

Настройка на маршрутизаторах Cisco IOS центров сертификации с множественной идентификацией

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Введение

Этот документ описывает, как настроить маршрутизаторы Cisco IOS® для поддержки центров сертификации со множественной идентификацией (CA). В некоторых ситуациях, таких как совместный проект между двумя компаниями или двумя служебными подразделениями, маршрутизаторы на каждой стороне (которые регистрируются к другим CAs, которые не имеют никаких доверительных отношений) должны передать IPSEC VPN использования. Краевой маршрутизатор, возможно, должен был бы иметь два набора сертификатов идентификации для передачи с маршрутизаторами на обоих доменах CA. Этот документ описывает, объясняет, как зарегистрировать маршрутизатор Cisco к другим серверам CA для получения множественных сертификатов идентификации; проверка предоставлена с помощью простого примера.

Предварительные условия

Требования

Функция представлена в релизе 12.2 программного обеспечения Cisco IOS (2) T. Более ранние версии программного обеспечения не будут в состоянии использовать

конфигурацию, показанную в этом документе.

Используемые компоненты

Сведения, содержащиеся в данном документе, касаются следующих версий программного обеспечения и оборудования:

- Маршрутизаторы Cisco 7200 с программным обеспечением Cisco IOS версии 12.2(4)T1
- Microsoft CA server на Сервере Windows 2000
- Наделите полномочиями сервер CA на Сервере Windows NT Server

Сведения, представленные в этом документе, были получены от устройств, работающих в специальной лабораторной среде. Все устройства, описанные в этом документе, были запущены с чистой (стандартной) конфигурацией. В рабочей сети необходимо изучить потенциальное воздействие всех команд до их использования.

Условные обозначения

[Дополнительные сведения об условных обозначениях в документах см. Cisco Technical Tips Conventions.](#)

Схема сети

В схеме, показанной ниже, SJhub, SJVPN и SJPKI являются три Маршрутизатора Cisco 7200, подключающие до мозга костей сеть. SJhub является маршрутизатором концентратора со множественными сертификатами идентификации от Поручать CA и Microsoft CA server, которые находятся в магистральной сети. SJVPN регистрируется к Поручать серверу CA, и SJPKI регистрируется к Microsoft CA server.

Настройка маршрутизатора Cisco IOS на получение нескольких сертификатов

В этом разделе содержатся сведения о настройке функций, описанных в этом документе.

Примечание: [Поиск дополнительной информации о командах в данном документе можно выполнить с помощью средства "Command Lookup" \(Поиск команд\) \(только для зарегистрированных клиентов\).](#)

Примечание: Некоторые выходные данные, показанные в процедуре ниже, были обернуты к составным строкам для ограничений пространства.

1. Генерируйте RSA, включает маршрутизатор.

```
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. Определите первого crypto CA identity на маршрутизаторе. Сервер, используемый здесь, является Поручать сервером CA.

```
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. Получите СА и сертификаты центра регистрации (RA) и зарегистрируйте

маршрутизатор к Поручать СА.
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. Проверьте сертификаты.
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 2001 Associated Identity: EntrustPKI

5. Определите crypto CA identity второго СА на маршрутизаторе. Microsoft CA server

используется здесь.
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. Получите СА и сертификаты RA от 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. Зарегистрируйтесь к Microsoft CA server и получите сертификат идентификации

маршрутизатора.
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. Проверьте сертификаты. Необходимо видеть два набора сертификатов.
SJhub#**show crypto ca certificates** Certificate Status: Available Certificate Serial Number: 132BD14C000000000000B Key Usage: General Purpose Issuer: CN = SJPKICA OU = SJPKI O = SJTAC L = SAN JOSE ST = CA C = US Subject Name Contains: Name: SJhub.sjtac.com CRL Distribution Point: ldap:///CN=SJPKICA,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: 054E60AD0000000000002 Key Usage: Signature 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=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 = 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=sjvpmspki,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 = 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=sjvpmspki,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
```

Проверка

Этот раздел использует простую установку, чтобы проверить, как маршрутизаторы IOS обрабатывают множественные сертификаты идентификации. Схема сети выше показывает три 7200 маршрутизаторов, формирующих топологию звезды. Маршрутизатор концентратора (SJhub) имеет два сертификата идентификации — один от Поручать сервера CA и один от Microsoft CA server. Маршрутизатор на конце луча (SJVPN) имеет один сертификат идентификации от того же, Наделяют полномочиями сервер CA, и другой маршрутизатор на конце луча (SJKI) имеет один сертификат идентификации от того же Microsoft CA server. В данном примере маршрутизатор концентратора моделирует связывающуюся точку двух компаний в совместном проекте; с помощью множественной идентичности CA поддерживают, концентратор в состоянии связаться с любой стороной даже при том, что лучи зарегистрированы к другому CAs.

Примеры конфигураций

Конфигурации всех маршрутизаторов упомянуты ниже как ссылка.

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

SJhub (маршрутизатор концентратора)

```
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
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7F52AD9C	B596743A	853549C5	771DA2	quit	certificate
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300D69AE 399894E8 8DBFADFF AC8D9FEA 81755872 BE242CD9
231932FE 3B4D370C F7E4DD76 2DA6E0C1 B6BA26CA 9955858B
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711A7F54	FBCAFBF6	633FCEFA	AA9D9A8D	2C79550F	99314B3E
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03550403	1307534A	504B4943	41301E17	0D303230	31313130
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06035504	0A130553	4A544143	310E300C	06035504	0B130553
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706B692E 736A706B 692E636F 6D2F4365 7274456E 726F6C6C
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735977DF 7822B944 96A50106 722108F0 1A60EF86 EFEDA9ED
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 (маршрутизатор на конце луча зарегистрировался для Наделения полномочиями сервер CA),

```

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
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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	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 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 (маршрутизатор на конце луча зарегистрировался к 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	054E63CE00	0000000000	03	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
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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
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711A7F54 FBCAFBF6 633FCEFA AA9D9A8D 2C79550F 99314B3E
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03010001 A38202A2 3082029E 300B0603 551D0F04 04030207
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6F006C00 6C006D00 65006E00 74004100 67006500 6E007400
4F006600 66006C00 69006E00 65301D06 03551D0E 04160414
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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
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 = 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=sjvpnmospki,CN=CDP,CN=Public%20Key%
20Services,
CN=Services,CN=Configuration,DC=sjpki,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 =
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=sjvpnmospki,CN=CDP,CN=Public%20Key%
20Services,
CN=Services,CN=Configuration,DC=sjpki,DC=com?
certificateRevocationList?base?objectclass=cRLDistributi
onPoint Validity Date: start date: 01:59:28 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 =
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=sjvpnmospki,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: 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=sjvpnmospki,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

```

[Устранение неполадок](#)

[Команды для устранения неполадок](#)

Можно использовать некоторые СВЯЗАННЫЕ С IPSEC команды отладки IOS, чтобы видеть, как согласование Протокола IKE работает со множественными сертификатами идентификации.

Некоторые команды show поддерживаются Средством интерпретации выходных

данных(только зарегистрированные клиенты), которое позволяет просматривать аналитику выходных данных команды show.

Примечание: Прежде чем вызывать команды debug, обратитесь к разделу Важные сведения о командах отладки.

- **debug crypto isakmp** – отображает сообщения о событиях IKE.
- **debug crypto ipsec**– показывает события IPsec.
- **debug crypto pki transaction** — Отображает сообщения отладки для трассировки взаимодействия (тип сообщения) между CA и маршрутизатором.
- **debug crypto pki message** — Отображает сообщения отладки для подробных данных взаимодействия (дамп сообщений) между CA и маршрутизатором.

[Сертификаты от сервера Entrust CA](#)

Следующие отладки были собраны на SJVPN и SJhub. Как правило, SJVPN пытается инициировать Туннель IPsec к SJhub маршрутизатора концентратора. SJhub передает информационное наполнение CERT_REQ за каждым доменом CA, который он поддерживает. Каждое **информационное наполнение CERT_REQ** содержит составное имя (DN) отправителя сертификатов. SJVPN тогда пытается сопоставить DN в CERT_REQ и передать его собственные сертификаты к SJhub.

В примерах ниже, маршрутизатор SJhub передает свои сертификаты на основе CERT_REQ, передаваемого маршрутизатором SJVPN. Сертификаты от Поручать сервера CA используются.

- [Отладки, собранные на SJVPN](#)
- [Отладки, собранные на SJhub](#)
- [Список отозванных сертификатов \(CRL\), кэширующийся на маршрутизаторах](#)

[Отладки, собранные на 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
.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 = 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 = sjvnp, 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 SJVNP#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

Отладки, собранные на 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_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_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 = sjvnp, 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 00:02:21: 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.sjvnp.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_MESG_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_MESG_INTERNAL, IKE_PROCESS_COMPLETE Old State = IKE_R_MM5 New State = IKE_PI_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_MESG_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_MESG_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
```

[Список отозванных сертификатов \(CRL\), кэширующийся на маршрутизаторах](#)

```
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
```

[Сертификаты от Microsoft CA Server](#)

Следующие отладки были собраны на SJKI и SJhub во время IKe согласование. После того, как SJKI проверяет первое информационное наполнение CERT_REQ, он уже находит соответствующие сертификаты в своей базе данных, таким образом, он не продолжает изучать второе информационное наполнение CERT_REQ. В этом случае сертификаты от Microsoft CA server используются для аутентификации IKE.

- [Отладки, собранные на SJKI](#)
- [Отладки, собранные на SJhub](#)

[Отладки, собранные на 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
```

[Отладки, собранные на 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_MSG_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.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_MSG_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_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_MSG_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_MSG_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_MSG_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

```

Выходные данные команд show

Можно использовать команду **show crypto ipsec sa** для проверки ISAKMP и Сопоставлений безопасности IPSec на маршрутизаторах после того, как о туннелях успешно выполнят согласование. Ниже приводится пример выходных данных.

```

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 pcp 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 pcp sas:
```

[Дополнительные сведения](#)

- [Страницы поддержки продуктов с IP Security \(IPSec\)](#)
- [Техническая поддержка - Cisco Systems](#)