

Configuring Multiple–Identity Certificate Authorities on Cisco IOS Routers

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Introduction

This document describes how to configure Cisco IOS® routers to support multiple–identity certificate authorities (CA). In some situations, such as a joint project between two companies or two business units, the routers on each side (which enroll to different CAs that do not have any trust relationship) need to communicate using IPsec VPNs. The edge router might need to have two sets of identity certificates to communicate with routers on both CA domains. This document describes explains how to enroll a Cisco router to different CA servers to get multiple identity certificates; verification is provided using a simple example.

Prerequisites

Requirements

The feature is introduced in Cisco IOS® Software Release 12.2(2)T. Earlier versions of the software will not be able to use the configuration shown in this document.

Components Used

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

- Cisco 7200 routers with Cisco IOS Software Release 12.2(4)T1
- Microsoft CA server on Windows 2000 server
- Entrust CA server on Windows NT server

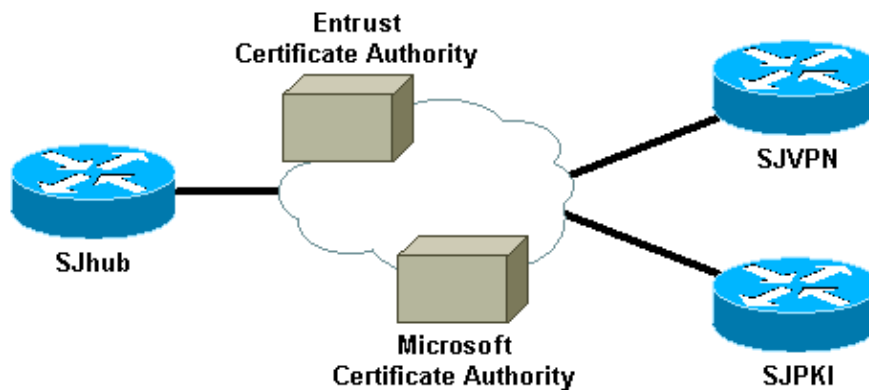
The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

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

Network Diagram

In the diagram shown below, SJhub, SJVPN, and SJPKI are three Cisco 7200 routers connecting to the backbone network. SJhub is the hub router, with multiple-identity certificates from the Entrust CA and Microsoft CA servers that reside in the backbone network. SJVPN enrolls to the Entrust CA server, and SJPKI enrolls to the Microsoft CA server.



Configuring Cisco IOS Router to Get Multiple Certificates

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).

Note: Some of the output shown in the procedure below has been wrapped to multiple lines for spacing considerations.

1. Generate RSA keys on the router.

```
SJhub#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SJhub(config)#ip domain-name sjtac.com
SJhub(config)#crypto key generate rsa
The name for the keys will be: SJhub.sjtac.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]:
Generating RSA keys ...
[OK]
```

2. Define the first crypto CA identity on the router. The server used here is an Entrust CA server.

```
SJhub(config)#crypto ca identity EntrustPKI
SJhub(ca-identity)#enrollment url http://171.69.89.16
SJhub(ca-identity)#enrollment mode ra
SJhub(ca-identity)#query url ldap://171.69.89.16
SJhub(ca-identity)#exit
```

3. Get the CA and registration authority (RA) certificates and enroll the router to the Entrust CA.

```
SJhub(config)#crypto ca authenticate EntrustPKI
Certificate has the following attributes:
Fingerprint: 1FCDF2C8 2DEDA6AC 4819D4C4 B4CFF2F5
% Do you accept this certificate? [yes/no]: y
```

```
SJhub(config)#crypto ca enroll EntrustPKI
%
% Start certificate enrollment ..
% Create a challenge password. You will need to verbally provide this
password to the CA Administrator in order to revoke your certificate.
For security reasons your password will not be saved in the configuration.
Please make a note of it.
```

```
Password:
Re-enter password:
```

```
% The subject name in the certificate will be: SJhub.sjtac.com
% Include the router serial number in the subject name? [yes/no]: n
% Include an IP address in the subject name? [yes/no]: n
Request certificate from CA? [yes/no]: y
% Certificate request sent to Certificate Authority
% The certificate request fingerprint will be displayed.
% The 'show crypto ca certificate' command will also show the fingerprint.
```

```
SJhub(config)# Fingerprint: B530BB30 70D2C565 E6F20A88 BB86A75A
```

4. Verify the certificates.

```
SJhub#show crypto ca certificates
Certificate
Status: Available
Certificate Serial Number: 3B2FD63F
Key Usage: General Purpose
Issuer:
OU = sjvpn
O = cisco
C = us
Subject Name Contains:
Name: SJhub.sjtac.com
CRL Distribution Point:
CN = CRL1, OU = sjvpn, O = cisco, C = us
Validity Date:
start date: 21:48:52 UTC Jan 9 2002
end date: 22:18:52 UTC Jan 9 2003
Associated Identity: EntrustPKI
RA Signature Certificate
Status: Available
Certificate Serial Number: 3B2FD319
Key Usage: Signature
Issuer:
OU = sjvpn
O = cisco
C = us
Subject:
CN = First Officer
OU = sjvpn
O = cisco
C = us
CRL Distribution Point:
CN = CRL1, OU = sjvpn, O = cisco, C = us
Validity Date:
start date: 22:03:31 UTC Jun 19 2001
end date: 22:33:31 UTC Jun 19 2004
Associated Identity: EntrustPKI

RA KeyEncipher Certificate
```

```
Status: Available
Certificate Serial Number: 3B2FD318
Key Usage: Encryption
Issuer:
OU = sjvpn
O = cisco
C = us
Subject:
CN = First Officer
OU = sjvpn
O = cisco
C = us
CRL Distribution Point:
CN = CRL1, OU = sjvpn, O = cisco, C = us
Validity Date:
start date: 22:03:31 UTC Jun 19 2001
end date: 22:33:31 UTC Jun 19 2004
Associated Identity: EntrustPKI
```

```
CA Certificate
Status: Available
Certificate Serial Number: 3B2FD307
Key Usage: General Purpose
Issuer:
OU = sjvpn
O = cisco
C = us
Subject:
OU = sjvpn
O = cisco
C = us
CRL Distribution Point:
CN = CRL1, OU = sjvpn, O = cisco, C = us
Validity Date:
start date: 22:02:40 UTC Jun 19 2001
end date: 22:32:40 UTC Jun 19 2021
Associated Identity: EntrustPKI
```

5. Define the crypto CA identity of the second CA on the router. A Microsoft CA server is used here.

```
SJhub(config)#crypto ca identity MicrosoftCA
SJhub(ca-identity)#enrollment url
                        http://171.69.89.182:80/certsrv/mscep/mscep.$
SJhub(ca-identity)#enrollment mode ra
SJhub(ca-identity)#query url ldap://171.69.89.182
SJhub(ca-identity)#exit
```

6. Get the CA and RA certificates from the Microsoft CA server.

```
SJhub(config)#crypto ca authenticate MicrosoftCA
Certificate has the following attributes:
Fingerprint: 5FC47E85 9A2724A2 7242F172 BFB87F7E
% Do you accept this certificate? [yes/no]: y
```

7. Enroll to the Microsoft CA server and get the router's identity certificate.

```
SJhub(config)#crypto ca enroll MicrosoftCA
%
% Start certificate enrollment ..
% Create a challenge password. You will need to verbally provide this
password to the CA Administrator in order to revoke your certificate.
For security reasons your password will not be saved in the configuration.
Please make a note of it.
Password:
Re-enter password:

% The subject name in the certificate will be: SJhub.sjtac.com
% Include the router serial number in the subject name? [yes/no]: n
```

```
% Include an IP address in the subject name? [yes/no]: n
Request certificate from CA? [yes/no]: y
% Certificate request sent to Certificate Authority
% The certificate request fingerprint will be displayed.
% The 'show crypto ca certificate' command will also show the fingerprint.
```

```
SJhub(config)# Fingerprint: 4046052F 2D32A725 235D55E9 694DF3EA
```

8. Verify the certificates. You should see two sets of certificates.

```
SJhub#show crypto ca certificates
Certificate
Status: Available
Certificate Serial Number: 132BD14C00000000000B
Key Usage: General Purpose
Issuer:
CN = SJKICA
OU = SJKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US
Subject Name Contains:
Name: SJhub.sjtac.com
CRL Distribution Point:
ldap:///CN=SJKICA,CN=sjvpnmSpi,CN=CDP,CN=Public%20Key%20Services,
    CN=Services, CN=Configuration,DC=sjki,
    DC=com?certificateRevocationList?base?
    objectclass=cRLDistributionPoint
Validity Date:
start date: 18:36:23 UTC Jan 13 2002
end date: 18:36:23 UTC Jan 13 2004
Associated Identity: MicrosoftCA
RA Signature Certificate
Status: Available
Certificate Serial Number: 054E60AD000000000002
Key Usage: Signature
Issuer:
CN = SJKICA
OU = SJKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US
Subject:
CN = SJVPNRA
OU = SJKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US
CRL Distribution Point:
ldap:///CN=SJKICA,CN=sjvpnmSpi,CN=CDP,CN=Public%20Key%20Services,
    CN=Services, CN=Configuration,DC=sjki,
    DC=com?certificateRevocationList?base?
    objectclass=cRLDistributionPoint
Validity Date:
start date: 01:59:27 UTC Jan 11 2002
end date: 01:59:27 UTC Jan 11 2004
Associated Identity: MicrosoftCA

RA KeyEncipher Certificate
Status: Available
Certificate Serial Number: 054E63CE000000000003
Key Usage: Encryption
Issuer:
CN = SJKICA
```

OU = SJPKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US
Subject:
CN = SJVPNRA
OU = SJPKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US
CRL Distribution Point:
ldap:///CN=SJKICA,CN=sjvpnmspki,CN=CDP,CN=Public%20Key%20Services,
CN=Services,CN=Configuration,DC=sjpk,
DC=com?certificateRevocationList?base?
objectclass=cRLDistributionPoint
Validity Date:
start date: 01:59:28 UTC Jan 11 2002
end date: 01:59:28 UTC Jan 11 2004
Associated Identity: MicrosoftCA

CA Certificate
Status: Available
Certificate Serial Number: 091B47AEE8CFE2A94D3E8B38F292F5AF
Key Usage: General Purpose
Issuer:
CN = SJKICA
OU = SJPKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US
Subject:
CN = SJKICA
OU = SJPKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US
CRL Distribution Point:
ldap:///CN=SJKICA,CN=sjvpnmspki,CN=CDP,CN=Public%20Key%20Services,
CN=Services,CN=Configuration,DC=sjpk,
DC=com?certificateRevocationList?base?
objectclass=cRLDistributionPoint
Validity Date:
start date: 01:51:39 UTC Jan 11 2002
end date: 02:00:04 UTC Jan 11 2007
Associated Identity: MicrosoftCA

CA Certificate
Status: Available
Certificate Serial Number: 3B2FD307
Key Usage: General Purpose
Issuer:
OU = sjvpn
O = cisco
C = us
Subject:
OU = sjvpn
O = cisco
C = us
CRL Distribution Point:
CN = CRL1, OU = sjvpn, O = cisco, C = us
Validity Date:
start date: 22:02:40 UTC Jun 19 2001

end date: 22:32:40 UTC Jun 19 2021
Associated Identity: EntrustPKI

RA KeyEncipher Certificate
Status: Available
Certificate Serial Number: 3B2FD318
Key Usage: Encryption
Issuer:
OU = sjvpn
O = cisco
C = us
Subject:
CN = First Officer
OU = sjvpn
O = cisco
C = us
CRL Distribution Point:
CN = CRL1, OU = sjvpn, O = cisco, C = us
Validity Date:
start date: 22:03:31 UTC Jun 19 2001
end date: 22:33:31 UTC Jun 19 2004
Associated Identity: EntrustPKI

RA Signature Certificate
Status: Available
Certificate Serial Number: 3B2FD319
Key Usage: Signature
Issuer:
OU = sjvpn
O = cisco
C = us
Subject:
CN = First Officer
OU = sjvpn
O = cisco
C = us
CRL Distribution Point:
CN = CRL1, OU = sjvpn, O = cisco, C = us
Validity Date:
start date: 22:03:31 UTC Jun 19 2001
end date: 22:33:31 UTC Jun 19 2004
Associated Identity: EntrustPKI

Certificate
Status: Available
Certificate Serial Number: 3B2FD63F
Key Usage: General Purpose
Issuer:
OU = sjvpn
O = cisco
C = us
Subject Name Contains:
Name: SJhub.sjtac.com
CRL Distribution Point:
CN = CRL1, OU = sjvpn, O = cisco, C = us
Validity Date:
start date: 21:48:52 UTC Jan 9 2002
end date: 22:18:52 UTC Jan 9 2003
Associated Identity: EntrustPKI

Verify

This section uses a simple setup to verify how IOS routers handle multiple identity certificates. The network diagram above shows three 7200 routers forming a hub-and-spoke topology. The hub router (SJhub) has two

identity certificates one from an Entrust CA server and one from a Microsoft CA server. The spoke router (SJVPN) has one identity certificate from the same Entrust CA server, and the other spoke router (SJPKI) has one identity certificate from the same Microsoft CA server. In this example, the hub router simulates the linking point of two companies in a joint project; with the help of the multiple-identity CA support, the hub is able to communicate with either side even though the spokes are enrolled to different CAs.

Configuration Examples

The configurations of all the routers are listed below as a reference.

- SJhub
- SJVPN
- SJPKI

SJhub (hub router)

```
SJhub#write terminal
Building configuration...

Current configuration : 19665 bytes
!
! Last configuration change at 18:40:55 UTC Sun Jan 13 2002
! NVRAM config last updated at 18:41:45 UTC Sun Jan 13 2002
!
version 12.2
no parser cache
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname SJhub
!
enable password cisco
!
ip subnet-zero
ip cef
!
!
ip telnet source-interface Loopback88
no ip domain-lookup
ip domain-name sjtac.com
!
ip audit notify log
ip audit po max-events 100
ip ssh time-out 120
ip ssh authentication-retries 3
!
crypto ca identity EntrustPKI
  enrollment mode ra
  enrollment url http://171.69.89.16:80
  query url ldap://171.69.89.16
!
crypto ca identity MicrosoftCA
  enrollment mode ra
  enrollment url http://171.69.89.182:80/certsrv/mscep/mscep.dll
  query url ldap://171.69.89.182
  crl optional
crypto ca certificate chain EntrustPKI
certificate ca 3B2FD307
  308202E4 3082024D A0030201 0202043B 2FD30730 0D06092A 864886F7 0D010105
  0500302D 310B3009 06035504 06130275 73310E30 0C060355 040A1305 63697363
  6F310E30 0C060355 040B1305 736A7670 6E301E17 0D303130 36313932 32303234
  305A170D 32313036 31393232 33323430 5A302D31 0B300906 03550406 13027573
```


310E300C 06035504 0A130563 6973636F 310E300C 06035504 0B130573 6A76706E
30819F30 0D06092A 864886F7 0D010101 05000381 8D003081 89028181 00E8C25B
EDF4A6EE A352B142 C16578F4 FBDAF45E 4F2F7733 8D2B8879 96138C63 1DB713BF
753BF845 2D7E600F AAF4D75B 9E959513 BB13FF13 36696F48 86C464F2 CF854A66
4F8E83F8 025F216B A44D4BB2 39ADD1A5 1BCCF812 09A19BDC 468EEAE1 B6C2A378
69C81348 1A9CD61C 551216F2 8B168FBB 94CBEF37 E1D9A8F7 80BBC17F D1020301
0001A382 010F3082 010B3011 06096086 480186F8 42010104 04030200 07304F06
03551D1F 04483046 3044A042 A040A43E 303C310B 30090603 55040613 02757331
0E300C06 0355040A 13056369 73636F31 0E300C06 0355040B 1305736A 76706E31
0D300B06 03550403 13044352 4C31302B 0603551D 10042430 22800F32 30303130
36313932 32303234 305A810F 32303231 30363139 32323332 34305A30 0B060355
1D0F0404 03020106 301F0603 551D2304 18301680 1446C160 9CDBEA53 EE80A480
601A9658 3B0DF80D 2F301D06 03551D0E 04160414 46C1609C DBEA53EE 80A48060
1A96583B 0DF80D2F 300C0603 551D1304 05300301 01FF301D 06092A86 4886F67D
07410004 10300E1B 0856352E 303A342E 30030204 90300D06 092A8648 86F70D01
01050500 03818100 7E3DBAC4 8CAE7D5A B19C0625 8780D222 F965A1A2 C0C25B84
CBC5A203 BF50FAC4 9656699A 52D8CB46 40776237 87163118 8F3C0F47 D2CAA36B
6AB34F99 AB71269E 78C0AC10 DA0B9EC5 AE448B46 701254CF 3EBC64C1 5DBB2EE5
56C0140B B0C83497 D79FB148 80018F51 3A4B6174 590B85AA 9CE3B391 629406AA
7CE9CC0D 01593E6B

quit

certificate ra-encrypt 3B2FD318

308202D0 30820239 A0030201 0202043B 2FD31830 0D06092A 864886F7 0D010105
0500302D 310B3009 06035504 06130275 73310E30 0C060355 040A1305 63697363
6F310E30 0C060355 040B1305 736A7670 6E301E17 0D303130 36313932 32303333
315A170D 30343036 31393232 33333331 5A304531 0B300906 03550406 13027573
310E300C 06035504 0A130563 6973636F 310E300C 06035504 0B130573 6A76706E
31163014 06035504 03130D46 69727374 204F6666 69636572 30819F30 0D06092A
864886F7 0D010101 05000381 8D003081 89028181 00BFC427 727E15E9 30CB1BCB
C0EFFB2F 3E4916D4 EC365F57 C13D1356 6388E66D 7BCCBCB9 04DA2E7C C9639F31
AF15E7B1 E698A33C 0EB447E4 B3B72EC8 766EADCF 9883E612 AD782E39 B0603A90
0322CE78 D6735E07 BDC022F1 1164EC9E 31FC5309 9AA9DC1D 69ECC316 8727A6CB
ADCFB488 FF904D6D 9D9E5778 05B24D4B BB5B4F5F 4D020301 0001A381 E43081E1
300B0603 551D0F04 04030205 20301B06 03551D09 04143012 30100609 2A864886
F67D0744 1D310302 0100304F 0603551D 1F044830 463044A0 42A040A4 3E303C31
0B300906 03550406 13027573 310E300C 06035504 0A130563 6973636F 310E300C
06035504 0B130573 6A76706E 310D300B 06035504 03130443 524C3130 1F060355
1D230418 30168014 46C1609C DBEA53EE 80A48060 1A96583B 0DF80D2F 301D0603
551D0E04 16041400 A7C3DD9F 9FAB0A25 E1485FC7 DB88A63F 78CE4830 09060355
1D130402 30003019 06092A86 4886F67D 07410004 0C300A1B 0456352E 30030204
B0300D06 092A8648 86F70D01 01050500 03818100 69105382 0BE0BA59 B0CD2652
9C6A4585 940C7882 DCEB1D1E 610B8525 0C032A76 2C8758C2 F5CA1EF4 B946848A
C49047D5 6D1EF218 FA082A00 16CCD9FC 42DF3B05 A8EF2AAD 151637DE 67885BB2
BA0BB6A1 308F63FF 21C3CB00 9272257A 3C292645 FD62D486 C247F067 301C2FEE
5CF6D12B 6CFA1DAA E74E8B8E 5B017A2E 5BB6C5F9

quit

certificate ra-sign 3B2FD319

308202FF 30820268 A0030201 0202043B 2FD31930 0D06092A 864886F7 0D010105
0500302D 310B3009 06035504 06130275 73310E30 0C060355 040A1305 63697363
6F310E30 0C060355 040B1305 736A7670 6E301E17 0D303130 36313932 32303333
315A170D 30343036 31393232 33333331 5A304531 0B300906 03550406 13027573
310E300C 06035504 0A130563 6973636F 310E300C 06035504 0B130573 6A76706E
31163014 06035504 03130D46 69727374 204F6666 69636572 30819F30 0D06092A
864886F7 0D010101 05000381 8D003081 89028181 00E85434 395790E9 416ED13D
72F1A411 333A0984 66B8F68A 0ECA7E2B CBC40C39 A21E2D8A 5F94772D 69846720
73227891 E43D46B6 B2D1DDC5 385C5135 DB2075F1 4D252ACF AC80DA4C 2111946F
26F7193B 8EA1CA66 8332D2A1 5310B2D7 07C985A8 0B44CE37 BC95EAF7 C328D4C6
73B3B35E 0F6D25F5 DCAC6AFA 2DAAD6D1 47BB3396 E1020301 0001A382 01123082
010E300B 0603551D 0F040403 02078030 2B060355 1D100424 3022800F 32303031
30363139 32323033 33315A81 0F323030 33303732 37303233 3333315A 301B0603
551D0904 14301230 1006092A 864886F6 7D07441D 31030201 00304F06 03551D1F
04483046 3044A042 A040A43E 303C310B 30090603 55040613 02757331 0E300C06
0355040A 13056369 73636F31 0E300C06 0355040B 1305736A 76706E31 0D300B06
03550403 13044352 4C31301F 0603551D 23041830 16801446 C1609CDB EA53EE80
A480601A 96583B0D F80D2F30 1D060355 1D0E0416 04147BD2 620C611F 3AC69FB3
155FD8F9 8A7CF353 3A583009 0603551D 13040230 00301906 092A8648 86F67D07

```
4100040C 300A1B04 56352E30 030204B0 300D0609 2A864886 F70D0101 05050003
8181003A A6431D7D 1979DDF9 CC99D8F8 CC987F67 DBF67280 2A9418E9 C6255B08
DECDE1C2 50FCB1A6 544F1D51 C214162E E2403DAB 2F1294C4 841240ED FD6F799C
130A0B24 AC74DD74 C60EB5CD EC648631 E0B88B3F 3D19A2E1 6492958E 9F64746E
45C080AE E5A6C245 7827D7B1 380A6FE8 A01D9022 7F52AD9C B596743A 853549C5 771DA2
quit
certificate 3B2FD63F
308202C2 3082022B A0030201 0202043B 2FD63F30 0D06092A 864886F7 0D010105
0500302D 310B3009 06035504 06130275 73310E30 0C060355 040A1305 63697363
6F310E30 0C060355 040B1305 736A7670 6E301E17 0D303230 31303932 31343835
325A170D 30333031 30393232 31383532 5A304D31 0B300906 03550406 13027573
310E300C 06035504 0A130563 6973636F 310E300C 06035504 0B130573 6A76706E
311E301C 06092A86 4886F70D 01090216 0F534A68 75622E73 6A746163 2E636F6D
305C300D 06092A86 4886F70D 01010105 00034B00 30480241 00B5C0D3 B5DC7620
0C08953F E10C3391 8E262A72 2F5268F2 E53EEC89 BA7A1634 A736B835 77C5F7DF
72255DF2 CE121603 30CA8A2B 7C1E41D5 4983C9E6 5901198E 0F020301 0001A382
01113082 010D300B 0603551D 0F040403 0205A030 1A060355 1D110413 3011820F
534A6875 622E736A 7461632E 636F6D30 2B060355 1D100424 3022800F 32303032
30313039 32313438 35325A81 0F323030 32303932 32313031 3835325A 30470603
551D1F04 48304630 44A042A0 40A43E30 3C310B30 09060355 04061302 75F3310E
300C0603 55040A13 05636973 636F310E 300C0603 55040B13 05736A76 706E310D
300B0603 55040313 0443524C 31301F06 03551D23 04183016 801446C1 609CDBEA
53EE80A4 80601A96 583B0DF8 0D2F301D 0603551D 0E041604 14FBE38B 58E5868B
65C3AED1 5CE7C8E9 6658815B 1C300906 03551D13 04023000 30190609 2A864886
F67D0741 00040C30 0A1B0456 352E3003 0204B030 0D06092A 864886F7 0D010105
05000381 81001732 4B19CE9F 5EDA454B D782B240 D9FEC161 215AC65E 4DD449B9
022ADDE6 489D5125 949BA7E7 68B61D2C 3E6F0871 4A9E1DC0 95EBCB11 875CE3BD
649D5BC0 E85B77AD 8541DBC9 2904DA65 0BF441D7 A2BEBD12 0EA438D2 AB6B8AFC
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03EE4DD7 13BB
quit
crypto ca certificate chain MicrosoftCA
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1307534A 504B4943 41301E17 0D303230 31313331 38333632 335A170D 30343031
31333138 33363233 5A302031 1E301C06 092A8648 86F70D01 0902130F 534A6875
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0603551D 0E041604 14FBE38B 58E5868B 65C3AED1 5CE7C8E9 6658815B 1C308198
0603551D 23048190 30818D80 14231557 4F054052 81E113C7 E86D83CB F233B71C
B1A163A4 61305F31 0B300906 03550406 13025553 310B3009 06035504 08130243
41311130 0F060355 04071308 53414E20 4A4F5345 310E300C 06035504 0A130553
4A544143 310E300C 06035504 0B130553 4A504B49 3110300E 06035504 03130753
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69632532 304B6579 25323053 65727669 6365732C 434E3D53 65727669 6365732C
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3F636572 74696669 63617465 5265766F 63617469 6F6E4C69 73743F62 6173653F
6F626A65 6374636C 6173733D 63524C44 69737472 69627574 696F6E50 6F696E74
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8681976C 6461703A 2F2F2F43 4E3D534A 504B4943 412C434E 3D414941 2C434E3D
5075626C 69632532 304B6579 25323053 65727669 6365732C 434E3D53 65727669
6365732C 434E3D43 6F6E6669 67757261 74696F6E 2C44433D 736A706B 692C4443
3D636F6D 3F634143 65727469 66696361 74653F62 6173653F 6F626A65 6374636C
6173733D 63657274 69666963 6174696F 6E417574 686F7269 7479300C 0603551D
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092B0601 04018237 14020432 1E300049 00500053 00450043 0049006E 00740065
0072006D 00650064 00690061 00740065 004F0066 0066006C 0069006E 0065300D
06092A86 4886F70D 01010505 00034100 39A41B77 72A2EF4D 300D69AE 399894E8
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B6BA26CA 9955858B 95430434 0DD7C88E
quit
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13024341 3111300F 06035504 07130853 414E204A 4F534531 0E300C06 0355040A
1305534A 54414331 0E300C06 0355040B 1305534A 504B4931 10300E06 03550403
1307534A 504B4943 41301E17 0D303230 31313130 31353932 375A170D 30343031
31313031 35393237 5A305F31 0B300906 03550406 13025553 310B3009 06035504
08130243 41311130 0F060355 04071308 53414E20 4A4F5345 310E300C 06035504
0A130553 4A544143 310E300C 06035504 0B130553 4A504B49 3110300E 06035504
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63617465 5265766F 63617469 6F6E4C69 73743F62 6173653F 6F626A65 6374636C
6173733D 63524C44 69737472 69627574 696F6E50 6F696E74 3081B706 082B0601
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304B6579 25323053 65727669 6365732C 434E3D53 65727669 6365732C 434E3D43
6F6E6669 67757261 74696F6E 2C44433D 736A706B 692C4443 3D636F6D 3F634143
65727469 66696361 74653F62 6173653F 6F626A65 6374636C 6173733D 63657274
69666963 6174696F 6E417574 686F7269 7479300D 06092A86 4886F70D 01010505
00034100 2CEFFC7E B2C42AED 167FA630 AB3F9460 5E12B77F 07BC860A 48A5DBDB
E942F9B8 1B053148 05A70A17 B2EF37D4 F4234622 DD59571B F8D8AF09 2B54D40C 9145302D
quit
certificate ra-encrypt 054E63CE0000000000003
3082048E 30820438 A0030201 02020A05 4E63CE00 00000000 03300D06 092A8648
86F70D01 01050500 305F310B 30090603 55040613 02555331 0B300906 03550408
13024341 3111300F 06035504 07130853 414E204A 4F534531 0E300C06 0355040A
1305534A 54414331 0E300C06 0355040B 1305534A 504B4931 10300E06 03550403
1307534A 504B4943 41301E17 0D303230 31313130 31353932 385A170D 30343031
31313031 35393238 5A305F31 0B300906 03550406 13025553 310B3009 06035504
08130243 41311130 0F060355 04071308 53414E20 4A4F5345 310E300C 06035504
0A130553 4A544143 310E300C 06035504 0B130553 4A504B49 3110300E 06035504
03130753 4A56504E 52413081 9F300D06 092A8648 86F70D01 01010500 03818D00
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76696365 732C434E 3D436F6E 66696775 72617469 6F6E2C44 433D736A 706B692C
44433D63 6F6D3F63 65727469 66696361 74655265 766F6361 74696F6E 4C697374
3F626173 653F6F62 6A656374 636C6173 733D6352 4C446973 74726962 7574696F
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quit
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300C0603 55040A13 05534A54 4143310E 300C0603 55040B13 05534A50 4B493110
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706B692C 434E3D43 44502C43 4E3D5075 626C6963 2532304B 65792532 30536572
76696365 732C434E 3D536572 76696365 732C434E 3D436F6E 66696775 72617469
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766F6361 74696F6E 4C697374 3F626173 653F6F62 6A656374 636C6173 733D6352
4C446973 74726962 7574696F 6E506F69 6E743038 A036A034 86326874 74703A2F
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2F534A50 4B494341 2E63726C 30100609 2B060104 01823715 01040302 0100300D
06092A86 4886F70D 01010505 00034100 735977DF 7822B944 96A50106 722108F0
1A60EF86 EFD9A9ED 2C7C9174 5EF48909 B4A66A08 226FBD11 3F20BA61 C556182A
8E914788 AE6C5363 A769805F 9E2F6458
quit
!
crypto isakmp policy 1
 hash md5
!
crypto isakmp identity hostname
crypto isakmp keepalive 10
!
!
crypto ipsec transform-set myset esp-des esp-md5-hmac
crypto mib ipsec flowmib history tunnel size 200
crypto mib ipsec flowmib history failure size 200
!
crypto map vpn 10 ipsec-isakmp
 set peer 172.16.172.52
 set transform-set myset
 match address 101
crypto map vpn 20 ipsec-isakmp
 set peer 172.16.172.10
 set transform-set myset
 match address 102
!
!
interface Loopback1
```

```
ip address 20.1.1.1 255.255.255.0
!
interface Loopback88
no ip address
!
interface FastEthernet0/0
no ip address
no keepalive
shutdown
duplex half
media-type MII
!
interface Ethernet4/0
ip address 172.16.172.69 255.255.255.240
ip route-cache same-interface
no ip mroute-cache
duplex half
crypto map vpn
!
interface Ethernet4/1
no ip address
duplex half
!
interface Ethernet4/2
no ip address
shutdown
duplex half
!
interface Ethernet4/3
no ip address
shutdown
duplex half
!
ip default-gateway 172.16.172.65
ip classless
ip route 0.0.0.0 0.0.0.0 172.16.172.65
ip http server
ip pim bidir-enable
!
access-list 101 permit ip 20.1.1.0 0.0.0.255 50.1.1.0 0.0.0.255
access-list 102 permit ip 20.1.1.0 0.0.0.255 10.1.1.0 0.0.0.255
!
!
call rsvp-sync
!
!
mgcp profile default
!
dial-peer cor custom
!
!
!
!
gatekeeper
shutdown
!
!
line con 0
exec-timeout 0 0
line aux 0
line vty 0 4
password cisco
login
line vty 5 15
login
!
```

```
no scheduler max-task-time
!
end
```

SJVPN (spoke router enrolled to Entrust CA server)

```
SJVPN#write terminal
Building configuration...

Current configuration : 8980 bytes
!
! Last configuration change at 10:28:19 UTC Sun Jan 13 2002
! NVRAM config last updated at 10:28:20 UTC Sun Jan 13 2002
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
service udp-small-servers
service tcp-small-servers
no service dhcp
!
hostname SJVPN
!
enable password cisco
!
ip subnet-zero
ip cef
!
!
no ip domain-lookup
ip domain-name sjvpn.com
!
ip audit notify log
ip audit po max-events 100
ip ssh time-out 120
ip ssh authentication-retries 3
!
crypto ca identity EntrustPKI
  enrollment mode ra
  enrollment url http://171.69.89.16:80
  query url ldap://171.69.89.16
crypto ca certificate chain EntrustPKI
certificate ca 3B2FD307
  308202E4 3082024D A0030201 0202043B 2FD30730 0D06092A 864886F7 0D010105
  0500302D 310B3009 06035504 06130275 73310E30 0C060355 040A1305 63697363
  6F310E30 0C060355 040B1305 736A7670 6E301E17 0D303130 36313932 32303234
  305A170D 32313036 31393232 33323430 5A302D31 0B300906 03550406 13027573
  310E300C 06035504 0A130563 6973636F 310E300C 06035504 0B130573 6A76706E
  30819F30 0D06092A 864886F7 0D010101 05000381 8D003081 89028181 00E8C25B
  EDF4A6EE A352B142 C16578F4 FBDAF45E 4F2F7733 8D2B8879 96138C63 1DB713BF
  753BF845 2D7E600F AAF4D75B 9E959513 BB13FF13 36696F48 86C464F2 CF854A66
  4F8E83F8 025F216B A44D4BB2 39ADD1A5 1BCCF812 09A19BDC 468EEAE1 B6C2A378
69C81348 1A9CD61C 551216F2 8B168FBB 94CBEF37 E1D9A8F7 80BBC17F D1020301
  0001A382 010F3082 010B3011 06096086 480186F8 42010104 04030200 07304F06
  03551D1F 04483046 3044A042 A040A43E 303C310B 30090603 55040613 02757331
  0E300C06 0355040A 13056369 73636F31 0E300C06 0355040B 1305736A 76706E31
  0D300B06 03550403 13044352 4C31302B 0603551D 10042430 22800F32 30303130
  36313932 32303234 305A810F 32303231 30363139 32323332 34305A30 0B060355
  1D0F0404 03020106 301F0603 551D2304 18301680 1446C160 9CDBEA53 EE80A480
  601A9658 3B0DF80D 2F301D06 03551D0E 04160414 46C1609C DBEA53EE 80A48060
  1A96583B 0DF80D2F 300C0603 551D1304 05300301 01FF301D 06092A86 4886F67D
  07410004 10300E1B 0856352E 303A342E 30030204 90300D06 092A8648 86F70D01
  01050500 03818100 7E3DBAC4 8CAE7D5A B19C0625 8780D222 F965A1A2 C0C25B84
  CBC5A203 BF50FAC4 9656699A 52D8CB46 40776237 87163118 8F3C0F47 D2CAA36B
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6AB34F99 AB71269E 78C0AC10 DA0B9EC5 AE448B46 701254CF 3EBC64C1 5DBB2EE5
56C0140B B0C83497 D79FB148 80018F51 3A4B6174 590B85AA 9CE3B391 629406AA
7CE9CC0D 01593E6B

quit

certificate ra-encrypt 3B2FD318

308202D0 30820239 A0030201 0202043B 2FD31830 0D06092A 864886F7 0D010105
0500302D 310B3009 06035504 06130275 73310E30 0C060355 040A1305 63697363
6F310E30 0C060355 040B1305 736A7670 6E301E17 0D303130 36313932 32303333
315A170D 30343036 31393232 33333331 5A304531 0B300906 03550406 13027573
310E300C 06035504 0A130563 6973636F 310E300C 06035504 0B130573 6A76706E
31163014 06035504 03130D46 69727374 204F6666 69636572 30819F30 0D06092A
864886F7 0D010101 05000381 8D003081 89028181 00BFC427 727E15E9 30CB1BCB
C0EFFB2F 3E4916D4 EC365F57 C13D1356 6388E66D 7BCCBCB9 04DA2E7C C9639F31
AF15E7B1 E698A33C 0EB447E4 B3B72EC8 766EADCF 9883E612 AD782E39 B0603A90
0322CE78 D6735E07 BDC022F1 1164EC9E 31FC5309 9AA9DC1D 69ECC316 8727A6CB
ADCFB488 FF904D6D 9D9E5778 05B24D4B BB5B4F5F 4D020301 0001A381 E43081E1
300B0603 551D0F04 04030205 20301B06 03551D09 04143012 30100609 2A864886
F67D0744 1D310302 0100304F 0603551D 1F044830 463044A0 42A040A4 3E303C31
0B300906 03550406 13027573 310E300C 06035504 0A130563 6973636F 310E300C

06035504 0B130573 6A76706E 310D300B 06035504 03130443 524C3130 1F060355
1D230418 30168014 46C1609C DBEA53EE 80A48060 1A96583B 0DF80D2F 301D0603
551D0E04 16041400 A7C3DD9F 9FAB0A25 E1485FC7 DB88A63F 78CE4830 09060355
1D130402 30003019 06092A86 4886F67D 07410004 0C300A1B 0456352E 30030204
B0300D06 092A8648 86F70D01 01050500 03818100 69105382 0BE0BA59 B0CD2652
9C6A4585 940C7882 DCEB1D1E 610B8525 0C032A76 2C8758C2 F5CA1EF4 B946848A
C49047D5 6D1EF218 FA082A00 16CCD9FC 42DF3B05 A8EF2AAD 151637DE 67885BB2
BA0BB6A1 308F63FF 21C3CB00 9272257A 3C292645 FD62D486 C247F067 301C2FEE
5CF6D12B 6CFA1DAA E74E8B8E 5B017A2E 5BB6C5F9

quit

certificate ra-sign 3B2FD319

308202FF 30820268 A0030201 0202043B 2FD31930 0D06092A 864886F7 0D010105
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6F310E30 0C060355 040B1305 736A7670 6E301E17 0D303130 36313932 32303333
315A170D 30343036 31393232 33333331 5A304531 0B300906 03550406 13027573
310E300C 06035504 0A130563 6973636F 310E300C 06035504 0B130573 6A76706E
31163014 06035504 03130D46 69727374 204F6666 69636572 30819F30 0D06092A
864886F7 0D010101 05000381 8D003081 89028181 00E85434 395790E9 416ED13D
72F1A411 333A0984 66B8F68A 0ECA7E2B CBC40C39 A21E2D8A 5F94772D 69846720
73227891 E43D46B6 B2D1DDC5 385C5135 DB2075F1 4D252ACF AC80DA4C 2111946F
26F7193B 8EA1CA66 8332D2A1 5310B2D7 07C985A8 0B44CE37 BC95EAF7 C328D4C6
73B3B35E 0F6D25F5 DCAC6AFA 2DAAD6D1 47BB3396 E1020301 0001A382 01123082
010E300B 0603551D 0F040403 02078030 2B060355 1D100424 3022800F 32303031
30363139 32323033 33315A81 0F323030 33303732 37303233 3333315A 301B0603
551D0904 14301230 1006092A 864886F6 7D07441D 31030201 00304F06 03551D1F
04483046 3044A042 A040A43E 303C310B 30090603 55040613 02757331 0E300C06
0355040A 13056369 73636F31 0E300C06 0355040B 1305736A 76706E31 0D300B06
03550403 13044352 4C31301F 0603551D 23041830 16801446 C1609CDB EA53EE80
A480601A 96583B0D F80D2F30 1D060355 1D0E0416 04147BD2 620C611F 3AC69FB3
155FD8F9 8A7CF353 3A583009 0603551D 13040230 00301906 092A8648 86F67D07
4100040C 300A1B04 56352E30 030204B0 300D0609 2A864886 F70D0101 05050003
8181003A A6431D7D 1979DDF9 CC99D8F8 CC987F67 DBF67280 2A9418E9 C6255B08
DECDE1C2 50FCB1A6 544F1D51 C214162E E2403DAB 2F1294C4 841240ED FD6F799C
130A0B24 AC74DD74 C60EB5CD EC648631 E0B88B3F 3D19A2E1 6492958E 9F64746E
45C080AE E5A6C245 7827D7B1 380A6FE8 A01D9022 7F52AD9C B596743A 853549C5 771DA2

quit

certificate 3B2FD65B

308202C2 3082022B A0030201 0202043B 2FD65B30 0D06092A 864886F7 0D010105
0500302D 310B3009 06035504 06130275 73310E30 0C060355 040A1305 63697363
6F310E30 0C060355 040B1305 736A7670 6E301E17 0D303230 31313132 30313630
385A170D 30333031 31313230 34363038 5A304D31 0B300906 03550406 13027573
310E300C 06035504 0A130563 6973636F 310E300C 06035504 0B130573 6A76706E
311E301C 06092A86 4886F70D 01090216 0F534A56 504E2E73 6A76706E 2E636F6D
305C300D 06092A86 4886F70D 01010105 00034B00 30480241 00EC4BE5 44E6ABC4
404BBBAD FE61E486 F2F85AC5 751EAC1D E68BD930 09958131 A977BA90 13BFD94D
297E41CA 23CDB0A3 EC38A296 49F61BBE 8037C94E F7FF6F35 29020301 0001A382

```

01113082 010D300B 0603551D 0F040403 0205A030 1A060355 1D110413 3011820F
534A5650 4E2E736A 76706E2E 636F6D30 2B060355 1D100424 3022800F 32303032
30313131 32303136 30385A81 0F323030 32303932 34303834 3630385A 304F0603
551D1F04 48304630 44A042A0 40A43E30 3C310B30 09060355 04061302 7573310E
300C0603 55040A13 05636973 636F310E 300C0603 55040B13 05736A76 706E310D
300B0603 55040313 0443524C 31301F06 03551D23 04183016 801446C1 609CDBEA
53EE80A4 80601A96 583B0DF8 0D2F301D 0603551D 0E041604 14494FC9 CE8C0C8E
2B078D54 EF43111B 3F1FAAB2 8A300906 03551D13 04023000 30190609 2A864886
F67D0741 00040C30 0A1B0456 352E3003 0204B030 0D06092A 864886F7 0D010105
05000381 81006C96 16AB6674 1FF8D1AB 27FA7384 0C08272A 8D68C826 8F80006B
0C146105 2FB8BDF9 CCC85262 2133F1EF FC7AA2F9 48191740 86AFC27C EF5AD773
768C5597 A953316B 839617FE 210B1195 3E5CD64A B643ADFC 43A57C8E 1D56BD39
5812109B 2C8301E1 BC30A6E1 8E634030 1851AC22 CD941F9C 65F21608 0229AFB4
126FD11A 6825
quit
!
crypto isakmp policy 1
  hash md5
!
crypto isakmp identity hostname
crypto isakmp keepalive 10
!
!
crypto ipsec transform-set myset esp-des esp-md5-hmac
crypto mib ipsec flowmib history tunnel size 200
crypto mib ipsec flowmib history failure size 200
!
crypto map vpn 10 ipsec-isakmp
  set peer 172.16.172.69
  set transform-set myset
  match address 101
!
!
!
!
!
!
!
!
!
!
controller ISA 3/1
!
!
!
!
interface Ethernet1/0
  ip address 172.16.172.52 255.255.255.248
  no ip redirects
  duplex half
  crypto map vpn
!
interface Ethernet1/1
  ip address 50.1.1.1 255.255.255.0
  no ip redirects
  duplex half
!
interface Ethernet1/2
  no ip address
  shutdown
  duplex half
!
interface Ethernet1/3
  no ip address
  shutdown
  duplex half
!

```



```
ip classless
ip route 0.0.0.0 0.0.0.0 172.16.172.49
no ip http server
ip pim bidir-enable
!
access-list 101 permit ip 50.1.1.0 0.0.0.255 20.1.1.0 0.0.0.255
!
snmp-server community public RO
!
call rsvp-sync
!
!
mgcp profile default
!
dial-peer cor custom
!
!
!
!
gatekeeper
 shutdown
!
!
line con 0
 exec-timeout 0 0
line aux 0
line vty 0 4
 password cisco
 no login
line vty 5 15
 login
!
no scheduler max-task-time
!
end
```

SJVPN#show crypto ca certificates

```
CA Certificate
Status: Available
Certificate Serial Number: 3B2FD307
Key Usage: General Purpose
Issuer:
  OU = sjvpn
  O = cisco
  C = us
Subject:
  OU = sjvpn
  O = cisco
  C = us
CRL Distribution Point:
  CN = CRL1, OU = sjvpn, O = cisco, C = us
Validity Date:
  start date: 22:02:40 UTC Jun 19 2001
  end date: 22:32:40 UTC Jun 19 2021
Associated Identity: EntrustPKI
```

RA KeyEncipher Certificate

```
Status: Available
Certificate Serial Number: 3B2FD318
Key Usage: Encryption
Issuer:
  OU = sjvpn
  O = cisco
  C = us
Subject:
  CN = First Officer
```

```
OU = sjvpn
O = cisco
C = us
CRL Distribution Point:
  CN = CRL1, OU = sjvpn, O = cisco, C = us
Validity Date:
  start date: 22:03:31 UTC Jun 19 2001
  end   date: 22:33:31 UTC Jun 19 2004
Associated Identity: EntrustPKI
```

RA Signature Certificate

```
Status: Available
Certificate Serial Number: 3B2FD319
Key Usage: Signature
Issuer:
  OU = sjvpn
  O = cisco
```

C = us

```
Subject:
  CN = First Officer
  OU = sjvpn
  O = cisco
  C = us
CRL Distribution Point:
  CN = CRL1, OU = sjvpn, O = cisco, C = us
Validity Date:
  start date: 22:03:31 UTC Jun 19 2001
  end   date: 22:33:31 UTC Jun 19 2004
Associated Identity: EntrustPKI
```

Certificate

```
Status: Available
Certificate Serial Number: 3B2FD65B
Key Usage: General Purpose
Issuer:
  OU = sjvpn
  O = cisco
```

C = us

```
Subject Name Contains:
  Name: SJVPN.sjvpn.com
CRL Distribution Point:
  CN = CRL1, OU = sjvpn, O = cisco, C = us
Validity Date:
  start date: 20:16:08 UTC Jan 11 2002
  end   date: 20:46:08 UTC Jan 11 2003
Associated Identity: EntrustPKI
```

SJPKI (spoke router enrolled to Microsoft CA server)

```
SJPKI#write terminal
Building configuration...

Current configuration : 12452 bytes
!
! Last configuration change at 18:40:41 UTC Sun Jan 13 2002
! NVRAM config last updated at 18:42:15 UTC Sun Jan 13 2002
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
service udp-small-servers
service tcp-small-servers
!
```

```
hostname SJPKI
!
!
ip subnet-zero
ip cef
!
!
ip domain-name sjtac
!
ip audit notify log
ip audit po max-events 100
ip ssh time-out 120
ip ssh authentication-retries 3
!
crypto ca identity MicrosoftPKI
  enrollment mode ra
  enrollment url http://171.69.89.182:80/certsrv/mscep/mscep.dll
  query url ldap://171.69.89.182
  crl optional
!
!
crypto ca certificate chain MicrosoftPKI
  certificate ca 091B47AEE8CFE2A94D3E8B38F292F5AF
    3082032C 308202D6 A0030201 02021009 1B47AEE8 CFE2A94D 3E8B38F2 92F5AF30
    0D06092A 864886F7 0D010105 0500305F 310B3009 06035504 06130255 53310B30
    09060355 04081302 43413111 300F0603 55040713 0853414E 204A4F53 45310E30
    0C060355 040A1305 534A5441 43310E30 0C060355 040B1305 534A504B 49311030
    0E060355 04031307 534A504B 49434130 1E170D30 32303131 31303135 3133395A
    170D3037 30313131 30323030 30345A30 5F310B30 09060355 04061302 5553310B
    30090603 55040813 02434131 11300F06 03550407 13085341 4E204A4F 5345310E
    300C0603 55040A13 05534A54 4143310E 300C0603 55040B13 05534A50 4B493110
    300E0603 55040313 07534A50 4B494341 305C300D 06092A86 4886F70D 01010105
00034B00 30480241 00AEC268 0C6388F1 404A2E97 3C94742D 37070BE0 368069BF
    C98A7AB3 E81131A5 DDC3E41F B9D9EB66 AF504D65 2BD2864C 87260696 8AAFF871
    88A80301 1500F11D 63020301 0001A382 016C3082 01683013 06092B06 01040182
    37140204 061E0400 43004130 0B060355 1D0F0404 03020146 300F0603 551D1301
    01FF0405 30030101 FF301D06 03551D0E 04160414 2315574F 05405281 E113C7E8
    6D83CBF2 33B71CB1 30820100 0603551D 1F0481F8 3081F530 81B8A081 B5A081B2
    8681AF6C 6461703A 2F2F2F43 4E3D534A 504B4943 412C434E 3D736A76 706E6D73
    706B692C 434E3D43 44502C43 4E3D5075 626C6963 2532304B 65792532 30536572
    76696365 732C434E 3D536572 76696365 732C434E 3D436F6E 66696775 72617469
    6F6E2C44 433D736A 706B692C 44433D63 6F6D3F63 65727469 66696361 74655265
    766F6361 74696F6E 4C697374 3F626173 653F6F62 6A656374 636C6173 733D6352
    4C446973 74726962 7574696F 6E506F69 6E743038 A036A034 86326874 74703A2F
    2F736A76 706E6D73 706B692E 736A706B 692E636F 6D2F4365 7274456E 726F6C6C
    2F534A50 4B494341 2E63726C 30100609 2B060104 01823715 01040302 0100300D
    06092A86 4886F70D 01010505 00034100 735977DF 7822B944 96A50106 722108F0
    1A60EF86 EFEDA9ED 2C7C9174 5EF48909 B4A66A08 226FBD11 3F20BA61 C556182A
    8E914788 AE6C5363 A769805F 9E2F6458
  quit
  certificate ra-encrypt 054E63CE00000000000003
    3082048E 30820438 A0030201 02020A05 4E63CE00 00000000 03300D06 092A8648
    86F70D01 01050500 305F310B 30090603 55040613 02555331 0B300906 03550408
    13024341 3111300F 06035504 07130853 414E204A 4F534531 0E300C06 0355040A
    1305534A 54414331 0E300C06 0355040B 1305534A 504B4931 10300E06 03550403
    1307534A 504B4943 41301E17 0D303230 31313130 31353932 385A170D 30343031
    31313031 35393238 5A305F31 0B300906 03550406 13025553 310B3009 06035504
    08130243 41311130 0F060355 04071308 53414E20 4A4F5345 310E300C 06035504
    0A130553 4A544143 310E300C 06035504 0B130553 4A504B49 3110300E 06035504
    03130753 4A56504E 52413081 9F300D06 092A8648 86F70D01 01010500 03818D00
    30818902 818100C6 E17A9C97 9CD883ED CCE68AAD DA4AF518 1D1B0056 EAE19CF7
    40A1CBA7 622A83DB 4131898F 5FC662A6 5486D0FB CE253DE5 26A85487 27CCC45C
    54803AB6 F5644F21 6967296A B075E6A3 0392704C 862A3344 8F15F512 FE86F257
    6465A4C5 B265DBA5 EBA53F19 D488839E 5881EA32 2943CDF2 2D03B889 5E47A30B
    C908D29B 64656102 03010001 A3820290 3082028C 300B0603 551D0F04 04030205
    20301506 03551D25 040E300C 060A2B06 01040182 37140201 30290609 2B060104
```

01823714 02041C1E 1A004300 45005000 45006E00 63007200 79007000 74006900
6F006E30 1D060355 1D0E0416 04148F6F 02D57617 E11F78D2 48547776 FE42DBE3
D8CC3081 98060355 1D230481 9030818D 80142315 574F0540 5281E113 C7E86D83
CBF233B7 1CB1A163 A461305F 310B3009 06035504 06130255 53310B30 09060355
04081302 43413111 300F0603 55040713 0853414E 204A4F53 45310E30 0C060355
040A1305 534A5441 43310E30 0C060355 040B1305 534A504B 49311030 0E060355
04031307 534A504B 49434182 10091B47 AEE8CFE2 A94D3E8B 38F292F5 AF3081C6
0603551D 1F0481BE 3081BB30 81B8A081 B5A081B2 8681AF6C 6461703A 2F2F2F43
4E3D534A 504B4943 412C434E 3D736A76 706E6D73 706B692C 434E3D43 44502C43
4E3D5075 626C6963 2532304B 65792532 30536572 76696365 732C434E 3D536572
76696365 732C434E 3D436F6E 66696775 72617469 6F6E2C44 433D736A 706B692C
44433D63 6F6D3F63 65727469 66696361 74655265 766F6361 74696F6E 4C697374
3F626173 653F6F62 6A656374 636C6173 733D6352 4C446973 74726962 7574696F
6E506F69 6E743081 B706082B 06010505 07010104 81AA3081 A73081A4 06082B06
01050507 30028681 976C6461 703A2F2F 2F434E3D 534A504B 4943412C 434E3D41
49412C43 4E3D5075 626C6963 2532304B 65792532 30536572 76696365 732C434E
3D536572 76696365 732C434E 3D436F6E 66696775 72617469 6F6E2C44 433D736A
706B692C 44433D63 6F6D3F63 41436572 74696669 63617465 3F626173 653F6F62
6A656374 636C6173 733D6365 72746966 69636174 696F6E41 7574686F 72697479
300D0609 2A864886 F70D0101 05050003 41008FE9 45687473 3798A614 D3A41747
D357B72B 8D286162 91A7B519 B100159E CF283215 28DE4504 EBB55282 247A9164
DC6B8185 63F159DC 18F6541B E289FC37 EC74
quit
certificate ra-sign 054E60AD000000000002
308204A0 3082044A A0030201 02020A05 4E60AD00 00000000 02300D06 092A8648
86F70D01 01050500 305F310B 30090603 55040613 02555331 0B300906 03550408
13024341 3111300F 06035504 07130853 414E204A 4F534531 0E300C06 0355040A
1305534A 54414331 0E300C06 0355040B 1305534A 504B4931 10300E06 03550403
1307534A 504B4943 41301E17 0D303230 31313130 31353932 375A170D 30343031
31313031 35393237 5A305F31 0B300906 03550406 13025553 310B3009 06035504
08130243 41311130 0F060355 04071308 53414E20 4A4F5345 310E300C 06035504
0A130553 4A544143 310E300C 06035504 0B130553 4A504B49 3110300E 06035504
03130753 4A56504E 52413081 9F300D06 092A8648 86F70D01 01010500 03818D00
30818902 818100E2 61FD62D2 64BED93E 7DBF1FDE 52F0D811 479A4F4E 48E56811
83ED9285 F2A3907B F236F508 43742D4A E89A76EF 3CB98722 D0A7DC1F 432F386C
721A3379 D50B7EA7 43C07AD0 AA6C087D FDA7BDBF 0BA92FA3 711A7F54 FBCAFBF6
633FCEFA AA9D9A8D 2C79550F 99314B3E FC97F764 BC6D6D67 D79A7292 A679B42F
4B5C083F 0AA6C902 03010001 A38202A2 3082029E 300B0603 551D0F04 04030207
80301506 03551D25 040E300C 060A2B06 01040182 37140201 303B0609 2B060104
01823714 02042E1E 2C004500 6E007200 6F006C00 6C006D00 65006E00 74004100
67006500 6E007400 4F006600 66006C00 69006E00 65301D06 03551D0E 04160414
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30090603 55040613 02555331 0B300906 03550408 13024341 3111300F 06035504
07130853 414E204A 4F534531 0E300C06 0355040A 1305534A 54414331 0E300C06
0355040B 1305534A 504B4931 10300E06 03550403 1307534A 504B4943 41821009
1B47AEE8 CFE2A94D 3E8B38F2 92F5AF30 81C60603 551D1F04 81BE3081 BB3081B8
A081B5A0 81B28681 AF6C6461 703A2F2F 2F434E3D 534A504B 4943412C 434E3D73
6A76706E 6D73706B 692C434E 3D434450 2C434E3D 5075626C 69632532 304B6579
25323053 65727669 6365732C 434E3D53 65727669 6365732C 434E3D43 6F6E6669
67757261 74696F6E 2C44433D 736A706B 692C4443 3D636F6D 3F636572 74696669
63617465 5265766F 63617469 6F6E4C69 73743F62 6173653F 6F626A65 6374636C
6173733D 63524C44 69737472 69627574 696F6E50 6F696E74 3081B706 082B0601
05050701 010481AA 3081A730 81A40608 2B060105 05073002 8681976C 6461703A
2F2F2F43 4E3D534A 504B4943 412C434E 3D414941 2C434E3D 5075626C 69632532
304B6579 25323053 65727669 6365732C 434E3D53 65727669 6365732C 434E3D43
6F6E6669 67757261 74696F6E 2C44433D 736A706B 692C4443 3D636F6D 3F634143
65727469 66696361 74653F62 6173653F 6F626A65 6374636C 6173733D 63657274
6966963 6174696F 6E417574 686F7269 7479300D 06092A86 4886F70D 01010505
00034100 2CEFFC7E B2C42AED 167FA630 AB3F9460 5E12B77F 07BC860A 48A5DBDB
E942F9B8 1B053148 05A70A17 B2EF37D4 F4234622 DD59571B F8D8AF09 2B54D40C 9145302D
quit
certificate 0961EAC400000000000A
30820444 308203EE A0030201 02020A09 61EAC400 00000000 0A300D06 092A8648
86F70D01 01050500 305F310B 30090603 55040613 02555331 0B300906 03550408
13024341 3111300F 06035504 07130853 414E204A 4F534531 0E300C06 0355040A

```
1305534A 54414331 0E300C06 0355040B 1305534A 504B4931 10300E06 03550403
1307534A 504B4943 41301E17 0D303230 31313132 30353931 375A170D 30343031
31313230 35393137 5A301C31 1A301806 092A8648 86F70D01 0902130B 534A504B
492E736A 74616330 5C300D06 092A8648 86F70D01 01010500 034B0030 48024100
C7FB363F 410E22E5 1B5649A6 8948CC05 D8A58518 A3633227 F6908EE1 7809600F
80771B65 09316FA0 DCB317D3 7FB6D7DF BBAC418D 2D8E2ABA 418A49AE 7961560D
02030100 01A38202 CD308202 C9300B06 03551D0F 04040302 05A0301D 0603551D
0E041604 142C9F6B 2DAFF8F8 C040121B B78AA486 0CD207E0 DF308198 0603551D
23048190 30818D80 14231557 4F054052 81E113C7 E86D83CB F233B71C B1A163A4
61305F31 0B300906 03550406 13025553 310B3009 06035504 08130243 41311130
0F060355 04071308 53414E20 4A4F5345 310E300C 06035504 0A130553 4A544143
310E300C 06035504 0B130553 4A504B49 3110300E 06035504 03130753 4A504B49
43418210 091B47AE E8CFE2A9 4D3E8B38 F292F5AF 30190603 551D1101 01FF040F
300D820B 534A504B 492E736A 74616330 81C60603 551D1F04 81BE3081 BB3081B8
A081B5A0 81B28681 AF6C6461 703A2F2F 2F434E3D 534A504B 4943412C 434E3D73
6A76706E 6D73706B 692C434E 3D434450 2C434E3D 5075626C 69632532 304B6579
25323053 65727669 6365732C 434E3D53 65727669 6365732C 434E3D43 6F6E6669
67757261 74696F6E 2C44433D 736A706B 692C4443 3D636F6D 3F636572 74696669
63617465 5265766F 63617469 6F6E4C69 73743F62 6173653F 6F626A65 6374636C
6173733D 63524C44 69737472 69627574 696F6E50 6F696E74 3081B706 082B0601
05050701 010481AA 3081A730 81A40608 2B060105 05073002 8681976C 6461703A
2F2F2F43 4E3D534A 504B4943 412C434E 3D414941 2C434E3D 5075626C 69632532
304B6579 25323053 65727669 6365732C 434E3D53 65727669 6365732C 434E3D43
6F6E6669 67757261 74696F6E 2C44433D 736A706B 692C4443 3D636F6D 3F634143
65727469 66696361 74653F62 6173653F 6F626A65 6374636C 6173733D 63657274
69666963 6174696F 6E417574 686F7269 7479300C 0603551D 130101FF 04023000
30130603 551D2504 0C300A06 082B0601 05050802 02303F06 092B0601 04018237
14020432 1E300049 00500053 00450043 0049006E 00740065 0072006D 00650064
00690061 00740065 004F0066 0066006C 0069006E 0065300D 06092A86 4886F70D
01010505 00034100 377A0F69 2909A243 11F41B30 4F3B125F DDE22145 0BEA2BF1
4E030C8E B82DCFF9 3639C047 AF40A0A7 EE0FF252 71E48C82 4AA309C4 9343BFB6
2C9C2D81 FE788AF3
quit
!
crypto isakmp policy 1
 hash md5
!
crypto isakmp identity hostname
crypto isakmp keepalive 10
!
!
crypto ipsec transform-set myset esp-des esp-md5-hmac
crypto mib ipsec flowmib history tunnel size 200
crypto mib ipsec flowmib history failure size 200
!
crypto map vpn 10 ipsec-isakmp
 set peer 172.16.172.69
 set transform-set myset
 match address 101
!
!
!
!
!
!
!
!
!
!
controller ISA 2/1
!
!
!
!
interface Ethernet1/0
 ip address 172.16.172.10 255.255.255.240
 ip broadcast-address 172.16.172.0
```

```
no ip redirects
duplex half
crypto map vpn
!
interface Ethernet1/1
ip address 10.1.1.2 255.255.255.0
ip broadcast-address 10.1.1.0
duplex half
!
interface Ethernet1/2
no ip address
ip broadcast-address 0.0.0.0
shutdown
duplex half
!
interface Ethernet1/3
no ip address
ip broadcast-address 0.0.0.0
shutdown
duplex half
!
router ospf 1
log-adjacency-changes
redistribute static subnets
network 10.1.1.0 0.0.0.255 area 0
!
ip classless
ip route 0.0.0.0 0.0.0.0 172.16.172.1
no ip http server
ip pim bidir-enable
!
access-list 101 permit ip 10.1.1.0 0.0.0.255 20.1.1.0 0.0.0.255
!
route-map tftp permit 10
match ip address 150
!
!
call rsvp-sync
!
!
mgcp profile default
!
dial-peer cor custom
!
!
!
!
gatekeeper
shutdown
!
!
line con 0
exec-timeout 0 0
line aux 0
line vty 0 4
login
line vty 5 15
login
!
!
end
```

SJPKI#**show crypto ca cert**

CA Certificate

Status: Available

Certificate Serial Number: 091B47AEE8CFE2A94D3E8B38F292F5AF

Key Usage: General Purpose

Issuer:

CN = SJKICA
OU = SJKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US

Subject:

CN = SJKICA
OU = SJKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US

CRL Distribution Point:

ldap:///CN=SJKICA,CN=sjvpnmspi,CN=CDP,CN=Public%20Key%20Services,
CN=Services,CN=Configuration,DC=sjpk,DC=com?
certificateRevocationList?base?objectclass=cRLDistributionPoint

Validity Date:

start date: 01:51:39 UTC Jan 11 2002
end date: 02:00:04 UTC Jan 11 2007

Associated Identity: MicrosoftPKI

RA KeyEncipher Certificate

Status: Available

Certificate Serial Number: 054E63CE000000000003

Key Usage: Encryption

Issuer:

CN = SJKICA
OU = SJKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US

Subject:

CN = SJVPNRA
OU = SJKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US

CRL Distribution Point:

ldap:///CN=SJKICA,CN=sjvpnmspi,CN=CDP,CN=Public%20Key%20Services,
CN=Services,CN=Configuration,DC=sjpk,DC=com?
certificateRevocationList?base?objectclass=cRLDistributionPoint

Validity Date:

start date: 01:59:28 UTC Jan 11 2002
end date: 01:59:28 UTC Jan 11 2004

Associated Identity: MicrosoftPKI

RA Signature Certificate

Status: Available

Certificate Serial Number: 054E60AD000000000002

Key Usage: Signature

Issuer:

CN = SJKICA
OU = SJKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US

Subject:

CN = SJVPNRA
OU = SJKI
O = SJTAC

```

L = SAN JOSE
ST = CA
C = US
CRL Distribution Point:
  ldap:///CN=SJPKICA,CN=sjvpnmspi,CN=CDP,CN=Public%20Key%20Services,
CN=Services,CN=Configuration,DC=sjpk,DC=com?
certificateRevocationList?base?objectclass=cRLDistributionPoint
Validity Date:
  start date: 01:59:27 UTC Jan 11 2002
  end date: 01:59:27 UTC Jan 11 2004
Associated Identity: MicrosoftPKI

Certificate
Status: Available
Certificate Serial Number: 0961EAC400000000000A
Key Usage: General Purpose
Issuer:
  CN = SJPKICA
  OU = SJPKI
  O = SJTAC
  L = SAN JOSE
  ST = CA
  C = US
Subject Name Contains:
  Name: SJPKI.sjtac
  CRL Distribution Point:
    ldap:///CN=SJPKICA,CN=sjvpnmspi,CN=CDP,CN=Public%20Key%20Services,
CN=Services,CN=Configuration,DC=sjpk,DC=com?
certificateRevocationList?base?objectclass=cRLDistributionPoint
Validity Date:
  start date: 20:59:17 UTC Jan 11 2002
  end date: 20:59:17 UTC Jan 11 2004
Associated Identity: MicrosoftPKI

```

Troubleshoot

Troubleshooting Commands

You can use some IPSec-related IOS debug commands to see how the Internet Key Exchange (IKE) negotiation works with multiple identity certificates.

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

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

- **debug crypto isakmp** Displays messages about IKE events.
- **debug crypto ipsec** Displays IPSec events.
- **debug crypto pki transaction** Displays debug messages for the trace of interaction (message type) between the CA and the router.
- **debug crypto pki message** Displays debug messages for the details of the interaction (message dump) between the CA and the router.

Certificates From an Entrust CA Server

The following debugs were collected on SJVPN and SJhub. Typically, SJVPN tries to initiate the IPSec tunnel to the hub router SJhub. SJhub sends a CERT_REQ payload for each CA domain it supports. Each **CERT_REQ payload** contains the distinguished name (DN) of the issuer of the certificates. SJVPN then tries to map the DN in the CERT_REQ and send its own certificates to SJhub.

In examples below, SJhub router sends its certificates based on the **CERT_REQ** sent by the SJVPN router. Certificates from the Entrust CA server are used.

- Debugs Collected on SJVPN
- Debugs Collected on SJhub
- Certificate Revocation List (CRL) Caching on the Routers

Debugs Collected on SJVPN

```
00:02:24: IPSEC(sa_request): ,
(key eng. msg.) src= 172.16.172.52, dest= 172.16.172.69,
src_proxy= 50.1.1.0/255.255.255.0/0/0 (type=4),
dest_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 3600s and 4608000kb,
spi= 0xFA8261EB(4202848747), conn_id= 0, keysize= 0, flags= 0x4004
00:02:24: ISAKMP: received ke message (1/1)
00:02:24: ISAKMP: local port 500, remote port 500
00:02:24: ISAKMP (0:2): Input = IKE_MSG_FROM_IPSEC, IKE_SA_REQ_MM
Old State = IKE_READY New State = IKE_I_MM1
00:02:24: ISAKMP (0:2): beginning Main Mode exchange
00:02:24: ISAKMP (0:2): sending packet to 172.16.172.69 (I) MM_NO_STATE
00:02:24: ISAKMP (0:2): received packet from 172.16.172.69 (I) MM_NO_STATE
00:02:24: ISAKMP (0:2): Input = IKE_MSG_FROM_PEER, IKE_MM_EXCH
Old State = IKE_I_MM1 New State = IKE_I_MM2

00:02:24: ISAKMP (0:2): processing SA payload. message ID = 0
00:02:24: ISAKMP (0:2): Checking ISAKMP transform 1
    against priority 1 policy
00:02:24: ISAKMP: encryption DES-CBC
00:02:24: ISAKMP: hash MD5
00:02:24: ISAKMP: default group 1
00:02:24: ISAKMP: auth RSA sig
00:02:24: ISAKMP: life type in seconds
00:02:24: ISAKMP: life duration (VPI) of 0x0 0x1 0x51 0x80
00:02:24: ISAKMP (0:2): atts are acceptable. Next payload is 0
00:02:24: ISAKMP (0:2): SA is doing RSA signature authentication
    using id type ID_FQDN
00:02:24: ISAKMP (0:2): Input = IKE_MSG_INTERNAL, IKE_PROCESS_MAIN_MODE
Old State = IKE_I_MM2 New State = IKE_I_MM2

00:02:24: ISAKMP (0:2): sending packet to 172.16.172.69 (I) MM_SA_SETUP
00:02:24: ISAKMP (0:2): Input = IKE_MSG_INTERNAL, IKE_PROCESS_COMPLETE
Old State = IKE_I_MM2 New State = IKE_I_MM3

00:02:24: ISAKMP (0:2): received packet from 172.16.172.69 (I) MM_SA_SETUP
00:02:24: ISAKMP (0:2): Input = IKE_MSG_FROM_PEER, IKE_MM_EXCH
Old State = IKE_I_MM3 New State = IKE_I_MM4

00:02:24: ISAKMP (0:2): processing KE payload. message ID = 0
00:02:24: ISAKMP (0:2): processing NONCE payload. message ID = 0
00:02:24: ISAKMP (0:2): SKEYID state generated
00:02:24: ISAKMP (0:2): processing CERT_REQ payload. message ID = 0
00:02:24: ISAKMP (0:2): peer wants a CT_X509_SIGNATURE cert
00:02:24: ISAKMP (0:2): peer want cert issued by CN = SJKICA,
    OU = SJKPI, O = SJTAC, L = SAN JOSE, ST = CA, C = US
00:02:24: ISAKMP (0:2): can't find router cert for signature!
00:02:24: ISAKMP (2): issuer name is not a trusted root.
00:02:24: ISAKMP (0:2): processing CERT_REQ payload. message ID = 0
00:02:24: ISAKMP (0:2): peer wants a CT_X509_SIGNATURE cert
00:02:24: ISAKMP (0:2): peer want cert issued by OU = sjvpn,
    O = cisco, C = us
00:02:24: ISAKMP (0:2): processing vendor id payload
00:02:24: ISAKMP (0:2): speaking to another IOS box!
```

00:02:24: ISAKMP (0:2): Input = IKE_MSG_INTERNAL, IKE_PROCESS_MAIN_MODE
Old State = IKE_I_MM4 New State = IKE_I_MM4

00:02:24: ISAKMP (2): ID payload
next-payload : 6
type : 2
protocol : 17
port : 500
length : 19

00:02:24: ISAKMP (2): Total payload length: 23
00:02:24: ISAKMP (0:2): sending packet to 172.16.172.69 (I) MM_KEY_EXCH
00:02:24: ISAKMP (0:2): Input = IKE_MSG_INTERNAL, IKE_PROCESS_COMPLETE
Old State = IKE_I_MM4 New State = IKE_I_MM5

.

00:02:26: ISAKMP (0:2): received packet from 172.16.172.69 (I) MM_KEY_EXCH
00:02:26: ISAKMP (0:2): Input = IKE_MSG_FROM_PEER, IKE_MM_EXCH
Old State = IKE_I_MM5 New State = UNKNOWN

00:02:26: ISAKMP (0:2): processing ID payload. message ID = 0
00:02:26: ISAKMP (0:2): processing CERT payload. message ID = 0
00:02:26: ISAKMP (0:2): processing a CT_X509_SIGNATURE cert
00:02:26: CRYPTO_PKI: status = 0: poll CRL
00:02:27: CRYPTO_PKI: ldap_bind() succeeded.
00:02:27: CRYPTO_PKI: set CRL update timer with delay: 46206
00:02:27: CRYPTO_PKI: the current router time: 13:07:32 UTC Jan 14 2002

00:02:27: CRYPTO_PKI: the last CRL update time: 00:57:38 UTC Jan 14 2002
00:02:27: CRYPTO_PKI: the next CRL update time: 01:57:38 UTC Jan 15 2002
00:02:27: CRYPTO_PKI: status = 0: failed to get public key from the storage
00:02:27: CRYPTO_PKI: status = 65535: failed to get issuer pubkey in cert
00:02:27: CRYPTO_PKI: status = 0: failed to get public key from the storage
00:02:27: CRYPTO_PKI: status = 65535: failed to get issuer pubkey in cert
00:02:27: CRYPTO_PKI: status = 0: failed to get public key from the storage
00:02:27: CRYPTO_PKI: status = 65535: failed to get issuer pubkey in cert
00:02:28: CRYPTO_PKI: transaction GetCRL completed
00:02:28: CRYPTO_PKI: blocking callback received status: 105
00:02:28: CRYPTO_PKI: Certificate verified, chain status= 1
00:02:28: ISAKMP (0:2): processing SIG payload. message ID = 0
00:02:28: ISAKMP (2): sa->peer.name = , sa->peer_id.id.id_fqdn.fqdn
= SJhub.sjtac.com

00:02:28: ISAKMP:received payload type 14
00:02:28: ISAKMP (0:2): processing keep alive: proposal=10/2 sec.,
actual=10/2 sec.
00:02:28: ISA.!!
Success rate is 40 percent (2/5), round-trip min/avg/max = 1/2/4 ms
SJVPN#KMP (0:2): peer knows about the keepalive extension mechanism.

00:02:28: ISAKMP (0:2): read keepalive extended attribute VPI: /0x2/0x4
00:02:28: ISAKMP (0:2): peer keepalives capabilities: 0x1
00:02:28: ISAKMP (0:2): SA has been authenticated with 172.16.172.69
00:02:28: ISAKMP (0:2): Input = IKE_MSG_INTERNAL, IKE_PROCESS_MAIN_MODE
Old State = UNKNOWN New State = UNKNOWN

00:02:28: ISAKMP (0:2): Input = IKE_MSG_INTERNAL, IKE_PROCESS_COMPLETE
Old State = UNKNOWN New State = IKE_P1_COMPLETE

00:02:28: ISAKMP (0:2): beginning Quick Mode exchange, M-ID of -304515331
00:02:28: ISAKMP (0:2): sending packet to 172.16.172.69 (I) QM_IDLE
00:02:28: ISAKMP (0:2): Node -304515331, Input = IKE_MSG_INTERNAL, IKE_INIT_QM
Old State = IKE_QM_READY New State = IKE_QM_I_QM1

00:02:28: ISAKMP (0:2): Input = IKE_MSG_INTERNAL, IKE_PHASE1_COMPLETE
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE

00:02:28: ISAKMP (0:2): received packet from 172.16.172.69 (I) QM_IDLE
00:02:28: ISAKMP (0:2): processing HASH payload. message ID = -304515331
00:02:28: ISAKMP (0:2): processing SA payload. message ID = -304515331

```
00:02:28: ISAKMP (0:2): Checking IPSec proposal 1
00:02:28: ISAKMP: transform 1, ESP_DES
00:02:28: ISAKMP: attributes in transform:
00:02:28: ISAKMP: encaps is 1
00:02:28: ISAKMP: SA life type in seconds
00:02:28: ISAKMP: SA life duration (basic) of 3600
00:02:28: ISAKMP: SA life type in kilobytes
00:02:28: ISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0
00:02:28: ISAKMP: authenticator is HMAC-MD5
00:02:28: ISAKMP (0:2): atts are acceptable.
00:02:28: IPSEC(validate_proposal_request): proposal part #1,
(key eng. msg.) dest= 172.16.172.69, src= 172.16.172.52,
dest_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
src_proxy= 50.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 0s and 0kb,
spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x4
00:02:28: ISAKMP (0:2): processing NONCE payload. message ID = -304515331
00:02:28: ISAKMP (0:2): processing ID payload. message ID = -304515331
00:02:28: ISAKMP (0:2): processing ID payload. message ID = -304515331
00:02:28: ISAKMP (0:2): Creating IPSec SAs
00:02:28: inbound SA from 172.16.172.69 to 172.16.172.52
(proxy 20.1.1.0 to 50.1.1.0)
00:02:28: has spi 0xFA8261EB and conn_id 2029 and flags 4
00:02:28: lifetime of 3600 seconds
00:02:28: lifetime of 4608000 kilobytes
00:02:28: outbound SA from 172.16.172.52 to 172.16.172.69
(proxy 50.1.1.0 to 20.1.1.0 )
00:02:28: has spi 206728450 and conn_id 2030 and flags 4
00:02:28: lifetime of 3600 seconds
00:02:28: lifetime of 4608000 kilobytes
00:02:28: IPSEC(key_engine): got a queue event...
00:02:28: IPSEC(initialize_sas): ,
(key eng. msg.) dest= 172.16.172.52, src= 172.16.172.69,
dest_proxy= 50.1.1.0/255.255.255.0/0/0 (type=4),
src_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 3600s and 4608000kb,
spi= 0xFA8261EB(4202848747), conn_id= 2029, keysize= 0, flags= 0x4
00:02:28: IPSEC(initialize_sas): ,
(key eng. msg.) src= 172.16.172.52, dest= 172.16.172.69,
src_proxy= 50.1.1.0/255.255.255.0/0/0 (type=4),
dest_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 3600s and 4608000kb,
spi= 0xC526D02(206728450), conn_id= 2030, keysize= 0, flags= 0x4
00:02:28: IPSEC(create_sa): sa created,
(sa) sa_dest= 172.16.172.52, sa_prot= 50,
sa_spi= 0xFA8261EB(4202848747),
sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2029
00:02:28: IPSEC(create_sa): sa created,
(sa) sa_dest= 172.16.172.69, sa_prot= 50,
sa_spi= 0xC526D02(206728450),
sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2030
00:02:28: ISAKMP (0:2): sending packet to 172.16.172.69 (I) QM_IDLE
00:02:28: ISAKMP (0:2): deleting node -304515331 error FALSE reason ""
00:02:28: ISAKMP (0:2): Node -304515331, Input = IKE_MSG_FROM_PEER,
IKE_QM_EXCH
Old State = IKE_QM_I_QM1 New State = IKE_QM_PHASE2_COMPLETE

00:02:36: ISAKMP (0:2): received packet from 172.16.172.69 (I) QM_IDLE
00:02:36: ISAKMP (0:2): processing HASH payload. message ID = -2051070354
00:02:36: ISAKMP (0:2): processing NOTIFY ITS_ALIVE protocol 1
spi 0, message ID = -2051070354, sa = 62DF2768
00:02:36: ISAKMP (0:2): deleting node -2051070354 error
FALSE reason "informational (in) state 1"
```

```
00:02:36: ISAKMP (0:2): Input = IKE_MESG_FROM_PEER, IKE_INFO_NOTIFY
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE

00:02:36: ISAKMP (0:2): sending packet to 172.16.172.69 (I) QM_IDLE
00:02:36: ISAKMP (0:2): purging node -739583249
00:02:36: ISAKMP (0:2): Input = IKE_MESG_FROM_PEER, IKE_MESG_KEEP_ALIVE
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE
```

Debugs Collected on SJhub

```
00:02:18: ISAKMP (0:0): received packet from 172.16.172.52 (N) NEW SA
00:02:18: ISAKMP: local port 500, remote port 500
00:02:18: ISAKMP (0:2): Input = IKE_MESG_FROM_PEER, IKE_MM_EXCH
Old State = IKE_READY New State = IKE_R_MM1
00:02:18: ISAKMP (0:2): processing SA payload. message ID = 0
00:02:18: ISAKMP (0:2): Checking ISAKMP transform 1 against priority 1 policy
00:02:18: ISAKMP: encryption DES-CBC
00:02:18: ISAKMP: hash MD5
00:02:18: ISAKMP: default group 1
00:02:18: ISAKMP: auth RSA sig
00:02:18: ISAKMP: life type in seconds
00:02:18: ISAKMP: life duration (VPI) of 0x0 0x1 0x51 0x80
00:02:18: ISAKMP (0:2): atts are acceptable. Next payload is 3
00:02:18: ISAKMP (0:2): Input = IKE_MESG_INTERNAL, IKE_PROCESS_MAIN_MODE
Old State = IKE_R_MM1 New State = IKE_R_MM1

00:02:18: ISAKMP (0:2): SA is doing RSA signature authentication
    using id type ID_FQDN
00:02:18: ISAKMP (0:2): sending packet to 172.16.172.52 (R) MM_SA_SETUP
00:02:18: ISAKMP (0:2): Input = IKE_MESG_INTERNAL, IKE_PROCESS_COMPLETE
Old State = IKE_R_MM1 New State = IKE_R_MM2

00:02:18: ISAKMP (0:2): received packet from 172.16.172.52 (R) MM_SA_SETUP
00:02:18: ISAKMP (0:2): Input = IKE_MESG_FROM_PEER, IKE_MM_EXCH
Old State = IKE_R_MM2 New State = IKE_R_MM3

00:02:18: ISAKMP (0:2): processing KE payload. message ID = 0
00:02:19: ISAKMP (0:2): processing NONCE payload. message ID = 0
00:02:19: ISAKMP (0:2): SKEYID state generated
00:02:19: ISAKMP (0:2): processing CERT_REQ payload. message ID = 0
00:02:19: ISAKMP (0:2): peer wants a CT_X509_SIGNATURE cert
00:02:19: ISAKMP (0:2): peer want cert issued by OU = sjvpn, O = cisco, C = us
00:02:19: ISAKMP (0:2): processing vendor id payload
00:02:19: ISAKMP (0:2): speaking to another IOS box!
00:02:19: ISAKMP (0:2): Input = IKE_MESG_INTERNAL, IKE_PROCESS_MAIN_MODE
Old State = IKE_R_MM3 New State = IKE_R_MM3

00:02:19: ISAKMP (0:2): sending packet to 172.16.172.52 (R) MM_KEY_EXCH
00:02:19: ISAKMP (0:2): Input = IKE_MESG_INTERNAL, IKE_PROCESS_COMPLETE
Old State = IKE_R_MM3 New State = IKE_R_MM4

00:02:19: ISAKMP (0:2): received packet from 172.16.172.52 (R) MM_KEY_EXCH
00:02:19: ISAKMP (0:2): Input = IKE_MESG_FROM_PEER, IKE_MM_EXCH
Old State = IKE_R_MM4 New State = IKE_R_MM5

00:02:19: ISAKMP (0:2): processing ID payload. message ID = 0
00:02:19: ISAKMP (0:2): processing CERT payload. message ID = 0
00:02:19: ISAKMP (0:2): processing a CT_X509_SIGNATURE cert
00:02:19: CRYPTO_PKI: status = 0: poll CRL
00:02:19: CRYPTO_PKI: ldap_bind() succeeded.
00:02:20: CRYPTO_PKI: set CRL update timer with delay: 49920
00:02:20: CRYPTO_PKI: the current router time: 12:05:38 UTC Jan 14 2002

00:02:20: CRYPTO_PKI: the last CRL update time: 00:57:38 UTC Jan 14 2002
00:02:20: CRYPTO_PKI: the next CRL update time: 01:57:38 UTC Jan 15 2002
00:02:20: CRYPTO_PKI: status = 0: failed to get public key from the storage
```

```
00:02:20: CRYPTO_PKI: status = 65535: failed to get issuer pubkey in cert
00:02:20: CRYPTO_PKI: status = 0: failed to get public key from the storage
00:02:20: CRYPTO_PKI: status = 65535: failed to get issuer pubkey in cert
00:02:20: CRYPTO_PKI: status = 0: failed to get public key from the storage
00:02:20: CRYPTO_PKI: status = 65535: failed to get issuer pubkey in cert
00:02:20: CRYPTO_PKI: status = 0: failed to get public key from the storage
00:02:20: CRYPTO_PKI: status = 65535: failed to get issuer pubkey in cert
00:02:20: CRYPTO_PKI: status = 0: failed to get public key from the storage
00:02:20: CRYPTO_PKI: status = 65535: failed to get issuer pubkey in cert
00:02:20: CRYPTO_PKI: status = 0: failed to get public key from the storage
00:02:20: CRYPTO_PKI: status = 65535: failed to get issuer pubkey in cert
00:02:21: CRYPTO_PKI: transaction GetCRL completed
00:02:21: CRYPTO_PKI: blocking callback received status: 105
00:02:21: CRYPTO_PKI: Certificate verified, chain status= 1
00:02:21: ISAKMP (0:2): processing SIG payload. message ID = 0
00:02:21: ISAKMP (2): sa->peer.name = , sa->peer_id.id.id_fqdn.fqdn
    = SJVPN.sjvpn.com
00:02:21: ISAKMP:received payload type 14
00:02:21: ISAKMP (0:2): processing keep alive: proposal=10/2 sec.,
    actual=10/2 sec.
00:02:21: ISAKMP (0:2): peer knows about the keepalive extension mechanism.
00:02:21: ISAKMP (0:2): read keepalive extended attribute VPI: /0x2/0x4
00:02:21: ISAKMP (0:2): peer keepalives capabilities: 0x1
00:02:21: ISAKMP (0:2): SA has been authenticated with 172.16.172.52
00:02:21: ISAKMP (0:2): Input = IKE_MSG_INTERNAL, IKE_PROCESS_MAIN_MODE
Old State = IKE_R_MM5 New State = IKE_R_MM5

00:02:21: ISAKMP (2): ID payload
next-payload : 6
type : 2
protocol : 17
port : 500
length : 19
00:02:21: ISAKMP (2): Total payload length: 23
00:02:21: ISAKMP (0:2): sending packet to 172.16.172.52 (R) QM_IDLE
00:02:21: ISAKMP (0:2): Input = IKE_MSG_INTERNAL, IKE_PROCESS_COMPLETE
Old State = IKE_R_MM5 New State = IKE_P1_COMPLETE

00:02:23: ISAKMP (0:2): received packet from 172.16.172.52 (R) QM_IDLE
00:02:23: ISAKMP (0:2): processing HASH payload. message ID = -304515331
00:02:23: ISAKMP (0:2): processing SA payload. message ID = -304515331
00:02:23: ISAKMP (0:2): Checking IPsec proposal 1
00:02:23: ISAKMP: transform 1, ESP_DES
00:02:23: ISAKMP: attributes in transform:
00:02:23: ISAKMP: encaps is 1
00:02:23: ISAKMP: SA life type in seconds
00:02:23: ISAKMP: SA life duration (basic) of 3600
00:02:23: ISAKMP: SA life type in kilobytes
00:02:23: ISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0
00:02:23: ISAKMP: authenticator is HMAC-MD5
00:02:23: ISAKMP (0:2): atts are acceptable.
00:02:23: IPSEC(validate_proposal_request): proposal part #1,
(key eng. msg.) dest= 172.16.172.69, src= 172.16.172.52,
dest_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
src_proxy= 50.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 0s and 0kb,
spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x4
00:02:23: ISAKMP (0:2): processing NONCE payload. message ID = -304515331
00:02:23: ISAKMP (0:2): processing ID payload. message ID = -304515331
00:02:23: ISAKMP (2): ID_IPV4_ADDR_SUBNET src 50.1.1.0/255.255.255.0
    prot 0 port 0
00:02:23: ISAKMP (0:2): processing ID payload. message ID = -304515331
00:02:23: ISAKMP (2): ID_IPV4_ADDR_SUBNET dst 20.1.1.0/255.255.255.0
    prot 0 port 0
00:02:23: ISAKMP (0:2): asking for 1 spis from ipsec
```

```
00:02:23: ISAKMP (0:2): Node -304515331, Input = IKE_MSG_FROM_PEER,
IKE_QM_EXCH
Old State = IKE_QM_READY New State = IKE_QM_SPI_STARVE

00:02:23: IPSEC(key_engine): got a queue event...
00:02:23: IPSEC(spi_response): getting spi 206728450 for SA
from 172.16.172.52 to 172.16.172.69 for prot 3
00:02:23: ISAKMP: received ke message (2/1)
00:02:23: ISAKMP (0:2): sending packet to 172.16.172.52 (R) QM_IDLE
00:02:23: ISAKMP (0:2): Node -304515331, Input = IKE_MSG_FROM_IPSEC,
IKE_SPI_REPLY
Old State = IKE_QM_SPI_STARVE New State = IKE_QM_R_QM2

00:02:23: ISAKMP (0:2): received packet from 172.16.172.52 (R) QM_IDLE
00:02:23: ISAKMP (0:2): Creating IPsec SAs
00:02:23: inbound SA from 172.16.172.52 to 172.16.172.69
(proxy 50.1.1.0 to 20.1.1.0)
00:02:23: has spi 0xC526D02 and conn_id 2000 and flags 4
00:02:23: lifetime of 3600 seconds
00:02:23: lifetime of 4608000 kilobytes
00:02:23: outbound SA from 172.16.172.69 to 172.16.172.52
(proxy 20.1.1.0 to 50.1.1.0 )
00:02:23: has spi -92118549 and conn_id 2001 and flags 4
00:02:23: lifetime of 3600 seconds
00:02:23: lifetime of 4608000 kilobytes
00:02:23: ISAKMP (0:2): deleting node -304515331 error
FALSE reason "quick mode done (await())"
00:02:23: ISAKMP (0:2): Node -304515331, Input = IKE_MSG_FROM_PEER,
IKE_QM_EXCH
Old State = IKE_QM_R_QM2 New State = IKE_QM_PHASE2_COMPLETE

00:02:23: IPSEC(key_engine): got a queue event...
00:02:23: IPSEC(initialize_sas): ,
(key eng. msg.) dest= 172.16.172.69, src= 172.16.172.52,
dest_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
src_proxy= 50.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 3600s and 4608000kb,
spi= 0xC526D02(206728450), conn_id= 2000, keysize= 0, flags= 0x4
00:02:23: IPSEC(initialize_sas): ,
(key eng. msg.) src= 172.16.172.69, dest= 172.16.172.52,
src_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
dest_proxy= 50.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 3600s and 4608000kb,
spi= 0xFA8261EB(4202848747), conn_id= 2001, keysize= 0, flags= 0x4
00:02:23: IPSEC(create_sa): sa created,
(sa) sa_dest= 172.16.172.69, sa_prot= 50,
sa_spi= 0xC526D02(206728450),
sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2000
00:02:23: IPSEC(create_sa): sa created,
(sa) sa_dest= 172.16.172.52, sa_prot= 50,
sa_spi= 0xFA8261EB(4202848747),
sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2001
00:02:31: ISAKMP (0:2): sending packet to 172.16.172.52 (R) QM_IDLE
00:02:31: ISAKMP (0:2): purging node -2051070354
00:02:31: ISAKMP (0:2): Input = IKE_MSG_FROM_TIMER, IKE_TIMER_IM_ALIVE
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE

00:02:31: ISAKMP (0:2): received packet from 172.16.172.52 (R) QM_IDLE
00:02:31: ISAKMP (0:2): processing HASH payload. message ID = -739583249
00:02:31: ISAKMP (0:2): processing NOTIFY ITS_ALIVE_ACK protocol 1
spi 0, message ID = -739583249, sa = 62DF5324
00:02:31: ISAKMP (0:2): peer 172.16.172.52 is alive!
00:02:31: ISAKMP (0:2): deleting node -739583249 error
FALSE reason "informational (in) state 1"
```

```
00:02:31: ISAKMP (0:2): Input = IKE_MSG_FROM_PEER, IKE_INFO_NOTIFY
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE
```

Certificate Revocation List (CRL) Caching on the Routers

```
SJVPN#show crypto ca crls
CRL Issuer Name:
OU = sjvpn, O = cisco, C = us
LastUpdate: 00:57:38 UTC Jan 14 2002
NextUpdate: 01:57:38 UTC Jan 15 2002
Retrieved from CRL Distribution Point:
LDAP: CN = CRL1, OU = sjvpn, O = cisco, C = us
SJhub#show crypto ca crls
CRL Issuer Name:
OU = sjvpn, O = cisco, C = us
LastUpdate: 00:57:38 UTC Jan 14 2002
NextUpdate: 01:57:38 UTC Jan 15 2002
Retrieved from CRL Distribution Point:
LDAP: CN = CRL1, OU = sjvpn, O = cisco, C = us
```

Certificates from a Microsoft CA Server

The following debugs were collected on SJKI and SJhub during the IKE negotiation. After SJKI checks the first CERT_REQ payload, it already finds matching certificates in its database, so it doesn't continue to look into the second CERT_REQ payload. In this case, certificates from the Microsoft CA server are used for IKE authentication.

- Debugs Collected on SJKI
- Debugs Collected on SJhub

Debugs Collected on SJKI

```
2d21h: IPSEC(sa_request): ,
(key eng. msg.) src= 172.16.172.10, dest= 172.16.172.69,
src_proxy= 10.1.1.0/255.255.255.0/0/0 (type=4),
dest_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 3600s and 4608000kb,
spi= 0xE8559075(3897921653), conn_id= 0, keysize= 0, flags= 0x4004
2d21h: ISAKMP: received ke message (1/1)
2d21h: ISAKMP: local port 500, remote port 500
2d21h: ISAKMP (0:1): Input = IKE_MSG_FROM_IPSEC, IKE_SA_REQ_MM
Old State = IKE_READY New State = IKE_I_MM1
2d21h: ISAKMP (0:1): beginning Main Mode exchange
2d21h: ISAKMP (0:1): sending packet to 172.16.172.69 (I) MM_NO_STATE
2d21h: ISAKMP (0:1): received packet from 172.16.172.69 (I) MM_NO_STATE
2d21h: ISAKMP (0:1): Input = IKE_MSG_FROM_PEER, IKE_MM_EXCH
Old State = IKE_I_MM1 New State = IKE_I_MM2

2d21h: ISAKMP (0:1): processing SA payload. message ID = 0
2d21h: ISAKMP (0:1): Checking ISAKMP transform 1 against priority 1 policy
2d21h: ISAKMP: encryption DES-CBC
2d21h: ISAKMP: hash MD5
2d21h: ISAKMP: default group 1
2d21h: ISAKMP: auth RSA sig
2d21h: ISAKMP: life type in seconds
2d21h: ISAKMP: life duration (VPI) of 0x0 0x1 0x51 0x80
2d21h: ISAKMP (0:1): atts are acceptable. Next payload is 0
2d21h: ISAKMP (0:1): SA is doing RSA signature authentication
using id type ID_FQDN
2d21h: ISAKMP (0:1): Input = IKE_MSG_INTERNAL, IKE_PROCESS_MAIN_MODE
Old State = IKE_I_MM2 New State = IKE_I_MM2
```

```
2d21h: ISAKMP (0:1): sending packet to 172.16.172.69 (I) MM_SA_SETUP
2d21h: ISAKMP (0:1): Input = IKE_MSG_INTERNAL, IKE_PROCESS_COMPLETE
Old State = IKE_I_MM2 New State = IKE_I_MM3

2d21h: ISAKMP (0:1): received packet from 172.16.172.69 (I) MM_SA_SETUP
2d21h: ISAKMP (0:1): Input = IKE_MSG_FROM_PEER, IKE_MM_EXCH
Old State = IKE_I_MM3 New State = IKE_I_MM4

2d21h: ISAKMP (0:1): processing KE payload. message ID = 0
2d21h: .!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/3/4 ms
SJKPI# ISAKMP (0:1): processing NONCE payload. message ID = 0
2d21h: ISAKMP (0:1): SKEYID state generated
2d21h: ISAKMP (0:1): processing CERT_REQ payload. message ID = 0
2d21h: ISAKMP (0:1): peer wants a CT_X509_SIGNATURE cert
2d21h: ISAKMP (0:1): peer want cert issued by CN = SJKPICA,
OU = SJKPI, O = SJTAC, L = SAN JOSE, ST = CA, C = US
2d21h: ISAKMP (0:1): already have a matching cert for this peer.
Finish processing cert req.
2d21h: ISAKMP (0:1): processing vendor id payload
2d21h: ISAKMP (0:1): speaking to another IOS box!
2d21h: ISAKMP (0:1): Input = IKE_MSG_INTERNAL, IKE_PROCESS_MAIN_MODE
Old State = IKE_I_MM4 New State = IKE_I_MM4

2d21h: ISAKMP (1): ID payload
next-payload : 6
type : 2
protocol : 17
port : 500
length : 15
2d21h: ISAKMP (1): Total payload length: 19
2d21h: ISAKMP: growing send buffer from 1024 to 3072
2d21h: ISAKMP (0:1): sending packet to 172.16.172.69 (I) MM_KEY_EXCH
2d21h: ISAKMP (0:1): Input = IKE_MSG_INTERNAL, IKE_PROCESS_COMPLETE
Old State = IKE_I_MM4 New State = IKE_I_MM5

2d21h: ISAKMP (0:1): received packet from 172.16.172.69 (I) MM_KEY_EXCH
2d21h: ISAKMP (0:1): Input = IKE_MSG_FROM_PEER, IKE_MM_EXCH
Old State = IKE_I_MM5 New State = UNKNOWN

2d21h: ISAKMP (0:1): processing ID payload. message ID = 0
2d21h: ISAKMP (0:1): processing CERT payload. message ID = 0
2d21h: ISAKMP (0:1): processing a CT_X509_SIGNATURE cert
2d21h: CRYPTO_PKI: status = 0: crl check ignored
2d21h: CRYPTO_PKI: WARNING: Certificate, private key
or CRL was not found while selecting CRL

2d21h: CRYPTO_PKI: cert revocation status unknown.
2d21h: ISAKMP (0:1): cert approved with warning
2d21h: ISAKMP (0:1): processing SIG payload. message ID = 0
2d21h: ISAKMP (1): sa->peer.name = , sa->peer_id.id.id_fqdn.fqdn
= SJhub.sjtac.com
2d21h: ISAKMP:received payload type 14
2d21h: ISAKMP (0:1): processing keep alive: proposal=10/2 sec.,
actual=10/2 sec.
2d21h: ISAKMP (0:1): peer knows about the keepalive extension mechanism.
2d21h: ISAKMP (0:1): read keepalive extended attribute VPI: /0x2/0x4
2d21h: ISAKMP (0:1): peer keepalives capabilities: 0x1
2d21h: ISAKMP (0:1): SA has been authenticated with 172.16.172.69
2d21h: ISAKMP (0:1): Input = IKE_MSG_INTERNAL, IKE_PROCESS_MAIN_MODE
Old State = UNKNOWN New State = UNKNOWN

2d21h: ISAKMP (0:1): Input = IKE_MSG_INTERNAL, IKE_PROCESS_COMPLETE
Old State = UNKNOWN New State = IKE_P1_COMPLETE
```


2d21h: ISAKMP (0:1): beginning Quick Mode exchange, M-ID of -1644677681
2d21h: ISAKMP (0:1): sending packet to 172.16.172.69 (I) QM_IDLE
2d21h: ISAKMP (0:1): Node -1644677681, Input = IKE_MSG_INTERNAL, IKE_INIT_QM
Old State = IKE_QM_READY New State = IKE_QM_I_QM1

2d21h: ISAKMP (0:1): Input = IKE_MSG_INTERNAL, IKE_PHASE1_COMPLETE
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE

2d21h: ISAKMP (0:1): received packet from 172.16.172.69 (I) QM_IDLE
2d21h: ISAKMP (0:1): processing HASH payload. message ID = -1644677681

2d21h: ISAKMP (0:1): processing SA payload. message ID = -1644677681
2d21h: ISAKMP (0:1): Checking IPsec proposal 1
2d21h: ISAKMP: transform 1, ESP_DES
2d21h: ISAKMP: attributes in transform:
2d21h: ISAKMP: encaps is 1
2d21h: ISAKMP: SA life type in seconds
2d21h: ISAKMP: SA life duration (basic) of 3600
2d21h: ISAKMP: SA life type in kilobytes
2d21h: ISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0
2d21h: ISAKMP: authenticator is HMAC-MD5
2d21h: ISAKMP (0:1): atts are acceptable.
2d21h: IPSEC(validate_proposal_request): proposal part #1,
(key eng. msg.) dest= 172.16.172.69, src= 172.16.172.10,
dest_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
src_proxy= 10.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 0s and 0kb,
spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x4
2d21h: ISAKMP (0:1): processing NONCE payload. message ID = -1644677681
2d21h: ISAKMP (0:1): processing ID payload. message ID = -1644677681
2d21h: ISAKMP (0:1): processing ID payload. message ID = -1644677681
2d21h: ISAKMP (0:1): Creating IPsec SAs
2d21h: inbound SA from 172.16.172.69 to 172.16.172.10
(proxy 20.1.1.0 to 10.1.1.0)
2d21h: has spi 0xE8559075 and conn_id 2029 and flags 4
2d21h: lifetime of 3600 seconds
2d21h: lifetime of 4608000 kilobytes
2d21h: outbound SA from 172.16.172.10 to 172.16.172.69
(proxy 10.1.1.0 to 20.1.1.0)
2d21h: has spi -889328648 and conn_id 2030 and flags 4
2d21h: lifetime of 3600 seconds
2d21h: lifetime of 4608000 kilobytes
2d21h: IPSEC(key_engine): got a queue event...
2d21h: IPSEC(initialize_sas): ,
(key eng. msg.) dest= 172.16.172.10, src= 172.16.172.69,
dest_proxy= 10.1.1.0/255.255.255.0/0/0 (type=4),
src_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 3600s and 4608000kb,
spi= 0xE8559075(3897921653), conn_id= 2029, keysize= 0, flags= 0x4
2d21h: IPSEC(initialize_sas): ,
(key eng. msg.) src= 172.16.172.10, dest= 172.16.172.69,
src_proxy= 10.1.1.0/255.255.255.0/0/0 (type=4),
dest_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 3600s and 4608000kb,
spi= 0xCAFDEBF8(3405638648), conn_id= 2030, keysize= 0, flags= 0x4
2d21h: IPSEC(create_sa): sa created,
(sa) sa_dest= 172.16.172.10, sa_prot= 50,
sa_spi= 0xE8559075(3897921653),
sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2029
2d21h: IPSEC(create_sa): sa created,
(sa) sa_dest= 172.16.172.69, sa_prot= 50,
sa_spi= 0xCAFDEBF8(3405638648),
sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2030

```

2d21h: ISAKMP (0:1): sending packet to 172.16.172.69 (I) QM_IDLE
2d21h: ISAKMP (0:1): deleting node -1644677681 error FALSE reason ""
2d21h: ISAKMP (0:1): Node -1644677681, Input = IKE_MSG_FROM_PEER,
IKE_QM_EXCH
Old State = IKE_QM_I_QM1 New State = IKE_QM_PHASE2_COMPLETE

SJKPI#
2d22h: ISAKMP (0:1): received packet from 172.16.172.69 (I) QM_IDLE
2d22h: ISAKMP (0:1): processing HASH payload. message ID = -2115263482
2d22h: ISAKMP (0:1): processing NOTIFY ITS_ALIVE protocol 1
spi 0, message ID = -2115263482, sa = 6335D814
2d22h: ISAKMP (0:1): deleting node -2115263482 error
FALSE reason "informational (in) state 1"
2d22h: ISAKMP (0:1): Input = IKE_MSG_FROM_PEER, IKE_INFO_NOTIFY
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE

2d22h: ISAKMP (0:1): sending packet to 172.16.172.69 (I) QM_IDLE
2d22h: ISAKMP (0:1): purging node -1850875331
2d22h: ISAKMP (0:1): Input = IKE_MSG_FROM_PEER, IKE_MSG_KEEP_ALIVE

SJKPI#Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE

```

Debugs Collected on SJhub

```

SJhub#
00:07:26: ISAKMP (0:0): received packet from 172.16.172.10 (N) NEW SA
00:07:26: ISAKMP: local port 500, remote port 500
00:07:26: ISAKMP (0:3): Input = IKE_MSG_FROM_PEER, IKE_MM_EXCH
Old State = IKE_READY New State = IKE_R_MM1
00:07:26: ISAKMP (0:3): processing SA payload. message ID = 0
00:07:26: ISAKMP (0:3): Checking ISAKMP transform 1 against priority 1 policy
00:07:26: ISAKMP: encryption DES-CBC
00:07:26: ISAKMP: hash MD5
00:07:26: ISAKMP: default group 1
00:07:26: ISAKMP: auth RSA sig
00:07:26: ISAKMP: life type in seconds
00:07:26: ISAKMP: life duration (VPI) of 0x0 0x1 0x51 0x80
00:07:26: ISAKMP (0:3): atts are acceptable. Next payload is 3
00:07:26: ISAKMP (0:3): Input = IKE_MSG_INTERNAL, IKE_PROCESS_MAIN_MODE
Old State = IKE_R_MM1 New State = IKE_R_MM1

00:07:26: ISAKMP (0:3): SA is doing RSA signature authentication
using id type ID_FQDN
00:07:26: ISAKMP (0:3): sending packet to 172.16.172.10 (R) MM_SA_SETUP
00:07:26: ISAKMP (0:3): Input = IKE_MSG_INTERNAL, IKE_PROCESS_COMPLETE
Old State = IKE_R_MM1 New State = IKE_R_MM2

00:07:26: ISAKMP (0:3): received packet from 172.16.172.10 (R) MM_SA_SETUP
00:07:26: ISAKMP (0:3): Input = IKE_MSG_FROM_PEER, IKE_MM_EXCH
Old State = IKE_R_MM2 New State = IKE_R_MM3

00:07:26: ISAKMP (0:3): processing KE payload. message ID = 0
00:07:26: ISAKMP (0:3): processing NONCE payload. message ID = 0
00:07:26: ISAKMP (0:3): SKEYID state generated
00:07:26: ISAKMP (0:3): processing CERT_REQ payload. message ID = 0
00:07:26: ISAKMP (0:3): peer wants a CT_X509_SIGNATURE cert
00:07:26: ISAKMP (0:3): peer want cert issued by CN = SJKICA,
OU = SJKPI, O = SJTAC, L = SAN JOSE, ST = CA, C = US
00:07:26: ISAKMP (0:3): processing vendor id payload
00:07:26: ISAKMP (0:3): speaking to another IOS box!
00:07:26: ISAKMP (0:3): Input = IKE_MSG_INTERNAL, IKE_PROCESS_MAIN_MODE
Old State = IKE_R_MM3 New State = IKE_R_MM3

00:07:26: ISAKMP (0:3): sending packet to 172.16.172.10 (R) MM_KEY_EXCH
00:07:26: ISAKMP (0:3): Input = IKE_MSG_INTERNAL, IKE_PROCESS_COMPLETE
Old State = IKE_R_MM3 New State = IKE_R_MM4

```

00:07:26: ISAKMP (0:3): received packet from 172.16.172.10 (R) MM_KEY_EXCH
00:07:26: ISAKMP (0:3): Input = IKE_MESG_FROM_PEER, IKE_MM_EXCH
Old State = IKE_R_MM4 New State = IKE_R_MM5

00:07:26: ISAKMP (0:3): processing ID payload. message ID = 0
00:07:26: ISAKMP (0:3): processing CERT payload. message ID = 0
00:07:26: ISAKMP (0:3): processing a CT_X509_SIGNATURE cert
00:07:26: CRYPTO_PKI: status = 0: crl check ignored
00:07:26: CRYPTO_PKI: WARNING: Certificate, private key
or CRL was not found while selecting CRL

00:07:26: CRYPTO_PKI: cert revocation status unknown.
00:07:26: ISAKMP (0:3): cert approved with warning
00:07:26: ISAKMP (0:3): processing SIG payload. message ID = 0
00:07:26: ISAKMP (3): sa->peer.name = , sa->peer_id.id.id_fqdn.fqdn
= SJPKI.sjtac
00:07:26: ISAKMP:received payload type 14
00:07:26: ISAKMP (0:3): processing keep alive: proposal=10/2 sec.,
actual=10/2 sec.
00:07:26: ISAKMP (0:3): peer knows about the keepalive extension mechanism.
00:07:26: ISAKMP (0:3): read keepalive extended attribute VPI: /0x2/0x4
00:07:26: ISAKMP (0:3): peer keepalives capabilities: 0x1
00:07:26: ISAKMP (0:3): SA has been authenticated with 172.16.172.10
00:07:26: ISAKMP (0:3): Input = IKE_MESG_INTERNAL, IKE_PROCESS_MAIN_MODE
Old State = IKE_R_MM5 New State = IKE_R_MM5

00:07:26: ISAKMP (3): ID payload
next-payload : 6
type : 2
protocol : 17
port : 500
length : 19
00:07:26: ISAKMP (3): Total payload length: 23
00:07:26: ISAKMP: growing send buffer from 1024 to 3072
00:07:26: ISAKMP (0:3): sending packet to 172.16.172.10 (R) QM_IDLE
00:07:26: ISAKMP (0:3): Input = IKE_MESG_INTERNAL, IKE_PROCESS_COMPLETE
Old State = IKE_R_MM5 New State = IKE_P1_COMPLETE

00:07:26: ISAKMP (0:3): received packet from 172.16.172.10 (R) QM_IDLE
00:07:26: ISAKMP (0:3): processing HASH payload. message ID = -1644677681
00:07:26: ISAKMP (0:3): processing SA payload. message ID = -1644677681
00:07:26: ISAKMP (0:3): Checking IPsec proposal 1
00:07:26: ISAKMP: transform 1, ESP_DES
00:07:26: ISAKMP: attributes in transform:
00:07:26: ISAKMP: encaps is 1
00:07:26: ISAKMP: SA life type in seconds
00:07:26: ISAKMP: SA life duration (basic) of 3600
00:07:26: ISAKMP: SA life type in kilobytes
00:07:26: ISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0
00:07:26: ISAKMP: authenticator is HMAC-MD5
00:07:26: ISAKMP (0:3): atts are acceptable.
00:07:26: IPSEC(validate_proposal_request): proposal part #1,
(key eng. msg.) dest= 172.16.172.69, src= 172.16.172.10,
dest_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
src_proxy= 10.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 0s and 0kb,
spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x4
00:07:26: ISAKMP (0:3): processing NONCE payload. message ID = -1644677681
00:07:26: ISAKMP (0:3): processing ID payload. message ID = -1644677681
00:07:26: ISAKMP (3): ID_IPV4_ADDR_SUBNET src 10.1.1.0/255.255.255.0
prot 0 port 0
00:07:26: ISAKMP (0:3): processing ID payload. message ID = -1644677681
00:07:26: ISAKMP (3): ID_IPV4_ADDR_SUBNET dst 20.1.1.0/255.255.255.0
prot 0 port 0

```
00:07:26: ISAKMP (0:3): asking for 1 spis from ipsec
00:07:26: ISAKMP (0:3): Node -1644677681,
    Input = IKE_MSG_FROM_PEER, IKE_QM_EXCH
Old State = IKE_QM_READY New State = IKE_QM_SPI_STARVE

00:07:26: IPSEC(key_engine): got a queue event...
00:07:26: IPSEC(spi_response): getting spi 3405638648 for SA
from 172.16.172.10 to 172.16.172.69 for prot 3
00:07:26: ISAKMP: received ke message (2/1)
00:07:27: ISAKMP (0:3): sending packet to 172.16.172.10 (R) QM_IDLE
00:07:27: ISAKMP (0:3): Node -1644677681, Input = IKE_MSG_FROM_IPSEC,
    IKE_SPI_REPLY
Old State = IKE_QM_SPI_STARVE New State = IKE_QM_R_QM2

00:07:27: ISAKMP (0:3): received packet from 172.16.172.10 (R) QM_IDLE
00:07:27: ISAKMP (0:3): Creating IPsec SAs
00:07:27: inbound SA from 172.16.172.10 to 172.16.172.69
(proxy 10.1.1.0 to 20.1.1.0)
00:07:27: has spi 0xCAFDEBF8 and conn_id 2002 and flags 4
00:07:27: lifetime of 3600 seconds
00:07:27: lifetime of 4608000 kilobytes
00:07:27: outbound SA from 172.16.172.69 to 172.16.172.10
(proxy 20.1.1.0 to 10.1.1.0 )
00:07:27: has spi -397045643 and conn_id 2003 and flags 4
00:07:27: lifetime of 3600 seconds
00:07:27: lifetime of 4608000 kilobytes
00:07:27: ISAKMP (0:3): deleting node -1644677681 error
    FALSE reason "quick done (await())"
00:07:27: ISAKMP (0:3): Node -1644677681, Input = IKE_MSG_FROM_PEER,
    IKE_QM_EXCH
Old State = IKE_QM_R_QM2 New State = IKE_QM_PHASE2_COMPLETE

00:07:27: IPSEC(key_engine): got a queue event...
00:07:27: IPSEC(initialize_sas): ,
(key eng. msg.) dest= 172.16.172.69, src= 172.16.172.10,
dest_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
src_proxy= 10.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 3600s and 4608000kb,
spi= 0xCAFDEBF8(3405638648), conn_id= 2002, keysize= 0, flags= 0x4
00:07:27: IPSEC(initialize_sas): ,
(key eng. msg.) src= 172.16.172.69, dest= 172.16.172.10,
src_proxy= 20.1.1.0/255.255.255.0/0/0 (type=4),
dest_proxy= 10.1.1.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac ,
lifedur= 3600s and 4608000kb,
spi= 0xE8559075(3897921653), conn_id= 2003, keysize= 0, flags= 0x4
00:07:27: IPSEC(create_sa): sa created,
(sa) sa_dest= 172.16.172.69, sa_prot= 50,
sa_spi= 0xCAFDEBF8(3405638648),
sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2002
00:07:27: IPSEC(create_sa): sa created,
(sa) sa_dest= 172.16.172.10, sa_prot= 50,
sa_spi= 0xE8559075(3897921653),
sa_trans= esp-des esp-md5-hmac , sa_conn_id= 2003
00:07:30: ISAKMP (0:2): sending packet to 172.16.172.52 (R) QM_IDLE
00:07:30: ISAKMP (0:2): purging node -652282805
00:07:30: ISAKMP (0:2): Input = IKE_MSG_FROM_TIMER, IKE_TIMER_IM_ALIVE
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE

00:07:30: ISAKMP (0:2): received packet from 172.16.172.52 (R) QM_IDLE
00:07:30: ISAKMP (0:2): processing HASH payload. message ID = 564680579
00:07:30: ISAKMP (0:2): processing NOTIFY ITS_ALIVE_ACK protocol 1
spi 0, message ID = 564680579, sa = 62DF5324
00:07:30: ISAKMP (0:2): peer 172.16.172.52 is alive!
00:07:30: ISAKMP (0:2): deleting node 564680579 error
```

```

FALSE reason "informational (in) state 1"
00:07:30: ISAKMP (0:2): Input = IKE_MESG_FROM_PEER, IKE_INFO_NOTIFY
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE

00:07:32: ISAKMP (0:2): purging node 1414513005
00:07:36: ISAKMP (0:3): sending packet to 172.16.172.10 (R) QM_IDLE
00:07:36: ISAKMP (0:3): purging node -2115263482
00:07:36: ISAKMP (0:3): Input = IKE_MESG_FROM_TIMER, IKE_TIMER_IM_ALIVE
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE

00:07:36: ISAKMP (0:3): received packet from 172.16.172.10 (R) QM_IDLE
00:07:36: ISAKMP (0:3): processing HASH payload. message ID = -1850875331
00:07:36: ISAKMP (0:3): processing NOTIFY ITS_ALIVE_ACK protocol 1
spi 0, message ID = -1850875331, sa = 63338630
00:07:36: ISAKMP (0:3): peer 172.16.172.10 is alive!
00:07:36: ISAKMP (0:3): deleting node -1850875331 error
FALSE reason "informational (in) state 1"
00:07:36: ISAKMP (0:3): Input = IKE_MESG_FROM_PEER, IKE_INFO_NOTIFY
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE

00:07:40: ISAKMP (0:2): received packet from 172.16.172.52 (R) QM_IDLE
00:07:40: ISAKMP (0:2): processing HASH payload. message ID = 2075099983
00:07:40: ISAKMP (0:2): processing NOTIFY ITS_ALIVE protocol 1
spi 0, message ID = 2075099983, sa = 62DF5324
00:07:40: ISAKMP (0:2): deleting node 2075099983 error
FALSE reason "informational (in) state 1"
00:07:40: ISAKMP (0:2): Input = IKE_MESG_FROM_PEER, IKE_INFO_NOTIFY
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE

00:07:40: ISAKMP (0:2): sending packet to 172.16.172.52 (R) QM_IDLE
00:07:40: ISAKMP (0:2): purging node 1356214450
00:07:40: ISAKMP (0:2): Input = IKE_MESG_FROM_PEER, IKE_MESG_KEEP_ALIVE
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE

```

show Command Output

You can use **show crypto ipsec sa** command to verify the ISAKMP and IPsec security associations on the routers after the tunnels are successfully negotiated. Sample output is shown below.

```

SJhub#show crypto isakmp sa
dst src state conn-id slot
172.16.172.69 172.16.172.10 QM_IDLE 3 0
172.16.172.69 172.16.172.52 QM_IDLE 2 0

SJhub#show crypto ipsec sa

interface: Ethernet4/0
Crypto map tag: vpn, local addr. 172.16.172.69

local ident (addr/mask/prot/port): (20.1.1.0/255.255.255.0/0/0)
remote ident (addr/mask/prot/port): (10.1.1.0/255.255.255.0/0/0)
current_peer: 172.16.172.10
PERMIT, flags={origin_is_acl,}
#pkts encaps: 4, #pkts encrypt: 4, #pkts digest 4
#pkts decaps: 4, #pkts decrypt: 4, #pkts verify 4
#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.: 172.16.172.69, remote crypto endpt.: 172.16.172.10
path mtu 1500, media mtu 1500
current outbound spi: E8559075

inbound esp sas:

```

spi: 0xCAFDEBF8(3405638648)
transform: esp-des esp-md5-hmac ,
in use settings ={Tunnel, }
slot: 0, conn id: 2002, flow_id: 3, crypto map: vpn
sa timing: remaining key lifetime (k/sec): (4607998/3434)
IV size: 8 bytes
replay detection support: Y

inbound ah sas:

inbound pcp sas:

outbound esp sas:
spi: 0xE8559075(3897921653)
transform: esp-des esp-md5-hmac ,
in use settings ={Tunnel, }
slot: 0, conn id: 2003, flow_id: 4, crypto map: vpn
sa timing: remaining key lifetime (k/sec): (4607999/3434)
IV size: 8 bytes
replay detection support: Y

outbound ah sas:

outbound pcp sas:

local ident (addr/mask/prot/port): (20.1.1.0/255.255.255.0/0/0)
remote ident (addr/mask/prot/port): (50.1.1.0/255.255.255.0/0/0)
current_peer: 172.16.172.52
PERMIT, flags={origin_is_acl,}
#pkts encaps: 2, #pkts encrypt: 2, #pkts digest 2
#pkts decaps: 2, #pkts decrypt: 2, #pkts verify 2
#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.: 172.16.172.69, remote crypto endpt.: 172.16.172.52
path mtu 1500, media mtu 1500
current outbound spi: FA8261EB

inbound esp sas:
spi: 0xC526D02(206728450)
transform: esp-des esp-md5-hmac ,
in use settings ={Tunnel, }
slot: 0, conn id: 2000, flow_id: 1, crypto map: vpn
sa timing: remaining key lifetime (k/sec): (4607999/3108)
IV size: 8 bytes
replay detection support: Y

inbound ah sas:

inbound pcp sas:

outbound esp sas:
spi: 0xFA8261EB(4202848747)
transform: esp-des esp-md5-hmac ,
in use settings ={Tunnel, }
slot: 0, conn id: 2001, flow_id: 2, crypto map: vpn
sa timing: remaining key lifetime (k/sec): (4607999/3108)
IV size: 8 bytes
replay detection support: Y

outbound ah sas:

outbound pcp sas:

```
SJVPN#show crypto isakmp sa
dst src state conn-id slot
172.16.172.69 172.16.172.52 QM_IDLE 2 0
```

```
SJVPN#show crypto ipsec sa
```

```
interface: Ethernet1/0
```

```
Crypto map tag: vpn, local addr. 172.16.172.52
```

```
local ident (addr/mask/prot/port): (50.1.1.0/255.255.255.0/0/0)
remote ident (addr/mask/prot/port): (20.1.1.0/255.255.255.0/0/0)
current_peer: 172.16.172.69
PERMIT, flags={origin_is_acl,}
#pkts encaps: 2, #pkts encrypt: 2, #pkts digest 2
#pkts decaps: 2, #pkts decrypt: 2, #pkts verify 2
#pkts compressed: 0, #pkts decompressed: 0
#pkts not compressed: 0, #pkts compr. failed: 0, #pkts decompress failed: 0
#send errors 3, #recv errors 0
```

```
local crypto endpt.: 172.16.172.52, remote crypto endpt.: 172.16.172.69
path mtu 1500, media mtu 1500
current outbound spi: C526D02
```

```
inbound esp sas:
```

```
spi: 0xFA8261EB(4202848747)
transform: esp-des esp-md5-hmac ,
in use settings ={Tunnel, }
slot: 0, conn id: 2029, flow_id: 1, crypto map: vpn
sa timing: remaining key lifetime (k/sec): (4607999/3398)
IV size: 8 bytes
replay detection support: Y
```

```
inbound ah sas:
```

```
inbound pcp sas:
```

```
outbound esp sas:
```

```
spi: 0xC526D02(206728450)
transform: esp-des esp-md5-hmac ,
in use settings ={Tunnel, }
slot: 0, conn id: 2030, flow_id: 2, crypto map: vpn
sa timing: remaining key lifetime (k/sec): (4607999/3389)
IV size: 8 bytes
replay detection support: Y
```

```
outbound ah sas:
```

```
outbound pcp sas:
```

```
SJPKI#show crypto isa sa
dst src state conn-id slot
172.16.172.69 172.16.172.10 QM_IDLE 1 0
```

```
SJPKI#show crypto ipsec sa
```

```
interface: Ethernet1/0
```

```
Crypto map tag: vpn, local addr. 172.16.172.10
```

```
local ident (addr/mask/prot/port): (10.1.1.0/255.255.255.0/0/0)
remote ident (addr/mask/prot/port): (20.1.1.0/255.255.255.0/0/0)
current_peer: 172.16.172.69
PERMIT, flags={origin_is_acl,}
#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 3, #recv errors 0
```

```
local crypto endpt.: 172.16.172.10, remote crypto endpt.: 172.16.172.69
path mtu 1500, media mtu 1500
current outbound spi: CAFDEBF8
```

```
inbound esp sas:
spi: 0xE8559075(3897921653)
transform: esp-des esp-md5-hmac ,
in use settings ={Tunnel, }
slot: 0, conn id: 2029, flow_id: 1, crypto map: vpn
sa timing: remaining key lifetime (k/sec): (4607998/3308)
IV size: 8 bytes
replay detection support: Y
```

```
inbound ah sas:
```

```
inbound pcg sas:
```

```
outbound esp sas:
spi: 0xCAFDEBF8(3405638648)
transform: esp-des esp-md5-hmac ,
in use settings ={Tunnel, }
slot: 0, conn id: 2030, flow_id: 2, crypto map: vpn
sa timing: remaining key lifetime (k/sec): (4607999/3308)
IV size: 8 bytes
replay detection support: Y
```

```
outbound ah sas:
```

```
outbound pcg sas:
```

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