



CHAPTER 9

Troubleshooting and Maintenance

This chapter provides information that can assist you in troubleshooting problems with your Cisco Unified IP Phone or with your IP telephony network. It also explains how to clean and maintain your phone.

If you need additional assistance to resolve an issue, see the [“Obtaining Documentation, Obtaining Support, and Security Guidelines”](#) section on page xi.

This chapter includes these topics:

- [Resolving Startup Problems](#), page 9-1
- [Cisco Unified IP Phone Resets Unexpectedly](#), page 9-6
- [Troubleshooting Cisco Unified IP Phone Security](#), page 9-8
- [General Troubleshooting Tips](#), page 9-9
- [Resetting or Restoring the Cisco Unified IP Phone](#), page 9-12
- [Monitoring the Voice Quality of Calls](#), page 9-13
- [Where to Go for More Troubleshooting Information](#), page 9-15
- [Cleaning the Cisco Unified IP Phone](#), page 9-15

Resolving Startup Problems

After installing a Cisco Unified IP Phone into your network and adding it to Cisco Unified Communications Manager, the phone should start up as described in the [“Verifying the Phone Startup Process”](#) section on page 3-10. If the phone does not start up properly, see the following sections for troubleshooting information:

- [Symptom: The Cisco Unified IP Phone Does Not Go Through its Normal Startup Process](#), page 9-2
- [Symptom: The Cisco Unified IP Phone Does Not Register with Cisco Unified Communications Manager](#), page 9-2
- [Symptom: Cisco Unified IP Phone Unable to Obtain IP Address](#), page 9-5

Symptom: The Cisco Unified IP Phone Does Not Go Through its Normal Startup Process

When you connect a Cisco Unified IP Phone into the network port, the phone should go through its normal startup process as described in [“Verifying the Phone Startup Process” section on page 3-10](#) and the LCD screen should display information. If the phone does not go through the startup process, the cause may be faulty cables, bad connections, network outages, lack of power, and so on. Or, the phone may not be functional.

To determine whether the phone is functional, follow these suggestions to systematically eliminate these other potential problems:

1. Verify that the network port is functional:
 - Exchange the Ethernet cables with cables that you know are functional.
 - Disconnect a functioning Cisco Unified IP Phone from another port and connect it to this network port to verify the port is active.
 - Connect the Cisco Unified IP Phone that will not start up to a different network port that is known to be good.
 - Connect the Cisco Unified IP Phone that will not start up directly to the port on the switch, eliminating the patch panel connection in the office.
2. Verify that the phone is receiving power:
 - If you are using external power, verify that the electrical outlet is functional.
 - If you are using in-line power, use the external power supply instead.
 - If you are using the external power supply, switch with a unit that you know to be functional.
3. If the phone still does not start up properly, power up the phone with the handset off-hook. When the phone is powered up in this way, it attempts to launch a backup software image.
4. If the phone still does not start up properly, perform a factory reset of the phone. For instructions, see the [“Performing a Factory Reset” section on page 9-12](#).

If after attempting these solutions, the LCD screen on the Cisco Unified IP Phone does not display any characters after at least five minutes, contact a Cisco technical support representative for additional assistance.

Symptom: The Cisco Unified IP Phone Does Not Register with Cisco Unified Communications Manager

If the phone proceeds past the first stage of the startup process (LED buttons flashing on and off) but continues to cycle through the messages displaying on the LCD screen, the phone is not starting up properly. The phone cannot successfully start up unless it is connected to the Ethernet network and it has registered with a Cisco Unified Communications Manager server.

These sections can assist you in determining the reason the phone is unable to start up properly:

- [Identifying Error Messages, page 9-3](#)
- [Checking Network Connectivity, page 9-3](#)
- [Verifying TFTP Server Settings, page 9-3](#)
- [Verifying IP Addressing and Routing, page 9-3](#)

- [Verifying DNS Settings, page 9-4](#)
- [Cisco CallManager and TFTP Services Are Not Running, page 9-4](#)
- [Creating a New Configuration File, page 9-4](#)
- [Checking Network Connectivity, page 9-3](#)

In addition, problems with security may prevent the phone from starting up properly. See the “[Troubleshooting Cisco Unified IP Phone Security](#)” section on [page 9-8](#) for more information.

Identifying Error Messages

As the phone cycles through the startup process, you can access status messages that might provide you with information about the cause of a problem. See the “[Status Messages Screen](#)” section on [page 7-2](#) for instructions about accessing status messages and for a list of potential errors, their explanations, and their solutions.

Checking Network Connectivity

If the network is down between the phone and the TFTP server or Cisco Unified Communications Manager, the phone cannot start up properly. Ensure that the network is currently running.

Verifying TFTP Server Settings

You can determine the IP address of the TFTP server used by the phone by pressing the **Applications** button, then selecting **Administrator Settings > Network Setup > IPv4 > TFTP Server 1**.

If you have assigned a static IP address to the phone, you must manually enter a setting for the TFTP Server 1 option. See the “[Network Setup Menu](#)” section on [page 4-4](#).

If you are using DHCP, the phone obtains the address for the TFTP server from the DHCP server. Check the IP address configured in Option 150.

You can also enable the phone to use an alternate TFTP server. Such a setting is particularly useful if the phone was recently moved from one location to another. See the “[Network Setup Menu](#)” section on [page 4-4](#) for instructions.

Verifying IP Addressing and Routing

You should verify the IP addressing and routing settings on the phone. If you are using DHCP, the DHCP server should provide these values. If you have assigned a static IP address to the phone, you must enter these values manually.

On the Cisco Unified IP Phone, press the **Applications** button, then select **Administrator Settings > Network Setup > IPv4**, and look at the following options:

- **Boot/DHCP Server**—If you have assigned a static IP address to the phone, you do not need to enter a value for the DHCP Server option. However, if you are using a DHCP server, this option must have a value. If it does not, check your IP routing and VLAN configuration. Refer to the *Troubleshooting Switch Port and Interface Problems* document, available at this URL: http://www.cisco.com/en/US/customer/products/hw/switches/ps700/products_tech_note09186a008015bfd6.shtml
- **IP Address, Subnet Mask, Default Router**—If you have assigned a static IP address to the phone, you must manually enter settings for these options. See the “[Network Setup Menu](#)” section on [page 4-4](#) for instructions.

If you are using DHCP, check the IP addresses distributed by your DHCP server. Refer to the *Understanding and Troubleshooting DHCP in Catalyst Switch or Enterprise Networks* document, available at this URL:

http://www.cisco.com/en/US/tech/tk648/tk361/technologies_tech_note09186a00800f0804.shtml

Verifying DNS Settings

If you are using DNS to refer to the TFTP server or to Cisco Unified Communications Manager, you must ensure that you have specified a DNS server. Verify this setting by pressing the **Applications** button, then selecting **Administrator Settings > Network Setup > IPv4 > DNS Server 1**. You should also verify that there is a CNAME entry in the DNS server for the TFTP server and for the Cisco Unified Communications Manager system.

You must also ensure that DNS is configured to do reverse look-ups.

Cisco CallManager and TFTP Services Are Not Running

If the Cisco CallManager or TFTP services are not running, phones may not be able to start up properly. However, in such a situation, it is likely that you are experiencing a system-wide failure, and other phones and devices are unable to start up properly.

If the Cisco CallManager service is not running, all devices on the network that rely on it to make phone calls will be affected. If the TFTP service is not running, many devices will not be able to start up successfully.

To start a service, follow these steps:

Procedure

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- Step 1** From Cisco Unified Communications Manager Administration, choose **Cisco Unified Serviceability** from the Navigation drop-down list and click **Go**.
 - Step 2** Choose **Tools > Control Center - Feature Services**.
 - Step 3** Choose the primary Cisco Unified Communications Manager server from the Server drop-down list.
The window displays the service names for the server that you chose, the status of the services, and a service control panel to start or stop a service.
 - Step 4** If a service has stopped, click its radio button and then click the **Start** button.
The Service Status symbol changes from a square to an arrow.
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Note

A service must be activated before it can be started or stopped. To activate a service, choose **Tools > Service Activation**.

Creating a New Configuration File

If you continue to have problems with a particular phone that other suggestions in this chapter do not resolve, the configuration file may be corrupted.

To create a new configuration file, follow these steps:

Procedure

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- Step 1** From Cisco Unified Communications Manager, choose **Device > Phone > Find** to locate the phone experiencing problems.
- Step 2** Choose **Delete** to remove the phone from the Cisco Unified Communications Manager database.
- Step 3** Add the phone back to the Cisco Unified Communications Manager database. See the [“Adding Phones to the Cisco Unified CM Database”](#) section on page 2-8 for details.
- Step 4** Power cycle the phone.



Note

- When you remove a phone from the Cisco Unified Communications Manager database, its configuration file is deleted from the Cisco Unified Communications Manager TFTP server. The phone’s directory number or numbers remain in the Cisco Unified Communications Manager database. They are called “unassigned DN’s” and can be used for other devices. If unassigned DN’s are not used by other devices, delete them from the Cisco Unified Communications Manager database. You can use the Route Plan Report to view and delete unassigned reference numbers. Refer to *Cisco Unified Communications Manager Administration Guide* for more information.
 - Changing the buttons on a phone button template, or assigning a different phone button template to a phone, may result in directory numbers that are no longer accessible from the phone. The directory numbers are still assigned to the phone in the Cisco Unified Communications Manager database, but there is no button on the phone with which calls can be answered. These directory numbers should be removed from the phone and deleted if necessary.
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Registering the Phone with Cisco Unified Communications Manager

A Cisco Unified IP Phone can register with a Cisco Unified Communications Manager server only if the phone has been added to the server or if auto-registration is enabled and if there are sufficient number of unit licenses. Review the information and procedures in the [“Adding Phones to the Cisco Unified CM Database”](#) section on page 2-8 to ensure that the phone has been added to the Cisco Unified Communications Manager database.

To verify that the phone is in the Cisco Unified Communications Manager database, choose **Device > Phone > Find** from Cisco Unified Communications Manager Administration to search for the phone based on its MAC Address. For information about determining a MAC address, see the [“Determining the MAC Address for a Cisco Unified IP Phone”](#) section on page 2-11.

If the phone is already in the Cisco Unified Communications Manager database, its configuration file may be damaged. See the [“Creating a New Configuration File”](#) section on page 9-4 for assistance.

For more information on licensing go to the [Licenses for Phones](#) section in the *Cisco Unified Communications Manager System Guide*

Symptom: Cisco Unified IP Phone Unable to Obtain IP Address

If a phone is unable to obtain an IP address when it starts up, the phone may be not be on the same network or VLAN as the DHCP server, or the switch port to which the phone is connected may be disabled. Make sure that the network or VLAN to which the phone is connected has access to the DHCP server, and make sure that the switch port is enabled.

Cisco Unified IP Phone Resets Unexpectedly

If users report that their phones are resetting during calls or while idle on their desk, you should investigate the cause. If the network connection and Cisco Unified Communications Manager connection are stable, a Cisco Unified IP Phone should not reset on its own.

Typically, a phone resets if it has problems connecting to the Ethernet network or to Cisco Unified Communications Manager. These sections can help you identify the cause of a phone resetting in your network:

- [Verifying the Physical Connection, page 9-6](#)
- [Identifying Intermittent Network Outages, page 9-6](#)
- [Verifying DHCP Settings, page 9-6](#)
- [Checking Static IP Address Settings, page 9-7](#)
- [Verifying the Voice VLAN Configuration, page 9-7](#)
- [Verifying that the Phones Have Not Been Intentionally Reset, page 9-7](#)
- [Eliminating DNS or Other Connectivity Errors, page 9-7](#)

Verifying the Physical Connection

Verify that the Ethernet connection to which the Cisco Unified IP Phone is connected is up. For example, check whether the particular port or switch to which the phone is connected is down and that the switch is not rebooting. Also make sure that there are no cable breaks.

Identifying Intermittent Network Outages

Intermittent network outages affect data and voice traffic differently. Your network might have been experiencing intermittent outages without detection. If so, data traffic can resend lost packets and verify that packets are received and transmitted. However, voice traffic cannot recapture lost packets. Rather than retransmitting a lost network connection, the phone resets and attempts to reconnect its network connection.

If you are experiencing problems with the voice network, you should investigate whether an existing problem is simply being exposed.

Verifying DHCP Settings

The following suggestions can help you determine if the phone has been properly configured to use DHCP:

1. Verify that you have properly configured the phone to use DHCP. See the [“Network Setup Menu” section on page 4-4](#) for more information.
2. Verify that the DHCP server has been set up properly.
3. Verify the DHCP lease duration. Cisco recommends that you set it to 8 days.

Checking Static IP Address Settings

If the phone has been assigned a static IP address, verify that you have entered the correct settings. See the [“Network Setup Menu” section on page 4-4](#) for more information.

Verifying the Voice VLAN Configuration

If the Cisco Unified IP Phone appears to reset during heavy network usage (for example, following extensive web surfing on a computer connected to the same switch as the phone), it is likely that you do not have a voice VLAN configured.

Isolating the phones on a separate auxiliary VLAN increases the quality of the voice traffic. See the [“Understanding How the Cisco Unified IP Phone Interacts with the VLAN” section on page 2-2](#) for details.

Verifying that the Phones Have Not Been Intentionally Reset

If you are not the only administrator with access to Cisco Unified Communications Manager, you should verify that no one else has intentionally reset the phones.

You can check whether a Cisco Unified IP Phone received a command from Cisco Unified Communications Manager to reset by pressing the **Applications** button on the phone and choosing **Administrator Settings > Status > Network Statistics**. If the phone was recently reset, one of these messages appears:

- Reset-Reset—Phone closed due to receiving a Reset/Reset from Cisco Unified Communications Manager Administration.
- Reset-Restart—Phone closed due to receiving a Reset/Restart from Cisco Unified Communications Manager Administration.

Eliminating DNS or Other Connectivity Errors

If the phone continues to reset, follow these steps to eliminate DNS or other connectivity errors:

Procedure

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- Step 1** Use the Reset Settings menu to reset phone settings to their default values. See the [“Resetting or Restoring the Cisco Unified IP Phone” section on page 9-12](#) for details.
 - Step 2** Modify DHCP and IP settings:
 - a. Disable DHCP. See the [“Network Setup Menu” section on page 4-4](#) for instructions.
 - b. Assign static IP values to the phone. See the [“Network Setup Menu” section on page 4-4](#) for instructions. Use the same default router setting used for other functioning Cisco Unified IP Phones.
 - c. Assign a TFTP server. See the [“Network Setup Menu” section on page 4-4](#) for instructions. Use the same TFTP server used for other functioning Cisco Unified IP Phones.
 - Step 3** On the Cisco Unified Communications Manager server, verify that the local host files have the correct Cisco Unified Communications Manager server name mapped to the correct IP address.

- Step 4** From Cisco Unified Communications Manager, choose **System > Server** and verify that the server is referred to by its IP address and not by its DNS name.
- Step 5** From Cisco Unified Communications Manager, choose **Device > Phone > Find** and verify that you have assigned the correct MAC address to this Cisco Unified IP Phone. For information about determining a MAC address, see the “[Determining the MAC Address for a Cisco Unified IP Phone](#)” section on [page 2-11](#).
- Step 6** Power cycle the phone.
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Checking Power Connection

In most cases, a phone will restart if it powers up by using external power but loses that connection and switches to PoE. Similarly, a phone may restart if it powers up by using PoE and then gets connected to an external power supply.

Troubleshooting Cisco Unified IP Phone Security

[Table 9-1](#) provides troubleshooting information for the security features on the Cisco Unified IP Phone. For information relating to the solutions for any of these issues, and for additional troubleshooting information about security and encryption, refer to *Cisco Unified Communications Manager Security Guide*.

Table 9-1 Cisco Unified IP Phone Security Troubleshooting

Problem	Possible Cause
Device authentication error.	CTL file does not have a Cisco Unified Communications Manager certificate or has an incorrect certificate.
Phone cannot authenticate CTL file.	The security token that signed the updated CTL file does not exist in the CTL file on the phone.
Phone cannot authenticate any of the configuration files other than the CTL file.	Bad TFTP record.
Phone does not register with Cisco Unified Communications Manager.	The CTL file does not contain the correct information for the Cisco Unified Communications Manager server.
Phone does not request signed configuration files.	The CTL file does not contain any TFTP entries with certificates.

Table 9-1 Cisco Unified IP Phone Security Troubleshooting (continued)

Problem	Possible Cause
802.1X Enabled on Phone but Not Authenticating	
Phone cannot obtain a DHCP-assigned IP address	<p>These errors typically indicate that 802.1X is enabled on the phone, but the phone is unable to authenticate.</p> <ol style="list-style-type: none"> 1. Verify that you have properly configured the required components “Supporting 802.1X Authentication on Cisco Unified IP Phones” section on page 1-16. 2. Confirm that the shared secret is configured on the phone (see the “Security Configuration Menu” section on page 4-8 for more information). <ul style="list-style-type: none"> – If the shared secret is configured, verify that you have the same shared secret entered on the authentication server. – If the shared secret is not configured, enter it, and ensure that it matches the one on the authentication server.
Phone does not register with Cisco Unified Communications Manager	
Phone status display as “Configuring IP” or “Registering”	
802.1X Authentication Status displays as “Held” (see the “802.1X Authentication and Status” section on page 4-8).	
Status menu displays 802.1x status as “Failed” (see the “Call Statistics Screen” section on page 7-8).	
802.1X Not Enabled	
Phone cannot obtain a DHCP-assigned IP address	<p>These errors typically indicate that 802.1X is not enabled on the phone. To enable it, see the “Security Configuration Menu” section on page 4-8 for information on enabling 802.1X on the phone.</p>
Phone does not register with Cisco Unified Communications Manager	
Phone status display as “Configuring IP” or “Registering”	
802.1X Authentication Status displays as “Disabled” (see the “802.1X Authentication and Status” section on page 4-8).	
Status menu displays DHCP status as timing out (see the “Call Statistics Screen” section on page 7-8).	
Factory Reset Deleted 802.1X Shared Secret	
Phone cannot obtain a DHCP-assigned IP address	<p>These errors typically indicate that the phone has completed a factory reset while 802.1X was enabled. A factory reset deletes the shared secret, which is required for 802.1X authentication and network access. To resolve this, you have two options:</p> <ul style="list-style-type: none"> • Temporarily disable 802.1X on the switch. • Temporarily move the phone to a network environment that is not using 802.1X authentication. <p>Once the phone starts up normally in one of these conditions, you can access the 802.1X configuration menus and re-enter the shared secret.</p>
Phone does not register with Cisco Unified Communications Manager	
Phone status display as “Configuring IP” or “Registering”	
Cannot access phone menus to verify 802.1X status	

General Troubleshooting Tips

Table 9-2 provides general troubleshooting information for the Cisco Unified IP Phone.

Table 9-2 Cisco Unified IP Phone Troubleshooting

Summary	Explanation
Connecting a Cisco Unified IP Phone to another Cisco Unified IP Phone/	Cisco does not support connecting an IP phone to another IP phone through the PC port. Each IP phone should directly connect to a switch port. If phones are connected together in a line (by using the PC port), the phones will not work.
Poor quality when calling digital cell phones using the G.729 protocol.	In Cisco Unified Communications Manager, you can configure the network to use the G.729 protocol (the default is G.711). When using G.729, calls between an IP phone and a digital cellular phone will have poor voice quality. Use G.729 only when absolutely necessary.
Prolonged broadcast storms cause IP phones to reset, or be unable to make or answer a call.	A prolonged Layer 2 broadcast storm (lasting several minutes) on the voice VLAN may cause IP phones to reset, lose an active call, or be unable to initiate or answer a call. Phones may not come up until a broadcast storm ends.
Moving a network connection from the phone to a workstation.	<p>If you are powering your phone through the network connection, you must be careful if you decide to unplug the phone's network connection and plug the cable into a desktop computer.</p> <p> Caution The computer's network card cannot receive power through the network connection; if power comes through the connection, the network card can be destroyed. To protect a network card, wait 10 seconds or longer after unplugging the cable from the phone before plugging it into a computer. This delay gives the switch enough time to recognize that there is no longer a phone on the line and to stop providing power to the cable.</p>
Changing the telephone configuration.	By default, the network setup options are locked to prevent users from making changes that could impact their network connectivity. You must unlock the network setup options before you can configure them. See the “Unlocking and Locking Options” section on page 4-3 for details.
Phone resetting.	The phone resets when it loses contact with the Cisco Unified Communications Manager software. This lost connection can be due to any network connectivity disruption, including cable breaks, switch outages, and switch reboots.
LCD display issues.	If the display appears to have rolling lines or a wavy pattern, it might be interacting with certain types of older fluorescent lights in the building. Moving the phone away from the lights, or replacing the lights, should resolve the problem.
Dual-Tone Multi-Frequency (DTMF) delay.	When you are on a call that requires keypad input, if you press the keys too quickly, some of them might not be recognized.
Codec mismatch between the phone and another device.	<p>The RxType and the TxType statistics show the codec that is being used for a conversation between this Cisco Unified IP phone and the other device. The values of these statistics should match. If they do not, verify that the other device can handle the codec conversation, or that a transcoder is in place to handle the service.</p> <p>See the “Call Statistics Screen” section on page 7-8 for information about displaying these statistics.</p>

Table 9-2 Cisco Unified IP Phone Troubleshooting (continued)

Summary	Explanation
Sound sample mismatch between the phone and another device.	<p>The RxSize and the TxSize statistics show the size of the voice packets that are being used in a conversation between this Cisco Unified IP phone and the other device. The values of these statistics should match.</p> <p>See the “Call Statistics Screen” section on page 7-8 for information about displaying these statistics.</p>
Gaps in voice calls.	<p>Check the AvgJtr and the MaxJtr statistics. A large variance between these statistics might indicate a problem with jitter on the network or periodic high rates of network activity.</p> <p>See the “Call Statistics Screen” section on page 7-8 for information about displaying these statistics.</p>
Loopback condition.	<p>A loopback condition can occur when the following conditions are met:</p> <ul style="list-style-type: none"> • The SW Port Configuration option in the Network Setup menu on the phone is set to 10 Half (10-BaseT / half duplex) • The phone receives power from an external power supply • The phone is powered down (the power supply is disconnected) <p>In this case, the switch port on the phone can become disabled and the following message will appear in the switch console log:</p> <p>HALF_DUX_COLLISION_EXCEED_THRESHOLD</p> <p>To resolve this problem, re-enable the port from the switch.</p>
One-way audio.	<p>When at least one person in a call does not receive audio, IP connectivity between phones is not established. Check the configurations in routers and switches to ensure that IP connectivity is properly configured.</p>
Phone call cannot be established	<p>The phone does not have a DHCP IP address, is unable to register to Cisco Unified Communications Manager, and shows a Configuring IP or Registering message.</p> <p>Verify the following:</p> <ol style="list-style-type: none"> 1. The Ethernet cable is attached. 2. The Cisco CallManager service is running on the Cisco Unified Communications Manager server. 3. Both phones are registered to the same Cisco Unified Communications Manager. 4. Audio server debug and capture logs are enabled for both phones. If needed, enable Java debug.

Resetting or Restoring the Cisco Unified IP Phone

There are two general methods for resetting or restoring the Cisco Unified IP Phone:

- [Performing a Basic Reset, page 9-12](#)
- [Performing a Factory Reset, page 9-12](#)

Performing a Basic Reset

Performing a basic reset of a Cisco Unified IP Phone provides a way to recover if the phone experiences an error and provides a way to reset or restore various configuration and security settings.

[Table 9-3](#) describes the ways to perform a basic reset. You can reset a phone with any of these operations after the phone has started up. Choose the operation that is appropriate for your situation.

Table 9-3 **Basic Reset Methods**

Operation	Performing	Explanation
Restart phone	Press the Services, Applications, or Directories button and then press ***#** .	Resets any user and network setup changes that you have made, but that the phone has not written to its Flash memory, to previously saved settings, then restarts the phone.
Reset Settings	To reset settings, press the Applications button and choose Administrator Settings > Reset Settings > Network .	Resets user and network setup settings to their default values, and restarts the phone.
	To reset the CTL file, press the Applications button and choose Administrator Settings > Reset Settings > Security .	Resets the CTL file.

Performing a Factory Reset

When you perform a factory reset of the Cisco Unified IP Phone, the following information is erased or reset to its default value:

- User configuration settings—Reset to default values
- Network setup settings—Reset to default values
- Call histories—Erased
- Locale information—Reset to default values

Before you perform a factory reset, ensure that the following conditions are met:

- The phone must be on a DHCP-enabled network.
- A valid TFTP server must be set in DHCP option 150 or option 66 on the DHCP server.

To perform a factory reset of a phone, you can press the Applications button and choose **Administrator Settings > Reset Settings > All**.

Alternatively, you can also follow these steps:

Procedure

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- Step 1** While powering up the phone, press and hold #.
- Step 2** When the light on the mute button and handset light strip turns off and all other lights (line button, headset button, speakerphone button and select button) stay green, press **123456789*0#** in sequence. When you press 1, the lights on the line buttons turn red. The light on the select button flash when a button is pressed.
- If you press the buttons out of sequence, the lights on the line button, headset button, speakerphone button, and select button turn green. You will need to start over and press **123456789*0#** in sequence again.
- After you press these buttons, the phone goes through the factory reset process.
- Do not power down the phone until it completes the factory reset process, and the main screen appears.
-

Monitoring the Voice Quality of Calls

To measure the voice quality of calls that are sent and received within the network, Cisco Unified IP Phones use these statistical metrics that are based on concealment events. The DSP plays concealment frames to mask frame loss in the voice packet stream.

- **Concealment Ratio metrics**—Show the ratio of concealment frames over total speech frames. An interval conceal ratio is calculated every 3 seconds.
- **Concealed Second metrics**—Show the number of seconds in which the DSP plays concealment frames due to lost frames. A severely “concealed second” is a second in which the DSP plays more than five percent concealment frames.
- **Mean Opinion Score (MOS) for Listening Quality (LQK) Voice Metrics**—Uses a numeric score to estimate the relative voice-listening quality. The Cisco Unified IP Phones calculate the MOS LQK based audible-concealment events due to a frame loss in the preceding 8 seconds and includes weighting factors such as codec type and frame size.

MOS LQK scores are produced by a Cisco-proprietary algorithm, the Cisco Voice Transmission Quality (CVTQ) index. Depending on the MOS LQK version number, these scores may comply with the International Telecommunications Union (ITU) standard P.564. (This standard defines evaluation methods and performance accuracy targets that predict listening quality scores based on observation of actual network impairment.)



Note

Concealment ratio and concealment seconds are primary measurements based on frame loss. A Conceal Ratio of zero indicates that the IP network is delivering frames and packets on time with no loss.

You can access voice quality metrics from the Cisco Unified IP Phone by using the Call Statistics screen (see the “[Call Statistics Screen](#)” section on page 7-8) or remotely by using Streaming Statistics (see the [Monitoring the Cisco Unified IP Phone Remotely](#) chapter).

Troubleshooting Tips

When you observe significant and persistent changes to metrics, use [Table 9-4](#) for general troubleshooting information.

Table 9-4 *Changes to Voice Quality Metrics*

Metric Change	Condition
Conceal Ratio and Conceal Seconds increase significantly	Network impairment from packet loss or high jitter.
Conceal Ratio is near or at zero, but the voice quality is poor.	<ul style="list-style-type: none"> Noise or distortion in the audio channel such as echo or audio levels. Tandem calls that undergo multiple encode/decode such as calls to a cellular network or calling card network. Acoustic problems coming from a speakerphone, handsfree cellular phone or wireless headset. Check packet transmit (TxCnt) and packet receive (RxCnt) counters to verify that voice packets are flowing.
MOS LQK scores decrease significantly	Network impairment from packet loss or high jitter levels: <ul style="list-style-type: none"> Average MOS LQK decreases may indicate widespread and uniform impairment. Individual MOS LQK decreases may indicate bursty impairment. Cross-check the conceal ratio and conceal seconds for evidence of packet loss and jitter.
MOS LQK scores increase significantly	<ul style="list-style-type: none"> Check to see if the phone is using a different codec than expected (RxType and TxType). Check to see if the MOS LQK version changed after a firmware upgrade.



Note

Voice quality metrics do not account for noise or distortion, only frame loss.

Using Voice-Quality Metrics

When using the metrics for monitoring voice quality, note the typical scores under normal conditions of zero packet loss and use the metrics as a baseline for comparison.

It is also important to distinguish significant changes from random changes in metrics. Significant changes are scores that change about 0.2 MOS or more and persist in calls that last longer than 30 seconds. Conceal ratio changes indicate a frame loss greater than 3 percent.

The MOS LQK scores can vary based on the codec that the Cisco Unified IP Phone uses. The following codecs provide these corresponding maximum MOS LQK scores under normal conditions with zero frame loss for Cisco Unified Phones 8941 and 8945:

- G.711: 4.5 MOS LQK
- G.722: 4.5 MOS LQK

- G.728/iLBC: 3.9 MOS LQK
- G729A/AB: 3.7 MOS LQK

**Note**

- Cisco Voice Transmission Quality (CVTQ) does not support wideband (7 kHz) speech codecs, because ITU has not defined the extension of the technique to wideband. Therefore, MOS LQK scores that correspond to G.711 performance are reported for G.722 calls to allow basic quality monitoring, rather than not reporting an MOS score.
- Reporting G.711-scale MOS scores for wideband calls through the use of CVTQ allows basic-quality classifications to be indicated as good/normal or bad/abnormal. Calls with high scores (approximately 4.5) indicate high quality or a low packet loss, and lower scores (approximately 3.5) indicate low quality or a high packet loss.
- Unlike MOS, the conceal ratio and concealed seconds metrics remain valid and useful for both wideband and narrowband calls.

A conceal ratio of zero indicates that the IP network is delivering frames and packets on time with no loss.

Where to Go for More Troubleshooting Information

If you have additional questions about troubleshooting the Cisco Unified IP Phones, several Cisco.com web sites can provide you with more tips. Choose from the sites available for your access level.

- Cisco Unified IP Phone Troubleshooting Resources:
http://www.cisco.com/en/US/products/hw/phones/ps379/tsd_products_support_troubleshoot_and_alerts.html
- Cisco Products and Services (Technical Support and Documentation):
http://www.cisco.com/en/US/products/ps10451/tsd_products_support_series_home.html

Cleaning the Cisco Unified IP Phone

To clean your Cisco Unified IP phone, use only a dry soft cloth to gently wipe the phone and the LCD screen. Do not apply liquids or powders directly on the phone. As with all non-weather-proof electronics, liquids and powders can damage the components and cause failures.

