

# 在ISR4000上配置安全SIP SRST

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## 簡介

本檔案介紹如何在ISR4000系列路由器和Cisco Unified Communications Manager(CUCM)上設定安全作業階段啟始通訊協定(SIP)Survivable Remote Site Telephony(SRST)。

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## 必要條件

### 需求

思科建議您瞭解以下主題：

思科整合通訊管理員(CUCM)

Cisco整合Survivable遠端站點電話(SRST)

傳輸層安全(TLS)

安全即時傳輸通訊協定(SRTP)

即時傳輸通訊協定(RTP)

作業階段啟始通訊協定(SIP)

使用者資料包通訊協定 (UDP)

採用元件

CUCM:10.5.2

SIP SRST版本 — 根據SRST管理指南至少為[12.1](#)

SRST路由器：ISR 4451

CA伺服器：已在ISR 2921和第三方CA伺服器上測試。

測試的電話：78XX和88XX

根據SRST相容性清單的平台容[量](#)和[韌體要求](#)。

ISRG2用作IOS CA伺服器 ( 同一個SRST網關也可以用作IOS CA伺服器 )

**注意：**本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除 ( 預設 ) 的組態來啟動。如果您的網路運作中，請確保您瞭解任何指令可能造成的影響。

## 安全SRST概述

Cisco Unified Secure SRST提供身份驗證、完整性和媒體加密等安全功能。

身份驗證為一方提供了保證，確保它聲稱自己是另一方。

完整性可保證給定資料在實體之間未被更改。

加密意味著保密；也就是說，除了預期接收者，任何人都不能讀取資料。這些安全功能可為Cisco Unified SRST語音呼叫提供隱私保護，並可防止語音安全違規和身份盜用。

在以下情況下實現SRST安全性：

- 終端裝置透過憑證進行驗證。
- 通過TCP的傳輸層安全性(TLS)對信令進行身份驗證和加密。
- 安全媒體路徑會透過安全即時傳輸通訊協定(SRTP)進行加密。
- 證書由證書頒發機構(CA)生成和分發

## 背景資訊

在此配置之前，必須將CUCM調整到啟用安全功能的混合模式。

電話必須註冊為安全電話。

有關如何在安全模式下向CUCM註冊電話的資訊，請檢查[IP電話安全和CTL](#)

要使Cisco 4000系列整合多業務路由器支援安全SIP SRST，請在路由器上啟用以下技術包許可證：

安全性 uck9

## 設定步驟和範例

### 步驟1.在SRST和CA伺服器上啟用Http

```
ip http server
```

```
Router1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router1(config)#ip http server
Router1(config)#
```

### 2.IOS CACA

#### A)基於IOS的CA伺服器:

- 建立Cisco IOS證書伺服器:

1. **crypto pki** serverCA-Name
2. **database level**{minimal| names | complete}

**minimal:** Enough information is stored only to continue to issue new certificates without conflict; this is the default.

**names:** In addition to the information given in the minimal level, the serial number and subject name of each certificate are stored.

**complete:** In addition to the information given in the minimal and names levels, each issued certificate is written to the database.

3. **database url**root-url

The default location for the database entries to be written is flash; however, NVRAM is recommended for this task.

4. **issuer-name**DN-string  
Eg: issuer-name CN= CA-Name
5. **grant auto**
6. **no shutdown**

```

router(config)#crypto pki server srstcaserver
router(cs-server)#databa
router(cs-server)#database level complete
router(cs-server)#database url nvram
% Server database url was changed. You need to move the
% existing database to the new location.
router(cs-server)#issuer-name CN=srstcaserver
router(cs-server)#grant auto
router(cs-server)#no shut
%Some server settings cannot be changed after CA certificate generation.
% Please enter a passphrase to protect the private key
% or type Return to exit
Password:

Re-enter password:
% Generating 1024 bit RSA keys, keys will be non-exportable...
[OK] (elapsed time was 0 seconds)

% Certificate Server enabled.
router(cs-server)#

```

- 自動註冊並向CA伺服器驗證SRST路由器;

1. **crypto pki trustpoint** SRST-Trustpoint-Name
  2. **enrollment url** url
- If the CA is on your router itself url would be http://router-ip-address
3. **revocation-check** none
  4. **rsa keypair** keypair-label
  5. exit
  6. **crypto pki authenticate** SRST-Trustpoint-Name

Certificate has the following attributes:

Fingerprint MD5: 4C894B7D 71DBA53F 50C65FD7 75DDBFCA

Fingerprint SHA1: 5C3B6B9E EFA40927 9DF6A826 58DA618A BF39F291

% Do you accept this certificate? [yes/no]: y

Trustpoint CA certificate accepted.

```

Router1(config)#crypto pki trustpoint srstca
Router1(ca-trustpoint)#rsa keypair srstcakey 2048
Router1(ca-trustpoint)#enrollment url http:// . . . . .
Router1(ca-trustpoint)#revo
Router1(ca-trustpoint)#revocation-check none
Router1(ca-trustpoint)#exit
Router1(config)#cryp
Router1(config)#crypto pki auth
Router1(config)#crypto pki authenticate srstca
Certificate has the following attributes:
    Fingerprint MD5: AA086E13 EE0E5F61 2A585804 2DA3FB28
    Fingerprint SHA1: DD59741A DB10F1E3 566F6F9E C0AC97C2 9B7116D0

% Do you accept this certificate? [yes/no]: yes
Trustpoint CA certificate accepted.

```

## 7. crypto pki enroll SRST-Trustpoint-Name

% 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 fully-qualified domain name in the certificate will be: router.cisco.com
% The subject name in the certificate will be: router.cisco.com
% Include the router serial number in the subject name? [yes/no]: y
% The serial number in the certificate will be: DOB9E79C
% Include an IP address in the subject name? [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 pki certificate' command will also show the fingerprint.
```

```
Sep XX 00:41:55.427: CRYPTO_PKI: Certificate Request Fingerprint MD5: D154FB75
2524A24D 3D1F5C2B 46A7B9E4
```

```
Sep XX 00:41:55.427: CRYPTO_PKI: Certificate Request Fingerprint SHA1: 0573FBB2
98CD1AD0 F37D591A C595252D A17523C1
```

```
Sep XX 00:41:57.339: %PKI-6-CERTRET: Certificate received from Certificate Authority
```

```
Router1(config)#crypto pki enroll srstca
%
% 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 include: Router1
% Include the router serial number in the subject name? [yes/no]: yes
% The serial number in the certificate will be: FLM2008W049
% Include an IP address in the subject name? [no]: n
Request certificate from CA? [yes/no]: y
% Certificate request sent to Certificate Authority
% The 'show crypto pki certificate verbose srstca' command will show the fingerprint.
```

## **B)第三方CA伺服器**

### **摘要步驟:**

1. **crypto key generate rsa general-keys label SRST-Trustpoint-Name modulus 2048**
2. Router(config)#**crypto pki trustpoint srstca**  
Router(ca-trustpoint)#**enrollment terminal pem**  
Router(ca-trustpoint)#**subject-name CN=srstca**  
Router(ca-trustpoint)#**revocation-check none**  
Router(ca-trustpoint)#**rsa keypair cube**

```
Router1#
Router1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router1(config)#crypto key generate rsa gene
Router1(config)#crypto key generate rsa general-keys label srstca mod
Router1(config)#crypto key generate rsa general-keys label srstca modulus 2048
The name for the keys will be: srstca

% The key modulus size is 2048 bits
% Generating 2048 bit RSA keys, keys will be non-exportable...
[OK] (elapsed time was 1 seconds)

Router1(config)#
Router1(config)#
Router1(config)#
Router1(config)#
Router1(config)#cryp
Router1(config)#crypto pki tru
Router1(config)#crypto pki trustp
Router1(config)#crypto pki trustpo?
trustpoint trustpool

Router1(config)#crypto pki trustpoi
Router1(config)#crypto pki trustpoint srstca
Router1(ca-trustpoint)#enr
Router1(ca-trustpoint)#enrollment term
Router1(ca-trustpoint)#enrollment terminal pem
Router1(ca-trustpoint)#subje
Router1(ca-trustpoint)#subject-?
subject-alt-name subject-name

Router1(ca-trustpoint)#subject-name CN=srstca
Router1(ca-trustpoint)#revo
Router1(ca-trustpoint)#revocation-check non
Router1(ca-trustpoint)#revocation-check none
Router1(ca-trustpoint)#rsa
Router1(ca-trustpoint)#rsakeypair ?
WORD RSA keypair label

Router1(ca-trustpoint)#rsakeypair srstca
Router1(ca-trustpoint)#
Router1(ca-trustpoint)#
Router1(ca-trustpoint)#
```

### 3. **Crypto pki enroll** srstca



```

Router1(config)#crypto pki enroll srstca
% Start certificate enrollment ..

% The subject name in the certificate will include: CN=srstca
% The subject name in the certificate will include: Router1
% Include the router serial number in the subject name? [yes/no]: no
% Include an IP address in the subject name? [no]: no
Display Certificate Request to terminal? [yes/no]: yes
Certificate Request follows:

-----BEGIN CERTIFICATE REQUEST-----
MIICjzCCAAXcCAQAwKTEPMA0GA1UEAxMGc3JzdGNhMRYwFAYJKoZIhvcNAQkCFgdS
o3V0ZXIwMIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAA2rjyhAoTJq2e
//G6iM35Uu51aZPCDV6cFmBWxtOL0Qa2GQKe9odovPBLvV9zSzyw8bxSGkBYs1Qu
n9jgSV2f3IAV79S+oTXf/TEhYlsqWbmf6hm60jdZXjXF0w+4Wuidg1wSfAuaI+FY
8Y6jPRUAqYTZeJTnnp6q/8MfxLhIvyFBX3tzIgx0570sxFtY17rMQsdKfggvRUQ
Up4CFYm7LzFSn4uUM8/NOKcgJzJkihWY3VMsIXOg37d0M0tmAWdrIkIuAftF7pga
3sU5qJuD354Bm8tzkpBOUrf0YshDW93LWP6JZpov9WDFL5qa16pw1WZ3nAiGGINA
2kwitkibjwIDAQABoCEwHwYJKoZIhvcNAQkOMRIwEDAObgNVHQ8BAf8EBAMCBaAw
DQYJKoZIhvcNAQEFBQADggEBAJDJzAgXRvA5DCxrXe//M7Cwp456pZgSOESLtVeu
OgZhxzis6APYwYsQg6wxzAS821OkYFO0zCIQo2yBWeN7HMhO/UUqvbaF1//PXFkm
vdXRAM1KstDwDMb6EQpArvF23DNWXuVyFPid0uMS/d8xW2OB6+r+B4VGzy1gpZgZ
EHf+gyaemBvwWIWTjX2ZaA+pCeu2Tip3nuvrMnM7j1qFPBtTcTSEw4R8b1WgHZ3W
KSOUvmPS1HJ22c0ets2ruInvt5Pz1bOLcBnCY8JkqXcqAhOv282DkPy7G+X8Y59m
opKnAh0gx5LlANcEQd4a8o09jqgQjj5gz8KMs8MTvT3wrZ8=
-----END CERTIFICATE REQUEST-----

---End - This line not part of the certificate request---

Redisplay enrollment request? [yes/no]: no
Router1(config)#
Router1(config)#
Router1(config)#

```

向第三方CA提供證書。

4. CA provides the Signed Certificate as well as the Root CA Certificate and any Intermediate (subordinate) CA certificates if any.

5. Install Root CA cert;

```
crypto pki authenticate srstca
```





```

Router1(config)#crypto pki import srstca certificate

Enter the base 64 encoded certificate.
End with a blank line or the word "quit" on a line by itself

MIIFIzCCBAugAwIBAgITeAAAAAabDPlyI/7cowAAAAABjANBgkqhkiG9w0BAQsF
ADBRMRMWEQYKcZImiZPyLQGBGRYDY29tMR0wGAYKcZImiZPyLQGBGRYKcmNkbnNv
bGxhYjEeMBwGA1UEAxMVcmNkbnNvbGxhYi1XSU4yMDEyLUNBMB4XDTE4MTAwNTE4
MzMwNVVoXDTIwMTAwNDE4MzMwNVVowETEPMA0GA1UEAxMGc3JzdGNhMIIBIjANBgkq
hkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEA2rjyhAoTJq2e//G6iM35Uu51aZPCDV6c
FmBWxtOL0Qa2GQKe9odovPBLvV9zSzyw8bxSGkBYs1Qun9jgSV2f3IAV79S+oTXf
/TEhYlsqWbmf6hm60jdZXjXF0w+4WUidglwSfAuaI+FY8Y6jPRUAqYTZeJTnnrp6
q/8MfxLhIvyFBX3tzIgx0570sxFtY17rMQsdKfggvRUQUp4CFYm7LzFSn4uUM8/N
OKcgJzJkihWY3VMsIXOg37d0M0tmAWdrIkTuAftF7pga3sU5qJuD354Bm8tzkpBO
Urf0YshDW93LWP6JZpov9WdfL5qal6pw1WZ3nAiGGINA2kwitkibjwIDAQABo4IC
MjCCAI4wDgYDVR0PAQH/BAQDAgWgMB0GA1UdDgQWBBSK4+gNzQY5gac/9LftIdsd
8z/33zAfBqNVHSMEGDAWgBQlkfwPw0Sd9YQBkRcHIJlqxHgBBjCB1gYDVR0fBIHO
MIHLMiHIoIHFOIHChOG/bGRhcDovLy9DTjlyY2RuY29sbGFiLVdJTjIwMTItQ0Es
Q049d2luMjAxMjY2Zj1DRFAsQ049UHViBGljJTJwS2V5JTJwU2VydmljZXMsQ049
U2VydmljZXMsQ049Q29uZmlndXJhdGlvbixEQzlyY2RuY29sbGFiLERDPWNvbT9j
ZXJ0aWZpY2F0ZVJldm9jYXRpb25MaXN0P2Jhc2U/b2JqZWN0Q2xhc3M9Y1JMRGlz
dHJpYnV0aW9uUG9pbmQwgcoGCCsGAQUFBwEBBIG9MIG6MIG3BggrBgEFBQcwAoaB
qmXkYXA6Ly8vQ049cmNkbnNvbGxhYi1XSU4yMDEyLUNBLENOPUFJQSxDTj1QdWJs
aWwMlMjBLZkxklmJBTXJ2aWNlcyxDTj1TZXJ2aWNlcyxDTj1Db25maWdlcmF0aW9u
LERDPXJjZG5jb2xsYWIscm9yY29tP2NBQ2VydGlmawWnhdGU/YmFzZT9vYmplY3RD
bGFzc2l1jZXJ0aWZpY2F0aW9uQXV0aG9yaXR5MCEGCsGAQQBgjcUAQQUHhIAVwBl
AGIAUwBlAHIAAgBlAHITwEwYDVR0lBAwwCgYIKwYBBQUHAWAwEwDQYJKoZIhvcNAQEL
BQADggEBAC+YzH4UyqXF3dZp5wP3PHvTa64Bhynp8x6EmwGVEcw55EOKZI8x+bR2
cfbailJbs+LVXxjbTHfywtF2a9mg79QF4QEIQbbWoN75doYhYXa4CJfJf2nQahgc
F8cRBejSSs4n+WwGqagWmCe6qq34ZStEVTd62YAogujT3gErSS1rj6hKx8U1C6XV
4yDKSRmRjvIqK4Lkf9R/A6Bb95zHz5euYIewUpKzHU3nILE7x+vX1Cd/rSWesnG
JsUtctJx1a89Wg7OH4fOLZgEfFul3x3nGbL0//lgkOiTUSQcYVaNhgIw+36HVDGY
PW12TrRRRnZpAYpplhTmu/4Cp2JOuu4s=
quit
% Router Certificate successfully imported

```

### 步驟3.在SRST路由器上啟用憑據服務：

#### 摘要步驟：

1. **credentials**
2. **ip source-address** srst-router-ip port 2445
3. **trustpoint** SRST-trustpoint-name

```

credentials
ip source-address 10.10.10.1 port 2445
trustpoint srstca

```

### 步驟4.將Privacy Enhanced Mail(PEM)格式的電話證書檔案匯入到Secure SRST路由器：

CallManager-trust	<a href="#">CAPF-2fbd03a4</a>
CallManager-trust	CAPF-dc30da68
CallManager-trust	<a href="#">Cisco_Manufacturing_CA</a>
CallManager-trust	<a href="#">CAPF-19a340e5</a>
CallManager-trust	<a href="#">CAP-RTP-002</a>
CallManager-trust	<a href="#">CAPF-851d4452</a>
CallManager-trust	<a href="#">Cisco_Manufacturing_CA_SHA2</a>
CallManager-trust	<a href="#">CAP-RTP-001</a>
CallManager-trust	<a href="#">cm10</a>
CallManager-trust	<a href="#">ACT2_SUDI_CA</a>
CAPF	<a href="#">CAPF-72c7ffbb</a>
CAPF-trust	Cisco Root CA 2048
CAPF-trust	<a href="#">CAPF-72c7ffbb</a>
CAPF-trust	<a href="#">Cisco_Root_CA_M2</a>
CAPF-trust	<a href="#">CAPF-2fbd03a4</a>
CAPF-trust	Cisco Manufacturing CA
CAPF-trust	<a href="#">CAP-RTP-002</a>
CAPF-trust	<a href="#">CAPF-851d4452</a>
CAPF-trust	<a href="#">Cisco_Manufacturing_CA_SHA2</a>
CAPF-trust	<a href="#">CAP-RTP-001</a>
CAPF-trust	<a href="#">ACT2_SUDI_CA</a>
ipsec	<a href="#">cm10.vipul.com</a>
ipsec-trust	<a href="#">cm10.vipul.com</a>
ITLRecovery	<a href="#">ITLRECOVERY_cm10</a>

為您的SRST路由器上的每個信任點配置信任點。確保提供與.pem相同的信任點名稱。

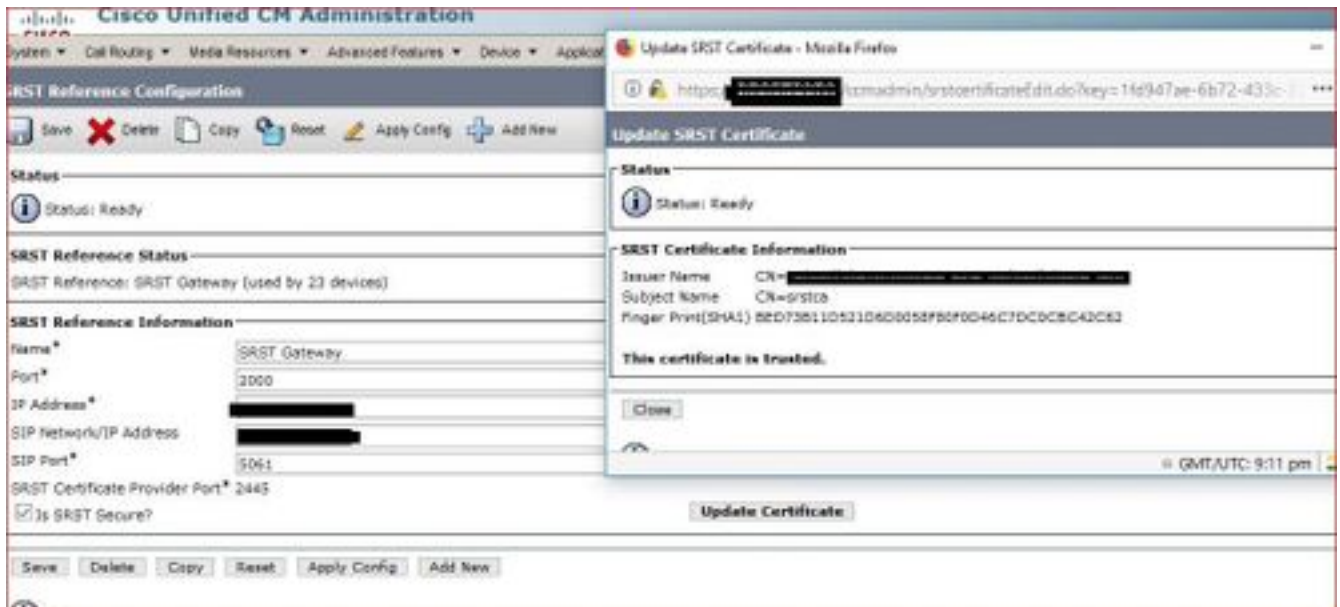
**摘要步驟：**

1. **crypto pki trustpointname**
2. **revocation-check none**
3. **enrollment terminal**
4. **exit**
5. **crypto pki authenticate name**

這裡複製相應.pem檔案的-----BEGIN CERTIFICATE-----和-----END CERTIFICATE-----之間出現的所有內容，並在結尾處顯示空白行，或複製文字quit，並將其貼上到終端機上，請按enter。







## 步驟6.您的SRST路由器的SRST特定配置

### A)。為加密電話配置SIP SRTP

#### 摘要步驟：

```
enable
configure terminal
voice service voip
srtp
allow-connections sip to h323
allow-connections sip to sip
end
```

附註：如果希望非srtp呼叫正常工作，請使用srtp回退。

### B)。配置SIP SRST安全策略

:

```
voice register global
security-policy secure
```

## 配置示例

```
Router1#sh run
Building configuration...
```

```
Current configuration : 43277 bytes
```

```
!  
!  
!  
version 16.8  
  
service timestamps debug datetime msec localtime  
service timestamps log datetime msec localtime  
service sequence-numbers  
  
platform qfp utilization monitor load 80  
  
no platform punt-keepalive disable-kernel-core  
  
!  
  
hostname Router1  
  
!  
  
boot-start-marker  
boot system bootflash:isr4400-universalk9.16.08.01.SPA.bin  
boot-end-marker  
  
!  
  
!  
  
vrf definition Mgmt-intf  
  
!  
address-family ipv4  
exit-address-family  
  
!  
address-family ipv6  
exit-address-family  
  
!  
  
! card type command needed for slot/bay 0/2  
  
no logging queue-limit  
logging buffered 10000000  
no logging rate-limit  
no logging console  
enable password cisco  
  
!
```



no aaa new-model

!

no ip domain lookup

!

!

!

!

!

!

!

!

!

!

subscriber templating

!

!

!

!

!

!

!

multilink bundle-name authenticated

!

!

!

!

!

!

crypto pki trustpoint TP-self-signed-2252801652

enrollment selfsigned

subject-name cn=IOS-Self-Signed-Certificate-2252801652

revocation-check none

rsakeypair TP-self-signed-2252801652

!

crypto pki trustpoint srstca

enrollment url <http://X.X.X.X:80>

serial-number

revocation-check none

rsakeypair srstcakey 2048

!

crypto pki trustpoint CAPF

enrollment terminal

revocation-check none

!

crypto pki trustpoint ACT2\_SUDI\_CA

enrollment terminal

revocation-check none

!

crypto pki trustpoint CAPF-2fbd03a4

enrollment terminal

revocation-check none

!

crypto pki trustpoint CAPF-72c7ffbb

enrollment terminal

revocation-check none

!

crypto pki trustpoint CAPF-851d4452

enrollment terminal

revocation-check none

!

crypto pki trustpoint CAP-RTP-001

enrollment terminal

revocation-check none

!

crypto pki trustpoint CAP-RTP-002

enrollment terminal

revocation-check none

!

crypto pki trustpoint Cisco\_Manufacturing\_CA

enrollment terminal

revocation-check none

!

crypto pki trustpoint Cisco\_Manufacturing\_CA\_SHA2

enrollment terminal

revocation-check none

!

crypto pki trustpoint Cisco\_Root\_CA\_2048

enrollment terminal

revocation-check none

!

crypto pki trustpoint Cisco\_Root\_CA\_M2

enrollment terminal

revocation-check none

!

crypto pki trustpoint CAPF-19a340e5

enrollment terminal

revocation-check none

!

crypto pki trustpoint CAPF-dc3cda68

enrollment terminal

revocation-check none

!

!

crypto pki certificate chain TP-self-signed-2252801652

certificate self-signed 01

30820330 30820218 A0030201 02020101 300D0609 2A864886 F70D0101 05050030

31312F30 2D060355 04031326 494F532D 53656C66 2D536967 6E65642D 43657274  
69666963 6174652D 32323532 38303136 3532301E 170D3138 30353232 31393534  
35315A17 0D323030 31303130 30303030 305A3031 312F302D 06035504 03132649  
4F532D53 656C662D 5369676E 65642D43 65727469 66696361 74652D32 32353238  
30313635 32308201 22300D06 092A8648 86F70D01 01010500 0382010F 00308201  
0A028201 01009A19 F3B5F20E E7451414 CB037164 CDE972C0 C3CBA15B 9A1B47AC  
36BF9279 B910BBDD 4EB7AA4B 59D2D498 1D9864E7 83FDBA4B 256F99C6 FD4F8BF8  
041692BB 6996565C 2B956192 ACAB67B2 50E6A345 0F587D3C D743DA12 FB4720BB  
74F45FF9 5030CDAD 6182981C FE9AB5C7 C87FE94F 08FA1D46 37D3AC40 D6AB5311  
ED0CE720 AA2CE8FC 38A1B392 86B2D5C9 01E3D052 51CC8925 CBF790D D5DBC179  
FDCA96C7 004483B6 D4A064C6 06D1F593 45610881 94E8AEC2 27E71EAF 412E9DE1  
DBA67CA5 4C5B8E2F D547A86B 374A04B8 F4A04AE7 9D38D398 B43801AE 779DD7A3  
B26FD7AE 542D15BC 71A1E602 E2710F70 587D7380 508FC890 1CD3CF7D A541DCB5  
025F645D CF9B0203 010001A3 53305130 0F060355 1D130101 FF040530 030101FF  
301F0603 551D2304 18301680 14C3E99A 3F385791 A48AB9CE A8A499B9 D07449D4  
58301D06 03551D0E 04160414 C3E99A3F 385791A4 8AB9CEA8 A499B9D0 7449D458  
300D0609 2A864886 F70D0101 05050003 82010100 39D88E81 B3762195 4E312E27  
1B5F1B0F 41D1F3C1 2BD6D35D 70B8FFCA 9B94DD5F 4176549B 3B91CD8B 63B67B9B  
2A0DAE22 F1FF44A4 12FB9E45 2E6A7040 5745F00E E585F4B9 F3358ABA BBA28EF6  
2DBE3930 250BC148 37A667EB C8B02B57 8A69AB6C 6F63E7D5 3FE0B6E7 7E0C5187  
87948F48 CD2B0275 D7E1538A EB91D857 083D47C1 41D78DB9 2B23E37D A08684C9  
4FC9FD8D 16809B90 331A2E28 B11F090B 867D4453 5B00F635 32477591 5D68044F  
44AC8679 997F6CA5 A4243FA2 C920A7B9 763881F5 EDA90EC1 F92611A4 E9D00B40  
A034343D 8C516C12 01A36C4D 305F85F2 FE76DD08 8B2958FD 44810372 694D80E8  
CB836B61 46B7E336 F2993913 BA6A9878 F47D35B7

quit

crypto pki certificate chain srstca

certificate 02

30820291 308201FA A0030201 02020102 300D0609 2A864886 F70D0101 05050030  
17311530 13060355 0403130C 73727374 63617365 72766572 301E170D 31383130  
30333137 35313332 5A170D31 39313030 33313735 3133325A 3031312F 30120603  
55040513 0B464A43 32313337 44313232 30190609 2A864886 F70D0109 02160C41

4E41532D 54455354 5F465830 82012230 0D06092A 864886F7 0D010101 05000382  
010F0030 82010A02 82010100 A38F8654 32A14C89 94139845 9BFE0C10 E229EBB4  
F4F2466B 1AA81A3C A0C9F48F D421C5D7 A3B7CCC3 61C80E70 82850A29 B862FED8  
DE82E342 4E5FAE59 F2EF6DE5 61DCC85A BB9F38C0 0C20C94D 601A7F9B 1FC9DEA0  
06690351 44BC61D2 C21AAEC8 92084F45 E3A0E91B D1961D49 F4604B29 78C93417  
EF8D8F6C DE842A22 935F99E7 940F8160 37DDB460 6CDAFC36 7A8C9BD6 B05B0D67  
D5919817 FEBFA31D 4F681558 2B241BA2 B865E06A AAF68493 B67F86A4 681865BD  
6E5794FD BA70435C 910FBFF3 F0A15C26 BBF96D72 05A567F9 B6406E1D A60F559D  
A08B7F79 4D0C3201 9E7AA715 E711D4ED 174B6352 340BA097 289E577B E21FC6F6  
13A1F17D F2461076 6C68A461 02030100 01A34F30 4D300B06 03551D0F 04040302  
05A0301F 0603551D 23041830 1680142B F374EDE2 C716627B CEE1A0F2 BEE9D139  
2E4C7B30 1D060355 1D0E0416 04144E01 3013A936 E68046F8 62A3A552 89635BAB  
9127300D 06092A86 4886F70D 01010505 00038181 0059B995 2E24119E 731DE753  
0D13A8A2 63937E96 834BC76D F6160309 9D6AF8EA FBA0134A 1655731C 8387A0FA  
3092B7CA 66947B1C 1B12EF42 E19AB43D 2570664C 82D58CE9 6747F0A5 D1FC1ED7  
B25454B2 B1570F1A 783D1FAB E76C2938 136C9475 3F1A63E8 4D931DD0 97B5D0FA  
CFC879FD B9CC3A3A 49037341 D61EC7D6 F3781DE8 F5

quit

certificate ca 01

30820207 30820170 A0030201 02020101 300D0609 2A864886 F70D0101 04050030  
17311530 13060355 0403130C 73727374 63617365 72766572 301E170D 31383130  
30333136 31363338 5A170D32 31313030 32313631 3633385A 30173115 30130603  
55040313 0C737273 74636173 65727665 7230819F 300D0609 2A864886 F70D0101  
01050003 818D0030 81890281 8100BB90 D2ABF45E 235EC458 80CAF0AC 5E7E9D16  
A2BE8B5E DC3C8F78 C6CD325F 5A7DAED0 06FAB17A 1E9A8C50 D661E3EE 8B9DC29E  
5DCD1B36 2AC4B89B E844F2F9 B98D54B8 CE539098 BBAC4913 E6822196 00C6964E  
16B793DD B7E7A5E7 CFC66CD1 3E01965D FBC29260 052AFBF2 930832E6 DF976644  
EC89CDAC 9B48A8C0 47CD30B6 219B0203 010001A3 63306130 0F060355 1D130101  
FF040530 030101FF 300E0603 551D0F01 01FF0404 03020186 301F0603 551D2304  
18301680 142BF374 EDE2C716 627BCEE1 A0F2BEE9 D1392E4C 7B301D06 03551D0E  
04160414 2BF374ED E2C71662 7BCEE1A0 F2BEE9D1 392E4C7B 300D0609 2A864886  
F70D0101 04050003 81810021 90395C26 1C020400 22F51B91 84715407 DB17A0C6



63E1D9FD 45F6B4C5 9F20823C 77C6A8E5 36488C3D F6D91F00 87567D03 D6C35A79  
665DB0BC 3C96A357 C402ABE8 47472636 28EC20F5 787D79F5 C913B62D 4B4E236F  
9FF26BB8 B1BC4A11 82AE890A 83258084 2F288359 5F52E5DB 80F7A7DC A923BE70  
83C9B689 6DB4A7F5 59DA9F

quit

crypto pki certificate chain CAPF

certificate ca 6DBF757CC9B4B5D97357362ACF2F6A5B  
308203A1 30820289 A0030201 0202106D BF757CC9 B4B5D973 57362ACF 2F6A5B30  
0D06092A 864886F7 0D01010B 05003065 310B3009 06035504 06130255 53310E30  
0C060355 040A0C05 63697363 6F310C30 0A060355 040B0C03 74616331 16301406  
03550403 0C0D4341 50462D37 32633766 66626231 0B300906 03550408 0C027478  
31133011 06035504 070C0A72 69636861 7264736F 6E301E17 0D313830 33323032  
30303730 385A170D 32333033 31393230 30373037 5A306531 0B300906 03550406  
13025553 310E300C 06035504 0A0C0563 6973636F 310C300A 06035504 0B0C0374  
61633116 30140603 5504030C 0D434150 462D3732 63376666 6262310B 30090603  
5504080C 02747831 13301106 03550407 0C0A7269 63686172 64736F6E 30820122  
300D0609 2A864886 F70D0101 01050003 82010F00 3082010A 02820101 00B65FDA  
4AA4FBAF 24374D68 110FF40D FDD90234 C0242C1C 6928A6AB 06E98725 62B6F006  
A1CE0D00 8C70B706 9961FF19 06FB66F0 66DF762F C739884C 3A29B36C E0F7BF1C  
9178182D 19C9AA3C 7B26840F 0B14E615 8B65E27B C1777D57 0DA158C8 0E203B16  
A00B5124 2C3A09FE 3871921B E7D3A7BD 8316B6C1 C18F09F2 2F5A62D1 A04E7709  
E1C9C0AC 8DE1F853 D63A64DD 7980EE9D 085DBEBB BE788B30 E644E364 868A0F11  
2764218A 3B86A603 AE58575B C5D53E47 69819971 2A6C3038 0390138D 904C5632  
2167CA22 A3F35409 2A2047BB F09A220F 13796E6D 044C19FB 3C15B2CE F90FFCD5  
8ED067DB 6E7F28F6 BE0DE28F 97B99AE8 726E3E75 093B9208 414033B7 DF020301  
0001A34D 304B300B 0603551D 0F040403 0202A430 1D060355 1D250416 30140608  
2B060105 05070301 06082B06 01050507 0305301D 0603551D 0E041604 145E5F34  
7B18A5FE 71A2A609 0DFB5A15 3A8B9A38 A2300D06 092A8648 86F70D01 010B0500  
03820101 003364ED 00769497 12D3A98D FB362FAE 4241391D FF8B40D9 C9D28565  
B633A082 46EAF721 1E7C96E6 BD82CFB6 64D0908A C0B09941 66C905E1 2FEE394F  
560E89A0 E159983A A492D1E3 741A42CC 9B2D75E4 B1145EF1 C0956B76 380A1BE3  
B9C1A6BF F1AD89C4 F3A0FDD0 455EAB60 4C85814F 821D4DEA D43AC5DD E43702FA

50F6B7F3 82FF80AC 647731E5 A79372EE 1666EEF6 A18BF2BE B2FDC8BE C9CAA4EE  
A658E864 3C66ECFA BA3213D3 576F124F B14B56E3 802B0B9C 9026FB69 00373361  
66002D9F EAD2C465 2E473265 2550098E 3FD28A04 3850BDA4 32EBC7FA 03A75A8F  
80C2AFEB F108500B 97F5D6E9 06854D5C A6E656F6 0BAD484F B49C0857 8EC4D05E  
73379F52 83

quit

crypto pki certificate chain ACT2\_SUDI\_CA

certificate ca 61096E7D000000000000C

3082043C 30820324 A0030201 02020A61 096E7D00 00000000 0C300D06 092A8648  
86F70D01 01050500 30353116 30140603 55040A13 0D436973 636F2053 79737465  
6D73311B 30190603 55040313 12436973 636F2052 6F6F7420 43412032 30343830  
1E170D31 31303633 30313735 3635375A 170D3239 30353134 32303235 34325A30  
27310E30 0C060355 040A1305 43697363 6F311530 13060355 0403130C 41435432  
20535544 49204341 30820122 300D0609 2A864886 F70D0101 01050003 82010F00  
3082010A 02820101 00D26E65 DD31C8C4 0F6D37F8 52E6A47F E94651A5 D77EF5A1  
3625B164 36386DEA 07C729DE 3BEC0912 E5702D52 CE68C436 15B7FCC4 6EC959AB  
7F8B47AA ABA8A290 56EE8962 F1F4E546 0B06A0A3 DFCB3BE8 D2E4E77F 74E56CE9  
F6945C99 108FB97F 9AEAD1C5 FEA46E3A 2278E267 5E0D8668 DEA3C2A7 1CE9AD62  
433DC94C E2260A1E E98C40CA A682683E C6084722 8A164BCD 0139C762 CA711B78  
FE6B67BA 91B9EC0A 3299754E 223759D0 4D8D98E7 A5F8E0EB A17E3F84 9A0E419B  
0577468F 5DE855E1 7E132156 2EB1638F DEDF2F6F BCA1AB95 E3742BBE 77F777F1  
9FA978FB 7B0FB3FE C5E55ED1 0E8D25C9 511B3230 48F9DD17 5DF6D270 1E4CBC9D  
E6A9B334 BEAFE91D 55020301 0001A382 015A3082 0156300B 0603551D 0F040403  
0201C630 1D060355 1D0E0416 041448D8 F1F1C270 D55BBB7C 730993AF B8B83003  
F87F301F 0603551D 23041830 16801427 F3C8151E 6E9A0209 16AD2BA0 89605FDA  
7B2FAA30 43060355 1D1F043C 303A3038 A036A034 86326874 74703A2F 2F777777  
2E636973 636F2E63 6F6D2F73 65637572 6974792F 706B692F 63726C2F 63726361  
32303438 2E63726C 30500608 2B060105 05070101 04443042 30400608 2B060105  
05073002 86346874 74703A2F 2F777777 2E636973 636F2E63 6F6D2F73 65637572  
6974792F 706B692F 63657274 732F6372 63613230 34382E63 6572305C 0603551D  
20045530 53305106 0A2B0601 04010915 010C0030 43304106 082B0601 05050702  
01163568 7474703A 2F2F7777 772E6369 73636F2E 636F6D2F 73656375 72697479

2F706B69 2F706F6C 69636965 732F696E 6465782E 68746D6C 30120603 551D1301  
01FF0408 30060101 FF020100 300D0609 2A864886 F70D0101 05050003 82010100  
6875A9C9 6BF6DC78 8735A00C 4466DFBD 727AE126 A9C21F8B D6FDF866 CC4896E2  
64773F09 C0A5D252 6ED1AF73 4D703DC3 8EC7F7FB 7A95E76E 1B16F859 E2F17300  
A2520BC5 B426B9D4 8925B7C9 CD6DC298 FF8770D5 EC7EEDA9 804D440E E1082020  
4EBBC152 0FBBA6E0 004DC96B F9D14B7C 4A6129E3 F07E537A 18A6052B FA4C40A2  
8B98D484 E5ABC802 B8755A3C 8428E48C 4933BB7B 9F05325A A67BF6CF 0F4E13E1  
F754A338 2FEFCA76 450EFB9D 9D8C52A7 872978ED DEDC651E 036382C8 B853363F  
502CF18C A3CE8369 2BFBAB49 1235E167 48969951 D671FB28 D0E5E7AD 7CC9F54F  
D0814964 11ABA280 91063392 C05BFC72 95826E65 9D3DA090 4F69F022 34DF63C7

quit

crypto pki certificate chain CAPF-2fbd03a4

certificate ca 7FA76BD99C1DDA013BE037763BC78C33

3082029C 30820205 A0030201 0202107F A76BD99C 1DDA013B E037763B C78C3330  
0D06092A 864886F7 0D010105 05003065 310B3009 06035504 06130255 53310E30  
0C060355 040A1305 63697363 6F310C30 0A060355 040B1303 74616331 16301406  
03550403 130D4341 50462D32 66626430 33613431 0B300906 03550408 13027478  
31133011 06035504 07130A72 69636861 7264736F 6E301E17 0D313430 38313831  
39333633 395A170D 31393038 31373139 33363338 5A306531 0B300906 03550406  
13025553 310E300C 06035504 0A130563 6973636F 310C300A 06035504 0B130374  
61633116 30140603 55040313 0D434150 462D3266 62643033 6134310B 30090603  
55040813 02747831 13301106 03550407 130A7269 63686172 64736F6E 30819F30  
0D06092A 864886F7 0D010101 05000381 8D003081 89028181 00A175B5 F8D9CED4  
A7972459 B51B335C E1DCCF3B 6E2D9504 78A95267 C5BFEC43 5FD0B430 AD87632F  
8643B1AF 542F3028 526EA7AC F7721A3B 79BBF5BE E650883B B7AD60F1 62C7EA02  
A1DBAA49 738FE258 B47F9D28 1D6CF1E5 7974151B 9D4F8CFB 68EA7D17 68E47D75  
61787FB3 3A64CC9D 26FAB9D0 684A4F15 EA917F79 7696E0C5 7B020301 0001A34D  
304B300B 0603551D 0F040403 0202A430 1D060355 1D250416 30140608 2B060105  
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8F0197BE 8AAD174A AB785D53 FB300D06 092A8648 86F70D01 01050500 03818100  
4C39EC6E 28E512E1 B034E827 F9034E5B B01A33CF DB321FFD 30374692 8521592E  
CD7583BE 5BAB0CD7 A03E12B0 0B4E8120 A028E08C CEBEB871 67DF12B6 20000DD2

CE77ED30 188F728A B60D877D 513B9BB1 FCF79545 9FC38909 D8808EEE BB013106  
5560DAAB 3AE7ADA5 E437063E 8A50F3A7 FC5584D5 66A6B9D7 261E9331 53A66AB9

quit

crypto pki certificate chain CAPF-72c7ffbb

certificate ca 6DBF757CC9B4B5D97357362ACF2F6A5B

308203A1 30820289 A0030201 0202106D BF757CC9 B4B5D973 57362ACF 2F6A5B30  
0D06092A 864886F7 0D01010B 05003065 310B3009 06035504 06130255 53310E30  
0C060355 040A0C05 63697363 6F310C30 0A060355 040B0C03 74616331 16301406  
03550403 0C0D4341 50462D37 32633766 66626231 0B300906 03550408 0C027478  
31133011 06035504 070C0A72 69636861 7264736F 6E301E17 0D313830 33323032  
30303730 385A170D 32333033 31393230 30373037 5A306531 0B300906 03550406  
13025553 310E300C 06035504 0A0C0563 6973636F 310C300A 06035504 0B0C0374  
61633116 30140603 5504030C 0D434150 462D3732 63376666 6262310B 30090603  
5504080C 02747831 13301106 03550407 0C0A7269 63686172 64736F6E 30820122  
300D0609 2A864886 F70D0101 01050003 82010F00 3082010A 02820101 00B65FDA  
4AA4FBAF 24374D68 110FF40D FDD90234 C0242C1C 6928A6AB 06E98725 62B6F006  
A1CE0D00 8C70B706 9961FF19 06FB66F0 66DF762F C739884C 3A29B36C E0F7BF1C  
9178182D 19C9AA3C 7B26840F 0B14E615 8B65E27B C1777D57 0DA158C8 0E203B16  
A00B5124 2C3A09FE 3871921B E7D3A7BD 8316B6C1 C18F09F2 2F5A62D1 A04E7709  
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2764218A 3B86A603 AE58575B C5D53E47 69819971 2A6C3038 0390138D 904C5632  
2167CA22 A3F35409 2A2047BB F09A220F 13796E6D 044C19FB 3C15B2CE F90FFCD5  
8ED067DB 6E7F28F6 BE0DE28F 97B99AE8 726E3E75 093B9208 414033B7 DF020301  
0001A34D 304B300B 0603551D 0F040403 0202A430 1D060355 1D250416 30140608  
2B060105 05070301 06082B06 01050507 0305301D 0603551D 0E041604 145E5F34  
7B18A5FE 71A2A609 0DFB5A15 3A8B9A38 A2300D06 092A8648 86F70D01 010B0500  
03820101 003364ED 00769497 12D3A98D FB362FAE 4241391D FF8B40D9 C9D28565  
B633A082 46EAF721 1E7C96E6 BD82CFB6 64D0908A C0B09941 66C905E1 2FEE394F  
560E89A0 E159983A A492D1E3 741A42CC 9B2D75E4 B1145EF1 C0956B76 380A1BE3  
B9C1A6BF F1AD89C4 F3A0FDD0 455EAB60 4C85814F 821D4DEA D43AC5DD E43702FA  
50F6B7F3 82FF80AC 647731E5 A79372EE 1666EEF6 A18BF2BE B2FDC8BE C9CAA4EE  
A658E864 3C66ECFA BA3213D3 576F124F B14B56E3 802B0B9C 9026FB69 00373361

66002D9F EAD2C465 2E473265 2550098E 3FD28A04 3850BDA4 32EBC7FA 03A75A8F  
80C2AFEB F108500B 97F5D6E9 06854D5C A6E656F6 0BAD484F B49C0857 8EC4D05E  
73379F52 83

quit

crypto pki certificate chain CAPF-851d4452

certificate ca 497E1692253769919F72D12F6754F2CF  
308203A1 30820289 A0030201 02021049 7E169225 3769919F 72D12F67 54F2CF30  
0D06092A 864886F7 0D010105 05003065 310B3009 06035504 06130255 53310E30  
0C060355 040A0C05 63697363 6F310C30 0A060355 040B0C03 74616331 16301406  
03550403 0C0D4341 50462D38 35316434 34353231 0B300906 03550408 0C027478  
31133011 06035504 070C0A72 69636861 7264736F 6E301E17 0D313630 35323631  
37313234 345A170D 32313035 32353137 31323433 5A306531 0B300906 03550406  
13025553 310E300C 06035504 0A0C0563 6973636F 310C300A 06035504 0B0C0374  
61633116 30140603 5504030C 0D434150 462D3835 31643434 3532310B 30090603  
5504080C 02747831 13301106 03550407 0C0A7269 63686172 64736F6E 30820122  
300D0609 2A864886 F70D0101 01050003 82010F00 3082010A 02820101 00A59E68  
74D20933 FAC49493 2B2F1955 46C04608 B9D0037F 4608875C 29BC674C 2A28A147  
1213EFC5 7FFDC43E F6CD6863 AF135F2C D379B790 D2508D3C 131FA04A F6ABC3CE  
D2B1AF30 EEB6D323 3BF82553 47C83415 FCEA183B 3D6405F3 019B5CF9 D337FFE2  
D53D14F5 5E5E3CAE 6398617A F3AACD79 0FDF2503 62E71F7E 8EFBE8C3 822CBBDE  
748805B0 79C36694 C3430D8E ABF7541D B258FD44 E1191E56 13B08CCA FCDE02BB  
F4E14129 3EDB3D19 98DA5464 9E0DCC92 F84E95D3 EB318D8F AEAFB6CB 941843F2  
19864A3F 2781B7DF 5818F0FD 7A073630 D8DCB9AE 345408B5 BA58F03D C5986FFF  
7F60E295 82A8567B F11A5950 D2F0DD35 83A9AF2F 66B0AE27 93BFFEE5 89020301  
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B4E0FFF3 1EF6DC28 6386BE6E FC85E859 292993E8 28C8635E E793AF76 493934F1  
654FADF2 16B11AA0 9E73F81B 9DE787A3 A683343E 60D4FF2E 5F478199 EFC8DC6F  
8650BCA9 5EBF6FF5 09060341 0ED13620 A08C53C7 9012E2F6 7DC439DA 3C4C0DE7



AF1B7FD9 C5E019ED 6EE6D573 5FA1569B C82E54B6 7748A171 AF6A7F44 46A9E3C0  
B2B74889 39D8CA52 0A46B2FE 196AD4F4 3E0E327C 98DF3850 43FD421A D7CB64F8  
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FE203183 86

quit

crypto pki certificate chain CAP-RTP-001

certificate ca 7612F960153D6F9F4E42202032B72356  
308203A8 30820290 A0030201 02021076 12F96015 3D6F9F4E 42202032 B7235630  
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20537973 74656D73 31143012 06035504 03130B43 41502D52 54502D30 3031301E  
170D3033 30323036 32333237 31335A17 0D323330 32303632 33333633 345A302E  
31163014 06035504 0A130D43 6973636F 20537973 74656D73 31143012 06035504  
03130B43 41502D52 54502D30 30313082 0120300D 06092A86 4886F70D 01010105  
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21C1967F DEA7F4B0 969694B7 80CC196A 463DA516 54A28F47 5D903B5F 104A3D54  
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6361702D 7274702D 3030315C 43657274 456E726F 6C6C5C43 41502D52 54502D30  
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7F4BD4BA 0B5AB462 94D9167E 6D8D48F2 597CDE61 25CFADCC 5BD141FB 210275A2  
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A61CD9AE C5558A52 B5EEAA6A 08F96528 B1804B87 D26E4AEE AB7AFFE9 2FD2A574  
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74A2A6CE DC56275C A20A303D

quit

crypto pki certificate chain CAP-RTP-002

certificate ca 353FB24BD70F14A346C1F3A9AC725675  
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20537973 74656D73 31143012 06035504 03130B43 41502D52 54502D30 3032301E  
170D3033 31303130 32303138 34395A17 0D323331 30313032 30323733 375A302E  
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00038201 0D003082 01080282 010100C4 266504AD 7DC3FD8D 65556FA6 308FAE95  
B570263B 575ABD96 1CC8F394 5965D9D0 D8CE02B9 F808CCD6 B7CD8C46 24801878  
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FB4D221B 21D7A3AD 38184171 8FD8C271 42183E65 09461434 736C77CC F380EEBF  
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CDAB9FD7 A190C1A2 A462C5F2 4A6E0B02 0103A381 C33081C0 300B0603 551D0F04  
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quit

crypto pki certificate chain Cisco\_Manufacturing\_CA

certificate ca 6A6967B300000000000003

308204D9 308203C1 A0030201 02020A6A 6967B300 00000000 03300D06 092A8648  
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6D73311B 30190603 55040313 12436973 636F2052 6F6F7420 43412032 30343830  
1E170D30 35303631 30323231 3630315A 170D3239 30353134 32303235 34325A30  
39311630 14060355 040A130D 43697363 6F205379 7374656D 73311F30 1D060355  
04031316 43697363 6F204D61 6E756661 63747572 696E6720 43413082 0120300D  
06092A86 4886F70D 01010105 00038201 0D003082 01080282 010100A0 C5F7DC96  
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94A91161 121C5CEA 33201C9A 16A77DDB 99066AE2 36AFECF8 0AFF9867 07F430EE  
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27F3C815 1E6E9A02 0916AD2B A089605F DA7B2FAA 30430603 551D1F04 3C303A30  
38A036A0 34863268 7474703A 2F2F7777 772E6369 73636F2E 636F6D2F 73656375  
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22DAEBDC 87CF5921 421AE9CF 707588E0 243D5D7D 4E963880 97D56FF0 9B71D8BA  
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quit

crypto pki certificate chain Cisco\_Manufacturing\_CA\_SHA2

certificate ca 02

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6F20526F 6F742043 41204D32 301E170D 31323131 31323133 35303538 5A170D33  
37313131 32313330 3031375A 3036310E 300C0603 55040A13 05436973 636F3124  
30220603 55040313 1B436973 636F204D 616E7566 61637475 72696E67 20434120  
53484132 30820122 300D0609 2A864886 F70D0101 01050003 82010F00 3082010A  
02820101 00F4364B 42023267 DE493DF2 153BC145 69E9094E 16B948B4 471EE82A  
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DC3B9D0A 3DCD54F7 7B23EE84 5FFAFFD4 C4755067 EF9CDBE4 27D5F84E A577E7C7  
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9E06EFE3 72D96E30 AA697928 D5B6BA1F E6FB7EA5 B9028348 900008EC 2F4A9CCD  
3DF268D5 EF020301 0001A382 01873082 0183300E 0603551D 0F0101FF 04040302  
01063012 0603551D 130101FF 04083006 0101FF02 0100305C 0603551D 20045530  
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6974792F 706B692F 63726C2F 63726361 6D322E63 726C307C 06082B06 01050507  
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010B0500 03820101 00735936 AC7E984F 88EE171B 3DABB39B CDF70A6C DBCEC83B  
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0819D3C6 9ED68410 409A3092 2D086DDF 8B44B1A8 BED1302E 0F32CAA8 93206BDE  
ED514BDA C45AF19D EB2BDB65 C0A547DA 4A4528D0 1E377ADF 285AABD3 FC1E4747  
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3BC0BE2A 0EAA876E 73

quit

crypto pki certificate chain Cisco\_Root\_CA\_2048

certificate ca 5FF87B282B54DC8D42A315B568C9ADFF

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20537973 74656D73 311B3019 06035504 03131243 6973636F 20526F6F 74204341  
20323034 38301E17 0D303430 35313432 30313731 325A170D 32393035 31343230  
32353432 5A303531 16301406 0355040A 130D4369 73636F20 53797374 656D7331  
1B301906 03550403 13124369 73636F20 526F6F74 20434120 32303438 30820120



300D0609 2A864886 F70D0101 01050003 82010D00 30820108 02820101 00B09AB9  
ABA7AF0A 77A7E271 B6B46662 94788847 C6625584 4032BFC0 AB2EA51C 71D6BC6E  
7BA8AABA 6ED21588 48459DA2 FC83D0CC B98CE026 68704A78 DF21179E F46105C9  
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0187D068 A4277FAB FFE9FAC9 40388867 B439C684 6F57C953 DBBA8EEE C043B2F8  
09836EFF 66CF3EEF 17B35818 2509345E E3CBD614 B6ECF292 6F74E42F 812AD592  
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quit

crypto pki certificate chain Cisco\_Root\_CA\_M2

certificate ca 01

30820313 308201FB A0030201 02020101 300D0609 2A864886 F70D0101 0B050030  
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6F20526F 6F742043 41204D32 301E170D 31323131 31323133 30303138 5A170D33  
37313131 32313330 3031385A 302B310E 300C0603 55040A13 05436973 636F3119  
30170603 55040313 10436973 636F2052 6F6F7420 4341204D 32308201 22300D06  
092A8648 86F70D01 01010500 0382010F 00308201 0A028201 0100D806 2521134F  
8D3A757C E93DC874 413B4DA0 65F9C2BF 9484EF6B 0B7187D4 58C26032 2CBACCBA  
BB6334DB B312426A 798586B3 E87FC992 8BE3A737 45D39483 686520DB 8AD44341

DFCA4CD4 D710CD68 2795724E 744A54F5 DA71E9A5 AF4D0CB1 6C31FB0C DE73829A  
50095E0E E335BEBA 4EC2CAE0 6EC8842D 8AB3EE92 EC0482E4 C76E4D18 B5E964CB  
6486D2F0 B8E15916 3AA62648 05EE6329 1E1583EF 1E79C182 0029D456 8F0A6DC2  
C858392D 63B87180 3AE1DCEB B3135222 05514700 88876DED D13CD7B8 DA857924  
C62A5D1D F2834D81 1FA7CDD4 198EAB69 40E6FB07 0AF28E65 3E6DE53D C132EE06  
262DECEB 1EB14562 512BF059 1731721A CC0074C3 0CBB84CA 73AD0203 010001A3  
42304030 0E060355 1D0F0101 FF040403 02010630 0F060355 1D130101 FF040530  
030101FF 301D0603 551D0E04 160414C9 00F91F8A 1FC266BD A5D26D65 0E222E34  
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86B41304 8763F57D 69AE2262 6C767292 9AF3055E 6633E597 20E00D79 346F311D  
585ECDE0 25C1C3A5 DD10DCCE 7E95F6DB 44A75DC6 7192CFA1 81FAF08D E9A6D992  
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quit

crypto pki certificate chain CAPF-19a340e5

certificate ca 4745CDD0D3E0387C09316AE7ED0914CD  
308203A1 30820289 A0030201 02021047 45CDD0D3 E0387C09 316AE7ED 0914CD30  
0D06092A 864886F7 0D010105 05003065 310B3009 06035504 06130255 53310E30  
0C060355 040A0C05 63697363 6F310C30 0A060355 040B0C03 74616331 16301406  
03550403 0C0D4341 50462D31 39613334 30653531 0B300906 03550408 0C027478  
31133011 06035504 070C0A72 69636861 7264736F 6E301E17 0D313630 35323031  
37303530 385A170D 32313035 31393137 30353037 5A306531 0B300906 03550406  
13025553 310E300C 06035504 0A0C0563 6973636F 310C300A 06035504 0B0C0374  
61633116 30140603 5504030C 0D434150 462D3139 61333430 6535310B 30090603  
5504080C 02747831 13301106 03550407 0C0A7269 63686172 64736F6E 30820122  
300D0609 2A864886 F70D0101 01050003 82010F00 3082010A 02820101 0097753D  
51483CE9 66F8EF0D DC131D63 C6B7408E C0B465A0 0D597B8E 2F7EEEBB 34E0E4F8  
77D2C53C 4C9AF2E0 D75D6F92 C5CCBDC6 C7CCB58D A1CC7288 300D9678 94E1645B

109DD7DF A7104B07 C98B41CD 7262096D A9DE1076 7F40F787 16BA70DF C18C3C66  
9453CC28 F294A7F2 BFFE8F8C 0D7268D4 55C63554 6C6B28ED 073BF7F9 BED32D99  
A5D63ACD 673D8476 5E26F6A4 73526766 7E34063D 86AFFFA5 E5B509BB 962FF514  
8263F539 2542A9DB A4473F49 E2D79CF4 C495E608 DBBA015A B2F69281 50FB0400  
8D946575 42DD1689 B2435512 0BEBC2E5 6C223C1B D5B45F40 527C67F1 F89A97AF  
5ECFD7ED 738F4D19 D5421F95 E0E940DF 1F8C83B0 28F80862 F5CDC690 55020301  
0001A34D 304B300B 0603551D 0F040403 0202A430 1D060355 1D250416 30140608  
2B060105 05070301 06082B06 01050507 0305301D 0603551D 0E041604 14F66D8B  
E1B34990 F0483694 A2D1D37E ACA52C59 22300D06 092A8648 86F70D01 01050500  
03820101 006C0E8F 9E3B17B5 C902C177 F931099A 3177669F C1196185 0A3F72E4  
EB046423 FB1C7BB1 D0D7255C BB4C6074 9AD2815F 9059FF2E 8216E473 6839DB2A  
9600C167 40172BAF 17679406 3EDDB4CD E5F5B96D 1354C6C2 7ACE1867 74EB5CB2  
0423ACE8 B66FF253 13393E13 BE08C8D6 28AF907B 2FCECC91 C1A86A2B C311DECO  
9A20C3AF FD0629A0 2A30ED70 7369F570 1A38FD85 B4BEA740 4D87AF64 42B68F99  
C8B16842 F75F49A5 2FA41571 BA9757F0 F0C7D22D 221A4442 9E20D7C7 5A90D912  
7C4BAD41 BB929AC5 89526810 F6B96C28 FC6BFE69 BEBFF33B ECC59282 0F20D269  
13A662BB E11D2E69 B1D8561B 881F35DF 8E1549A7 2154A8E1 AE967842 5CC6FC22  
0F99CE3D 90

quit

crypto pki certificate chain CAPF-dc3cda68

certificate ca 55FF50FABA2D6E7EBD5EF96F32451117  
308203A1 30820289 A0030201 02021055 FF50FABA 2D6E7EBD 5EF96F32 45111730  
0D06092A 864886F7 0D010105 05003065 310B3009 06035504 06130255 53310E30  
0C060355 040A0C05 63697363 6F310C30 0A060355 040B0C03 74616331 16301406  
03550403 0C0D4341 50462D64 63336364 61363831 0B300906 03550408 0C027478  
31133011 06035504 070C0A72 69636861 7264736F 6E301E17 0D313630 35323632  
30303430 345A170D 32313035 32353230 30343033 5A306531 0B300906 03550406  
13025553 310E300C 06035504 0A0C0563 6973636F 310C300A 06035504 0B0C0374  
61633116 30140603 5504030C 0D434150 462D6463 33636461 3638310B 30090603  
5504080C 02747831 13301106 03550407 0C0A7269 63686172 64736F6E 30820122  
300D0609 2A864886 F70D0101 01050003 82010F00 3082010A 02820101 0088A466  
E4A472FB BA1CF50D CF98FA6A BC625C9B 51B46772 30ECA673 6226002C 2E6A5F53

FD193E14 E08DEEB9 0DDF2485 1EE7DBC1 2B45973A 94659A40 37E1AAE0 CF56AE82  
78C369F2 B0BF2D7C 9072CA2C F00D9754 E641F27D 140A849C A1D71922 35167213  
30BED42B 11C7A601 C12F5DFC 0F3C4277 0638F285 9FF6F3A4 CD017CBA A4B4685B  
62BDF035 2A570A48 1ACA0618 763BBA81 C2734558 9575E08B 008A365C EE376461  
31D3FEE1 0A579F46 4CEAF0F3 4231A81B 9A82ABD7 60D91735 1DE7F325 79D15BD5  
55DD807E D37008DD F4440C36 5A8ABB0E 15EF5530 07031278 D0BFB69F 6F3BDC95  
046F7949 0A848C86 7B72BEDF 496748BC 300B3772 6E997BA8 73204638 FF020301  
0001A34D 304B300B 0603551D 0F040403 0202A430 1D060355 1D250416 30140608  
2B060105 05070301 06082B06 01050507 0305301D 0603551D 0E041604 147B0417  
3B747718 BBA4521F 3727684A 05DBDE19 5A300D06 092A8648 86F70D01 01050500  
03820101 007F6D12 E049495C 081D95F9 49FC254A EA3144DA 9CAA8A9A 5A865938  
F43D2FC3 1B060434 720B2F85 EF5EEA48 3E5F528B 9F222526 42FE5E83 59F91EBA  
EAC14360 4A05BEE3 2FA68B9E 5C49091F 34D8A956 B1ABA51F 8CD416A5 24A57763  
A26A59AC 9B525EE2 B927D87F E28DA955 7EC0D322 04AAA2A1 BB92CF21 A5D14151  
6E551D5E AEE4BE5C F205AF08 AFEB44D4 624D34AE A9ECD8DE CD09A1E1 212DAA19  
61555E04 29A2A688 76515E91 EB2600CE F005C570 7F37C514 654F2A5C 7E52B88B  
6341575E 08C71102 BC536A18 D5797501 AC8C775A 230ACCC2 41FA0B03 D3B01653  
D3083B3C F942F0A6 FC71969B 006B3975 B9DA33D1 5041A500 38646FFA 2BB0DCC4  
DB80BE20 2C

quit

!

!

!

voice service voip

ip address trusted list

ipv4 0.0.0.0 0.0.0.0

no ip address trusted authenticate

media bulk-stats

media disable-detailed-stats

srtplib

allow-connections sip to sip

no supplementary-service sip refer

```
no supplementary-service sip handle-replaces
supplementary-service media-renegotiate
fax protocol t38 version 0 ls-redundancy 0 hs-redundancy 0 fallback none
modem passthrough nse codec g711ulaw
sip
bind control source-interface GigabitEthernet0/0/0
bind media source-interface GigabitEthernet0/0/0
rellxx disable
registrar server expires max 120 min 60
!
voice class codec 1
  codec preference 1 g711ulaw
!
!
!
!
!
!
voice iec syslog
!
voice register global
  default mode
  no allow-hash-in-dn
  security-policy secure
  max-dn 50
  max-pool 40
!
voice register pool 1
  id network A.B.C.0 mask 255.255.255.0
  dtmf-relay rtp-nte
  codec g711ulaw
!
!
```

```
!  
voice-card 0/1  
    no local-bypass  
    no watchdog  
!  
voice-card 0/3  
    no watchdog  
!  
voice-card 0/4  
    no watchdog  
!  
license udi pid ISR4431/K9 sn FOCXXXXXXXXX  
license accept end user agreement  
license boot level uck9  
license boot level securityk9  
diagnostic bootup level minimal  
!  
spanning-tree extend system-id  
!  
!  
!  
!  
redundancy  
    mode none  
!  
!  
interface GigabitEthernet0/0/0  
    ip address A.B.C.D 255.255.255.192  
    negotiation auto  
!
```

```
interface GigabitEthernet0/0/1

no ip address

shutdown

negotiation auto

!

interface GigabitEthernet0/0/2

no ip address

shutdown

negotiation auto

!

interface GigabitEthernet0/0/3

no ip address

shutdown

negotiation auto

!

interface Service-Engine0/1/0

!

interface Service-Engine0/3/4

!

interface Service-Engine0/4/0

!

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

!

interface BRI0/3/0:0

isdn incoming-voice voice

!

interface BRI0/3/1:0

isdn incoming-voice voice
```

```
!  
interface BRI0/3/2:0  
    isdn incoming-voice voice  
!  
interface BRI0/3/3:0  
    isdn incoming-voice voice  
!  
ip forward-protocol nd  
ip http server  
ip http authentication local  
ip http secure-server  
ip tftp source-interface GigabitEthernet0/0/0  
ip route 0.0.0.0 0.0.0.0 GigabitEthernet0/0/0 XX.XX.XX.XX  
!  
!  
!  
!  
!  
!  
!  
control-plane  
!  
!  
voice-port 0/1/0  
    no battery-reversal  
!  
voice-port 0/1/1  
!  
voice-port 0/1/2  
!  
voice-port 0/1/3  
!  
voice-port 0/1/4
```



```
!  
voice-port 0/1/5  
  
!  
voice-port 0/3/0  
  
!  
voice-port 0/3/1  
  
!  
voice-port 0/3/2  
  
!  
voice-port 0/3/3  
  
!  
mgcp behavior rsip-range tgcp-only  
mgcp behavior comedia-role none  
mgcp behavior comedia-check-media-src disable  
mgcp behavior comedia-sdp-force disable  
  
!  
mgcp profile default  
  
!  
!  
!  
!  
  
!  
!  
!  
  
credentials  
  
ip source-address A.B.C.D port 2445  
  
trustpoint srstca  
  
!  
sip-ua
```

```
crypto signaling default trustpoint srstca
!
!
!
line con 0
logging synchronous
transport input none
stopbits 1
line aux 0
stopbits 1
line vty 0 4
logging synchronous
login local
transport input all
!
wsma agent exec
!
wsma agent config
!
wsma agent filesys
!
wsma agent notify
!
!
end
```

Router1#

## 驗證

使用本節內容，確認您的組態是否正常運作。

如果使用Cisco IOS證書伺服器作為CA，請使用 **show running-config** 命令驗證證書註冊或 **show crypto pki server** 命令以驗證CA伺服器的狀態。

## 摘要步驟

1.show running-config

2.show crypto pki server

```
Router# show crypto pki server
Certificate Server srstcaserver:
Status: enabled
Server's configuration is locked (enter "shut" to unlock it)
Issuer name: CN=srstcaserver
CA cert fingerprint: AC9919F5 CAFE0560 92B3478A CFF5EC00
Granting mode is: auto
Last certificate issued serial number: 0x2
CA certificate expiration timer: 13:46:57 PST Dec 1 2021
CRL NextUpdate timer: 14:54:57 PST Jan 19 2019
Current storage dir: nvram
Database Level: Complete - all issued certs written as <serialnum>.cer
使用show sip-ua status registrar驗證註冊
```

## 疑難排解

目前尚無適用於此組態的具體疑難排解資訊。

## 相關資訊

- [SRST管理指南](#)
- [技術支援與文件 - Cisco Systems](#)