Preface

This document provides design considerations and guidelines for deploying
Cisco Unified CallManager Express (Cisco Unified CME) in the context of standalone or distributed
call control environments.

> **Note** Some of the content used in this his publication originated as content in the Cisco Press book entitled
> *Cisco IP Communications Express: CallManager Express with Cisco Unity Express* (ISBN:
> 158705180X). See the following Cisco Press summary for a complete table of contents and book
> description: http://www.ciscopress.com/bookstore/product.asp?isbn=158705180X

Scope

> **Note** This document addresses features available as of Cisco Unified CME 3.1 and later. Features that are
> associated only with later releases are specifically noted in the body of the publication.

This publication addresses a variety of design considerations associated with deploying
Cisco Unified CME. Specific chapters presented in this design guide are as follows:

- Chapter 1, "Introducing Cisco Unified Communications Express"
- Chapter 2, "IP Telephony Deployment Models"
- Chapter 3, "Network Infrastructure"
- Chapter 4, "Voice Gateways"
- Chapter 5, "Cisco Unified CallManager Express Call Transfer and Forward"
- Chapter 6, "Connecting Multiple Cisco Unified CallManager Express Systems with VoIP"
- Chapter 7, "Integrating Cisco Unified CallManager Express with Cisco Unified CallManager"
- Chapter 8, "Integrating External Applications with Cisco Unified CallManager Express"
- Chapter 9, "Cisco Unified CallManager Express Dial Plan"
- Chapter 10, "Cisco Unified CallManager Express Security Best Practices"
- Chapter 11, "Managing and Monitoring Cisco Unified CallManager Express Systems"
- Chapter 12, "IP Telephony Endpoints for Cisco Unified CallManager Express"

Related Documents and References

For more information about topics addressed in this publication, see the Cisco documents listed in Table 1 and external websites listed in Table 2.

Table 1   Related Cisco Content by Chapter

Chapter	Topic	Cisco Public Website Links
Chapter 2	Cisco Unified CME	http://www.cisco.com/en/US/products/sw/voicesw/ps4625/tsd_products_support_series_home.html
	Large scale deployment	http://www.cisco.com/en/US/products/sw/voicesw/ps556/products_implementation_design_guides_list.html
Chapter 3	Cisco 1800 ISR APs	http://www.cisco.com/en/US/products/ps5853/products_data_sheet0900aecd8028a95f.html
	Cisco 870 Integrated Service Routers (ISR) APs	http://www.cisco.com/en/US/products/hw/routers/ps380/products_data_sheet0900aecd8028a976.html
	Campus network design	http://www.cisco.com/warp/public/cc/so/neso/lnso/cpso/gcnd_wp.pdf
	Cisco High-speed WAN Interface Card (HWIC)-AP	http://www.cisco.com/en/US/products/ps5949/products_data_sheet0900aecd8028cc7b.html
	Cisco IOS Wireless LAN configuration	http://www.cisco.com/en/US/docs/ios/wlan/configuration/guide/12_4t/wl_12_4t_book.html
	Cisco Unified Wireless IP Phone 7920	http://www.cisco.com/en/US/products/hw/phones/ps379/products_user_guide_list.html
	Cisco Wireless LAN Services Module (WLSM)	http://www.cisco.com/en/US/products/hw/modules/ps2706/products_implementation_design_guide09186a00807d592c.html
	Integrated Services Router (ISR) implementation limitations	http://www.cisco.com/en/US/products/hw/routers/ps380/products_data_sheet0900aecd8016ef57.html
	Voice-Adaptive Traffic Shaping and Fragmentation	http://www.cisco.com/en/US/docs/ios/12_2t/12_2t15/feature/guide/ft_vats.html
Chapter 4	Digital trunks	http://www.cisco.com/en/US/tech/tk652/tk653/technologies_configuration_example09186a008010f05d.shtml
Chapter 6	Cisco Multiservice IP-to-IP Gateway	http://www.cisco.com/en/US/products/sw/voicesw/ps5640/products_qanda_item09186a00801da69b.shtml

Table 1   Related Cisco Content by Chapter (continued)

Chapter	Topic	Cisco Public Website Links
Chapter 8	Cisco and Microsoft implementations	http://www.cisco.com/web/partners/pr67/pr41/partners_strategic_alliance_.html
	Cisco Unity Express	*Cisco Unity Express Design Guide* http://www.cisco.com/en/US/docs/voice_ip_comm/unity_exp/design/design21/cuedg21.html *Excerpts from Cisco IP Communications Express: CallManager Express with Cisco Unity Express* http://www.cisco.com/en/US/docs/voice_ip_comm/unity_exp/design/CP_CIPExpress/excerpts.html
	CRM Communications Connector	http://www.cisco.com/en/US/products/ps7274/tsd_products_support_series_home.html
	XML development	http://www.cisco.com/en/US/products/svcs/ps3034/ps5408/ps5418/serv_home.html
Chapter 10	Cisco Unified CME Command Reference	http://www.cisco.com/en/US/docs/voice_ip_comm/cucme/command/reference/cme_cr.html
Chapter 11	XML Provisioning Guide for Cisco CME/SRST	http://www.cisco.com/en/US/docs/voice_ip_comm/cucme/xml/developer/guide/xmldev.html
	Cisco CallManager Express 3.4 SNMP MIB Support	http://www.cisco.com/en/US/docs/voice_ip_comm/cucme/mib/reference/guide/ccme_mib.html
	Cisco Networking Services Configuration Engine	http://www.cisco.com/en/US/products/sw/netmgtsw/ps4617/tsd_products_support_series_home.html
	Cisco Unified CME QCT Data Sheet	http://www.cisco.com/en/US/products/sw/voicesw/ps4625/products_data_sheet0900aecd802e9be9.html
	Cisco Unified CME QCT software download site	http://www.cisco.com/pcgi-bin/tablebuild.pl/cme-qct
	Cisco Unified Operations Manager data sheets	http://www.cisco.com/en/US/products/ps6535/products_data_sheets_list.html
	Technical documentation for Cisco Unified Operations Manager	http://www.cisco.com/en/US/products/ps6535/tsd_products_support_series_home.html
	Cisco Unified Service Monitor data sheets	http://www.cisco.com/en/US/products/ps6536/products_data_sheets_list.html
	Technical documentation for Cisco Unified Service Monitor	http://www.cisco.com/en/US/products/ps6536/tsd_products_support_series_home.html
General	Cisco developer support (limited access site)	http://developer.cisco.com/web/cdc
	Cisco Unified CME configuration examples	http://www.cisco.com/en/US/products/sw/voicesw/ps4625/prod_configuration_examples_list.html
	Solution Reference Network Design guides	http://www.cisco.com/go/srnd

Table 2   Recommended External Websites References

Organization	External Website Link
IP Blue	http://www.ipblue.com/
NetIQ	http://www.netiq.com/
Stonevoice	http://www.stonevoice.com/
ISI Telemanagement Solutions	http://www.isi-info.com/
Integrated Research	http://www.prognosis.com/

Table 3   Standards and RFCs

Organization	External Website Link
ITU-T H-series standard	http://www.itu.int/rec/T-REC-H/en
RFC 1918	http://www.apps.ietf.org/rfc/rfc1918.html

Document Conventions

This guide uses the following special convention:

Table 4   Document Conventions

Convention	Description
The letter *y* used in a phone number prefix.	Represents the prefix for a telephone number. Example: 506.5yy.1234. This convention is used when phone numbers outside the range of 555-0100 to 555-0199 are required for a given example.

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. This section explains the product documentation resources that Cisco offers.

Cisco.com

You can access the most current Cisco documentation at this URL:

http://www.cisco.com/cisco/web/support/index.html

You can access the Cisco website at this URL:

http://www.cisco.com

You can access international Cisco websites at this URL:

http://www.cisco.com/web/siteassets/locator/index.html

Product Documentation DVD

The Product Documentation DVD is a library of technical product documentation on a portable medium. The DVD enables you to access installation, configuration, and command guides for Cisco hardware and software products. With the DVD, you have access to the HTML documentation and some of the PDF files found on the Cisco website at this URL:

http://www.cisco.com/en/US/products/index.html

The Product Documentation DVD is created monthly and is released in the middle of the month. DVDs are available singly or by subscription. Registered Cisco.com users can order a Product Documentation DVD (product number DOC-DOCDVD= or DOC-DOCDVD=SUB) from Cisco Marketplace at the Product Documentation Store at this URL:

http://www.cisco.com/go/marketplace/docstore

Ordering Documentation

You must be a registered Cisco.com user to access Cisco Marketplace. Registered users may order Cisco documentation at the Product Documentation Store at this URL:

http://www.cisco.com/go/marketplace/docstore

If you do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do

Documentation Feedback

You can provide feedback about Cisco technical documentation on the Cisco Technical Support & Documentation site area by entering your comments in the feedback form available in every online document.

Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you will find information about how to do the following:

- Report security vulnerabilities in Cisco products
- Obtain assistance with security incidents that involve Cisco products
- Register to receive security information from Cisco

A current list of security advisories, security notices, and security responses for Cisco products is available at this URL:

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

To see security advisories, security notices, and security responses as they are updated in real time, you can subscribe to the Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed. Information about how to subscribe to the PSIRT RSS feed is found at this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you have identified a vulnerability in a Cisco product, contact PSIRT:

- For emergencies only — security-alert@cisco.com

  An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.

- For nonemergencies — psirt@cisco.com

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

Tip We encourage you to use Pretty Good Privacy (PGP) or a compatible product (for example, GnuPG) to encrypt any sensitive information that you send to Cisco. PSIRT can work with information that has been encrypted with PGP versions 2.*x* through 9.*x*.

Never use a revoked encryption key or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

The link on this page has the current PGP key ID in use.

If you do not have or use PGP, contact PSIRT to find other means of encrypting the data before sending any sensitive material.

Product Alerts and Field Notices

Modifications to or updates about Cisco products are announced in Cisco Field Notices. You can receive product alerts and Cisco Field Notices by using the Cisco Notification Service on Cisco.com. This tool enables you to create a profile and choose those products for which you want to receive information.

To access the Cisco Notification Service, you must be a registered Cisco.com user. (To register as a Cisco.com user, go to this URL: http://tools.cisco.com/RPF/register/register.do) Registered users can access the tool at this URL: http://www.cisco.com/cisco/support/notifications.html

Obtaining Technical Assistance

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

Cisco Technical Support & Documentation Website

The Cisco Technical Support & Documentation website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day at this URL:

http://www.cisco.com/cisco/web/support/index.html

Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do

Note Use the **Cisco Product Identification Tool** to locate your product serial number before submitting a request for service online or by phone. You can access this tool from the Cisco Technical Support & Documentation website by clicking the **Tools & Resources** link, clicking the **All Tools (A-Z)** tab, and then choosing **Cisco Product Identification Tool** from the alphabetical list. This tool offers three search options: by product ID or model name; by tree view; or, for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Tip Displaying and Searching on Cisco.com

If you suspect that the browser is not refreshing a web page, force the browser to update the web page by holding down the Ctrl key while pressing F5.

To find technical information, narrow your search to look in technical documentation, not the entire Cisco.com website. On the Cisco.com home page, click the **Advanced Search** link under the Search box and then click the **Technical Support & Documentation**.radio button.

To provide feedback about the Cisco.com website or a particular technical document, click **Contacts & Feedback** at the top of any Cisco.com web page.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/cisco/web/support/index.html

For S1 or S2 service requests, or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411
Australia: 1 800 805 227
EMEA: +32 2 704 55 55
USA: 1 800 553 2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/en/US/support/tsd_contact_technical_support.html

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—An existing network is "down" or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operations are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of the network is impaired while most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The *Cisco Product Quick Reference Guide* is a handy, compact reference tool that includes brief product overviews, key features, sample part numbers, and abbreviated technical specifications for many Cisco products that are sold through channel partners. It is updated twice a year and includes the latest Cisco channel product offerings. To order and find out more about the *Cisco Product Quick Reference Guide*, go to this URL:

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

- Cisco Marketplace provides a variety of Cisco books, reference guides, documentation, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

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

- Cisco Press publishes a wide range of general networking, training, and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the magazine for Cisco networking professionals. Each quarter, *Packet* delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can subscribe to *Packet* magazine at this URL:

  http://www.cisco.com/web/about/ac123/ac114/about_cisco_packet_magazine.html

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the *Internet Protocol Journal* at this URL:

  http://www.cisco.com/web/about/ac123/ac147/about_cisco_the_internet_protocol_journal.html

- Networking products offered by Cisco Systems, as well as customer support services, can be obtained at this URL:

  http://www.cisco.com/en/US/products/index.html

- Networking Professionals Connection is an interactive website where networking professionals share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:

  https://supportforums.cisco.com/index.jspa

- "What's New in Cisco Documentation" is an online publication that provides information about the latest documentation releases for Cisco products. Updated monthly, this online publication is organized by product category to direct you quickly to the documentation for your products. You can view the latest release of "What's New in Cisco Documentation" at this URL:

  http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

- World-class networking training is available from Cisco. You can view current offerings at this URL:

  http://www.cisco.com/web/learning/index.html