

在 Cisco IOS 路由器上配置多重身份的证书授权机构

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简介

本文档介绍如何配置Cisco IOS®路由器以支持多身份证书颁发机构(CA)。在某些情况下(例如两家公司或两个业务部门之间的联合项目),两端的路由器(注册到不具有任何信任关系的不同CA)需要使用IPSec VPN进行通信。边缘路由器可能需要两组身份证书才能与两个CA域上的路由器通信。本文档介绍如何将思科路由器注册到不同的CA服务器以获取多个身份证书;使用一个简单的示例提供验证。

先决条件

要求

该功能在Cisco IOS®软件版本12.2(2)T中引入。早期版本的软件将无法使用本文档中所示的配置。

使用的组件

本文档中的信息基于以下软件和硬件版本:

- 带Cisco IOS软件版本12.2(4)T1的Cisco 7200路由器
- Windows 2000服务器上的Microsoft CA服务器

- 在Windows NT服务器上委托CA服务器

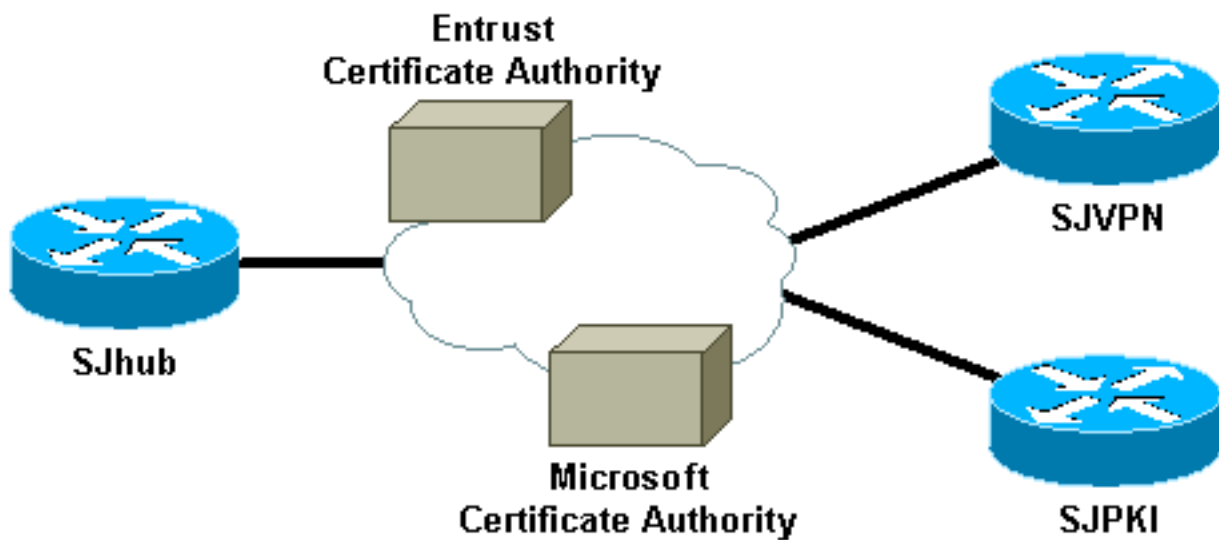
本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

规则

有关文档规则的详细信息，请参阅 [Cisco 技术提示规则](#)。

网络图

在下图中，SJhub、SJVPN和SJPKI是三台连接到主干网络的Cisco 7200路由器。SJhub是中心路由器，其中包含来自Entrust CA和Microsoft CA服务器的多身份证书，这些证书驻留在主干网络中。SJVPN注册到Entrust CA服务器，SJPKI注册到Microsoft CA服务器。



配置 Cisco IOS 路由器以获得多份证书

本部分提供有关如何配置本文档所述功能的信息。

注：要查找有关本文档中使用的命令的其他信息，请使用命令[查找工具](#)([仅注册客户](#))。

注意：出于间距考虑，以下步骤中显示的部分输出已换行到多行。

1. 在路由器上生成RSA密钥。

```
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. 在路由器上定义第一个加密CA标识。此处使用的服务器是Entrust CA服务器。

```
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. 获取CA和注册机构(RA)证书，并将路由器注册到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. 验证证书。

```
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. 定义路由器上第二个CA的加密CA标识。此处使用Microsoft CA服务器。

```
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. 从Microsoft CA服务器获取CA和RA证书。

```
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. 注册到Microsoft CA服务器并获取路由器的身份证书。

```
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. 验证证书。您应看到两组证书。

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=sjvpnmspki,CN=CDP,CN=Public%20Key%20Services,
CN=Services,CN=Configuration,DC=sjpk,
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=sjvpnmspki,CN=CDP,CN=Public%20Key%20Services,
CN=Services,CN=Configuration,DC=sjpk,
DC=com?certificateRevocationList?base?
objectclass=cRLDistributionPoint

Validity Date:
start date: 01:59:27 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 = SJPKICA
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=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: 01:59:28 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 = SJPKICA
OU = SJPKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US

Subject:

CN = SJPKICA
OU = SJPKI
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: 01:51:39 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
```

验证

本节使用简单设置来验证IOS路由器如何处理多个身份证书。上面的网络图显示了三台7200路由器，形成了一个中心辐射型拓扑。中心路由器(SJhub)有两个身份证书 — 一个来自Entrust CA服务器，另一个来自Microsoft CA服务器。分支路由器(SJVPN)具有来自同一Entrust CA服务器的一个身份证书，而另一个分支路由器(SJPKI)具有来自同一Microsoft CA服务器的一个身份证书。在本例中，中心路由器在一个联合项目中模拟两家公司的连接点；借助多身份CA支持，即使辐条注册到不同CA，集线器也能与任一端通信。

配置示例

下面列出了所有路由器的配置作为参考。

- [SJhub](#)
- [SJVPN](#)
- [SJPKI](#)

SJhub (集线器路由器)

```
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
C0EFFF2F 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
BC95EAFF 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
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 1305534A 54414331 0E300C06 0355040B 1305534A 504B4931
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 1307534A 504B4943 41301E17 0D303230 31313331 38333632
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 434E3D43 6F6E6669 67757261 74696F6E 2C44433D 736A706B
692C4443 3D636F6D
 3F636572 74696669 63617465 5265766F 63617469 6F6E4C69
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6365732C 434E3D43 6F6E6669 67757261 74696F6E 2C44433D
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6173733D 63657274 69666963 6174696F 6E417574 686F7269
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0B300906 03550408
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0A130553 4A544143 310E300C 06035504 0B130553 4A504B49
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quit
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0B300906 03550408
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0E300C06 0355040A
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1307534A 504B4943 41301E17 0D303230 31313130 31353932
385A170D 30343031
31313031 35393238 5A305F31 0B300906 03550406 13025553
310B3009 06035504
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0A130553 4A544143 310E300C 06035504 0B130553 4A504B49
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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 (分支路由器注册到Entrust CA服务器)

```
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
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1305736A 76706E31
0D300B06 03550403 13044352 4C31302B 0603551D 10042430
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36313932 32303234 305A810F 32303231 30363139 32323332
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1D0F0404 03020106 301F0603 551D2304 18301680 1446C160
9CDBEA53 EE80A480
601A9658 3B0DF80D 2F301D06 03551D0E 04160414 46C1609C
DBEA53EE 80A48060
1A96583B 0DF80D2F 300C0603 551D1304 05300301 01FF301D
06092A86 4886F67D
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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
C0EFFF2F 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
BC95EAFB 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
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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 (分支路由器注册到Microsoft CA服务器)

```
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 FBCAF6F6
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
09AD6911 B0F87B73 06A2ECAE 24853CA4 DBB12A9E 30819806
03551D23 04819030
818D8014 2315574F 05405281 E113C7E8 6D83CBF2 33B71CB1
A163A461 305F310B
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
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 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


```
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 = SJPKICA
    OU = SJPKI
    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=sjvpmnsjki,CN=CDP,CN=Public%20Key%20Services,CN=Services,CN=Configuration,DC=sjki,DC=com?

certificateRevocationList?base?objectclass=cRLDistributi
onPoint

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=sjvpmnsjki,CN=CDP,CN=Public%20Key%20Services,CN=Services,CN=Configuration,DC=sjki,DC=com?

certificateRevocationList?base?objectclass=cRLDistributi
onPoint

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 = SJPKI
O = SJTAC
L = SAN JOSE
ST = CA
C = US
CRL Distribution Point:

ldap:///CN=SJPKICA,CN=svpnmspki,CN=CDP,CN=Public%20Key%
20Services,
CN=Services,CN=Configuration,DC=sjpki,DC=com?

certificateRevocationList?base?objectclass=cRLDistributi
onPoint
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: 0961EAC4000000000000A
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=svpnmspki,CN=CDP,CN=Public%20Key%
20Services,
CN=Services,CN=Configuration,DC=sjpki,DC=com?

certificateRevocationList?base?objectclass=cRLDistributi
onPoint
Validity Date:
  start date: 20:59:17 UTC Jan 11 2002
  end   date: 20:59:17 UTC Jan 11 2004
Associated Identity: MicrosoftPKI
```

故障排除

故障排除命令

您可以使用一些与IPSec相关的IOS调试命令来查看互联网密钥交换(IKE)协商如何与多个身份证书配合使用。

[命令输出解释程序工具 \(仅限注册用户 \) 支持某些 show 命令](#)，使用此工具可以查看对 show 命令输出的分析。

注意：在发出debug命令之前，请[参阅有关Debug命令的重要信息](#)。

- debug crypto isakmp — 显示关于 IKE 事件的消息。
- debug crypto ipsec — 显示 IPSec 事件。

- **debug crypto pki transaction** — 显示CA和路由器之间交互（消息类型）跟踪的调试消息。
- **debug crypto pki message** — 显示调试消息，了解CA和路由器之间交互（消息转储）的详细信息。

[来自 Entrust CA Server 的证书](#)

在SJVPN和SJhub上收集了以下调试。通常，SJVPN会尝试发起到中心路由器SJhub的IPSec隧道。SJhub为其支持的每个CA域发送CERT_REQ负载。每个CERT_REQ负载都包含证书颁发者的可分辨名称(DN)。然后，SJVPN尝试映射CERT_REQ中的DN，并将自己的证书发送到SJhub。

在以下示例中，SJhub路由器根据SJVPN路由器发送的CERT_REQ发送其证书。使用Entrust CA服务器的证书。

- [在SJVPN上收集的调试](#)
- [在SJhub上收集的调试](#)
- [路由器上的证书撤销列表\(CRL\)缓存](#)

[在SJVPN上收集的调试](#)

```
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
```

.ld 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 = SJPKICA,
OU = SJPKI, 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 = sjvnpn,
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_MSG_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_MSG_FROM_PEER, IKE_MSG_KEEP_ALIVE
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE
```

[在SJhub上收集的调试](#)

```
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_MSG_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_MSG_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_MSG_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_MSG_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_MSG_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_MSG_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_MSG_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
```

[路由器上的证书撤销列表\(CRL\)缓存](#)

```
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
```

[来自 Microsoft CA Server 的证书](#)

在IKE协商期间，在SJPKI和SJhub上收集了以下调试。在SJPKI检查第一个CERT_REQ负载后，它已在其数据库中找到匹配的证书，因此它不继续查看第二个CERT_REQ负载。在这种情况下，来自Microsoft CA服务器的证书用于IKE身份验证。

- [在SJPKI上收集的调试](#)
- [在SJhub上收集的调试](#)

[在SJPKI上收集的调试](#)

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 = SJKICA,
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: ISKAMP: 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

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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

SJPKI#
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

SJPKI#Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE
在SJhub上收集的调试

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_MESG_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_MESG_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_MESG_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_MESG_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_MESG_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_MESG_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
= SJKPI.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_MSG_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 mode done (await())"
00:07:27: ISAKMP (0:3): Node -1644677681, Input = IKE_MESG_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_MESG_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_MSG_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_MSG_FROM_PEER, IKE_MSG_KEEP_ALIVE
Old State = IKE_P1_COMPLETE New State = IKE_P1_COMPLETE
```

[show 命令输出](#)

成功协商隧道后，您可以使用**show crypto ipsec sa**命令验证路由器上的ISAKMP和IPSec安全关联。输出示例如下所示。

```
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 pcg 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 pcg 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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