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. An essential component of this process is the implementation plan.

Before You Begin

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

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 a 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 installed

• 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, on page 2

• Install and Configure System Components, on page 2

• Introduction to Troubleshooting, on page 12

• Conduct User Acceptance Test, on page 23

Order Equipment

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

Ordering Guides

Ordering guides for most Cisco Collaboration Systems products are available for Cisco partners, Cisco sales staff, and Cisco service providers.

Install and Configure System Components

When implementing a new Cisco Collaboration system, create a site-specific installation plan for your team. Describe what needs to be installed and configured. Your plan should reference product-specific installation and configuration guides in Component Installation and Configuration Guides, on page 3.

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.

Planning a System Installation provides guidance for the installation order of components for a Cisco Collaboration Systems Release 10.6(1) contact center deployment. It does not describe installation procedures for individual components. For links to the complete documentation set for each contact center system component, see Resource Library.

The following topics provide additional information for installing and configuring individual contact center products:

• Component Installation and Configuration Guides, on page 3 provides a complete list of components and links to related installation and configuration documents.

- Installation and Configuration Checklists, on page 11 provides checklists for installing and configuring some of your contact center components.

- Component Compatibility and Interoperability, on page 11 provides links to information about compatibility between Cisco products and with third-party systems or a hardware platform.

For system configuration examples, as well as other system implementation topics, see the documentation wiki (DocWiki) at: http://docwiki.cisco.com/wiki/Unified_Communications_System_Implementation

When You Are Done

Components are configured and ready to test:

- For basic standalone operation

- For interoperability in your application(s)

- Acceptance Test Plan is completed

Performing Your System Installation

Before You Begin

See Planning a System Installation to plan your overall strategy.

Install Contact Center Software Components

After you have your installation plan and preparations in place, perform your system installation by following the guidelines and sequence in the individual product installation and configuration guides.

- See Component Resources Documentation for links to component installation and upgrade documents.

Component Installation and Configuration Guides

The following table provides references to installation and configuration documents for the software and hardware components that are part of the Cisco Collaboration Systems Release 10.6(1) solution. This information includes component names and related documentation.

Table 1: Component Installation and Configuration Documentation

Product Technology	Components	Documentation Title	
Call Control			

Product Technology	Components	Documentation Title
Cisco Unified Communications Manager and Cisco Unified Communications Manager IM and Presence Service	• Cisco Unified Communications Manager • Cisco Unified Communications Manager IM and Presence Service • Cisco Real-Time Monitoring Tool • Music on Hold • Cisco Security Agent (only as a standalone agent) • Third-party Antivirus	• Install and Upgrade Guides • Configuration Guides • Maintain and Operate
Contact Center		

Product Technology	Components	Documentation Title
Cisco Unified Contact Center Enterprise	• Cisco Unified Contact Center Enterprise • Progger (Peripheral Gateway, CallRouter, and Logger) • Rogger (CallRouter and Logger) • Generic Peripheral Gateway • Cisco Unified Contact Center Gateway Enterprise • Cisco Unified Contact Center System Gateway • Media Routing Peripheral Gateway • CTI Server • Real-Time Admin Workstation (RTAW) • Historical Data Server • Cisco Outbound Option • Cisco Unified Mobile Agent • Cisco Security Agent • Windows 2003 Active Directory • Third-party Antivirus	• Install and Upgrade Guides • Configuration Guides • Maintain and Operate Guides
Cisco Unified Intelligence Center	Cisco Unified Intelligence Center	• Install and Upgrade Guides • Maintain and Operate Guides

Product Technology	Components	Documentation Title
Cisco MediaSense	Cisco MediaSense	• Install and Upgrade Guides • Configuration Guides
Cisco Finesse	Cisco Finesse	• Install and Upgrade Guides • Configuration Guides • Maintain and Operate
Cisco Unified Customer Voice Portal	• Cisco Unified Customer Voice Portal • Unified CVP Call Servers • Cisco Unified CVP Reporting Server • Cisco Unified CVP Operations Console • HTTP Media Server/Web Server • Cisco Unified Call Studio • Nuance OSR • Nuance OSMS • Cisco Security Agent • Third-party video components • Third-party Antivirus	• Install and Upgrade Guides • Configuration Guides

Product Technology	Components	Documentation Title
Cisco Unified Contact Center Express	• Cisco Unified Contact Center Enterprise • Cisco Agent Desktop • Cisco Agent Desktop—Browser Edition • Cisco Supervisor Desktop • Cisco Desktop Administrator	• Install and Upgrade Guides • Configuration Guides • Maintain and Operate Guides
Cisco SocialMiner	Cisco SocialMiner	• Maintain and Operate
Conferencing		
Cisco TelePresence MCU	• Cisco TelePresence MCU 5300 Series	• Install and Upgrade Guides • Configuration Guides • Maintain and Operate Guides
Enterprise Edge		
Cisco TelePresence Video Communication Server	• Cisco TelePresence Video Communication Server	• Install and Upgrade Guides • Configuration Guides • Maintain and Operate Guides
Cisco Expressway Series	Cisco Expressway	• Install and Upgrade • Configuration Guides • Maintain and Operate Guides

Product Technology	Components	Documentation Title
Cisco Unified Border Element	Cisco Unified Border Element	• Configuration Guides • Maintain and Operate
Voicemail and Unified Messaging		
Cisco Unity Connection	Cisco Unity Connection	• Install and Upgrade Guides • Configuration Guides • Maintain and Operate Guides
Endpoints		
Cisco Desktop Collaboration Experience DX650	Cisco Desktop Collaboration Experience DX600 Series	• Install and Upgrade Guides • End-User Guides • Maintain and Operate Guides
Cisco TelePresence System EX Series	• Cisco TelePresence System EX90 • Cisco TelePresence System EX60	• Install and Upgrade Guides • End-User Guides • Maintain and Operate Guides
Cisco Unified IP Phones 6900 Series	Cisco Unified IP Phones 6901, 6911, 6921, 6941, 6945, 6961	• End-User Guides • Maintain and Operate Guides
Cisco IP Phone 7800 Series	Cisco IP Phones 7821, 7841, 7861	• Install and Upgrade Guides • End-User Guides • Maintain and Operate Guides

Product Technology	Components	Documentation Title
Cisco Unified IP Phones 7900 Series	• Cisco Unified IP Phones (SCCP) 7942, 7945, 7960, 7962, 7965, 7970, 7975 • Cisco Unified IP Phone 7931G, 7941G, 7961G (Wireless)	• Install and Upgrade Guides • End-User Guides • Maintain and Operate Guides
Cisco Unified IP Phones 8900 Series	• Cisco Unified IP Phones 8941, 8945, 8961	• Install and Upgrade Guides • End-User Guides • Maintain and Operate Guides
Cisco Unified IP Phone 9900 Series	Cisco Unified IP Phones 9900 Series	• Install and Upgrade Guides • End-User Guides • Maintain and Operate Guides
Cisco Jabber for Windows	Cisco Jabber for Windows	• Install and Upgrade Guides • User Guides • Maintain and Operate
Cisco Virtualization Experience Media Engine	• Cisco Virtualization Experience Media Engine for Windows • Cisco Virtualization Experience Media Engine for SUSE Linux	• Install and Upgrade Guides • End-User Guides

Product Technology	Components	Documentation Title
Cisco Jabber for iPhone and iPad	Cisco Jabber for iPhone and iPad	• Install and Upgrade Guides • User Guides • Licensing
Cisco Jabber Guest	Cisco Jabber Guest	• Install and Upgrade • Maintain and Operate Guides
Service Management		
Cisco Prime Collaboration	• Cisco Prime Collaboration Provisioning • Cisco Prime Collaboration Assurance • Cisco Prime Collaboration Deployment	• Install and Upgrade • Configure • Maintain and Operate • Cisco Prime Collaboration Deployment Administration Guide
Licensing		
Cisco Prime License Manager	Cisco Prime License Manager	• Maintain and Operate
Communications Gateways		
Cisco Unified SIP Proxy	Cisco Unified SIP Proxy	Install and Upgrade Guides
Cisco 3900 Series Integrated Services Routers	• Cisco 3900 Series Integrated Services Routers	• Install and Upgrade Guides • Configuration Guides

Product Technology	Components	Documentation Title
Cisco 2900 Series Integrated Services Routers	Cisco 2900 Series Integrated Services Routers	• Install and Upgrade Guides • Configuration Guides

Installation and Configuration Checklists

Use the checklists from the following documents to install and configure the required components for your applications.

> **Note** The order in which you install components depends on your site. Follow the order recommended in your site-specific implementation plan.

- Installing Cisco Unified Communications Manager
- Installation Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted
- Installation and Configuration Guide Cisco Unified Contact Center Enterprise
- Cisco Contact Center Gateway Deployment Guide for Cisco Unified ICME/CCE/SCCE/CCX
- Getting Started with Cisco Unified Contact Center Express

Component Compatibility and Interoperability

Use the following links to access commonly used interoperability and compatibility information for Cisco products with each other, with a third-party system, or with a computer hardware platform.

- Cisco Collaboration Systems Compatibility Matrix (For compatibility information prior to Collaboration Systems Release 10.6, refer to the Compatibility Tool.)
- Cisco Unified Communications Manager Compatibility Information
- Cisco Unified Contact Center Enterprise Software Compatibility Guide
- Cisco Unified Contact Center Express Software and Hardware Compatibility Guide
- Cisco Interoperability Portal
- Hardware and System Software Specification (Bill of Materials) for Cisco Unified ICM/Contact Center Enterprise & Hosted
- Cisco Unified Communications Manager Server Support Matrix

Software Versions and System Caveats

For specific information on product software versions used, see Cisco Collaboration Systems Compatibility Matrix. For compatibility information prior to Collaboration Systems Release 10.6, refer to the Compatibility Tool.

For information on system limitations and known caveats, see System Release Notes for Contact Center: Cisco Collaboration Systems Release 10.6(1).

Call Flow Configuration Examples

Sample configuration commands for infrastructure components that are involved in the call flows are in downloadable zip files for all test bed components in the Resource Library.

System-level configuration examples are available on the Cisco DocWiki at: http://docwiki.cisco.com/wiki/Category:Contact_Center_System_Configurations

Introduction to Troubleshooting

This topic describes how to develop a system-level troubleshooting methodology as you install and configure a Cisco Collaboration Systems 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, on page 12
- Preparing Your Network for Troubleshooting and Recovery, on page 20

For more information about system-level troubleshooting, see the Cisco Collaboration Systems category on the documentation wiki (DocWiki) at: http://docwiki.cisco.com/wiki/Unified_Communications_System_Troubleshooting

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, on page 13

2   Isolate Point(s) of Failure, on page 15

3   Apply Tools to Determine the Problems Root Cause, on page 17

Gather Information on the Problem

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

- External customers dialing into a call center to order products, obtain customer service, and so forth.

- Internal agents receiving incoming calls from a call queue or initiating outbound collection calls to customers.

- Internal users using administrative 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. The following table 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 2: 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.

Ask this Question...	To Determine...
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 email 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.
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.

Ask this Question...	To Determine...
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 Collaboration Systems 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, on page 20 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 Collaboration Systems Release 10.6(1) verification, Cisco Systems has performed interoperability and load testing on simulated network environments running specific software versions.

However, if the combination of releases installed in your network does not match the values in the System Release Notes, it does not necessarily mean the combination is invalid. To check interoperability for a specific device and software release, locate and review its individual 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.

Note   The open caveat information in the Release Notes contains links to the Bug Search. The Bug Search requires that you are a Cisco partner or a registered Cisco.com user with a Cisco service contract. To access the Bug Search, go to the http://tools.cisco.com/bugsearch//

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 agent 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 Collaboration 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 Collaboration 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 Problems Root Cause

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

The following table lists the diagnostic tools and supporting troubleshooting documentation available for most components in a contact center 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 where appropriate.

Table 3: Contact Center Component Troubleshooting Tools and Documentation

Component	Information Available In...
Call Control	
Cisco Unified Communications Manager and IM and Presence Service	• Troubleshooting Guides for Cisco Unified Communications Manager
Contact Center	
Cisco Unified Contact Center Enterprise	• Troubleshoots and Alerts • DocWiki: Troubleshooting Tips for Unified CCE • Troubleshooting TechNotes
Cisco Unified Contact Center Express	• Troubleshooting Guides • Troubleshooting TechNotes
Cisco Unified Customer Voice Portal	• Troubleshooting Guides • Cisco Support Tools User Guide for Cisco Unified Software • Troubleshooting TechNotes

Component	Information Available In...
Cisco Unified Intelligence Center	• Troubleshooting TechNotes
Cisco Finesse	• Troubleshooting TechNotes
Cisco MediaSense	• Troubleshooting Guides
Cisco SocialMiner	• Troubleshoot and Alerts
Conferencing	
Cisco TelePresence MCU 5300 Series	• Troubleshooting Guides • Troubleshooting TechNotes
Enterprise Edge	
Cisco TelePresence Video Communication Server	• Troubleshooting Guides • Troubleshooting TechNotes
Cisco Expressway Series	• Troubleshooting Guides • Troubleshooting TechNotes
Cisco Unified Border Element	• Troubleshooting TechNotes
Voicemail and Messaging	
Cisco Unity Connection	• Error and System Messages • Password Recovery Procedure for Cisco Unity Connection • Troubleshooting Guides • Troubleshooting TechNotes
Endpoints	

Component	Information Available In...
Cisco Phones	• End-User Guides 　◦ Cisco Unified IP Phone 6900 Series 　◦ Cisco IP Phone 7800 Series 　◦ Cisco IP Phone 7900 Series 　◦ Cisco Unified IP Phone 8900 Series 　◦ Cisco Unified IP Phone 9900 Series • Maintain and Operate Guides, "Troubleshooting and Maintenance" chapters 　◦ Cisco Unified IP Phone 6900 Series 　◦ Cisco Unified IP Phone 7900 Series 　◦ Cisco Unified IP Phone 8900 Series 　◦ Cisco Unified IP Phone 9900 Series • Error Message Decoder • Output Interpreter • Troubleshooting TechNotes 　◦ Cisco IP Phone 7800 Series 　◦ Cisco IP Phone 7900 Series
Cisco Desktop Collaboration Experience DX650	• End-User Guides
Cisco TelePresence System EX Series	• Troubleshooting Guides • Troubleshooting TechNotes
Cisco Jabber for Windows	• Troubleshooting TechNotes
Cisco Virtualization Experience Media Engine	• End-User Guides
Cisco Jabber Guest	• Troubleshooting TechNotes
Service Management	

Component	Information Available In...
Cisco Prime Collaboration Provisioning, Assurance and Deployment	• Troubleshooting Guides • Troubleshooting TechNotes
Communications Gateways	
Cisco 3900 Series Integrated Services (ISR)	• Troubleshooting Guides
Cisco 2900 Series Integrated Services (ISR)	• Troubleshooting Guides • 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.

- Set trace/logging levels on key devices so that diagnostic information is available when problems occur.

- Create IVR flowcharts that illustrate how calls are routed between agents and sites.

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 termination points 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.

Note 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.

The following figure shows a typical high-level topology diagram for a two sites in a contact center network. Agents accepting calls from customers are located in a central distribution site in Kansas, while the equipment supporting interactive voice is located in a data center in San Francisco.
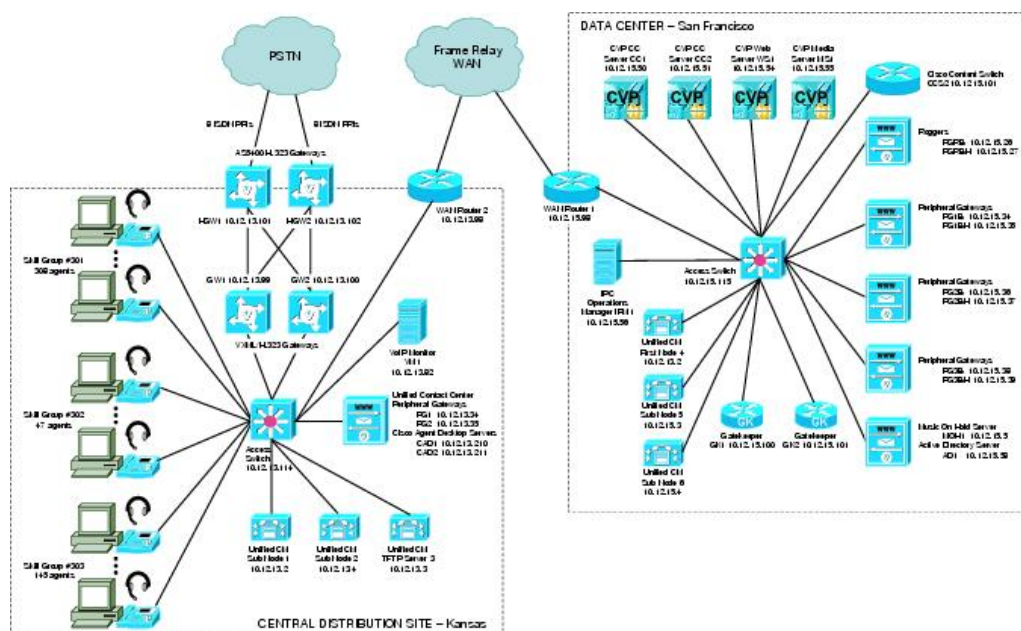
Synchronizing Server Date and Time

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 Using the Cisco IOS Command-Line Interface for details about these IOS commands.

Recommended Trace/Logging Settings

In order to have diagnostic information available when you begin to research problems, you must configure devices in your network to capture signaling, processing and other activity in log files.

Cisco Unified Communications Manager Trace Settings

Trace settings for Cisco Unified Communications Manager servers are maintained using the Cisco Communications Manager Serviceability graphical interface. There are two ways to set trace logging levels for Unified Communications Manager services:

- **Customize trace levels for individual parameters:** This approach offers a high-degree of control and flexibility over the trace output. However, in order to use this approach you should understand not only the significance of each parameter, but also the impact of tracing on Unified Communications Manager server performance. For example, setting trace levels to "Error" has a minimal impact to CPU cycles while leaving the "Detail" level set for long periods of time may impact call processing. For instructions on setting individual trace levels, see the Cisco Unified Serviceability Administration Guide, "Configuring Trace" chapter.

- **Apply predefined trace levels:** This approach allows you to quickly enable and disable tracing for each Unified Communications Manager service based on predefined levels. You can also use these default troubleshooting trace settings in combination with customized settings to temporarily override the your custom settings. For instructions on using the Troubleshooting Trace Settings option in the Cisco Unified Communications Manager Serviceability interface, see the Cisco Unified Serviceability Administration Guide, "Configuring Troubleshooting Trace Setting Configuration" chapter.

Debug Trace Settings for Unified IP IVR System

If you encounter any problems with the Unified CCX platform and Unified IP IVR system, activate the following debug trace settings to generate debug logs:

- For Unified CCX platform issues: SS_TEL, SS_ICM, and LIB_ICM.

- For JTAPI Client issues: Enable all Trace Levels and select all debug levels except MISC_DEBUGGING.

However, deactivate the above trace settings if you experience any degradation in performance during heavy load situations.

IVR Flowcharts

In a contact center environment, another tool that can help you troubleshoot call processing problems is a flowchart that traces the call routing process based on the interactive voice response (IVR) menu choices that callers make. traces the processing of an incoming call received by a central distribution site. The call receives a voice treatment prompting the call to select between three menu options or hold for an agent. The flowchart indicates which set of agents receives the call based on the menu option selected, as well as describing the capacity (number of agents) in the particular skill set group.

For calls received during high traffic periods, with more than 20 calls queued up for agents, the flowchart indicates the announcements played to the callers and how the calls are routed. This type of flowchart is useful

for troubleshooting problems reported by external users (customers). While shows a fairly simple example, where calls stay within a particular site, some contact center applications may overflow calls to other sites. In those cases, the overflow calls may traverse an IP WAN to a secondary site and may be handled by additional devices. In situations like that, you need to also view a network topology diagram for the secondary site to trace the call processing.

Figure 1: Interactive Voice Response Flowchart Example
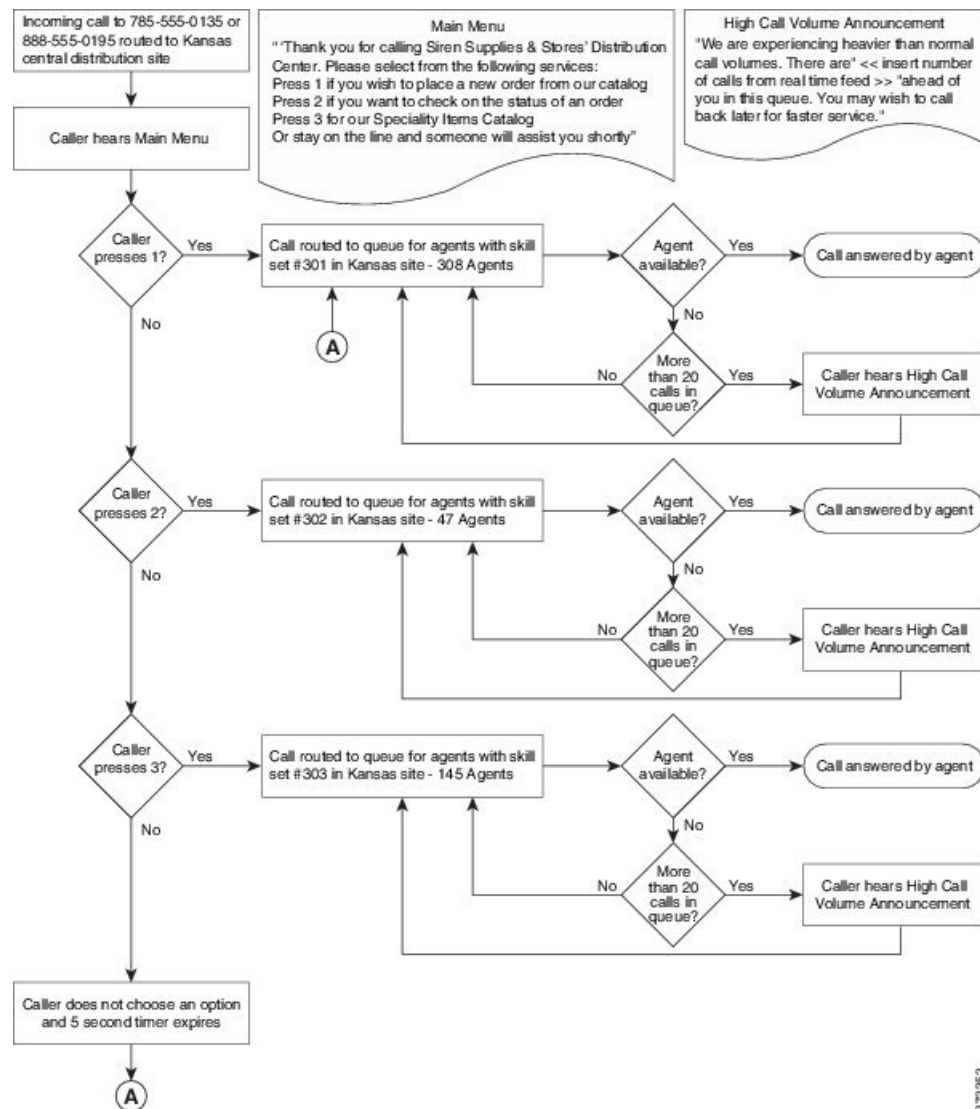
Conduct User Acceptance Test

After the components are configured and integrated with other Collaboration System 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.

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

Train End Users

The final stage of the Implement phase is to help ensure that the customer's system administration team and end users are trained to take over management of the new system.

Cisco Systems offers several training and certification programs for customers to maximize the usage of their newly adopted systems. See Using the Training Library for more information on Cisco training websites and videos on demand (VODs).

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 Collaboration process flows.

Cisco Collaboration Systems 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 Services for Unified Communications site.