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[概要](#)

このドキュメントでは、デジタル証明書を使用して LAN-to-LAN IPSec を実装するように Cisco ルータおよび Cisco Secure PIX Firewall を設定する方法について説明します。この設定を行うには、次の作業を行う必要があります。

1. ルータおよび PIX を設定します。
2. ルータおよび PIX 上にデジタル証明書を取得します。
3. ルータおよび PIX 上に IKE および IPSec ポリシーを設定し、IPSec を使用して暗号化するトラフィック (対象トラフィック) をアクセス リストによって定義します。

[はじめに](#)

[表記法](#)

ドキュメント表記の詳細は、『[シスコ テクニカル ティップスの表記法](#)』を参照してください。

前提条件

このドキュメントに関する固有の要件はありません。

使用するコンポーネント

このドキュメントの情報は、次のソフトウェアとハードウェアのバージョンに基づくものです。

- Cisco 1700 ルータ
- Cisco IOS® ソフトウェア バージョン 12.2(6)
- Cisco PIX Firewall 520
- PIX Firewall バージョン 6.0.1

このドキュメントの情報は、特定のラボ環境にあるデバイスに基づいて作成されたものです。このドキュメントで使用するすべてのデバイスは、クリアな（デフォルト）設定で作業を開始しています。対象のネットワークが実稼働中である場合には、どのような作業についても、その潜在的な影響について確実に理解しておく必要があります。

背景理論

ここに示す例では、ホスト A のネットワーク アドレス（ソース アドレス）とホスト B のネットワーク アドレス（宛先アドレス）を、IPSec が PIX 上で暗号化するトラフィックとして定義します。ルータ上のアクセスリストは PIX 上のアクセスリストのミラー イメージです。

PIX およびルータの設定により、これら 2 つのデバイスの LAN 内部に存在するホストは、IPSec トンネルを通過する際にプライベート アドレスを使用します。PIX では、**access-list** および **nat 0** コマンドが連携して機能します。192.168.4.0 ネットワーク上のホスト A が 1.1.1.0 ネットワークにアクセスする際、アクセス リストによって、192.168.4.0 ネットワークのトラフィックをネットワーク アドレス変換（NAT）を行わずに暗号化できます。しかし、同じユーザが他の場所にアクセスするときは、ポート アドレス変換（PAT）によってアドレス 172.16.172.57 に変換されます。ルータでは、**route-map** および **access-list** コマンドにより、NAT を行わずに 1.1.1.0 ネットワークのトラフィックを暗号化できます。ただし、同じホスト B が他の場所にアクセスする場合、PAT によってアドレス 172.16.172.39 に変換されます。

設定をテストするために、PIX Firewall の背後にあるホスト A からルータの背後にあるホスト B に ping を送信します。IP パケットが PIX Firewall に到達したとき、アクセスリストに一致したため、IPSec ネゴシエーションが開始されます。したがって、IPSec ネゴシエーション中は、PIX が発信側でルータが応答側になります。トラブルシューティング目的で、PIX とルータの両方で暗号化のデバッグを検査する必要があります。

ネットワーク図

このドキュメントでは次の図に示すネットワーク



ルータおよび PIX Firewall の設定

設定

この項では、このドキュメントで説明する機能の設定に必要な情報を提供します。

- [ルータの設定例](#)
- [PIX の設定例](#)

ルータの設定例

```
1720-1#show running-configBuilding
configuration...Current configuration : 8694 bytes!!
Last configuration change at 20:17:48 PST Thu Jan 10
2002! NVRAM config last updated at 20:19:27 PST Thu Jan
10 2002!version 12.2no parser cacheservice timestamps
debug uptimeservice timestamps log uptimeno service
password-encryption!hostname 1720-1!no logging
bufferedenable secret 5
$1$6jAs$tNxIla/2DYFAtPLYCDXjo/enable password
ww!username cisco password 0 ciscousername allmemory-
size iomem 15clock timezone PST -8ip subnet-zero ip
domain-lookupip domain-name cisco.com!ip ssh time-out
120ip ssh authentication-retries 3!!!crypto ca identity
vpn enrollment retry count 20 enrollment mode ra
enrollment url http://171.69.89.16:80 query url
ldap://171.69.89.16crypto ca certificate chain vpn
certificate 3B2FD652 308202C4 3082022D A0030201 0202043B
2FD65230 0D06092A 864886F7 0D010105 0500302D 310B3009
06035504 06130275 73310E30 0C060355 040A1305 63697363
6F310E30 0C060355 040B1305 736A7670 6E301E17 0D303230
31313130 33303631 345A170D 30333031 31313033 33363134
5A304E31 0B300906 03550406 13027573 310E300C 06035504
0A130563 6973636F 310E300C 06035504 0B130573 6A76706E
311F301D 06092A86 4886F70D 01090216 10313732 302D312E
63697363 6F2E636F 6D305C30 0D06092A 864886F7 0D010101
0500034B 00304802 4100A085 B4A756F8 CEB91F2E 52E2A23F
847EC95F 44F65AF2 EBC1F816 081CC61F AB077482 F1FAD124
2444B9F6 6B9EC48E 1B1EB5B9 D0E802BA B9A57048 EBB8CD18
773F0203 010001A3 82011230 82010E30 0B060355 1D0F0404
030205A0 301B0603 551D1104 14301282 10313732 302D312E
63697363 6F2E636F 6D302B06 03551D10 04243022 800F3230
30323031 31313033 30363134 5A810F32 30303230 39323331
35333631 345A304F 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 160414B1 2707AB30 F7CFDC79 C554D1AE
3208EF16 CF96ED30 09060355 1D130402 30003019 06092A86
4886F67D 07410004 0C300A1B 0456352E 30030204 B0300D06
092A8648 86F70D01 01050500 03818100 E82DE82B AE5C7F80
EB9CED1A 306F36E6 437DA791 81D53CF3 0E561C8A 7A168EDE
6728F371 3EB90B21 CC40E1F3 CA4ED98F CDFA6E15 A2C0AA38
4AE137C7 281AA7EC AD26D550 4E4AAA0B E0C588F8 661C4031
ACF35F7B 28330B64 667E00E3 832AED7F 08D5EA3D 33CCB2BE
E73DC41A B40A9B64 4CD2D98C 6943AE84 55605741 E136A6BD
quit certificate ra-sign 3B2FD319 308202FF 30820268
A0030201 0202043B 2FD31930 0D06092A 864886F7 0D010105
0500302D 310B3009 06035504 06130275 73310E30 0C060355
```

040A1305 63697363 6F310E30 0C060355 040B1305 736A7670
6E301E17 0D303130 36313932 32303333 315A170D 30343036
31393232 33333331 5A304531 0B300906 03550406 13027573
310E300C 06035504 0A130563 6973636F 310E300C 06035504
0B130573 6A76706E 31163014 06035504 03130D46 69727374
204F6666 69636572 30819F30 0D06092A 864886F7 0D010101
05000381 8D003081 89028181 00E85434 395790E9 416ED13D
72F1A411 333A0984 66B8F68A 0ECA7E2B CBC40C39 A21E2D8A
5F94772D 69846720 73227891 E43D46B6 B2D1DDC5 385C5135
DB2075F1 4D252ACF AC80DA4C 2111946F 26F7193B 8EA1CA66
8332D2A1 5310B2D7 07C985A8 0B44CE37 BC95EAF7 C328D4C6
73B3B35E 0F6D25F5 DCAC6AFA 2DAAD6D1 47BB3396 E1020301
0001A382 01123082 010E300B 0603551D 0F040403 02078030
2B060355 1D100424 3022800F 32303031 30363139 32323033
33315A81 0F323030 33303732 37303233 3333315A 301B0603
551D0904 14301230 1006092A 864886F6 7D07441D 31030201
00304F06 03551D1F 04483046 3044A042 A040A43E 303C310B
30090603 55040613 02757331 0E300C06 0355040A 13056369
73636F31 0E300C06 0355040B 1305736A 76706E31 0D300B06
03550403 13044352 4C31301F 0603551D 23041830 16801446
C1609CDB EA53EE80 A480601A 96583B0D F80D2F30 1D060355
1D0E0416 04147BD2 620C611F 3AC69FB3 155FD8F9 8A7CF353
3A583009 0603551D 13040230 00301906 092A8648 86F67D07
4100040C 300A1B04 56352E30 030204B0 300D0609 2A864886
F70D0101 05050003 8181003A A6431D7D 1979DDF9 CC99D8F8
CC987F67 DBF67280 2A9418E9 C6255B08 DECDE1C2 50FCB1A6
544F1D51 C214162E E2403DAB 2F1294C4 841240ED FD6F799C
130A0B24 AC74DD74 C60EB5CD EC648631 E0B88B3F 3D19A2E1
6492958E 9F64746E 45C080AE E5A6C245 7827D7B1 380A6FE8
A01D9022 7F52AD9C B596743A 853549C5 771DA2 quit
certificate 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 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!crypto isakmp policy
10 hash md5crypto isakmp identity hostname!!crypto ipsec
transform-set myset esp-des esp-md5-hmac !!crypto map
vpn 10 ipsec-isakmp set peer 172.16.172.34 set
transform-set myset match address 130!!!!interface
Loopback0 ip address 10.10.10.1 255.255.255.0!
interface Loopback1 ip address 121.1.1.1
255.255.255.0!interface Loopback88 ip address
88.88.88.88 255.255.255.255!interface FastEthernet0 ip
address 172.16.172.39 255.255.255.240ip nat outside
speed auto crypto map vpn!interface Serial0ip nat inside
ip address 1.1.1.1 255.255.255.252!ip nat inside source
route-map nonat interface FastEthernet0 overloadip
classlessip route 0.0.0.0 0.0.0.0 172.16.172.33no ip
http serverip pim bidir-enable!access-list 120 deny ip
1.1.1.0 0.0.0.255 192.168.4.0 0.0.0.255 access-list 120
permit ip 1.1.1.0 0.0.0.255 anyaccess-list 130 permit ip
1.1.1.0 0.0.0.255 192.168.4.0 0.0.0.255 route-map nonat
permit 10 match ip address 120!line con 0line aux 0line
vty 0 4 exec-timeout 0 0 password cisco no login line
vty 5 15 login!no scheduler allocateend

```

PIX の設定例

```

pix520-1# write terminalBuilding configuration...:
Saved:PIX Version 6.0(1)nameif ethernet0 outside
security0nameif ethernet1 inside security100enable
password 2KFQnbNIdI.2KYOU encryptedpasswd
2KFQnbNIdI.2KYOU encryptedhostname pix520-1domain-name
vpn.comfixup protocol ftp 21fixup protocol http 80fixup
protocol h323 1720fixup protocol rsh 514fixup protocol
smtp 25fixup protocol sqlnet 1521fixup protocol sip
5060fixup protocol skinny 2000namesaccess-list 130
permit ip 192.168.4.0 255.255.255.0 1.1.1.0
255.255.255.0 access-list 140 permit ip 192.168.4.0

```

```
255.255.255.0 1.1.1.0 255.255.255.0 no pagerlogging
onlogging monitor debugginglogging buffered
debugginglogging trap debugginglogging history
debugginglogging host outside 192.168.2.6interface
ethernet0 autointerface ethernet1 automtu outside
1500mtu inside 1500ip address outside 172.16.172.34
255.255.255.240ip address inside 192.168.4.50
255.255.255.0ip audit info action alarmip audit attack
action alarmno failoverfailover timeout 0:00:00failover
poll 15failover ip address outside 0.0.0.0failover ip
address inside 0.0.0.0pdm history enablearp timeout
14400global (outside) 1 172.16.172.57 netmask
255.255.255.255nat (inside) 0 access-list 140nat
(inside) 1 0.0.0.0 0.0.0.0 0 0route outside 0.0.0.0
0.0.0.0 172.16.172.33 ltimeout xlate 3:00:00timeout conn
1:00:00 half-closed 0:10:00 udp 0:02:00 rpc 0:10:00 h323
0:05:00 sip 0:30:00 sip_media 0:02:00timeout uauth
0:05:00 absoluteaaa-server TACACS+ protocol tacacs+ aaa-
server RADIUS protocol radius aaa-server mytest protocol
tacacs+ aaa-server nasir protocol radius snmp-server
host outside 192.168.2.6no snmp-server locationno snmp-
server contactsnmp-server community publicsnmp-server
enable trapsfloodguard enablesysopt connection permit-
ipsecno sysopt route dnacrypto ipsec transform-set
myset esp-des esp-md5-hmac crypto map mymap 5 ipsec-
isakmpcrypto map mymap 5 match address 130crypto map
mymap 5 set peer 172.16.172.39 crypto map mymap 5 set
transform-set mysetcrypto map mymap interface
outsideisakmp enable outsideisakmp policy 10
authentication rsa-sigisakmp policy 10 encryption
desisakmp policy 10 hash md5isakmp policy 10 group
1isakmp policy 10 lifetime 86400ca identity cisco
171.69.89.16:/cgi-bin 171.69.89.16ca configure cisco ra
20 5 telnet 192.168.4.0 255.255.255.0 insidetelnet
171.69.89.82 255.255.255.255 insidetelnet 192.168.4.3
255.255.255.255 insidetelnet timeout 5ssh 172.0.0.0
255.0.0.0 outsidessh 171.0.0.0 255.255.255.0 outsidessh
171.0.0.0 255.0.0.0 outsidessh 171.0.0.0 255.0.0.0
insidessh timeout 60terminal width
80Cryptochecksum:c2d5976fc87875678356cf83b135bb8c:
end[OK]pix520-1#
```

証明書の取得

ルータでの証明書の取得

このセクションでは、ルータ側でデジタル証明書を取得する方法について説明します。

1. ルータのホスト名および IP ドメイン名をまだ設定していない場合、これらを設定します。

```
pix520-1# write terminalBuilding configuration...: Saved:PIX Version 6.0(1)nameif ethernet0
outside security0nameif ethernet1 inside security10enable password 2KFQnbNIdI.2KYOU
encryptedpasswd 2KFQnbNIdI.2KYOU encryptedhostname pix520-1domain-name vpn.comfixup
protocol ftp 21fixup protocol http 80fixup protocol h323 1720fixup protocol rsh 514fixup
protocol smtp 25fixup protocol sqlnet 1521fixup protocol sip 5060fixup protocol skinny
2000namesaccess-list 130 permit ip 192.168.4.0 255.255.255.0 1.1.1.0 255.255.255.0 access-
list 140 permit ip 192.168.4.0 255.255.255.0 1.1.1.0 255.255.255.0 no pagerlogging
onlogging monitor debugginglogging buffered debugginglogging trap debugginglogging history
debugginglogging host outside 192.168.2.6interface ethernet0 autointerface ethernet1
automtu outside 1500mtu inside 1500ip address outside 172.16.172.34 255.255.255.240ip
address inside 192.168.4.50 255.255.255.0ip audit info action alarmip audit attack action
```

```
alarmno failoverfailover timeout 0:00:00failover poll 15failover ip address outside
0.0.0.0failover ip address inside 0.0.0.0pdm history enablearp timeout 14400global
(outside) 1 172.16.172.57 netmask 255.255.255.255nat (inside) 0 access-list 140nat (inside)
1 0.0.0.0 0.0.0.0 0 0route outside 0.0.0.0 0.0.0.0 172.16.172.33 ltimeout xlate
3:00:00timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 rpc 0:10:00 h323 0:05:00 sip
0:30:00 sip_media 0:02:00timeout uauth 0:05:00 absoluteaaa-server TACACS+ protocol tacacs+
aaa-server RADIUS protocol radius aaa-server mytest protocol tacacs+ aaa-server nasir
protocol radius snmp-server host outside 192.168.2.6no snmp-server locationno snmp-server
contactsnmp-server community publicsnmp-server enable trapsfloodguard enablesysopt
connection permit-ipsecno sysopt route dnacrypto ipsec transform-set myset esp-des esp-
md5-hmac crypto map mymap 5 ipsec-isakmpcrypto map mymap 5 match address 130crypto map
mymap 5 set peer 172.16.172.39 crypto map mymap 5 set transform-set mysetcrypto map mymap
interface outsideisakmp enable outsideisakmp policy 10 authentication rsa-sigisakmp policy
10 encryption desisakmp policy 10 hash md5isakmp policy 10 group lisakmp policy 10 lifetime
86400ca identity cisco 171.69.89.16:/cgi-bin 171.69.89.16ca configure cisco ra 20 5 telnet
192.168.4.0 255.255.255.0 insidetelnet 171.69.89.82 255.255.255.255 insidetelnet
192.168.4.3 255.255.255.255 insidetelnet timeout 5ssh 172.0.0.0 255.0.0.0 outsidessh
171.0.0.0 255.255.255.0 outsidessh 171.0.0.0 255.0.0.0 outsidessh 171.0.0.0 255.0.0.0
insidessh timeout 60terminal width 80Cryptochecksum:c2d5976fc87875678356cf83b135bb8c:
```

end[OK]pix520-1# **注**ホスト名および IP ドメイン名が必要な理由は、ルータに割り当てられたホスト名および IP ドメイン名に基づいて、ルータは IPsec により使用されるキーおよび証明書に対して完全修飾ドメイン名 (FQDN) を割り当てるためです。たとえば、証明書の名前「router.cisco.com」は、ルータのホスト名「router」と、ルータの IP ドメイン名「cisco.com」に基づきます。

- ルータの RSA キー ペアを生成します。これは、IKE キー管理メッセージに署名して暗号化するために使用されます。ルータの証明書を取得するために、キー ペアを生成する必要があります。

```
1720-1(config)#crypto key generate rsa The name for the keys will be: 1720-
1.cisco.comChoose the size of the key modulus in the range of 360 to 2048 for yourGeneral
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]1720-1(config)#show crypto key mypubkey
rsa コマンドを使用して、ルータの RSA キー ペアを表示します。1720-1#sh cr key mypubkey
rsa % Key pair was generated at: 19:26:22 PST Jan 10 2002Key name: 1720-1.cisco.com Usage:
General Purpose Key Key Data: 305C300D 06092A86 4886F70D 01010105 00034B00 30480241
00A085B4 756F8CE B91F2E52 E2A23F84 7EC95F44 F65AF2EB C1F81608 1CC61FAB 077482F1 FAD12424
44B9F66B 9EC48E1B 1EB5B9D0 E802BAB9 A57048EB B8CD1877 3F020301 0001% Key pair was generated
at: 19:26:24 PST Jan 10 2002Key name: 1720-1.cisco.com.server Usage: Encryption Key Key
Data: 307C300D 06092A86 4886F70D 01010105 00036B00 30680261 00C653F7 2AE7E397 0041E273
BFCC0E35 E7AF9874 A73B77E8 B15EF54A CA2417AD AB75BAD9 BA1540F4 3DB849BD B70DF4D8 EBBBE7ED
AB93BE4B 5C1E9E6A 560A9C8A 12D7CBE3 060DBE7E 8C1667AE 93993049 DA362602 4E4D9EF8 2F8C4777
30F9F958 7F020301 00011720-1#
```

- 認証局 (CA) サーバを宣言して、ルータと CA の間の通信パラメータを設定します。登録局を使用する場合、登録局 (RA) モードも指定する必要があります。ルータが適切な証明書失効リスト (CRL) にアクセスできない場合であっても、他のピアの証明書をルータで受け入れるようにするには、**crl optional** コマンドを使用します。

```
1720-1(config)# crypto ca
identity vpn1720-1(ca-identity)#enrollment url http://171.69.89.16:801720-1(ca-identity)#
query url ldap://171.69.89.161720-1(ca-identity)# enrollment retry count 201720-1(ca-
identity)# enrollment retry period 51720-1(ca-identity)# enrollment mode ra1720-1(ca-
identity)#exit
```

- ルータは、CA の公開キーが含まれている CA の自己署名証明書を取得することによって、CA を認証する必要があります。CA はそれ自体の証明書に署名するため、CA 管理者に連絡を取って CA 証明書のフィンガープリントを比較することによって、CA の公開キーを手動で認証する必要があります。この例では、CA の証明書を受け取った後、証明書をコマンドステートメントに入力するのではなく、2 つのフィンガープリントを比較することによって公開キーを手動で認証します。
- ```
1720-1(config)#cr ca authenticate vpnCertificate has the
following attributes:Fingerprint: 1FCDF2C8 2DEDA6AC 4819D4C4 B4CFF2F5 % Do you accept this
certificate? [yes/no]: y1720-1(config)#sh crypto ca cert コマンドを使用して CA および RA
```



証明書を表示し、認証に成功したことを確認します。1720-1#sh cr ca certRA Signature Certificate Status: Available !--- The authentication was successful. 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: 14:03:31 PST Jun 19 2001 end date: 14:33:31 PST Jun 19 2004 Associated Identity: vpn RA KeyEncipher Certificate Status: Available !--- The authentication was successful. 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: 14:03:31 PST Jun 19 2001 end date: 14:33:31 PST Jun 19 2004 Associated Identity: vpn CA Certificate Status: Available !--- The authentication was successful. 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: 14:02:40 PST Jun 19 2001 end date: 14:32:40 PST Jun 19 2021 Associated Identity: vpn

5. ルータの RSA キー ペアそれぞれに対する署名付き証明書を CA から取得します。汎用の RSA キーを生成した場合、ルータは 1 つの RSA キー ペアを持ち、1 つの証明書のみが必要です。特殊用途の RSA キーを生成した場合、ルータは 2 つの RSA キー ペアを持ち、2 つの証明書が必要です。証明書が CA サーバ上で設定されている場合、CA 管理者に連絡を取ってルータ証明書を手動で認可する必要があります。また、登録時にパスワードの指定を求めるように CA サーバが設定されている場合、CA 管理者に連絡を取ってこのパスワードを尋ねてください。この例では、登録時にパスワードを指定しなくてもよいように CA サーバが設定されています。

```
1720-1(config)#cr ca enroll vpn%% 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: 1720-1.cisco.com% Include the
router serial number in the subject name? [yes/no]: n% Include an IP address in the subject
name? [yes/no]: nRequest 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.1720-1(config)#
Fingerprint: A1D6C28B 6575AD08 F0B656D4 7161F76F 3d09h: CRYPTO_PKI: status = 102:
```

登録用コマンドの実行後、ルータは CA サーバと通信して証明書の取得を試行します。証明書の手動認証が必要になるように CA サーバが設定されていれば、この間に CA 管理者に連絡を取る必要があります。sh crypto ca cert コマンドを使用してルータ証明書を表示し、登録に成功したことを確認します。次の例で、証明書は承認されていません。

```
1720-1#sh crypto ca certRA 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: 14:03:31 PST Jun 19 2001 end date: 14:33:31 PST Jun 19 2004 Associated
Identity: vpn 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: 14:03:31 PST Jun 19
2001 end date: 14:33:31 PST Jun 19 2004 Associated Identity: vpn 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: 14:02:40 PST Jun 19 2001 end date: 14:32:40 PST Jun 19 2021 Associated
Identity: vpn Certificate Subject Name Contains: Name: 1720-1.cisco.com Status: Pending
!--- The certificate is still pending. Key Usage: General Purpose Fingerprint: A1D6C28B
```

6575AD08 F0B656D4 7161F76F Associated Identity: vpn 次の出力例では、CA から証明書を受け取ったことを示しています。3d09h: %CRYPTO-6-CERTRET: Certificate received from Certificate Authority1720-1#sh crypto ca certCertificate Status: Available !--- This status indicates that the certificates were successfully received. Certificate Serial Number: 3B2FD652 Key Usage: General Purpose Issuer: OU = sjvpn O = cisco C = us Subject Name Contains: Name: 1720-1.cisco.com CRL Distribution Point: CN = CRL1, OU = sjvpn, O =



```
cisco, C = us Validity Date: start date: 19:06:14 PST Jan 10 2002 end date: 19:36:14 PST
Jan 10 2003 Associated Identity: vpn 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: 14:03:31 PST Jun 19 2001 end date:
14:33:31 PST Jun 19 2004 Associated Identity: vpn 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: 14:03:31 PST Jun
19 2001 end date: 14:33:31 PST Jun 19 2004 Associated Identity: vpn CA Certificate Status:
Available Certificate Serial Number: 3B2FD307 Key Usage: General Purpose Issuer: OU = sjvpn
O = cisco C = us CRL Distribution Point: CN = CRL1, OU = sjvpn, O = cisco, C = us Validity
Date: start date: 14:02:40 PST Jun 19 2001 end date: 14:32:40 PST Jun 19 2021 Associated
Identity: vpn
```

6. 手動により、CA に対して CRL を要求することができます。ルータ上の CRL を更新するには、次のコマンドを使用します。1720-1(config)#**crypto ca crl request vpn1720-**

```
1(config)#exitshow crypto ca crls コマンドを使用して CRL を表示します。1720-1#sh crypto
ca crls CRL Issuer Name: OU = sjvpn, O = cisco, C = us LastUpdate: 16:17:34 PST Jan
10 2002 NextUpdate: 17:17:34 PST Jan 11 2002 Retrieved from CRL Distribution Point:
LDAP: CN = CRL1, OU = sjvpn, O = cisco, C = us1720-1#
```

7. **write mem** コマンドを発行して設定を保存します。1720-1# **wr m**Building configuration?[OK]1720-1#

## PIX での証明書の取得

PIX ファイアウォール側で証明書を取得するには、ルータと同じ手順を実行します。ただし、PIX のコマンド構文は異なります。

1. ホスト名と IP ドメイン名を設定します。hostname pix520-1domain-name vpn.com
2. RSA キー ペアを生成します。pix520-1(config)# **ca generate rsa key 512**show ca mypubkey **rsa** コマンドを使用して RSA キー ペアを表示します。pix520-1(config)# **sh ca mypubkey rsa**%  
Key pair was generated at: 04:54:34 Jan 11 2002Key name: pix520-1.vpn.com Usage: General Purpose Key Key Data: 305c300d 06092a86 4886f70d 01010105 00034b00 30480241 009d95d5 e1147546 1f9ef873 81a36256 4b81388b 188fbc6 40fc4c56 c1801311 ff450cca e8d715c3 ffb8fa28 d347120f ae8a9972 3a88321c a71c1c7f ef29b810 2f020301 0001pix520-1(config)#
3. CA サーバを宣言します。pix520-1(config)# **ca identity cisco 171.69.89.16**  
171.69.89.16pix520-1(config)# **ca configure cisco ra 20 5**
4. CA を認証します。pix520-1(config)# **ca authenticate cisco** Certificate has the following attributes:Fingerprint: 1fcd2c8 2deda6ac 4819d4c4 b4cff2f5 pix520-1(config)# **show ca cert** コマンドを使用して、PIX 上の CA 証明書を表示します。pix520-1(config)# **sh ca cert**CA Certificate Status: Available !--- The authentication was successful. Certificate Serial Number: 3b2fd307 Key Usage: General Purpose OU = sjvpn O = cisco C = us CRL Distribution Point: CN = CRL1, OU = sjvpn, O = cisco, C = us Validity Date: start date: 22:02:40 Jun 19 2001 end date: 22:32:40 Jun 19 2021RA Signature Certificate Status: Available !--- The authentication was successful. Certificate Serial Number: 3b2fd319 Key Usage: Signature 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 Jun 19 2001 end date: 22:33:31 Jun 19 2004RA KeyEncipher Certificate Status: Available !--- The authentication was successful. Certificate Serial Number: 3b2fd318 Key Usage: Encryption 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 Jun 19 2001 end date: 22:33:31 Jun 19 2004
5. CA に対して CRL を要求します。pix520-1(config)# **ca enroll cisco 171.69.89.16**%% Start certificate enrollment .. % The subject name in the certificate will be: pix520-1.vpn.com% Certificate request sent to Certificate Authority% The certificate request fingerprint will be displayed.pix520-1(config)# Fingerprint: 6961df68 d3b5e667 8903a66b 969eee64 CRYPTO\_PKI: status = 102: certificate request pendingCRYPTO\_PKI: status = 102: certificate request pending証明書が CA によって認可されました。pix520-1(config)# pix520-1(config)# **show ca cert**Certificate Status: Available !--- The enrollment was successful. Certificate

```

Serial Number: 3b2fd653 Key Usage: General Purpose Subject Name Name: pix520-1.vpn.com CRL
Distribution Point: CN = CRL1, OU = sjvpn, O = cisco, C = us Validity Date: start date:
04:13:45 Jan 11 2002 end date: 04:43:45 Jan 11 2003RA Signature Certificate Status:
Available!--- The enrollment was successful. Certificate Serial Number: 3b2fd319 Key Usage:
Signature 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 Jun 19 2001 end date:
22:33:31 Jun 19 2004CA Certificate Status: Available !--- The enrollment was successful.
Certificate Serial Number: 3b2fd307 Key Usage: General Purpose OU = sjvpn O = cisco C = us
CRL Distribution Point: CN = CRL1, OU = sjvpn, O = cisco, C = us Validity Date: start date:
22:02:40 Jun 19 2001 end date: 22:32:40 Jun 19 2021RA KeyEncipher Certificate Status:
Available !--- The enrollment was successful. Certificate Serial Number: 3b2fd318 Key
Usage: Encryption 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 Jun 19 2001 end
date: 22:33:31 Jun 19 2004pix520-1(config)# pix520-1(config)# ca crl request cisco

```

6. **sh ca crl** コマンドを使用して CRL を表示します。pix520-1(config)# **sh ca crl** CRL: CRL  
 Issuer Name: OU = sjvpn, O = cisco, C = us LastUpdate: 00:17:34 Jan 11 2002  
 NextUpdate: 01:17:34 Jan 12 2002pix520-1(config)#

7. PIX 上で証明書を保存するには、次のコマンドを使用します。pix520-1(config)# **ca save**  
 allpix520-1(config)#

## 確認

このセクションでは、設定が正常に動作しているかどうかを確認する際に役立つ情報を提供しています。

特定の **show** コマンドは、[Output Interpreter Tool](#) (登録ユーザ専用) によってサポートされています。このツールを使用すると、**show** コマンド出力の分析を表示できます。

**show** コマンドは、PIX およびルータ上で実行できます。

- **show crypto isakmp sa** : ピア上の現在の IKE セキュリティ アソシエーション ( SA ) をすべて表示します。
- **show crypto ipsec sa** : 現在の IPSec セキュリティ アソシエーションで使用されている設定を表示します。
- **show crypto engine connections active** : ( ルータのみ ) 現在の接続と、暗号化および復号化されたパケットに関する情報を表示します。
- **show crypto ca crls** : ( ルータのみ ) ルータ上の現在の CRL を表示します。
- **show crypto ca certificates** : ( ルータのみ ) ルータ、CA サーバ、およびルータ上の RA 証明書を表示します。証明書分散ポイント ( CDP ) も表示します。
- **show ca certificates** : ( PIX のみ ) PIX、CA、および RA 証明書を表示します。ルータと異なり、CDP を表示しません。
- **show ca crl** : ( PIX のみ ) PIX 上の CRL を表示します。
- **show clock** : ルータおよび PIX 上の現在時刻を表示します ( イネーブル モードから ) 。

## ルータの show コマンドからの出力例

```

1720-1#sh cr isa sadst src state conn-id slot172.16.172.39
172.16.172.34 QM_IDLE 110 01720-1#sh cr map Interfaces using crypto
map mymap:Crypto Map "vpn" 10 ipsec-isakmp Peer = 172.16.172.34 Extended IP access
list 130 access-list 130 permit ip 1.1.1.0 0.0.0.255 192.168.4.0 0.0.0.255
Current peer: 172.16.172.34 Security association lifetime: 4608000 kilobytes/3600 seconds
PFS (Y/N): N Transform sets={ myset, } Interfaces using crypto map vpn:
FastEthernet0 Interfaces using crypto map certificate:1720-1#sh cr isa policy Protection
suite of priority 10 encryption algorithm: DES - Data Encryption Standard (56 bit

```



- **debug crypto pki transactions** : ( ルータのみ ) ルータの公開鍵インフラストラクチャ ( PKI ) トランザクションに関する情報を表示します。
- **debug crypto pki messages** : ( ルータのみ ) PKI 入出力メッセージに関する情報を表示します。
- **debug crypto ca** : ( PIX のみ ) PKI トランザクションおよび入出力メッセージに関する情報を表示します。

両方のピアで、セキュリティ アソシエーションをクリアする必要があります。PIX コマンドはイネーブル モードで実行され、ルータ コマンドは非イネーブル モードで実行されます。

- **clear crypto isakmp sa** : ( PIX ) フェーズ 1 のセキュリティ アソシエーションをクリアします。
- **clear crypto ipsec sa** : ( PIX ) フェーズ 2 のセキュリティ アソシエーションをクリアします。
- **clear crypto isakmp** : ( ルータ ) フェーズ 1 のセキュリティ アソシエーションをクリアします。
- **clear crypto sa** : ( ルータ ) フェーズ 2 のセキュリティ アソシエーションをクリアします。

## ルータからの証明書のデバッグ例

このセクションでは、CA サーバからの証明書の取得中に、次の PKI デバッグ コマンドを実行したときにルータから得られるデバッグを示します。これらのデバッグは、成功したセッションから得られたものです。

```
1720-1#debug cr pki transactions Crypto PKI Trans debugging is on 1720-1#debug cr pki messages
Crypto PKI Msg debugging is on 1720-1(config)#cr ca authenticate vpn Certificate has the
following attributes: Fingerprint: 1FCDF2C8 2DEDA6AC 4819D4C4 B4CFF2F5 % Do you accept this
certificate? [yes/no]: 08:48:10: CRYPTO_PKI: Sending CA Certificate Request: GET /cgi-
bin/pkiclient.exe?operation=GetCACert&message =vpn HTTP/1.0 08:48:10: CRYPTO_PKI: can not
resolve server name/IP address 08:48:10: CRYPTO_PKI: Using unresolved IP Address 171.69.89.16
08:48:10: CRYPTO_PKI: http connection opened 08:48:11: CRYPTO_PKI: HTTP response header:
HTTP/1.1 200 OK Date: Fri, 11 Jan 2002 19:10:53 Pacific Standard Time Server:
Entrust/VPNConnector v5.0 Connection: close Content-Type: application/x-x509-ra-ca-certs
Content-Type indicates we have received CA and RA certificates. 08:48:11: CRYPTO_PKI:CA and RA
certs: 08:48:11: 30 82 08 EA 06 09 2A 86 48 86 F7 0D 01 07 02 A0 08:48:11: 82 08 DB 30
82 08 D7 02 01 01 31 00 30 0B 06 09 08:48:11: 2A 86 48 86 F7 0D 01 07 01 A0 82 08 BF 30 82
02 !--- Hex data omitted.08:48:11: 14 06 03 55 04 03 13 0D 46 69 72 73 74 20 4F 66 08:48:11: 66
69 63 65 72 30 81 9F 30 0D 06 09 2A 86 48 86 08:48:11: 80 01 8F 51 3A 4B 61 74 59 0B 85 AA 9C E3
B3 91 08:48:11: 62 94 06 AA 7C E9 CC 0D 01 59 3E 6B 31 00 08:48:11: 08:48:11: CRYPTO_PKI: Error:
Certificate, private key or CRL was not found while selecting certificate chain 08:48:11:
CRYPTO_PKI: WARNING: A certificate chain could not be constructed while selecting certificate
status 08:48:11: CRYPTO_PKI: Error: Certificate, private key or CRL was not found while
selecting certificate chain 08:48:11: CRYPTO_PKI: WARNING: A certificate chain could not be
constructed while selecting certificate status 08:48:11: CRYPTO_PKI: crypto_process_ra_certs()
For:vpn 08:48:11: CRYPTO_PKI: crypto_set_ra_pubkey() (using global_auth_context) 08:48:11:
CRYPTO_PKI: crypto_set_ra_pubkey() (using global_auth_context) 08:48:11: CRYPTO_PKI: transaction
GetCACert completed 08:48:11: CRYPTO_PKI: CA certificate received. 08:48:11: CRYPTO_PKI: CA
certificate received. % Please answer 'yes' or 'no'. % Do you accept this certificate? [yes/no]:
y 1720-1(config)# 08:49:08: CRYPTO_PKI: crypto_process_ra_certs() For:vpn 1720-1(config)#cr ca
enroll vpn % 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: 1720-1.cisco.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. 1720-
1(config)# Fingerprint: CB9730B0 5EAAEBCB CC04C77B 2B7F253D 08:51:09: CRYPTO_PKI:
```



transaction PKCSReq completed 08:51:09: CRYPTO\_PKI: status: 08:51:10: CRYPTO\_PKI:Write out  
pkcs#10 content:272 08:51:10: 30 82 01 0C 30 81 B7 02 01 00 30 21 31 1F 30 1D 08:51:10:  
06 09 2A 86 48 86 F7 0D 01 09 02 16 10 31 37 32 !--- Hex data omitted. 08:51:10: 8F 87 32 4A 25  
27 2A 9B 17 F1 1F C5 67 1E 2A D2 08:51:10: 08:51:10: CRYPTO\_PKI:Enveloped Data ... 08:51:10: 30  
80 06 09 2A 86 48 86 F7 0D 01 07 03 A0 80 30 !--- Hex data omitted.08:51:10: 2F C8 94 16 FE 2F  
1B 00 00 00 00 00 00 00 00 00 08:51:10: 00 08:51:10: 08:51:10: CRYPTO\_PKI:Signed Data 1311 bytes  
08:51:10: 30 80 06 09 2A 86 48 86 F7 0D 01 07 02 A0 80 30 08:51:10: 80 02 01 01 31 0E 30 0C 06  
08 2A 86 48 86 F7 0D !--- Hex data omitted. 08:51:10: D0 56 7D 24 59 9C DE 00 00 00 00 00 00  
00 08:51:10: 08:51:10: CRYPTO\_PKI: can not resolve server name/IP address 08:51:10: CRYPTO\_PKI:  
Using unresolved IP Address 171.69.89.16 08:51:10: CRYPTO\_PKI: http connection opened 08:51:13:  
CRYPTO\_PKI: received msg of 656 bytes 08:51:13: CRYPTO\_PKI: HTTP response header: HTTP/1.1 200  
OK Date: Fri, 11 Jan 2002 19:13:55 Pacific Standard Time Server: Entrust/VPNConnector v5.0  
Connection: close Content-Type: application/x-pki-message 08:51:13: CRYPTO\_PKI:Received pki  
message: 487 types 08:51:13: 30 82 01 E3 06 09 2A 86 48 86 F7 0D 01 07 02 A0 !--- Hex data  
omitted. 08:51:13: E6 E3 CC 8B 6C 5E 74 9E 6A 0B 7D E1 B7 31 A0 EF 08:51:13: 02 1B C6 F3 C2 B9  
86 08:51:13: 08:51:13: CRYPTO\_PKI: signed attr: pki-message-type: 13 01 33 08:51:13: 08:51:13:  
CRYPTO\_PKI: signed attr: pki-status: 13 01 33 08:51:13: 08:51:13: CRYPTO\_PKI: signed attr: pki-  
recipient-nonce: 08:51:13: 04 20 32 46 37 30 36 35 37 45 39 44 43 31 36 31 08:51:13: 39 31 34 39  
30 32 33 34 46 35 42 44 30 46 41 31 08:51:13: 46 34 08:51:13: 08:51:13: CRYPTO\_PKI: signed attr:  
pki-transaction-id: 08:51:13: 13 20 35 33 43 46 43 31 35 30 37 36 42 33 35 42 08:51:13: 37 30 42  
43 42 39 39 36 44 36 42 46 39 32 38 30 08:51:13: 37 35 08:51:13: 08:51:13: CRYPTO\_PKI: status =  
102: certificate request pending 08:51:13: CRYPTO\_PKI:Write out getcert initial content:84  
08:51:13: 30 52 30 2D 31 0B 30 09 06 03 55 04 06 13 02 75 08:51:13: 73 31 0E 30 0C 06 03 55 04  
0A 13 05 63 69 73 63 08:51:13: 6F 31 0E 30 0C 06 03 55 04 0B 13 05 73 6A 76 70 08:51:13: 6E 30  
21 31 1F 30 1D 06 09 2A 86 48 86 F7 0D 01 08:51:13: 09 02 16 10 31 37 32 30 2D 31 2E 63 69 73 63  
6F 08:51:13: 2E 63 6F 6D 08:51:13: 08:51:13: CRYPTO\_PKI:Enveloped Data ... 08:51:13: 30 80 06 09  
2A 86 48 86 F7 0D 01 07 03 A0 80 30 !--- Hex data omitted.08:51:13: 08:51:13: CRYPTO\_PKI:Signed  
Data 1738 bytes 08:51:13: 30 80 06 09 2A 86 48 86 F7 0D 01 07 02 A0 80 30 !--- Hex data omitted.  
08:51:14: 59 DA 00 00 00 00 00 00 00 00 08:51:14: 08:51:14: CRYPTO\_PKI: can not resolve server  
name/IP address 08:51:14: CRYPTO\_PKI: Using unresolved IP Address 171.69.89.16 08:51:14:  
CRYPTO\_PKI: http connection opened 08:51:36: CRYPTO\_PKI: received msg of 656 bytes 08:51:36:  
CRYPTO\_PKI: HTTP response header: HTTP/1.1 200 OK Date: Fri, 11 Jan 2002 19:13:58 Pacific  
Standard Time Server: Entrust/VPNConnector v5.0 Connection: close Content-Type: application/x-  
pki-message 08:51:36: CRYPTO\_PKI:Received pki message: 487 types 08:51:36: 30 82 01 E3 06 09 2A  
86 48 86 F7 0D 01 07 02 A0 08:51:36: 82 01 D4 30 82 01 D0 02 01 01 31 0E 30 0C 06 08 !--- Hex  
data omitted. 08:51:36: E6 E3 CC 8B 6C 5E 74 9E 6A 0B 7D E1 B7 31 A0 EF 08:51:36: 02 1B C6 F3 C2  
B9 86 08:51:36: 08:51:36: CRYPTO\_PKI: signed attr: pki-message-type: 13 01 33 08:51:36:  
08:51:36: CRYPTO\_PKI: signed attr: pki-status: 13 01 33 08:51:36: 08:51:36: CRYPTO\_PKI: signed  
attr: pki-recipient-nonce: 08:51:36: 04 20 32 46 37 30 36 35 37 45 39 44 43 31 36 31 08:51:36:  
39 31 34 39 30 32 33 34 46 35 42 44 30 46 41 31 08:51:36: 46 34 08:51:36: 08:51:36: CRYPTO\_PKI:  
signed attr: pki-transaction-id: 08:51:36: 13 20 35 33 43 46 43 31 35 30 37 36 42 33 35 42  
08:51:36: 37 30 42 43 42 39 39 36 44 36 42 46 39 32 38 30 08:51:36: 37 35 08:51:36: 08:51:36:  
CRYPTO\_PKI: status = 102: certificate request pending 08:51:46: CRYPTO\_PKI: All sockets are  
closed. 08:51:56: CRYPTO\_PKI: All sockets are closed. 08:52:36: CRYPTO\_PKI: resend  
GetCertInitial, 1 08:52:36: CRYPTO\_PKI: resend GetCertInitial for session: 0 08:52:36:  
CRYPTO\_PKI: can not resolve server name/IP address 08:52:36: CRYPTO\_PKI: Using unresolved IP  
Address 171.69.89.16 08:52:36: CRYPTO\_PKI: http connection opened 08:52:38: CRYPTO\_PKI: received  
msg of 1647 bytes 08:52:38: CRYPTO\_PKI: HTTP response header: HTTP/1.1 200 OK Date: Fri, 11 Jan  
2002 19:15:20 Pacific Standard Time Server: Entrust/VPNConnector v5.0 Connection: close Content-  
Type: application/x-pki-message 08:52:38: CRYPTO\_PKI:Received pki message: 1478 types 08:52:38:  
30 82 05 C2 06 09 2A 86 48 86 F7 0D 01 07 02 A0 !--- Hex data omitted.08:52:38: B4 0D EC 6D 61  
9B 08:52:38: 08:52:38: CRYPTO\_PKI: signed attr: pki-message-type: 13 01 33 08:52:38: 08:52:38:  
CRYPTO\_PKI: signed attr: pki-status: 13 01 30 08:52:38: 08:52:38: CRYPTO\_PKI: signed attr: pki-  
recipient-nonce: 08:52:38: 04 20 32 41 35 44 31 31 42 34 43 39 46 31 34 32 08:52:38: 30 30 38 34  
32 43 35 45 38 36 44 44 43 41 45 44 08:52:38: 33 34 08:52:38: 08:52:38: CRYPTO\_PKI: signed attr:  
pki-transaction-id: 08:52:38: 13 20 35 33 43 46 43 31 35 30 37 36 42 33 35 42 08:52:38: 37 30 42  
43 42 39 39 36 44 36 42 46 39 32 38 30 08:52:38: 37 35 08:52:38: 08:52:38: CRYPTO\_PKI: status =  
100: certificate is granted !--- Certificate is granted by the CA.08:52:38: CRYPTO\_PKI:Verified  
signed data 985 bytes: 08:52:38: 30 82 03 D5 06 09 2A 86 48 86 F7 0D 01 07 03 A0 !--- Hex data  
omitted.08:52:38: 39 DE 0A 10 3B D1 17 30 79 83 E0 54 D9 59 47 13 08:52:38: 86 9A E5 5D F8 45 3D  
61 63 08:52:38: 08:52:38: CRYPTO\_PKI:Decrypted enveloped content: 08:52:38: 30 82 02 F3 06 09 2A  
86 48 86 F7 0D 01 07 02 A0 08:52:38: 82 02 E4 30 82 02 E0 02 01 01 31 00 30 0B 06 09 !--- Hex  
data omitted.08:52:39: CE 33 54 B3 4A 62 23 65 6E B1 83 D9 7C 24 87 A5 08:52:39: E8 FF D8 50 6F  
31 00 08:52:39: 08:52:39: CRYPTO\_PKI: All enrollment requests completed. 08:52:39: %CRYPTO-6-

CERTRET: Certificate received from Certificate Authority 08:52:49: CRYPTO\_PKI: All enrollment requests completed.

## PIX からの証明書のデバッグ例

このセクションでは、CA サーバからの証明書の取得中に、次の PKI デバッグ コマンドを実行したときに PIX から得られるデバッグを示します。これらのデバッグは、成功したセッションから得られたものです。

```
pix520-1(config)# pix520-1(config)# debug cr ca pix520-1(config)# pix520-1(config)# ca
configure cisco ra 20 5 pix520-1(config)# ca authenticate cisco CI thread sleeps! Crypto CA
thread wakes up! CRYPTO_PKI: http connection opened Certificate has the following attributes:
Fingerprint: 1fcdf2c8 2deda6ac 4819d4c4 b4cff2f5 PKI: key process suspended and continued
CRYPTO_PKI: WARNING: A certificate chain could not be constructed while selecting certificate
status CRYPTO_PKI: WARNING: A certificate chain could not be constructed while selecting
certificate status CRYPTO_PKI: Name: CN = First Officer, OU = sjvnp, O = cisco, C = us
CRYPTO_PKI: Name: CN = First Officer, OU = sjvnp, O = cisco, C = us CRYPTO_PKI: transaction
GetCACert completed CRYPTO_PKI: Name: CN = First Officer, OU = sjvnp, O = cisco, C = us
CRYPTO_PKI: Name: CN = First Officer, OU = sjvnp, O = cisco, C = us Crypto CA thread sleeps!
pix520-1(config)# ! pix520-1(config)# sh ca cert CA CRYPTO_PKI: Name: OU = sjvnp, O = cisco, C =
us CRYPTO_PKI: Name: CN = CRL1, OU = sjvnp, O = cisco, C = us CRYPTO_PKI: Name: CN = First
Officer, OU = sjvnp, O = cisco, C = us CRYPTO_PKI: Name: CN = CRL1, OU = sjvnp, O = cisco, C =
us CRYPTO_PKI: Name: CN = First Officer, OU = sjvnp, O = cisco, C = us CRYPTO_PKI: Name: CN =
CRL1, OU = sjvnp, O = cisco, C = us Certificate Status: Available Certificate Serial Number:
3b2fd307 Key Usage: General Purpose OU = sjvnp O = cisco C = us CRL
Distribution Point: CN = CRL1, OU = sjvnp, O = cisco, C = us Validity Date: start
date: 22:02:40 Jun 19 2001 end date: 22:32:40 Jun 19 2021 RA Signature Certificate
Certificate Serial Number: 3b2fd319 Key Usage: Signature CN = First Officer OU =
sjvnp O = cisco C = us CRL Distribution Point: CN = CRL1, OU = sjvnp, O = cisco,
C = us Validity Date: start date: 22:03:31 Jun 19 2001 end date: 22:33:31 Jun 19
2004 RA KeyEncipher Certificate Status: Available Certificate Serial Number: 3b2fd318
Key Usage: Encryption CN = First Officer OU = sjvnp O = cisco C = us CRL
Distribution Point: CN = CRL1, OU = sjvnp, O = cisco, C = us Validity Date: start
date: 22:03:31 Jun 19 2001 end date: 22:33:31 Jun 19 2004 pix520-1(config)# Status:
Available pix520-1(config)# ca enroll cisco 171.69.89.16 CI thread sleeps! % Crypto CA
thread wakes up! % Start certificate enrollment .. % The subject name in the certificate will
be: pix520-1.vpn.com % Certificate request sent to Certificate Authority % The certificate
request fingerprint will be displayed. pix520-1(config)# Fingerprint: bc923bc0 ee66b336
08a513b1 a226c5c8 CRYPTO_PKI: transaction PKCSReq completed CRYPTO_PKI: status: Crypto CA thread
sleeps! PKI: key process suspended and continued CRYPTO_PKI: http connection opened CRYPTO_PKI:
received msg of 656 bytes CRYPTO_PKI: WARNING: Certificate, private key or CRL was not found
while selecting CRL CRYPTO_PKI: signed attr: pki-message-type: 13 01 33 CRYPTO_PKI: signed attr:
pki-status: 13 01 33 CRYPTO_PKI: signed attr: pki-recipient-nonce: 04 20 30 36 38 33 34 44 35 46
30 44 31 37 42 39 42 30 30 44 37 37 42 33 44 37 39 42 45 43 43 43 41 41 CRYPTO_PKI: signed attr:
pki-transaction-id: 13 20 64 38 32 36 37 37 34 33 31 39 62 65 65 31 62 65 34 36 65 33 63 32 38
37 66 61 65 31 31 36 64 32 CRYPTO_PKI: status = 102: certificate request pending CRYPTO_PKI: All
sockets are closed. CRYPTO_PKI: All sockets are closed. CRYPTO_PKI: resend GetCertInitial for
session: 0 CRYPTO_PKI: http connection opened !--- The certificate has been granted by
CA!CRYPTO_PKI: received msg of 1720 bytes CRYPTO_PKI: WARNING: Certificate, private key or CRL
was not found while selecting CRL PKI: key process suspended and continued CRYPTO_PKI: signed
attr: pki-message-type: 13 01 33 CRYPTO_PKI: signed attr: pki-status: 13 01 30 CRYPTO_PKI:
signed attr: pki-recipient-nonce: 04 20 34 42 41 36 31 31 31 42 42 35 42 38 42 43 44 31 36 31 34
30 34 44 45 34 45 33 33 41 34 41 46 36 CRYPTO_PKI: signed attr: pki-transaction-id: 13 20 64 38
32 36 37 37 34 33 31 39 62 65 65 31 62 65 34 36 65 33 63 32 38 37 66 61 65 31 31 36 64 32
CRYPTO_PKI: status = 100: certificate is granted CRYPTO_PKI: WARNING: Certificate, private key
or CRL was not found while selecting CRL CRYPTO_PKI: All enrollment requests completed.
CRYPTO_PKI: All enrollment requests completed. CRYPTO_PKI: WARNING: Certificate, private key or
CRL was not found while selecting CRL
```

## ルータからの IPsec のデバッグ例

このセクションでは、両方の IPsec ピアが IPsec トンネルのネゴシエーションを実行していると

きに、ルータから得られる IPsec デバッグを示します。

```
1720-1#debug crypto ipsec1720-1#debug crypto isakmp1720-1#debug crypto engine1720-1#sh
debugCryptographic Subsystem: Crypto ISAKMP debugging is on Crypto Engine debugging is on
Crypto IPSEC debugging is on1720-1#3d11h: ISAKMP (0:0): received packet from 172.16.172.34 (N)
NEW SA3d11h: ISAKMP: local port 500, remote port 5003d11h: ISAKMP (0:110): processing SA
payload. message ID = 03d11h: ISAKMP (0:110): Checking ISAKMP transform 1 against priority 10
policy3d11h: ISAKMP: encryption DES-CBC3d11h: ISAKMP: hash MD53d11h: ISAKMP:
default group 13d11h: ISAKMP: auth RSA sig !--- IKE phase one is accepting
certificates as the authentication method.3d11h: ISAKMP (0:110): atts are acceptable. Next
payload is 33d11h: CryptoEngine0: generate alg parameter3d11h: CryptoEngine0:
CRYPTO_ISA_DH_CREATE(hw)(ipsec)3d11h: CRYPTO_ENGINE: Dh phase 1 status: 03d11h: ISAKMP (0:110):
SA is doing RSA signature authentication using id type ID_FQDN 3d11h: ISAKMP (0:110): sending
packet to 172.16.172.34 (R) MM_SA_SETUP 3d11h: ISAKMP (0:110): received packet from
172.16.172.34 (R) MM_SA_SETUP3d11h: ISAKMP (0:110): processing KE payload. message ID = 03d11h:
CryptoEngine0: generate alg parameter3d11h: CryptoEngine0:
CRYPTO_ISA_DH_SHARE_SECRET(hw)(ipsec)3d11h: ISAKMP (0:110): processing NONCE payload. message ID
= 03d11h: CryptoEngine0: calculate pkey hmac for conn id 1103d11h: CryptoEngine0:
CRYPTO_ISA_IKE_HMAC(hw)(ipsec)3d11h: CryptoEngine0: create ISAKMP SKEYID for conn id 1103d11h:
CryptoEngine0: CRYPTO_ISA_SA_CREATE(hw)(ipsec)3d11h: ISAKMP (0:110): SKEYID state
generated3d11h: ISAKMP (0:110): processing CERT_REQ payload. message ID = 03d11h: ISAKMP
(0:110): peer wants a CT_X509_SIGNATURE cert3d11h: ISAKMP (0:110): peer want cert issued by OU =
sjvnp, O = cisco, C = us3d11h: ISAKMP (0:110): processing vendor id payload3d11h: ISAKMP
(0:110): processing vendor id payload3d11h: ISAKMP (0:110): processing vendor id payload3d11h:
ISAKMP (0:110): speaking to another IOS box!3d11h: ISAKMP (0:110): sending packet to
172.16.172.34 (R) MM_KEY_EXCH3d11h: ISAKMP (0:110): received packet from 172.16.172.34 (R)
MM_KEY_EXCH3d11h: CryptoEngine0: CRYPTO_ISA_IKE_DECRYPT(hw)(ipsec)3d11h: ISAKMP (0:110):
processing ID payload. message ID = 03d11h: ISAKMP (0:110): processing CERT payload. message ID
= 03d11h: ISAKMP (0:110): processing a CT_X509_SIGNATURE cert3d11h: ISAKMP (0:110): processing
SIG payload. message ID = 03d11h: ISAKMP (110): sa->peer.name = , sa->peer.id.id.id_fqdn.fqdn =
pix520-1.vpn.com3d11h: Crypto engine 0: RSA decrypt with public key3d11h: CryptoEngine0:
CRYPTO_RSA_PUB_DECRYPT3d11h: CryptoEngine0: generate hmac context for conn id 1103d11h:
CryptoEngine0: CRYPTO_ISA_IKE_HMAC(hw)(ipsec)3d11h: ISAKMP (0:110): SA has been authenticated
with 172.16.172.343d11h: ISAKMP (110): ID payload next-payload : 6 type : 2 protocol : 17 port :
500 length : 203d11h: ISAKMP (110): Total payload length: 243d11h: CryptoEngine0: generate hmac
context for conn id 1103d11h: CryptoEngine0: CRYPTO_ISA_IKE_HMAC(hw)(ipsec)3d11h: Crypto engine
0: RSA encrypt with private key3d11h: CryptoEngine0: CRYPTO_RSA_PRIV_ENCRYPT3d11h:
CRYPTO_ENGINE: key process suspended and continued3d11h: CryptoEngine0: clear dh number for conn
id 13d11h: CryptoEngine0: CRYPTO_ISA_DH_DELETE(hw)(ipsec)3d11h: CryptoEngine0:
CRYPTO_ISA_IKE_ENCRYPT(hw)(ipsec)3d11h: ISAKMP (0:110): sending packet to 172.16.172.34 (R)
QM_IDLE 3d11h: ISAKMP (0:110): received packet from 172.16.172.34 (R) QM_IDLE 3d11h:
CryptoEngine0: CRYPTO_ISA_IKE_DECRYPT(hw)(ipsec)3d11h: CryptoEngine0: generate hmac context for
conn id 1103d11h: CryptoEngine0: CRYPTO_ISA_IKE_HMAC(hw)(ipsec)3d11h: ISAKMP (0:110): processing
HASH payload. message ID = -1403251453d11h: ISAKMP (0:110): processing SA payload. message ID =
-1403251453d11h: ISAKMP (0:110): Checking IPsec proposal 13d11h: ISAKMP: transform 1,
ESP_DES3d11h: ISAKMP: attributes in transform:3d11h: ISAKMP: encaps is 13d11h: ISAKMP: SA life
type in seconds3d11h: ISAKMP: SA life duration (basic) of 288003d11h: ISAKMP: SA life type in
kilobytes3d11h: ISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0 3d11h: ISAKMP: authenticator
is HMAC-MD53d11h: validate proposal 03d11h: ISAKMP (0:110): atts are acceptable.3d11h:
IPSEC(validate_proposal_request): proposal part #1, (key eng. msg.) INBOUND local=
172.16.172.39, remote= 172.16.172.34, local_proxy= 1.1.1.0/255.255.255.0/0/0 (type=4),
remote_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-
hmac , lifedur= 0s and 0kb, spi= 0x0(0), conn_id= 0, keysize= 0, flags= 0x43d11h: validate
proposal request 03d11h: ISAKMP (0:110): processing NONCE payload. message ID = -1403251453d11h:
ISAKMP (0:110): processing ID payload. message ID = -1403251453d11h: ISAKMP (0:110): processing
ID payload. message ID = -1403251453d11h: ISAKMP (0:110): asking for 1 spis from ipsec3d11h:
IPSEC(key_engine): got a queue event...3d11h: IPSEC(spi_response): getting spi 3611334428 for SA
from 172.16.172.39 to 172.16.172.34 for prot 33d11h: ISAKMP: received ke message (2/1)3d11h:
CryptoEngine0: generate hmac context for conn id 1103d11h: CryptoEngine0:
CRYPTO_ISA_IKE_HMAC(hw)(ipsec)3d11h: CryptoEngine0: CRYPTO_ISA_IKE_ENCRYPT(hw)(ipsec)3d11h:
ISAKMP (0:110): sending packet to 172.16.172.34 (R) QM_IDLE 3d11h: ISAKMP (0:110): received
packet from 172.16.172.34 (R) QM_IDLE 3d11h: CryptoEngine0:
CRYPTO_ISA_IKE_DECRYPT(hw)(ipsec)3d11h: CryptoEngine0: generate hmac context for conn id
```



```

1103d11h: CryptoEngine0: CRYPTO_ISA_IKE_HMAC(hw)(ipsec)3d11h: ipsec allocate flow 03d11h: ipsec
allocate flow 03d11h: CryptoEngine0: CRYPTO_ISA_IPSEC_KEY_CREATE(hw)(ipsec)3d11h: CryptoEngine0:
CRYPTO_ISA_IPSEC_KEY_CREATE(hw)(ipsec)3d11h: ISAKMP (0:110): Creating IPsec SAs3d11h: inbound SA
from 172.16.172.34 to 172.16.172.39 (proxy 192.168.4.0 to 1.1.1.0)3d11h: has spi 0xD740971C and
conn_id 200 and flags 43d11h: lifetime of 28800 seconds3d11h: lifetime of 4608000
kilobytes3d11h: outbound SA from 172.16.172.39 to 172.16.172.34 (proxy 1.1.1.0 to 192.168.4.0
)3d11h: has spi 939761857 and conn_id 201 and flags C3d11h: lifetime of 28800 seconds3d11h:
lifetime of 4608000 kilobytes3d11h: ISAKMP (0:110): deleting node -140325145 error FALSE reason
"quick mode done (await())"3d11h: IPSEC(key_engine): got a queue event...3d11h:
IPSEC(initialize_sas): , (key eng. msg.) INBOUND local= 172.16.172.39, remote= 172.16.172.34,
local_proxy= 1.1.1.0/255.255.255.0/0/0 (type=4), remote_proxy= 192.168.4.0/255.255.255.0/0/0
(type=4), protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 28800s and 4608000kb, spi=
0xD740971C(3611334428), conn_id= 200, keysize= 0, flags= 0x43d11h: IPSEC(initialize_sas): , (key
eng. msg.) OUTBOUND local= 172.16.172.39, remote= 172.16.172.34, local_proxy=
1.1.1.0/255.255.255.0/0/0 (type=4), remote_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 28800s and 4608000kb, spi=
0x3803A0C1(939761857), conn_id= 201, keysize= 0, flags= 0xC3d11h: IPSEC(create_sa): sa created,
(sa) sa_dest= 172.16.172.39, sa_prot= 50, sa_spi= 0xD740971C(3611334428), sa_trans= esp-des esp-
md5-hmac , sa_conn_id= 2003d11h: IPSEC(create_sa): sa created, (sa) sa_dest= 172.16.172.34,
sa_prot= 50, sa_spi= 0x3803A0C1(939761857), sa_trans= esp-des esp-md5-hmac , sa_conn_id=
2013d11h: ISAKMP (0:108): purging SA., sa=811A823C, delme=811A823C3d11h: CryptoEngine0: delete
connection 1083d11h: CryptoEngine0: CRYPTO_ISA_SA_DELETE(hw)(ipsec)3d11h: ISAKMP (0:107):
purging SA., sa=811FE440, delme=811FE4403d11h: CryptoEngine0: delete connection 1073d11h:
CryptoEngine0: CRYPTO_ISA_SA_DELETE(hw)(ipsec)1720-1#

```

## PIXからのIPSecのデバッグ例

このセクションでは、両方のIPSecピアがIPSecトンネルのネゴシエーションを実行しているときに、PIXから得られるIPSecデバッグを示します。

```

pix520-1# debug crypto ipsecpix520-1# debug crypto isakmppix520-1# sh debugdebug crypto ipsec
ldebug crypto isakmp ldebug fover status tx Off rx Off open
Off cable Off txdump Off rxdmp Off ifc Off rxip
Off txip Off get Off put Off verify Off switch
Off fail Off fmsg OffISAKMP (0): beginning Main Mode
exchangecrypto_isakmp_process_block: src 172.16.172.39, dest 172.16.172.34OAK_MM exchangeISAKMP
(0): processing SA payload. message ID = 0ISAKMP (0): Checking ISAKMP transform 1 against
priority 10 policyISAKMP: encryption DES-CBCISAKMP: hash MD5ISAKMP: default group
1ISAKMP: auth RSA sigISAKMP (0): atts are acceptable. Next payload is 0ISAKMP (0): SA is
doing RSA signature authentication using id type ID_FQDNreturn status is
IKMP_NO_ERRORcrypto_isakmp_process_block: src 172.16.172.39, dest 172.16.172.34OAK_MM
exchangeISAKMP (0): processing KE payload. message ID = 0ISAKMP (0): processing NONCE payload.
message ID = 0ISAKMP (0): processing CERT_REQ payload. message ID = 0ISAKMP (0): peer wants a
CT_X509_SIGNATURE certISAKMP (0): processing vendor id payloadISAKMP (0): speaking to another
IOS box!ISAKMP (0): ID payload next-payload : 6 type : 2 protocol
: 17 port : 500 length : 20ISAKMP (0): Total payload length:
24return status is IKMP_NO_ERRORcrypto_isakmp_process_block: src 172.16.172.39, dest
172.16.172.34OAK_MM exchangeISAKMP (0): processing ID payload. message ID = 0ISAKMP (0):
processing CERT payload. message ID = 0ISAKMP (0): processing a CT_X509_SIGNATURE certISAKMP
(0): processing SIG payload. message ID = 0ISAKMP (0): sa->peer.name = , sa-
>peer_id.id.id_fqdn.fqdn = 1720-1.cisco.comISAKMP (0): SA has been authenticatedISAKMP (0):
beginning Quick Mode exchange, M-ID of -140325145:f7a2cee7IPSEC(key_engine): got a queue
event...IPSEC(spi_response): getting spi 0x3803a0c1(939761857) for SA from 172.16.172.39 to
172.16.172.34 for prot 3return status is IKMP_NO_ERRORcrypto_isakmp_process_block: src
172.16.172.39, dest 172.16.172.34OAK_QM exchangeoakley_process_quick_mode:OAK_QM_IDLEISAKMP (0):
processing SA payload. message ID = 4154642151ISAKMP : Checking IPsec proposal 1ISAKMP:
transform 1, ESP_DESISAKMP: attributes in transform:ISAKMP: encaps is 1ISAKMP: SA
life type in secondsISAKMP: SA life duration (basic) of 28800ISAKMP: SA life type in
kilobytesISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0 ISAKMP: authenticator is
HMAC-MD5ISAKMP (0): atts are acceptable.IPSEC(validate_proposal_request): proposal part #1,
(key eng. msg.) dest= 172.16.172.39, src= 172.16.172.34, dest_proxy=
1.1.1.0/255.255.255.0/0/0 (type=4), src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 0s and 0kb, spi= 0x0(0),

```

```

conn_id= 0, keysize= 0, flags= 0x4ISAKMP (0): processing NONCE payload. message ID =
4154642151ISAKMP (0): processing ID payload. message ID = 4154642151ISAKMP (0): processing ID
payload. message ID = 4154642151ISAKMP (0): processing NOTIFY payload 24576 protocol 3
spi 3611334428, message ID = 4154642151ISAKMP (0): processing responder lifetimeISAKMP (0):
responder lifetime of 3600sISAKMP (0): Creating IPsec SAs inbound SA from 172.16.172.39
to 172.16.172.34 (proxy 1.1.1.0 to 192.168.4.0) has spi 939761857 and conn_id 4 and
flags 4 lifetime of 3600 seconds lifetime of 4608000 kilobytes outbound SA
from 172.16.172.34 to 172.16.172.39 (proxy 192.168.4.0 to 1.1.1.0) has spi
3611334428 and conn_id 3 and flags 4 lifetime of 3600 seconds lifetime of 4608000
kilobytesIPSEC(key_engine): got a queue event...IPSEC(initialize_sas): , (key eng. msg.) dest=
172.16.172.34, src= 172.16.172.39, dest_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
src_proxy= 1.1.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-hmac
, lifedur= 3600s and 4608000kb, spi= 0x3803a0c1(939761857), conn_id= 4, keysize= 0,
flags= 0x4IPSEC(initialize_sas): , (key eng. msg.) src= 172.16.172.34, dest= 172.16.172.39,
src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4), dest_proxy= 1.1.1.0/255.255.255.0/0/0
(type=4), protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 3600s and 4608000kb,
spi= 0xd740971c(3611334428), conn_id= 3, keysize= 0, flags= 0x4return status is IKMP_NO_ERROR
pix520-1(config)#

```

## 潜在的な問題

このセクションでは、ルータおよび PIX 上で証明書を取得するときに発生する一般的な間違いの症状、原因、および解決策について説明します。

### ISAKMP の ID が一致しない

ルータおよび PIX は、IPSec によって使用されるキーおよび証明書に対して FQDN を割り当てます。IKE つまりフェーズ 1 のネゴシエーション中、ルータまたは IOS は証明書内の FQDN をチェックします。したがって、PIX およびルータのアドレスでなく ISAKMP の ID をホスト名として使用する必要があります。次の例では、ルータまたは IOS が証明書内の FQDN をチェックしています。

```

pix520-1# debug crypto ipsecpix520-1# debug crypto isakmpix520-1# sh debugdebug crypto ipsec
ldebug crypto isakmp ldebug fover status tx Off rx Off open
Off cable Off txdmp Off rxdmp Off ifc Off rxip
Off txip Off get Off put Off verify Off switch
Off fail Off fmsg OffISAKMP (0): beginning Main Mode
exchangecrypto_isakmp_process_block: src 172.16.172.39, dest 172.16.172.34OAK_MM exchangeISAKMP
(0): processing SA payload. message ID = 0ISAKMP (0): Checking ISAKMP transform 1 against
priority 10 policyISAKMP: encryption DES-CBCISAKMP: hash MD5ISAKMP: default group
1ISAKMP: auth RSA sigISAKMP (0): atts are acceptable. Next payload is 0ISAKMP (0): SA is
doing RSA signature authentication using id type ID_FQDNreturn status is
IKMP_NO_ERRORcrypto_isakmp_process_block: src 172.16.172.39, dest 172.16.172.34OAK_MM
exchangeISAKMP (0): processing KE payload. message ID = 0ISAKMP (0): processing NONCE payload.
message ID = 0ISAKMP (0): processing CERT_REQ payload. message ID = 0ISAKMP (0): peer wants a
CT_X509_SIGNATURE certISAKMP (0): processing vendor id payloadISAKMP (0): speaking to another
IOS box!ISAKMP (0): ID payload next-payload : 6 type : 2 protocol
: 17 port : 500 length : 20ISAKMP (0): Total payload length:
24return status is IKMP_NO_ERRORcrypto_isakmp_process_block: src 172.16.172.39, dest
172.16.172.34OAK_MM exchangeISAKMP (0): processing ID payload. message ID = 0ISAKMP (0):
processing CERT payload. message ID = 0ISAKMP (0): processing a CT_X509_SIGNATURE certISAKMP
(0): processing SIG payload. message ID = 0ISAKMP (0): sa->peer.name = , sa-
>peer_id.id.id_fqdn.fqdn = 1720-1.cisco.comISAKMP (0): SA has been authenticatedISAKMP (0):
beginning Quick Mode exchange, M-ID of -140325145:f7a2cee7IPSEC(key_engine): got a queue
event...IPSEC(spi_response): getting spi 0x3803a0c1(939761857) for SA from 172.16.172.39 to
172.16.172.34 for prot 3return status is IKMP_NO_ERRORcrypto_isakmp_process_block: src
172.16.172.39, dest 172.16.172.34OAK_QM exchangeoakley_process_quick_mode:OAK_QM_IDLEISAKMP (0):
processing SA payload. message ID = 4154642151ISAKMP : Checking IPsec proposal 1ISAKMP:
transform 1, ESP_DESISAKMP: attributes in transform:ISAKMP: encaps is 1ISAKMP: SA
life type in secondsISAKMP: SA life duration (basic) of 28800ISAKMP: SA life type in
kilobytesISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0 ISAKMP: authenticator is

```

```

HMAC-MD5ISAKMP (0): atts are acceptable.IPSEC(validate_proposal_request): proposal part #1,
(key eng. msg.) dest= 172.16.172.39, src= 172.16.172.34, dest_proxy=
1.1.1.0/255.255.255.0/0/0 (type=4), src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 0s and 0kb, spi= 0x0(0),
conn_id= 0, keysize= 0, flags= 0x4ISAKMP (0): processing NONCE payload. message ID =
4154642151ISAKMP (0): processing ID payload. message ID = 4154642151ISAKMP (0): processing ID
payload. message ID = 4154642151ISAKMP (0): processing NOTIFY payload 24576 protocol 3
spi 3611334428, message ID = 4154642151ISAKMP (0): processing responder lifetimeISAKMP (0):
responder lifetime of 3600sISAKMP (0): Creating IPsec SAs inbound SA from 172.16.172.39
to 172.16.172.34 (proxy 1.1.1.0 to 192.168.4.0) has spi 939761857 and conn_id 4 and
flags 4 lifetime of 3600 seconds lifetime of 4608000 kilobytes outbound SA
from 172.16.172.34 to 172.16.172.39 (proxy 192.168.4.0 to 1.1.1.0) has spi
3611334428 and conn_id 3 and flags 4 lifetime of 3600 seconds lifetime of 4608000
kilobytesIPSEC(key_engine): got a queue event...IPSEC(initialize_sas): , (key eng. msg.) dest=
172.16.172.34, src= 172.16.172.39, dest_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
src_proxy= 1.1.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-hmac
, lifedur= 3600s and 4608000kb, spi= 0x3803a0c1(939761857), conn_id= 4, keysize= 0,
flags= 0x4IPSEC(initialize_sas): , (key eng. msg.) src= 172.16.172.34, dest= 172.16.172.39,
src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4), dest_proxy= 1.1.1.0/255.255.255.0/0/0
(type=4), protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 3600s and 4608000kb,
spi= 0xd740971c(3611334428), conn_id= 3, keysize= 0, flags= 0x4return status is IKMP_NO_ERROR
pix520-1(config)#

```

## ルータのデバッグ :

```

pix520-1# debug crypto ipsecpix520-1# debug crypto isakmppix520-1# sh debugdebug crypto ipsec
ldebug crypto isakmp ldebug fover status tx Off rx Off open
Off cable Off txdmp Off rxdmp Off ifc Off rxip
Off txip Off get Off put Off verify Off switch
Off fail Off fmsg OffISAKMP (0): beginning Main Mode
exchangecrypto_isakmp_process_block: src 172.16.172.39, dest 172.16.172.34OAK_MM exchangeISAKMP
(0): processing SA payload. message ID = 0ISAKMP (0): Checking ISAKMP transform 1 against
priority 10 policyISAKMP: encryption DES-CBCISAKMP: hash MD5ISAKMP: default group
1ISAKMP: auth RSA sigISAKMP (0): atts are acceptable. Next payload is 0ISAKMP (0): SA is
doing RSA signature authentication using id type ID_FQDNreturn status is
IKMP_NO_ERRORcrypto_isakmp_process_block: src 172.16.172.39, dest 172.16.172.34OAK_MM
exchangeISAKMP (0): processing KE payload. message ID = 0ISAKMP (0): processing NONCE payload.
message ID = 0ISAKMP (0): processing CERT_REQ payload. message ID = 0ISAKMP (0): peer wants a
CT_X509_SIGNATURE certISAKMP (0): processing vendor id payloadISAKMP (0): speaking to another
IOS box!ISAKMP (0): ID payload next-payload : 6 type : 2 protocol
: 17 port : 500 length : 20ISAKMP (0): Total payload length:
24return status is IKMP_NO_ERRORcrypto_isakmp_process_block: src 172.16.172.39, dest
172.16.172.34OAK_MM exchangeISAKMP (0): processing ID payload. message ID = 0ISAKMP (0):
processing CERT payload. message ID = 0ISAKMP (0): processing a CT_X509_SIGNATURE certISAKMP
(0): processing SIG payload. message ID = 0ISAKMP (0): sa->peer.name = , sa-
>peer.id.id.id_fqdn.fqdn = 1720-1.cisco.comISAKMP (0): SA has been authenticatedISAKMP (0):
beginning Quick Mode exchange, M-ID of -140325145:f7a2cee7IPSEC(key_engine): got a queue
event...IPSEC(spi_response): getting spi 0x3803a0c1(939761857) for SA from 172.16.172.39 to
172.16.172.34 for prot 3return status is IKMP_NO_ERRORcrypto_isakmp_process_block: src
172.16.172.39, dest 172.16.172.34OAK_QM exchangeoakley_process_quick_mode:OAK_QM_IDLEISAKMP (0):
processing SA payload. message ID = 4154642151ISAKMP : Checking IPsec proposal 1ISAKMP:
transform 1, ESP_DESISAKMP: attributes in transform:ISAKMP: encaps is 1ISAKMP: SA
life type in secondsISAKMP: SA life duration (basic) of 28800ISAKMP: SA life type in
kilobytesISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0 ISAKMP: authenticator is
HMAC-MD5ISAKMP (0): atts are acceptable.IPSEC(validate_proposal_request): proposal part #1,
(key eng. msg.) dest= 172.16.172.39, src= 172.16.172.34, dest_proxy=
1.1.1.0/255.255.255.0/0/0 (type=4), src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 0s and 0kb, spi= 0x0(0),
conn_id= 0, keysize= 0, flags= 0x4ISAKMP (0): processing NONCE payload. message ID =
4154642151ISAKMP (0): processing ID payload. message ID = 4154642151ISAKMP (0): processing ID
payload. message ID = 4154642151ISAKMP (0): processing NOTIFY payload 24576 protocol 3
spi 3611334428, message ID = 4154642151ISAKMP (0): processing responder lifetimeISAKMP (0):
responder lifetime of 3600sISAKMP (0): Creating IPsec SAs inbound SA from 172.16.172.39
to 172.16.172.34 (proxy 1.1.1.0 to 192.168.4.0) has spi 939761857 and conn_id 4 and

```

```

flags 4 lifetime of 3600 seconds lifetime of 4608000 kilobytes outbound SA
from 172.16.172.34 to 172.16.172.39 (proxy 192.168.4.0 to 1.1.1.0) has spi
3611334428 and conn_id 3 and flags 4 lifetime of 3600 seconds lifetime of 4608000
kilobytesIPSEC(key_engine): got a queue event...IPSEC(initialize_sas): , (key eng. msg.) dest=
172.16.172.34, src= 172.16.172.39, dest_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
src_proxy= 1.1.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-hmac
, lifedur= 3600s and 4608000kb, spi= 0x3803a0c1(939761857), conn_id= 4, keysize= 0,
flags= 0x4IPSEC(initialize_sas): , (key eng. msg.) src= 172.16.172.34, dest= 172.16.172.39,
src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4), dest_proxy= 1.1.1.0/255.255.255.0/0/0
(type=4), protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 3600s and 4608000kb,
spi= 0xd740971c(3611334428), conn_id= 3, keysize= 0, flags= 0x4return status is IKMP_NO_ERROR
pix520-1(config)#

```

## PIX のデバッグ :

```

pix520-1# debug crypto ipsecpix520-1# debug crypto isakmppix520-1# sh debugdebug crypto ipsec
ldebug crypto isakmp ldebug fover status tx Off rx Off open
Off cable Off txdmp Off rxdmp Off ifc Off rxip
Off txip Off get Off put Off verify Off switch
Off fail Off fmsg OffISAKMP (0): beginning Main Mode
exchangecrypto_isakmp_process_block: src 172.16.172.39, dest 172.16.172.34OAK_MM exchangeISAKMP
(0): processing SA payload. message ID = 0ISAKMP (0): Checking ISAKMP transform 1 against
priority 10 policyISAKMP: encryption DES-CBCISAKMP: hash MD5ISAKMP: default group
1ISAKMP: auth RSA sigISAKMP (0): atts are acceptable. Next payload is 0ISAKMP (0): SA is
doing RSA signature authentication using id type ID_FQDNreturn status is
IKMP_NO_ERRORcrypto_isakmp_process_block: src 172.16.172.39, dest 172.16.172.34OAK_MM
exchangeISAKMP (0): processing KE payload. message ID = 0ISAKMP (0): processing NONCE payload.
message ID = 0ISAKMP (0): processing CERT_REQ payload. message ID = 0ISAKMP (0): peer wants a
CT_X509_SIGNATURE certISAKMP (0): processing vendor id payloadISAKMP (0): speaking to another
IOS box!ISAKMP (0): ID payload next-payload : 6 type : 2 protocol
: 17 port : 500 length : 20ISAKMP (0): Total payload length:
24return status is IKMP_NO_ERRORcrypto_isakmp_process_block: src 172.16.172.39, dest
172.16.172.34OAK_MM exchangeISAKMP (0): processing ID payload. message ID = 0ISAKMP (0):
processing CERT payload. message ID = 0ISAKMP (0): processing a CT_X509_SIGNATURE certISAKMP
(0): processing SIG payload. message ID = 0ISAKMP (0): sa->peer.name = , sa-
>peer.id.id.id_fqdn.fqdn = 1720-1.cisco.comISAKMP (0): SA has been authenticatedISAKMP (0):
beginning Quick Mode exchange, M-ID of -140325145:f7a2cee7IPSEC(key_engine): got a queue
event...IPSEC(spi_response): getting spi 0x3803a0c1(939761857) for SA from 172.16.172.39 to
172.16.172.34 for prot 3return status is IKMP_NO_ERRORcrypto_isakmp_process_block: src
172.16.172.39, dest 172.16.172.34OAK_QM exchangeoakley_process_quick_mode:OAK_QM_IDLEISAKMP (0):
processing SA payload. message ID = 4154642151ISAKMP : Checking IPsec proposal 1ISAKMP:
transform 1, ESP_DESISAKMP: attributes in transform:ISAKMP: encaps is 1ISAKMP: SA
life type in secondsISAKMP: SA life duration (basic) of 28800ISAKMP: SA life type in
kilobytesISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0 ISAKMP: authenticator is
HMAC-MD5ISAKMP (0): atts are acceptable.IPSEC(validate_proposal_request): proposal part #1,
(key eng. msg.) dest= 172.16.172.39, src= 172.16.172.34, dest_proxy=
1.1.1.0/255.255.255.0/0/0 (type=4), src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 0s and 0kb, spi= 0x0(0),
conn_id= 0, keysize= 0, flags= 0x4ISAKMP (0): processing NONCE payload. message ID =
4154642151ISAKMP (0): processing ID payload. message ID = 4154642151ISAKMP (0): processing ID
payload. message ID = 4154642151ISAKMP (0): processing NOTIFY payload 24576 protocol 3
spi 3611334428, message ID = 4154642151ISAKMP (0): processing responder lifetimeISAKMP (0):
responder lifetime of 3600sISAKMP (0): Creating IPsec SAs inbound SA from 172.16.172.39
to 172.16.172.34 (proxy 1.1.1.0 to 192.168.4.0) has spi 939761857 and conn_id 4 and
flags 4 lifetime of 3600 seconds lifetime of 4608000 kilobytes outbound SA
from 172.16.172.34 to 172.16.172.39 (proxy 192.168.4.0 to 1.1.1.0) has spi
3611334428 and conn_id 3 and flags 4 lifetime of 3600 seconds lifetime of 4608000
kilobytesIPSEC(key_engine): got a queue event...IPSEC(initialize_sas): , (key eng. msg.) dest=
172.16.172.34, src= 172.16.172.39, dest_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
src_proxy= 1.1.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-hmac
, lifedur= 3600s and 4608000kb, spi= 0x3803a0c1(939761857), conn_id= 4, keysize= 0,
flags= 0x4IPSEC(initialize_sas): , (key eng. msg.) src= 172.16.172.34, dest= 172.16.172.39,
src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4), dest_proxy= 1.1.1.0/255.255.255.0/0/0
(type=4), protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 3600s and 4608000kb,

```

```
spi= 0xd740971c(3611334428), conn_id= 3, keysize= 0, flags= 0x4return status is IKMP_NO_ERROR
pix520-1(config)#
```

## 時刻と日付の不一致

PIX およびルータ上の証明書は、次の例で示すように一定の期間有効です。

```
pix520-1# debug crypto ipsecpix520-1# debug crypto isakmppix520-1# sh debugdebug crypto ipsec
ldebug crypto isakmp ldebug fover status tx Off rx Off open
Off cable Off txdmp Off rxdmp Off ifc Off rxip
Off txip Off get Off put Off verify Off switch
Off fail Off fmsg OffISAKMP (0): beginning Main Mode
exchangecrypto_isakmp_process_block: src 172.16.172.39, dest 172.16.172.34OAK_MM exchangeISAKMP
(0): processing SA payload. message ID = 0ISAKMP (0): Checking ISAKMP transform 1 against
priority 10 policyISAKMP: encryption DES-CBCISAKMP: hash MD5ISAKMP: default group
1ISAKMP: auth RSA sigISAKMP (0): atts are acceptable. Next payload is 0ISAKMP (0): SA is
doing RSA signature authentication using id type ID_FQDNreturn status is
IKMP_NO_ERRORcrypto_isakmp_process_block: src 172.16.172.39, dest 172.16.172.34OAK_MM
exchangeISAKMP (0): processing KE payload. message ID = 0ISAKMP (0): processing NONCE payload.
message ID = 0ISAKMP (0): processing CERT_REQ payload. message ID = 0ISAKMP (0): peer wants a
CT_X509_SIGNATURE certISAKMP (0): processing vendor id payloadISAKMP (0): speaking to another
IOS box!ISAKMP (0): ID payload next-payload : 6 type : 2 protocol
: 17 port : 500 length : 20ISAKMP (0): Total payload length:
24return status is IKMP_NO_ERRORcrypto_isakmp_process_block: src 172.16.172.39, dest
172.16.172.34OAK_MM exchangeISAKMP (0): processing ID payload.message ID = 0ISAKMP (0):
processing CERT payload. message ID = 0ISAKMP (0): processing a CT_X509_SIGNATURE certISAKMP
(0): processing SIG payload. message ID = 0ISAKMP (0): sa->peer.name = , sa-
>peer_id.id.id_fqdn.fqdn = 1720-1.cisco.comISAKMP (0): SA has been authenticatedISAKMP (0):
beginning Quick Mode exchange, M-ID of -140325145:f7a2cee7IPSEC(key_engine): got a queue
event...IPSEC(spi_response): getting spi 0x3803a0c1(939761857) for SA from 172.16.172.39 to
172.16.172.34 for prot 3return status is IKMP_NO_ERRORcrypto_isakmp_process_block: src
172.16.172.39, dest 172.16.172.34OAK_QM exchangeoakley_process_quick_mode:OAK_QM_IDLEISAKMP (0):
processing SA payload. message ID = 4154642151ISAKMP : Checking IPsec proposal 1ISAKMP:
transform 1, ESP_DESISAKMP: attributes in transform:ISAKMP: encaps is 1ISAKMP: SA
life type in secondsISAKMP: SA life duration (basic) of 28800ISAKMP: SA life type in
kilobytesISAKMP: SA life duration (VPI) of 0x0 0x46 0x50 0x0 ISAKMP: authenticator is
HMAC-MD5ISAKMP (0): atts are acceptable.IPSEC(validate_proposal_request): proposal part #1,
(key eng. msg.) dest= 172.16.172.39, src= 172.16.172.34, dest_proxy=
1.1.1.0/255.255.255.0/0/0 (type=4), src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 0s and 0kb, spi= 0x0(0),
conn_id= 0, keysize= 0, flags= 0x4ISAKMP (0): processing NONCE payload. message ID =
4154642151ISAKMP (0): processing ID payload. message ID = 4154642151ISAKMP (0): processing ID
payload. message ID = 4154642151ISAKMP (0): processing NOTIFY payload 24576 protocol 3
spi 3611334428, message ID = 4154642151ISAKMP (0): processing responder lifetimeISAKMP (0):
responder lifetime of 3600sISAKMP (0): Creating IPsec SAs inbound SA from 172.16.172.39
to 172.16.172.34 (proxy 1.1.1.0 to 192.168.4.0) has spi 939761857 and conn_id 4 and
flags 4 lifetime of 3600 seconds lifetime of 4608000 kilobytes outbound SA
from 172.16.172.34 to 172.16.172.39 (proxy 192.168.4.0 to 1.1.1.0) has spi
3611334428 and conn_id 3 and flags 4 lifetime of 3600 seconds lifetime of 4608000
kilobytesIPSEC(key_engine): got a queue event...IPSEC(initialize_sas): , (key eng. msg.) dest=
172.16.172.34, src= 172.16.172.39, dest_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4),
src_proxy= 1.1.1.0/255.255.255.0/0/0 (type=4), protocol= ESP, transform= esp-des esp-md5-hmac
, lifedur= 3600s and 4608000kb, spi= 0x3803a0c1(939761857), conn_id= 4, keysize= 0,
flags= 0x4IPSEC(initialize_sas): , (key eng. msg.) src= 172.16.172.34, dest= 172.16.172.39,
src_proxy= 192.168.4.0/255.255.255.0/0/0 (type=4), dest_proxy= 1.1.1.0/255.255.255.0/0/0
(type=4), protocol= ESP, transform= esp-des esp-md5-hmac , lifedur= 3600s and 4608000kb,
spi= 0xd740971c(3611334428), conn_id= 3, keysize= 0, flags= 0x4return status is IKMP_NO_ERROR
pix520-1(config)#
```

次の show コマンド出力も時間間隔を示しています。

```
1720-1#sh crypto ca crls CRL Issuer Name: OU = sjvpn, O = cisco, C = us LastUpdate:
16:17:34 PST Jan 10 2002 NextUpdate: 17:17:34 PST Jan 11 2002 Retrieved from CRL
Distribution Point: LDAP: CN = CRL1, OU = sjvpn, O = cisco, C = us
```



ルータまたは PIX のクロックの日付および時刻が、証明書の開始日と終了日の間 ( および CRL の次回更新と最終更新の間 ) に該当しない場合、フェーズ 1 ネゴシエーション中に次のエラーが表示されます。

ルータのデバッグ :

```
1720-1#sh crypto ca crls CRL Issuer Name: OU = sjvpn, O = cisco, C = us LastUpdate:
16:17:34 PST Jan 10 2002 NextUpdate: 17:17:34 PST Jan 11 2002 Retrieved from CRL
Distribution Point: LDAP: CN = CRL1, OU = sjvpn, O = cisco, C = us
```

この例で、ルータ時刻は 1993 年 2 月 28 日 16:07:02 に設定されており、CA が求める有効期間内にありません。この問題を解決するには、ルータに適切な時刻を設定します。

```
1720-1#clock set 01:05:01 january 11 20021720-1#sh clock01:05:04.903 PST Fri Jan 11 20021720-1#
```

## [HTTP/TCP ポート 80 がブロックされる](#)

ルータおよび PIX は、CA サーバへの認証および登録中に TCP ポート 80 を使用します。登録または認証に関する問題がある場合、ルータおよび PIX と CA サーバの間で HTTP/TCP ポート 80 がブロックされていないか確認してください。

## [PIX またはルータに CRL がない](#)

PIX またはルータに `crl optional` コマンドを指定しなかったため、これら両方のデバイスは、フェーズ 1 ネゴシエーション中に CRL をチェックします。CRL が存在しない場合、次のエラーが表示されます。

PIX のデバッグ :

```
1720-1#clock set 01:05:01 january 11 20021720-1#sh clock01:05:04.903 PST Fri Jan 11 20021720-1#
```

この問題を解決するには、`ca crl request ca nickname` コマンドを発行して CA サーバから証明書を取得してください。ここでは `cr ca crl request Cisco` が使用されています。

## [証明書および RSA キー ペアの削除](#)

デジタル証明書または RSA キー ペアをルータまたは PIX から削除することが必要な場合もあります。

## [ルータ証明書および RSA キー ペアの削除](#)

コマンド :

- `no crypto ca identity ca nickname` : ルータ証明書を削除します。
- `crypto key zeroize rsa` : RSA キー ペアを削除します。

証明書を削除するには、次の例を実行してください。

```
1720-1#conf tEnter configuration commands, one per line. End with CNTL/Z.1720-1(config)#no
crypto ca identity vpn% Removing an identity will destroy all certificates received from the
related Certificate Authority.Are you sure you want to do this? [yes/no]: y% Be sure to ask the
CA administrator to revoke your certificates.No enrollment sessions are currently active.1720-
1(config)#1720-1#sh cr ca cert1720-1#!--- The certificates are no longer available.
```

ルータ上の RSA キー ペアを削除するには、次の例を実行してください。

```
1720-1(config)#crypto key zeroize rsa% Keys to be removed are named 1720-1.cisco.com.Do you
```

```
really want to remove these keys? [yes/no]: y1720-1(config)#.1720-1#sh crypto key mypubkey
rsa1720-1#!-- The RSA key pairs are no longer available.
```

## PIX 証明書および RSA キー ペアの削除

コマンド :

- **no ca identity ca nickname** : PIX から証明書を削除します。
- **ca zeroize rsa** : PIX から RSA キー ペアを削除します。


PIX 上の証明書を削除するには、次の例を実行してください。

```
pix520-1(config)# no ca identity cisco% Removing the identity will destroy all certificates.% Be
sure to ask the CA administrator to revoke your certificates.pix520-1(config)# sh cr ca
certpix520-1(config)#!--- The certificates are no longer available.
```

PIX 上の RSA キー ペアを削除するには、次の例を実行してください。

```
pix520-1(config)# ca zeroize rsapix520-1(config)# sh ca mypubkey rsa!--- The RSA key pairs are
no longer available.
```

## 関連情報

- [IPSec に関するサポート ページ](#)
- [PIX に関するサポート ページ](#)
- [Requests for Comments \( RFC \)](#) 
- [テクニカルサポート - Cisco Systems](#)