



Overview

This chapter discusses the deployment models that are available for Unified CCX. Use the Cisco Unified Communications Sizing Tool to help you determine the number and types of servers required for any supported deployment model and call processing requirements. Before using that tool, it is necessary to have an understanding of what deployment model you desire.

Cisco Unified Communication Manager (Unified CM) co-loaded with Unified CCX on the same Virtual Machine (VM) is not supported.



Note Cisco Unified Intelligence Center and Cisco Finesse are deployed on the same Virtual Machine (VM) with Unified CCX and supports all the Unified CCX deployment models.

The following table depicts the deployment models that are supported in Unified CCX. These models have no bearing on which specific server model is used. The minimum server model required is identified by the Cisco Unified Communications Sizing Tool. This chapter provides general rules for design and considerations and limitations for each of these deployment models. This information allows an Unified CCX system planner or designer to understand what other similar deployment models are supported and to understand how to determine the best solution for a given set of requirements.

Table 1: Unified CCX Deployment Models

Unified CCX Deployment Model	Unified CCX Components on Server 1	Unified CCX Components on Server 2
Single-Server Non-High Availability Deployment Model—Unified Communication Manager Integration	Engine, Database, Recording, Monitoring components	—
Two-Server High Availability Deployment Model—Unified Communication Manager Integration	Engine, Database, Recording, Monitoring components	Engine, Database, Recording, Monitoring components



Note Unified CCX deployment model integrated with Unified CME is not supported in 9.0(1) and higher versions.

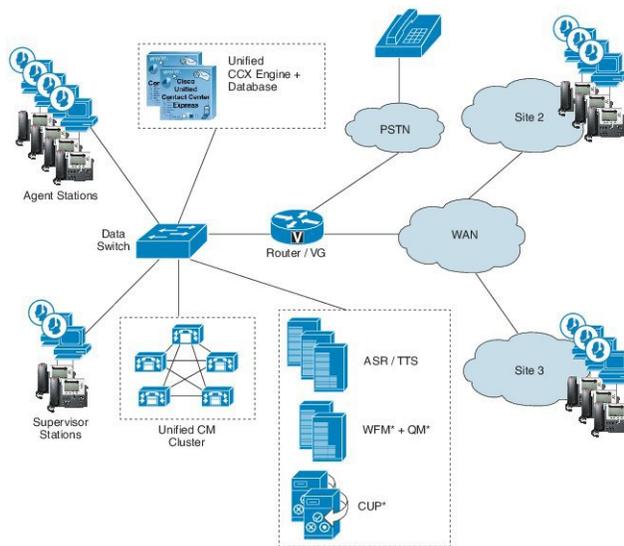
The following figure depicts the deployment when integrating Unified CCX with Unified Communications Manager. In this deployment, optional Unified CCX components shown with an asterisk (*) can be added. These components are:

- Cisco Unified Work Force Management and Cisco Unified Quality Manager.
- Cisco IM and Presence Server.

For more details about deploying the Presence Server, refer the *Cisco Unified Communications SRND*, which is available at this URL:

<http://www.cisco.com/go/ucsmd>

Figure 1: Deployment Model of Unified CCX Integrated with Unified Communication Manager



Note ASR and TTS can be added in Unified CCX integrated with Unified Communication Manager. ASR and TTS software is not provided by Cisco. This software must be purchased from other vendors. These vendors can provide design and server sizing requirements for their software.

- [Unified CCX General Rules for Design, on page 2](#)
- [Single-Server Non-High Availability Reference Design, on page 3](#)
- [Two-Server High Availability Reference Design, on page 4](#)
- [Other Design Considerations, on page 10](#)
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Unified CCX General Rules for Design

The following rules apply when designing a Unified CCX deployment:

- When deploying for high availability (HA), the Unified CCX servers can be located in the same campus LAN to provide server redundancy. The Cisco Unified CCX servers can also be located in different sites separated by WAN to provide spatial redundancy.



Note For HA over LAN deployment, heartbeats are sent every half a second and failover occurs if five consecutive heartbeats are missed. For HA over WAN deployment, heartbeats are sent every second and failover occurs if missing ten consecutive heartbeats. These values are not configurable.

- You can locate the Unified Communications Manager servers that run CTI Managers with which Unified CCX communicates in the same campus LAN. In Unified CCX servers that are deployed over WAN, for better site redundancy, deploy local Unified Communications Manager server at both sites.
- The Recording component must be redundant, if recording is used in a high availability deployment.
- All agents for a Unified CCX deployment must be using phones that register to the same Unified CM cluster. Calls can be received from devices and callers on another Unified CM cluster (using intercluster trunks).
- Unified CCX software versions must be the same for both the master and standby nodes in a high availability deployment.
- Unified CCX solution works with a combination of software and hardware components, providing an open and flexible environment for customers to execute complex scripts, custom codes, documents, and so on. Overloading any of the software and hardware components such as virtual memory and CPU could impact the solution performance. Review and optimize the scripts, custom codes, and documents before they are loaded to the production setup. Also constantly monitor the system component and hardware attributes like disk space and CPU utilization.

When deploying Advanced Quality Management and Workforce Management with Unified CCX, consider the following guidelines:

- Advanced Quality Management and Workforce Management must be installed on separate VM from each other and from Unified CCX. No form of coresidency is supported in this release with any other software, such as installing on Unified CCX or installing both Advanced Quality Management and Workforce Management on the same VM.
- Unified CCX does not support the use of third-party applications (for example, using TAPI) to control its devices.
- For more deployment information about Workforce Management and Advanced Quality Management, refer to the *Cisco Workforce Optimization System Configuration Guide* available at here:

http://www.cisco.com/en/US/products/ps8293/products_implementation_design_guides_list.html

Single-Server Non-High Availability Reference Design

Unified CM integration with Unified CCX on a single-server nonhigh availability is for small deployments. This reference design places a single instance of all the Unified CCX software components on the same server and uses Informix Dynamic Server as the database server.

This reference design allows the Unified CCX Engine to fail over to a backup CTI Manager if the primary CTI Manager fails. CTI ports and CTI route points should be grouped into device pools that have the same primary and secondary server list as those used for JTAPI communications with the CTI Managers.

Two-Server High Availability Reference Design

This reference design is for small-to medium-sized contact centers requiring high availability. This reference design incorporates redundant Unified CCX engine, database, recording, and monitoring components using Cisco Finesse.

This reference design can support silent monitoring and recording for agents at any WAN-connected site by using desktop monitoring. (See the Unified CCX Compatibility related information located at: <http://www.cisco.com/c/en/us/support/customer-collaboration/unified-contact-center-express/products-device-support-tables-list.html> for a list of phones that support desktop monitoring.) It can also support SPAN port monitoring for agents on the VLAN segment local to Unified CCX server. This reference design provides redundancy for both recording and silent monitoring for all agents using desktop monitoring (regardless of location) or agents on the local VLAN using SPAN port monitoring. Silent monitoring and recording are not possible for agents who are using the Cisco Finesse IP Phone Agent at remote sites. Similarly, silent monitoring and recording are not possible for agents at remote sites who are using phones that do not support desktop monitoring.

This reference design allows either Unified CCX Engine component to fail over to a backup CTI Manager if the primary server fails. CTI Ports and CTI Route Points should be grouped into device pools that have the same primary and secondary server list as that used for JTAPI communications to the CTI Managers.

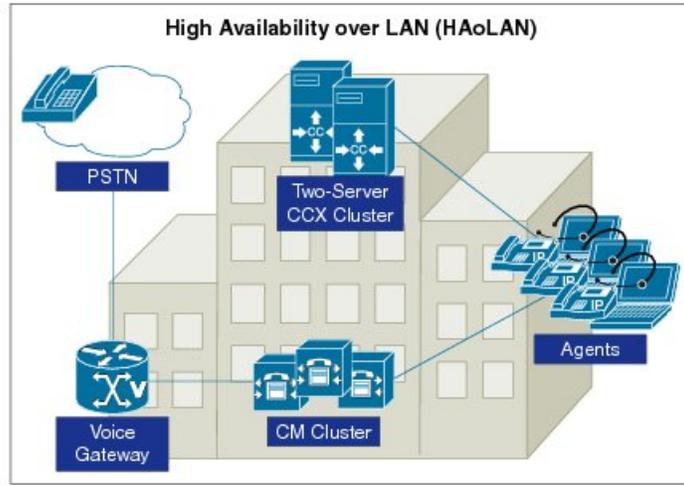


Note In HA deployments, historical data comes from the database located in the standby engine node. A higher number of historical reporting sessions during operating hours is supported for HA deployments.

Unified CCX High Availability over LAN

Unified CCX supports high availability over LAN to provide redundancy over LAN. The following figure depicts the deployment for Unified CCX high availability over LAN. This also includes a single Cisco SocialMiner on one of the nodes.

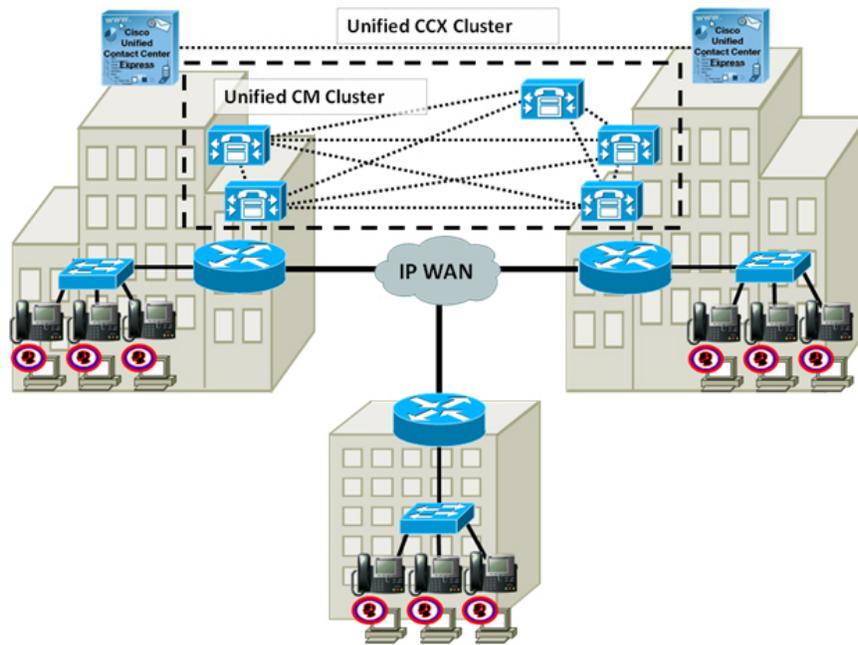
Figure 2: Unified CCX High Availability over LAN Deployment



Unified CCX High Availability over WAN

Unified CCX supports high availability over WAN to provide site redundancy. In this deployment, the Unified CCX servers are located in two different sites across the WAN. Each site should have at least one Unified CM server that is running CTI Manager with which Unified CCX communicates. This also includes a single Cisco SocialMiner on one of the nodes. The following figure depicts the deployment for Unified CCX high availability over WAN.

Figure 3: Unified CCX High Availability over WAN Deployment



Network Requirements

Observe the network requirements described in this section when deploying Unified CCX HA over WAN.

Delay

The maximum allowed round-trip time (RTT) between Unified CCX servers is 80 ms.

The maximum allowed round-trip time (RTT) between Unified CCX server and Unified CM server at same site is 20 ms.



Note

Do not use the ping utility on the Unified CCX server to verify RTT as it will not provide an accurate result. The ping is sent as a best-effort tagged packet and is not transported using the same QoS-enabled path as the WAN traffic. Therefore, verify the delay by using the closest network device to the Unified CCX servers, ideally the access switch to which the server is attached. Cisco IOS provides an extended ping capable of setting the Layer 3 type of service (ToS) bits to make sure that the ping packet is sent on the same QoS-enabled path that the WAN traffic will traverse. The time recorded by the extended ping is the round-trip time (RTT), or the time it takes to traverse the communications path and return. Refer to the Cisco IOS document available at

http://www.cisco.com/en/US/tech/tk365/technologies_tech_note09186a0080093f22.shtml#extend_ping for more detail.

Bandwidth

Sufficient bandwidth must be provisioned for Unified CCX cluster, Unified CM cluster, and other optional components to deploy HA over WAN.

The following components must be accounted for, while calculating the bandwidth requirements:

- Unified CCX Cluster and Unified CM Cluster

Unified CCX cluster consumes bandwidth between the Unified CCX servers in high availability. If the Unified CM running CTI Manager that Unified CCX communicates with is remote, there would be additional bandwidth utilized by Unified CCX.

Unified CM could consume significantly higher bandwidth for Intra-Cluster Communication Signaling (ICCS) between sites when deploying with Unified CCX. This is due to the additional number of call redirects and CTI/JTAPI communications encompassed in the intra-cluster communications.

Unified CCX can be deployed as ACD to route and queue contacts for available agent or as IP-IVR to perform self-service. The bandwidth requirements for Unified CCX and Unified CM clusters are different depending on the deployment type.

The following table shows the minimum bandwidth requirement for Unified CCX and Unified CM clusters when deploying HA over WAN.

Table 2: Unified CCX HA over WAN Bandwidth Requirement

Deployment type	Unified CCX Cluster		Unified CM Cluster	
		Between Unified CCX Servers	Between Unified CCX and Remote Unified CM Servers	Database ¹

Deployment type	Unified CCX Cluster		Unified CM Cluster	
	ACD	1.2 Mbps	800 kbps	1.544 Mbps (T1)
IP-IVR	1.2 Mbps	200 kbps	1.544 Mbps (T1)	25 kbps per 100 BHCA

¹ This column shows the database bandwidth required for Unified CM clustering over WAN and could be subject to change. For the final authorized value, refer to *Cisco Unified Communications Solution Reference Network Design (SRND)* available at: <http://www.cisco.com/go/ucsrnd>

² BHCA (Busy Hour Call Attempt) is the number of calls entering the system in the busy hour for Unified CCX or IP-IVR.

For Unified CCX Cluster in the preceding table:

- The traffic between Unified CCX servers includes database replication, heartbeat, and other communication between the Unified CCX HA servers.
- The traffic between Unified CCX server and remote Unified CM server running CTI Manager is the JTAPI call signaling.

For Unified CM Cluster in the preceding table:

- *Database* column includes traffic for database and other inter-server traffic for every Cisco Unified CM subscriber server remote to the Unified CM publisher.
- *ICCS* column shows all the ICCS traffic between CallManager/CallManager services and CallManager/CTI Manager services running in the Unified CM nodes across sites.

As an example, assume the Unified CCX HA over WAN deployment has two sites and is used as ACD. Site 1 has the Unified CCX, one Unified CM publisher and two Unified CM subscribers. Site 2 has the other Unified CCX and two Unified CM subscribers. Unified CCX in site 1 communicates with Unified CM subscriber in site 2 for JTAPI signaling. In the busy hour, there are 1500 calls coming into Unified CCX that get routed or queued for agents.



Note

- MediaSense recording is not included in the above calculations.
 - The maximum supported RTT between the Unified CCX server and the Microsoft Exchange server is 80 ms.
-

For Unified CCX cluster, bandwidth required is:

$$1.2 \text{ Mbps} + 800 \text{ kbps (0.8 Mbps)} = 2 \text{ Mbps}$$

For Cisco Unified CM cluster, there are two Unified CM subscribers remote from the Unified CM publisher and the BHCA is 1500. Bandwidth required is:

$$1.544 \text{ Mbps} \times 2 + 70 \text{ kbps} \times 15 (1.05 \text{ Mbps}) = 4.138 \text{ Mbps}$$

In total, 6.138 Mbps between sites is required for this deployment.

- Agents and Supervisors

In HA over WAN deployment, agents and supervisors could reside in either Unified CCX sites or they could be remote depending on the location of active Unified CCX server at the time of operation. Bandwidth should be provisioned for remote agents between sites using the maximum number of agents from the two sites. Estimate the required bandwidth using the Cisco Finesse Agent Desktop Bandwidth Calculator available at:

<http://www.cisco.com/c/en/us/support/customer-collaboration/finesse/products-technical-reference-list.html>

- **Optional Components**

Customers might have the following optional components deployed across the WAN from Unified CCX or Unified IP IVR. Ensure to account for the additional bandwidth required in their HA over WAN deployment.

- **Wallboard Server**— Determine the amount of data that is retrieved from Unified CCX database to the remote wallboard server.
- **Enterprise Database**— Estimate the total amount of data that is retrieved through the database steps from the remote enterprise database.
- **SMTP Server**— If the SMTP server is remote from the Unified IP IVR, determine the average size of each outgoing email and calculate the total.
- To calculate bandwidth for Finesse, see the *Finesse Bandwidth Calculator for Unified Contact Center Express*, available at:

<http://www.cisco.com/c/en/us/support/customer-collaboration/finesse/products-technical-reference-list.html>

Quality of Service

Quality of Service (QoS) must be enabled and engineered correctly on the network to provide consistent and predictable end-to-end levels of service. Unified CCX software does not mark any network packet, so ensure that you mark the traffic at the network edge routers.

The following table shows the QoS markings for Unified CCX HA over WAN deployment.

Table 3: QoS Considerations for Unified CCX HA Over WAN

Traffic	QoS Marking
JTAPI Call Signaling	IP Precedence 3 (DSCP 24 or PHB CS3)
Database Replication between Unified CCX nodes ³	IP Precedence 0 (DSCP 0 or PHB BE)

³ The database traffic may be reprioritized to a higher priority data service (for example, IP Precedence 2 [DSCP 18 or PHB AF21] if required by the particular business needs). An example of this is the usage of outbound dialer in Unified CCX, which relies on writing data to the Config Datastore.

For more information on QoS requirements of VoIP, refer to the Enterprise QoS Solution Reference Network Design Guide available here:

http://www.cisco.com/en/US/docs/solutions/Enterprise/WAN_and_MAN/QoS_SRND/QoSIntro.html#wp46447

Deployment Considerations

Consider the following when deploying high availability over WAN with Unified CCX:

- Deploy the ASR or TTS server locally in each Unified CCX site
- Set up Unified CCX to use the local Unified CM servers for both primary and secondary in the following configurations. If this is not possible, at least the primary Unified CM server should be local.
 - AXL Service Provider
 - JTAPI Provider for Unified CM Telephony Subsystem
 - JTAPI Provider for Resource Manager/Contact Manager Subsystem



Note Significant delays in agent login will occur during Unified CCX failover if AXL and JTAPI communications are over WAN, especially under load conditions.

- Assign the two sets of CTI Ports (one for the master and the other for the standby engine) to different device pools, regions and locations, in the CTI Port Group.
- Data in Historical Datastore and Repository Datastore start merging after the network partition is restored. This situation could potentially generate heavy data traffic over WAN. Restore the WAN link during after hours to minimize the performance impact.
- Do not support VPN tunneling across the WAN.

Unified CCX-Finesse deployment

Cisco Finesse is supported in both single-node deployment and high-availability deployment over LAN and WAN.

Unified CCX-Standalone Cisco Unified Intelligence Center deployment

Standalone CUIC doesn't have an HA but works with a Unified CCX in HA.

Unified CCX-Cisco SocialMiner deployment

SocialMiner doesn't have an HA but works with a Unified CCX in HA.

Unified CCX-MediaSense Deployment

In a LAN deployment, Unified CCX supports:

- A single Cisco MediaSense node
- A two-node Cisco MediaSense cluster

Consider two sites (site A and site B) separated over WAN. A Unified CCX HA cluster over WAN supports:

- A single Cisco MediaSense node on either site A or site B
- A two-node MediaSense cluster, both nodes of which are on either site A or site B

For more information, see *Cisco MediaSense Design Guide* available here:

http://www.cisco.com/en/US/products/ps11389/products_implementation_design_guides_list.html

Other Design Considerations

Consider the following when designing your Unified CCX system:

- High availability requires additional disk space, so historical call reporting capacity may be reduced. Historical call reporting capacity also depends upon BHCC, hours of operation per day, and days of operation per week.
- G.711 call recording requires about 1 MB per minute. G.729 call recording requires about 256 KB per minute.
- The following categories of data use hard disk space:
 - Linux server operating system files, Unified CCX software, and Informix Database Management software
 - Unified CCX logs
 - The Unified CCX database (comprised of 4 data stores)
 - Recording files.Systems planners and designers should attempt to estimate the impact of each in order to determine hard disk requirements.
- The Unified CM sizing tools assume devices are evenly distributed across all servers. CTI route points are configured as part of a device pool in the Cisco Unified Communications Manager Server as the primary CTI Manager being used; it may be required to run the Cisco Unified Communications Manager sizing tool on a per-location or per-server basis.
- The Unified CM QSIG (Q Signaling) path replacement feature is not supported for Unified CCX calls.
- Unified CM Forced Authorization Codes and Client Matter Codes should be turned off for all route patterns in the Unified CM cluster that are used by Unified CCX. Enabling these features for route patterns that are not used by Unified CCX does not affect Unified CCX.
- For a list of unsupported features in Unified CM with Unified CCX, refer to the current release notes for Unified CCX.
- Unified CCX supports different sets of IP Phones as agent devices on the Unified CM and Unified CM platform; not all agent devices can be used as IP Phone Agent. For a complete list of supported agent devices, refer to the *Cisco Unified CCX Software and Hardware Compatibility Guide* available at http://docwiki.cisco.com/wiki/Compatibility_Matrix_for_Unified_CCX.
- Finesse allows each agent to choose and set a language from the language selector drop-down list on the sign-in page.
- An agent using Cisco Finesse Agent Desktop can log in using Extension Mobility but the agent phone must be in the Unified CM cluster that is used by Unified CCX.
- Sometimes new releases of Unified CM will not support Unified CCX immediately at Unified CM first customer ship (FCS) time. Some organizations may be early adopters of new Unified CM releases and may be delayed from migrating to new Unified CM releases and using new Unified CM features if Unified CCX is installed with that same Unified CM cluster. Therefore, in some situations, it makes sense to have a separate Unified CM cluster for Unified CCX.

- Cisco Jabber runs in two modes: Deskphone Mode and Softphone Mode. Unified CCX only supports Cisco Jabber as an agent device in Softphone Mode.



Note Cisco Jabber for Windows is supported for a remote agent.

- Finesse does not support video operation if you are using Cisco Jabber for Windows as agent phone.
- The following features are not supported if you are using Cisco Jabber for Windows as agent phone:
 - Multiline (ACD and non-ACD)
 - Extension Mobility

Multiple Cisco Unified CCX Clusters Integrated with a Single Cisco Unified Communications Manager Cluster

You can integrate multiple Unified CCX clusters with a single Cisco Unified Communications Manager cluster.



Note There is no limit to the number of Unified CCX clusters supported with a single Unified CM cluster as long as the combined agent phones, CTI ports, and CTI route points that are utilized by all Unified CCX clusters are used to size Unified CM.

- To determine if you need more than one CTI Manager, refer to the *Cisco Unified Communications Solution Reference Network Design (SRND)*, available at <http://www.cisco.com/go/ucsrnd>.

If your deployment requires more than one CTI Manager, you load-balance the Unified CCX and other CTI applications across various CTI Managers in the cluster to provide maximum resilience, performance, and redundancy.

For additional information on CTI Manager, refer to the *Cisco Unified Communications Solution Reference Network Design (SRND)*, available at <http://www.cisco.com/go/ucsrnd>.

- If more than one Unified CM primary subscriber is required to support your configuration, distribute all agents equally among the Unified CM subscriber nodes. This configuration assumes that the busy-hour call attempts (BHCA) is uniform across all agents.
- Each Unified CCX cluster is standalone and independent from other Unified CCX clusters. There is no communication or synchronization between the Unified CCX clusters. Agents should operate using only one Unified CCX cluster.

Unified CM Telephony Triggers (CTI Route Points) and CTI ports should be different across Unified CCX clusters.

- In the list of Resources in Unified CCX Administration, each Unified CCX cluster displays all the agents in the Cisco Unified Communications Manager cluster, even though the agents can operate and log in to another Unified CCX cluster.

This situation requires that the Unified CCX Administrator be aware of which resources are associated with each cluster. The Unified CCX Administrator can mitigate this situation by having a unique naming convention for resources associated with a particular Unified CCX cluster.

- This deployment is not intended to provide Unified CCX redundancy across different Unified CCX clusters. If a Unified CCX cluster fails, the agents that operate in this cluster cannot operate in other Unified CCX clusters. If another Unified CCX cluster is configured to accept the calls that were originally sent to the Unified CCX cluster that failed, there will be no report integration between the Unified CCX clusters.
- This deployment does not change the characteristics and design considerations of each individual Unified CCX cluster. For example, within a Unified CCX cluster, high availability is still supported.
- If more than one Unified CCX cluster is integrated with the same Unified CM cluster, all agents belonging to all the Unified CCX clusters are visible to administrators of all the Unified CCX clusters. The administrator must be aware of the agents belonging to the Unified CCX cluster that the administrator manages and configures.

Other Reference Designs

Cisco Remote Expert

For information about the supported Cisco Remote Expert reference designs, see *Cisco Remote Expert Mobile Design Guide* available at:

http://www.cisco.com/c/en/us/solutions/enterprise/design-zone/remote_expert.html

Other Unified Communications Integration

Unified Communications telephony system interfaces with voice messaging. It supports other vendor voicemail. The voice storage is dependent on storage capacity.