



CHAPTER 3

Design

Introduction to Design

Using the project plan that was developed in the Plan phase, your team should have enough information to develop a detailed design for each site and the entire network. The network design should contain, at a minimum:

- Routing and switching component connectivity
- WAN connectivity for intra- and inter-sites
- Software applications and configurations for routers and switches
- Power and environment
- Security
- Redundancy and failover
- Disaster recovery

For each site, in addition to the above, your design should include telephone circuitry, equipment racks with cabinet locations, and layouts. Each site should have a design that encompasses your network call processing, conferencing, and messaging requirements. The design should be scalable for future growth.

For specific deployment steps, see [Deployment Methodology](#) in the Cisco Unified Communications System Description.

Before You Begin

Review Solution Reference Network Design (SRND) documents and design tools. Gather requirements and data, which can include:

- Business and system requirements
- Service-level agreements (SLAs)
- Capacity (bandwidth) requirements
- Site survey and proposal from the project plan

When You Are Done

The main deliverable of the Design phase is the detailed design, including:

- Network diagrams (see [Network Topology Resources](#) in the Resource Library for editable Microsoft Visio network drawings)
- Routing strategy

- Redundancy
- Call flows
- Traffic flows
- Equipment list
- Bill of materials

Major Concepts and Tasks in This Process

- [Design Concepts](#)
- [Design Tasks](#)

Design Concepts

Read these conceptual, overview topics for the background knowledge you need to build an intelligent design.

- [Using SRND Documents](#)
- [Using Design Tools and Templates](#)

Using SRND Documents

Solution Reference Network Design (SRND) documents provide guidelines, recommendations, and best practices for implementing enterprise networking solutions.

The following SRNDs are recommended for designing Cisco Unified Communications systems:

- [Cisco Unified Communications SRND Based on Cisco Unified Communications Manager 6.x](#)
- [Cisco Unified Communications SRND Based on Cisco Unified Communications Manager 5.x](#)
- [Cisco Unified Communications SRND Based on Cisco Unified CallManager 4.x](#)
- [Cisco Unified Contact Center Enterprise SRND Release 7.x](#)
- [Cisco Unified Contact Center Express SRND Release 5.0](#)
- [Cisco Unified Customer Voice Portal SRND Release 4.x](#)
- [Enterprise QoS Solution Reference Network Design](#)

**Note**

Additional SRND resources are available at <http://www.cisco.com/go/srnd>.

Using Design Tools and Templates

Use these design tools to assist you in sizing your network:

- [Cisco Unified Communications Sizing Tool](#) 

The Cisco Unified Communications Sizing Tool is a web-based tool that assists users with hardware sizing of large or complex Cisco Unified Communications solutions by calculating the call processing requirements for products that have a major impact on performance and scalability.

With the Cisco Unified Communications Sizing Tool, system engineers with Cisco Unified Communications solution experience or individuals with equivalent abilities can design and model solutions for existing and prospective customers. The tool requires various types of information to calculate the minimum size and type of devices required for a solution, such as the type and quantity of IP phones, gateways, and media resources. For most device types, the tool also requires the average number of call attempts per hour per device during the busy hour (known as busy hour call average or BHCA) and the average utilization time. The resulting calculations produced by the tool can be saved, copied, and sent to other users.

- [Cisco Unified Communications Manager Capacity Tool](#) 

The Cisco Unified Communications Manager Capacity Tool calculates the minimum number of active subscribers that are required to support a given installation. The tool input consists primarily of quantity and usage information on the various device types that are supported in a Cisco Unified Communications Manager system.

- [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.

For additional information on design tools such as the Cisco Unified Communications Sizing Tool, as well as other system design topics, see the documentation wiki (DocWiki) at http://docwiki.cisco.com/wiki/Unified_Communications_System_Design.

Design Tasks

The following list is an overview of the design process and is not meant to represent an ordered sequence of tasks:

- [Identify the Components That You Need](#)
- [Review Tested Deployment Models](#)
- [Review System Caveats](#)
- [Review System Test Results](#)
- [Develop Traffic Engineering Specifications](#)
- [Define Security Policies](#)
- [Define Failover Behavior](#)

Identify the Components That You Need

This topic provides links to descriptions of components, component documentation, and matrixes.

- [Contact Center Overview](#)—Describes the primary Cisco software components in the contact center system.
- [Review Release Matrix](#)—Identifies the components and their software versions that you need.

- [Component Resources Documentation](#)—Lists the documentation available for each component.
- [Cisco Unified Communications Compatibility Tool](#)—Provides tables that identify the compatible software release versions for each product in each Cisco Unified Communications release.
- [Software Advisor Tool](#)  —Helps you find software releases that are compatible with your hardware configuration, locate information about a particular software release, identify a software release that supports specific features you want, or compare the features in two software releases.
- [Cisco Interoperability Portal](#)—Provides information about configuring Cisco technologies with third-party products and lists features that interoperate between Cisco solutions and other vendors.
- Bill of Materials (BOMs)
 - [Hardware and System Software Specification \(Bill of Materials\) for Cisco Unified ICM/Unified CC Enterprise & Hosted Editions](#) document—Specifies the hardware and system software compatible with and required for Cisco Unified ICM and Cisco Unified Contact Center.
 - [Hardware and System Software Specification for Cisco Unified Customer Voice Portal](#)—Provides platform hardware specifications and compatible third-party software version requirements across the major components of the Cisco Unified CVP solution.

For an additional overview of primary components that can be installed and configured in the contact center environment, see [Primary Contact Center Components in Cisco Unified Communications Systems](#).

Ordering Tools

- [Solution Expert Tool](#) 

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- [Cisco Unified Contact Center Express/Cisco Unified IP IVR Ordering tool](#) 
- [Ordering Guides](#) 

Ordering guides for most Cisco Unified Communications products are available for partners and Cisco employees.

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

Review Tested Deployment Models

The tested deployment models reflect the business requirements that were introduced on the Prepare and Plan tab. Each deployment model was installed, configured, and tested with hardware and software designed to work together seamlessly and to provide a complete and optimized contact center solution. The tested deployment models provide you with guidance for your design and implementation. Compare your design to these models to see if they have similar characteristics. Where your requirements are different, do a risk analysis. See [Using SRND Documents](#) to help you with your design decisions.

Refer to this content map for an overview of the deployment models that are implemented in the contact center environment.

Topic	Description
Test Deployment Models and Sites	Describes the site models and routing models used in the test deployment models: <ul style="list-style-type: none"> • Single site • Multisite centralized • Multisite distributed • Clustering over the WAN
Test Bed Software Implementation	Describes how the contact center software, network management, security, Customer Response Solutions (CRS), Unified CVP, and the parent and child model were implemented at the test sites.
Test Bed 1: Unified IP IVR Test Sites	Provides component lists, topologies, and site definitions for IP IVR sites that are testing Cisco Unified Communications Manager Post-Routed call flows.
Test Bed 2: Parent and Child Test Sites	Provides component lists, topologies, and site definitions for parent and child sites that are testing parent and child call flows.
Test Bed 3: Unified CVP Test Sites	Provides component lists, topologies, and site definitions for CVP sites that are testing Unified CVP Post-Routed call flows.

Review System Caveats

System caveats describe unexpected behavior, defects, and product limitations discovered during system-level testing of the Cisco Unified Communications components. Check the [Limitations and Restrictions](#) section in the latest release notes to make sure that your design has taken all system caveats into consideration.

Review System Test Results

System test results show the scope and extent of the testing conducted for Cisco Unified Communications systems in a test environment that is modeled on real-world deployments.

Depending on the network you are designing and your specific environment, use the system test results as a guide and supplement for your own site test and turn-up plan.

For the results of testing for Cisco Unified Communications Release 6.0(1), see [System Test Results](#) in the Resource Library.

Develop Traffic Engineering Specifications

- [Traffic Analysis for Voice over IP](#) white paper—Provides background information on various traffic analysis concepts and features that are applicable to Voice over IP (VoIP). This document presents fundamental traffic theory, several statistical traffic models, application of traffic analysis to VoIP networks, and an end-to-end traffic analysis example.
- [Cisco Unified Communications Manager Capacity Tool](#)  —Calculates the minimum number of active subscribers that are required to support a given installation. Input consists primarily of quantity and usage information on the various device types that are supported in a Cisco Unified Communications Manager system.
- [Bandwidth Calculators](#)  —Calculate bandwidth for CTI OS, CAD, and HDS WebView withfor contact center systems. The output from these tools can also be used as input to the [Cisco Unified Contact Center Express Configuration Tool](#)  and the [Cisco Unified Communications Manager Capacity Tool](#) .
- [Cisco Unified Contact Center Enterprise Sizing Tool \(Unified CCE Tool\)](#)  —Helps size the Unified CCE resources required to meet the needs of a specific contact center. It also provides data that can be used as input for other capacity planning and sizing tools, such as the Cisco Unified Communications Manager Capacity Tool, and the Unified CVP and Cisco IP IVR sizing tools.

In addition, these third-party traffic engineering tools are provided for your reference:

- [VoIP Bandwidth Calculator](#)
- [Online Erlang traffic calculators](#)

The [Cisco Unified Contact Center Enterprise Release 7.x SRND](#) also includes information on sizing your contact center components.

Define Security Policies

Refer to security policies in these guides:

- [Cisco Unified Communications Manager Security Guide](#)
- Specific component documents are available in the [Component Resources Documentation](#) topic in the Resource Library.

Additional security information is included here for your reference:

- [Secure Unified Communications](#)
- [Introduction to Security](#)
- [Design Zone for Security](#)
- [Cisco Security Center](#)

Define Failover Behavior

Specific test cases were executed as a part of Cisco Unified Communications System Release 6.0(1) failover testing. See [Failure, Failover, and Recovery](#) for specific information.

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.

For a solution that may fit your network design requirements, see Industry Solutions at <http://www.cisco.com/web/strategy/index.html>.

