



Preparing to Install the Cisco IP Phone on Your Network

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

These sections provide you with an important overview of the interaction between the Cisco IP Phone models 7902G/7905G/7912G and other key components of the Voice over IP (VoIP) network:

- [Understanding Interactions with Other Cisco IP Telephony Products, page 2-1](#)
- [Understanding the Phone Startup Process, page 2-4](#)
- [Guidelines for Configuring Ports on the Cisco IP Phone models 7902G/7905G/7912G, page 2-8](#)
- [Adding Phones to the Cisco CallManager Database, page 2-12](#)

Understanding Interactions with Other Cisco IP Telephony Products

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

This section covers the following topics:

- [Understanding How the Cisco IP Phone Interacts with Cisco CallManager, page 2-2](#)
- [Understanding How the Cisco IP Phone Interacts with the Cisco Catalyst Family of Switches, page 2-3](#)

Understanding How the Cisco IP Phone Interacts with Cisco CallManager

Cisco CallManager is an open and industry-standard call processing system. Cisco CallManager software runs on a Windows 2000 server and sets up and tears down calls between phones, integrating traditional PBX functionality with the corporate IP network. Cisco CallManager manages the components of the IP telephony system—the phones, access gateways, and the resources necessary for such features as call conferencing and route planning.

For information about configuring Cisco CallManager to work with the IP devices described in this chapter, refer to *Cisco CallManager Administration Guide* and *Cisco CallManager System Guide*.



Note

If the Cisco IP Phone model that you want to configure does not appear in the Phone Type drop-down list in Cisco CallManager, go to the following URL and install the latest support patch for your version of Cisco CallManager:
<http://www.cisco.com/cgi-bin/tablebuild.pl/callmgr-33>

Related Topic

- [Configuring Telephony Features Using Cisco CallManager Administration, page 5-2](#)

Understanding How the Cisco IP Phone Interacts with the Cisco Catalyst Family of Switches

The Cisco IP Phone 7912G has an internal Ethernet switch, enabling it to switch incoming traffic to the phone, the access port, or to the network port (see the [“Connecting to the Network” section on page 2-8](#) for details). The Cisco IP Phone models 7902G/7905G do not include an internal Ethernet switch or an access port.

If a computer is connected to the access port, the computer and the phone share the same physical link to the switch and 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 may 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.

You can resolve these issues by isolating the voice traffic onto a separate VLAN on each of the ports connected to a phone. The switch port configured for connecting a phone would have separate VLANs configured for carrying:

- Voice traffic to and from the IP phone (auxiliary VLAN)
- 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 more information, refer to the documentation included with the Cisco Catalyst switch.

Related Topics

- [Connecting to the Network, page 2-8](#)
- [Understanding the Phone Startup Process, page 2-4](#)
- [Modifying VLAN Settings, page 4-24](#)

Understanding the Phone Startup Process

When connecting to the VoIP network, the Cisco IP Phone goes through a standard startup process composed of up to seven steps. Depending on your specific network configuration, not all of these steps may occur on your Cisco IP Phone.

Each of these steps is described in the sections that follow:

- [Obtaining Power from the Switch, page 2-4](#)
- [Loading the Stored Phone Image, page 2-5](#)
- [Configuring VLAN, page 2-5](#)
- [Obtaining an IP Address, page 2-5](#)
- [Accessing TFTP Server, page 2-6](#)
- [Requesting Configuration Files, page 2-6](#)
- [Contacting Cisco CallManager, page 2-7](#)

Related Topics

- [Verifying the Phone Startup Process, page 3-9](#)
- [Resolving Startup Problems, page 6-12](#)

Obtaining Power from the Switch

You can connect the Cisco IP Phone to a Cisco Catalyst switch with one of the modules that provides power to the phone (WS-X6348-RJ45V). See the [“Providing Power to the Cisco IP Phone” section on page 2-9](#) for details.

If you use this optional configuration, the phone receives phantom power and powers up when you connect the Cisco IP Phone to the switch. The phone then sends Cisco Discovery Protocol (CDP) notifications to the switch indicating it is ready to receive CDP packets and indicating the power requirement for the phone. The switch allocates power and sends it over the network cable.

Related Topics

- [Understanding the Phone Startup Process, page 2-4](#)
- [Providing Power to the Cisco IP Phone, page 2-9](#)
- [Resolving Startup Problems, page 6-12](#)

Loading the Stored Phone Image

The Cisco 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.

Related Topics

- [Understanding the Phone Startup Process, page 2-4](#)
- [Resolving Startup Problems, page 6-12](#)

Configuring VLAN

If the Cisco 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.

Related Topics

- [Understanding the Phone Startup Process, page 2-4](#)
- [Modifying VLAN Settings, page 4-24](#)
- [Resolving Startup Problems, page 6-12](#)

Obtaining an IP Address

If the Cisco 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.

Related Topics

- [Understanding the Phone Startup Process, page 2-4](#)
- [Modifying DHCP Settings, page 4-9](#)
- [Configuring IP Settings, page 4-15](#)
- [Resolving Startup Problems, page 6-12](#)

Accessing TFTP Server

In addition to assigning an IP address, the DHCP server directs the Cisco 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.

Related Topics

- [Understanding the Phone Startup Process, page 2-4](#)
- [Configuring TFTP Options, page 4-28](#)
- [Resolving Startup Problems, page 6-12](#)

Requesting Configuration Files

The TFTP server has configuration files (.cnf file format or .cnf.xml) for telephony devices, which define parameters for connecting to Cisco CallManager. In general, any time you make a change in Cisco CallManager that requires the phone (device) to be reset, a change has been made to the phone's configuration file.

The .cnf.xml file also contains the information that tells the phone which image load it should be running. If this image load differs from the one currently loaded on the phone, the phone contacts the TFTP server to request the new image file.

The phone first requests the file SEPxxxxxxxxxxxx.cnf.xml, where each *xx* is the two-digit lowercase hexadecimal representation of each integer in the phone's MAC address. If the phone cannot find this file, it requests the files XMLDefault.cnf.xml and SEDDefault.cnf.

After the phone obtains one of the .cnf.xml files or the .cnf file, the Cisco IP Phone 7902G requests the profile file `ffxxxxxxxxxxxx`, the Cisco IP Phone 7905G requests the profile file `ldxxxxxxxxxxxx`, and the Cisco IP Phone 7912G requests the profile file `gkxxxxxxxxxxxx`, where each `xx` is the two-digit lowercase hexadecimal representation of each integer in the phone's MAC address. If a phone cannot find this profile file, it requests the profile file `ffdefault.cfg` for the Cisco IP Phone 7902G, the profile file `lddefault.cfg` for the Cisco IP Phone 7905G, or the profile file `gkdefault.cfg` for the Cisco IP Phone 7912G. For more information about profile files, see [Appendix A, "Additional Configuration Methods, Parameters, and Procedures."](#)

After the phone finds one of the profile files, or if it cannot find a profile file, it continues with its startup process.

Related Topics

- [Understanding the Phone Startup Process, page 2-4](#)
- [Resolving Startup Problems, page 6-12](#)

Contacting Cisco CallManager

The configuration file defines how the Cisco IP Phone communicates with Cisco CallManager. After obtaining the file from the TFTP server, the phone attempts to make a TCP connection to the highest priority Cisco CallManager on the list.

If the phone was manually added to the database, Cisco CallManager identifies the phone. If the phone was not manually added to the database and auto-registration is enabled in Cisco CallManager, the phone attempts to auto-register itself in the Cisco CallManager database.

Cisco CallManager informs devices using .cnf format configuration files of their load ID. Devices using .xml format configuration files receive the load ID in the configuration file.

Related Topics

- [Understanding the Phone Startup Process, page 2-4](#)
- [Resolving Startup Problems, page 6-12](#)

Guidelines for Configuring Ports on the Cisco IP Phone models 7902G/7905G/7912G

Cisco IP Phones include ports for connecting the phones to the network and for providing power to the phones. These sections provide tips for configuring these ports:

- [Connecting to the Network, page 2-8](#)
- [Providing Power to the Cisco IP Phone, page 2-9](#)

Connecting to the Network

The Cisco IP Phone 7912G has two RJ-45 ports labelled “network” and “access.” The Cisco IP Phone models 7902G/7905G have one RJ-45 port. Each port supports 10/100 Mbps half- or full-duplex connections to external devices. You can use either Category 3 or 5 cabling for 10-Mbps connections, but you must use Category 5 for 100 Mbps connections. On both the network port and access port, use full-duplex mode to avoid collisions.

See Figure 3-1 for the connection ports available on the back of the Cisco IP Phone models 7902G/7905G. See [Figure 3-2](#) for the connection ports available on the back of the Cisco IP Phone 7912G

Related Topics

- [Connecting the Cisco IP Phone to the Network, page 3-4](#)
- [Using the Network Port, page 2-8](#)
- [Using the Access Port, page 2-9](#)

Using the Network Port

Use the network port to connect the phone to the network. You must use a straight-through cable on this port. The phone can also obtain inline power from the Cisco Catalyst switch over this connection. See the [“Providing Power to the Cisco IP Phone”](#) section on [page 2-9](#) for details.

Related Topics

- [Connecting the Cisco IP Phone to the Network, page 3-4](#)
- [Providing Power to the Cisco IP Phone, page 2-9](#)

Using the Access Port

Use the access port to connect a network device, such as a computer, to the phone. You must use a straight-through cable on this port.

Related Topic

- [Connecting the Cisco IP Phone to the Network, page 3-4](#)

Providing Power to the Cisco IP Phone

You can power a Cisco IP Phone from an external power supply, from a switch port, or from a power source between the phone and the switch.

The Cisco IP Phone can be powered by the following sources:

- External power—optional Cisco AC adapter and power cord for connecting to a standard wall receptacle.
- Inline power—inline power provider to the Cisco IP Phone when connected to a Cisco Catalyst switch capable of providing inline power.



Note Only the network port supports inline power from the Cisco Catalyst switches.

- WS-PWR-PANEL—power patch panel that allows the Cisco IP Phone to be connected to existing Catalyst 4000, 5000, and 6000 family 10/100BaseTX switching modules.

This module sends power on pins 4, 5, 7, & 8, which are not used for Ethernet signaling. The power patch panel also attempts to verify that the attached device is a Cisco IP Phone before providing power.

Related Topics

- [Connecting the Cisco IP Phone to the Network, page 3-4](#)
- [Connecting to the Network, page 2-8](#)
- [Understanding Interactions with Other Cisco IP Telephony Products, page 2-1](#)
- [Power Source Design, page 2-10](#)
- [Redundancy Feature, page 2-11](#)

Power Source Design

The phone and switch automatically determine which power source the phone uses. If the power has to be switched to a different source, the phone user will experience different results based on which power source is being used by the phone.

Use the following information to choose a power source for the phone:

- If you plug a phone into the optional power supply before plugging it into the network, the phone is powered by the power supply.
- If you then unplug the phone from the power supply, the phone resets. If the switch port is configured for 10/100 Mbps, the switch recognizes the loss of power and brings the phone back up.
- If the switch port is configured for 10 Mbps only, then you must unplug the network connection and plug it back into the phone for the switch to recognize the phone's loss of power.
- If, however, you plugged the network connection into the phone before you plugged in the power cord, the phone receives power through the switch, and unplugging the power cord will not bring down the phone. If the switch reboots, the phone will then be powered by the power cord.

Related Topics

- [Connecting the Cisco IP Phone to the Network, page 3-4](#)
- [Connecting to the Network, page 2-8](#)
- [Understanding Interactions with Other Cisco IP Telephony Products, page 2-1](#)
- [Providing Power to the Cisco IP Phone, page 2-9](#)

Redundancy Feature

For redundancy, you can use the Cisco AC adapter even if you are using inline power from the Cisco Catalyst switches. The Cisco IP Phone can share the power load being used from the inline power and external power source. If either the inline power or the external power goes down, the phone can switch entirely to the other power source.

To use this redundancy feature:

1. Set the inline power mode to auto on the Cisco Catalyst switch.
2. Connect the unpowered Cisco IP Phone to the network.
3. Connect the external power supply to the phone after the phone powers up.

Related Topics

- [Connecting the Cisco IP Phone to the Network, page 3-4](#)
- [Connecting to the Network, page 2-8](#)
- [Understanding Interactions with Other Cisco IP Telephony Products, page 2-1](#)
- [Providing Power to the Cisco IP Phone, page 2-9](#)

Connecting a Handset to a Cisco IP Phone

Each Cisco IP Phone includes a handset designed especially for use with the phone. These handsets are interchangeable among Cisco IP Phone models. The handsets include a light strip used to indicate voice messages waiting.

To place and answer calls using a handset, plug the included handset into the back of the phone base (see the [“Connecting the Cisco IP Phone to the Network”](#) section on page 3-4 for details) and pick up the handset.

Adding Phones to the Cisco CallManager Database

Before installing any Cisco IP phones, you must make decisions about how you want the phones to be added to the Cisco CallManager database. Because Cisco CallManager handles call processing in the network, this is a critical step.

You can add phones to the Cisco CallManager database automatically using auto-registration, manually using the Cisco CallManager Administration application, or in groups with the Bulk Administration Tool (BAT).

Once you add a Cisco IP phone using the Cisco CallManager Administration application, the Phone Configuration Window in the application displays the device name, registration status, and the IP address of the Cisco CallManager to which the device is registered.

This section covers the following topics:

- [Using Auto-Registration, page 2-12](#)
- [Adding Phones Manually, page 2-14](#)
- [Using the Bulk Administration Tool, page 2-17](#)



Tip

To get help using the Cisco CallManager application, access context-sensitive help by choosing **Help > For this page** from the main menu bar. For complete instructions and conceptual information, refer to *Cisco CallManager Administration Guide* and *Cisco CallManager System Guide*.

Using Auto-Registration

Use auto-registration if you want Cisco CallManager to assign directory numbers automatically to new phones as they connect to the IP telephony network. Once a phone has auto-registered, you can move it to a new location and assign it to a different device pool without affecting its directory number.

With auto-registration enabled, Cisco CallManager begins the automatic startup process to obtain a directory number as soon as you connect the Cisco IP Phone to the network. During auto-registration, Cisco CallManager automatically assigns the next available sequential directory number to the phone.

Use auto-registration to quickly get all phones into the Cisco CallManager database. You can then modify any settings, such as the directory numbers, from Cisco CallManager. If you do not use auto-registration, you must manually add phones to the Cisco CallManager database or use the Bulk Administration Tool (BAT).

Use the following procedure as a starting point to enable auto-registration using the Cisco CallManager Administration application. For additional information, access context-sensitive help from the application or refer to Cisco CallManager documentation.

Procedure

- Step 1** Log in to the Cisco CallManager Administration application.
 - Step 2** From the menu bar, choose **System > Cisco CallManager**.
The Cisco CallManager Configuration window appears.
 - Step 3** Verify that the “Auto-registration disabled on this Cisco CallManager” setting is not checked. Cisco CallManager disables the auto-registration by default to prevent unauthorized connections to the network.
 - Step 4** To modify phone settings, choose **Device > Phone**. Use the Find and List Phones window to enter search criteria for each phone.
 - Step 5** Install the phone by following the instructions in [Chapter 3, “Installing the Cisco IP Phone.”](#)
 - Step 6** To configure additional phone features, see the “[Configuring Telephony Features Using Cisco CallManager Administration](#)” section on page 5-2 for details.
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Related Topics

- [Adding Phones Manually, page 2-14](#)
- [Using the Bulk Administration Tool, page 2-17](#)
- [Configuring Telephony Features Using Cisco CallManager Administration, page 5-2](#)

Adding Phones Manually

If you want to assign specific directory numbers to a specific Cisco IP Phone without using auto-registration, you can manually add each phone to the Cisco CallManager database or use the Bulk Administration Tool (BAT).

If you want to add phones manually, and are not using Dynamic Host Configuration Protocol (DHCP) in your network, then you must configure the IP settings and Trivial File Transfer Protocol (TFTP) server locally on each phone.

Alternatively, if you use DHCP, but want to manually set the TFTP server, then allow the phone to start up, using DHCP, before re-assigning the TFTP server.

See these topics for more information:

- [Adding Phones Manually Using DHCP, page 2-14](#)
- [Assigning Static IP Addresses, page 2-15](#)

Adding Phones Manually Using DHCP

If you are using DHCP in your network, but you are not using auto-registration, you can manually add a phone to the Cisco CallManager database. If you are using DHCP, you do not need to assign IP addresses or TFTP servers.

Use the following procedure as a starting point to add phones manually using the Cisco CallManager Administration application.

Procedure

- Step 1** Log in to the Cisco CallManager Administration application.
- Step 2** From the menu bar, choose **Device > Add a New Device**.
The Add a New Device window appears.
- Step 3** Select **Phone** from the Device Type drop-down menu and click **Next**.
The Add a New Phone window appears.
- Step 4** Select a phone type from the drop-down menu and click **Next**.
The Phone Configuration window appears. The fields displayed in this window depend upon the phone type selected.

- Step 5** In the Phone Configuration window, you must enter information in the following fields:
- MAC Address
 - Device Pool
- Step 6** Click **Insert**.
- The Cisco CallManager Administration application asks if you want to assign a directory number.
- Step 7** To configure additional phone features, see the “[Configuring Telephony Features Using Cisco CallManager Administration](#)” section on page 5-2 for details.
- For additional information, access context-sensitive help from the application or refer to Cisco CallManager documentation.
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Related Topics

- [Using Auto-Registration, page 2-12](#)
- [Assigning Static IP Addresses, page 2-15](#)
- [Using the Bulk Administration Tool, page 2-17](#)
- [Configuring Telephony Features Using Cisco CallManager Administration, page 5-2](#)

Assigning Static IP Addresses

If you do not use DHCP in your network, you must assign static IP addresses to each phone. You must configure each phone locally.

Use the following procedure as a starting point to add phones manually using the Cisco CallManager Administration application.

Procedure

- Step 1** Log in to the Cisco CallManager Administration application.
- Step 2** From the menu bar, choose **Device > Add a New Device**.
- The Add a New Device window appears.

- Step 3** Select **Phone** from the Device Type drop-down menu and click **Next**.
The Add a New Phone window appears.
- Step 4** Select a phone type from the drop-down menu and click **Next**.
The Phone Configuration window appears. The fields displayed in this window depend upon the phone type selected.
- Step 5** In the Phone Configuration window, enter information in the following fields:
- MAC Address
 - Device Pool
- Step 6** Click **Insert**.
The Cisco CallManager Administration application asks if you want to assign a directory number.
- Step 7** Enter information in the required fields.
- Step 8** Install the phone by following the instructions in the [Chapter 3, “Installing the Cisco IP Phone.”](#)
- Step 9** Configure the IP settings by following the instructions in the [“Configuring IP Settings” section on page 4-15.](#)
- Step 10** Configure the TFTP server by following the instructions in the [“Configuring TFTP Options” section on page 4-28.](#)
- Step 11** To configure additional phone features, see the [“Configuring Telephony Features Using Cisco CallManager Administration” section on page 5-2](#) for details.
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Related Topics

- [Using Auto-Registration, page 2-12](#)
- [Adding Phones Manually Using DHCP, page 2-14](#)
- [Using the Bulk Administration Tool, page 2-17](#)
- [Configuring Telephony Features Using Cisco CallManager Administration, page 5-2](#)

Using the Bulk Administration Tool

The Cisco Bulk Administration Tool (BAT) is a plug-in application for Cisco CallManager that enables system administrators to perform batch operations, including registration, on large numbers of Cisco IP Phones.

Refer to *Bulk Administration Tool Guide for Cisco CallManager* for information about using BAT in your network.

Related Topics

- [Using Auto-Registration, page 2-12](#)
- [Adding Phones Manually, page 2-14](#)
- [Configuring Telephony Features Using Cisco CallManager Administration, page 5-2](#)

