CHAPTER 5

Implement

Introduction to Implementation

The goal of implementation is to introduce the new system into the network with the least amount of disruption and the highest level of interoperability with the existing network. To minimize downtime, an essential component of this process is the implementation plan.

Tip You can navigate to any topic on this tab by using the tab navigation pane at the left of the content pane. This navigation pane contains the table of contents (TOC) for the active tab.

Before You Begin

You should understand how to implement Cisco Unified Communications. For more information, see Cisco Unified Communications Implementation.

Before you begin installing components, you should have a completed implementation plan from the detailed design. Use the equipment list and site specification from the detailed design to do the following:

- Order and stage equipment
- Perform detailed site survey
- Create site-specific installation guidelines

Your implementation plan should include:

- Deployment strategy
- Network maps and topology diagrams
- Installation and commissioning tests
- Site survey results
- List of all devices to be implemented
- Installation guidelines
- Configuration worksheets
- Test and turn-up plan

When You Are Done

All components are installed and ready to configure.

Major Tasks in This Process

- Order Equipment
- Small Business: Install and Configure System Components
- Medium Business: Install and Configure System Components
- Introduction to Troubleshooting
- Training Resources
- Conduct User Acceptance Testing

Order Equipment

This topic includes links to ordering guides and tools that you need to choose your ordering options.

Solution Expert Tool

Solution Expert is a web-based tool that assists in the design, configuration, quoting, and ordering of Cisco Unified Communications products. Solution Expert is available for Cisco sales and partner systems engineers who have Cisco Unified Communications specializations.

With the Solution Expert tool, users can generate a recommended solution based on their requirements. Users can modify the recommended configuration if desired. Solution Expert validates any changes when it presents the new solution. Solution Expert also generates a bill of materials with list pricing, a Visio diagram, and other design documentation. To access Solution Expert, go to the following URL. For an overview of how to use the tool, see the introductory PDF on the home page.

http://www.cisco.com/go/sx

Quote Builder Tool

The Quote Builder tool is a solutions quoting application for Cisco Unified Communications products. Quote Builder is available to specialized partners and Cisco employees.

With Quote Builder, users can build a system quote with design documents to aid in the implementation of the solution. Quote Builder also validates designs for common deployments. Quote Builder generates a bill of materials, a network diagram, and design guides for deployment. To access Quote Builder, go to the following URL:

http://www.cisco.com/web/partners/quotebuilder/index.html

Ordering Guides

Ordering guides for most Cisco Unified Communications products are available for partners and Cisco employees. For information on ordering guides, go to the following URL:

http://www.cisco.com/web/partners/sell/technology/ipc/announcements/unified_communications_system_6_launch.html

Click the “What is available for Partners” tab to view a list of the ordering guides and other marketing collaterals.

Small Business: Install and Configure System Components

When implementing a Cisco Unified Communications system for small business, create a site-specific plan for your team. Describe what needs to be installed and configured. Your plan should list the referenced product-specific installation and configuration guides in Table 5-1 and Table 5-2 that can be used during the implementation process.

Your plan will help you manage timelines for implementing equipment and scheduling outages. Include an installation schedule, as well as a test plan that will verify that the operation conforms to the design objectives.

Plan and Prepare for Your System Installation provides guidance for the installation order of components for a Cisco Unified Communications System, Release 7.0(1) IP telephony small and medium business deployment. It does not describe installation procedures for individual components. For links to the complete documentation set for each IP telephony system component, see the Sample Configuration Information topic.

Performing Your System Installation

Before You Begin

See Plan and Prepare for Your System Installation on the Plan tab to plan your overall strategy.

Install IPT Software Components

Once you have your installation plan and preparations in place, perform your system installation by following the guidelines and sequence in Performing Your System Installation:

- See Deployment Models for the general installation sequence for the various components in the different deployment models. For a description of deployment models, see Tested Deployments and Site Models.
- See Related Documentation for links to component installation and upgrade documentation.

Component Installation

Using the steps from the documents listed in Table 5-1, install the required components for your network in the recommended order according to your site-specific implementation plan.

Table 5-1 Component Installation Documentation

Product Category	Product Technology	Documentation Title
Call Control Components	Cisco Unified Communications 500 Series for Small Business	• Getting Started Guide for Cisco Unified Communications 500 Series
	Cisco Unified Communications Manager Express	• Cisco Unified Communications Manager Express System Administrator Guide:
	Cisco Unified Contact Center Express	• Getting Started with Cisco Unified Contact Center Express

Table 5-1 Component Installation Documentation (continued)

Product Category	Product Technology	Documentation Title
Conferencing Components	Cisco Unified MeetingPlace Express	• Installation and Upgrade Guide for Cisco Unified MeetingPlace Express
	Cisco Unified Video Conferencing	• Installation and Upgrade Guide for Cisco Unified Videoconferencing 3545 MCU Release 5.1 • Installation and Upgrade Guide for Cisco Unified Videoconferencing 3515 MCU12 and MCU24 Release 5.1
Voice Mail and Messaging Components	Cisco Unity Express	• Cisco Unity Express 3.0 Installation and Upgrade Guide
Endpoints and Clients Components	Cisco Unified 79xx IP Phones	• Cisco Unified 7900 Series IP Phones
	Cisco IP Communicator	• Cisco IP Communicator, Data Sheet • Deploying and Updating Cisco IP Communicator
	Cisco Unified Video Advantage	• Installation and Troubleshooting Guide for Cisco Unified Video Advantage Release 2.0
Wireless and Mobility Components	Cisco Unified Mobile Communicator Express	• Cisco Unified Mobile Communicator Product Literature Index
Security Components	Aironet Wireless Access Points	• Cisco Unified Wireless Products and Solutions
Network Management Components	Cisco netManager Unified Communications	• User Guide for Cisco netManager Unified Communications
Infrastructure Components	Routers	• Getting Started Guide for Cisco Unified Communications 500 Series • Cisco 800 Series Routers
	Switches	• Cisco Catalyst 500 Series Switches

Sample Configuration Information

Table 5-2 lists the types of IPT components that were tested in Cisco Unified Communications System Release 7.0(1) for small business and provides a brief description of each type. The each type in the table is linked to information that describes how the components were configured during system-level testing.

Table 5-2 Component Types and Descriptions

Type	Description
Call Control Components	Call control components extend telephony features and capabilities to packet telephony network devices such as Unified IP phones, media processing devices and multimedia applications. These components are Unified Communications Manager Express and Cisco Unified Communications 500 Series.
Conferencing Components	Conferencing components provide integrated voice, video, and Web conferencing capabilities to enable remote meetings that are natural and effective with face-to-face quality, such as meetings, training sessions, and presentations. These components are Cisco Unified MeetingPlace Express and Cisco Unified Video Conferencing.
Voice Mail and Unified Messaging Components	Voice mail and unified messaging components deliver powerful voice, integrated, and unified messaging options. The Voice Mail and Unified Messaging Component is Cisco Unity Express.
Endpoints and Clients Components	Endpoint and client components integrate the management capabilities of IP-based networks with phones, pagers, and computers and use these for signaling, voice communications, and data communications. Some examples of these components are Cisco IP Communicator and Cisco Unified 79xx IP Phones.
Network Management Components	Network management components actively monitors key device parameters on voice and data networks serving 5 to 250 users. Network management components enables around-the-clock, active voice and data network management support These components are Cisco netManager Unified Communications.
Infrastructure Components	Infrastructure components are network routers, switches, software, and other standards-based networking components that provide reliable connectivity that is more resilient and enables all the latest network services. Some examples of these components are Cisco Unified Communications 500 Series, Cisco Catalyst 500 Series Switches, and Cisco 870 Series Integrated Services Router.

Sample Configuration Files

You can download sample configuration files from Table 5-3 for the components described in the Sample Configuration Information topic.

Table 5-3 Configuration Command Files

Description	Filename
Zip file includes Cisco device configurations listed below: **Note** Some parameters, such as passwords, have been removed from the configuration files for security reasons.	IPT_SMB_UC701_Reference_Configs.zip (right-click to download zip) includes the files below. **Note** If you click the link rather than right-click, the zip file may open in the secondary window but also replace the contents of this window. Use your Back button to return to this window.
Cisco Unified Communications 500 Series (Convington-UC500)	uc500-Covington-Freddo.txt
Cisco Unified Communications 500 Series (Robins-UC500)	isr1861-Robins-Freddo.txt

Medium Business: Install and Configure System Components

When implementing a Cisco Unified Communications System for medium business, create a site-specific plan for your team. Describe what needs to be installed and configured. Your plan should list the referenced product-specific installation and configuration guides in Table 5-4 and Table 5-5 that can be used during the implementation process.

Your plan will help you manage timelines for implementing equipment and scheduling outages. Include an installation schedule, as well as a test plan that will verify that the operation conforms to the design objectives.

Plan and Prepare for Your System Installation provides guidance for the installation order of components for a Cisco Unified Communications System, Release 7.0(1) IP telephony small and medium business deployment. It does not describe installation procedures for individual components.

Performing Your System Installation

Before You Begin

See Plan and Prepare for Your System Installation on the Plan tab to plan your overall strategy.

Install IP Telephony Software Components

Once you have your installation plan and preparations in place, perform your system installation by following the guidelines and sequence in Performing Your System Installation:

- See Deployment Models for the general installation sequence for the various components in the different deployment models. For a description of deployment models, see Tested Deployments and Site Models.
- See Related Documentation for links to component installation and upgrade documentation.

Component Installation

Using the steps from the documents listed in Table 5-4, install the required components for your network in the recommended order according to your site-specific implementation plan.

Table 5-4 Component Installation Documentation

Product Category	Product Technology	Documentation Title
Call Control Components	Cisco Unified Communications Manager Express	• Cisco Unified Communications Manager Express System Administrator Guide:
	Cisco Unified Contact Center Express	• Getting Started with Cisco Unified Contact Center Express
Conferencing Components	Cisco Unified MeetingPlace Express	• Installation and Upgrade Guide for Cisco Unified MeetingPlace Express
	Cisco Unified Video Conferencing	• Installation and Upgrade Guide for Cisco Unified Videoconferencing 3545 MCU Release 5.1 • Installation and Upgrade Guide for Cisco Unified Videoconferencing 3515 MCU12 and MCU24 Release 5.1
Voice Mail and Messaging Components	Cisco Unity Express	• Cisco Unity Express 3.0 Installation and Upgrade Guide
Endpoints and Clients Components	Cisco Unified 79xx IP Phones	• Cisco Unified 7900 Series IP Phones
	Cisco IP Communicator	• Cisco IP Communicator, Data Sheet • Deploying and Updating Cisco IP Communicator
	Cisco Unified Video Advantage	• Installation and Troubleshooting Guide for Cisco Unified Video Advantage Release 2.0
Wireless and Mobility Components	Cisco Unified Mobile Communicator Express	• Cisco Unified Mobile Communicator Product Literature Index
Security Components	Aironet Wireless Access Points	• Cisco Unified Wireless Products and Solutions
Network Management Components	Cisco netManager Unified Communications	• User Guide for Cisco netManager Unified Communications
Infrastructure Components	Routers	• Cisco 2800 Series Integrated Services Routers • Cisco 3800 Series Integrated Services Routers • Cisco 800 Series Routers
	Switches	• Catalyst Express 3500 Series Switch

Sample Configuration Information

Table 5-5 lists the types of IP telephony components that were tested in Cisco Unified Communications System Release 7.0(1) for medium business and provides a brief description of each type. The each type in the table is linked to information that describes how the components were configured during system-level testing.

Table 5-5 Component Types and Descriptions

Type	Description
Call Control Components	Call control components extend telephony features and capabilities to packet telephony network devices such as IP phones, media processing devices and multimedia applications. These components are Unified Communications Manager Express.
Conferencing Components	Conferencing components provide integrated voice, video, and Web conferencing capabilities to enable remote meetings that are natural and effective with face-to-face quality, such as meetings, training sessions, and presentations. The component is Cisco Unified MeetingPlace Express.
Voice Mail and Unified Messaging Components	Voice mail and unified messaging components deliver powerful voice, integrated, and unified messaging options. The Voice Mail and Unified Messaging Component is Cisco Unity Express.
Endpoints and Clients Components	Endpoint and client components integrate the management capabilities of IP-based networks with phones, pagers, and computers and use these for signaling, voice communications, and data communications. Some examples of these components are Cisco IP Communicator and Cisco Unified 79xx IP Phones.
Wireless and Mobility Components	Wireless and mobility components provide services that enable secure, scalable, methods to real-time access to instant messaging, e-mail, and network resources. You can also access real-time simultaneous tracking of thousands of Wi-Fi devices for location-based security, high-value asset tracking, and business policy enforcement. Some examples of these components are Cisco Unified Mobile Communicator Express and Aironet Wireless Access Points.
Network Management Components	Network management components actively monitors key device parameters on voice and data networks serving 5 to 250 users. Network management components enables around-the-clock, active voice and data network management support The components Cisco netManager Unified Communications.
Infrastructure Components	Infrastructure components are network routers, switches, software, and other standards-based networking components that provide reliable connectivity that is more resilient and enables all the latest network services. Some examples of these components are Cisco Integrated Services Router 2800 Series, Cisco Integrated Services Router 3800 Series, Cisco 800 Series Integrated Services Router and Catalyst Express 3500 Series Switches.

Sample Configuration Files

You can download sample configuration files from Table 5-6 for the components described in the Sample Configuration Information topic.

Table 5-6 Configuration Command Files

Description	Filename
Zip file includes Cisco device configurations listed below: **Note** Some parameters, such as passwords, have been removed from the configuration files for security reasons.	IPT_SMB_UC701_Reference_Configs.zip (right-click to download zip) includes the files below. **Note** If you click the link rather than right-click, the zip file may open in the secondary window but also replace the contents of this window. Use your Back button to return to this window.
Cisco Unified Communications Manager Express on a Cisco 2801 Series Cisco Integrated Router (Ely-2801-CME)	ELY-PureSIP.txt
Cisco Unified Communications Manager Express on a Cisco 3825 Series Cisco Integrated Router (Otis-2825-CME)	Otis-2825-CME.txt

Introduction to Troubleshooting

This topic describes how to develop a system-level troubleshooting methodology as you install and configure a Cisco Unified Communications network for the first time. It also provides recommendations for preparing and documenting the network that may assist you in diagnosing and isolating problems when they occur. This topic contains the following sections:

- System Troubleshooting Methodology
- Conduct User Acceptance Testing

System Troubleshooting Methodology

The Implementation phase of your network deployment is an excellent time to develop a methodology for troubleshooting the network as a whole. Troubleshooting networking equipment at a system level requires solid detective skills. When a problem occurs, the list of potential suspects is long. You must collect detailed information and systematically narrow the list of potential causes to determine the root problem. This topic does not provide step-by-instructions for resolving problems that occur during network installation. Instead, this topic describes sound methods for troubleshooting your network using the following general steps:

1. Gather Information on the Problem.
2. Isolate Point(s) of Failure.
3. Apply Tools to Determine the Problem's Root Cause.

Gather Information on the Problem

Problems are typically discovered and reported by one of the following types of users:

- External users trying to reach employees within your company
- Internal users using phones to call employees in other company locations or PSTN destinations, and perform basic actions such as call transfers and dialing into conferences.

As the network administrator, you must collect sufficient information from these users to allow you to isolate the problem. Detailed, accurate information will make this task easier. Table 5-7 lists recommended questions to ask users when they report a problem. As you turn up your network, you may consider putting these questions in an on-line form. A form will encourage users to provide more details about the problem and also put them into the habit of looking for particular error messages and indicators. Capturing the information electronically will also permit you to retrieve and re-examine this information in the future, should the problem repeat itself.

Table 5-7 Questions to Ask Users When They Report Problems

Ask this Question...	To Determine...
Did something fail or did it simply perform poorly?	Whether the issue relates to system degradation or a connectivity failure. An example of a failure is when a user dials a phone number and hears fast busy tone. An example of a performance problem is when a user dials into a conference call and hears “choppy” audio when other parties speak. Quality of service or performance issues require a different approach than connectivity or operational problems. You must still isolate the potential sources of the problem, but you will typically use performance management tools instead of log files.
What device were you trying to use?	The device type, model and version of software installed. It is also critical to capture the IP address assigned to the device, as well as its MAC address. If the case of IP phones, determining the phone’s active Cisco Unified Communications Manager server is also important. On Cisco Unified IP phones, these important network values can be displayed by pressing the Settings button and choosing the Network Configuration option from the menu.
Did it ever work?	If a device was recently installed and the problem occurred while making it work for the first time, or if the device was operating normally before the problem occurred. If the device was newly installed, the problem is most likely due to improper configuration or wiring of that particular device. Problems with devices that are already up and running can typically be traced back to one of two causes: (a) the user modifying their device, such as changing their configuration or upgrading software, or (b) a change or failure elsewhere in the network.
Exactly what action(s) did you perform?	The steps that led up to the problem, including which buttons were pressed and in which order. Capturing this information in detail is important so that you can consistently reproduce the problem.
What error message(s) appeared or announcements did you hear?	The visual and audio indicators of the problem. Ask users to provide the exact text that appears and any error codes in either an E-mail or on-line form. If the error indication was audible, ask the user to write down the announcement they heard, the last menu option they were able to successfully choose or the tone they heard when the call failed.

Table 5-7 Questions to Ask Users When They Report Problems (continued)

Ask this Question...	To Determine...
What time did the problem occur?	The date and time to compare against entries in log files. If the problem occurred on a Cisco Unified IP phone, make certain the user provides the timestamp that appears on their phone's display. Several Cisco components in a network may capture the same problem event in separate log files, with different ID values. In order to correlate log entries written by different components, you must compare the timestamps to find messages for the same event. Cisco Unified IP phones synchronize their date and time with their active Cisco Unified Communications Manager server. If all Cisco components in the network use Network Time Protocol (NTP) to synchronize with the same source, then the timestamps for the same problem messages will match in every log file.
What is the number of the phone you used and what was the phone number you called?	If the problem relates to a WAN or PTSN link, or a Cisco Unified Communications Manager dial plan issue. Ask the user the phone number he or she dialed (called number) and determine if the destination was within his or her site, another site within the corporate network, or a PSTN destination. Because the calling number (the number of the phone used) also affects call routing in some cases, capture this number as well.
Did you try to perform any special actions, such as a transfer, forward, call park, call pickup, or meet-me conference? Is the phone set up to automatically perform any of these actions?	If the problem is not directly related to the calling number or called number but rather to the supplementary service setup on Unified Communications Manager or the problem is at the destination phone the user tried to reach by transferring or forwarding the call.
Did you attempt the same action on another device?	If the problem is isolated to that user's device or represents a more widespread network problem. If the user cannot make a call from his or her phone, ask the user to place a call to the same destination using a phone in a nearby office.

Isolate Point(s) of Failure

After collecting information on the symptoms and behavior of the problem, to narrow the focus of your efforts you should:

- Identify the specific devices involved in the problem.
- Check the version of software running on each device.
- Determine if something has changed in the network.
- Verify the integrity of the IP network.

Identify Devices Involved in the Problem

In large- to medium-sized networks, it is crucial to identify the specific phones, routers, switches, servers and other devices that were involved in a reported problem. Isolating these devices allows you to rule out the vast majority of equipment within the network and focus your time and energy on suspect devices. To help you isolate which devices were involved in a problem, two types of information can prove invaluable:

- **Network topology diagrams**: It is strongly recommended that you have one or more diagrams that show the arrangement of all Cisco Unified Communications products in your network. These diagrams illustrate how these devices are connected and also capture each device's IP address and name (you may want to also have a spreadsheet or database of the latter information). This information can help you visualize the situation and focus on the devices that may be contributing to the reported problem. See Network Topology Diagrams for recommendations on how to prepare these diagrams.
- **Call flow diagrams**: Cisco equipment, including Unified Communications Manager servers, typically provide detailed debug and call trace log files. To interpret these log files, however, it is useful to understand the signaling that occurs between devices as calls are set up and disconnected. Using the network topology and call flow diagrams in conjunction with the log files, you can trace how far a call progressed before it failed and identify which device reported the problem. Examples of using call flow diagrams for problem isolation are shown in Troubleshooting Daily Operations.

Check Software Release Versions for Compatibility

After you have identified which devices may be involved in the problem, verify that the version of software running on each device is compatible with the software running on every other device. As part of Cisco Unified Communications Release 6.0(1) verification, Cisco Systems has performed interoperability and load testing on simulated network environments running specific software versions. The Release Matrix lists the combination of software releases that were tested.

However, if the combination of releases installed in your network does not match the values in the Release Matrix, it does not necessarily mean the combination is invalid. To check interoperability for a specific device and software release, locate and review its Release Notes. Release Notes contain up-to-date information on compatibility between the product and various releases of other products. This document also describes open caveats, known issues that may cause unexpected behavior. Before beginning extensive troubleshooting work, examine the Release Notes to determine if you are experiencing a known problem that has an available workaround.

Tip The Bug Toolkit requires that you are a Cisco partner or a registered Cisco.com user with a Cisco service contract. Using the Bug Toolkit, you can find caveats for any release. To access the Bug Toolkit, go to the http://tools.cisco.com/Support/BugToolKit/.

Determine if Network Changes Have Occurred

Before focusing on the particular device or site where the problem occurred, it may be useful to determine if a change was made to surrounding devices. If something has been added, reconfigured or removed from elsewhere in the network, that change may be the source of the problem. It is recommended that you track changes to the network such as:

- New user phones added
- Modifications to Cisco Unified Communications Manager call routing settings, such as new directory numbers, route patterns and dial rules to support new sites or devices
- Changes to port configurations on switches, routers or gateways (new equipment, wiring changes or new port activation)
- Changes to IP addressing schemes (such as adding new subnets) that may have affected route tables

Verify the IP Network Integrity

Always remember that Cisco Unified Communications equipment relies on a backbone IP network. Many connectivity problems are not caused by configuration errors or operational failures on Cisco devices, but rather by the IP network that interconnects them. Problems such as poor voice quality are typically due to IP network congestion, while call failures between locations may be the result of network outages due to disconnected cables or improperly configured IP route tables.

Before assuming that call processing problems result from Cisco Unified Communications devices themselves, check the integrity of the backbone IP network. Keep the OSI model in mind as you perform these checks. Start from the bottom, at the physical layer, by checking that end-to-end cabling. Then verify the status of Layer 2 switches, looking for any port errors. Move from there to confirm that the Layer 3 routers are running and contain correct routing tables. Continue up the OSI stack to Layer 7, the application layer. To resolve problems occurring at the top levels of the stack, a protocol analyzer (or "sniffer") may be useful. You can use sniffer to examine the IP traffic passing between devices and also decode the packets. Sniffers are particularly useful for troubleshooting errors between devices that communicate using Media Gateway Control Protocol (MGCP) or Session Initiation Protocol (SIP).

Apply Tools to Determine the Problem's Root Cause

After you have eliminated the IP network as the source of the problem and you have isolated the specific Cisco Unified Communications components involved, you can start applying the many diagnostic tools provided by Cisco components.

Table 5-8 lists the diagnostic tools and supporting troubleshooting documentation available for most components in a small or medium business network. Note that this summary table is provided for reference only. The procedures in Troubleshooting Daily Operations specify when to use each tool and provide links to the troubleshooting instructions in each component's documentation where appropriate.

Table 5-8 IP Telephony for Small and Medium Business Component Troubleshooting Tools and Documentation

Category	Component	Diagnostic Tools Available	Information Available In...
Call Control	Cisco Unified Communications Manager Express	IOS command line tools (such as Show commands and Debug trace utilities)	Troubleshooting Guides Troubleshooting TechNotes
Contact Center	Cisco Unified Contact Center Express	Log files Alarms	Cisco Unified Contact Center Express Servicing and Troubleshooting Guide Cisco CAD Troubleshooting Guide for Cisco Unified Communications Manager Cisco CAD Troubleshooting Guide for Cisco Unified Communications Manager Express Troubleshooting TechNotes
Conferencing	Cisco Unified MeetingPlace Express	System logs Alarms	Configuration and Maintenance Guide for Cisco Unified MeetingPlace Express, "Troubleshooting Cisco Unified MeetingPlace Express" chapter User Guide for Cisco Unified MeetingPlace Express, "Troubleshooting and Getting Help" chapter

Table 5-8 IP Telephony for Small and Medium Business Component Troubleshooting Tools and Documentation

Category	Component	Diagnostic Tools Available	Information Available In...
Voice Mail and Unified Messaging	Cisco Unity Express	CLI commands for status checking and performance monitoring SNMP alarms/events	Cisco Unity Express GUI Administrator Guide, "Troubleshooting" chapter Cisco Unity Express Voice-Mail and Auto-Attendant CLI Administrator Guide, "Troubleshooting" chapter Troubleshooting TechNotes
Endpoints and Clients	Cisco Unified IP phones	Network configuration, status and phone model information on Settings menu	End-User Guides Cisco Unified IP Phone Administration Guides for Cisco Unified Communications Manager, "Troubleshooting and Maintenance" chapters Error Message Decoder Output Interpreter Troubleshooting TechNotes
	Cisco IP Communicator	Quality Report Tool (QRT) Error Reporting Tool	Cisco IP Communicator Administration Guide, "Troubleshooting Cisco IP Communicator" chapter User Guide for Cisco IP Communicator, "Troubleshooting Cisco IP Communicator" chapter Troubleshooting TechNotes
	Cisco Unified Video Advantage	Diagnostics Tool AutoUpdate Status Viewer CAST Viewer CDP Viewer Trace Tool Error Reporting Tool	Installation and Troubleshooting Guide for Cisco Unified Video Advantage, "Troubleshooting Cisco Unified Video Advantage" chapter Cisco Unified Video Advantage User Guide, "Troubleshooting Cisco Unified Video Advantage" chapter Troubleshooting TechNotes
Wireless	Cisco Aironet 521 Access Point	LEDs Carrier busy test Ping/link test	Quick Start Guide: Cisco 521 Wireless Express Access Point Cisco IOS Software Configuration Guide for Cisco Aironet Access Points, "Troubleshooting" chapter
Network Management	Cisco Unified Operations Manager	Alarms and events appearing in Console displays	User Guide for Cisco netManager - Unified Communications

Table 5-8 IP Telephony for Small and Medium Business Component Troubleshooting Tools and Documentation

Category	Component	Diagnostic Tools Available	Information Available In...
Communications Infrastructure	Cisco Unified Communications 500 Series for Small Business	IOS command line tools (such as Show commands and Debug trace utilities) SNMP alarms/events	User Guide for the Catalyst Express 520 Switches, "Troubleshooting the Switch" chapter Cisco Unified Communications 500 Series Support Wiki *See also* Cisco Unified Communications Manager Express *and* Cisco Unity Express
	Cisco 1800 Series Integrated Services Router (ISR)	IOS command line tools (such as Show commands and Debug trace utilities)	Cisco 1800 Series Integrated Services Routers (Fixed) Software Configuration Guide, "Troubleshooting" chapter Troubleshooting TechNotes
	Cisco Catalyst 3560 Access Switch	IOS command line tools (such as Show commands and Debug trace utilities)	Catalyst 3560 Switch Software Configuration Guide, "Troubleshooting" chapter Catalyst 3560 Switch System Message Guide, "Catalyst 3560 Switch Debug Commands" chapter Error Message Decoder Output Interpreter Troubleshooting Tech Notes
	Cisco Catalyst 3750 Access Switch	IOS command line tools (such as Show commands and Debug trace utilities)	Catalyst 3750 Switch Software Configuration Guide, "Troubleshooting" chapter Catalyst 3750 Switch System Message Guide, "Catalyst 3750 Switch Debug Commands" chapter Error Message Decoder Output Interpreter Troubleshooting Tech Notes
	Cisco Catalyst 4506 Access Switch	IOS command line tools (such as Show and Debug commands)	Catalyst 4500 Series Installation Guide, "Troubleshooting the Installation" chapter Catalyst 4500 Series Switch Cisco IOS System Message Guide Error Message Decoder Output Interpreter Troubleshooting TechNotes

Preparing Your Network for Troubleshooting and Recovery

Before your network becomes operational, you can take several proactive steps to make troubleshooting easier, including:

- Produce network topology diagrams to help you isolate potential sources of problems.
- Synchronize the date and time on all servers.

Network Topology Diagrams

One of the first lines of defense is possessing current topology information. One of the most important pieces of topology information is a detailed network diagram (usually created using Microsoft Visio or a similar application). At a minimum, your network topology diagrams should include the following information:

- The name assigned to each major device (typically the DNS name)
- IP addresses for all devices in the network
  - Addresses for each router, core and access switch
  - Addresses for all telephony and application servers, including the IP address for each server in a Cisco Unified Communications Manager cluster
  - DHCP address range for addresses assigned to endpoints such as IP phones and agent workstations
- Phone extension number ranges assigned to sets of agents or users, as well as the main inbound dial-up numbers for each location. This information is useful in resolving dial plan configuration errors.
- WAN IP and PSTN links between sites.

This information is critical for isolating which components are involved in a particular problem. For medium- to large-sized networks, you may want to take a "layered" approach in your diagrams. Create a high-level diagram that illustrates the overall physical layout of your network, including all sites and the links between them. Then for each site create additional diagrams that show detailed addressing information, port numbers and dial plan configurations.

Tip Frequent adds, changes and upgrades to your network can quickly make these diagrams out-of-date. Inaccurate diagrams slow down the troubleshooting process and may lead to misdiagnosing the problem. Remember to keep these diagrams as current as possible.

Synchronizing Server Date and Time

The best resources for diagnosing problems within your network are the debug and trace log files produced by individual Cisco devices. Tracing can be enabled on multiple devices and the log file output compared to isolate problems. In order to correlate messages for the same activity in different log files, you must compare the message timestamps and the source device MAC and IP addresses (there is no universal call ID value shared between Cisco devices). You should synchronize every device to the same date and time source so that the timestamps match. To accomplish this synchronization, set each device to obtain its date and time from the same Network Time Protocol (NTP) source.

For Cisco IOS-based devices (switches, routers or voice gateways), you can configure each device to act as a NTP client and periodically poll a master NTP source using the following command:

ntp server ***ip-address*** **[version** ***number*****] [key** ***keyid*****] [source** ***interface*****] [prefer]**

Additional IOS commands are available to establish a device as a NTP peer (operating as the master source for other devices), as well as setting up NTP broadcasting instead of polling. See the Cisco IOS Configuration Fundamentals Command Reference for details on these IOS commands.

Training Resources

The Cisco Select Certification for Cisco Small and Medium Business Specialization includes the following courses and exams:

- SMB Account Manager Exam 646-171 (SMBAM)
- Selling SBCS 650-173 (SBCSAM)
- SMB Sales Engineer Exam 642-176 (SMBEN)
- SBCS for Engineers 650-178 (SBCSEN)

Register for the on-line exams via the Small and Medium Business role's Learning Map in PEC http://www.cisco.com/go/pe

The following VODs are available for Small and Medium Business solutions:

- Cisco SBCS Tutorial VODS - Cisco SBCS Phone Overview
- How to restore Unified Communications 500 Series configuration using Cisco Configuration Assistant
- Cisco Configuration Assistant (CCA) 1.5 Overview
- How to install Cisco Configuration Assistant
- How to configure firewall using Cisco Configuration Assistant
- How to access UC520 command line interface
- How to configure SIP trunking on a UC520
- Cisco Unified Communications Manager Express: Implementing SIP Interworking
- Setting up Cisco Unified Communications Manager Express PSTN trunks Cisco Unity Express (CUE) integration
- Introduction to Cisco Integrated Services Routers- Voice
- Unified Communications Solution - Express 1.0

A demo for Cisco Smart Business Communications is available at:

- Cisco Smart Business Communications (SBCS) DemoBox

Additionally, Cisco Smart Business Communications System Training Tutorials and Virtual Labs are also offered; see http://www.cisco.com/web/LA/microsites/smb/rediseno/documentos/pdf/catalogo.pdf

Conduct User Acceptance Testing

After the components are configured and integrated with other Cisco IP telephony applications, the field engineer prepares the system for the user acceptance test. Test scripts are run and compared against expected results. Any variability in network performance is noted and addressed before the user acceptance test.

Testing the customer solution involves the following tasks:

- Determine the user acceptance test parameters and deliverables and record these in the user acceptance test plan.
- Conduct a prelaunch test—Using an incremental approach, test the solution against the system design in a low-risk environment with limited users. If the system is stable, the rollout pace is increased until the full implementation is operational.

- Network ready for use acceptance—The customer signs the Ready-for-Use Acceptance Letter acknowledging that the acceptance test yielded satisfactory results.

Additional Sites and Services

Steps to Success is a Cisco methodology that outlines the tasks required to complete a successful customer engagement. Registered users can visit the Steps to Success resource site for Cisco Unified Communications process flows.

Cisco Unified Communications Services is a Cisco service offering that provides engineering expertise and best practices.

- Registered users can visit the Cisco Unified Communications Services partner site.
- Nonregistered users can visit the Cisco Unified Communications Services site.