CHAPTER 3

Design

Introduction to Design

Using the project plan that was developed in the Plan phase, the design team develops the detailed design. The detailed design contains the network design, which includes a redundancy and failover plan, a disaster recovery plan, and an implementation plan. When the design is reviewed and accepted, a purchase order is generated for equipment and services.

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

Gather requirements and data for the detailed design:

- Business and system requirements
- Service-level agreements
- 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:

- Network diagrams (see Network Topology Resources on the Resource Library tab 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

Go directly to the main design concepts and tasks:

- 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 CallManager 5.x
- Cisco Unified Communications SRND Based on Cisco Unified CallManager 4.x
- Enterprise QoS SRND, Version 3.3, November 2005 (right-click to download PDF)
- Cisco Unified Contact Center Enterprise SRND, Releases 7.0 and 7.1
- Cisco MeetingPlace 5.3 Solution Reference Network Design (SRND)

Additional SRND resources are available at this location:

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

Using Design Tools and Templates

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

- Cisco CallManager Capacity Tool (CCMCT)

  http://www.cisco.com/cgi-bin/CT/CCMCT/ct.cgi

  The Cisco CallManager Capacity Tool calculates the minimum number of active subscribers that are required to support a given installation. The inputs consist primarily of quantity and usage information on the various device types that are supported in a Cisco CallManager system.

- IPC Voice Tools

  http://tools.cisco.com/partner/ipccal/index.htm

  The IPC Voice Tools, such as the IPC Resource Calculators, are intended to simplify and automate the process of sizing IP Contact Center (IPCC) resources that are required for specific IPCC business operations. They are also useful for verifying and troubleshooting existing installations.

  The output from these tools can also be used as input to the IPCC Express Configuration Tool and the CallManager Capacity Tool.

- Solution Expert tool

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

Design Tasks

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

- Identify the Components You Need
- Review Tested Site Models
- Review System Caveats
- Review System Test Results
- Develop Traffic Engineering Specifications
- Define Security Policies
- Design for High Availability

Identify the Components You Need

Refer to the Release Matrix to identify the components that you need. The Release Matrix is part of the system release notes, which reside in the Resource Library. A list of component documentation can also be found in the Resource Library. Links are provided here for your convenience.

- Release Matrix Tables
- Component Resources

Ordering Tool

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

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

Review Tested Site Models

For Release 5.1(1), Cisco developed a variety of site models as standard architectures. These models were tested and optimized for maximum efficiency and performance. You can derive your network design by choosing the deployment model that most closely matches your business and then adding the specific features and applications that meet your business needs. Review the following information:

- Tested Deployments and Site Models
- Purpose of Solution Tests
- Multi-Site Distributed Deployment Options
- North America Site Models
- Europe and Emerging Markets Site Models

Review System Caveats

System caveats are system limitations and restrictions. Check the latest release notes to make sure that your design has taken all system caveats into consideration. System caveats are listed under the Limitations and Restrictions section of the release notes.

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 5.1(1), see System Test Results in the Resource Library.

Develop Traffic Engineering Specifications

For background information on various traffic analysis concepts and features that are applicable to Voice over IP (VoIP), see the white paper, *Traffic Analysis for Voice over IP*. 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.

- *Traffic Analysis for Voice over IP*

  http://www.cisco.com/en/US/tech/tk652/tk701/technologies_white_paper09186a00800d6b74.shtml

  Use the Cisco CallManager Capacity Tool to calculate the minimum number of active subscribers that are required to support a given installation. Inputs consist primarily of quantity and usage information on the various device types that are supported in a Cisco Unified CallManager system.

- Cisco CallManager Capacity Tool (CCMCT)

  http://www.cisco.com/cgi-bin/CT/CCMCT/ct.cgi

  These third-party traffic engineering tools are provided for your reference.

- VoIP Bandwidth Calculator

http://www.packetizer.com/voip/diagnostics/bandcalc.html

- Online Erlang traffic calculators

  http://www.erlang.com/calculator/voip_calculator.htm

Define Security Policies

Refer to security policies in these guides:

- Cisco Unified CallManager Security Guide, Release 5.0(4)
- Cisco CallManager Security Guide, Release 4.1(3)

Additional IP security information is included here for your reference:

- IP Security white paper
- Integrated network security—SAFE Blueprint

Design for High Availability

Cisco IP telephony systems are designed for high availability. In order to achieve this, the design must include redundancy for failover and rapid recovery. For recommendations and design assistance from Cisco Advanced Services, see Navigating the Road to Five Nines.

The Cisco Unified CallManager plays the key role in maintaining call processing following a failure in an IP telephony environment. This topic describes the following high-availability features that are built into Cisco Unified CallManager:

- Unified CallManager Clusters
- Unified CallManager Redundancy Groups
- Keepalive Mechanism

For additional information on Unified CallManager high-availability features, as well as Unified CallManager failover processing and recovery systems, see Cisco Unified CallManager Failure, Failover, and Recovery.

Unified CallManager Clusters

A cluster comprises a set of Unified CallManager servers (or *nodes*) that share the same database and resources. Unified CallManager servers can be configured to perform the following functions: database server, TFTP server, or application software server. You can dedicate a particular server to one function or combine several functions on one server, depending on the size of your network and the level of redundancy desired.

Each cluster can have only one database server (also called the *first node*) and usually one TFTP server (either separate or combined with another function). Cisco Systems recommends that large enterprise networks contain a dedicated Unified CallManager database server with other servers (called *subsequent nodes*) running the Unified CallManager application software. The Unified CallManager application software performs all call control, including signaling of endpoints, feature invocation, and calling restrictions. Large-scale networks typically use paired redundant application software servers, running in an active-active configuration, with endpoints evenly distributed across the two servers. The TFTP server provides configuration files for the endpoint devices and the associated firmware loads. Large enterprise networks typically use redundant TFTP servers.

Unified CallManager Redundancy Groups

A redundancy group comprises a prioritized list of up to three Unified CallManager servers. You can associate each group with one or more device pools to provide call processing redundancy. Each group must contain a primary Unified CallManager, and it may contain one or two backup Unified CallManager servers. If the primary Unified CallManager fails for any reason, the first backup Unified CallManager in the group takes control of the devices that were registered with the primary Unified CallManager. If you specify a second backup Unified CallManager for the group, it takes control of the devices if both the primary and the first backup Unified CallManager servers fail.

When a failed primary Unified CallManager comes back into service, it takes control of the group again, and the devices in that group automatically reregister with the primary Unified CallManager.

Keepalive Mechanism

A keepalive mechanism is an essential part of an IP telephony solution. Keepalives ensure that endpoints (typically phones and gateways) retain their communications path to a Unified CallManager server. Keepalives not only determine when the primary Unified CallManager server is no longer available, they also determine when the site has become completely isolated from a centralized call control system and must revert to some form of remote survivability capability such as Cisco Unified SRST. Keepalives avoid delays in establishing a call caused by searching for an available Unified CallManager server.

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.