



Default Security Setup

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Default Security Features

Security by Default provides the following automatic security features for Cisco Unified IP Phones:

- Signing of the phone configuration files.
- Support for phone configuration file encryption.
- https with Tomcat and other Web services (Midlets)

For Unified Communications Manager Release 8.0 later, these security features are provided by default without running the CTL Client.

Trust Verification Service

There are large number of phones in a network and Cisco Unified IP Phone have limited memory. Hence, Unified Communications Manager acts as a remote trust store through TVS and so that a certificate trust store doesn't have to be placed on each phone. The Cisco Unified IP Phones contact TVS server for verification, because it cannot verify a signature or certificate through CTL or ITL files. Thus, having a central trust store is easier to manage than having the trust store on all the Cisco Unified IP Phones.

TVS enables Cisco Unified IP Phone to authenticate application servers, such as EM services, directory, and MIDlet, during HTTPS establishment.

TVS provides the following features:

- Scalability—Cisco Unified IP Phone resources are not impacted by the number of certificates to trust.
- Flexibility—Addition or removal of trust certificates are automatically reflected in the system.
- Security by Default—Non-media and signaling security features are part of the default installation and don't require user intervention.



Note When you enable secure signaling and media, create a CTL file and then set the cluster to mixed mode. To create a CTL file and set the cluster to mixed mode, use the CLI command **utils ctl set-cluster mixed-mode**.

The following are the basic concepts that describe TVS:

- TVS runs on the Unified Communications Manager server and authenticates certificates on behalf of the Cisco IP Phone.
- Cisco Unified IP Phone only needs to trust TVS, instead of downloading all the trusted certificates.
- The ITL file is generated automatically without user intervention. The ITL file is downloaded by Cisco Unified IP Phone and trust flows from there.

TVS Description

The following are the basic concepts that describe TVS:

- TVS runs on the Unified Communications Manager server and authenticates certificates on behalf of the Cisco IP Phone.
- Cisco IP Phone only needs to trust TVS, instead of downloading all the trusted certificates.
- The ITL file is generated automatically without user intervention. The ITL file is downloaded by Cisco IP Phone and trust flows from there.

Initial Trust List

The Initial Trust List (ITL) file is used for the initial security, so that the endpoints can trust Unified Communications Manager. ITL does not need any security features to be enabled explicitly. The ITL file is

automatically created when the TFTP service is activated and the cluster is installed. The Unified Communications Manager's TFTP server's private key is used to sign the ITL file.

When the Unified Communications Manager cluster or server is in non-secure mode, the ITL file is downloaded on every supported Cisco Unified IP Phone. You can view the contents of an ITL file using the CLI command **admin:show itl**.

Cisco Unified IP Phone need the ITL file to perform the following tasks:

- Communicate securely to CAPF, a prerequisite to support the configuration file encryption.
- Authenticate the configuration file signature
- Authenticate application servers, such as EM services, directory, and MIDlet during HTTPS establishment using TVS.

If the Cisco IP Phone does not have an existing CTL file, it trusts the first ITL file automatically. The TVS must be able to return the certificate corresponding to the signer.

If the Cisco IP Phone has an existing CTL file, it uses the CTL file to authenticate the ITL file signature.



Note The SHA-1 or MD5 algorithm value changes only when there is a change in the Initial Trust List (ITL) file value. You can use the checksum value of the ITL files to identify the difference between the ITL file of Cisco IP Phone and Unified Communications Manager cluster. The checksum value of the ITL file changes only when you modify the ITL file.

The Initial Trust List (ITL) file has the same format as the CTL file. However, it is a smaller and leaner version.

The following attributes apply to the ITL file:

- The system builds the ITL file automatically when the TFTP service is activated and you install the cluster. The ITL file is updated automatically if the content is modified.
- The ITL file does not require eTokens. It uses a soft eToken (the private key associated with TFTP server's CallManager certificate).
- The Cisco Unified IP Phone download the ITL file during a reset, restart, or after downloading the CTL file.

The ITL file contains the following certificates:

- ITLRecovery Certificate—This certificate signs the ITL File.
- The CallManager certificate of the TFTP server—This certificate allows you to authenticate the ITL file signature and the phone configuration file signature.
- All the TVS certificates available on the cluster—These certificates allow the phone to communicate to TVS securely and to request certificates authentication.
- The CAPF certificate—These certificates support configuration file encryption. The CAPF certificate isn't required in the ITL File (TVS can authenticate it), however, it simplifies the connection to CAPF.

The ITL file contains a record for each certificate. Each record contains:

- A certificate

- Pre-extracted certificate fields for easy lookup by the Cisco IP Phone
- Certificate role (TFTP, CUCM, TFTP+CCM, CAPF, TVS, SAST)

The TFTP server's CallManager certificate is present in two ITL records with two different roles:

- TFTP or the TFTP and CCM role—To authenticate configuration file signature.
- SAST role—To authenticate the ITL file signature.

Initial Trust List Files

The Initial Trust List (ITL) file has the same format as the CTL file. However, it is a smaller and leaner version.

The following attributes apply to the ITL file:

- The system builds the ITL file automatically when you install the cluster. The ITL file is updated automatically if the content is modified.
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- The Cisco Unified IP Phone download the ITL file during a reset, restart, or after downloading the CTL file.

ITL File Contents

The ITL file contains the following certificates:

- The CallManager certificate of the TFTP server—This certificate allows you to authenticate the ITL file signature and the phone configuration file signature.
- All the TVS certificates available on the cluster—These certificates allow the phone to communicate to TVS securely and to request certificates authentication.
- The CAPF certificate—These certificates support configuration file encryption. The CAPF certificate isn't required in the ITL File (TVS can authenticate it), however, it simplifies the connection to CAPF.

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- SAST role—To authenticate the ITL file signature.

ITL and CTL File Interaction

The Cisco IP Phone relies on the CTL file to know about the cluster security mode (non-secure or mixed mode). The CTL File tracks the cluster security mode by including the Unified Communications Manager certificate in the Unified Communications Manager record.

The ITL File also contains the cluster security mode indication.

Certificate Management Changes for ITLRecovery Certificate

- The validity of ITLRecovery has been extended from 5 years to 20 years to ensure that the ITLRecovery certificate remains same for a longer period.



Note The validity of ITLRecovery certificates continues to be 5 years if you upgrade Unified Communications Manager. While upgrading Unified Communications Manager, the certificates get copied to the later release. However, when you regenerate an ITLRecovery certificate or when you do a fresh install of Unified Communications Manager, the validity of ITLRecovery gets extended to 20 years.

- Before you regenerate an ITLRecovery certificate, a warning message appears on both the CLI and the GUI. This warning message displays that if you use a tokenless CTL and if you regenerate the CallManager certificate, ensure that the CTL file has the updated CallManager certificate and that certificate is updated to endpoints.

Interactions and Restrictions

If a Unified Communications Manager cluster has more than 39 certificates, then the ITL file size on Cisco IP Phone exceeds 64 kilobytes. Increase in the ITL file size affects the ITL to load properly on the phone causing the phone registration to fail with Unified Communications Manager.

Update ITL File for Cisco Unified IP Phones

A centralized TFTP with Unified Communication Manager using Security By Default with ITL files installed on the phones does not validate TFTP configuration files.

Perform the following procedure before any phones from the remote clusters are added to the centralized TFTP deployment.

Procedure

- Step 1** On the Central TFTP server, enable the Enterprise Parameter **Prepare cluster for pre CM-8.0 rollback**.
- Step 2** Restart TVS and TFTP.
- Step 3** Reset all phones to verify that they download the new ITL file that disables ITL signature verification.
- Step 4** Configure Enterprise Parameter Secure https URLs to use HTTP instead of HTTPS.

Note Unified Communications Manager Release 10.5 and later automatically resets phones after you enable the **Prepare cluster for pre CM-8.0 rollback** Enterprise Parameter. For Central TFTP server's Unified Communications Manager version and how to enable this parameter, see "Roll Back Cluster to a Pre-8.0 Release" section in the [Security Guide for Cisco Unified Communications Manager](#).

Autoregistration

The system supports autoregistration in both mixed mode and nonsecure mode. The default configuration file will also be signed. Cisco IP Phones that do not support Security by Default will be served a nonsigned default configuration file.

Obtain Cisco Unified IP Phone Support List

Use the Cisco Unified Reporting tool to generate a list of Cisco endpoints that support Security By Default.

Procedure

- Step 1** From Cisco Unified Reporting, choose **System Reports**.
 - Step 2** From the **System Reports** list, choose **Unified CM Phone Feature List**.
 - Step 3** From the **Product** drop-down list, choose **Security By Default**.
 - Step 4** Click **Submit**.
A report is generated with the list of supported features for the particular phone.
-

ECDSA Support for Common Criteria for Certified Solutions

Unified Communications Manager supports Elliptic Curve Digital Signature Algorithm (ECDSA) certificates. These certificates are stronger than the RSA-based certificates and are required for products that have Common Criteria (CC) certifications. The US government Commercial Solutions for Classified Systems (CSfC) program requires the CC certification and so, it is included in Unified Communications Manager.

The ECDSA certificates are available along with the existing RSA certificates in the following areas—Certificate Manager, SIP, Certificate Authority Proxy Function (CAPF), Transport Layer Security (TLS) Tracing, Entropy, HTTP, and computer telephony integration (CTI) Manager.



Note ECDSA is supported only for Unified Communications Manager and Tomcat.

Certificate Manager ECDSA Support

In Unified Communications Manager Release 11.0, the certificate manager supports both generation of self-signed ECDSA certificates and the ECDSA certificate signing request (CSR). Earlier releases of Unified Communications Manager supported **RSA** certificate only. However, Unified Communications Manager Release 11.0 onwards, **CallManager-ECDSA** certificate has been added along with the existing **RSA** certificate.

Both the **CallManager** and **CallManager-ECDSA** certificates share the common certificate trust store—CallManager-Trust. Unified Communications Manager uploads these certificates to this trust store.

The certificate manager supports generation of ECDSA certificates having different values of key length.

When you update or install Unified Communications Manager, the self-signed certificate is generated. Unified Communications Manager Release 11.0 always has an ECDSA certificate and uses that certificate in its SIP interface. The secure Computer Telephony Integration (CTI) Manager interface also supports ECDSA certificates. As both the CTI Manager and SIP server use the same server certificate, both the interfaces work in synchronization.

SIP ECDSA Support

Unified Communications Manager Release 11.0 includes ECDSA support for SIP lines and SIP trunk interfaces. The connection between Unified Communications Manager and an endpoint phone or video device is a SIP line connection whereas the connection between two Unified Communications Managers is a SIP trunk connection. All SIP connections support the ECDSA ciphers and use ECDSA certificates.

Following are the scenarios when SIP makes (Transport Layer Security) TLS connections:

- When SIP acts as a TLS server—When the SIP trunk interface of Unified Communications Manager acts as a TLS server for incoming secure SIP connection, the SIP trunk interface determines if the CallManager-ECDSA certificate exists on disk. If the certificate exists on the disk, the SIP trunk interface uses the CallManager-ECDSA certificate if the selected cipher suite is **TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256** or **TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384**. The SIP trunk interface continues to support RSA TLS cipher suites for connections from clients that do not support ECDSA cipher suites. The **TLS Ciphers** drop-down list contains options that permit configuration of the supported cipher suites when Unified Communications Manager acts as a TLS server.
- When SIP acts as a TLS client—When the SIP trunk interface acts as a TLS client, the SIP trunk interface sends a list of requested cipher suites to the server based on the **TLS Ciphers** field (which also includes the **ECDSA ciphers** option) in the **Enterprise Parameters** window of Cisco Unified Communications Manager. The **TLS Ciphers**. This configuration determines the TLS client cipher suite list and the supported cipher suites in order of preference.



Note If you establish a TLS connection with an earlier release of the Unified Communications Manager that does not support ECDSA client certificate, the connection uses an RSA cipher suite. The client certificate sent in the TLS connection is not bound to the TLS Cipher you that you choose. Earlier releases of Unified Communications Manager also support that TLS servers receive and handle ECDSA client certificates.

Devices that use an ECDSA cipher to make a connection to Unified Communications Manager must have the CallManager-ECDSA certificate in their Identity Trust List (ITL) file. Then, the devices must incorporate the CallManager-ECDSA certificate into their local certificate store to trust the connection that is secured by the CallManager-ECDSA certificate.

CAPF ECDSA Support

Certificate Authority Proxy Function (CAPF) is a Cisco proprietary method for exchanging certificates between Cisco endpoints and Unified Communications Manager. Only Cisco endpoints use CAPF. To accomplish common criteria requirements, CAPF is updated to CAPF version 3 so that a client can be provided with ECDSA Locally Significant Certificate (LSC). A customer creates LSC locally. An LSC is an alternative to manufacturer installed certificate (MIC) that the manufacturer creates.

Use CAPF version 3 to allow Unified Communications Manager server to direct phone, CTI applications, and Jabber clients to generate EC keys to be used in their LSCs. After the EC Keys are generated, Unified Communications Manager either generates an ECDSA LSC and sends it to the Cisco endpoint or generates an ECDSA CSR.

In case the endpoint does not have CAPF version 3 support, you can configure the required EC key size and RSA key size and choose **EC Key Preferred, RSA Backup** option in **Phone Configuration** window from Cisco Unified CM Administration as a backup. This backup option is useful when CAPF server tries to send a request to EC key pair and the phone communicates to the server that it does not support EC key, the server sends the request to generate an RSA key pair instead of the EC key pair.



Note If Cisco endpoint supports CAPF version 3, and you choose **EC Preferred, RSA Backup** option in **Phone Configuration** without enabling **Endpoint Advanced Encryption Algorithm Support** parameter, then the ECDSA or RSA-based LSCs are not issued. If Cisco endpoint does not support CAPF version 3, and you enable or disable **Endpoint Advanced Encryption Algorithm Support** parameter then the RSA-based LSCs are issued.



Note The **Endpoint Advanced Encryption Algorithms Support** parameter indicates that phones download the TFTP configuration files using advanced TLS ciphers. By default, EC ciphers have the highest priority. This solution is only supported for an on-premises deployment without MRA.

Entropy

To have strong encryption, a robust source of entropy is required. Entropy is a measure of randomness of data and helps in determining the minimum threshold for common criteria requirements. Data conversion techniques, such as cryptography and encryption, rely on a good source of entropy for their effectiveness. If a strong encryption algorithm, such as ECDSA, uses a weak source of entropy, the encryption can be easily broken.

In Unified Communications Manager Release 11.0, the entropy source for Unified Communications Manager is improved. Entropy Monitoring Daemon is a built-in feature that does not require configuration. However, you can turn it off through the Unified Communications Manager CLI.

Use the following CLI commands to control the Entropy Monitoring Daemon service:

CLI Command	Description
utils service start Entropy Monitoring Daemon	Starts the Entropy Monitoring Daemon service.
utils service stop Entropy Monitoring Daemon	Stops the Entropy Monitoring Daemon service.
utils service active Entropy Monitoring Daemon	Activates the Entropy Monitoring Daemon service, which further loads the kernel module.
utils service deactivate Entropy Monitoring Daemon	Deactivates the Entropy Monitoring Daemon service, which further unloads the kernel module.

HTTPS Support for Configuration Download

For secure configuration download, Unified Communications Manager Release 11.0 is enhanced to support HTTPS in addition to the HTTP and TFTP interfaces that were used in the earlier releases. Both client and server use mutual authentication, if required. Clients that are enrolled with ECDSA LSCs and Encrypted TFTP configurations are required to present their LSC.

The HTTPS interface uses both the CallManager and the CallManager-ECDSA certificates as the server certificates.



Note When you update CallManager, CallManager ECDSA, or Tomcat certificates, you must deactivate and reactivate the TFTP service. Port 6971 is used for authentication of the CallManager and CallManager-ECDSA certificates whereas port 6972 is used for the authentication of the Tomcat certificates.

CTI Manager Support

The computer telephony integration (CTI) interface is enhanced to support four new ciphers. The ciphers suites are **TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256**, **TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384**, **TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256** and **TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384**. By supporting these cipher suites, the CTI Manager interface needs to have the **CallManager-ECDSA** certificate, if it exists in Unified Communications Manager. Similar to the SIP interface, the Enterprise Parameter **TLS Ciphers** option in Unified Communications Manager is used to configure the TLS ciphers that are supported on the CTI Manager secure interface.

Certificate Regeneration

If you regenerate one of the Unified Communications Manager certificates, you must perform the steps in this section.



Caution Regenerating a certificate can affect your system operations. Regenerating a certificate overwrites the existing certificate including a third party signed certificate if one was uploaded. For more information, see the *Administration Guide for Cisco Unified Communications Manager*.

Regenerate CAPF Certificate

To regenerate the CAPF certificate, perform the following steps:



Note If the CAPF certificate is on the publisher, you might observe the phones restarting automatically to update their ITL file. This is applicable when the Phone interaction on Certificate Update parameter is automatically reset.

Procedure

-
- Step 1** Regenerate the CAPF certificate.
- Step 2** If you have a CTL file then you must update the CTL file.
- For more information see *Regenerate Certificate*, section in the Cisco Unified Communications Manager Security Guide.
- Step 3** CAPF service is automatically restarted when CAPF certificate is regenerated.
- See the “Activating the Certificate Authority Proxy Function Service” section, in the *Cisco Unified Communications Manager Security Guide*.
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Regenerate TVS Certificate



Note If you plan to regenerate both TVS and TFTP certificates, regenerate the TVS certificate, wait for the possible phone restarts to complete, and then regenerate the TFTP certificate. This is applicable when the Phone interaction on Certificate Update parameter is automatically reset.

Procedure

-
- Step 1** Regenerate the TVS certificate.
- Step 2** If you have a CTL file then you must update the CTL file.
- For more information see *Regenerate Certificate*, section in the Cisco Unified Communications Manager Security Guide.

Step 3 TVS service is automatically restarted when TVS certificate is regenerated.

Regenerate TFTP Certificate

To regenerate a TFTP certificate, follow these steps:



Note If you plan to regenerate multiples certificates you must regenerate the TFTP certificate last. Wait for the possible phone restarts to complete before you regenerate the TFTP certificate. You might need to manually delete the ITL File from all Cisco IP Phones, if you do not follow this procedure. This is applicable when the Phone interaction on Certificate Update parameter is automatically reset.

Procedure

- Step 1** Regenerate the TFTP certificate.
For more information see *Administration Guide for Cisco Unified Communications Manager* .
- Step 2** If the TFTP service was activated, wait until all the phones have automatically restarted.
- Step 3** If your cluster is in mixed mode, update the CTL file.
- Step 4** If the cluster is part of an EMCC deployment, repeat the steps for bulk certificate provisioning.
For more information see *Administration Guide for Cisco Unified Communications Manager* .
-

Regenerate ITLRecovery Certificate



Warning Do not regenerate the ITLRecovery Certificate very frequently as this certificate has a long validity with phones and also it contains the CallManager Certificate.

Regenerate ITLRecovery Certificate for Non-Secure Cluster

1. Verify if the ITL File is valid and that all phones in the cluster trust the current ITL File.
2. Regenerate the ITLRecovery Certificate.
Navigate to the publisher in each cluster to regenerate the ITLRecovery Certificate.
 - a. From the Unified OS Administration, choose **Security > Certificate Management**
 - b. Click **Find**.
The Certificate List window appears.
 - c. Click the ITLRecovery.pem Certificate link from the list of certificates displayed.

- d. Click **Regenerate**, to regenerate the ITLRecovery Certificate.
 - e. In the confirmation message pop-up, click **OK**.
3. Sign the ITL file using `utils itl reset localkey` in the CallManager Certificate to accept the new ITL file.
 4. Reset in batches all the phones in the cluster.



Note Make sure all the phones in the cluster are registered.

5. Restart TFTP Service to have the ITL file re-signed by the New ITLRecovery Certificate.
New ITLRecovery Certificates are uploaded on phones while they reset.
6. Reset in batches all phones in the cluster for a second time to pick up the new ITL File.
7. Phones are uploaded with the new ITLRecovery Certificate after the reset.

Regenerate ITLRecovery Certificate for Secure Cluster

If you want to migrate from a token based ITL file to tokenless ITL file, refer the migration section in security guide.

1. Verify if the ITL File is valid and that all phones in the cluster trust the current ITL File.
2. Verify the CTL File using `show ctl` command.
3. Regenerate the ITLRecovery Certificate.
Navigate to the publisher in each cluster to regenerate the ITLRecovery Certificate.
 - a. From the Unified OS Administration, Choose **Security > Certificate Management > Find**
 - b. Click **Find** to find the list of Certificates.
The Certificate List window appears.
 - c. Click the ITLRecovery.pem Certificate link from the list of Certificates displayed.
 - d. Click **Regenerate**, to regenerate the ITLRecovery Certificate.
 - e. In the confirmation message pop-up, click **OK**.
4. Sign the CTLFile with `utils ctl reset localkey` in the CallManager Certificate. This also updates the CTLFile with the new ITLRecovery Certificate.
5. Reset in batches all the phones in the cluster to pick up the new CTLFile with new ITLRecovery Certificate.



Note

- Make sure all the phones in the cluster are registered.
- Regenerating ITLRecovery will affect SAML SSO login of cluster incase system wide certificate is used for enablement.

6. Update the CTLFile to have it re-signed by the new ITLRecovery Certificate `utils ctl update CTLFile`.
7. Reset in batches all phones in the cluster for a second time to pick up the new CTLFile signed by the new ITLRecovery Certificate.
8. Phones are uploaded with the new ITLRecovery Certificate after the reset.

Tomcat Certificate Regeneration



Note When SIP OAuth is enabled, you must restart the Cisco CallManager service after tomcat certificate regeneration and service restart.

To regenerate the Tomcat certificate, perform the following steps:

Procedure

-
- Step 1** Regenerate the Tomcat certificate.
For more information see *Administration Guide for Cisco Unified Communications Manager* .
 - Step 2** Restart the Tomcat Service.
For more information see *Administration Guide for Cisco Unified Communications*.
 - Step 3** If the cluster is part of an EMCC deployment, repeat the steps for bulk certificate provisioning.
For more information see *Administration Guide for Cisco Unified Communications Manager* .
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System Back-Up Procedure After TFTP Certificate Regeneration

The trust anchor for the ITL File is a software entity: the TFTP private key. If the server crashes, the key gets lost, and phones will not be able to validate new ITL File.

In Unified Communications Manager Release 10.0, the TFTP certificate and private key both get backed up by the Disaster Recovery System. The system encrypts the backup package to keep the private key secret. If the server crashes, the previous certificates and keys will be restored.

Whenever the TFTP certificate gets regenerated, you must create a new system backup. For backup procedures, see the *Administration Guide for Cisco Unified Communications Manager* .

Refresh Upgrade From Cisco Unified Communications Manager Release 7.x to Release 8.6 Or Later

To upgrade your cluster from Release 7.x to Release 8.6 or later, follow this procedure:

Procedure

- Step 1** Follow the normal procedure for upgrading a cluster. For more information, see *Administration Guide for Cisco Unified Communications Manager*.
- Tip** After you finish upgrading all nodes in the cluster to Unified Communications Manager Release 8.6 or later, you must also follow all the steps in this procedure to ensure that your Cisco Unified IP Phones register with the system.
- Step 2** If you are running one of the following releases in mixed mode, you must run the CTL client:
- Unified Communications Manager Release 7.1(2)
 - All regular releases of 7.1(2)
 - All ES releases of 712 prior to 007.001(002.32016.001)
 - Unified Communications Manager Release 7.1(3)
 - All regular releases of 713 prior to 007.001(003.21900.003) = 7.1(3a)su1a
 - All ES releases of 713 prior to 007.001(003.21005.001)
- Note** For more information about running the CTL client, see Chapter 4, “Configuring the CTL Client.”
- Step 3** Wait ten minutes for the Cisco IP Phones to automatically restart and register with Unified Communications Manager.
- Caution** You must back up your cluster using the Disaster Recovery System (DRS) to be able to recover the cluster.
- Step 4** Back Up Your Cluster.
- To backup your cluster using DRS, see the *Administration Guide for Cisco Unified Communications Manager*.
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What to do next

Once the publisher is up after the upgrade, do not reboot until the CAR migration completes. You are not allowed to switch to old version or perform a DRS backup in this phase. You can monitor the CAR migration status by navigating to **Cisco Unified Serviceability > Tools > CDR Analysis and Reporting**.

Roll Back Cluster to a Pre-8.0 Release

Before you roll back a cluster to a pre-8.0 release of Unified Communications Manager, you must prepare the cluster for rollback using the Prepare Cluster for Rollback to pre-8.0 enterprise parameter.

To prepare the cluster for rollback, follow this procedure on each server in the cluster.

Procedure

-
- Step 1** From Unified Communications Manager, choose **System > Enterprise Parameters Configuration**. The **Enterprise Parameters Configuration** window displays.
- Set the Prepare Cluster for Rollback to pre-8.0 enterprise parameter to **True**.
- Note** Enable this parameter only if you are preparing to rollback your cluster to a pre-8.0 release of Unified Communications Manager. Phone services that use https (for example, extension mobility) will not work while this parameter is enabled. However, users will be able to continue making and receiving basic phone calls while this parameter is enabled.
- Step 2** Wait ten minutes for the Cisco IP Phones to automatically restart and register with Unified Communications Manager.
- Step 3** Revert each server in the cluster to the previous release.
- For more information about reverting a cluster to a previous version, see *Administration Guide for Cisco Unified Communications Manager*.
- Step 4** Wait until the cluster finishes switching to the previous version.
- Step 5** If you are running one of the following releases in mixed mode, you must run the CTL client:
- Unified Communications Manager Release 7.1(2)
 - All regular releases of 7.1(2)
 - All ES releases of 712 prior to 007.001(002.32016.001)
 - Unified Communications Manager Release 7.1(3)
 - All regular releases of 713 prior to 007.001(003.21900.003) = 7.1(3a)su1a
 - All ES releases of 713 prior to 007.001(003.21005.001)
- Note** For more information about running the CTL client, see the “Configuring the CTL Client” chapter.
- Step 6** If “Prepare Cluster for Rollback to pre 8.0” is set to True in Enterprise Parameters then the following change must be made for Corporate Directories to work:
- Under **Device > Device Settings > Phone Services > Corporate Directory** you must change the Service URL from Application:Cisco/CorporateDirectory to `http://<ipaddr>:8080/ccmcip/xmldirectoryinput.jsp`.

Step 7 If “Prepare Cluster for Rollback to pre 8.0” is set to True in Enterprise Parameters then the following change must be made for Personal Directories to work:

Under **Device > Device Settings > Phone Services > Personal Directory** you must change the Service URL from Application: Cisco/PersonalDirectory to 'http://<ipaddr>:8080/ccmpd/pdCheckLogin.do?name=undefined.

Switch Back to Release 8.6 or Later After Revert

If you decide to switch back to the release 8.6 or later partition after you revert the cluster to Release 7.x, follow this procedure.

Procedure

Step 1 Follow the procedure for switching the cluster back to the inactive partition. For more information, see the *Administration Guide for Cisco Unified Communications Manager*.

Step 2 If you were running one of the following releases in mixed mode, you must run the CTL client:

Unified Communications Manager Release 7.1(2)

- All regular releases of 7.1(2)
- All ES releases of 712 prior to 007.001(002.32016.001)
- Unified Communications Manager Release 7.1(3)
 - All regular releases of 713 prior to 007.001(003.21900.003) = 7.1(3a)su1a
 - All ES releases of 713 prior to 007.001(003.21005.001)

Note For more information about running the CTL client, see the “Configuring the CTL Client” chapter.

Step 3 From Unified Communications Manager Administration, choose **System > Enterprise Parameters Configuration**.

The **Enterprise Parameters Configuration** window displays.

Set the Prepare Cluster for Rollback to pre-8.6 enterprise parameter to **False**.

Step 4 Wait ten minutes for the Cisco Unified IP Phones to automatically restart and register with Unified Communications Manager.

Migrate IP Phones Between Clusters with Cisco Unified Communications Manager and ITL Files

Unified Communications Manager 8.0(1) and later introduced the new Security By Default feature and the use of Initial Trust List (ITL) files. With this new feature, you must be careful when moving phones between different Unified CM clusters and ensure that you follow the proper steps for migration.



Caution Failure to follow the proper steps may lead to a situation where thousands of phones must manually have their ITL files deleted.

Cisco IP Phones that support the new ITL file must download this special file from their Unified CM TFTP server. Once an ITL file is installed on a phone, all future configuration files and ITL file updates must be signed by one of the following items:

- The TFTP server certificate that is currently installed on the phone or
- A TFTP certificate that can be validated TVS services on one of the clusters. You can find the certificates of TVS services within the cluster listed in the ITL file.

With this new security functionality in mind, three problems can occur when moving a phone from one cluster to another cluster:

1. The ITL file of the new cluster is not signed by the current ITL file signer, so the phone cannot accept the new ITL file or configuration files.
2. The TVS servers listed in the existing ITL of the phone may not be reachable when the phones are moved to the new cluster.
3. Even if the TVS servers are reachable for certificate verification, the old cluster servers may not have the new server certificates.

If one or more of these three problems are encountered, one possible solution is to delete the ITL file manually from all phones being moved between clusters. However, this is not a desirable solution since it requires massive effort as the number of phones increases.

The most preferred option is to make use of the Cisco Unified CM Enterprise Parameter Prepare Cluster for Rollback to pre-8.0. Once this parameter is set to True, the phones download a special ITL file that contains empty TVS and TFTP certificate sections.

When a phone has an empty ITL file, the phone accepts any unsigned configuration file (for migrations to Unified CM pre-8.x clusters), and also accepts any new ITL file (for migrations to different Unified CM 8.x clusters).

The empty ITL file can be verified on the phone by checking **Settings > Security > Trust List > ITL**. Empty entries appear where the old TVS and TFTP servers used to be.

The phones must have access to the old Unified CM servers only as long as it takes them to download the new empty ITL files.

If you plan to keep the old cluster online, disable the Prepare Cluster for Rollback to pre-8.0 Enterprise Parameter to restore Security By Default.

Related Topics

[Roll Back Cluster to a Pre-8.0 Release](#), on page 15

Bulk Certificate Export

If both the old and new clusters are online at the same time, you can use the Bulk Certificate migration method.

Remember that the Cisco Unified IP Phones verify every downloaded file against either the ITL file, or against a TVS server that exists in the ITL file. If the phone needs to move to a new cluster, the ITL file that the new cluster presents must be trusted by the old cluster TVS certificate store.



Note The Bulk Certificate Export method only works if both clusters are online with network connectivity while the phones are being migrated.



Note During bulk certificate import, you need to import an additional ITLRecovery certificate on both the visiting cluster and the home cluster for Cisco Extension Mobility Cross Cluster (EMCC) to continue functioning. A new option to import ITL_Recovery certificate is added in Bulk Certificate Management for the **Certificate Type** drop-down list.

To use the Bulk Certificate Export method complete the following procedure:

Procedure

-
- Step 1** From Cisco Unified Operating System Administration, choose **Security > Bulk Certificate Management**.
 - Step 2** Export certificates from new destination cluster (TFTP only) to a central SFTP server.
 - Step 3** Consolidate certificates (TFTP only) on the SFTP server using the Bulk Certificate interface.
 - Step 4** On the origination cluster use the Bulk Certificate function to import the TFTP certificates from the central SFTP server.
 - Step 5** Use DHCP option 150, or some other method, to point the phones to the new destination cluster.

The phones download the new destination cluster ITL file and attempt to verify it against their existing ITL file. The certificate is not in the existing ITL file so the phone requests the old TVS server to verify the signature of the new ITL file. The phone sends a TVS query to the old origination cluster on TCP port 2445 to make this request.

If the certificate export/consolidate/import process works correctly then the TVS returns success, and the phone replaces the ITL file in memory with the newly downloaded ITL file.

The phones can now download and verify the signed configuration files from the new cluster.

Generate Self-Signed Certificate

Procedure

-
- Step 1** From Cisco Unified OS Administration, choose **Security > Certificate Management**. The **Certificate List** window appears.
- Step 2** Enter search parameters to find a certificate and view its configuration details. The system displays the records that match all the criteria in the **Certificate List** window.
- Step 3** Click **Generate Self-Signed Certificate** to generate a new self-signed certificate. The **Generate New Self-Signed Certificate** window appears.
- Step 4** From the **Certificate Purpose** drop-down box, select a system security certificate, such as **CallManager-ECDSA**.
- Step 5** Configure the fields in the **Generate New Self-Signed Certificate** window. See the Related Topics section for more information about the fields and their configuration options.
- Step 6** Click **Generate**.
-

Related Topics

[Self-Signed Certificate Fields](#), on page 19

Self-Signed Certificate Fields

Table 1: Self-signed Certificate Fields

Field	Description
Certificate Purpose	<p>Choose the required option from the drop-down list.</p> <p>When you choose any of the following options, the Key Type field is automatically set to RSA.</p> <ul style="list-style-type: none"> • tomcat • ipsec • ITLRecovery • CallManager • CAPF • TVS <p>When you choose any of the following options, the Key Type field is automatically set to EC (Elliptical Curve).</p> <ul style="list-style-type: none"> • tomcat-ECDSA • CallManager-ECDSA
Distribution	Choose a Unified Communications Manager server from the drop-down list.

Field	Description
Auto-populated Domains	<p>Appears only if you have chosen any of the following options using the Certificate Purpose drop-down list.</p> <ul style="list-style-type: none"> • tomcat • tomcat-ECDSA • CallManager • CallManager-ECDSA • TVS <p>This field lists the host names that are protected by a single certificate. The certificate common name is the same as the hostname. Both, CallManager-ECDSA and tomcat-ECDSA certificate has a common name that is different from the hostname.</p> <p>The field displays the fully qualified domain name for CallManager-ECDSA certificate.</p>
Key Type	<p>This field lists the type of keys used for encryption and decryption of the public-private key pair.</p> <p>Unified Communications Manager supports EC and RSA key types.</p>

Field	Description
Key Length	<p>Choose any of the following values from the drop-down list:</p> <ul style="list-style-type: none"> • 1024 • 2048 • 3072 • 4096 <p>Depending on the key length, the self-signed certificate request, limits the hash algorithm choices. With the limited hash algorithm choices, you can use a hash algorithm strength that is greater than or equal to the key length strength.</p> <ul style="list-style-type: none"> • If the key length value is 256, the supported hash algorithms are SHA256, SHA384, or SHA512. • If the key length value is 384, the supported hash algorithms are SHA384 or SHA512. <p>Note Certificates with a key length value of 3072 or 4096 are chosen only for RSA certificates. These options are not available for ECDSA certificates.</p> <p>Note Some phone models might fail to register if the RSA key length value chosen for the CallManager Certificate Purpose is greater than 2048.</p> <p>For more information, navigate to Unified CM Phone Feature List Report on the Cisco Unified Reporting Tool (CURT), to check the 3072/4096 RSA key size support for the list of supported phone models.</p>
Hash Algorithm	<p>Choose a value that is greater than or equal to the key length from the drop-down list:</p> <p>Note</p> <ul style="list-style-type: none"> • The values in the Hash Algorithm drop-down list changes based on the value you have chosen in the Key Length field. • If your system is running in FIPS mode, it is mandatory to choose SHA256 as the hashing algorithm.

Generate Certificate Signing Request

If you generate a new certificate signing request for a specific certificate type, the application overwrites the existing certificate signing request for that certificate type.

You can upload the CA signed certificates by generating CSR from Cisco Unified Operating System Administration and present to the CA. Whenever you generate a CSR, a new private key is generated along with CSR.

A private key is a file that is unique to a server and service, which you have selected while generating CSR. Do not share this private key with anyone for security compliance. If you provide a private key to someone, it compromises the security that the certificate provides. Also, do not regenerate a new CSR for the same service if you are using the old CSR to create a certificate. Unified Communications Manager deletes the old CSR and private key, replaces both of them with new one and makes the old CSR unserviceable.



Note Unified Communications Manager Release 11.0 onwards, when you choose the bulk operation units—TFTP or all, the ECDSA certificates get included with the RSA certificates.

Procedure

-
- Step 1** From Cisco Unified OS Administration, choose **Security > Certificate Management**. The **Certificate List** window appears.
- Step 2** Click **Generate CSR**. The **Generate Certificate Signing Request** window appears.
- Step 3** Enter search parameters to find a certificate and view its configuration details. The system displays the records that match all the criteria in the **Certificate List** window.
- Step 4** From the **Certificate Purpose** drop-down box, select a system security certificate, such as **CallManager-ECDSA**.
- Step 5** Configure the fields in the **Generate Certificate Signing Request** window. See the Related Topics section for more information about the fields and their configuration options.
- Step 6** Click **Generate**.
-

Related Topics

[Certificate Signing Request Fields](#), on page 22

Certificate Signing Request Fields

Table 2: Certificate Signing Request Fields

Field	Description
Certificate Purpose	From the drop-down list, select a value: <ul style="list-style-type: none"> • CallManager • CallManager-ECDSA
Distribution	Select a Unified Communications Manager server. When you select this field for multiserver for ECDSA, the syntax is: <code>Callmanager-ecdsa common name: <host-name>-EC-ms.<domain></code> When you select this field for multiserver for RSA, the syntax is: <code>Callmanager common name: <host-name>-ms.<domain></code>

Field	Description
	<p>Important Supported from Release 14SU1 onwards.</p> <p>Shows the name of the Unified Communications Manager application that you selected in the Distribution field by default.</p>
Auto-populated Domains	This field appears in Subject Alternate Names (SANs) section. It lists the host names that are to be protected by a single certificate.
Parent Domain	This field appears in Subject Alternate Names (SANs) section. It shows the default domain name. You can modify the domain name, if required.
Key Type	<p>This field identifies the type of key used for encryption and decryption for the public-private key pair.</p> <p>Unified Communications Manager supports EC and RSA key types.</p>
Key Length	<p>From the Key Length drop-down list, select one of the values.</p> <p>Depending on the key length, the CSR request limits the hash algorithm choices. By having the limited hash algorithm choices, you can use a hash algorithm strength that is greater than or equal to the key length strength. For example, for a key length of 256, the supported hash algorithms are SHA256, SHA384, or SHA512. Similarly, for the key length of 384, the supported hash algorithms are SHA384 or SHA512.</p> <p>Note Certificates with a key length value of 3072 or 4096 can only be selected for RSA certificates. These options aren't available for ECDSA certificates.</p> <p>Note Some phone models may fail to register if the RSA key length selected for the CallManager Certificate Purpose is greater than 2048. From the Unified CM Phone Feature List Report on the Cisco Unified Reporting Tool (CURT), you can check the 3072/4096 RSA key size support feature for the list of supported phone models.</p>
Hash Algorithm	<p>Select a value from the Hash Algorithm drop-down list to have stronger hash algorithm as the elliptical curve key length. From the Hash Algorithm drop-down list, select one of the values.</p> <p>Note</p> <ul style="list-style-type: none"> • The values for the Hash Algorithm field change based on the value you select in the Key Length field. • If your system is running on FIPS mode, it's mandatory that you select SHA256 as the hashing algorithm.

Interactions and Restrictions

- SIP devices that do not support `TLS_ECDHE_ECDSA_WITH_AES256_SHA384` and `TLS_ECDHE_ECDSA_WITH_AES128_SHA256` can still connect with `TLS_ECDHE_RSA_WITH_AES_256_SHA384`, `TLS_ECDHE_RSA_WITH_AES_128_SHA256`, or `AES128_SHA`. These options are dependent on the TLS cipher option that you choose. If you choose **ECDSA only** option, then the device that does not support the ECDSA ciphers will not be able make a TLS connection to the SIP interface. When you choose the **ECDSA only** option, the value of this parameter are `TLS_ECDHE_ECDSA_WITH_AES128_SHA256` and `TLS_ECDHE_ECDSA_WITH_AES256_SHA384`.
- CTI Manager Secure clients do not support `TLS_ECDHE_RSA_WITH_AES_128_SHA256`, `TLS_ECDHE_RSA_WITH_AES_256_SHA384`, `TLS_ECDHE_ECDSA_WITH_AES_128_SHA256`, and `TLS_ECDHE_ECDSA_WITH_AES_256_SHA384`. However, they can connect with `AES128_SHA`.

Perform Bulk Reset of ITL File

Make sure you perform this procedure only from the Unified Communications Manager publisher.

The bulk reset of the ITL file is performed, when phones no longer trust the ITL file signer and also cannot authenticate the ITL file provided by the TFTP service locally or using TVS.

To perform a bulk reset, use the CLI command **utils itl reset**. This command generates a new ITL recovery file and re-establishes the trust between phones and the TFTP service on CUCM.



Tip When you install Unified Communications Manager, use the CLI command **file get tftp ITLRecovery.p12** to export the ITL Recovery pair and then perform a backup through DR. You will also be prompted to enter the SFTP server (where the key is exported) and password.

Procedure

Step 1 Perform any one of the following steps:

- Run **utils itl reset localkey**.
- Run **utils itl reset remotekey**.

Note For **utils itl reset localkey**, the local key resides on the publisher. When issuing this command, the ITL file is signed temporarily by the CallManager key while the ITL Recovery key is resetting.

Step 2 Run **show itl** to verify that the reset was successful.

Step 3 From Cisco Unified CM Administration, choose **System > Enterprise Parameters**.

Step 4 Click **Reset**.

The devices restart. They are ready to download the ITL file that is signed by the CallManager key and accept configuration files.

Step 5 Restart the TFTP service and restart all devices.

Note Restarting the TFTP service causes the ITL File to be signed by the ITLRecovery Key and rolling back the changes in Step 1.

The devices download the ITL file that is signed with the ITLRecovery Key and register correctly to Unified Communications Manager again.

Reset CTL Localkey

When devices on a Unified Communications Manager cluster are locked and lose their trusted status, perform a reset of the Cisco Trust List (CTL) file with the CLI command **utils ctl reset localkey**. This command generates a new CTL file.

Procedure

Step 1 Run **utils ctl reset localkey**

Note For **utils ctl reset localkey**, the local key resides on the publisher. When issuing this command, the CTL file is temporarily signed by the CallManager key.

Step 2 Run **show ctl** to verify that the reset was successful.

Step 3 From Cisco Unified CM Administration, choose **System > Enterprise Parameters**. The **Enterprise Parameters Configuration** page appears.

Step 4 Click **Reset**.

The devices restart. They are ready to download the CTL file that is signed by the CallManager key and accept configuration files.

Step 5 Run the **utils ctl update CTLfile** and restart the necessary services rolling back the changes in Step 1.

The devices restart. They are ready to download the CTL file that is signed by the ITLRecovery key and accept configuration files.

The devices download the CTL file that is signed using the required keys and register correctly to Unified Communications Manager again.

View the Validity Period of ITLRecovery Certificate

The ITLRecovery certificate has a long validity period with phones. You can navigate to the **Certificate File Data** pane to view the validity period or any other ITLRecovery certificate details.

Procedure

Step 1 From Cisco Unified OS Administration, choose **Security > Certificate Management**.

- Step 2** Enter the required search parameters to find the certificate and view its configuration details. The list of certificates that match the criteria appears in the **Certificate List** page.
- Step 3** Click the **ITLRecovery** link to view the validity period.
The ITLRecovery certificate details appear in the **Certificate File Data** pane.
The validity period is 20 years from the current year.

Contact Search Authentication Task Flow

Complete the following tasks to set up Contact Search Authentication in Unified Communications Manager. When this feature is configured, users must authenticate themselves before searching the directory for other users.

Procedure

	Command or Action	Purpose
Step 1	Confirm Phone Support for Contact Search Authentication, on page 26	Confirm that your phones support this feature. Run the Unified CM Phone Feature List report in Cisco Unified Reporting to get a list of phone models that support the feature.
Step 2	Enable Contact Search Authentication, on page 27	Configure Unified Communications Manager for Contact Search Authentication.
Step 3	Configure Secure Directory Server for Contact Search, on page 27	Use this procedure to configure Unified Communications Manager with the URL to which phone users are directed when they search the directory for other users.

Confirm Phone Support for Contact Search Authentication

Confirm that the phones in your deployment support contact search authentication. Run a Phone Feature List report to obtain a full list of phone models that support the feature.

Procedure

- Step 1** From Cisco Unified Reporting, click **System Reports**.
- Step 2** Select **Unified CM Phone Feature**.
- Step 3** Click the **Unified CM Phone Feature** report.
- Step 4** Leave the **Product** field at the default value.
- Step 5** From the **Feature** drop-down, choose **Authenticated Contact Search**.
- Step 6** Click **Submit**.

Enable Contact Search Authentication

Use this procedure on Unified Communications Manager to configure contact search authentication for phone users.

Procedure

- Step 1** Log in to the Command Line Interface.
- Step 2** Run the **utils contactsearchauthentication status** command to confirm the contact search authentication setting on this node.
- Step 3** If you need to configure contact search authentication:
- To enable authentication, run the **utils contactsearchauthentication enable** command.
 - To disable authentication, run the **utils contactsearchauthentication disable** command.
- Step 4** Repeat this procedure on all Unified Communications Manager cluster nodes.
- Note** You must reset phones in order for the changes to take effect.
-

Configure Secure Directory Server for Contact Search

Use this procedure to configure Unified Communications Manager with the directory server URL to which UDS sends user search requests. The default value is `https://<cucm-fqdn-or-ip>:port/cucm-uds/users`.



- Note** The default UDS port is 8443. When contact search authentication becomes enabled, the default UDS port switches to 9443. If you then disable contact search authentication, you must change the UDS port back to 8443 manually.
-

Procedure

- Step 1** From Cisco Unified Communications Manager Administration, choose **System > Enterprise Parameters**.
- Step 2** In the **Secure Contact Search URL** text box, enter the URL for secure UDS directory requests.
- Note** We recommend that for the URL, you choose a node that is not running the Cisco TFTP service. The CiscoTFTP and UDS services may disrupt each other if either service gets restarted.
- Step 3** Click **Save**.
-

