Implement CA-Signed Certificates in a CCE 12.6 Solution

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Introduction

This document describes how to Implement Certificate Authority (CA) Signed certificates in Cisco Contact Center Enterprise (CCE) solution.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Unified Contact Center Enterprise (UCCE) Release 12.6.2
- Package Contact Center Enterprise Release 12.6.2
- Customer Voice Portal (CVP) Release 12.6.2
- Cisco Virtualized Voice Browser (VVB)

- Cisco CVP Operations and Administration Console (OAMP)
- Cisco Unified Intelligence Center (CUIC)
- Cisco Unified Communication Manager (CUCM)

Components Used

The information in this document is based on these software versions:

- PCCE 12.6.2
- CVP 12.6.2
- Cisco VVB 12.6.2
- Finesss 12.6.2
- CUIC 12.6.2
- Windows 2019

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Background Information

Certificates are used to ensure that communication is secure with the authentication between clients and servers. Users can purchase certificates from a CA or they can use self-signed certificates.

Self-signed certificates (as the name implies) are signed by the same entity whose identity they certify, as opposed to be signed by a certificate authority. Self-signed certificates are not considered to be as secure as CA certificates, but they are used by default in many applications.

In the Package Contact Center Enterprise (PCCE) solution version 12.x all components of the solution are controlled by Single Pane of Glass (SPOG), which is hosted in the principal Admin Workstation (AW) server.

Due to Security Management Compliance (SRC) in the PCCE 12.5(1) version, all communication between SPOG and other components in the solution are done via secure HTTP protocol.

This document explains in detail the steps needed to implement CA signed certificates in a CCE Solution for secure HTTP communication. For any other UCCE security considerations, refer to UCCE Security Guidelines.

For any additional CVP secure communication different from secure HTTP, refer to the security guidelines in the CVP Configuration guide: CVP Security Guidelines.

Note: This document applies to CCE version 12.6 ONLY. See related information section for links to other versions.

Procedure

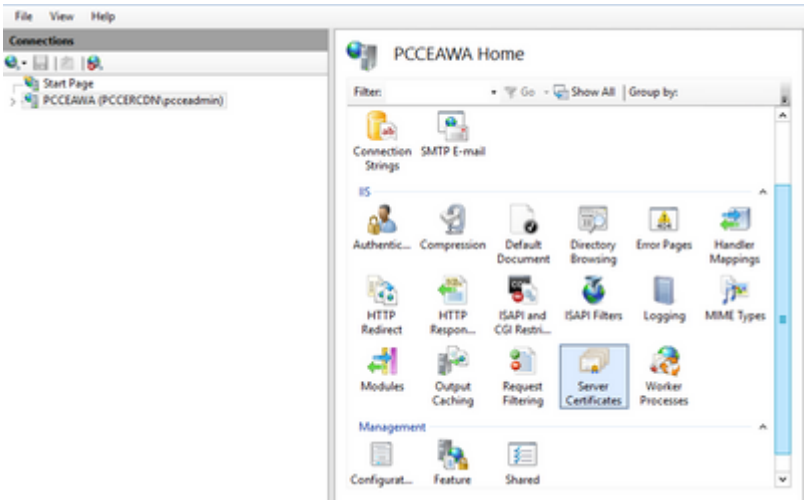
CCE Windows Based Servers

1. Generate CSR

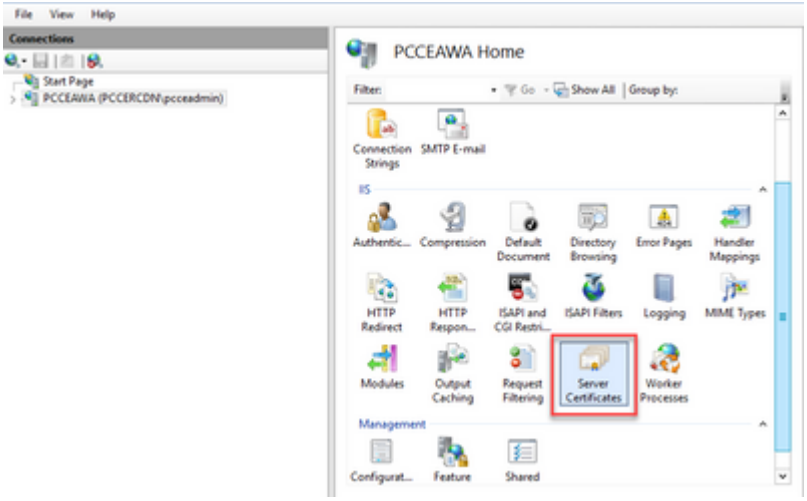
This procedure explains how to generate a Certificate Signing Request (CSR) from Internet Information Services (IIS) Manager.

Step 1. Log in to **Windows** and choose **Control Panel > Administrative Tools > Internet Information Services (IIS) Manager**.

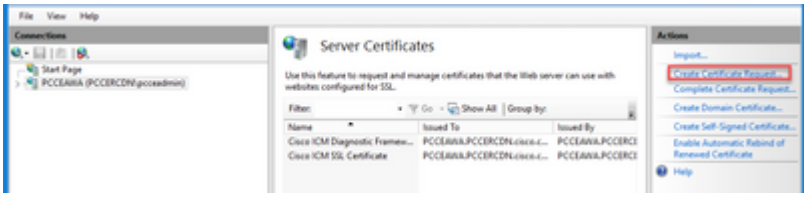
Step 2. In the Connections pane, click the **server name**. The server Home pane appears.



Step 3. In the IIS area, double-click **Server Certificates**.

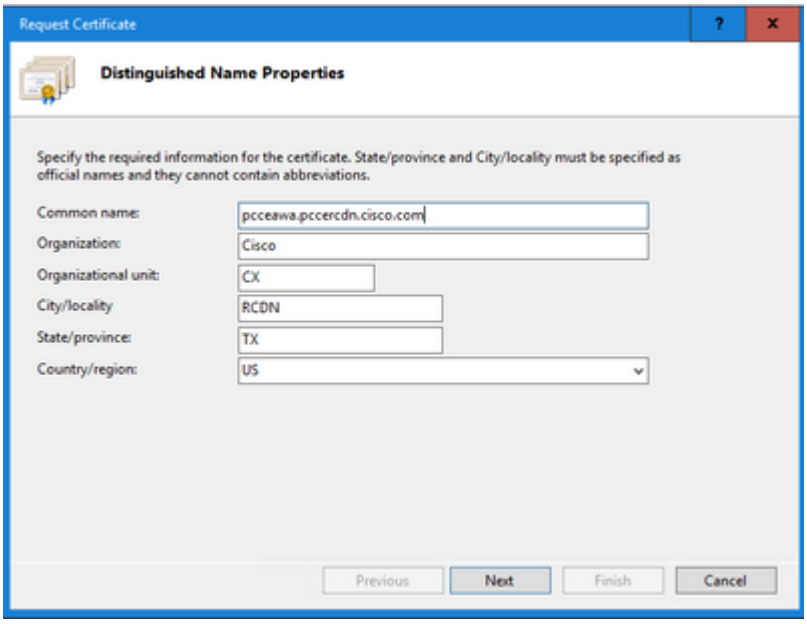


Step 4. In the Actions pane, click **Create Certificate Request**.



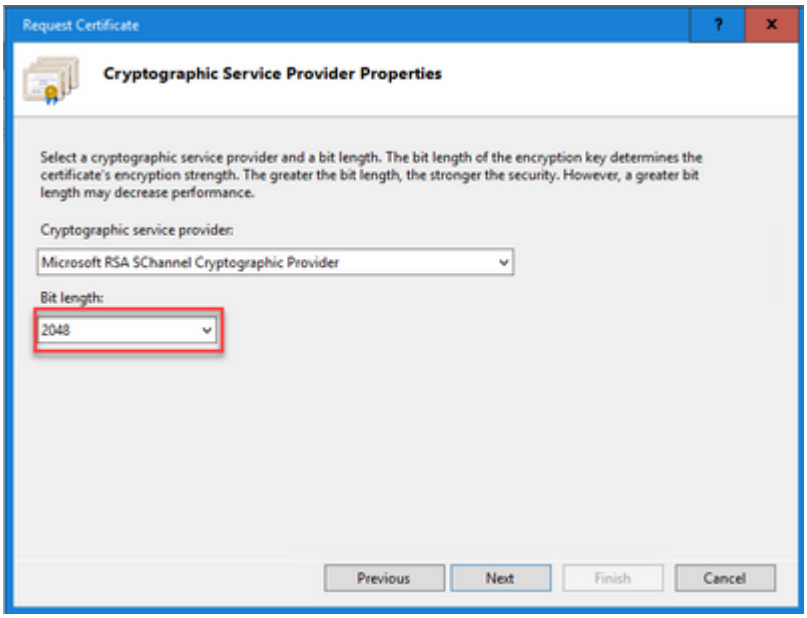
Step 5. In the Request Certificate dialog box, do this:

Specify the required information in the displayed fields and click **Next**.

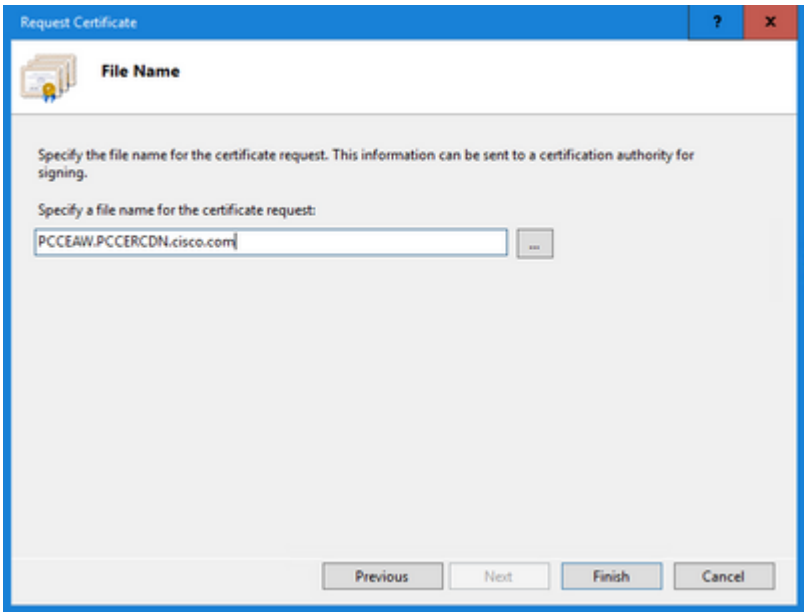


In the Cryptographic service provider drop-down list, leave the default setting.

From the Bit length drop-down list, select **2048**.



Step 6. Specify a **file name** for the certificate request and click **Finish**.



2. Obtain the CA Signed Certificates

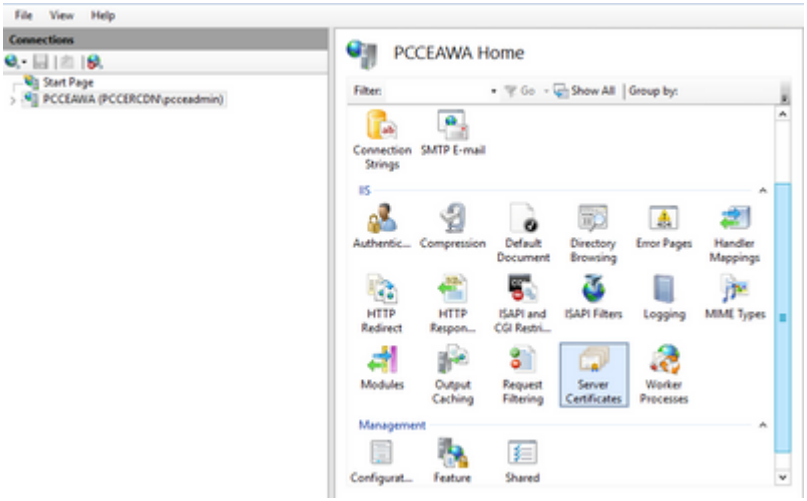
Step 1. Sign the **certificate** on a CA.

Note: Ensure that the certificate template used by the CA includes client and server authentication.

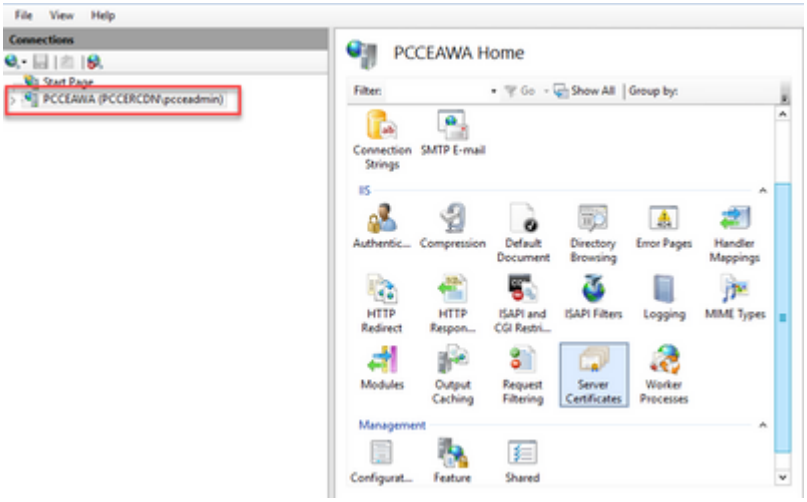
Step 2. Obtain the CA Signed Certificates from your Certificate Authority (Root, Application and Intermediate if any).

3. Upload the CA Signed Certificates

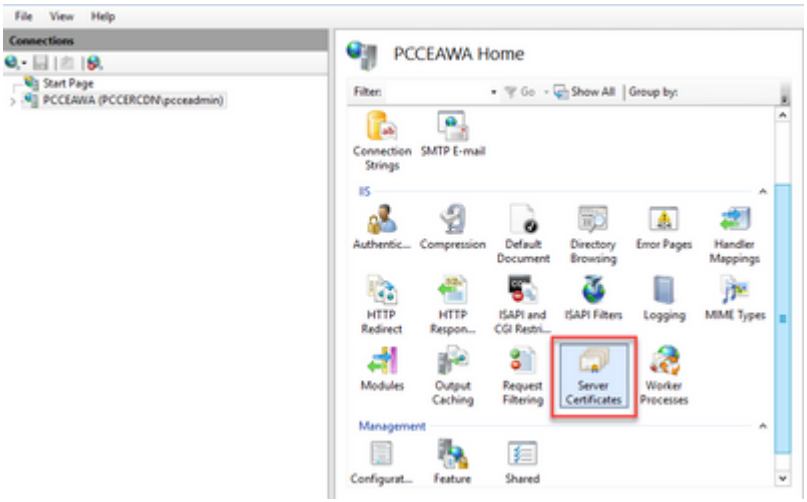
Step 1. Log in to **Windows** and choose **Control Panel > Administrative Tools > Internet Information Services (IIS) Manager**.



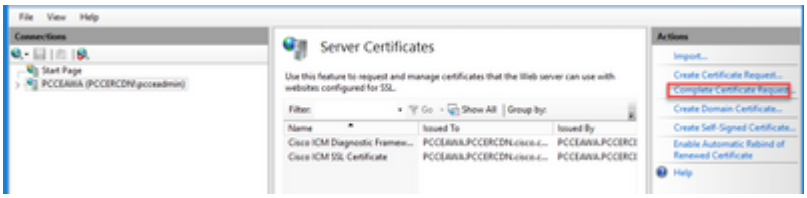
Step 2. In the Connections pane, click the **server name**.



Step 3. In the IIS area, double-click **Server Certificates**.



Step 4. In the Actions pane, click **Complete Certificate Request**.



Step 5. In the Complete Certificate Request dialog box, complete these fields:

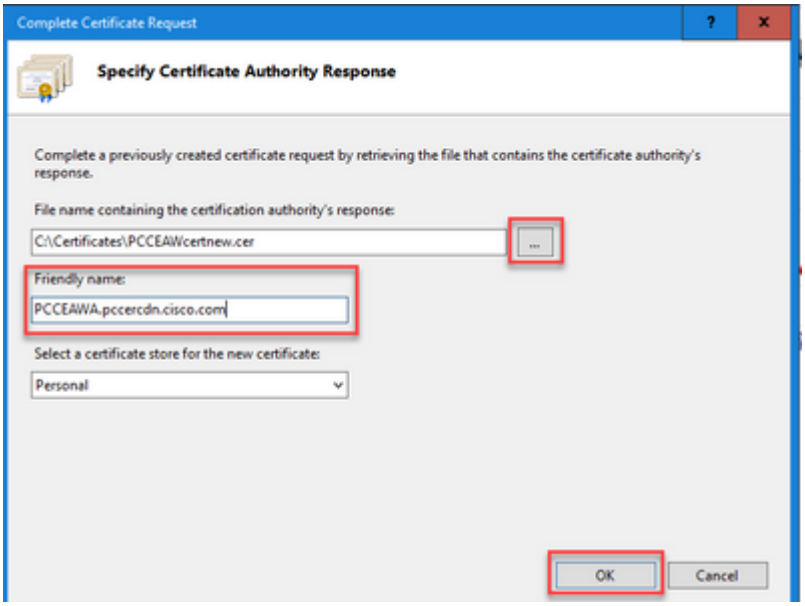
In the File name which contains the certification authority response field, click the **…** button.

Browse to the location where signed application certificate is stored and then click **Open**.

Note: If this is a 2-tier CA implementation and the root certificate is not already in the server certificate store, then the root needs to be uploaded to the Windows store before you import the signed cert. Refer to this document if you need to upload the root CA to the windows store [Microsoft - Installing the Trusted Root Certificate].

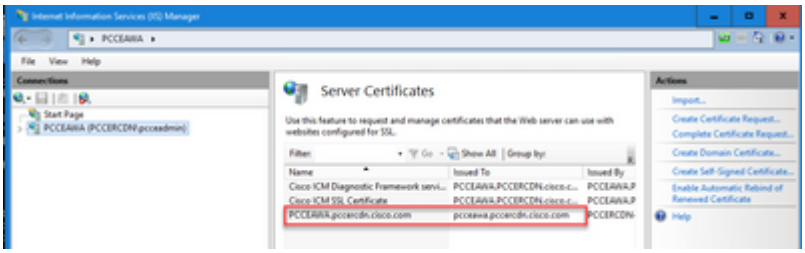
In the Friendly name field, enter the **Fully Qualified Domain Name (FQDN)** of the server or any significant name for you. Ensure that the **Select a certificate store for the new certificate** drop-down

remains as **Personal**.



Step 6. Click **OK** to upload the certificate.

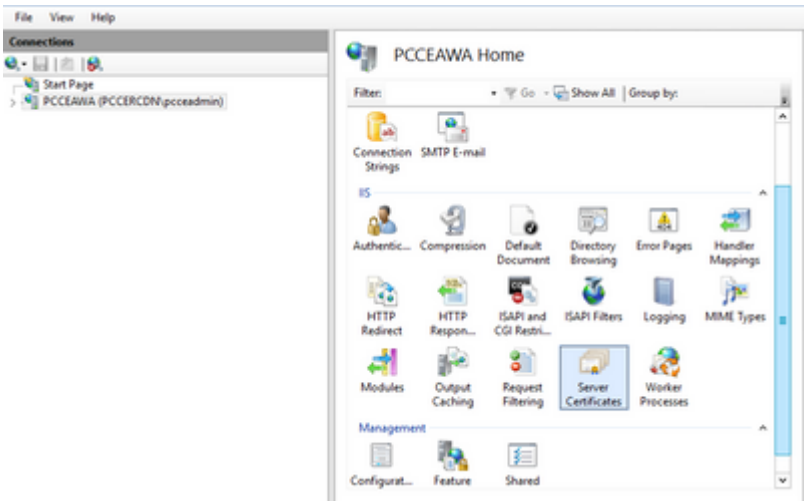
If the certificate upload is successful, the certificate appears in the Server Certificates pane.



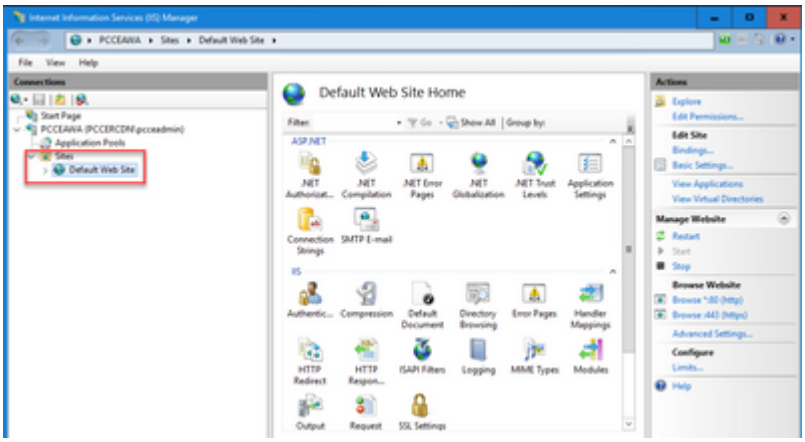
4. Bind the CA-Signed Certificate to IIS

This procedure explains how to bind a CA Signed certificate in the IIS Manager.

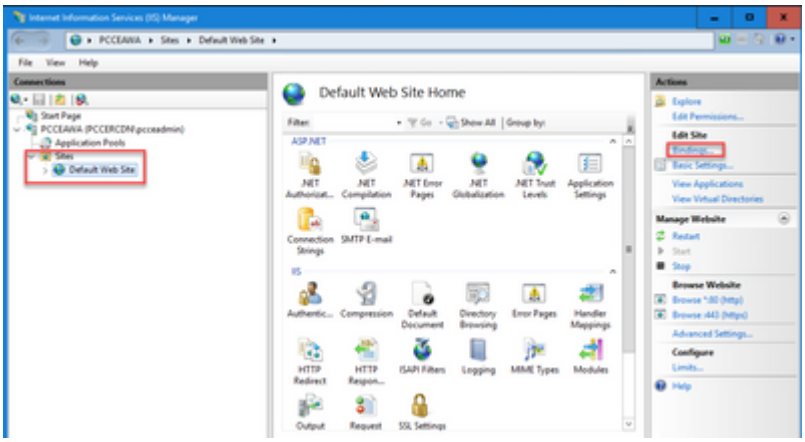
Step 1. Log in to **Windows** and choose **Control Panel > Administrative Tools > Internet Information Services (IIS) Manager**.



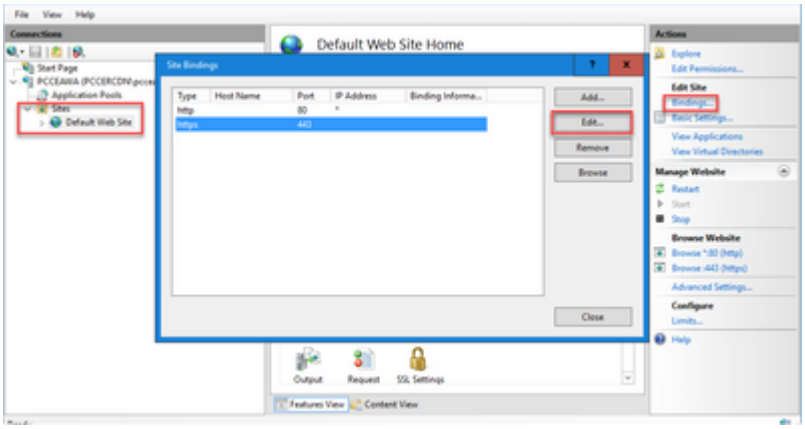
Step 2. In the Connections pane, choose **<server_name> > Sites > Default Web Site**.



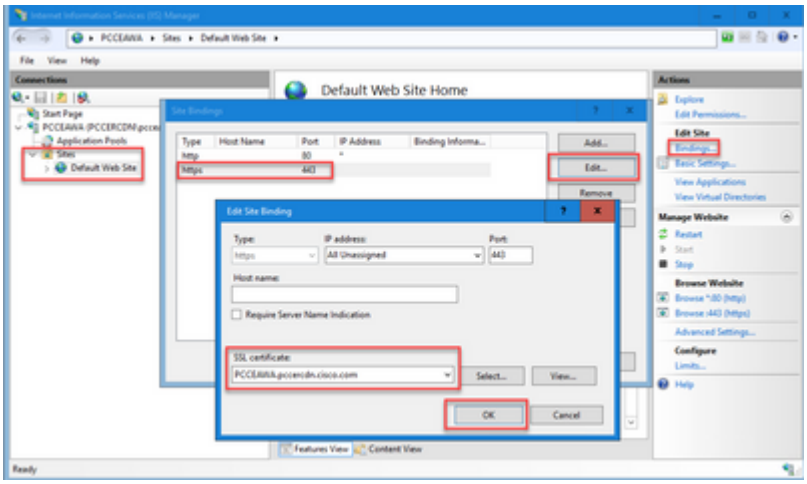
Step 3. In the Actions pane, click **Bindings...**.



Step 4. Click the type **https** with port **443**, and then click **Edit...**.

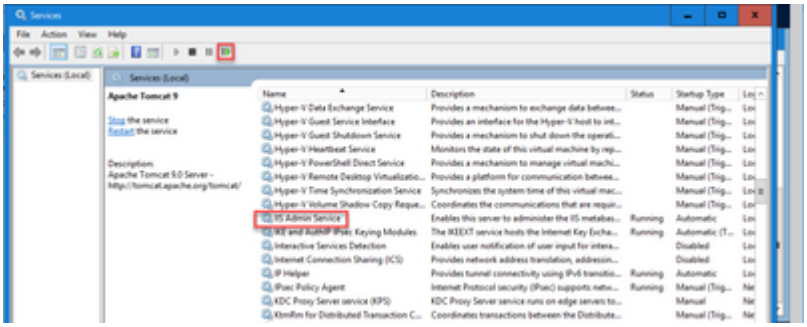


Step 5. From the SSL certificate drop-down list, select the **certificate** with the same friendly name as given in previous step.



Step 6. Click **OK**.

Step 7. Navigate to **Start > Run > services.msc** and restart the **IIS Admin Service**.



5. Bind the CA-Signed Certificate to Diagnostic Portico

This procedure explains how to bind a CA Signed Certificate in the Diagnostic Portico.

Step 1. Open the **command prompt** (Run as Administrator).

Step 2. Navigate to the **Diagnostic Portico** home folder. Run this command:

```
cd c:\icm\serviceability\diagnostics\bin
```

Step 3. Remove the **current certificate** binding to the Diagnostic Portico. Run this command:

```
DiagFwCertMgr /task:UnbindCert
```

```
c:\icm\serviceability\diagnostics\bin>DiagFwCertMgr /task:UnbindCert

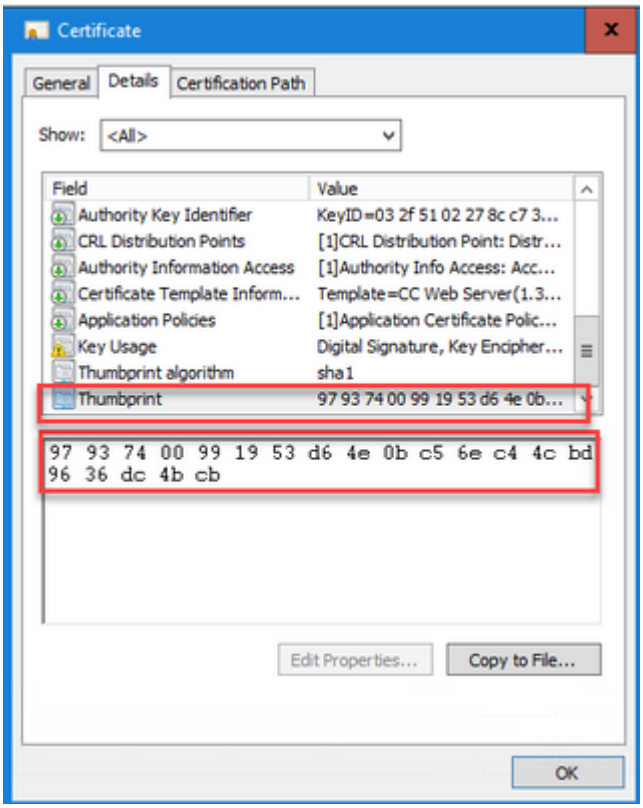
************************************************************************
Cisco Unified ICM/CCE Diagnostic Framework Certificate Manager
************************************************************************

Executing Task: 'UnbindCert'
Read port number from service configuration file: '7890'
ATTEMPTING TO UNBIND CERTIFICATE FROM WINDOWS HTTP SERVICE
Binding IP Address: '0.0.0.0:7890'
Attempting to delete the existing binding on 0.0.0.0:7890
Deleted existing binding successfully
Deleted entry from the service registry
ALL TASKS FOR UNBINDING THE CERTIFICATE FROM HTTP SERVICE COMPLETED SUCCESSFULLY


c:\icm\serviceability\diagnostics\bin>_
```

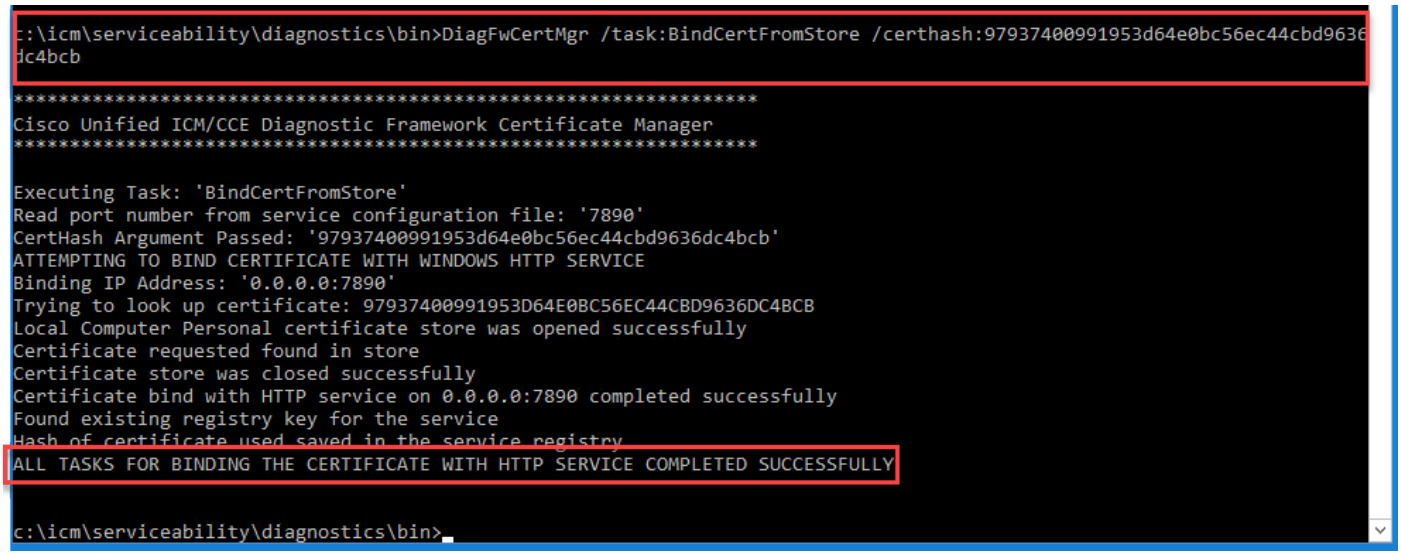
Step 4. Open the **signed certificate** and copy the **hash content** (without spaces) of the Thumbprint field.

Note: Ensure to remove any hidden characters from the beginning or end of the hash content. An editor like Notepad++ can help you to identify these hidden characters.



Step 5. Run this command and paste the **hash content**.

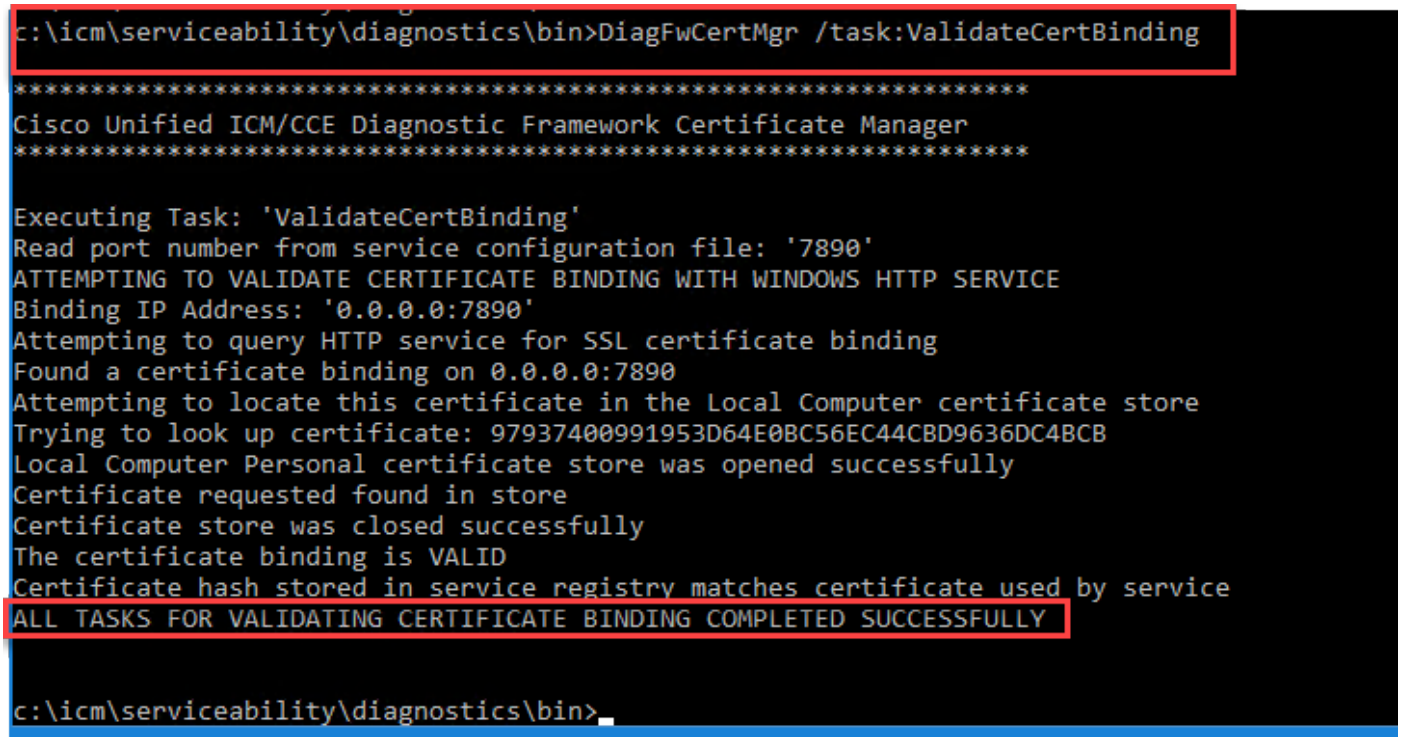
```
DiagFwCertMgr /task:BindCertFromStore /certhash:<hash_value>
```



If certificate binding is successful, it displays **The certificate binding is VALID** message.

Step 6. Validate if the certificate binding was successful. Run this command:

```
DiagFwCertMgr /task:ValidateCertBinding
```



Note: DiagFwCertMgr uses port 7890 by default..

If certificate binding is successful, it displays **The certificate binding is VALID** message.

Step 7. Restart the **Diagnostic Framework** service. Run these commands:

```
net stop DiagFwSvc
net start DiagFwSvc
```

If Diagnostic Framework restarts successfully, certificate error warnings do not appear when the application is launched.

6. Import the Root and Intermediate Certificate into Java Keystore

---

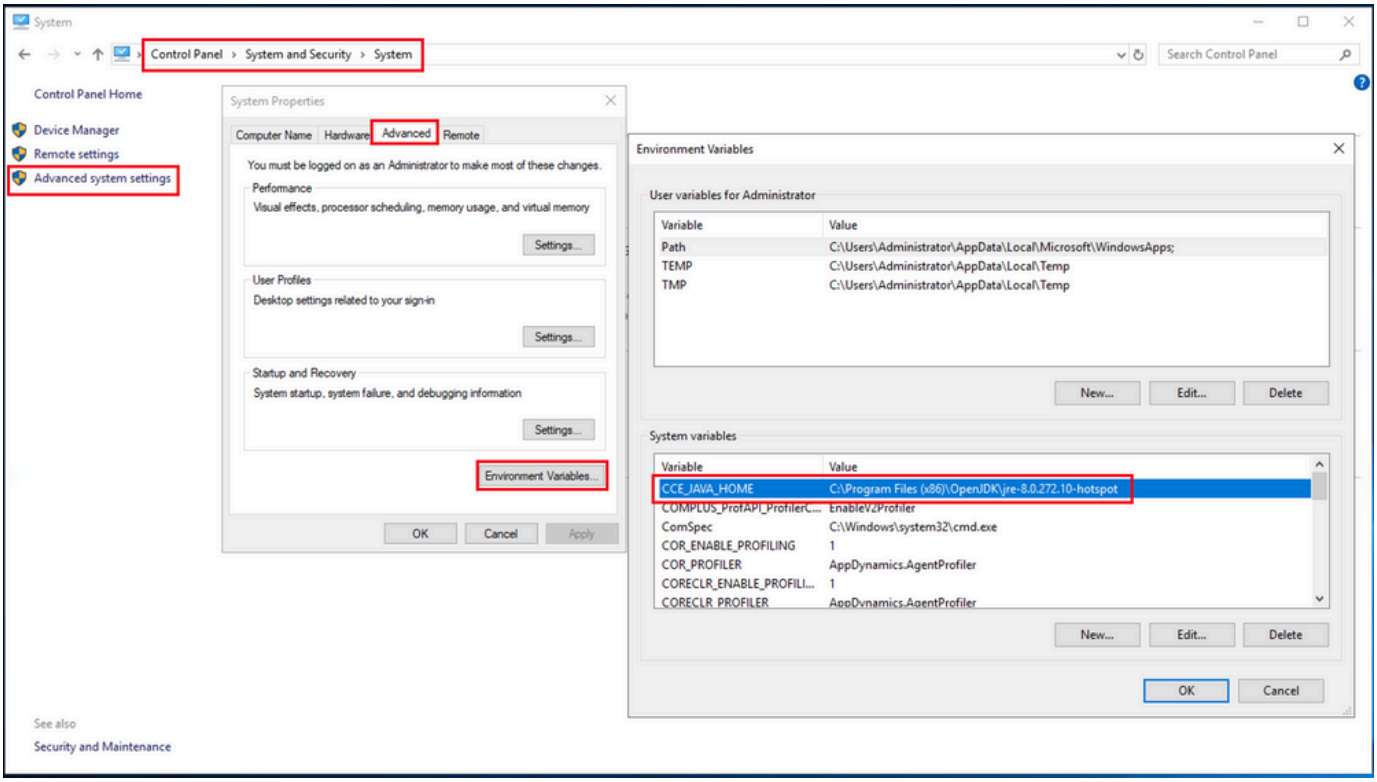
⚠ **Caution**: Before you begin, you must backup the keystore and run the commands from the java home as an Administrator.

Step 1. Know the java home path to ensure where the java keytool is hosted. There are couple of ways you can find the java home path.

Option 1: CLI command: **echo %CCE_JAVA_HOME%**

```
C:\>echo %CCE_JAVA_HOME%
C:\Program Files (x86)\OpenJDK\jre-8.0.272.10-hotspot
```

Option 2: Manually via Advanced system setting, as shown in the image



Step 2. Backup the **cacerts** file from both ICM and OpenJDK paths **<ICM install directory>\ssl** and **%CCE_JAVA_HOME%\lib\security\cacerts.** You can copy these to another location.

Step 3. Open a **command window** as Administrator and run these commands:

```
cd %CCE_JAVA_HOME%\bin
keytool.exe -keystore <ICM install directory>\ssl\cacerts -trustcacerts -import -file <path where the R
keytool.exe -keystore %CCE_JAVA_HOME%\lib\security\cacerts -trustcacerts -import -file <path where the
```

Note: The specific certificates required depend on the CA that you use to sign your certificates. In a two tier CA, which is typical of public CAs and more secure than internal CAs, then you need to import both the root and intermediate certificates. In a standalone CA with no intermediates, which is generally seen in a lab or more simple internal CA, then you only need to import the root certificate. The root and intermediate certificates must be imported to both ICM and OpenJDK keystores as System CLI still uses the OpenJDK keystore.

CVP Solution

1. Generate Certificates with FQDN

This procedure explains how to generate certificates with FQDN for Web Service Manager (WSM), Voice XML (VXML), Call Server and Operations Management (OAMP) services.

Note: When you install CVP the certificate, name only includes the name of the server and not the FQDN, therefore, you need to regenerate the certificates.

Caution: Before you begin, you must do this:
1. Open a **command window** as administrator.
2. For 12.6.2, to identify the keystore password, navigate to the **%CVP_HOME%\bin** folder and run the **DecryptKeystoreUtil.bat** file.

3. For 12.6.1, to identify the keystore password, run the command, **more %CVP_HOME%\conf\security.properties.**
4. You need this password when running the keytool commands.

5. From the **%CVP_HOME%\conf\security\ directory**, run the command, **copy .keystore backup.keystore**.

CVP Servers

Step 1. To delete the CVP servers certificates run these commands:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -delete -a

%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -delete -a

%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -delete -a
```

Enter the **keystore password** when prompted.

Step 2. To generate the WSM certificate run this command:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -genkeypai
```

Enter the **keystore password** when prompted.

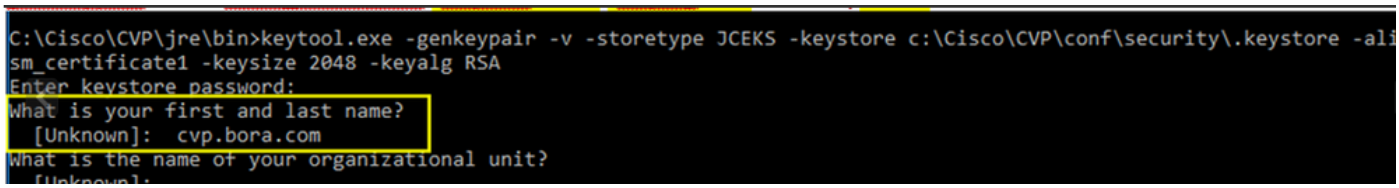
Note: By default, the certificates are generated for two years. Use -validity XXXX to set the expiry date when certificates are regenerated, otherwise certificates are valid for 90 days and need to be signed by a CA before this time. For most of these certificates, 3-5 years must be a reasonable validation time.

Here are some standard validity inputs:

One Year	365
Two Years	730
Three Years	1095
Four Years	1460
Five Years	1895
Ten Years	3650

Caution: From 12.5, certificates must be **SHA 256**, Key Size **2048**, and encryption Algorithm **RSA**. Use these parameters to set these values: -keyalg RSA and -keysize 2048. It is important that the CVP keystore commands include the -storetype JCEKS parameter. If this is not done, the certificate, the key, or wors,e the keystore can become corrupted.

Specify the **FQDN** of the server, on the question **what is your fist and last name?**



Complete these other questions:

What is the name of your organizational unit?

[Unknown]: **<specify OU>**

What is the name of your organization?

[Unknown]: **<specify the name of the org>**

What is the name of your City or Locality?

[Unknown]: **<specify the name of the city/locality>**

What is the name of your State or Province?

[Unknown]: **<specify the name of the state/province>**

What is the two-letter country code for this unit?

[Unknown]: **<specify two-letter Country code>**

Specify **yes** for the next two inputs.

Step 3. Perform the same steps for vxml_certificate and callserver_certificate:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -genkeypai
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -genkeypai
```

CVP Reporting Server

Step 1. To delete the WSM and Reporting Server certificates run these commands:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -delete -a
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -delete -a
```

Enter the **keystore password** when prompted.

Step 2. To generate the WSM certificate run this command:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -genkeypai
```

Enter the **keystore password** when prompted.

Specify the **FQDN** of the server for the query **what is your fist and last name?** and continue with the same steps as done with CVP servers.

Step 3. Perform the same steps for callserver_certificate:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -genkeypai
```

Enter the **keystore password** when prompted.

CVP OAMP (UCCE deployment)

Since In the PCCE solution version 12.x all components of the solution are controlled by the SPOG and OAMP is not installed, these steps are only required for a UCCE deployment solution.

Step 1. To delete the WSM and OAMP Server certificates run these commands:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -delete -a
```

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -delete -a
```

Enter the **keystore password** when prompted.

Step 2. To generate the WSM certificate run this command:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -genkeypai
```

Enter the **keystore password** when prompted.

Specify the **FQDN** of the server for the query **what is your fist and last name?** and continue with the same steps as done with CVP servers.

Step 3. Perform the same steps for oamp_certificate:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -genkeypai
```

Enter the **keystore password** when prompted.

2. Generate the CSR

Note: RFC5280 compliant browser requires Subject Alternative Name (SAN) to be included with each certificate. This can be accomplished using the -ext parameter with SAN when generating the CSR.

Subject Alternative Name

The -ext parameter allows a user to specific extensions. The example shown adds a subject alternative name (SAN) with the fully qualified domain name (FQDN) of the server as well as localhost. Additional SAN fields can be added as comma separated values.

Valid SAN Types are:

```
ip:192.168.0.1
dns:myserver.mydomain.com
email:name@mydomain.com
```

For example:

```
 -ext san=dns:mycvp.mydomain.com,dns:localhost
```

CVP Servers

Step 1. Generate the **certificate request** for the alias. Run this command and save it to a file (for example, wsm_certificate):

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -certreq -
```

Enter the **keystore password** when prompted.

Step 2. Perform the same steps for vxml_certificate and callserver_certificate:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -certreq -

%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -certreq -
```

Enter the **keystore password** when prompted.

CVP Reporting server

Step 1. Generate the **certificate request** for the alias. Run this command and save it to a file (for example, wsmreport_certificate):

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -certreq -
```

Enter the **keystore password** when prompted.

Step 2. Perform the same steps for the callserver_certificate:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -certreq -
```

Enter the **keystore password** when prompted.

CVP OAMP (UCCE deployment only)

Step 1. Generate the **certificate request** for the alias. Run this command and save it to a file (for example, wsmoamp_certificate):

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -certreq -
```

Enter the **keystore password** when prompted.

Step 2. Perform the same steps for oamp_certificate:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -certreq -
```

Enter the **keystore password** when prompted.

3. Obtain the CA Signed Certificates

Step 1. Sign the **certificates** on a CA (WSM, Callserver and VXML server for the CVP server; WSM and OAMP for the CVP OAMP server, and WSM and Callserver for the CVP Reporting server).

Step 2. Download the **application certificates** and the **root certificate** from the CA authority.

Step 3. Copy the **root certificate** and the **CA signed certificates** in to the folder **%CVP_HOME%\conf\security** of each server.

4. Import the CA Signed Certificates

Apply these steps to all servers of the CVP solution. Only the certificates for components on that server need to have the CA signed certificate imported.

Step 1. Import the **root certificate**. Run this command:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -import -t
```

Enter the **keystore password** when prompted. At Trust this certificate prompt, type **Yes**.

If there is an intermediate certificate, run this command:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -import -t
```

Enter the **keystore password** when prompted. At Trust this certificate prompt, type **Yes**.

Step 2. Import the **CA Signed WSM** for that server certificate (CVP, Reporting and OAMP). Run this command:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -import -t
```

Enter the **keystore password** when prompted. At Trust this certificate prompt, type **Yes**.

Step 3. In the CVP Servers and the Reporting servers import the Callserver CA Signed certificate. Run this command:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -import -t
```

Enter the **keystore password** when prompted. At Trust this certificate prompt, type **Yes**.

Step 4. In the CVP Servers import the VXML server CA Signed certificate. Run this command:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -import -t
```

Enter the **keystore password** when prompted. At Trust this certificate prompt, type **Yes**.

Step 5. In the CVP OAMP server (for UCCE only) import the **OAMP server CA Signed certificate**. Run this command:

```
%CVP_HOME%\jre\bin\keytool.exe -storetype JCEKS -keystore %CVP_HOME%\conf\security\.keystore -import -t
```

Enter the **keystore password** when prompted. At Trust this certificate prompt, type **Yes**.

Step 6. Reboot the servers.

Note: In UCCE deployment, ensure to add the servers (CVP Reporting, CVP Server, and so on) in CVP OAMP with the FQDN that you provided when you genarated the CSR.

VOS Servers

1. Generate CSR Certificate

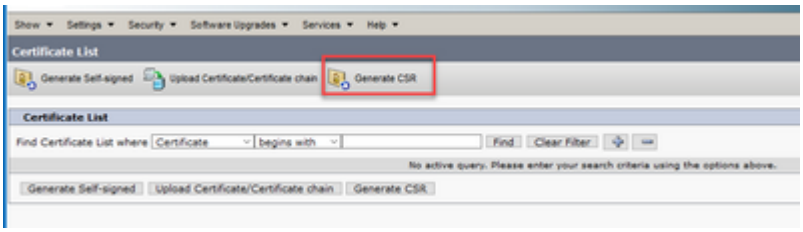
This procedure explains how to generate Tomcat CSR certificate from a Cisco Voice Operating System (VOS) based platforms.

This process is applicable for VOS based applications such as:

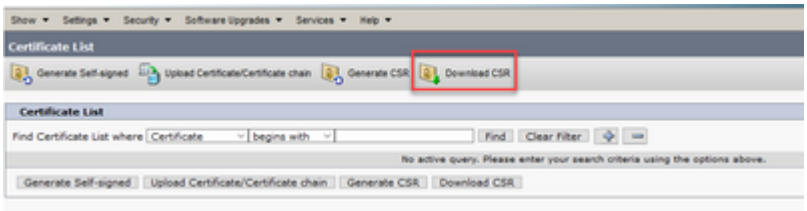
- Finesse
- CUIC \ Live Data (LD) \Identity Server(IDS)
- Cloud Connect
- Cisco VVB

Step 1. Navigate to **Cisco Unified Communications Operating System Administration page:https://FQDN :<8443 or 443>/cmplatform**.

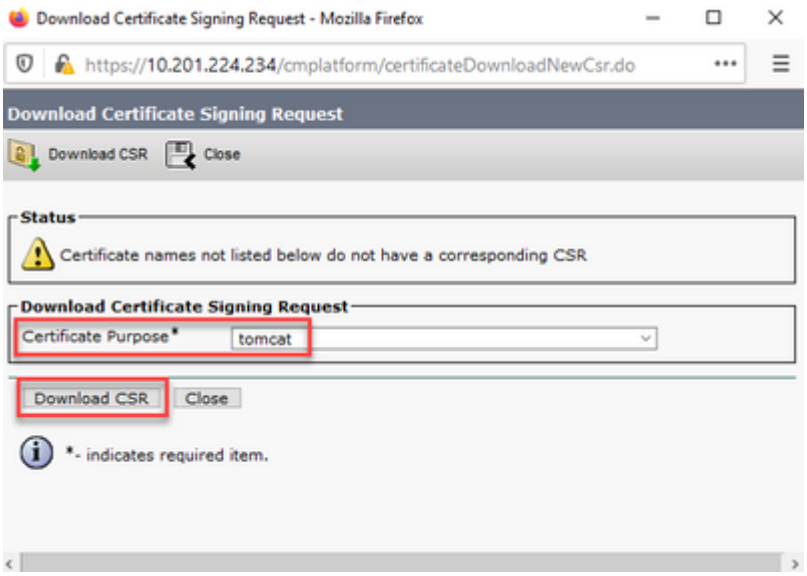
Step 2. Navigate to **Security > Certificate Management** and select **Generate CSR**.



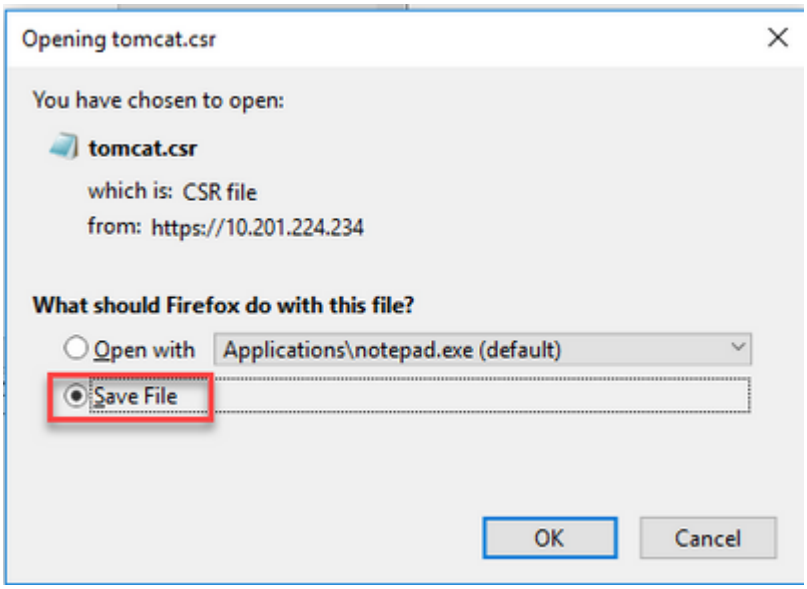
Step 3. After the CSR certificate is generated, close the **window** and select **Download CSR**.



Step 4. Ensure that the Certificate purpose is tomcat and click **Download CSR**.



Step 5. Click **Save File**. The file is saved on the Download folder.



2. Obtain the CA Signed Certificates

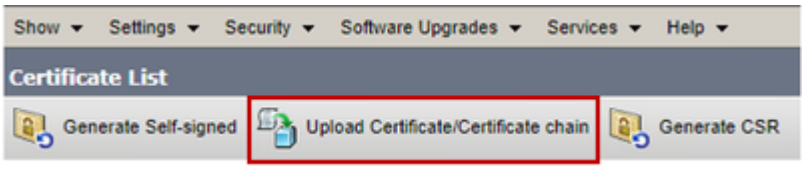
Step 1. Sign the **tomcat certificate** exported on a CA.

Step 2. Download the **application** and the **root certificated** from the CA authority.

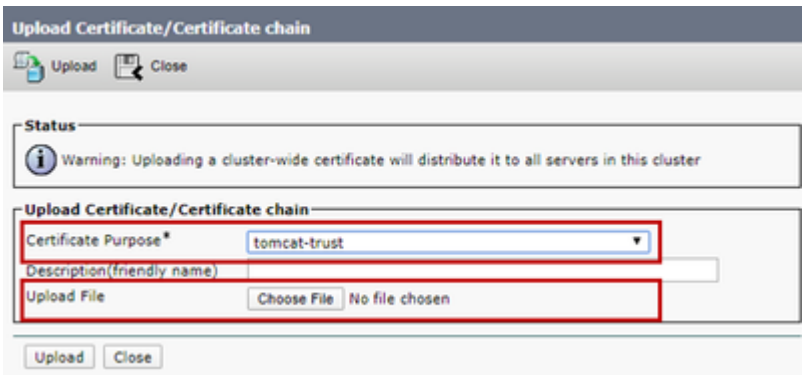
3. Upload the Application and Root Certificates

Step 1. Navigate to **Cisco Unified Communications Operating System Administration page: https://FQDN:<8443 or 443>/cmplatform.**

Step 2. Navigate to **Security > Certificate Management** and select **Upload Certificate/Certificate chain**.

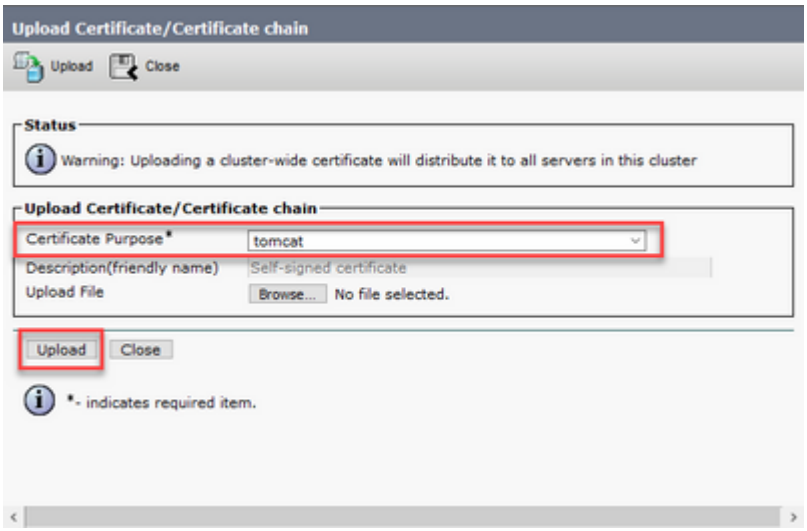


Step 3. On the Upload certificate/Certificate chain window, select **tomcat-trust** in certificate purpose field and upload the **Root certificate**.



Step 4. Upload an **intermediate certificate** (if any) as a tomcat-trust.

Step 5. On the Upload certificate/Certificate chain window, select **now tomcat** in the Certificate Purpose field and upload the **application CA signed certificate**.



Step 6. Reboot the **server**.

Verify

After you reboot the server, execute these steps to verify the CA signed implementation:

Step 1. Open a **Web Browser** and clear the **cache**.

Step 2. Close and Open the **browser** again.

Now, you must see the certificate switch to begin the CA signed certificate and the indication in the browser window that the certificate is self-signed and therefore not trusted, must go away.

Troubleshoot

There are no steps to troubleshoot the implementation of the CA Signed certificates in this guide.

Related Information

- CVP Configuration Guide - Security
- UCCE Security Guide
- PCCE Admin Guide
- Exchange PCCE Self-Signed Certificates - PCCE 12.5
- Exchange UCCE Self-Signed Certificates - UCCE 12.5
- Exchange PCCE Self-Signed Certificates - PCCE 12.6
- Exchange UCCE Self-Signed Certificates - UCCE 12.6
- Certificate Exchange Utility
- Technical Support & Documentation - Cisco Systems