

Implementing Cisco Collaboration Applications (CAPPS)

Foundation Learning Guide

(CCNP Collaboration Exam 300-085 CAPPS)



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Chris Olsen

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Implementing Cisco Collaboration Applications (CAPPS) Foundation Learning Guide

Chris Olsen

Cisco Press

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Chris Olsen

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Dedications

This book is dedicated to my wonderful wife, Antonia, whose constant love and tireless commitment to making my life better gave me the time to write this book. I am forever grateful.

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Introduction

Cisco Unity Connection, Cisco Unity Express, Cisco Instant Message and Presence, Cisco TelePresence Video Communication Server, and the Cisco TelePresence Management Suite provide valuable technologies to a Cisco Unified Communications design. This book was designed with the focus on utilizing these technologies in a production environment as effectively as possible. Industry leaders were consulted for technical accuracy throughout this book.

Who Should Read This Book?

This book is designed for those Unified Communications engineers and technologists who want to implement Cisco Unity Connection, Cisco Unity Express, Cisco Instant Message and Presence, Cisco TelePresence Video Communication Server, and the Cisco TelePresence Management Suite in a Unified Communication design.

How This Book Is Organized

Chapter 1, “Designing and Deploying Cisco Unity Connection”: The book starts by providing an overview of the technical requirements and functionality of Cisco Unity Connection. The required essentials of VMware storage and networking are discussed to ensure a successful Unity Connection installation.

Chapter 2, “Integrating Cisco Unity Connection with Cisco Unified Communications Manager”: The product Cisco Unity Connection cannot function on its own. This chapter provides the details of an integration with Cisco Unified Communications Manager or other private branch exchange products. The requirements for Unity Licensing in the Prime License Manager tool are outlined.

Chapter 3, “Configuring Cisco Unity Connection User, Templates, and Class of Service”: Once Unity Connection is installed, users and user settings must be configured to enable voice mail. This chapter describes the creation of users with class of service settings to provision the best services for each user within the organizational design.

Chapter 4, “Configuring the Cisco Unity Connection System”: This chapter gives the foundation of common configurations of Cisco Unity Connection such as distribution lists, security settings, and Lightweight Directory Access Protocol.

Chapter 5, “Implementing Cisco Unity Connection Dial Plan and Call Management”: This chapter explains the Cisco Unity Connection dial plan components of partitions and search spaces. Partitions, group objects, and search spaces comprise the search rights for objects in the included partitions. Call handlers are used to build auto-attendant functionality with Cisco Unity Connection.

Chapter 6, “Configuring Unified Messaging”: This chapter explains the single inbox feature of unified messaging. Single inbox allows users to receive their voice messages in the company mail inbox with the proper message waiting indicator synchronization when users are reading the e-mail on a PC or listening to the messages on the phone.

Chapter 7, “Troubleshooting Cisco Unity Connection”: This chapter explains how to resolve common issues with Cisco Unity Connection integrations and operations. In addition, the chapter presents the Cisco Unified Real Time Monitoring Tool to monitor Cisco Unity Connection and explains micro and macro traces for Cisco Unity Connection.

Chapter 8, “Deploying Voice-Mail Redundancy in Branch Offices”: This chapter describes the deployment of Cisco Unity Connection Survivable Remote Site Voicemail and its features and limitations. This chapter also describes the configuration process of the branch and the headquarters, or central, sites.

Chapter 9, “Designing and Deploying Cisco Unity Express”: Cisco Unity Express provides a feature-rich messaging solution that is ideal for the requirements of branch locations or small to medium-sized businesses. This chapter describes the features and characteristics of Cisco Unity Express.

Chapter 10, “Integrating Cisco Unity Express with Cisco Unified Communications Manager Express”: This chapter describes how to integrate Cisco Unity Express with Cisco Unified Communications Manager Express using Session Initiation Protocol. Sections that are covered include the setup of the Cisco Unity Express service module and the IP routing for Cisco Unity Express access. The various message waiting indicators and dual-tone multifrequency options are also discussed.

Chapter 11, “Configuring Cisco Unity Express User Accounts and Features”: This chapter describes the Cisco Unity Express system settings. The configuration of mailboxes and distribution lists is also covered. Cisco Unity Express time-based schedules and other features such as integrated messaging are also discussed.

Chapter 12, “Configuring Call Routing with Cisco Unity Express Auto-Attendant”: This chapter describes the Cisco Unity Express auto-attendant applications and options. Many businesses require an automated system for processing inbound calls. For example, when customers call the business number, they hear a welcome message and are prompted to press telephone buttons for different services. This type of service is referred to as an automatic attendant or auto-attendant.

Chapter 13, “Troubleshooting Cisco Unity Express”: This chapter describes how to troubleshoot issues within a Cisco Unity Express voice-mail solution using Cisco Unified Communications Manager Express as the call-processing system.

Chapter 14, “Designing and Deploying Cisco Unified IM and Presence”: This chapter describes the Cisco Unified Communications IM and Presence architecture and design. Native presence in Cisco Unified Communications Manager is presented, and the different Cisco Unified Communications IM and Presence approaches are described. Cisco Unified Communications IM and Presence can be configured to peer with another Cisco Unified Communications IM and Presence cluster in the same domain or can be federated with Cisco Unified Communications IM and Presence clusters in a different domain.

Chapter 15, “Describing Cisco Unified Communications IM and Presence Components and Communications Flows”: This chapter describes the Cisco Unified Communications IM and Presence architecture, protocols, interfaces, and call flows.

Chapter 16, “Integrating Cisco Unified Communications IM and Presence”: This chapter describes the integration of Cisco Unified Communications Manager and Cisco Unified Communications IM and Presence. First, Cisco Unified Communications Manager is prepared for integration with Cisco Unified Communications IM and Presence. Cisco Unified Communications IM and Presence is then set up to connect with Cisco Unified Communications Manager and system settings are modified. Network services are then established so that Cisco Jabber can discover its domain and services. Finally, the chapter discusses the Cisco Jabber installation options.

Chapter 17, “Configuring Cisco Unified Communications IM and Presence Features and Implementing Cisco Jabber”: This chapter describes how Cisco Jabber can be used in phone-only mode as compared to Cisco Jabber in softphone mode. The chapter explains the profiles that must be used (for example, the profiles for voice messaging) and how deskphone mode is implemented to control desk phones.

Chapter 18, “Configuring Cisco Jabber Mobile and Integrating Directory Servers”: This chapter describes how to configure and deploy Cisco Jabber Mobile and how the client accesses the directory for contact search and number resolution.

Chapter 19, “Verifying and Troubleshooting Tools for Cisco Unified IM and Presence Components”: This chapter covers the Cisco Unified Communications IM and Presence system troubleshooter and the Cisco Jabber Connection Status tool, which help the administrator resolve presence issues quickly. Some common issues for Cisco Jabber are presented and resolved. Finally, tracing is introduced.

Chapter 20, “Deploying Cisco Collaboration Systems Applications with Cisco Prime Collaboration”: This chapter introduces the Cisco Prime Collaboration modules and focuses on provisioning. Day 1 and Day 2 activities are described. The use of the design and deployment options in Cisco Prime Collaboration are discussed, and the Cisco Prime Collaboration telephone self-care portal is covered.

Chapter 21, “Describing Video Infrastructure”: This chapter describes the layers of the collaboration infrastructure for video integrated solutions and explains the differences between Cisco Unified Communications Manager and Cisco TelePresence Virtual Communications Server as the call-processing system. Cisco Jabber Video for TelePresence is described as a client that can be automatically provisioned and register to the Cisco TelePresence Virtual Communications Server only.

Chapter 22, “Describing Cisco TMS”: This chapter provides a detailed description of the Cisco TelePresence Management Suite (Cisco TMS) capabilities and scheduling options. Exchange extension and web scheduling are also explained in detail.

Designing and Deploying Cisco Unified IM and Presence

Upon completing this chapter, you will be able to do the following:

- Describe native presence in Cisco Unified Communications Manager without Cisco Unified Communications IM and Presence (IM&P) servers
- Describe how the subscribe CSS controls presence watchers
- Describe how presence groups add more granularity to the presence functionality
- Describe the requirements when using Cisco Jabber for presence functionality
- Describe how to integrate a Cisco presence solution within a Microsoft environment in an enterprise
- Describe the characteristics of the Cisco Unified Communications IM&P OVA templates and the required physical resources
- Describe the Cisco Unified Communications IM&P cluster architecture
- Describe how to deploy Cisco Unified Communications IM&P in different scenarios
- Describe how Cisco Jabber discovers services to register
- Describe the Cisco Jabber quality of service issues with trust boundaries
- Describe the different ports that Cisco Jabber uses to communicate
- Describe how to connect Cisco Unified Communications IM&P clusters within the same domain
- Describe how to connect Cisco Unified Communications IM&P clusters that are in different domains
- Describe SIP federations with Microsoft domains

- Describe the state mappings between Cisco Unified Communications IM&P and Microsoft Skype for Business
- Describe the preparation that is necessary to implement a federated presence network

This chapter describes the Cisco Unified Communications IM and Presence (IM&P) architecture and design. Native presence in Cisco Unified Communications Manager (CUCM) is presented and the different Cisco Unified Communications IM&P approaches are described. Cisco Unified Communications IM&P can be configured to peer with another Cisco Unified Communications IM&P cluster in the same domain or can be federated with Cisco Unified Communications IM&P clusters in a different domain.

Note The previous name of IM&P was Cisco Unified Presence Server (CUPS) in prior versions of Cisco UC.

CUCM Presence Introduction

This section describes native presence in CUCM without Cisco Unified Communications IM&P servers, as shown in Figure 14-1.

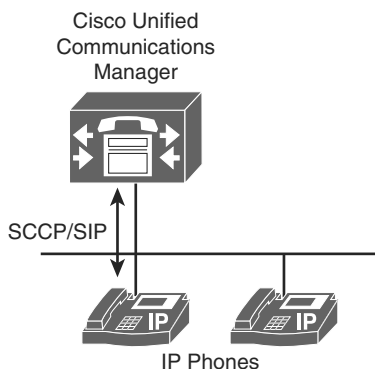


Figure 14-1 CUCM Presence

CUCM offers very limited native presence functionality on IP phones. Although a Cisco Unified Communications IM&P server is not required in this simple example, only these native presence features of the CUCM are available:

- **CUCM speed-dial presence:** CUCM administratively supports the ability for a speed dial to have presence capabilities via a BLF speed dial. BLF speed dials work as both a speed dial and a presence indicator.
- **CUCM call history presence:** CUCM administratively supports presence capabilities for call lists and directories on the phone.
- **CUCM presence policy:** CUCM provides the capability to set policy for users who request presence status.

CUCM Presence

This section describes the integration of external presence entities into the native presence solution.

All presence requests for users, whether inside or outside a cluster, are processed by CUCM, as shown in Figure 14-2.

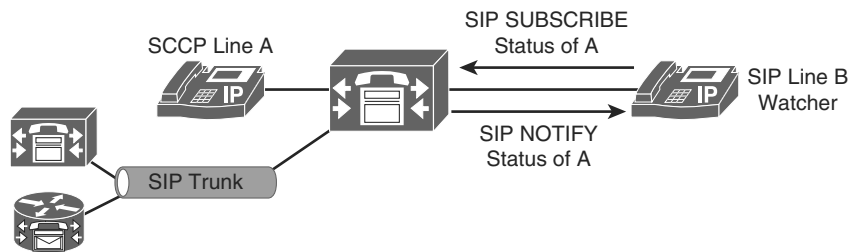


Figure 14-2 CUCM Native Presence

A CUCM watcher that sends a presence request will receive a direct response, including the presence status, if the watcher and presence entity are both located within the cluster.

If the presence entity exists outside the cluster, CUCM will query the external presence entity through the Session Initiation Protocol (SIP) trunk. For a watcher that is not in a CUCM cluster, the CUCM can send a presence request off cluster entity by way of a SIP trunk. If the off-cluster entity supports presence, it will respond with the current presence status. If the off-cluster entity does not support presence, it will reject the presence request with a SIP error response.

Skinny Client Control Protocol (SCCP) endpoints can request the presence status of the indicated presence entity by sending SCCP messages to CUCM. If the presence entity resides within the CUCM cluster, CUCM responds to the SCCP line-side presence request by sending SCCP messages to the presence watcher that indicate the status of the presence entity.







CUCM uses the term *SIP line* to represent endpoints supporting SIP that are directly connected and registered to CUCM, and the term *SIP trunk* to represent trunks supporting SIP. SIP line-side endpoints acting as presence watchers can send a SIP SUBSCRIBE message to CUCM requesting the presence status of the indicated presence entity.

If the presence entity resides outside the CUCM cluster, CUCM routes a SUBSCRIBE request out on the appropriate SIP trunk, based on the SUBSCRIBE CSS and presence groups. When CUCM receives a SIP NOTIFY response on the trunk that indicates the presence entity status, it responds to the SCCP line-side presence request by sending SCCP messages to the presence watcher indicating the status of the presence entity.

Indicators for Speed-Dial Presence

Table 14-1 describes the native presence indicators on IP phones.

Table 14-1 *Cisco Unified Communications Speed-Dial Presence*

State	Icon	LED
Idle		
Busy		
Unknown		

CUCM supports the ability for a speed dial to have presence capabilities via a Busy Lamp Field (BLF) speed dial. BLF speed dials work as both a speed dial and a presence indicator. Only the system administrator can configure a BLF speed dial. A system user is not allowed to configure or modify a BLF speed dial.

The administrator must configure the BLF speed dial with a target directory number that is resolvable to a directory number within the CUCM cluster or an entity accessed by a route pattern at accessed by a SIP trunk destination. The BLF speed-dial indicator is a line-level indicator and not a device-level indicator.

The BLF speed-dial indicators show the real-time state of the monitored phone:

- **Idle:** The user phone is on hook and the user is available.
- **Busy:** The user phone is off hook and the user is not available.
- **Unknown:** The real-time state cannot be determined. The phone might be disconnected, the users are not in the same presence group, or the users are not allowed to see the presence status.

CUCM Call Presence

Call list presence capabilities are controlled via the BLF for the Call Lists enterprise parameter within CUCM Administration. The BLF for the Call Lists enterprise parameter impacts all pages that use the phone Directories button and it is set on a global basis, as shown in Figure 14-3.



Figure 14-3 CUCM Presence Call History on an IP Phone

CUCM Subscribe CSS

Figure 14-4 describes how the subscribe CSS controls presence watchers.

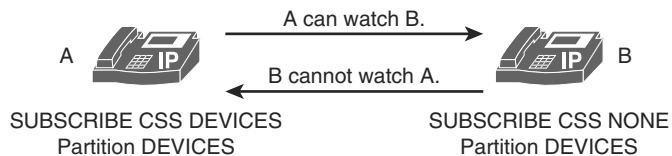


Figure 14-4 CUCM Subscribe CSS

CUCM provides the capability to set policy for users who request presence status:

- Configure a CSS to route SIP SUBSCRIBE messages for presence status.
- Configure presence groups with which watchers can be associated, that specify rules for viewing the presence status of presence entities that are associated with another group.

The first aspect of presence policies for CUCM is the subscribe CSS. CUCM uses the subscribe CSS to determine how to route presence requests. Presence requests are SUBSCRIBE messages with the Event field set to Presence. These messages are sent from the watcher, which can be a phone or a trunk. The subscribe CSS is associated with the watcher and lists the partitions that the watcher is allowed to see. This mechanism provides an additional level of granularity for the presence SUBSCRIBE requests to be routed independently from the normal call-processing CSS.

With the subscribe CSS set to <None>, BLF speed dial and call list presence status does not work (if no directory number or route pattern is associated with the <None> partition) and the subscription message is rejected as “user unknown.” When a valid subscribe CSS is specified, the indicators work and the SUBSCRIBE messages are accepted and routed properly.

CUCM Presence Groups

Figure 14-5 illustrates how presence groups add more granularity to the presence functionality.

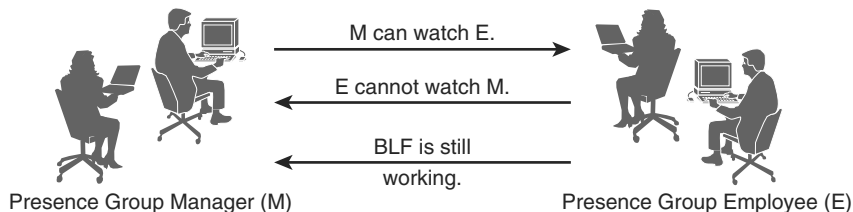


Figure 14-5 CUCM Presence Groups

Devices, directory numbers, and users can be assigned to a presence group, and by default, all users are assigned to the same standard presence group. By default, if the subscribe calling search space (CSS) permits, all watchers can watch all other entities.

A presence group controls the destinations that a watcher can monitor, based on the association of a user with a defined presence group; for example, employees watching managers is disallowed, but managers watching employees is allowed.

When multiple presence groups are defined, as shown in the picture, the Inter-Presence Group Subscribe Policy service parameter is applied. If one group has a relationship to another group via the Use System Default setting, rather than being allowed or disallowed, the value of this service parameter will take effect. If the Inter-Presence Group Subscribe Policy service parameter is set to Disallowed, CUCM will block the request even if the subscribe CSS allows it.

Note The Inter-Presence Group Subscribe Policy service parameter applies only for presence status with call lists and is not used for BLF speed dials.

Observe the following guidelines when configuring presence within CUCM:

- Define a presence policy for presence users.
- Use subscribe CSSs to control the routing of a watcher presence-based SIP SUBSCRIBE message to the correct destinations.
- Use presence groups to define sets of similar users and to define whether presence status updates of other user groups are allowed or disallowed.
- Call list presence capabilities are enabled on a global basis. The user status can be secured by using a presence policy.
- BLF speed dials are administratively controlled and are not impacted by the presence policy configuration.

Cisco Unified Communications IM&P Introduction

Figure 14-6 illustrates the components when using Cisco Jabber for presence functionality.

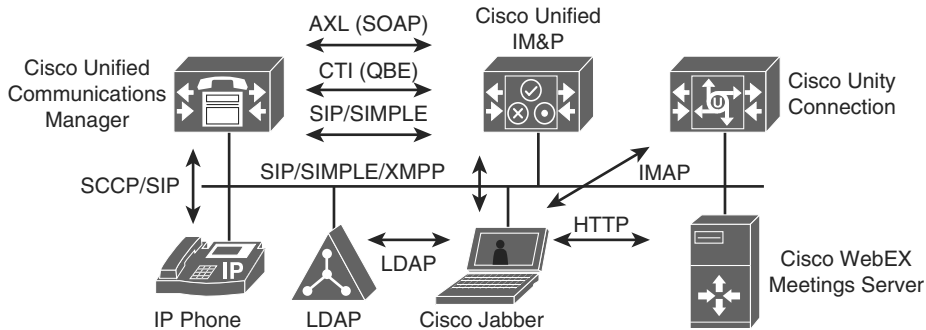


Figure 14-6 CUCM IM&P

Integrating Cisco WebEx Meetings Server, Cisco Unity Connection, and other applications into the presence network offers a feature-rich communications environment with the Cisco Jabber client application as the single interface for voice and video calls, voice-mail playback, web conferencing, and integrated directories.

The following are available features in this deployment:

- **Real-time availability:** This feature provides real-time availability of other Cisco Jabber users.
- **Contact list:** This feature allows users to search the corporate directory from one easy-to-use interface to locate contacts quickly. Simply click to call.
- **Media escalation:** This feature provides the ability to add communication methods during a session; for example, add video to an existing audio session, or add web conferencing to an existing audio or video session.
- **Click-to-call:** This feature provides the ability to dial from the contact list by using the integrated softphone or an associated IP phone.
- **Integrated voice and video calling:** This feature provides the ability to exchange ideas face to face with a coordinated video display on the PC screen and audio conversation with the softphone. Users can place video calls to other users.
- **IP phone association:** This feature allows users to use Cisco Jabber to control an IP phone and make or receive calls.
- **Conferencing:** This feature allows users to create multiparty voice or video conferencing sessions by simply merging conversation sessions by using the Cisco Jabber intuitive interface.

- **Web conferencing:** This feature allows users to launch a web conferencing session immediately to share content, such as a presentation, with others.
- **Voice messages:** This feature allows users to access Cisco Unity Connection voice-mail messages—view, play back, sort, and delete messages—all from the same client application.

Microsoft Integration

Figure 14-7 illustrates how to integrate a Cisco presence solution within a Microsoft environment in an enterprise.

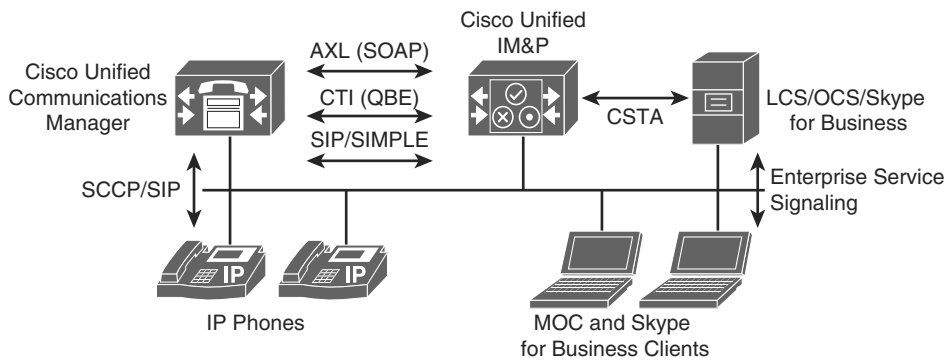


Figure 14-7 Cisco to Microsoft Integration

Cisco Unified Communications IM&P implements a Computer-Supported Telephony Application to Computer Telephony Integration (CSTA-to-CTI) bridge to integrate with Microsoft Office Communications Server (OCS) and Skype for Business interfaces. Cisco Unified Communications IM&P includes the following CTI gateway functionalities:

- CSTA over SIP interface to Microsoft Skype for Business and OCS server is available.
- A CTI interface to CUCM is available.
- A linkage of the older Microsoft Office Communicator (MOC) and the current Microsoft Skype for Business client and CUCM endpoints for a specific user is realized, which supports monitoring of CUCM endpoint activity via Microsoft clients. Support for call establishment and call modification for CUCM endpoints via Microsoft clients is also included.
- The functionality provides click to dial, phone hook status reporting, and general phone control directly from the Microsoft client.

OVA Template for Cisco Unified Communications IM&P

Table 14-2 presents the available VM overlays for Cisco Unified Communications IM&P installations.

Table 14-2 *OVA Template for Cisco Unified Communications IM&P*

User Capacity	vCPUs	Memory (GB)	vDisk	vNIC
500	1	2	1 x 80 GB	1
1000	1	2	1 x 80 GB	1
2000	1	4	1 x 80 GB	1
5000	2	4	2 x 80 GB	1
15,000	4	8	2 x 80 GB	1

The 500-user OVA template is the minimum VM configuration for use with the Cisco Hosted Collaboration Solution. The 1000-user OVA template is only supported for Cisco Business Edition 6000.

Another important factor is the number of presence or IM users. When using only IM, without presence, higher user counts are supported per server and cluster:

- 500 full UC users, 1000 IM-only users, 6 single nodes, or subclusters
- 1000 full UC users, 2000 IM-only users
- 2000 full UC users per node, 2000 IM-only users, 3 single nodes, or subclusters
- 5000 full UC users, 12,500 IM-only users, 6 single nodes, or subclusters
- 15,000 full UC users, 25,000 IM-only users, 6 single nodes, or subclusters

Note These templates may be adjusted and optimized with new releases of Cisco Unified Communications applications or VMware vSphere ESXi and can be found at http://docwiki.cisco.com/wiki/Virtualization_for_Unified_CM_IM_and_Presence.

IM&P Service maximum capacities per cluster are as follows:

- **Cisco Unified Communications mode:** In this mode, IM&P service integrates into a full Cisco Collaboration Systems environment to provide an enterprise-class IM&P solution in conjunction with the full suite of Cisco Collaboration Systems services, including voice and video. In this mode, IM&P service supports Cisco Collaboration Systems clients, such as the Cisco Jabber platform, and Cisco Jabber SDK, as well

as third-party Extensible Messaging and Presence Protocol (XMPP) standard-based clients. When operating in Cisco Unified Communications mode, IM&P Service scales up to a maximum of 45,000 users in a multinode CUCM cluster environment.

- **IM-only user mode:** IM&P Service provides an enterprise-class IM&P solution for enterprise users who are not using CUCM for call control. In IM-only user mode, IM&P Service supports Cisco Collaboration Systems clients such as the Cisco Jabber client, and Cisco Jabber SDK for all enterprise-class IM&P services. IM&P Service also supports the ability for third-party XMPP standard-based clients to interface with CUCM for IM&P services. When operating in Cisco IM-only user mode, IM&P Service scales up to a maximum of 75,000 users in a multinode cluster environment. Users deployed as part of the Jabber for Everyone offer without voice and video services operate in IM-only user mode.
- **Microsoft Skype for Business interoperability mode (or Microsoft Remote Call Control):** In this mode, IM&P Service allows Microsoft Skype for Business users on a PC to interoperate with Cisco Unified IP phones on CUCM by providing click-to-dial and associated phone monitoring capabilities. Interoperability is made available by activating Microsoft Skype for Business interoperability mode in IM&P Service and configuring Microsoft Skype for Business users. When operating in this mode, IM&P Service scales up to 40,000 Microsoft Office Communicator users per CUCM cluster.

Cisco Unified Communications IM&P Cluster

Figure 14-8 illustrates the Cisco Unified Communications IM&P cluster architecture maximum option of up to six servers per cluster.

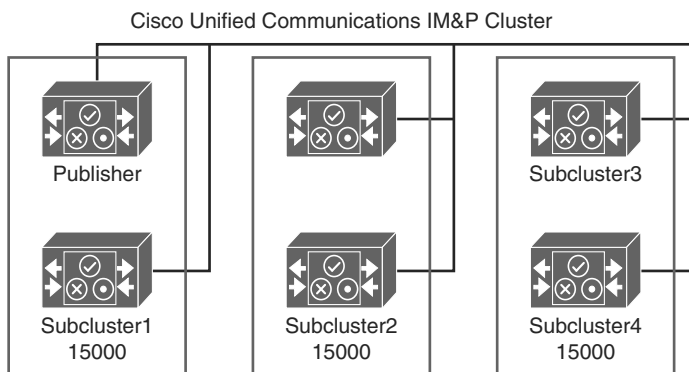


Figure 14-8 Cisco Unified IM&P Cluster

A cluster can be formed to scale Cisco Unified Communications IM&P to support up to 45,000 licensed presence users. The Cisco Unified Communications IM&P server uses the same virtualization approach that is used by CUCM or Cisco Unity Connection.

Cisco Unified Communications IM&P consists of up to six servers, including one server that is designated as a publisher. Cisco Unified Communications IM&P utilizes the same architectural concepts as the CUCM publisher and subscriber. Within a Cisco Unified Communications IM&P cluster, individual servers can be grouped to form a subcluster, and the subcluster can have at most two servers that are associated with it.

The figure shows the topology for a Cisco Unified Communications IM&P cluster. The Cisco Unified Communications IM&P cluster can also have mixed subclusters, where one subcluster is configured with two servers while other subclusters contain a single server. The Cisco Unified Communications IM&P servers form their own cluster even if they are integrated as subscribers in the CUCM cluster.

CUCM Deployment Options

This section describes how to deploy Cisco Unified Communications IM&P in different scenarios. Figure 14-9 illustrates CUCM and IM&P in different locations.

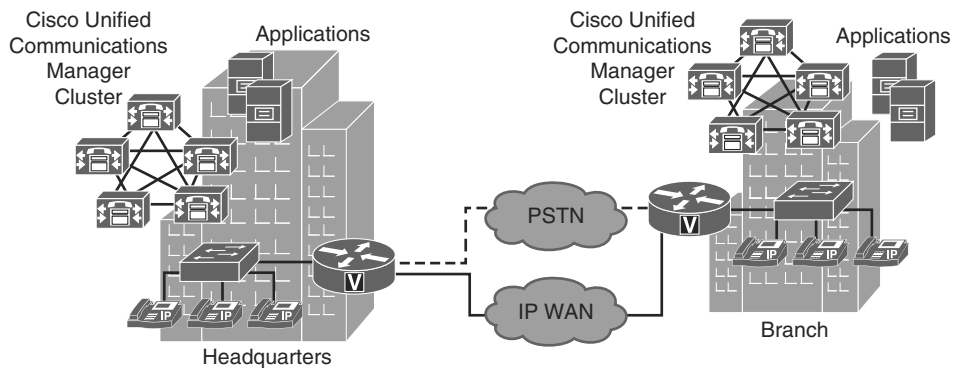


Figure 14-9 *Cisco Unified IM&P Cluster*

Cisco IM&P is supported with all CUCM deployment models. However, Cisco recommends locating the Cisco IM&P publisher in the same physical datacenter as the CUCM publisher due to the initial user database synchronization. All on-premises Cisco IM&P servers should be physically located in the same datacenter within the Cisco IM&P cluster, with the exception of geographic datacenter redundancy and clustering over the WAN.

A CUCM cluster can only connect to a single Cisco Unified Communications IM&P cluster. When you have a distributed CUCM deployment with two or more CUCM clusters, you also need two or more Cisco Unified Communications IM&P clusters per site. These Cisco Unified Communications IM&P servers can be connected using intercluster peers, when the clusters are in the same domain. If the Cisco Unified Communications IM&P clusters use different domains, a federation must be set up.

Service Discovery

When the Cisco Jabber client is opened the first time after a standard installation, you are asked to enter your e-mail address, as shown on the left of Figure 14-10.

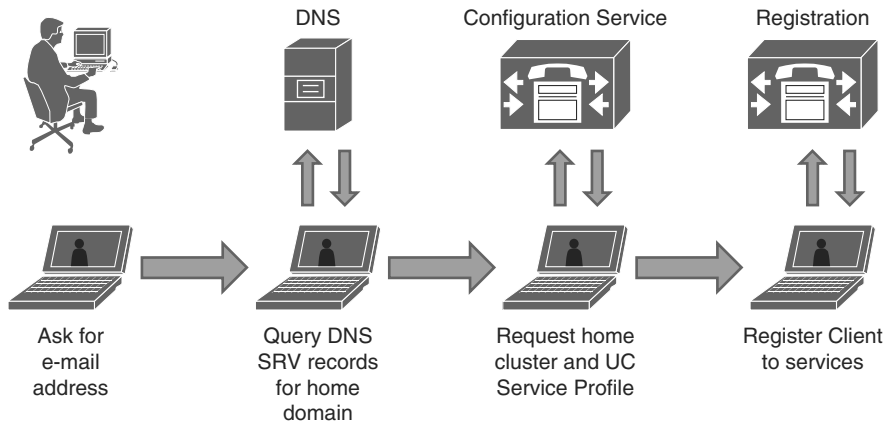


Figure 14-10 *Cisco Unified IM&P Service Discovery*

Based on the domain in your e-mail address, Cisco Jabber asks the DNS server for server records for `_cisco-uds._tcp.example.com`, as shown in the figure. The answer includes the IP address of a CUCM cluster server. Cisco Jabber contacts the CUCM server and requests the home cluster and service profile information that is required to reach the other application servers. Additional information is received via the `jabber-config.xml` file from the TFTP server in the CUCM cluster.

Quality of Service

This section describes the Cisco Jabber quality of service issues with trust boundaries.

The Cisco Jabber client marks call-signaling traffic with a differentiated services code point (DSCP) value of 24, or a PHB value of CS3, and it marks RTP media traffic with a DSCP value of 46 (PHB value of EF). Video traffic will be marked with a per-hop behavior (PHB) value of AF41 (DSCP value of 34), as illustrated in Table 14-3.

Table 14-3 *Quality of Service DSCP Markings*

Application	IP-Precedence	PHB	DSCP	CoS
Voice	5	EF	46	5
Video	4	AF41	34	4
Call signaling	3	CS3	24	3

Typically, networks are configured to strip DSCP markings from computer traffic. Therefore, if the administrator wants Cisco Jabber traffic to be marked, the administrator must configure switches and routers to preserve DSCP markings for packets originating from the Jabber client application.

Cisco Jabber Port Usage

Table 14-4 describes the different ports that Cisco Jabber uses to communicate.

Table 14-4 *Cisco Jabber Port Usage*

Port	Protocol	Description
53	UDP/TCP	DNS traffic
69/6790	UDP	TFTP/HTTP config download
80/443	TCP	HTTP/HTTPS to Cisco Unity Connection or WebEx
143	TCP	IMAP (TLS or plain TCP) to Cisco Unity Connection
389/636	TCP	LDAP/LDAPS
993	TCP	IMAP (over SSL) to retrieve and manage voice messages
2748	TCP	CTI gateway
3268/3269	TCP	Global Catalog/LDAPs
5060	UDP/TCP	SIP call signaling
5061	TCP	Secure SIP call signaling
5070	UDP	Binary Floor Control Protocol (BFCP) for video desktop sharing
5222	TCP	XMPP
7993	TCP	IMAP (over TLS) access to secure voice messages
8191	TCP	SOAP web services
8443	TCP	HTTPS for CCMCIP profiles and UDS
16384-32766	UDP	RTP media streams for audio and video

As shown in the table, Cisco Jabber uses a number of protocols for communication. In addition, these protocols may be used and are listed here for your reference:

- **Port 7080:** Protocol TCP (HTTPS); used for Cisco Unity Connection for notifications of voice messages (new message, message update, and message deletion)
- **Port 37200:** Protocol SOCKS5 Bytestreams; used for peer-to-peer file transfers. In on-premises deployments, the client also uses this port to send screen captures.

Enterprise Instant Messaging

This section describes enterprise instant messaging (EIM).

Cisco Unified Communications IM&P incorporates the supported EIM features of the Cisco Jabber Extensible Communications Platform (XCP), while allowing for modifications to enhance support for the multidevice user experience. Text conferencing, sometimes referred to as multiuser chat, is defined as ad hoc group chat. Persistent group chat is supported as part of the Jabber XCP feature set. In addition, offline IM (storing instant messages for users who are currently offline) is also supported as part of the Jabber XCP feature set. Cisco Unified Communications IM&P manages storage for each of these IM features in different locations, as shown in Table 14-5.

Table 14-5 *Cisco EIM Features*

Feature	Stored in
Offline instant messaging	Cisco Unified Communications IM&P IDS database
Ad hoc group chat	Cisco Unified Communications IM&P memory
Persistent chat	External database to store rooms and conversations

Note The supported external databases are PostgreSQL (see <http://www.postgresql.org/>) and Oracle (see <http://www.oracle.com>).

If persistent chat is enabled, ad hoc rooms are stored on the external PostgreSQL database for the duration of the ad hoc chat. This procedure allows a room owner to escalate an ad hoc chat to a persistent chat; otherwise, these ad hoc chats are purged from PostgreSQL at the end of the chat. If persistent chat is disabled, ad hoc chats are stored in volatile memory for the duration of the chat.

Multicluster Deployment

Figure 14-11 illustrates how to connect Cisco Unified Communications IM&P clusters within the same domain.

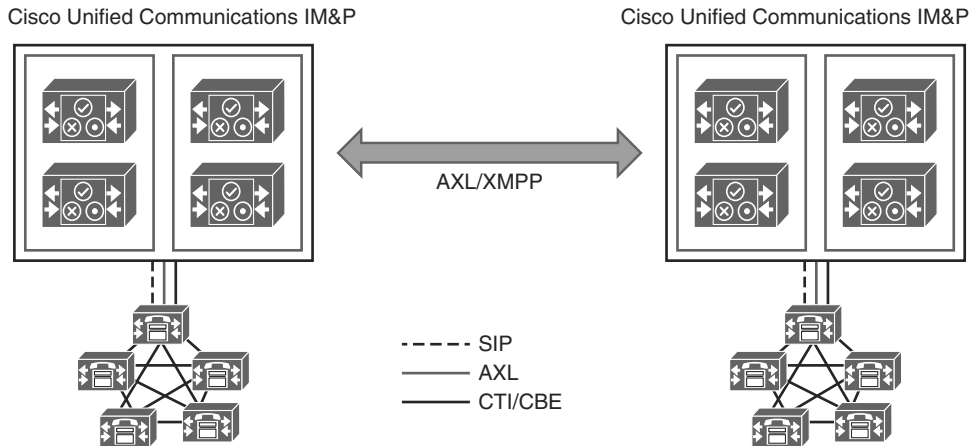


Figure 14-11 *Cisco Unified IM&P Cluster*

To extend presence and IM capability and functionality, these standalone clusters can be configured for peer relationships, thus enabling communication between clusters within the same domain. The figure represents the peer relationship between Cisco Unified Communications IM&P clusters when multiple clusters or sites are interconnected. This functionality provides the ability for users in one cluster to communicate and subscribe to the presence of users in a different cluster within the same domain.

To create a fully meshed presence topology, each Cisco Unified Communications IM&P cluster requires a separate peer relationship with each of the other Cisco Unified Communications IM&P clusters within the same domain. The address that is configured in this intercluster peer could be a DNS server FQDN that resolves to the remote Cisco Unified Communications IM&P cluster servers. The address could also simply be the IP address of the Cisco Unified Communications IM&P cluster servers.

The interface between Cisco Unified Communications IM&P clusters is twofold, an Administrative XML - Simple Object Access Protocol (AXL-SOAP) interface, and (SIP or XMPP). The AXL-SOAP interface manages the synchronization of user information for home cluster association, but it is not a complete user synchronization. The signaling protocol interface (SIP or XMPP) manages the subscription and notification traffic, and it rewrites the host portion of the URI before forwarding if the user is on a remote Cisco Unified Communications IM&P cluster within the same domain.

Federated Deployment

This section describes how to connect Cisco Unified Communications IM&P clusters that are in different domains.

Interdomain federation parameters:

- Two different DNS domains
- Cisco Adaptive Security Appliance (ASA) appliance in demilitarized zone (DMZ)

Cisco Unified Communications IM&P allows for business-to-business communications by enabling interdomain federation, which provides the ability to share presence and IM communications between different domains.

Federation is a term that describes data servers in different domains that can securely connect to one another, as shown in Figure 14-12.

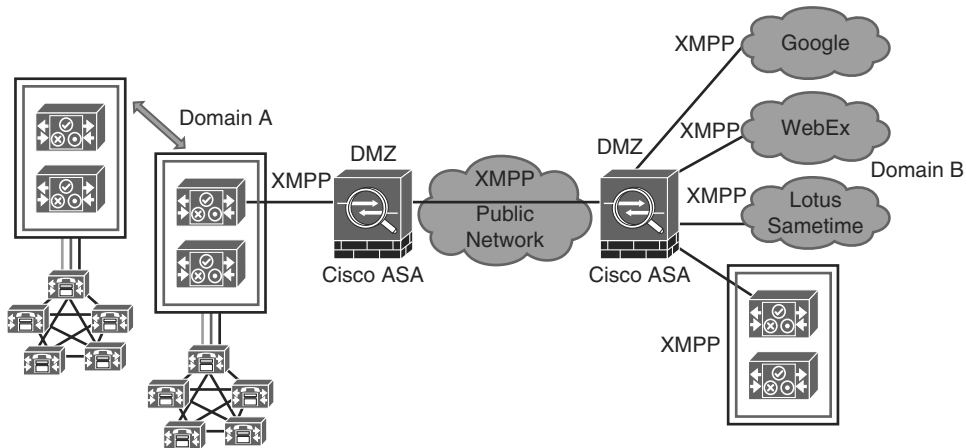


Figure 14-12 Cisco Unified IM&P Federation Deployment

Interdomain federation requires that two explicit DNS domains are configured, as well as a security appliance (Cisco ASA) in the DMZ to terminate federated connections with the enterprise.

Figure 14-12 shows a basic interdomain federation deployment between two different domains, indicated by Domain A and Domain B. The Cisco Adaptive Security Appliance in the DMZ is used as a point of demarcation into the enterprise. XMPP traffic is passed through, whereas SIP traffic is inspected. All federated incoming and outgoing traffic is routed through the Cisco Unified Communications IM&P server that is enabled as a federation node, and is routed internally to the appropriate server in the cluster where the user resides. For multicluster deployments, intercluster peers propagate the traffic to the appropriate home cluster within the domain. Multiple nodes can be enabled as federation nodes within large enterprise deployments, where each request is routed based on a round-robin implementation of the data that is returned from the DNS server lookup.

Microsoft Skype for Business Federation

Figure 14-13 illustrates Cisco SIP federations with one or more Microsoft domains.

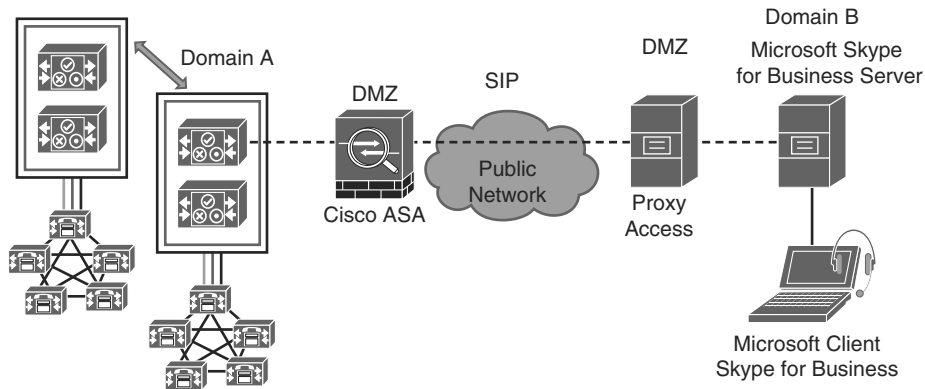


Figure 14-13 Cisco and Microsoft Skype for Business Federation

Cisco Unified Communications IM&P provides interdomain federation with Microsoft Skype for Business and the older Microsoft OCS, Microsoft Live Communications Server (LCS) to provide basic presence (available, away, busy, offline), and point-to-point IM.

Cisco Unified Communications IM&P must publish a DNS server record (SIP, XMPP, and each text conferencing node) for the domain to allow other domains to discover the Cisco Unified Communications IM&P servers through the DNS server records. With a Microsoft deployment, this procedure is required because Cisco Unified Communications IM&P is configured as a public IM provider on the access edge server. If the Cisco Unified Communications IM&P server cannot discover the Microsoft domain using DNS server records, the administrator must configure a static route on Cisco Unified Communications IM&P for the external domain.

The Cisco Unified Communications IM&P federation deployment can be configured with redundancy using a load balancer between the Cisco Adaptive Security Appliance and the Cisco Unified Communications IM&P server. Redundancy can also be achieved with a redundant Cisco Adaptive Security Appliance configuration.

In an intercluster and a multinode cluster Cisco Unified Communications IM&P deployment, when a foreign Microsoft domain initiates a new session, the Cisco Adaptive Security Appliance routes all messages to a Cisco Unified Communications IM&P server that is designated for routing purposes. If the Cisco Unified Communications IM&P routing server does not host the recipient user, it routes the message via intercluster communication to the appropriate Cisco Unified Communications IM&P server within the cluster. The system routes all responses that are associated with this request through the routing Cisco Unified Communications IM&P server.

Mapping of Presence Status

As Cisco's and Microsoft's products are developed separately by the different companies, in a federation between Cisco and Microsoft presence, not all presence fields have the same meaning. Table 14-6 shows a comparison between Cisco and Microsoft presence.

Table 14-6 *Cisco to Microsoft Mapping of Presence Status*

Cisco Status	Cisco Color	Status to Microsoft Skype for Business
Out of office	Red	Away
Do not disturb	Red	Busy
Busy	Red	Busy
On the phone	Yellow	Busy
In a meeting	Yellow	Busy
Idle on all clients	Yellow	Away
Available	Green	Available
Unavailable/offline	Gray	Offline

Rich presence capability (on the phone, in a meeting, on vacation, and so on), as well as advanced IM features, are not supported in an interdomain federation.

Federation Preparation

Additional preparation is required before implementing a federated deployment including routing, allocating public IP addresses, providing DNS records, and certificates. The following list gives you a quick overview of the tasks you must consider when building a federation on Cisco Unified Communications IM&P. Depending on the company, many departments may be involved when deploying presence federations.

- Routing configuration
 - Cisco Unified Communications IM&P to Cisco ASA appliance to foreign domain
 - Access lists and firewalls
- Public IP address
 - Outside interface of the Cisco ASA appliance
 - Use Network Address Translation (NAT) or Port Address Translation (PAT)
- DNS configuration
 - Cisco Unified Communications IM&P must publish a DNS server record
 - Publish the DNS server record `_xmpp-server`
- Certificate authority server
 - When using TLS, upload root certificate to Cisco Unified Communications IM&P server.

Summary

This section summarizes the key points that were discussed in this chapter:

- CUCM supports native presence for BLF or call history. Cisco Unified Communications IM&P is required for Cisco Jabber and presence functionality.
- Cisco Unified Communications IM&P can be federated with other domains via XMPP (for example, with Google Talk or via SIP with Microsoft Skype for Business).
- Persistent chat, message archiving, and compliance require external databases (for example, PostgreSQL).
- When designing Cisco Unified Communications IM&P, the limit is 45,000 users enabled for presence per cluster. A CUCM cluster can only connect to one Cisco Unified Communications IM&P cluster.

This chapter explained how to design and deploy a Cisco Unified Communications IM&P solution in different CUCM scenarios.

Review Questions

Answer the following questions, and then see Appendix A, “Answers to Review Questions,” for the answers.

1. Native presence in CUCM requires a Cisco Unified Communications IM&P server to function properly.
 - a. True
 - b. False
2. Which protocol is used between Cisco Unified Communications IM&P and Microsoft Skype for Business when integrating in an enterprise network?
 - a. AXL
 - b. CSTA
 - c. SIP
 - d. XMPP
3. Which two options identify the maximum number of presence users and the maximum number of IM-only users that are permitted in a Cisco Unified Communications IM&P cluster? (Choose two)
 - a. 40,000 presence users
 - b. 45,000 presence users
 - c. 75,000 presence users

- d. 45,000 IM-only users
 - e. 75,000 IM-only users
 - f. 80,000 IM-only users
4. How many servers can be in a Cisco Unified Communications IM&P cluster?
- a. 2
 - b. 4
 - c. 5
 - d. 6
 - e. 8
5. Which port number must be opened in a firewall to allow Cisco Jabber to discover services?
- a. 53 DNS
 - b. 69 TFTP
 - c. 3268 Global Catalog
 - d. 5060 SIP
 - e. 5222 XMPP

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