

Converting a Cisco 7940/7960 SCCP Phone to a SIP Phone and the Reverse Process

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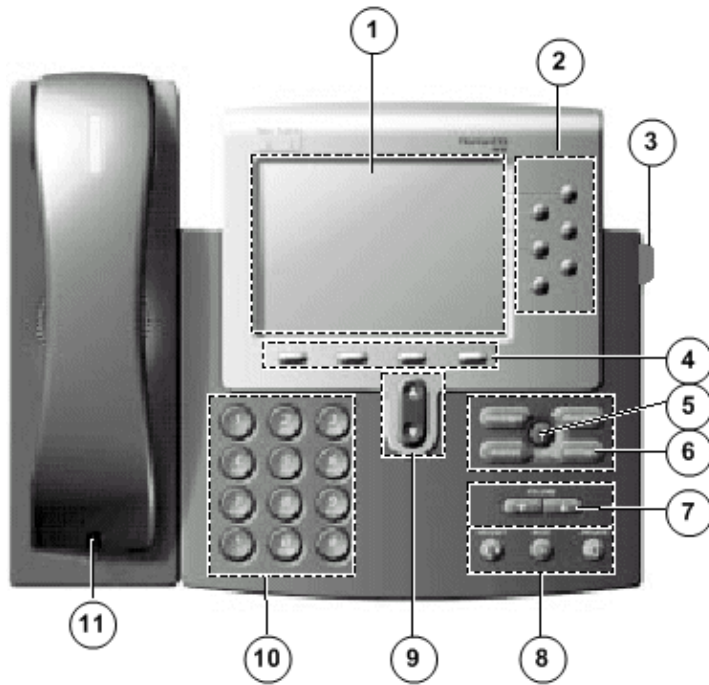
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Introduction

Cisco 7940/7960 IP phones can support either the Skinny Call Control Protocol (SCCP) to run with Cisco CallManager, the Session Initiation Protocol (SIP) (refer to RFC 2543), or the Media Gateway Control Protocol (MGCP), but not more than one simultaneously. This is possible because they load different firmware versions on bootup. This functionality is transparent to the end user, and you enable it through changes to the basic text-based configuration files that the phones download from a Trivial File Transfer Protocol (TFTP) server.

Refer to Cisco IP Phone 7960/7940 User Guide for SIP for more information about a Cisco SIP IP phone.



1	LCD
2	Line or Speed Dial buttons
3	Footstand adjustment
4	Softkeys
5	<i>i</i> button
6	On-screen mode buttons
7	Volume buttons
8	Function toggles
9	Scroll key
10	Dialing pad
11	Handset

Prerequisites

Requirements

Cisco recommends you have knowledge of these topics:

- SIP Session Initiation Protocol
- SCCP Skinny Call Control Protocol

Components Used

This document is not restricted to specific software or hardware versions.

Conventions

Refer to the Cisco Technical Tips Conventions for more information on document conventions.

Enable SIP Functionality

Complete these steps in order to enable SIP functionality:

1. Download these files from Cisco SIP IP Phone 7940/7960 Software (registered customers only) and place them in the root directory of your TFTP server (tftpboot on a UNIX machine):

- ◆ POS30100.bin This is the SIP image. Download the file in binary format, in order to ensure that it is not corrupted.

Note: There are many different variations of this file, which depend on the version of software that you load. These are some examples:

- ◇ SIP Release 2.3 or earlier: POS3xyy.bin The xx variable is the version number, and yy is the sub-version number.
- ◇ SIP Release 3.0 and later: POS3-xx-y-zz.bin The xx variable is the major version number, y is the minor version number, and zz is the sub-version number.
- ◇ SIP Release 5.0 and later: After this version is installed, you are not able to revert back to versions earlier than 5.0. You can still change from SCCP images to SIP images, but they both must be version 5.0 or later. Refer to Release Notes for Cisco SIP IP Phone 7940/7960 Release 5.0 for more information.
- ◇ This table describes the meanings of the first four characters in the binary files names:

First Digit	Second Digit	Third Digit	Fourth Digit
P represents a Phone.	0 means that it is a combined image (application and DSP).	Represents the phone Protocol: 0 for Skinny and S for SIP.	3 represents the ARM processor.

Note: Choose **Settings > Status > Firmware Versions** in order to verify which image the phone uses. Different phone models use different processors. This fourth digit can help determine the model of phone for which the file is used.

- ◆ OS79XX.TXT This file tells the Cisco 7940/7960 which binary to download from the TFTP server. This file is case sensitive and must only contain the name of the file that you want to load, without the .bin extension. For example, if you attempt to load the SIP version 2.3 software, it must contain only the line POS30203. If you try to load versions 3.0 and later, the file name must be in the format POS3-xx-y-zz. For example, if you attempt to load the SIP version 7.1 software, OS79XX.TXT must contain the line POS3-07-1-00. The binary referenced here must also be present in the TFTP root directory. Without this file, the phone does not know which file it needs to retrieve, in order to replace its existing software.
- ◆ SIPDefaultGeneric.cnf This file is an example of a default configuration file. This file contains configuration information relevant to all phones.
- ◆ SIPConfigGeneric.cnf This file is similar to the previous one, except that it contains information relevant to a specific phone instead of to all phones.

- ◆ RINGLIST.DAT Lists audio files that are the custom ring type options for the phones. The audio files listed in the RINGLIST.DAT file must also be in the root directory of the TFTP server.
- ◆ ringer1.pcm This file is a sample ring tone that is used by the Cisco 7940/7960.

Note: In version 3.0 and later, the universal application loader allows you to add additional phone features across all protocols. This feature also eliminates the need for a separate OS79XX.TXT file, which used to be required to boot between protocols.

Note: The universal application loader for SIP is delivered in a ZIP file that is posted to Cisco.com. For SCCP, the universal application loader is automatically installed as part of the executable phone_load install wrapper that is used on the Cisco CallManager. The ZIP file for SIP contains five files:

- ◆ OS79XX.TXT This file always contains the universal application loader image.
- ◆ P003.....bin Nonsecure universal application loader for upgrades from images earlier than 5.x.
- ◆ P003.....sbn Secure universal application loader for upgrades from images 5.x or later.
- ◆ P0a3.....loads File that contains the universal application loader and application image, where *a* represents the protocol of the application image LOADS file: 0 for SCCP, and S for SIP.
- ◆ P0a3.....sb2 Application firmware image, where *a* represents the application firmware image: 0 for SCCP, and S for SIP.

Note: The creation of the SIP CNF files is out of the scope of this document. Refer to Getting Started with Your Cisco SIP IP Phone for more information.

2. With a text editor (vi or Notepad), rename the file SIPDefaultGeneric.cnf to SIPDefault.cnf (used for global parameters on all phones).
3. With a text editor, rename the file SIPConfigGeneric.cnf to SIPmac_address.cnf, for each phone (for example, SIP002094D245CB.cnf).

The MAC address must be specified in capital letters and the extension (.cnf) must be in lower case. The MAC address of the phone can be found on the sticker that is located on the bottom of the phone, or it can be found through the phone LCD screen (choose **Settings > Network Configuration > MAC Address**).

Note: Allow read and write file permissions on the TFTP server for those files:

- ◆ On UNIX TFTP servers, issue the **chmod 777 file_name** UNIX command.
 - ◆ On Windows-based servers, refer to the software documentation.
4. Unplug the power cord or Ethernet cord (if inline power is used) in order to reset the phones. Ensure that the phones can find the TFTP server. Manually configure the phone's IP address, gateway address, and TFTP server address; or configure the phone network settings from the Dynamic Host Configuration Protocol (DHCP) server. It is recommended that you not use the TFTP server on the Cisco CallManager, if you have one in your current system.

Note: If the installation of SIP software 3.x or 4.x fails, try to convert to SIP image 2.3, first, and then move to 3.x. This is common when you use a particularly old version of the Cisco 7940/7960 SCCP Software. This is **tftp log debug** sample output that shows what the failure looks like:

```
Wed Nov 06 11:58:51 2002: Sending 'OS79XX.TXT' file to 10.1.1.1
in binary mode
Wed Nov 06 11:58:51 2002: Successful.
Wed Nov 06 11:58:51 2002: Sending 'POS30300.bin' file to 10.1.1.1
in binary mode
Wed Nov 06 11:58:52 2002: Failed ( State Error ).
Wed Nov 06 11:59:00 2002: Sending 'POS30300.bin' file to 10.1.1.1
in binary mode
```

```
Wed Nov 06 11:59:02 2002: Failed ( State Error ).
Wed Nov 06 11:59:10 2002: Sending 'POS30300.bin' file to 10.1.1.1
in binary mode
Wed Nov 06 11:59:13 2002: Failed ( State Error ).
```

Manually Configure the Phone Network Settings

Complete these steps in order to manually configure the phone network settings:

1. Press the ****#** buttons in order to unlock the phone. (This step either locks or unlocks the options, based on the current state.)
2. Press **Settings**.
3. Press the down arrow in order to select **Network Configuration** and press the **Select** softkey. There is an unlocked padlock icon in the upper-right portion of your LCD.
4. Use the toggle button and the arrow keys in order to modify any parameters. When you enter IP addresses, the ***** key is used for decimal points.
5. Press the **Save** softkey in order to save your changes.

Note: In order to lock the phone settings, press ****#**.

Refer to Getting Started with Your Cisco SIP IP Phone for more information.

Configure the Phone Network Settings via DHCP

You can also configure the phone network settings from the Dynamic Host Configuration Protocol (DHCP) server. For SIP phones, make sure that the DHCP server uses Option 66 for the TFTP server. These DHCP options are usually configured from the DHCP server:

- IP Address (DHCP Option 50)
- Subnet Mask (DHCP Option 1)
- Default IP Gateway (DHCP Option 3)
- DNS Server Address (DHCP Option 6)
- TFTP Server (DHCP Option 66)
- Domain Name (DHCP Option 15)

Note: Cisco CallManager uses Option 150 for the TFTP server, while SIP phones expect Option 66 for the TFTP server.

Refer to Getting Started with Your Cisco SIP IP Phone for more information.

Bootup Process for a Cisco 7940/7960 SIP IP Phone

- SCCP Image 3.x/Earlier to SIP Image 6.x/Earlier and from SCCP Image 5.x to SIP Image 5.x/6.x
- SCCP Image 3.x/Earlier and 5.x to SIP Image 7.x
- SCCP Image 6.x/Later and SIP Image 7.x/Later

SCCP Image 3.x/Earlier to SIP Image 6.x/Earlier and from SCCP Image 5.x to SIP Image 5.x/6.x

This is the procedure to convert SCCP image 3.x or earlier to the desired SIP image 6.x or earlier, or to convert SCCP image 5.x to the desired SIP images 5.x or 6.x:

1. Each phone requests the initial setup file OS79XX.TXT.

Note: Ensure that you use exactly the same name, because the file names on the TFTP server and the SIP image name in OS79XX.TXT are case sensitive.

2. Each phone loads the firmware binary file listed in the OS79XX.TXT file. After the proper BIN file is downloaded, it replaces the software that it runs with this new image. In order to switch back to another software version, the phone must be restarted so that the software can be downloaded again.
3. Each phone loads the SIP image that is indicated in the initial setup file. In this case, the POS30100.bin file is loaded.
4. Each phone loads the SIPDefault.cnf file. This file contains basic configuration settings that are common for all phones.
5. Each phone loads its specific configuration information from the file SIPmac_address.cnf. The MAC address must be specified in capital letters.

SCCP Image 3.x/Earlier and 5.x to SIP Image 7.x

This is the procedure to convert SCCP image 3.x or earlier to the desired SIP image 7.x, or to convert SCCP image 5.x to the desired SIP image 7.x:

1. Copy the desired binary image from Cisco.com to the root directory of the TFTP server.
2. Specify the image in the configuration file image parameter for the protocol to which you convert (load_information for SCCP or image_version for SIP).
3. Remove any protocol configuration files that are not used for the specified protocol.

For example, for SIP the SIPDefault.cnf and SIPmac_address.cnf files are downloaded when a phone is reset. This file contains the image_version parameter that tells the phone which image to run. Thus, if you attempt to load the SIP version 7.1 software, SIPDefault.cnf must contain image_version: POS3-07-1-00. If the image load differs from the one that is currently loaded on the phone, the phone contacts the TFTP server to convert to the new image.

SCCP Image 6.x/Later and SIP Image 7.x/Later

For current SCCP image 6.x or later and for SIP image 7.x or later, use the universal application loader and complete these steps:

1. Unzip the software_version.zip file in the root (top level) TFTP directory.
2. Reset the phone.

The phone contacts the TFTP server and requests its configuration files. The phone compares the image defined in the OS79XX.TXT and protocol configuration files to the image that it has stored in flash memory. If the phone determines that the image defined in the files differs from the image in flash memory, it downloads the image that is defined (which is stored in the root directory on the TFTP server). Once the new image downloads, the phone programs that image into flash memory and reboots.

TFTP Server Log of a Phone Booting Up

This is a sample log file from the TFTP server that shows the full boot procedure:

```
Mon Sep 11 15:24:53 2000: Sending 'OS79XX.TXT' file to 10.1.1.10
in binary mode
#
Mon Sep 11 15:24:53 2000: Successful.
Mon Sep 11 15:24:53 2000: Sending 'POS30100.bin' file to 10.1.1.10
in binary mode
#####
#####
```


SIP Images 4.x/Earlier to SCCP Images 5.x/Earlier

If your current SIP image is 4.x or earlier, complete these steps in order to convert to the desired SCCP images 5.x or earlier:

1. Run the executable file in order to install the SCCP software. Ensure that the new files are in your TFTP main folder.
2. Change the OS79XX.TXT file to reflect the new file name.

For example, if you download version 5.0(1.1), your BIN file is P00305000101.bin. Change the text in the OS79XX.TXT file to reflect this file name, without the .bin extension.

3. Reset each phone.

Note: Ensure that all of the required Cisco CallManager files are on the TFTP server before you reboot the phones.

SIP Images 4.x/Earlier to SCCP Images 6.x/Later

If your current SIP images is 4.x or earlier, complete these steps in order to convert to the desired SCCP images 6.x or later:

1. Complete these steps in order to convert to the 6.3 image first:
 - a. Copy the desired binary image from Cisco.com to the root directory of the TFTP server.
 - b. Open the OS79XX.TXT file with a text editor and edit the file to include the desired image.
 - c. Specify the desired image in the protocol configuration files.
 - d. Reset each phone.

The phone contacts the TFTP server and requests its configuration files. The phone compares the image that is defined in the configuration file to the image that it has stored in Flash memory. If the phone determines that the image in the configuration file differs from the image in Flash memory, it downloads the image in the configuration file (which is stored in the root directory on the TFTP server). Once the new image downloads, the phone programs that image into Flash memory and reboots.

2. Complete these steps in order to convert to the desired image:

- a. Unzip the *software_version.zip* file to the root (top level) TFTP directory.
- b. Reset the phone.

The phone contacts the TFTP server and requests its configuration files. The phone compares the image defined in the OS79XX.TXT and protocol configuration files to the image that it has stored in Flash memory. If the phone determines that the image defined in the files differs from the image in Flash memory, it downloads the image that is defined (which is stored in the root directory on the TFTP server). Once the new image downloads, the phone programs that image into Flash memory and reboots.

SIP Images 7.x/Later to SCCP Images 5.x/Later

If your current SIP image is 7.x or later, complete these steps in order to convert to the desired SCCP images 5.x or later:

In the configuration file for the protocol that the phone currently runs, change the image in the load_information parameter (SCCP) or the image_version parameter (SIP) to represent the protocol that you

want to run.

For example, if the image on the phone is SIP and the image desired is SCCP, change the image_version parameter to reflect the SCCP image (P00306000200).

Refer to these documents for more information on how to configure DHCP, TFTP, or Cisco CallManager:

- Cisco TFTP
- Configuring Windows 2000 DHCP Server for Cisco Call Manager
- Configuring Cisco CallManager 3.x with IOS MGCP Gateways (Analog FXO, FXS Ports)

Migrate Cisco CallManager 5.x SCCP Phones to SIP

Complete these steps in order to migrate the Cisco CallManager 5.x SCCP IP Phones to SIP:

1. Go to Cisco CallManager Administration and choose **Bulk Administration > Phones > Migrate Phones > SCCP to SIP**.
2. Click **Find** after you select/enter the appropriate search criteria to list the phones that need to be migrated.
3. Click **Next** and choose the phone template from the drop-down.
4. Enter the job description in the Job Information area.
5. Click **Run Immediately** in order to migrate phone records immediately or click **Run Later** in order to migrate at a later time.
6. Click **Submit** in order to create a job for migrating the phone records.

Note: After you submit a job for migrating phones from SCCP to SIP, make sure that you reset these phones. In order to reset the phones, choose **Bulk Administration > Phones > Reset/Restart Phones > Query**.

7. When the Migrate job is submitted, choose **Bulk Administration > Job Scheduler** in order to schedule and/or activate this job.

If it remains in the Pending state, you might need to activate the **Bulk Provisioning Service** under the **Serviceability > Tools > Service Activation** page. Refer to Activating Bulk Provisioning Service for more information.

8. Go to Cisco CallManager Administration, choose **System > Enterprise Parameters** and change Auto Registration Phone Protocol to **SIP** (SCCP is the default). Then restart the Cisco CallManager service. Refer to Autoregistration with Multiple Protocol Support for more information.

Note: In order to revert back to SCCP, you need to delete the SIP phone, set Auto Registration Phone Protocol to **SCCP** and then let the phone re-register as SCCP.

Common Issues and Troubleshooting Tips

TFTP Accessibility and Impact on Network

If you want to update only one phone in a production network, be sure to use a different TFTP server than the one that is listed on the DHCP server. If you use the listed TFTP server, you can potentially cause all phones on the network to convert to the new firmware. If you only attempt to convert one phone, use a different TFTP server and enter the IP address of the server manually in the phone settings (**Settings > Network Configuration > Alternate TFTP Server** [Change to Yes] > **TFTP Server** [Change IP address]). Always take great care when you upgrade phones, as changes to these configurations have the potential to bring down the entire phone system, if they are not properly implemented.

Obtain SCCP Firmware

The files at the Cisco Downloads (registered customers only) for the SCCP image are contained in an executable file. Upon execution of this file, an installer is launched to locate the presence of Cisco Call Manager and its TFTP root folder. Once this location is determined, the installer copies all necessary files to the TFTP root folder. After this installation, it is still necessary to make the appropriate changes to the OS79XX.TXT file, as mentioned earlier in this document.

"W210 TFTP Error : buffer full" Error

Older versions of the SIP software (2.x releases) have a bug where the phone cannot download the SIPDefault.cnf file if it is larger than a certain size. The phone can display `W210 TFTP error : buffer full`. In order to solve this problem, ensure that these files have the indicated characteristics:

- OS79XX.TXT must contain only the firmware file name minus the .bin extension (for example, P0S30203 for P0S30203.bin).
- SIPDefault.cnf must contain only `image_version: file_name`, where *file_name* is the firmware file name minus the .bin extension.

This allows the Cisco 7940/7960 to download the newer software. Once you have converted, you can replace SIPDefault.cnf with your configuration information, as the phone is able to download this larger file.

SIP Phone not Accepting SCCP Load

For SIP software version 2.1 and earlier, the phone does not accept an SCCP load whose file name is longer than eight characters. There are two options to work around this problem:

- Upgrade the SIP software to a newer version, then revert back to the SCCP software.
- Rename the SCCP load file so that it meets the 8.3 DOS standard naming convention (maximum file name length is `xxxxxxx.yyy`).

"Protocol Application Invalid" Error

This error message means that the application image cannot be loaded into Flash memory or that the image does not exist in Flash memory. This can happen for these reasons:

- The ZIP package was not unzipped to the root TFTP directory.
- Files were manually copied to the TFTP server (the ZIP package was not used).
- The universal application loader was unable to load a new application image into Flash memory (image authentication failure, nonexistent image, TFTP errors, and so forth).
- OS79XX.TXT file must only contain the name of the file that you attempt to load, without the .bin extension. For example, if you attempt to load the SIP version 2.3 software, it must contain only the line `P0S30203`. If you try to load versions 3.0 and later, the file name must be in the format `P0S3-xx-y-zz`. For example, if you attempt to load the SIP version 7.4 software, it must contain the line `P0S3-07-4-00`.
- The SIPDefault.cnf and SIPmac_address.cnf files are downloaded when a phone is reset. These files contain the `image_version` parameter that tells the phone which image it must run. Thus, if you attempt to load the SIP version 7.4 software, SIPDefault.cnf and SIPmac_address.cnf must contain `image_version: P0S3-07-4-00`.

"Image Authentication Failed" Error

This error message means that the new application image that is about to be downloaded has failed the signature check.

"No Load Specified" Error

This error message means that the application image cannot be loaded into Flash memory when there is no image in Flash memory. This occurs when there is no image specified in any of the configuration files.

IP Phones go to Unprovisioned State

The common reason for a phone to go to the Unprovisioned state is due to the lack of the correct syntax in the OS79XX.TXT file. The OS79XX.TXT file must only contain the name of the file that you attempt to load, without the .bin extension.

If you convert from SCCP to SIP and the version you attempt to load is SIP 2.3 software or earlier, the OS79XX.TXT must be in the format of **POS3xxyy** . For example, if the SIP software version is 2.2, the file must contain POS30202.

If you convert from SCCP to SIP and the version you attempt to load is SIP 3.0 software or later, the OS79XX.TXT must be in the format of **POS3-xx-y-zz** . For example, if the SIP software version is 7.4, the file must contain POS3-07-4-00.

If you convert from SIP to SCCP, the OS79XX.TXT must be in the format of **P003aabbccdd** . For example, if the SCCP software version is 7.2(3), the file must contain P00307020300.

Troubleshooting Tips

- In order to resolve image authentication and ZIP file issues, ensure that the image is extracted from the ZIP file (do not manually copy the image to the TFTP server).
- In order to resolve application image issues, add the desired image to the configuration files and reboot the phone, to cause the application image to download.
- In order to troubleshoot a failed conversion attempt, run a sniffer capture.
- In order to assist with any further errors or failed conversion attempts, the RS-232 port on the phone provides console access for troubleshooting and debugging. Refer to Console Access.

Note: The most common caveats in this conversion procedure are listed throughout this document. Most problems stem from the use of older software or from the lack of the correct syntax in the OS79XX.TXT file. Before you open a case with Technical Support, try to convert to the latest versions of the phone software, as this solves many problems that pertain to Cisco 7940/7960 Series phones.

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Related Information

- [IP Phone Load Conversion from SIP to MGCP](#)
- [Cisco 7940 and 7960 IP Phones Firmware Upgrade Matrix](#)
- [Cisco IP Phone 7960/7940 User Guide for SIP](#)
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