



# HCS for Contact Center

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## Prerequisites

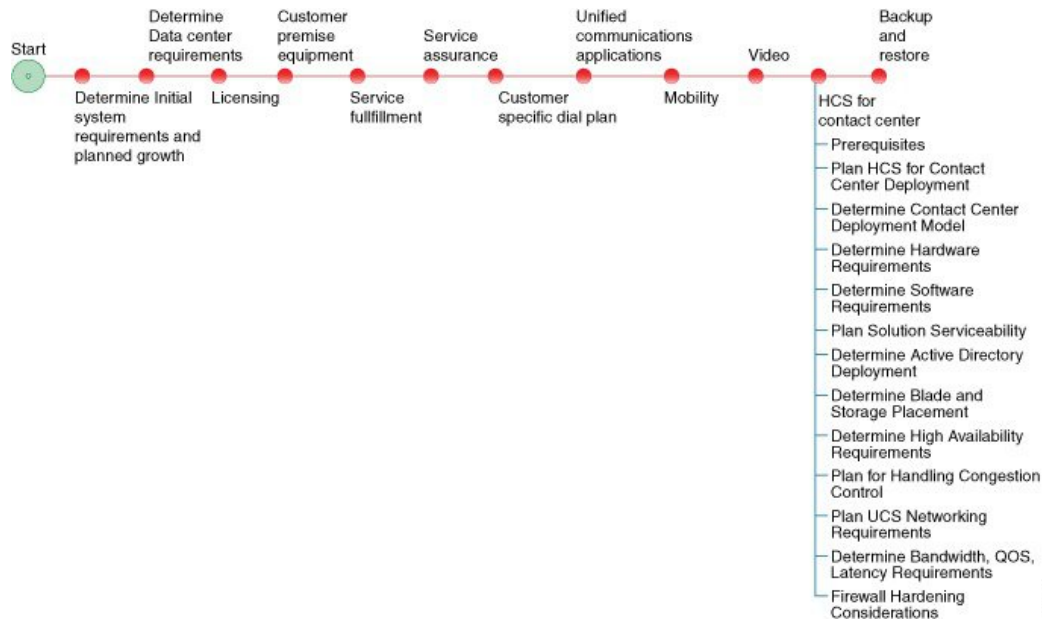
Before you plan the HCS for Contact Center deployment, review the *Cisco Hosted Collaboration Solution, Release 10.6(1) Solution Reference Network Design Guide* and *Installing and Configuring Cisco HCS for Contact Center*.

Consider the following carefully:

- 1 Initial system requirements and planned growth
- 2 Data center requirements
- 3 Licensing
- 4 Customer premise equipment
- 5 Service fulfillment

## 6 Service assurance

## HCS for Contact Center Workflow



## Plan the HCS for Contact Center Deployment

The following sections provide HCS for Contact Center deployment planning details:

- [Determine the HCS for Contact Center Deployment Model, on page 3](#)
- [Determine the Hardware Requirements, on page 30](#)
- [Determine the Software Requirements, on page 32](#)
- [Plan Solution Serviceability, on page 32](#)
- [Determine the Active Directory Deployment, on page 36](#)
- [Determine the Blade and Storage Placement Requirements, on page 37](#)
- [Determine High Availability Requirements, on page 37](#)
- [Plan the Solution for Handling Congestion Control, on page 38](#)
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- [Firewall Hardening Considerations, on page 40](#)

# Determine the HCS for Contact Center Deployment Model

## Procedure

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- Step 1** Identify the number of agents that you require: 100 or less, 500, 1000, 4000 or 12,000.
- Step 2** Review the [Configuration Limits](#), on page 4 for agents, supervisors, teams, and reporting users of each deployment model. Consider your initial requirements as well as any planned growth.
- Step 3** Identify any optional Cisco components to include in the deployment.
- AW-HDS-DDS server (Administration Server, Real-Time and Historical Data Server, and Detail Data server). The AW-HDS-DDS server is a core component for the 4000-agent deployment.
  - SPAN-based monitoring
  - Cisco Unified Web Interaction Manager (WIM) and Unified Email Interaction Manager (EIM)
  - Cisco Remote Silent Monitoring (RMS)
  - Cisco MediaSense
- Step 4** Review the [Optional Component Considerations](#), on page 10. Consider your initial requirements as well as any planned growth.
- Step 5** Identify any third-party components to include in the deployment.
- Automatic Speech Recognition (ASR) and Text-to-Speech (TTS)
  - Recording
  - Wallboard
  - Workforce Management
-

## Configuration Limits

*Table 1: Agents, Supervisors, Teams, Reporting Users*

Group	Resource	500 Agent Deployment	1000 Agent Deployment	4000 Agent Deployment	12000 Agent Deployment	Small Contact Center Deployment
Agents	Active Agents*	500	1000	4000	12000	4000
	Configured Agents*	3000	6000	24000	72000	24000
	Agents with Trace ON	50*	100*	400*	400	400*
	Agent Desk Settings*	500	1000	4000	12000	4000
	Active Mobile Agents	125	250	See, <a href="#">Mobile Agent Support, on page 5</a>	See, <a href="#">Mobile Agent Support, on page 5</a>	See, <a href="#">Mobile Agent Support, on page 5</a>
	Configured Mobile Agents	750	1500	6000	8000	6000
	Outbound Agents	500	1000	4000	12000	4000
	Agents per team	50*	50*	50*	50	50*
	Queues per Agent (Skill Groups and Precision Queues combined)	15*	15*	15*	15	15*
	Agents per skill group	No limit	No limit	No limit	No limit	No limit
	Attributes per agent*	50	50	50	50	50

Group	Resource	500 Agent Deployment	1000 Agent Deployment	4000 Agent Deployment	12000 Agent Deployment	Small Contact Center Deployment
<b>Supervisors</b>	Active Supervisors*	50	100	400	1200	400
	Configured Supervisors*	300	600	2400	7200	2400
	Active teams*	50	100	400	1200	400
	Configured teams*	300	600	2400	7200	2400
	Supervisors per Team	10*	10*	10*	10	10*
	Teams per supervisor	20*	20*	20*	20	20*
	Agents per supervisor	20	20	20	20	20
<b>Reporting</b>	Active Reporting users	50	100	400	1200	400
	Configured Reporting users	300	600	2400	7200	2400
<b>Access Control</b>	Administrator (Users)	100	100	1000	1000	1000

### Mobile Agent Support

Follow the below calculation to determine mobile agent capacity:

Each mobile agent for a nailed connection (nailed-up configuration) = two local agents



#### Note

- Total number of agents should be less than deployment limits
- For 500 and 1000 agent deployments if active mobile agent requirement exceeds the specified limit, use the above formula to determine mobile agent capacity

**Note**

- 1 Preview, Direct Preview, Progressive and Predictive dialing modes are supported.
- 2 For SIP Outbound Dialer in HCS for Contact Center deployment, if CUSP is not used only one gateway can be connected.

If CUSP is not used in the deployment the maximum configured ports are 500 dialer ports in the ICM and in the IOS gateway . If CUSP is used in the deployment the maximum configured ports are 1500 dialer ports.

- 3 The Symbol "\*" indicates that the configuration limits for the above resources are enforced through CCDM.
- 4 Number of active and configured mobile agents are considered from the total supported active and configured mobile agents.
- 5 Number of active and configured outbound agents are considered from the total supported active and configured outbound agents.

Group	Resource	500 Agent Deployment	1000 Agent Deployment	4000 Agent Deployment	12000 Agent Deployment	Small Contact Center Deployment
Outbound	Dialer per system	1	1	2	6	32
	Number of Campaigns (Agent/IVR based)	50	300	300	300	300
	Campaign skill groups per campaign	20	20	20	20	20
	Queues per Agent (Skill Groups and Precision Queues combined)	15	15	15	15	15
	Total Numbers of Agents	500	1000	4000	12000	4000
	Port Throttle	5	10	10	15	10

Group	Resource	500 Agent Deployment	1000 Agent Deployment	4000 Agent Deployment	12000 Agent Deployment	Small Contact Center Deployment
<b>Precision Queues</b>	Precision Queues*	4000	4000	4000	4000	4000
	Precision Queue steps*	10000	10000	10000	10000	10000
	Precision Queue term per Precision Queue*	10	10	10	10	10
	Precision steps per Precision Queue*	10	10	10	10	10
	Unique attributes per Precision Queue*	10	10	10	10	10

Group	Resource	500 Agent Deployment	1000 Agent Deployment	4000 Agent Deployment	12000 Agent Deployment	Small Contact Center Deployment
General	Attributes*	10000	10000	10000	10000	10000
	Bucket Intervals	500	1000	4000	12000	4000
	Active Call Types	1000	2000	8000	8000	8000
	Configured Call Types*	2000	2000	10000	10000	10000
	Call Type Skill Group per Interval	2000	2000	30000	30000	30000
	Active Routing Scripts	250	500	2000	6000	2000
	Configured Routing Scripts	500	1000	4000	12000	4000
	Network VRU Scripts *	500	1000	4000	12000	4000
	Reason Codes	100	100	100	100	100
	Skill Groups*	3000	3000	3000	3000	3000
	Persistent Enabled Expanded Call Variables *	20	20	5	5	5
	Persistent Enabled Expanded Call Variable Arrays	0	0	0	0	0
	Nonpersistent Expanded Call Variables(Bytes)*	2000	2000	2000	2000	2000
	Bulk Jobs	200	200	200	200	200
	CTI All event Clients	9/PG	9/PG	9/PG	9/PG	9/PG



Group	Resource	500 Agent Deployment	1000 Agent Deployment	4000 Agent Deployment	12000 Agent Deployment	Small Contact Center Deployment
<b>Dialed Number</b>	Dialed Number (External Voice)	1000	1000	4000	12000	4000
	Dialed Number (Internal Voice)	1000	1000	4000	12000	4000
	Dialed Number (Multichannel)	500	500	2000	6000	2000
	Dialed Number (Outbound Voice)	500	500	2000	6000	2000
<b>Load</b>	VRU Ports	900	1800	7200	21600	7200
	Calls per second	5	8	35	115	35
	Agent Load	30 BHCA	30 BHCA	30 BHCA	30 BHCA	30 BHCA
<b>Reskilling</b>	Dynamic (operations/hr.)	120	120	120	120	120

## Features & Options in Small Contact Center Deployment

The following table lists the Features and Optional component Multi tenancy capabilities in a Small Contact Center Deployment.

Features/Optional Components	Notes
Outbound Dialer	A single Outbound Dialer per Sub customer is supported, not exceeding 32 sub customers.
Outbound Campaigns	Each sub-customer supports 30 campaigns and total campaigns supported is 300.
WIM and EIM	A single WIM and EIM instance per sub customer is supported, not exceeding 74 sub customers.
Remote Silent Monitoring	A single RSM instance will support up to 6 sub customers and 120 concurrent sessions supported per RSM. A single RSM instance per sub customer is supported.
Media Sense	A single Media Sense instance per sub customer, not exceeding 149 sub customers.

## Optional Component Considerations

This section describes the capabilities of the following Cisco Optional Components:

- [Unified WIM and EIM Considerations](#), on page 10
- [Cisco RSM Considerations](#), on page 23
- [Cisco MediaSense Considerations](#), on page 26
- [Cisco Unified SIP Proxy Considerations](#), on page 27
- [Cisco SPAN based Monitoring Considerations](#), on page 28

### Unified WIM and EIM Considerations

This section describes the following considerations for Unified WIM and EIM.

- [Unified WIM and EIM Design Considerations](#), on page 16
- [Unified WIM and EIM Deployment Options](#), on page 10
- [Unified WIM and EIM Configuration Limits](#), on page 11
- [HCS Support Matrix for Unified WIM and EIM](#), on page 12
- [Unified WIM and WIM High Availability](#), on page 18
- [Cisco WIM and EIM Bandwidth, Latency and QOS Considerations](#), on page 23

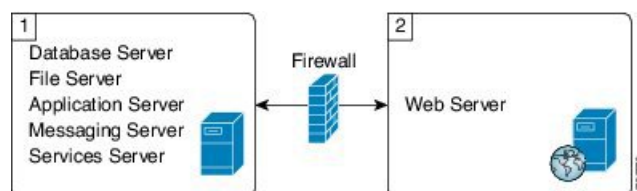
### Unified WIM and EIM Deployment Options

Due to the modular, component-based nature of the architecture, Cisco WIM and EIM has the ability to cater to the growing demands for concurrent user loads. To provide the flexibility to suit deployments of varied sizes, Cisco WIM and EIM supports various components that may be distributed across various servers in a deployment.

#### Collocated Deployment

In Collocated deployment option, the web server is installed on a separate machine and all other components are installed on one machine. The web server may be installed outside the firewall, if required.

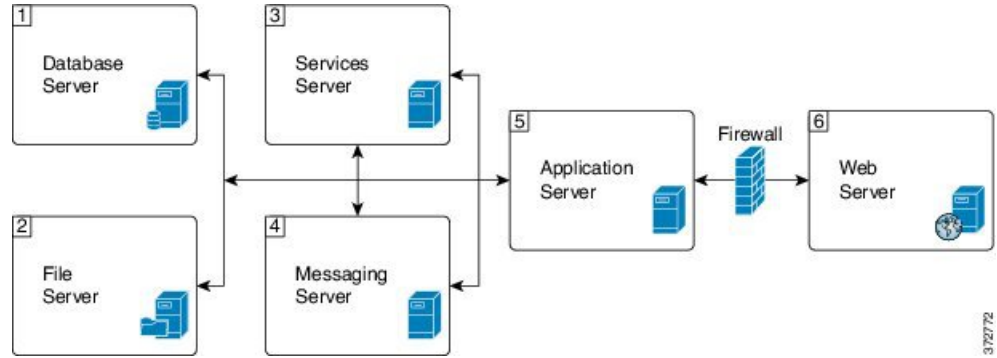
**Figure 1: Collocated Deployment**



### Distributed-Server Deployment

In this configuration, each component is on a separate machine, with the web server installed outside the firewall. The application, messaging, services, and web servers in this configuration can be restarted without restarting any other servers.

**Figure 2: Distributed-Server Deployment**



### Unified WIM and EIM Configuration Limits

#### Unified WIM and EIM Configuration Limits

**Table 2: Unified WIM and EIM Configuration Limits**

Group	Resource	Unified WIM and EIM Distributed server Deployment	Unified WIM and EIM Collocated Deployment
Multimedia	Agents (any combination of Email, Chat and Web callback activities)	1250 #	200 ##
	Maximum Number of Emails per agent per hour	5	12
	Maximum Number of chats per agent per hour	5	10
	Maximum Number of Web Callback per agents per hour	5	5

**Note**

The Symbol "#" indicates that the Unified WIM and EIM Distributed server Deployment allows combination of maximum 600 concurrent Web Callback and for the remaining it allows any combination of Email or Chat activities. The Symbol "##" indicates that the Unified WIM and EIM Collocated Deployment allows combination of maximum 100 concurrent Web Callback and for the remaining it allows any combination of Email or Chat activities.

## HCS Support Matrix for Unified WIM and EIM

### HCS Support Matrix for Unified WIM and EIM

*Table 3: HCS Support Matrix for Unified WIM and EIM*

HCS for CC Deployment	Unified WIM and EIM Distributed server Deployment	Unified WIM and EIM Collocated Deployment
HCS for CC 500 Agent Deployment	Support can't exceed 500 Multimedia agents	Yes
HCS for CC 1000 Agent Deployment	Support can't exceed 1000 Multimedia agents	Yes
HCS for CC 4000 Agent Deployment	Yes	Yes
HCS for CC 12000 Agent Deployment	Yes	Yes
HCS for CC Small Contact Center Agent Deployment	No	Yes

## Cisco RSM Capabilities

Platform	Capabilities
Call Flow	The Supervisor can only monitor agents who are in talking state.
Desktop	CTIOS
Voice Codec	Between Agent and RSM: G.729 (RTP) Between RSM and VXML Gateway: G.711 (RTSP)
Concurrent Monitoring Sessions	120
Monitored Calls (per minute)	17

Platform	Capabilities
Maximum Configured Agents per PG	12000
SimPhone Start line Number Range	Four to fifteen digits

## Cisco MediaSense Capabilities

Platform	Capabilities
Phone	All HCS supported Phone. See list of supported phones in <a href="#">Voice Infrastructure, on page 13</a> section.
Supported Model	2vCPU, 4vCPU and 7vCPU profiles.
Voice Codec	G.711 and G.729
Session	See session related details in <a href="http://docwiki.cisco.com/wiki/Virtualization_for_Cisco_MediaSense#Version_10.x">http://docwiki.cisco.com/wiki/Virtualization_for_Cisco_MediaSense#Version_10.x</a> .
Media Forking	CUBE, Phone and TDM
Network	Inter cluster communication over WAN is not supported.

## Voice Infrastructure

The following table lists the voice infrastructure.

**Table 4: Voice Infrastructure**

Voice Infrastructure	HCS for Contact Center Deployment	Notes
Music on Hold	Unicast Multicast Unified CM Subscriber source only	This sizing applies to agent node only, for both agent and back-office devices, with all agent devices on the same node pair.

Voice Infrastructure	HCS for Contact Center Deployment	Notes
Proxy	SIP Proxy is optionally supported.	<p>High Availability (HA) and load balancing are achieved using these solution components:</p> <ul style="list-style-type: none"> <li>• Time Division Multiplexing (TDM) gateway and Unified CM, which use the SIP Options heartbeat mechanism to perform HA.</li> <li>• Unified CVP servers, which use the SIP server group and SIP Options heartbeat mechanism to perform HA and load balancing.</li> </ul>
Ingress Gateways	ISR G2 Cisco Unified Border Element with combination VXML	<p>3925E and 3945E are the supported GWs.</p> <p>For SPAN based Silent Monitoring, the Ingress gateway is spanned.</p> <p>You must configure the gateway MTPs to do a codec pass-through because the Mobile Agent in HCS is configured to use G729 and the rest of the components in HCS support all the codecs. See <a href="#">CVP SRND</a> for list of supported gateway models and corresponding sizing.</p>
Protocol	Session Initiation Protocol (SIP) over TCP	SIP over UDP, H323, Media Gateway Control Protocol (MGCP) are not supported.
Proxy /Cisco Unified SIP Proxy (CUSP)	SIP Proxy is optionally supported.	<p>Outbound Option: The Outbound dialer can connect to only one physical gateway, if SIP proxy is not used. See <a href="#">Configuration Limits, on page 4</a></p>

Voice Infrastructure	HCS for Contact Center Deployment	Notes
Codec	<ul style="list-style-type: none"> <li>• IVR: G.711ulaw and G.711alaw</li> <li>• Agents: G.711ulaw, G.711 alaw, and G729r8</li> </ul>	G.722, iSAC, and iLBC are not supported.
Media Resources	Gateway-based: <ul style="list-style-type: none"> <li>• Conference bridges</li> <li>• Transcoders and Universal Transcoders</li> <li>• Hardware and IOS Software Media Termination Points.</li> </ul>	Unified CM-based (Cisco IP Voice Media Streaming Application) that are not supported: <ul style="list-style-type: none"> <li>• Conference bridges</li> <li>• MTPs</li> </ul>

## Optional Component Considerations

This section describes the capabilities of the following Cisco Optional Components:

- [Unified WIM and EIM Considerations, on page 10](#)
- [Cisco RSM Considerations, on page 23](#)
- [Cisco MediaSense Considerations, on page 26](#)
- [Cisco Unified SIP Proxy Considerations, on page 27](#)
- [Cisco SPAN based Monitoring Considerations, on page 28](#)

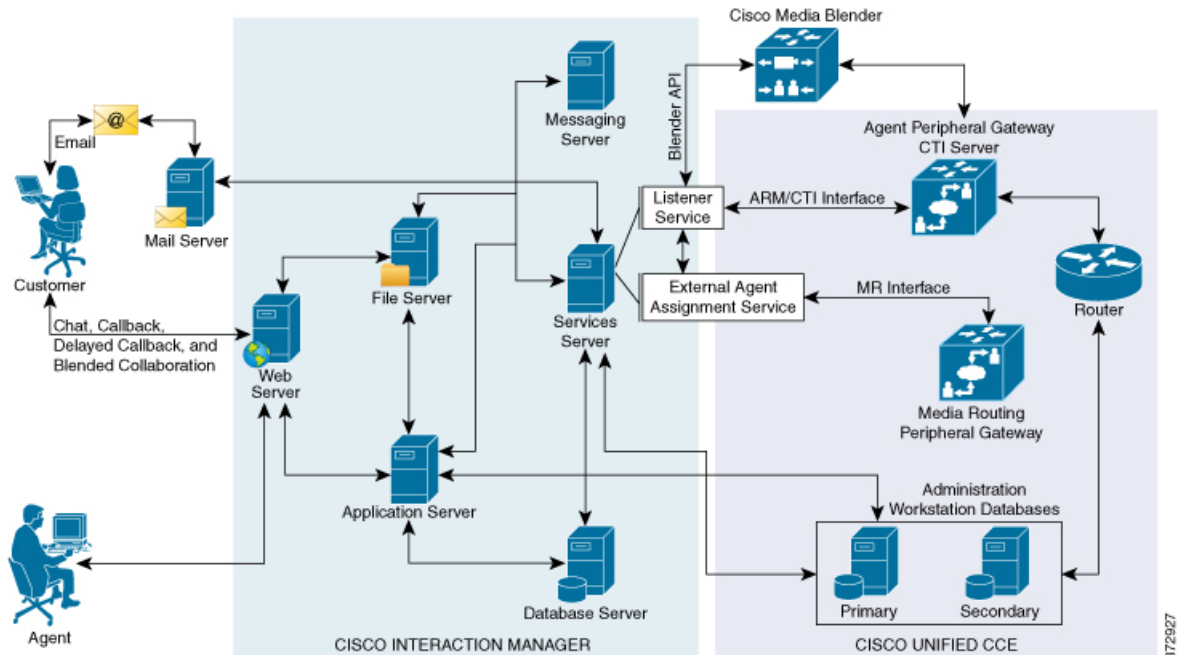
### Unified WIM and EIM Considerations

This section describes the following considerations for Unified WIM and EIM.

- [Unified WIM and EIM Design Considerations, on page 16](#)
- [Unified WIM and EIM Deployment Options, on page 10](#)
- [Unified WIM and EIM Configuration Limits, on page 11](#)
- [HCS Support Matrix for Unified WIM and EIM, on page 12](#)
- [Unified WIM and WIM High Availability, on page 18](#)
- [Cisco WIM and EIM Bandwidth, Latency and QOS Considerations, on page 23](#)

## Unified WIM and EIM Design Considerations

Figure 3: Unified WIM and EIM Design Considerations

**Note**

Cisco Media Blender is used only for Web/Scheduled Callback feature.

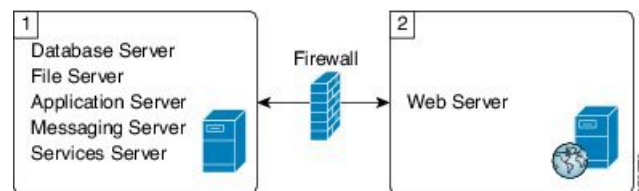
## Unified WIM and EIM Deployment Options

Due to the modular, component-based nature of the architecture, Cisco WIM and EIM has the ability to cater to the growing demands for concurrent user loads. To provide the flexibility to suit deployments of varied sizes, Cisco WIM and EIM supports various components that may be distributed across various servers in a deployment.

**Collocated Deployment**

In Collocated deployment option, the web server is installed on a separate machine and all other components are installed on one machine. The web server may be installed outside the firewall, if required.

Figure 4: Collocated Deployment

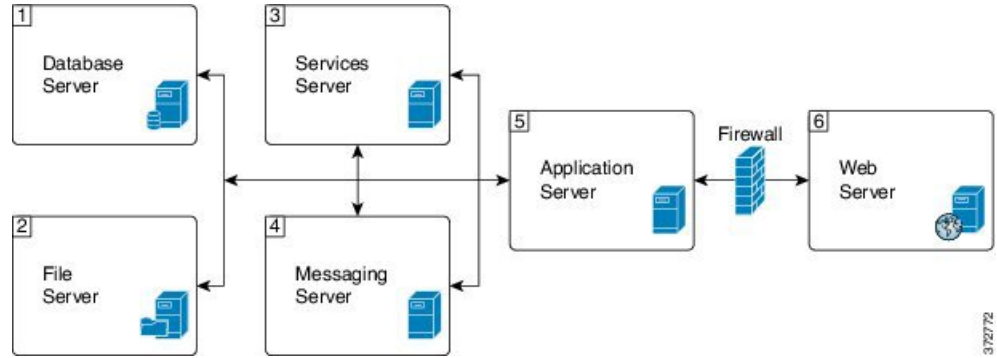




### Distributed-Server Deployment

In this configuration, each component is on a separate machine, with the web server installed outside the firewall. The application, messaging, services, and web servers in this configuration can be restarted without restarting any other servers.

**Figure 5: Distributed-Server Deployment**



### Unified WIM and EIM Configuration Limits

#### Unified WIM and EIM Configuration Limits

**Table 5: Unified WIM and EIM Configuration Limits**

Group	Resource	Unified WIM and EIM Distributed server Deployment	Unified WIM and EIM Collocated Deployment
Multimedia	Agents (any combination of Email, Chat and Web callback activities)	1250 #	200 ##
	Maximum Number of Emails per agent per hour	5	12
	Maximum Number of chats per agent per hour	5	10
	Maximum Number of Web Callback per agents per hour	5	5

**Note**

The Symbol "#" indicates that the Unified WIM and EIM Distributed server Deployment allows combination of maximum 600 concurrent Web Callback and for the remaining it allows any combination of Email or Chat activities. The Symbol "##" indicates that the Unified WIM and EIM Collocated Deployment allows combination of maximum 100 concurrent Web Callback and for the remaining it allows any combination of Email or Chat activities.

*HCS Support Matrix for Unified WIM and EIM***HCS Support Matrix for Unified WIM and EIM****Table 6: HCS Support Matrix for Unified WIM and EIM**

<b>HCS for CC Deployment</b>	<b>Unified WIM and EIM Distributed server Deployment</b>	<b>Unified WIM and EIM Collocated Deployment</b>
HCS for CC 500 Agent Deployment	Support can't exceed 500 Multimedia agents	Yes
HCS for CC 1000 Agent Deployment	Support can't exceed 1000 Multimedia agents	Yes
HCS for CC 4000 Agent Deployment	Yes	Yes
HCS for CC 12000 Agent Deployment	Yes	Yes
HCS for CC Small Contact Center Agent Deployment	No	Yes

*Unified WIM and WIM High Availability*

The following table contains the Cisco Unified WIM and EIM high availability during the failover of Unified CCE processes.

Component	Failover scenario	New session (Web Callback/ Delayed callback/ Chat/ Email) impact	Active session (Web Callback/ Delayed callback/ Chat/ Email) impact	Post recovery action
PG	Unified Communications Manager PG Failover	<p>Web Callback - The new call is lost, because there is no Longest Available agent during the failure of PG.</p> <p>Delayed Callback - The new call reaches the customer and the agent after the PG on the other side becomes active and the delay that the customer specifies gets complete.</p> <p>Chat - The new chat initiated by the customer reaches the agent after the other side of the PG becomes active.</p> <p>Email - The new Email sent by the customer reaches the agent.</p>	Active Web Callback, Delayed callback, Chat, and Email sessions continue uninterrupted.	Agent receives the Call, Chat or Email after the PG becomes active and the agent logs in again.

Component	Failover scenario	New session (Web Callback/ Delayed callback/ Chat/ Email) impact	Active session (Web Callback/ Delayed callback/ Chat/ Email) impact	Post recovery action
PG	MR PG Failover	<p>Web Callback - The new call is established between the customer and the agent after the PG becomes active.</p> <p>Delayed Callback - The new call reaches the customer and the agent after the PG on the other side becomes active and the delay that the customer specifies gets complete.</p> <p>Chat - The new chat initiated by the customer reaches the agent once the other side of the PG becomes active.</p> <p>Email - The new Email sent by the customer reaches the agent.</p>	Active Web Callback, Delayed callback, Chat, and Email sessions continue uninterrupted.	Agent receives the Call, Chat or Email once the PG becomes active.

Component	Failover scenario	New session (Web Callback/ Delayed callback/ Chat/ Email) impact	Active session (Web Callback/ Delayed callback/ Chat/ Email) impact	Post recovery action
CG	CTI Failover	<p>Web Callback -The new call cannot be placed and the customer receives the message, "System cannot assign an Agent to the request."</p> <p>Delayed Callback - The new call reaches the customer and the agent after the CG on the other side becomes active and the delay that the customer specifies gets complete.</p> <p>Chat - The new chat initiated by the customer reaches the agent after the other side of the CG process becomes active.</p> <p>Email - The new Email sent by the customer reaches the agent.</p>	Active Web Callback, Delayed callback, Chat, and Email sessions continue uninterrupted.	Agent receives the Call, Chat or Email once the process becomes active.

Component	Failover scenario	New session (Web Callback/ Delayed callback/ Chat/ Email) impact	Active session (Web Callback/ Delayed callback/ Chat/ Email) impact	Post recovery action
CTI OS	CTI OS Server Failure	<p>Web Callback - The new call is established without any impact.</p> <p>Delayed Callback - The new call is established without any impact after the delay that the customer specifies gets complete.</p> <p>Chat - The new chat reaches the agent without any impact.</p> <p>Email - The new Email sent by the customer reaches the agent.</p>	Active Web Callback, Delayed callback, Chat, and Email sessions continue uninterrupted.	Seamless.
Router	Router fails	<p>Web Callback - The new call is established through other side of the router process.</p> <p>Delayed Callback - The new call is established through other side of the router process and once the delay mentioned by the customer completes.</p> <p>Chat - The new chat reaches the agent through other side of the router process.</p> <p>Email - The new Email sent by the customer reaches the agent through other side of the router process.</p>	Active Web Callback, Delayed callback, Chat and Email sessions continue uninterrupted.	Agent gets the Call, Chat or Email with other side of the router process.

*Cisco WIM and EIM Bandwidth, Latency and QOS Considerations*

The minimum required network bandwidth for an agent connecting to the Cisco Interaction Manager servers on login is 384 kilobits/second or greater. After login in a steady state an average bandwidth of 40 kilobits/second or greater is required.

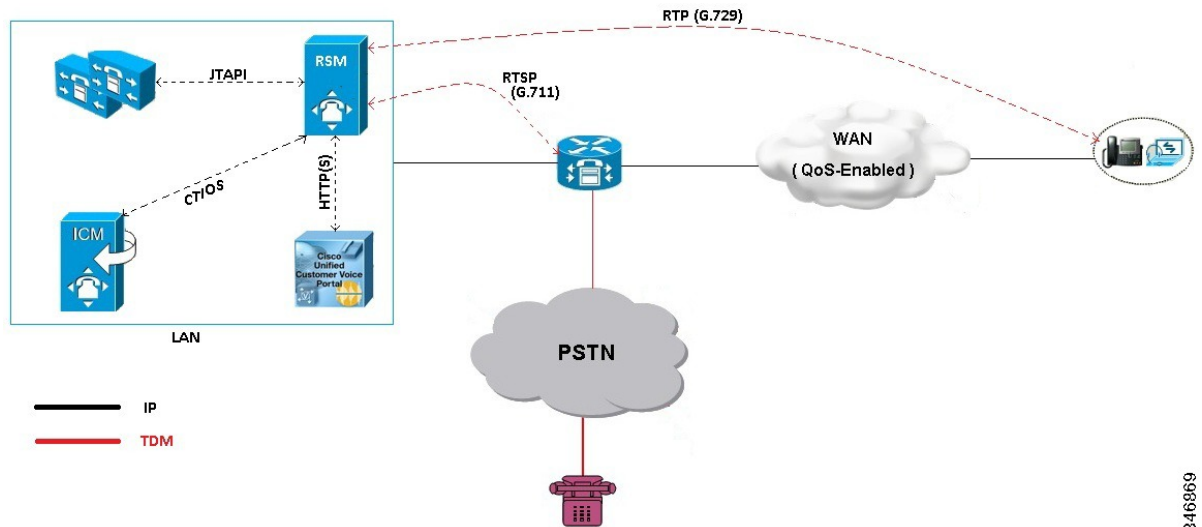
An attachment of size up to 50 KB is supported within this required bandwidth. For attachments of size greater than 50 KB, you may experience slow speed temporarily in the agent user interface during download of the attachments.

**Cisco RSM Considerations**

- [Cisco RSM Design Considerations, on page 23](#)
- [Cisco RSM High Availability, on page 23](#)
- [Cisco RSM Capabilities, on page 12](#)
- [Cisco RSM Bandwidth, Latency and QOS Considerations, on page 25](#)

*Cisco RSM Design Considerations*

**Figure 6: Cisco RSM Design Considerations**



*Cisco RSM High Availability*

The following table shows the Cisco RSM High Availability.

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**Table 7: Cisco RSM High Availability**

<b>Component</b>	<b>Failover/Failure Scenario</b>	<b>New Call Impact</b>	<b>Active Call Impact</b>	<b>Post-recovery Action</b>
RSM Server	RSM server (hardware) fails	Attempts to contact the RSM server fail	Active monitoring sessions terminate and supervisor is directed to the main menu	Supervisor can monitor calls after the RSM server becomes active
CTI OS Server	CTI OS Server Failure	Supervisor can monitor new calls without any failure	Active monitoring sessions will continue normally	Failover is seamless
CTI	Active CTI Gateway process fails	Supervisor can establish new monitoring sessions until the secondary CTI process becomes active	Active monitoring sessions continue normally	After the CTI Gateway becomes active the supervisor can establish new monitoring sessions
VLEngine	VLEngine fails	Supervisor can establish new monitoring sessions when VLEngine becomes active	Active monitoring sessions terminate and supervisor is directed to the main menu	After the VLEngine becomes active the supervisor can establish new monitoring sessions
PhoneSim	PhoneSim fails	Supervisor can monitor new calls when PhoneSim becomes active	Active monitoring sessions continue normally	After the PhoneSim becomes active the supervisor can establish new monitoring sessions
Unified CM	Active Subscriber fails	New calls cannot be established until the secondary subscriber becomes active	Active monitoring sessions continue normally	After the secondary subscriber becomes active the supervisor can establish new monitoring sessions
JTAPI	JTAPI gateway fails	Supervisor can establish new calls without any failure	Active monitoring sessions continue normally	Failover is seamless
Unified CVP	Active CVP fails	New calls cannot be established until the Unified CVP becomes active	Active monitoring sessions terminate	After the Unified CVP becomes active the supervisor can establish new monitoring sessions



*Cisco RSM Capabilities*

<b>Platform</b>	<b>Capabilities</b>
Call Flow	The Supervisor can only monitor agents who are in talking state.
Desktop	CTIOS
Voice Codec	Between Agent and RSM: G.729 (RTP) Between RSM and VXML Gateway: G.711 (RTSP)
Concurrent Monitoring Sessions	120
Monitored Calls (per minute)	17
Maximum Configured Agents per PG	12000
SimPhone Start line Number Range	Four to fifteen digits

*Cisco RSM Bandwidth, Latency and QOS Considerations*

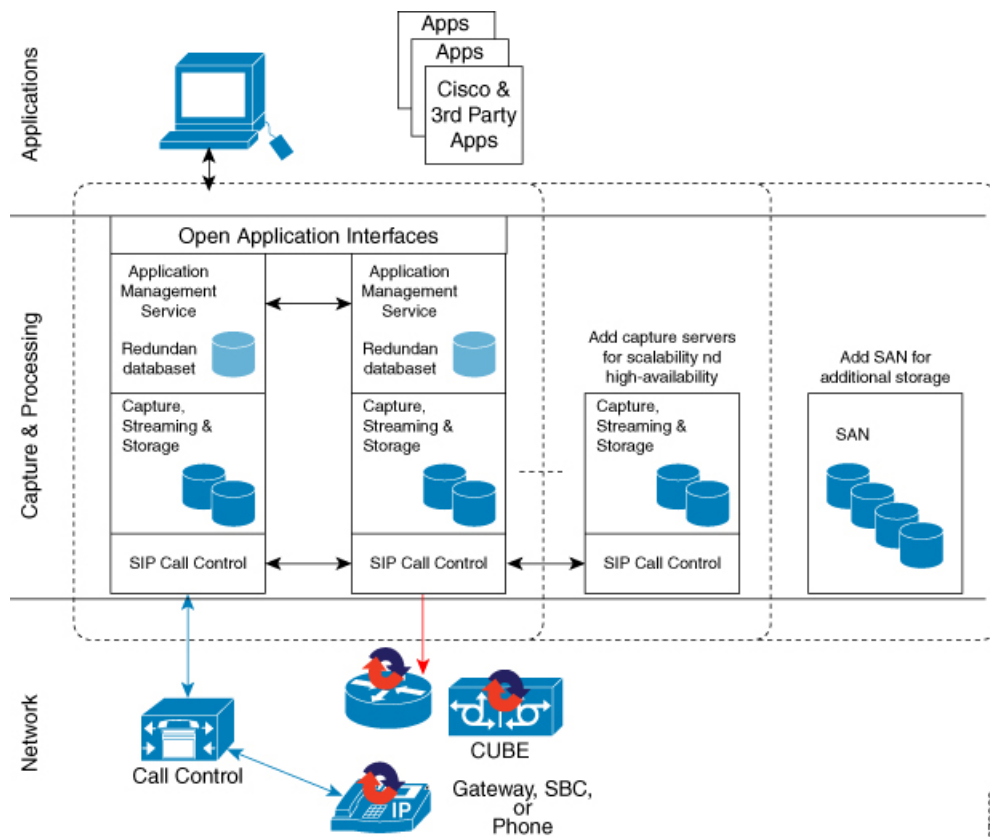
<b>RSM Peer</b>	<b>Purpose</b>	<b>Protocols Used</b>	<b>Data Format</b>	<b>Relative Bandwidth Requirements</b>	<b>Link Latency Requirements</b>
VRU	Service Requests and Responses	TCP (HTTP)	Textual	Minimal	< 500 ms avg.
VRU	Requested Voice Data from PhoneSim to VRU	TCP (HTTP)	G711, chunked transfer mode encoding	High (about 67 to 87 kbps per session)	< 400 ms avg.
Unified CM	Issuance of Agent Phone Monitoring	TCP (JTAPI)	Binary (JTAPI stream)	Minimal	< 300 ms avg.
CTI OS Server (PG)	Environment Events and Supervisor Logins	TCP (CTI OS)	Binary (CTI OS stream)	Minimal	< 300 ms avg.
Agent Phones	Simulated Phone Signaling	TCP or UDP (SIP)	Textual	Minimal	< 400 ms avg.
Agent Phones	Monitored Phone Voice Data	UDP (RTP)	Binary (G.711)	High (about 67 to 87 kbps per session)	< 400 ms avg

## Cisco MediaSense Considerations

- [Cisco MediaSense Design Considerations](#), on page 26
- [Cisco MediaSense Capabilities](#), on page 13
- [Cisco MediaSense High Availability](#), on page 27
- [Cisco MediaSense Bandwidth, Latency and QOS Considerations](#), on page 27

### Cisco MediaSense Design Considerations

**Figure 7: Cisco MediaSense Design Considerations**



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### Cisco MediaSense Capabilities

Platform	Capabilities
Phone	All HCS supported Phone. See list of supported phones in <a href="#">Voice Infrastructure</a> , on page 13 section.
Supported Model	2vCPU, 4vCPU and 7vCPU profiles.
Voice Codec	G.711 and G.729

Platform	Capabilities
Session	See session related details in <a href="http://docwiki.cisco.com/wiki/Virtualization_for_Cisco_MediaSense#Version_10.x">http://docwiki.cisco.com/wiki/Virtualization_for_Cisco_MediaSense#Version_10.x</a> .
Media Forking	CUBE, Phone and TDM
Network	Inter cluster communication over WAN is not supported.

### *Cisco MediaSense High Availability*

Component	Failover/Failure Scenario	New Call Impact	Active Call Impact	Postrecovery Action
Recording Sever	Primary Recording Sever is down	Distributes the incoming load across the remaining severs.	Unified CM sets a time limit beyond which, if the recording hasn't begun, it will stop trying, and Active calls will not get recorded till CM established the connection with Recording server.	Call will get recorded on failed recording sever once it becomes active.
	Secondary Recording Server	No Impact	No Impact	No Impact
Database	Either Primary or Secondary server goes down	No Impact	No Impact	Data Replication begins automatically.

### *Cisco MediaSense Bandwidth, Latency and QOS Considerations*

MediaSense requires gigabit LAN connectivity with 2ms or less between servers within a cluster.

### **Cisco Unified SIP Proxy Considerations**

- Consists of 2 gateways for redundancy, geographically separated, 1 proxy module each, using SRV priority for redundancy of proxies, no HSRP
- CUSP can co-reside with VXML or TDM gateways. In earlier versions of Unified CVP due to platform validation restriction co-residency was not supported, and a dedicated ISR was required for proxy functionalities
- TDM gateways are configured with SRV or with Dial Peer Preferences to use the primary and secondary CUSP proxies
- CUSP is set with Server Groups to find primary and back up Unified CVP, Unified CM and VXML gateways
- Unified CVP is set up with Server Group to use the primary and secondary CUSP proxies

- Cisco Unified CM is set up with a Route Group with multiple SIP Trunks, to use the primary and secondary CUSP proxies

### *Performance Matrix for CUSP Deployment*

CUSP baseline tests were done in isolation on the proxy, and capacity numbers (450 TCP transactions per second) should be used as the highest benchmark, and most stressed condition allowable. A CVP call, from the proxy server perspective, entails on average, 4 separate SIP calls:

- Caller inbound leg
- VXML outbound leg
- Ringtone outbound leg
- Agent outbound leg

When a consult with CVP queuing occurs, an additional 4 SIP transactions will be incurred for the session, effectively doubling the number of calls.



#### **Note**

Always turn the Record Route setting off on the proxy server to avoid a single point of failure and allow fault tolerance routing, as well as increase the performance of the Proxy server. Using record route setting on the proxy server doubles the impact to performance, as shown in the CUSP baseline matrix, and also breaks the high availability model since the proxy becomes a single point of failure for the call, if the proxy were to go down.

Record Route is turned off by default on CUSP.

## **Cisco SPAN based Monitoring Considerations**

### *Silent Monitoring Bandwidth, Latency and QOS Considerations*

With Silent Monitoring supervisors can listen to the agent calls in Unified CCE call centers that use CTI OS. Voice packets sent to and received by the monitored agent's IP hardware phone are captured from the network and sent to the supervisor desktop. At the supervisor desktop, these voice packets are decoded and played on the supervisor's system sound card. Silent Monitoring of an agent consumes approximately the same network bandwidth as an additional voice call. If a single agent requires bandwidth for one voice call, then the same agent being silently monitored requires bandwidth for two concurrent voice calls. To calculate the total network bandwidth required for your call load, multiply the number of calls by the per-call bandwidth figure for your particular codec and network protocol.

## **Optional Component Bandwidth, Latency and QOS Considerations**

This section describes the bandwidth and QOS considerations for Cisco HCS for Contact Center Optional components.

- [Silent Monitoring Bandwidth, Latency and QOS Considerations, on page 28](#)
- [Cisco RSM Bandwidth, Latency and QOS Considerations, on page 25](#)
- [Cisco WIM and EIM Bandwidth, Latency and QOS Considerations, on page 23](#)
- [Cisco MediaSense Bandwidth, Latency and QOS Considerations, on page 27](#)

### Silent Monitoring Bandwidth, Latency and QOS Considerations

With Silent Monitoring supervisors can listen to the agent calls in Unified CCE call centers that use CTI OS. Voice packets sent to and received by the monitored agent's IP hardware phone are captured from the network and sent to the supervisor desktop. At the supervisor desktop, these voice packets are decoded and played on the supervisor's system sound card. Silent Monitoring of an agent consumes approximately the same network bandwidth as an additional voice call. If a single agent requires bandwidth for one voice call, then the same agent being silently monitored requires bandwidth for two concurrent voice calls. To calculate the total network bandwidth required for your call load, multiply the number of calls by the per-call bandwidth figure for your particular codec and network protocol.

### Cisco RSM Bandwidth, Latency and QOS Considerations

RSM Peer	Purpose	Protocols Used	Data Format	Relative Bandwidth Requirements	Link Latency Requirements
VRU	Service Requests and Responses	TCP (HTTP)	Textual	Minimal	< 500 ms avg.
VRU	Requested Voice Data from PhoneSim to VRU	TCP (HTTP)	G711, chunked transfer mode encoding	High (about 67 to 87 kbps per session)	< 400 ms avg.
Unified CM	Issuance of Agent Phone Monitoring	TCP (JTAPI)	Binary (JTAPI stream)	Minimal	< 300 ms avg.
CTI OS Server (PG)	Environment Events and Supervisor Logins	TCP (CTI OS)	Binary (CTI OS stream)	Minimal	< 300 ms avg.
Agent Phones	Simulated Phone Signaling	TCP or UDP (SIP)	Textual	Minimal	< 400 ms avg.
Agent Phones	Monitored Phone Voice Data	UDP (RTP)	Binary (G.711)	High (about 67 to 87 kbps per session)	< 400 ms avg

### Cisco WIM and EIM Bandwidth, Latency and QOS Considerations

The minimum required network bandwidth for an agent connecting to the Cisco Interaction Manager servers on login is 384 kilobits/second or greater. After login in a steady state an average bandwidth of 40 kilobits/second or greater is required.

An attachment of size up to 50 KB is supported within this required bandwidth. For attachments of size greater than 50 KB, you may experience slow speed temporarily in the agent user interface during download of the attachments.

## Cisco MediaSense Bandwidth, Latency and QoS Considerations

MediaSense requires gigabit LAN connectivity with 2ms or less between servers within a cluster.

# Determine the Hardware Requirements

## Procedure

- 
- Step 1** Determine the hardware requirements by using one of the following hardware configurations:
- [Tested Reference Configurations](#), on page 30. You must use UCS B230 M2 blade servers in a specific configuration.
  - [Specification-Based Hardware Support](#), on page 31. You can use UCS B2XX blade servers with a Cisco Unified Border Element (Enterprise edition).
- Step 2** If the deployment includes optional Cisco or third-party components, determine if you require additional hardware.  
See the storage and blade placement considerations section in *Installing and Configuring Cisco HCS for Contact Center* at <http://www.cisco.com/c/en/us/support/unified-communications/hosted-collaboration-solution-contact-center/products-installation-guides-list.html>.
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## Tested Reference Configurations

This section lists the specifications for the UCSB200 M3 Blade server. The *source* system at the partner or service provider uses one core server for the golden template environment. The customer *destination* system must run in a duplexed environment using a pair of core Unified Computing System (UCS) UCSB200 M3 blade servers known as Side A and Side B.

**Table 8: B200 M3 Blades**

Server Model	Cisco UCS B200 M3 Tested Reference Configuration (TRC) blade server
CPU Type	Intel(R) Xeon(R) 2.80 GHz E5-2680 v2/15W 10C/25MB Cache
CPU Cores	Two 10-core CPUs
Memory	16 X [16GB DDR3-1866-MHz-RDIMM/PC-3-14900/dual rank/x4/1.5v]
Disks	Diskless

<b>Server Model</b>	<b>Cisco UCS B200 M3 Tested Reference Configuration (TRC) blade server</b>
Virtual Interface	Cisco UCS VIC 1240 modular LOM for M3 blade servers
Part Number	UCS-EZ7-B200-P

## Specification-Based Hardware Support

Cisco HCS for Contact Center supports [specification-based hardware](#), but limits this support to only UCS B-Series blade hardware. This section provides the supported server hardware, component version, and storage configurations.

**Table 9: Hardware Requirements**

Server	Component	Description
Cisco UCS B2XX Blade Server, such as <ul style="list-style-type: none"> <li>• Cisco UCS-B200M2-VCS1 Blade Server</li> <li>• Cisco UCS-B200M3 Blade Server</li> <li>• Cisco UCS-B230M2-VCDL1 Blade Server</li> </ul>	CPU Type	Intel Xeon 5600 family 2.40 GHz physical core speed minimum Intel Xeon 7500 family 2.40 GHz physical core speed minimum Intel Xeon E5-2600 family 2.4 GHz physical core speed minimum Intel Xeon E5-4600 family 2.4 GHz physical core speed minimum Intel Xeon E7-2800 family 2.4 GHz physical core speed minimum Intel Xeon E7-4800 family 2.4 GHz physical core speed minimum Intel Xeon E7-8800 family 2.4 GHz physical core speed minimum
	Memory	128 GB minimum
	Virtual Interface Card	In addition to legacy M71KR-Q support, all Cisco Virtual Interface Cards (VICs) are also supported.
Cisco Unified Border Element Enterprise Gateway		ISR G2 with a combination of TDM and VXML. Cisco supports ISR G2, which includes 3925E and 3945E gateways.
Cisco Unified Border Element SP		Cisco ASR 1000 series with Unified model

Server	Component	Description
Cisco Unified SIP Proxy		Services Module with Services Ready Engine
Adaptive Security Appliance		Cisco ASA 5585

**Note**

For specification-based hardware, total CPU reservations must be within 65 percent of the available CPU of the host and total memory reservations must be within 80% of the available memory of the host.

## Determine the Software Requirements

### Before You Begin

- Review the *Cisco Hosted Collaboration Solution Compatibility Matrix* at [http://www.cisco.com/en/US/partner/products/ps11363/products\\_device\\_support\\_tables\\_list.html](http://www.cisco.com/en/US/partner/products/ps11363/products_device_support_tables_list.html).
- Review the required software section in *Installing and Configuring Cisco HCS for Contact Center* at <http://www.cisco.com/c/en/us/support/unified-communications/hosted-collaboration-solution-contact-center/products-installation-guides-list.html>.

### Procedure

- 
- Step 1** Identify the required software for Cisco HCS for Contact Center for the required and optional components.
  - Step 2** Identify the requirements for automation software.
  - Step 3** Identify any requirements for third-party software.
  - Step 4** Identify the requirements for software licenses according to the agent deployment model.
  - Step 5** Identify any requirements for configuration software.
- 

## Plan Solution Serviceability

### Procedure

- 
- Step 1** Review the specified limits for the virtual machine performance counters. See [Virtual Machine Performance Monitoring](#), on page 33.
  - Step 2** Review the specified limits for the EXSi performance counters. See [ESXi Performance Monitoring](#), on page 34.
-



## Virtual Machine Performance Monitoring

The virtual machines must operate within the specified limits of the Virtual Machine performance counters listed in the following table.

**Table 10: Virtual Machine Performance Counters**

Category	Counter	Description	Threshold
CPU	CPU Usage (Average)	The CPU usage average in percentage for the VM and for each of the vCPUs.	60%
	CPU Usage in MHz (Average)	The CPU usage average in MHz.	95 percentile is less than 60% of the total MHz available on the VM. Total MHz = vCPUs x (Clock Speed).
	CPU Ready	The time a virtual machine or other process waits in the queue in a ready-to-run state before it can be scheduled on a CPU.	150 mSec.
Memory	Memory Usage (Average)	Memory Usage = Active / Granted * 100	80%
	Memory Active (Average)	Memory that the guest OS and its applications actively use or reference. The server starts swap when it exceeds the amount of memory on the host.	95 percentile is less than 80% of the granted memory.
	Memory Balloon (Average)	ESXi uses balloon driver to recover memory from less memory-intensive VMs so it can be used by those with larger active sets of memory.	0
	Memory Swap used (Average)	ESX Server swap usage. Use the disk for RAM swap.	0

Category	Counter	Description	Threshold
Disk	Disk Usage (Average)	Disk Usage = Disk Read rate + Disk Write rate	Ensure that your SAN is configured to handle this amount of disk I/O.
	Disk Usage Read rate	The rate of reading data from the disk.	Ensure that your SAN is configured to handle this amount of disk I/O.
	Disk Usage Write rate	The rate of writing data to the disk.	Ensure that your SAN is configured to handle this amount of disk I/O.
	Disk Commands Issued	The number of disk commands issued on this disk in the period.	Disk IO per second IOPS = Disk Commands Issued / 20 Ensure that your SAN is configured to handle this amount of disk I/O.
	Stop Disk Command	The number of disk commands aborted on this disk in the period. The disk command aborts when the disk array takes too long to respond to the command. (Command timeout).	0
Network	Network Usage (Average)	Network Usage = Data receive rate + Data transmit rate	30% of the available network bandwidth.
	Network Data Receive Rate	The average rate at which data is received on this Ethernet port.	30% of the available network bandwidth.
	Network Data Transmit Rate	The average rate at which data is transmitted on this Ethernet port.	30% of the available network bandwidth.

## ESXi Performance Monitoring

The virtual machines must operate within the specified limits of the ESXi performance counters listed in the following table. The counters listed apply to all hosts that contain contact center components.

**Table 11: ESXi Performance Counters**

Category	Counter	Description	Threshold
CPU	CPU Usage (Average)	CPU Usage Average in percentage for ESXi Server overall and for each of the CPU processors.	60%
	CPU Usage in MHz (Average)	CPU Usage Average in MHz for ESXi server overall and for each of the CPU processors.	60% of the available CPU clock cycles.

Category	Counter	Description	Threshold
Memory	Memory Usage (Average)*	Memory Usage = Active / Granted * 100	80%
	Memory Used by VMKernel	Memory Used by VMKernel	95 percentile is less than 80% of 2GB.
	Memory Balloon (Average)	ESX use balloon driver to recover memory from less memory-intensive VMs so it can be used by those with larger active sets of memory.	0
	SwapUsed	ESX Server swap usage. Use the disk for RAM swap.	0
Disk	Disk Commands Issued	Number of disk commands issued on this disk in the period.	Disk IO per second IOPS = Disk Commands Issued / 20
	Disk Commands Aborts	Number of disk commands aborted on this disk in the period.  Disk command aborts when the disk array is taking too long to respond to the command. (Command timeout).	0
	Disk Command Latency	The average amount of time taken for a command from the perspective of a Guest OS.  Disk Command Latency = Kernel Command Latency + Physical Device Command Latency.	20 mSec.
	Kernel Disk Command Latency	The average time spent in ESX Server VMKernel per command.	Kernel Command Latency should be very small compared to the Physical Device Command Latency, and it should be close to zero.

Category	Counter	Description	Threshold
Network	Network Usage (Average)	Network Usage = Data receive rate + Data transmit rate	30% of the available network bandwidth.
	Network Data Receive Rate	The average rate at which data is received on this Ethernet port.	30% of the available network bandwidth.
	Network Data Transmit Rate	The average rate at which data is transmitted on this Ethernet port.	30% of the available network bandwidth.
	droppedTx	Number of transmitting packets dropped.	0
	droppedRx	Number of receiving packets dropped.	0

\* The CVP Virtual Machine exceeds the 80% memory usage threshold due to the Java Virtual Machine memory usage.

## Determine the Active Directory Deployment

### Procedure

- 
- Step 1** Review [AD at Customer Premises](#), on page 36.
  - Step 2** Review [AD at Service Provider Premises](#), on page 37.
- 

## AD at Customer Premises

In the AD at the customer premises model, the service provider needs to request that the customer add entries into the customer AD to enable the service provider to sign into the system deployed in the domain. The service provider should be a local machine administrator and belong to the setup group for components that need to be installed and managed in the Cisco HCS for Contact Center environment. To run the Domain Manager, the service provider must be a domain administrator or a domain user with domain read and write permissions to create Organizational Units (OU) and groups.

The end-customer use of the Cisco HCS for Contact Center solution is limited if the customer premises AD is inaccessible to the Cisco HCS for Contact Center Virtual Machines. Cisco strongly advises service providers to work with end customers to ensure that they understand the potential service limitations when they use the AD at the customer premises model.

Cisco HCS for Contact Center also supports a deployment where the Cisco HCS for Contact Center components are associated with the AD at the service provider premises, and the CTI OS client desktops are part of the customer premises corporate AD. Consider the following for the AD in this deployment:

- The instance administrator account is created in the service provider domain.
- The instance administrator uses the Unified CCDM and Unified Intelligence Center to create agents, supervisors, and reporting users in the service provider domain.
- The instance administrator configures all supervisors and reporting users.

## AD at Service Provider Premises

In the AD at the service provider premises model, the service provider must have a dedicated AD for each customer instance. Each customer AD needs to be updated with Cisco HCS for Contact Center servers and accounts. The service provider administrator needs to be added to each customer AD to manage the Contact Center environment.

You can use overlapping IP addresses for each customer deployment. For example, Cisco Unified Border Element — Enterprise, Unified CCE, and Unified CVP should be able to overlap IP addresses across customers. When you use overlapping IP addresses, the static Network Address Translation (NAT) provides access from the management system to each Cisco HCS for Contact Center environment.

## Determine the Blade and Storage Placement Requirements

### Before You Begin

Review the section on storage and blade placement considerations in *Installing and Configuring Cisco HCS for Contact Center* at <http://www.cisco.com/c/en/us/support/unified-communications/hosted-collaboration-solution-contact-center/products-installation-guides-list.html>.

### Procedure

- 
- Step 1** Review the storage and blade placement for Cisco HCS shared management components.
  - Step 2** Review the storage and blade placement for Cisco HCS core components.
  - Step 3** Review the storage and blade placement for Cisco HCS optional components.
- 

## Determine High Availability Requirements

### Before You Begin

Review the section on high availability considerations in *Installing and Configuring Cisco HCS for Contact Center* at <http://www.cisco.com/c/en/us/support/unified-communications/hosted-collaboration-solution-contact-center/products-installation-guides-list.html>.

### Procedure

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- Step 1** Review the high availability considerations for Cisco HCS for Contact Center core components.
  - Step 2** Review the high availability considerations for Cisco HCS for Contact Center optional components.
- 

## Plan the Solution for Handling Congestion Control

### Before You Begin

Review the section on congestion control considerations in *Installing and Configuring Cisco HCS for Contact Center* at <http://www.cisco.com/c/en/us/support/unified-communications/hosted-collaboration-solution-contact-center/products-installation-guides-list.html>.

### Procedure

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- Step 1** Determine the supported congestion control deployment types.
  - Step 2** Determine the congestion treatment mode options.
  - Step 3** Determine the congestion control levels and thresholds.
- 

## Plan the UCS Networking Requirements

### Before You Begin

Review the section on UCS network considerations in *Installing and Configuring Cisco HCS for Contact Center* at <http://www.cisco.com/c/en/us/support/unified-communications/hosted-collaboration-solution-contact-center/products-installation-guides-list.html>.

### Procedure

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- Step 1** Determine the deployment model.
  - Step 2** Determine the data center design.
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# Determine the Trunk Design

## Procedure

- 
- Step 1** In the data center, review the trunk design for the Cisco Unified Border Element Service Provider edition. In a Cisco HCS for Contact Center deployment, the Cisco Unified Border Element Service Provider edition connects to the Cisco Unified Border Element Enterprise edition.
- Step 2** Review the considerations for [CUBE-Enterprise at Customer Premise](#), on page 39. Estimate the number of SIP sessions required in the CUBE-Enterprise. Go to the Ordering Tool at <https://www-gsc.cisco.com/swc/cisco/ciscoAdvisor.action?sfId=CISCO&scFlag=Y>.
- Step 3** Review the considerations for [TDM Gateway at Customer Premise](#), on page 39.
- 

## CUBE-Enterprise at Customer Premise

Consider the following if you use the Cisco Unified Border Element - Enterprise at the customer premise:

- Cisco Unified Border Element - Enterprise gateway and the Cisco VXML gateway reside at the customer premise and calls are queued at the customer premise.
- The Cisco Unified Border Element - Enterprise and VXML gateway can be co-located on the same ISR, or located on different ISRs for cases where the number of IVR ports to agent ratio is small.
- Cisco Unified Border Element - Enterprise Integrated Services Router (ISR) provides the security, routing, and Digital Signal Processors (DSPs) for transcoders.
- Redundant Cisco Unified Border Element - Enterprise and Cisco VXML ISRs for failover and redundancy.
- WAN bandwidth must be sized appropriately for calls from CUBE(SP) to CUBE - Enterprise at the customer premise.
- Cisco Unified Border Element Enterprise supports flow-through mode. Flow-around mode is not supported.

## TDM Gateway at Customer Premise

You can route PSTN calls using local gateway trunks if you prefer to keep your E1/T1 PSTN.

Consider the following if you use the TDM gateway at the customer premise:

- Both the Cisco TDM gateway and the Cisco VXML gateway reside at the customer premise.
- PSTN delivery is at the local customer premise.
- The media stays local at the customer premise for the local PSTN breakout. The IVR call leg is deterministically routed to the local VXML gateway and only uses the centralized resources in spill-over scenarios.

- When media is delivered to a different site, Cisco Unified Communications Manager location-based call admission control limits the number of calls over the WAN link.
- Calls local to a customer premise use the G.711 codec. Calls going over the WAN link can use the G.729 codec to optimize the WAN bandwidth.
- ASR/TTS server for local breakout is at the customer premise and resides on a UCS or bare metal server.
- CUBE(E) can also be used as an alternative for both TDM gateway and VXML gateway.
- A new call for HCS for Contact Center must originate from the TDM gateway to anchor the call to the survivability service. The Contact Center dialed number to route the calls to Unified Communications Manager must be configured manually.




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**Note** You need to manually modify the call routing from TDM gateway for the session target to route the call directly to Unified CVP.

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## Firewall Hardening Considerations

This section describes the specific ports required, which should be allowed from the Contact Center and customer networks, but are restricted only to the ports required for the services that need to be exposed, as well as from specific hosts or networks wherever possible. For an inventory of the ports used across the Hosted Collaboration Solutions for Contact Center applications, see the following documentation:

- [Port Utilization Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted](#)
- [Cisco Unified Customer Voice Portal \(CVP\) Solution Reference Network Design \(SRND\)](#). See section 'TCP/UDP ports used by Unified CVP, voice, and VoiceXML gateways in the *Network infrastructure considerations* chapter.
- [Cisco Unified Intelligence Center TCP and UDP Port Usage](#)
- [Installation and Getting Started Guide for Cisco Finesse](#). See the 'Ports used for Cisco Finesse' section in the *Frequently Asked Questions*. See chapter *Cisco Finesse port utilization* section in the *APPENDIX C*.
- [Cisco Unified Web and E-Mail Interaction Manager Solution Reference Network Design Guide](#). See the 'Port Number Configuration Between Components' in the *System Architecture* chapter.
- [Cisco Remote Silent Monitor Installation and Administration Guide](#). See the 'Port Numbers Used' section in the *Installation* chapter.
- [Cisco Media Sense User Guide](#). See the 'Port Usage' section in the *MediaSense Features and Services* chapter.