

Configurazione di Secure SIP SRST su ISR4000

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Introduzione

In questo documento viene descritto come configurare Secure Session Initiation Protocol (SIP) Survivable Remote Site Telephony (SRST) su router ISR serie 4000 e Cisco Unified Communications Manager (CUCM).

Contributo di Ankush Vijay, Cisco TAC Engineer.

Prerequisiti

Requisiti

Cisco raccomanda la conoscenza dei seguenti argomenti:

Cisco Unified Communications Manager (CUCM)

Cisco Unified Survivable Remote Site Telephony (SRST)

TLS (Transport Layer Security)

Protocollo SRTP (Secure Real-Time Transport Protocol)

Protocollo RTP (Real-Time Transport Protocol)

SIP (Session Initiation Protocol)

UDP (User Datagram Protocol)

Componenti usati

CUCM 10.5.2

Versione SRST SIP - Minimo 12,1 come da [Guida per l'amministratore SRST](#)

Router SRST: ISR 4451

Server CA: Testato su ISR 2921 e server CA di terze parti.

Telefoni testati: 78XX e 88XX

Requisiti di capacità e firmware della piattaforma in base alla [matrice di compatibilità SRST](#).

ISRG2 utilizzato come server CA IOS (lo stesso gateway SRST può essere utilizzato anche come server CA IOS)

Attenzione: Le informazioni discusse in questo documento fanno riferimento a dispositivi usati in uno specifico ambiente di emulazione. Su tutti i dispositivi menzionati nel documento la configurazione è stata ripristinata ai valori predefiniti. Se la rete è operativa, valutare attentamente eventuali conseguenze derivanti dall'uso dei comandi.

Panoramica su Secure SRST

Cisco Unified Secure SRST offre funzionalità di sicurezza quali autenticazione, integrità e crittografia dei supporti.

L'autenticazione garantisce a una parte che un'altra parte è quella dichiarata.

L'integrità garantisce che i dati specificati non sono stati alterati tra le entità.

La crittografia implica la riservatezza; in altre parole, nessuno può leggere i dati, ad eccezione del destinatario. Queste funzionalità di sicurezza garantiscono la privacy delle chiamate vocali a Cisco Unified SRST e la protezione contro le violazioni della sicurezza vocale e il furto di identità.

La sicurezza SRST si ottiene quando:

- I dispositivi terminali vengono autenticati tramite certificati.
- La segnalazione viene autenticata e crittografata tramite Transport Layer Security (TLS) per TCP.
- Un percorso multimediale sicuro viene crittografato tramite il protocollo SRTP (Secure Real-Time Transport Protocol).

- I certificati vengono generati e distribuiti da un'Autorità di certificazione (CA)

Premesse

Prima di questa configurazione, CUCM deve essere sintonizzato in modalità Mix con sicurezza attivata.

I telefoni devono essere registrati come telefoni sicuri.

Per informazioni su come registrare i telefoni con CUCM in modalità protetta, controllare [IP Phone Security e CTL](#)

Affinché Secure SIP SRST sia supportato sui Cisco serie 4000 Integrated Services Router, abilitare le seguenti licenze di pacchetti di tecnologia sul router:

```
sicurezza uck9
```

Procedura di configurazione ed esempio

Passaggio 1. Abilitare Http sul server SRST e CA

```
server http ip
```

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

Passaggio 2. Installare il certificato dal server CA basato su IOS o dal server CA di terze parti

A) CA Server basato su IOS:

- Crea server certificati Cisco IOS:

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)#

```

- Registra e autentica automaticamente il router SRST sul server CA;

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. **rsakeypair** 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)#rsakeypair 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. registrazione pki crittografica 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: F1M2008W049
% 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) Server CA di terze parti

Passi di riepilogo:

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-----
MIICjzCCAXcCAQAwKTEPMA0GA1UEAxMGc3JzdGNhMRYwFAYJKoZIhvcNAQkCFgdS
o3V0ZXIwMIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEA2rjyhAoTJq2e
//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
opKnAh0gx5LlANcEQd4a8o09jqQjj5gz8KMs8MTvT3wrZ8=
-----END CERTIFICATE REQUEST-----

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

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

```

Fornire il certificato all'autorità di certificazione di terze parti.

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
```


Sicurezza > Gestione certificati)

Scaricare tutti i certificati elencati in CAPF-trust, inclusi Cisco_Manufacturing_CA, Cisco_Root_CA_2048, CAP-RTP-001, CAP-RTP-002, CAPF e CAPF- xxx. Scaricare inoltre i certificati CAPF- xxx elencati in CallManager-trust e non in CAPF-trust.

CallManager-trust	CAPF-2fbd03a4
CallManager-trust	CAPF-dc3cda68
CallManager-trust	Cisco_Manufacturing_CA
CallManager-trust	CAPF-19a340e5
CallManager-trust	CAP-RTP-002
CallManager-trust	CAPF-851d4452
CallManager-trust	Cisco_Manufacturing_CA_SHA2
CallManager-trust	CAP-RTP-001
CallManager-trust	cm10
CallManager-trust	ACT2_SUDI_CA
CAPF	CAPF-72c7ffbb
CAPF-trust	Cisco Root CA 2048
CAPF-trust	CAPF-72c7ffbb
CAPF-trust	Cisco_Root_CA_M2
CAPF-trust	CAPF-2fbd03a4
CAPF-trust	Cisco Manufacturing CA
CAPF-trust	CAP-RTP-002
CAPF-trust	CAPF-851d4452
CAPF-trust	Cisco_Manufacturing_CA_SHA2
CAPF-trust	CAP-RTP-001
CAPF-trust	ACT2_SUDI_CA
ipsec	cm10.vipul.com
ipsec-trust	cm10.vipul.com
ITLRecovery	ITLRECOVERY_cm10

Configurare i trust point per ognuno di essi sul router SRST. Assicurarsi di assegnare al trust point lo stesso nome del file .pem.

PASSAGGI DI RIEPILOGO:

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

Copiare qui tutto il contenuto visualizzato tra **—BEGIN CERTIFICATE—**and **—END CERTIFICATE—** del file .pem corrispondente con una riga vuota alla fine o la parola **quit** (chiudi) e incolla sul terminale, premere Invio.

```

Router1(config)#crypto pki tru
Router1(config)#crypto pki trustpoi
Router1(config)#crypto pki trustpoint Cisco_Manufacturing_CA
Router1(ca-trustpoint)#revocat
Router1(ca-trustpoint)#revocation-check none
Router1(ca-trustpoint)#enroll
Router1(ca-trustpoint)#enrollment termi
Router1(ca-trustpoint)#enrollment terminal
Router1(ca-trustpoint)#exit
Router1(config)#crypto pki auth
Router1(config)#crypto pki authenticate Cisco_Manufacturing_CA

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

MIIE2TCCA8GgAwIBAgIKAmInswAAAAAAzANBgkqhkiG9w0BAQUFADA1MRYwFAYD
VQQKEW1DaXNjbyBTeXN0ZW1zMRswGQYDVQQDEsJDaXNjbyBScb290IENBIDIwNDgw
HhcNMDUwNjEwMjIxNjAxNjcNMjkwNTEOMjAyNTQyWjA5MRYwFAYDVQQKEW1DaXNj
byBTeXN0ZW1zMRswGQYDVQQDEs2DaXNjbyBNYw51ZmFjdHVyaW5nIENBMTIBIDAN
BgkqhkiG9w0BAQEFAAOCAQ0AMIIBCwKCAQEAAoMX33JaUNRXx9J1Ou5tB4X3beRaR
u/NU8kFK1DJiYskj95rnu5t56AcpTjDirhVFIvZGsPj05o6BuBbMqJuF0kKB23zL
lKkRYRiC0ozIByaFqd925xGauI2r+z4Cv+YEwf0M06l+IgaqujHPBz07k9zVw3
8YaTnjlxdX007ksDqcApewDQ74eeatEw9Ug2P9irzhXi6FifPmJxBIcmpBVIASWq
ld/JyVu4yaEHe75okpOTIKhsvRV100rdRUVsqNpgx9jIicjtQeH1X1eOUzKTSdXZ
D/g2qgfEMkHPp68d6f/2c5k5WnNnYhM0DR9elXBszBcG7FwCXTq6jUAQQIBA6OC
AecwggHjMBIGA1UdEwEB/wQIMAYBAf8CAQAwHQYDVROBBYEFNDFliaarT0Eg7K4F
kcfCwGwR/dsMAAGAlUdDwQEAWIBhJAQBgkrBgEEAYI3PQEEAwIBADAZBgkrBgEE
AYI3FAIEDB4KAFMAdQBiAEMAQTA1BgNVRSMEGDAMQBgQn88gVHm6aAgkWrSuglWbf
2nsvqjBDBgNVHR8EPDA6MDIgaNqA0hjJodHRwOi8vd3d3LmNpc2NvLmNvbS99zZWN1
cml0eS9wa2kvY3JsL2NyY2E5MDQ4LmNybDBBQggrBgEFBQcBAQREMEIwQAYIKwYB
BQUHMAKGNGh0dHA6Ly93d3cuY21zY28uY29tL3N1Y3VyaXR5L3BraS9wb2xpY211cy9j
cmNhmjA0OC5jZEXiWxAYDVROBgBFUwUzBRBggrBgEEAQkVAQIAMEMwQYIKwYBBQUH
AgEWNWh0dHA6Ly93d3cuY21zY28uY29tL3N1Y3VyaXR5L3BraS9wb2xpY211cy9p
bmRleC5odG1sSMF4GA1UdJQRMFUGCCsGAQUFBwMBBggrBgEFBQcDAgYIKwYBBQUH
AwUGCCsGAQUFBwMBBggrBgEFBQcDBWYKKwYBBAGCNwoDAQYKKwYBBAGCNxQCAQYJ
KwYBBAGCNrUGMA0GCSqGSIb3DQEBBQUAA4IBAQAww8zAtjPLKN0pkmSqpCvKGGkLV
I+ii6itvaSN6go4cTAnPpE+rhC836WVg0ZrG2PML9d7QJwBcbx2RvdFOWFEdeyeP3
OOFTC9Fovo4ipUsG4eakqjN9GnW6JvNwxEAPcN5JlunGdGTjaubEBEph6GC/f08
S2513JNFBemwM2tnIwcGh1La69yHz1khQhrpz3BliOAKpV19TpY4gJfVh/Cbcdi6
YBmlsGGGrdl1Eva5J6LuL2GbusqEwYf2+rDUU+bgtlwaww+9tzD0865XpgdOKXrbo
+nmka9eiV2TEP0zJ2+ic7APm1BCIolblPFft6QKoSJfjB6thJksaE5/k3Npf
quit
Certificate has the following attributes:
  Fingerprint MD5: 6EA241F5 AC9A1148 CC8B4B43 C7C13025
  Fingerprint SHA1: E3E783D3 CC9C30AE DEFFCDEB 5ECFEE08 FF8F1684
Certificate validated - Signed by existing trustpoint CA certificate.

Trustpoint CA certificate accepted.
% Certificate successfully imported

Router1(config)#

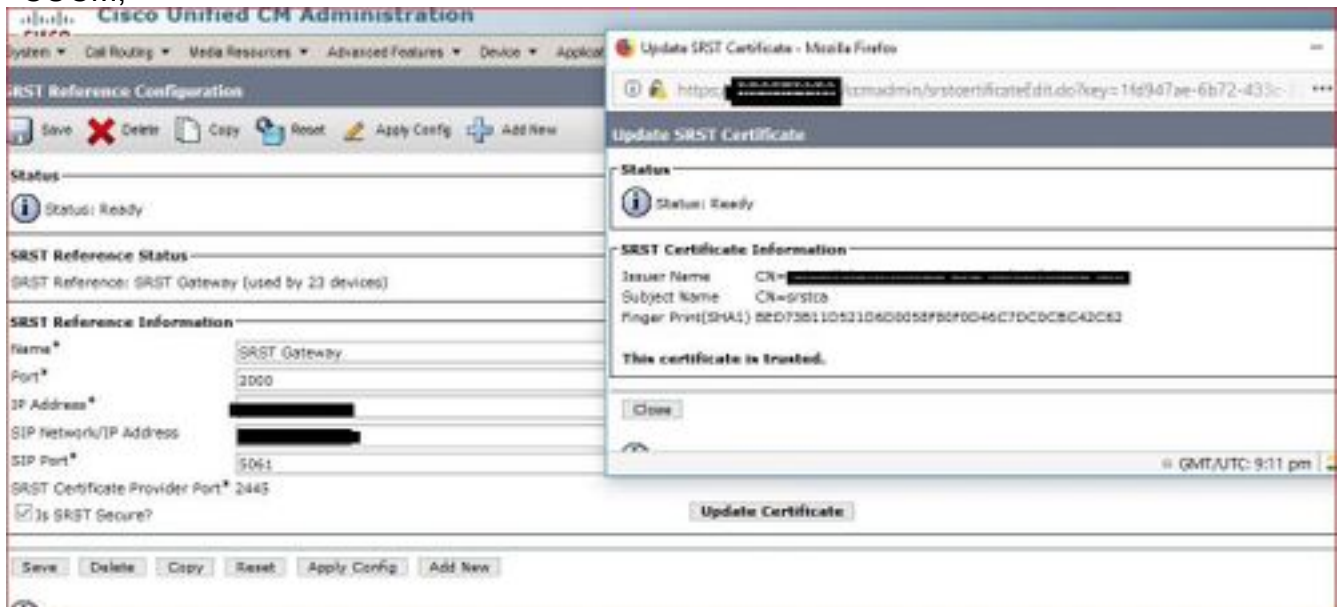
```

RIPETERE questa operazione per tutti i trust point

Passaggio 5. CONFIGURAZIONI CUCM:

1. Aggiungere il *referimento SRST* in System
2. Selezionare la casella di controllo *Is SRST Secure?*
3. Per SIP Secure-SRST, non dimenticare di modificare la porta nel riferimento SRST come **5061**.
4. Crea un profilo di sicurezza per il telefono in *Sistema>Sicurezza>Profilo sicurezza telefono*.
Aggiungi questo profilo di sicurezza al telefono in *Profilo di sicurezza del dispositivo*.
5. Selezionare *Aggiorna certificato* per verificare che il certificato SSR sia stato compilato in

CUCM;



Passaggio 6. Configurazioni specifiche per SRST per il router SRST

A) Configurazione di SIP SRTP per telefoni crittografati

PASSAGGI DI RIEPILOGO:

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

Nota: Utilizzare il fallback srtp se si desidera che le chiamate non srtp funzionino.

B) Configura criterio di sicurezza SIP SRST

PASSAGGI DI RIEPILOGO:

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

Configurazione di esempio

```
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
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FDCA96C7 004483B6 D4A064C6 06D1F593 45610881 94E8AEC C 27E71EAF 412E9DE1
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quit

crypto pki certificate chain srstca

certificate 02

30820291 308201FA A0030201 02020102 300D0609 2A864886 F70D0101 05050030
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55040513 0B464A43 32313337 44313232 30190609 2A864886 F70D0109 02160C41
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quit

certificate ca 01

30820207 30820170 A0030201 02020101 300D0609 2A864886 F70D0101 04050030
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5DCD1B36 2AC4B89B E844F2F9 B98D54B8 CE539098 BBAC4913 E6822196 00C6964E
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04160414 2BF374ED E2C71662 7BCEE1A0 F2BEE9D1 392E4C7B 300D0609 2A864886

F70D0101 04050003 81810021 90395C26 1C020400 22F51B91 84715407 DB17A0C6
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665DB0BC 3C96A357 C402ABE8 47472636 28EC20F5 787D79F5 C913B62D 4B4E236F
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83C9B689 6DB4A7F5 59DA9F

quit

crypto pki certificate chain CAPF

certificate ca 6DBF757CC9B4B5D97357362ACF2F6A5B
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0C060355 040A0C05 63697363 6F310C30 0A060355 040B0C03 74616331 16301406
03550403 0C0D4341 50462D37 32633766 66626231 0B300906 03550408 0C027478
31133011 06035504 070C0A72 69636861 7264736F 6E301E17 0D313830 33323032
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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
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73379F52 83

quit

crypto pki certificate chain ACT2_SUDI_CA

certificate ca 61096E7D000000000000C

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20535544 49204341 30820122 300D0609 2A864886 F70D0101 01050003 82010F00
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quit

crypto pki certificate chain CAPF-2fbd03a4

certificate ca 7FA76BD99C1DDA013BE037763BC78C33

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03550403 130D4341 50462D32 66626430 33613431 0B300906 03550408 13027478
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quit

crypto pki certificate chain CAPF-72c7ffbb

certificate ca 6DBF757CC9B4B5D97357362ACF2F6A5B

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03550403 0C0D4341 50462D37 32633766 66626231 0B300906 03550408 0C027478
31133011 06035504 070C0A72 69636861 7264736F 6E301E17 0D313830 33323032
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73379F52 83

quit

crypto pki certificate chain CAPF-851d4452

certificate ca 497E1692253769919F72D12F6754F2CF
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03550403 0C0D4341 50462D38 35316434 34353231 0B300906 03550408 0C027478
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61633116 30140603 5504030C 0D434150 462D3835 31643434 3532310B 30090603
5504080C 02747831 13301106 03550407 0C0A7269 63686172 64736F6E 30820122
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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
F789913E 7CF07503 4D522DC2 4952C16D 7A9751AA 7900DB9F D55F0E1D 5EAE3160
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
00038201 0D003082 01080282 010100AC 55BBED18 DE9B8709 FFBC8F2D 509AB83A
21C1967F DEA7F4B0 969694B7 80CC196A 463DA516 54A28F47 5D903B5F 104A3D54
A981389B 2FC7AC49 956262B8 1C143038 5345BB2E 273FA7A6 46860573 CE5C998D
55DE78AA 5A5CFE14 037D695B AC816409 C6211F0B 3BBF09CF B0BBB2D4 AC362F67
0FD145F1 620852B3 1F07E2F1 AA74F150 367632ED A289E374 AF0C5B78 CE7DFB9F
C8EBBE54 6ECF4C77 99D6DC04 47476C0F 36E58A3B 6BCB24D7 6B6C84C2 7F61D326
BE7CB4A6 60CD6579 9E1E3A84 8153B750 5527E865 423BE2B5 CB575453 5AA96093
58B6A2E4 AA3EF081 C7068EC1 DD1EBDDA 53E6F0D6 E2E0486B 109F1316 78C696A3
CFBA84CC 7094034F C1EB9F81 931ACB02 0103A381 C33081C0 300B0603 551D0F04
04030201 86300F06 03551D13 0101FF04 05300301 01FF301D 0603551D 0E041604
14E917B1 82C71FCF ACA91B6E F4A9269C 70AE05A0 9A306F06 03551D1F 04683066
3064A062 A060862D 68747470 3A2F2F63 61702D72 74702D30 30312F43 65727445
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6361702D 7274702D 3030315C 43657274 456E726F 6C6C5C43 41502D52 54502D30
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F70D0101 05050003 82010100 AB64FDEB F60C32DC 360F0E10 5FE175FA 0D574AB5
02ACDCA3 C7BBED15 A4431F20 7E9286F0 770929A2 17E4CDF4 F2629244 2F3575AF
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73A11AED F9B9DE74 1195C48F 99454B8C 30732980 CD6E7123 8B3A6D68 80B97E00
7F4BD4BA 0B5AB462 94D9167E 6D8D48F2 597CDE61 25CFADCC 5BD141FB 210275A2
0A4E3400 1428BA0F 69953BB5 50D21F78 43E3E563 98BCB2B1 A2D4864B 0616BACD
A61CD9AE C5558A52 B5EEAA6A 08F96528 B1804B87 D26E4AEE AB7AFFE9 2FD2A574
BAFE0028 96304A8B 13FB656D 8FC60094 D5A53D71 444B3CEF 79343385 3778C193
74A2A6CE DC56275C A20A303D

quit

crypto pki certificate chain CAP-RTP-002

certificate ca 353FB24BD70F14A346C1F3A9AC725675

308203A8 30820290 A0030201 02021035 3FB24BD7 0F14A346 C1F3A9AC 72567530
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20537973 74656D73 31143012 06035504 03130B43 41502D52 54502D30 3032301E
170D3033 31303130 32303138 34395A17 0D323331 30313032 30323733 375A302E
31163014 06035504 0A130D43 6973636F 20537973 74656D73 31143012 06035504
03130B43 41502D52 54502D30 30323082 0120300D 06092A86 4886F70D 01010105
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B570263B 575ABD96 1CC8F394 5965D9D0 D8CE02B9 F808CCD6 B7CD8C46 24801878
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FB4D221B 21D7A3AD 38184171 8FD8C271 42183E65 09461434 736C77CC F380EEBF
632C7B3F A5F92AA6 A8EF3490 8724A84F 4DAF7FD7 0928F585 764D3558 3C0FE9AF
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8A28AD8F 0F4883C0 77112A47 141DBEE0 948FBE53 FE67B308 D40C8029 87BD790E
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3064A062 A060862D 68747470 3A2F2F63 61702D72 74702D30 30322F43 65727445
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30322E63 726C3010 06092B06 01040182 37150104 03020100 300D0609 2A864886
F70D0101 05050003 82010100 56838CEF C4DA3AD1 EA8FBB15 2FFE6EE5 50A1972B
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FC73C697 11266E19 451C0FAB A55E6A28 901A48C5 B9911EE6 348A8920 0AEDE1E0
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BF78443D B08C3A41 2EEEE873 78CB8089 34F9D16E 91512F0D 3A8674AD 0991ED1A
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6918DE0F BD3C7F67 D8A33F70 9C4A596E D9F62B3B 1EDEE854 D5882AD4 3D71F72B
8FAB7F3C 0B5F0759 D9828F83 954D7BB1 57A638EC 7D72BFF1 8933C16F 760BCA94
4C5B1931 67947A4F 89A1BDB5

quit

crypto pki certificate chain Cisco_Manufacturing_CA

certificate ca 6A6967B3000000000003

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
943515F1 F4994EBB 9B41E17D DB791691 BBF354F2 414A9432 6262C923 F79AE7BB
9B79E807 294E30F5 AE1BC521 5646B0F8 F4E68E81 B816CCA8 9B85D242 81DB7CCB
94A91161 121C5CEA 33201C9A 16A77DDB 99066AE2 36AFECF8 0AFF9867 07F430EE
A5F8881A AAE8C73C 1CCEEE48 FD05C37 F186939E 3D71757D 34EE4B14 A9C0297B
0510EF87 9E693130 F548363F D8ABCE15 E2E8589F 3E627104 8726A415 620125AA
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C8D5C8ED 41E1F55F 578E5332 9349D5D9 0FF836AA 07C43241 C5A7AF1D 19FFF673
99395A73 67621334 0D1F5E95 70526417 06EC535C 5CDB6AEA 35004102 0103A382
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04040302 01863010 06092B06 01040182 37150104 03020100 30190609 2B060104
01823714 02040C1E 0A005300 75006200 43004130 1F060355 1D230418 30168014
27F3C815 1E6E9A02 0916AD2B A089605F DA7B2FAA 30430603 551D1F04 3C303A30
38A036A0 34863268 7474703A 2F2F7777 772E6369 73636F2E 636F6D2F 73656375
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72636132 3034382E 63657230 5C060355 1D200455 30533051 060A2B06 01040109
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6973636F 2E636F6D 2F736563 75726974 792F706B 692F706F 6C696369 65732F69
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2D8CF2CA 374A6499 24290AF2 86AA42D5 23E8A2EA 2B6F6923 7A828E1C 4C09CFA4
4FAB842F 37E96560 D19AC6D8 F30BF5DE D027005C 6F1D91BD D14E5851 1DC9E3F7
38E7D30B D168BE8E 22A54B06 E1E6A4AA 337D1A75 BA26F370 C66100A5 C379265B
A719D193 8DAB9B10 11291FA1 82FDFD3C 4B6E65DC 934505E9 AF336B67 23070686
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0166D410 88A256E5 3C57EDE9 02A84891 6307AB61 264B1A13 9FE4DCDA 5F

quit

crypto pki certificate chain Cisco_Manufacturing_CA_SHA2

certificate ca 02

30820465 3082034D A0030201 02020102 300D0609 2A864886 F70D0101 0B050030
2B310E30 0C060355 040A1305 43697363 6F311930 17060355 04031310 43697363
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
5B7D8A5E 2DD51E65 DB80A3E4 B4A2DCD3 949C12D8 194C859B 5A72EF6F 5297E65B
DC3B9D0A 3DCD54F7 7B23EE84 5FFAFFD4 C4755067 EF9CDBE4 27D5F84E A577E7C7
9EE3E217 206EF870 C3251777 EF73A9FB DE7B21DA 16C8FBC3 F211D1D4 7246149D
C924A060 D1449C2F 8242C257 AEF7C5EA FF23E502 A0611316 BB6B6FDF A9299903
4BD9206D 5B05F599 63C66D49 E4F12A0D DE5B29D5 FB112569 B1EA4C33 1859FFB6

A1BB3860 1E6520D4 DB6201F2 4444CFE9 3F17AFA4 ED0F4877 EB9E0E50 7716FB59
9E06EFE3 72D96E30 AA697928 D5B6BA1F E6FB7EA5 B9028348 900008EC 2F4A9CCD
3DF268D5 EF020301 0001A382 01873082 0183300E 0603551D 0F0101FF 04040302
01063012 0603551D 130101FF 04083006 0101FF02 0100305C 0603551D 20045530
53305106 0A2B0601 04010915 01120030 43304106 082B0601 05050702 01163568
7474703A 2F2F7777 772E6369 73636F2E 636F6D2F 73656375 72697479 2F706B69
2F706F6C 69636965 732F696E 6465782E 68746D6C 301D0603 551D0E04 1604147A
D77995CA BB482BB8 5514FDA3 C00FBCA7 0F961930 41060355 1D1F043A 30383036
A034A032 86306874 74703A2F 2F777777 2E636973 636F2E63 6F6D2F73 65637572
6974792F 706B692F 63726C2F 63726361 6D322E63 726C307C 06082B06 01050507
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6973636F 2E636F6D 2F736563 75726974 792F706B 692F6365 7274732F 63726361
6D322E63 6572302C 06082B06 01050507 30018620 68747470 733A2F2F 746F6F6C
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14C900F9 1F8A1FC2 66BDA5D2 6D650E22 2E34C305 A0300D06 092A8648 86F70D01
010B0500 03820101 00735936 AC7E984F 88EE171B 3DABB39B CDF70A6C DBCEC83B
1A53B6AF E081C55E 69FF2717 E706652F 631008D8 7C77C516 F42AD1B5 24691F7D
08D502D0 5BA135F2 9CB690B2 8FE38F8E 993AE6C8 17CCBA1E 8DE74C0B FB43A547
92A48275 90A556EF 75CDB1D5 F4515843 32718F0D 50801D1A E08B52E3 285D9A09
77A03344 71BDEDAD 07B3AD0D FFF39EFF 212A8119 52C46CA1 CEBBC1FA CCE2E1C4
0819D3C6 9ED68410 409A3092 2D086DDF 8B44B1A8 BED1302E 0F32CAA8 93206BDE
ED514BDA C45AF19D EB2BDB65 C0A547DA 4A4528D0 1E377ADF 285AABD3 FC1E4747
322A998B 32B4814C 165CC507 09098178 5FA14EFF 7D8A3AA7 3124520E 28654852
3BC0BE2A 0EAA876E 73

quit

crypto pki certificate chain Cisco_Root_CA_2048

certificate ca 5FF87B282B54DC8D42A315B568C9ADFF

30820343 3082022B A0030201 0202105F F87B282B 54DC8D42 A315B568 C9ADFF30
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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
15C8CF16 DA356189 9443A884 A8319878 9BB94E6F 2C53126C CD1DAD2B 24BB31C4
2BFF8344 6FB63D24 7709EABF 2AA81F6A 56F6200F 11549781 75A725CE 596A8265
EFB7EAE7 E28D758B 6EF2DD4F A65E629C CF100A64 D04E6DCE 2BCC5BF5 60A52747
8D69F47F CE1B70DE 701B20D6 6ECDA601 A83C12D2 A93FA06B 5EBB8E20 8B7A91E3
B568EEA0 E7C40174 A8530B2B 4A9A0F65 120E824D 8E63FDEF EB9B1ADB 53A61360
AFC27DD7 C76C1725 D473FB47 64508180 944CE1BF AE4B1CDF 92ED2E05 DF020103
A351304F 300B0603 551D0F04 04030201 86300F06 03551D13 0101FF04 05300301
01FF301D 0603551D 0E041604 1427F3C8 151E6E9A 020916AD 2BA08960 5FDA7B2F
AA301006 092B0601 04018237 15010403 02010030 0D06092A 864886F7 0D010105
05000382 0101009D 9D8484A3 41A97C77 0CB753CA 4E445062 EF547CD3 75171CE8
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701EF0E2 8BD7B0D8 0E9DB169 D62A917B A9494F7E E68E95D8 83273CD5 68490ED4
9DF62EEB A7BEEB30 A4AC1F44 FC95AB33 06FB7D60 0ADEB48A 63B09CA9 F2A4B953
0187D068 A4277FAB FFE9FAC9 40388867 B439C684 6F57C953 DBBA8EEE C043B2F8
09836EFF 66CF3EEF 17B35818 2509345E E3CBD614 B6ECF292 6F74E42F 812AD592
91E0E097 3C326805 854BD1F7 57E2521D 931A549F 0570C04A 71601E43 0B601EFE
A3CE8119 E10B35

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
C305A030 0D06092A 864886F7 0D01010B 05000382 0101007A BE3C8D27 E8CDE492
1CA68B30 6EC1D9D6 891AC3C0 9975F74E B582C895 2259B7A0 A8508E59 190B6F16
D90FF219 274D504D DEF46D0C E6745C74 F1447F82 92BC5C5E E3B37E25 A38BB910
3C6B5D5D 3E693BDC A85BEDA7 C2BAE8C2 F768CB28 8B707291 CF2C3FBA 75597333
52198294 ED709ED2 67147631 1B26A6A9 F97E7B19 B6E2A752 A2D453EA 6F867833
07C1DE7D DF15D03D 6CA225BC C732F049 7B6DF230 669BD914 5DB60FA5 6C5B926B
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
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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#
```

Verifica

Per verificare che la configurazione funzioni correttamente, consultare questa sezione.

Se come CA è stato utilizzato il server certificati Cisco IOS, utilizzare il **show running-config** per verificare la registrazione del certificato o **show crypto pki server** per verificare lo stato del server

CA.

Passi di riepilogo

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
```

Utilizzare **show sip-ua status registrar** per verificare la registrazione

Risoluzione dei problemi

Al momento non sono disponibili informazioni specifiche per la risoluzione dei problemi di questa configurazione.

Informazioni correlate

- [Guida per l'amministratore SRST](#)
- [Documentazione e supporto tecnico – Cisco Systems](#)