISAKMP
OAK MM (KE, NON, VID, VID)
```

```
14:25:38.310 New Connection - RECEIVED<<< ISAKMP
OAK MM (KE, NON, VID)
```

```
14:25:38.460 New Connection - SENDING>>>> ISAKMP
OAK MM *(ID, HASH, NOTIFY:STATUS_INITIAL_CONTACT)
```

```
14:25:38.610 New Connection - RECEIVED<<< ISAKMP
OAK MM *(ID, HASH)
```

```
14:25:38.710 New Connection - Established IKE SA
```

```
14:25:38.811 New Connection - Initiating IKE Phase
2 with Client IDs (message id
: B01876)
```

```
14:25:38.911 Initiator = IP ADDR=201.70.32.82,
prot = 0 port = 0
```

```
14:25:39.011 Responder = IP SUBNET/MASK=10.2.2.0/255.255.255.0,
prot = 0 port = 0
```

```
14:25:39.111 New Connection - SENDING>>>>
  ISAKMP OAK QM *(HASH, SA, NON, ID, ID)
14:25:39.251 New Connection - RECEIVED<<< ISAKMP
  OAK TRANS *(HASH, ATTR)
14:25:39.351 New Connection - Received Private IP
  Address = IP ADDR=10.2.1.1

14:25:39.451 New Connection - Discarding IPsec SA
  negotiation (message id: B01876)
14:25:39.552 New Connection - SENDING>>>> ISAKMP OAK
  TRANS *(HASH, ATTR)
14:25:40.022 New Connection - Received message for discarded
  IPsec SA negotiation (message id: B01876)
14:25:40.122 New Connection - Initiating IKE Phase 2 with
  Client IDs (message id: C8CBOCE)
14:25:40.223 Initiator = IP ADDR=10.2.1.1, prot = 0 port = 0
14:25:40.323 Responder = IP SUBNET/MASK=10.2.2.0/255.255.255.0,
  prot = 0 port = 0
14:25:40.423 New Connection - SENDING>>>> ISAKMP OAK
  QM *(HASH, SA, NON, ID, ID)
14:25:40.873 New Connection - RECEIVED<<< ISAKMP OAK
  QM *(HASH, SA, NON, ID, ID,
  NOTIFY:STATUS_RESP_LIFETIME)
14:25:40.974 New Connection - SENDING>>>> ISAKMP OAK
  QM *(HASH)
14:25:41.074 New Connection - Loading IPsec SA
  (Message ID = C8CBOCE OUTBOUND SPI = 19A22423
  INBOUND SPI = E4829433)
14:25:41.174
```

Related Information

- [Configuring IPsec Network Security](#)
- [Configuring Internet Key Exchange Security Protocol](#)
- [Introduction to IPsec](#)
- [IP Security \(IPsec\) Product Support Pages](#)
- [Technical Support – Cisco Systems](#)

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