



## CHAPTER 2

# Preparing to Install the Cisco Unified IP Phone on Your Network

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Cisco Unified IP Phones enable you to communicate by using voice over a data network. To provide this capability, the IP Phones depend upon and interact with several other key Cisco Unified IP Telephony components, including Cisco Unified Communications Manager.

This chapter focuses on the interactions between the Cisco Unified IP Phone 6901 and 6911 and Cisco Unified Communications Manager, DNS and DHCP servers, TFTP servers, and switches. It also describes options for powering phones.

For related information about voice and IP communications, refer to this URL:

<http://www.cisco.com/en/US/products/sw/voicesw/index.html>

This chapter provides an overview of the interaction between the Cisco Unified IP Phone and other key components of the Voice over IP (VoIP) network. It includes the following topics:

- [Understanding Interactions with Other Cisco Unified IP Telephony Products, page 2-1](#)
- [Providing Power to the Cisco Unified IP Phone, page 2-3](#)
- [Understanding Phone Configuration Files, page 2-5](#)
- [Understanding the Phone Startup Process, page 2-6](#)
- [Adding Phones to the Cisco Unified Communications Manager Database, page 2-7](#)
- [Determining the MAC Address for a Cisco Unified IP Phone, page 2-11](#)

## Understanding Interactions with Other Cisco Unified IP Telephony Products

To function in the IP telephony network, the Cisco Unified IP Phone must be connected to a networking device, such as a Cisco Catalyst switch. You must also register the Cisco Unified IP Phone with a Cisco Unified Communications Manager system before sending and receiving calls.

This section includes the following topics:

- [Understanding How the Cisco Unified IP Phone Interacts with Cisco Unified Communications Manager, page 2-2](#)
- [Understanding How the Cisco Unified IP Phone 6911 Interacts with the VLAN, page 2-2](#)

## Understanding How the Cisco Unified IP Phone Interacts with Cisco Unified Communications Manager

Cisco Unified Communications Manager is an open and industry-standard call processing system. Cisco Unified Communications Manager software sets up and tears down calls between phones, integrating traditional PBX functionality with the corporate IP network. Cisco Unified Communications Manager manages the components of the IP telephony system—the phones, the access gateways, and the resources necessary for features such as call conferencing and route planning. Cisco Unified Communications Manager also provides:

- Firmware for phones
- Configuration file via TFTP service
- Phone registration
- Call preservation, so that a media session continues if signaling is lost between the primary Communications Manager and a phone

For information about configuring Cisco Unified Communications Manager to work with the IP devices described in this chapter, go to the [Cisco Unified IP Phone Configuration](#) chapter in the *Cisco Communications Manager Administration Guide*.

For an overview of security functionality for the Cisco Unified IP Phone, see the “[Understanding Security Features for Cisco Unified IP Phones](#)” section on page 1-10.



### Note

If the Cisco Unified IP Phone model that you want to configure does not appear in the Phone Type drop-down list in Cisco Unified Communications Manager Administration, go to the following URL and install the latest support patch for your version of Cisco Unified Communications Manager: <http://tools.cisco.com/support/downloads/go/Redirect.x?mdfid=278875240>

For more information, refer to “Software Upgrades” chapter in the *Cisco Unified Communications Operating System Administration Guide*.

### Related Topic

- [Telephony Features Available for the Cisco Unified IP Phone, page 5-1](#)

## Understanding How the Cisco Unified IP Phone 6911 Interacts with the VLAN

The Cisco Unified IP Phone 6911 has an internal Ethernet switch, enabling forwarding of packets to the phone, and to the access port and the network port on the back of the phone.



### Note

Cisco Unified IP Phone 6901 does not support VLANs.

If a computer is connected to the access port, the computer and the phone share the same physical link to the switch and share the same port on the switch. This shared physical link has the following implications for the VLAN configuration on the network:

- The current VLANs might be configured on an IP subnet basis. However, additional IP addresses might not be available to assign the phone to the same subnet as other devices connected to the same port.

- Data traffic present on the VLAN supporting phones might reduce the quality of Voice-over-IP traffic.
- Network security may indicate a need to isolate the VLAN voice traffic from the VLAN data traffic.

You can resolve these issues by isolating the voice traffic onto a separate VLAN. The switch port that the phone is connected to would be configured to have separate VLANs for carrying:

- Voice traffic to and from the IP phone (auxiliary VLAN on the Cisco Catalyst 6000 series, for example)
- Data traffic to and from the PC connected to the switch through the access port of the IP phone (native VLAN)

Isolating the phones on a separate, auxiliary VLAN increases the quality of the voice traffic and allows a large number of phones to be added to an existing network where there are not enough IP addresses for each phone.

For more information, refer to the documentation included with a Cisco switch. You can also access switch information at this URL:

<http://cisco.com/en/US/products/hw/switches/index.html>

#### Related Topics

- [Understanding the Phone Startup Process, page 2-6](#)
- [Configuring Settings on the Cisco Unified IP Phone, page 4-1](#)

## Providing Power to the Cisco Unified IP Phone

The Cisco Unified IP Phone 6901 and 6911 can be powered with external power or with Power over Ethernet (PoE). External power is provided through a separate power supply. PoE is provided by a switch through the Ethernet cable attached to a phone.



#### Note

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When you install a phone that is powered with external power, connect the power supply to the phone and to a power outlet before you connect the Ethernet cable to the phone. When you remove a phone that is powered with external power, disconnect the Ethernet cable from the phone before you disconnect the power supply.

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The following sections provide more information about powering a phone:

- [Power Guidelines, page 2-4](#)
- [Power Outage, page 2-4](#)
- [Obtaining Additional Information About Power, page 2-5](#)

## Power Guidelines

Table 2-1 provides guidelines for powering the Cisco Unified IP Phone 6901 and 6911.

**Table 2-1 Guidelines for Powering the Cisco Unified IP Phone 6901 and 6911**

Power Type	Guidelines
External power—Provided through the CP-PWR-CUBE-3 external power supply.	The Cisco Unified IP Phone 6901 and 6911 use the CP-PWR-CUBE-3 power supply.
External power—Provided through the Cisco Unified IP Phone Power Injector.	The Cisco Unified IP Phone Power Injector may be used with any Cisco Unified IP Phone. Functioning as a midspan device, the injector delivers inline power to the attached phone. The Cisco Unified IP Phone Power Injector is connected between a switch port and the IP Phone, and supports a maximum cable length of 100m between the unpowered switch and the IP Phone.
PoE power—Provided by a switch through the Ethernet cable attached to the phone.	<ul style="list-style-type: none"> <li>• The Cisco Unified IP Phone 6901 and 6911 support Cisco inline PoE.</li> <li>• The Cisco Unified IP Phone 6901 and 6911 support IEEE 802.3af Class 1 power on signal pairs and spare pairs.</li> <li>• To ensure uninterruptible operation of the phone, make sure that the switch has a backup power supply.</li> <li>• Make sure that the CatOS or IOS version running on your switch supports your intended phone deployment. Refer to the documentation for your switch for operating system version information.</li> </ul>
External power—Provided through inline power patch panel WS-PWR-PANEL	The inline power patch panel WS-PWR-PANEL is compatible with the Cisco Unified IP Phone 6901 and 6911.

## Power Outage

Your accessibility to emergency service through the phone is dependent on the phone being powered. If there is an interruption in the power supply, Service and Emergency Calling Service dialing will not function until power is restored. In the case of a power failure or disruption, you may need to reset or reconfigure equipment before using the Service or Emergency Calling Service dialing.

## Obtaining Additional Information About Power

For related information about power, refer to the documents shown in [Table 2-2](#). These documents provide information about the following topics:

- Cisco switches that work with the Cisco Unified IP Phone 6901 and 6911
- The Cisco IOS releases that support bidirectional power negotiation
- Other requirements and restrictions regarding power

**Table 2-2**      *Related Documentation for Power*

Document Topics	URL
Cisco Unified IP Phone Power Injector	<a href="http://www.cisco.com/en/US/products/ps6951/index.html">http://www.cisco.com/en/US/products/ps6951/index.html</a>
PoE Solutions	<a href="http://www.cisco.com/en/US/netsol/ns340/ns394/ns147/ns412/net_working_solutions_package.html">http://www.cisco.com/en/US/netsol/ns340/ns394/ns147/ns412/net_working_solutions_package.html</a>
Cisco Catalyst Switches	<a href="http://cisco.com/en/US/products/hw/switches/index.html">http://cisco.com/en/US/products/hw/switches/index.html</a>
Integrated Service Routers	<a href="http://www.cisco.com/en/US/products/hw/routers/index.html">http://www.cisco.com/en/US/products/hw/routers/index.html</a>
Cisco IOS Software	<a href="http://www.cisco.com/en/US/products/sw/iosswrel/products_ios_cisco_ios_software_category_home.html">http://www.cisco.com/en/US/products/sw/iosswrel/products_ios_cisco_ios_software_category_home.html</a>

## Understanding Phone Configuration Files

Configuration files for a phone are stored on the TFTP server and define parameters for connecting to Cisco Unified Communications Manager. In general, any time you make a change in Cisco Unified Communications Manager that requires the phone to be reset, a change is automatically made to the phone's configuration file.

Configuration files also contain information about which image load the phone should be running. If this image load differs from the one currently loaded on a phone, the phone contacts the TFTP server to request the required load files.

In addition, if the device security mode in the configuration file is set to Authenticated and the CTL file on the phone has a valid certificate for Cisco Unified Communications Manager, the phone establishes a TLS connection to Cisco Unified Communications Manager. Otherwise, the phone establishes a TCP connection.



### Note

If the device security mode in the configuration file is set to Authenticated or Encrypted, but the phone has not received a CTL file, the phone tries four times to obtain a CTL file and an ITL file so it can register securely.

If you configure security-related settings in Cisco Unified Communications Manager Administration, the phone configuration file will contain sensitive information. To ensure the privacy of a configuration file, you must configure it for encryption. For detailed information, refer to the “Configuring Encrypted Phone Configuration Files” chapter in *Cisco Unified Communications Manager Security Guide*. A phone requests a configuration file whenever it resets and registers with Cisco Unified Communications Manager.

A phone accesses a default configuration file named `XmlDefault.cnf.xml` from the TFTP server when the following conditions exist:

- You have enabled auto-registration in Cisco Unified Communications Manager
- The phone has not been added to the Cisco Unified Communications Manager database
- The phone is registering for the first time

If auto registration is not enabled and the phone has not been added to the Cisco Unified Communications Manager database, the phone registration request will be rejected.

If the phone is registered and working in encrypted mode, the phone accesses the configuration file named `SEPMac_address.cnf.xml.enc.sgn`. If the `SEPMac_address.cnf.xml.enc.sgn` does not exist on the TFTP server, the phone requests for the file `SEPMac_address.cnf.xml.sgn`.

The filenames are derived from the MAC address and description fields in the Phone Configuration window of Cisco Unified Communications Manager Administration. The MAC address uniquely identifies the phone.

For more information on phone configuration settings, go to the [Cisco Unified IP Phone Configuration](#) chapter in the *Cisco Communications Manager Administration Guide*.

## Understanding the Phone Startup Process

When connecting to the VoIP network, the Cisco Unified IP Phone 6901 and 6911 go through a standard startup process that is described in [Table 2-3](#). Depending on your specific network configuration, not all of these steps may occur on your Cisco Unified IP Phone.

**Table 2-3** Cisco Unified IP Phone Startup Process

Task	Purpose	Related Topics
1.	Obtaining Power from the Switch If a phone is not using external power, the switch provides in-line power through the Ethernet cable attached to the phone.	<ul style="list-style-type: none"> <li>• <a href="#">Adding Phones to the Cisco Unified Communications Manager Database, page 2-7.</a></li> <li>• <a href="#">Resolving Startup Problems, page 7-1.</a></li> </ul>
2.	Loading the Stored Phone Image The Cisco Unified IP Phone has non-volatile Flash memory in which it stores firmware images and user-defined preferences. At startup, the phone runs a bootstrap loader that loads a phone image stored in Flash memory. Using this image, the phone initializes its software and hardware.	<a href="#">Resolving Startup Problems, page 7-1.</a>
3.	Configuring VLAN If the Cisco Unified IP Phone is connected to a Cisco Catalyst switch, the switch next informs the phone of the voice VLAN defined on the switch. The phone needs to know its VLAN membership before it can proceed with the Dynamic Host Configuration Protocol (DHCP) request for an IP address.	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Settings on the Cisco Unified IP Phone, page 4-1.</a></li> <li>• <a href="#">Resolving Startup Problems, page 7-1.</a></li> </ul>
4.	Obtaining an IP Address If the Cisco Unified IP Phone is using DHCP to obtain an IP address, the phone queries the DHCP server to obtain one. If you are not using DHCP in your network, you must assign static IP addresses to each phone locally.	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Settings on the Cisco Unified IP Phone, page 4-1.</a></li> <li>• <a href="#">Resolving Startup Problems, page 7-1.</a></li> </ul>

Table 2-3 Cisco Unified IP Phone Startup Process (continued)

Task	Purpose	Related Topics
5.	<p>Accessing a TFTP Server</p> <p>In addition to assigning an IP address, the DHCP server directs the Cisco Unified IP Phone to a TFTP Server. If the phone has a statically defined IP address, you must configure the TFTP server locally on the phone; the phone then contacts the TFTP server directly.</p> <p><b>Note</b> You can also assign an alternative TFTP server to use instead of the one assigned by DHCP.</p>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Settings on the Cisco Unified IP Phone</a>, page 4-1.</li> <li>• <a href="#">Resolving Startup Problems</a>, page 7-1.</li> </ul>
6.	<p>Requesting the Configuration File</p> <p>The TFTP server has configuration files, which define parameters for connecting to Cisco Unified Communications Manager and other information for the phone.</p>	<ul style="list-style-type: none"> <li>• <a href="#">Adding Phones to the Cisco Unified Communications Manager Database</a>, page 2-7.</li> <li>• <a href="#">Resolving Startup Problems</a>, page 7-1.</li> </ul>
7.	<p>Contacting Cisco Unified Communications Manager</p> <p>The configuration file defines how the Cisco Unified IP Phone communicates with Cisco Unified Communications Manager and provides a phone with its load ID. After obtaining the file from the TFTP server, the phone attempts to make a connection to the highest priority Cisco Unified Communications Manager on the list.</p> <p>If the phone was manually added to the database, Cisco Unified Communications Manager identifies the phone. If the phone was not manually added to the database and auto-registration is enabled in Cisco Unified Communications Manager, the phone attempts to auto-register itself in the Cisco Unified Communications Manager database.</p>	<p><a href="#">Resolving Startup Problems</a>, page 7-1.</p>

## Adding Phones to the Cisco Unified Communications Manager Database

Before installing the Cisco Unified IP phone, you must choose a method for adding phones to the Cisco Unified Communications Manager database. Be aware that each phone type requires a fixed number of device license units and the number of unit licenses that are available on the server may impact phone registration. For more information on licensing go to the [Licenses for Phones](#) section in the *Cisco Unified Communications Manager System Guide*

These sections describe the methods:

- [Adding Phones with Auto-Registration](#), page 2-8
- [Adding Phones with Auto-Registration and TAPS](#), page 2-9
- [Adding Phones with Cisco Unified Communications Manager Administration](#), page 2-9
- [Adding Phones Using the BAT Phone Template](#), page 2-10

Table 2-4 provides an overview of these methods for adding phones to the Cisco Unified Communications Manager database.

**Table 2-4 Methods for Adding Phones to the Cisco Unified Communications Manager Database**

Method	Requires MAC Address?	Notes
Auto-registration	No	<ul style="list-style-type: none"> <li>Results in automatic assignment of directory numbers</li> <li>Not available when security or encryption is enabled.</li> </ul>
Auto-registration with TAPS	No	Requires auto-registration and the Bulk Administration Tool (BAT); updates information in the Cisco Unified IP Phone and in Cisco Unified Communications Manager Administration
Using the Cisco Unified Communications Manager Administration	Yes	Requires phones to be added individually
Using BAT	Yes	Allows for simultaneous registration of multiple phones

## Adding Phones with Auto-Registration

By enabling auto-registration before you begin installing phones, you can:

- Add phones without first gathering MAC addresses from the phones.
- Automatically add a Cisco Unified IP Phone to the Cisco Unified Communications Manager database when you physically connect the phone to your IP telephony network. During auto-registration, Cisco Unified Communications Manager assigns the next available sequential directory number to the phone.
- Quickly enter phones into the Cisco Unified Communications Manager database and modify any settings, such as the directory numbers, from Cisco Unified Communications Manager.
- Move auto-registered phones to new locations and assign them to different device pools without affecting their directory numbers.



### Note

Cisco recommends you use auto-registration to add less than 100 phones to your network. To add more than 100 phones to your network, use the Bulk Administration Tool (BAT). See the [“Adding Phones Using the BAT Phone Template”](#) section on page 2-10.

Auto-registration is disabled by default. In some cases, you might not want to use auto-registration; for example, if you want to assign a specific directory number to the phone. For information about enabling auto-registration, go to the [“Enabling Auto-Registration”](#) section in the *Cisco Unified Communications Manager Administration Guide*.



### Note

When you configure the cluster for mixed mode through the Cisco CTL client, auto-registration is automatically disabled. When you configure the cluster for non-secure mode through the Cisco CTL client, auto-registration is automatically enabled.



**Related Topics**

- [Adding Phones with Auto-Registration and TAPS, page 2-9](#)
- [Adding Phones with Cisco Unified Communications Manager Administration, page 2-9](#)
- [Adding Phones Using the BAT Phone Template, page 2-10](#)

## Adding Phones with Auto-Registration and TAPS

You can add phones with auto-registration and TAPS, the Tool for Auto-Registered Phones Support, without first gathering MAC addresses from phones.

TAPS works with the Bulk Administration Tool (BAT) to update a batch of phones that were already added to the Cisco Unified Communications Manager database with dummy MAC addresses. Use TAPS to update MAC addresses and download pre-defined configurations for phones.

**Note**

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Cisco recommends you use auto-registration and TAPS to add less than 100 phones to your network. To add more than 100 phones to your network, use the Bulk Administration Tool (BAT). See the [“Adding Phones Using the BAT Phone Template”](#) section on page 2-10.

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To implement TAPS, you or the end-user dial a TAPS directory number and follow voice prompts. When the process is complete, the phone will have downloaded its directory number and other settings, and the phone will be updated in Cisco Unified Communications Manager Administration with the correct MAC address.

Auto-registration must be enabled in Cisco Unified Communications Manager Administration (**System > Cisco Unified CM**) for TAPS to function.

**Note**

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When you configure the cluster for mixed mode through the Cisco CTL client, auto-registration is automatically disabled. When you configure the cluster for non-secure mode through the Cisco CTL client, auto-registration is automatically enabled.

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For more information, go to the [“Bulk Administration”](#) chapter in *Cisco Unified Communications Manager Administration Guide*.

**Related Topics**

- [Adding Phones with Auto-Registration, page 2-8](#)
- [Adding Phones with Cisco Unified Communications Manager Administration, page 2-9](#)
- [Adding Phones Using the BAT Phone Template, page 2-10](#)

## Adding Phones with Cisco Unified Communications Manager Administration

You can add phones individually to the Cisco Unified Communications Manager database by using Cisco Unified Communications Manager Administration. To do so, you first need to obtain the MAC address for each 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.

After you have collected MAC addresses, in Cisco Unified Communications Manager Administration, choose **Device > Phone** and click **Add New** to begin.

For complete instructions and conceptual information about Cisco Unified Communications Manager, go to the “[Cisco Unified Communications Manager Overview](#)” chapter in the *Cisco Unified Communications Manager System Guide*.

#### Related Topics

- [Adding Phones with Auto-Registration, page 2-8](#)
- [Adding Phones with Auto-Registration and TAPS, page 2-9](#)
- [Adding Phones Using the BAT Phone Template, page 2-10](#)

## Adding Phones Using the BAT Phone Template

The Cisco Unified Communications Manager Bulk Administration Tool (BAT) enables you to perform batch operations, including registration, on multiple phones. To access BAT, choose **Bulk Administration** in Cisco Unified Communications Manager Administration,

To add phones by using BAT only (not in conjunction with TAPS), you must obtain the appropriate MAC address for each 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.

For detailed instructions about adding phones using the Bulk Administration menu, refer to the *Cisco Unified Communications Manager Bulk Administration Guide*, chapter [Inserting Phones](#).

To add a phone to the Cisco Unified Communications Manager using the BAT phone template, follow these steps:

#### Procedure

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- Step 1** From Cisco Unified Communications Manager, choose **Bulk Administration > Phones > Phone Template**.
  - Step 2** Click **Add New**.
  - Step 3** Choose a Phone Type and click **Next**.
  - Step 4** Enter the details of phone specific parameters like Device Pool, Phone Button Template, Device Security Profile and so on.
  - Step 5** Click **Save**.
  - Step 6** From Cisco Unified Communications Manager, choose **Device > Phone > Add New** to add a phone using an existing BAT phone template.
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#### Related Topics

- [Adding Phones with Auto-Registration, page 2-8](#)
- [Adding Phones with Auto-Registration and TAPS, page 2-9](#)
- [Adding Phones with Cisco Unified Communications Manager Administration, page 2-9](#)

## Determining the MAC Address for a Cisco Unified IP Phone

Several procedures described in this manual require you to determine the MAC address of a Cisco Unified IP Phone. You can determine a phone's MAC address in these ways:

- Look at the MAC label on the back of the phone.
- Display the web page for the phone and click the **Device Information** hyperlink.

For information about accessing the web page, see the [“Accessing the Web Page for a Phone”](#) section on page 6-2.



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