Hardware and System Software Specification (Bill of Materials) for Cisco Unified ICM/Contact Center Enterprise & Hosted

Release 9.0(x)

Revision 1.14

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1 Overview

The purpose of this document is to specify the hardware and system software compatible with and required for the Cisco Unified Intelligent Contact Management (Unified ICM) and Cisco Unified Contact Center Enterprise (Unified CCE) products* for Release 9.0(1) and subsequent 9.0(x) maintenance releases (MR).

***Note:** See the note on Contact Center Product Names in the References section.

This document is applicable to both the Enterprise and Hosted options of the Unified ICM and Unified CCE solutions.

The information contained herein is intended for use by Certified Partners and Cisco sales and system engineers, for presales hardware planning and third-party software selection, as well as for incremental system updates. In all cases, the reader is assumed to be familiar with the Unified ICM/CCE product at an overview level, and to understand high-level deployment models and essential application server types such as Logger and peripheral gateway.

Document content will be updated periodically for technical clarification and to align with subsequently qualified hardware and third-party software. Document updates are typically synchronized with minor and maintenance releases and include updated support policy details for Microsoft Service Pack (SP) support qualified for the release. New server hardware may be added to this document following initial publication; existing server hardware will not be rendered obsolete by these additions.

1.1 Hardware, System Software, and Capacity Sizing*

To simplify mapping of the hardware server configurations across various deployments, server hardware is identified as a "server class" for both MCS and vendor-sourced ("generic") servers. A server class contains one or more hardware types, based on category of processor family, memory, and hard drive configuration appropriate for the specified application. Server classes are detailed in Appendix A – Server Classes.

***Note:** System software consists of the operating system, database server, and other third-party applications

This document does not list Cisco Unified Computing System (UCS) hardware on which only virtualized Unified Contact Center components may be installed. See the Unified Communications Virtualization DocWiki page at: http://docwiki.cisco.com/wiki/Virtualization_for_Unified_CCE_9.x for detailed guidance on deploying Cisco Unified Communications products on UCS hardware.

Unified ICM/CCE system server configuration specifies hardware and associated system software. You must consider both the overall deployment model and the specific server software component configuration. Capacity sizing is an integral factor in proper requirement specification. It is indicated where requirements are tiered by system sizing, defined operating conditions and representative sizing thresholds (such as the maximum number of supported agents). Special consideration is provided for installations upgrading to Release 9.0(x) on existing hardware. A summary of system configuration boundaries is also provided, followed by specific Unified ICM/CCE solution deployments and the applicable corresponding hardware and software requirements, by server node type and capacity range. Each configuration is prefaced with a representative set of primary operating conditions on which sizing is based, with exceptions and special considerations called out under the applicable server node.

Cisco strives to enhance the usefulness of this document by ensuring accurate detailed technical information backed by an extensive in-house testing and qualification effort. We have increased the amount of sizing and system boundary information to more accurately portray expected capacity and sizing limitations of specific deployments. The reader must recognize, however, that the Unified ICM and Unified CCE systems are by design highly scalable and complex distributed systems, and it is often difficult to characterize representative configuration and workload / call flow scenarios—particularly for the high-end Unified ICM Enterprise and Unified ICM Hosted customer. Cisco often defaults to a conservative stance in sizing limitations to arrive at capacities that have the broadest level of applicability. For this reason, the system sizing and configuration limitation information contained herein should be considered as guidelines which are applicable to the vast majority of customers, but which might also have exceptions. Where specific circumstances or complex system designs dictate, Cisco strongly encourages partners and customers to consult with our Advanced Services / World Wide Voice Practice teams for further analysis and approval of specific deployments.

1.2 Updated Information in this Document

The following table provides information on publication updates for this document.

Table 1-1: Publication Updates

Rev.	Section	Notes
1.14	7.6.25 Cisco Finesse Desktops 8.5 CTI Supported Platforms	Updated Finesse Agent Desktop browser support to include Internet Explorer 9.0.
1.11	N/A	Updated for Finesse Release 9.1(1)
1.08	7.6.24 Cisco Finesse Server	Added that Finesse can be deployed according to coresidency policies outlined in the Unified Communications Virtualization DocWiki.
1.07	7.3 Unified Contact Center Management Portal	Updated hardware requirements for Unified CCMP to reflect support for up to 12,000 agents. Deleted additional limitations.
1.06	7.6.5 Administration Client 7.66. Internet Script Editor	Removed Microsoft Windows Server 2008 R2 SP1 from Operating system and other software for both sections.
1.05	N/A	Corrected numbering issues
1.04	Table 6-39	Added note about HTTP keep alive timer.
1.03	Table 7-5	Updated supported browsers for release 9.0(1).
1.02	Table 7-2	Updated SQL Server information.
1.01	Sections 6.2 and 7.5 updated	Updated sections for Cisco Finesse Release 9.0(1).
1.00	-	Initial revision for 9.0(1) release.

2 References

Cisco Unified Intelligent Contact Management/Unified Contact Center Enterprise and Hosted (Unified ICME and Unified ICMH) product information can be found on www.cisco.com.

Product documentation, including planning, upgrade, installation, configuration, reporting, reference, and developer documentation, is available at: Cisco Product Support.

Other useful documents include:

- *Cisco Unified ICM Software ACD Supplements*
  http://www.cisco.com/en/US/products/sw/custcosw/ps1844/prod_technical_reference_list.html
- *Cisco Unified ICM ACD PG Supportability Matrices*
  http://www.cisco.com/en/US/docs/voice_ip_comm/cust_contact/contact_center/ipcc_enterprise/compatibility_matrix/icmacdmx.pdf
- *Cisco Unified Contact Center Enterprise Software Compatibility Guide*
  http://docwiki.cisco.com/wiki/Compatibility_Matrix_for_Unified_CCE
- Cisco End-of-Life and End-of-Sale Notices
  http://www.cisco.com/en/US/products/sw/custcosw/ps1001/prod_eol_notices_list.html
- *Cisco Unified Contact Center Enterprise 9.x Solution Reference Network Design (SRND)*
  http://www.cisco.com/en/US/products/sw/custcosw/ps1844/products_implementation_design_guides_list.html
- *Cisco Unified Customer Voice Portal Solution Reference Network Design (SRND)*
  http://www.cisco.com/en/US/products/sw/custcosw/ps1006/products_implementation_design_guides_list.html
- *Virtualization Guide for Cisco Unified Intelligent Contact Management and Contact Center Enterprise*
  https://www.cisco.com/en/US/docs/voice_ip_comm/cust_contact/contact_center/icm_enterprise/icm_enterprise_7_5/user/guide/VirtualizationGde753.pdf
- *Bill of Material Guide for Cisco Unified Intelligence Center*
  http://www.cisco.com/en/US/docs/voice_ip_comm/cust_contact/contact_center/intelligence_suite/intelligence_suite_852/Design/guide/UnifiedIntellCenterBOM_852.pdf
- *Cisco Unified Customer Voice Portal Hardware and System Software Specification*
  http://www.cisco.com/en/US/products/sw/custcosw/ps1006/products_implementation_design_guides_list.html

Note: The documents listed above are not necessarily updated on the same schedule as the *Hardware and System Software Specification (Bill of Materials)*. For that reason, specification data might differ between this document and the references cited. For Unified ICM/CCE 9.0, see the most recent revision of these documents or those revisions listed within the specific Unified ICM/CCE release heading on Cisco.com.

The use of the generic abbreviation "Unified ICM" is intended to include both Unified ICMH and Unified ICME.

The use of the generic abbreviation "Unified CCE" in this document is intended to include Unified CCH and Unified CCE, but *not* Cisco Unified Contact Center Express (Unified CCX).

3 Servers for Cisco Contact Center Products

The Cisco Unified Contact Center Enterprise 9.0(x) product is fully supported on Cisco Unified Computing System (UCS) servers in a virtualized environment. See Unified Communications in a Virtualized Environment for more details about this deployment option.

The Unified ICM/CCE solutions are fully supported on the Cisco 7800 Series Media Convergence Server (MCS) family of Intel-based, high-performance hardware servers. The MCS 7800 family is an integral part of a complete and scalable Cisco Voice architecture solution for the enterprise, thoroughly tested for compatibility and optimal performance with the Unified ICM/ CCE product. MCS servers have a proven track record of high reliability, offer a common consistent architecture across Cisco Voice applications, and accommodate value-added Cisco support services such as SMARTnet (technical support services).

The range of MCS server sizes aligns with specific Unified ICM/CCE server node types and the corresponding anticipated capacity of a given solution. As explained in the Overview section, and as listed in Appendix A – Server Classes, MCS servers are categorized in this document by "server class" designation. Specific classes are, in turn, listed as applicable to a given Unified ICM/CCE server node type and capacity in, Unified ICM/Unified Contact Center Operating Conditions. Where specific Unified ICM/CCE component server requirements dictate certain hardware capabilities (for example, SAS-II disk drives for high transaction SQL Server deployments, or dual processor configurations to achieve specific system performance metrics), the applicable MCS servers are depicted.

Full detail on the range of MCS servers and their features can be found at the following reference:
http://www.cisco.com/go/mcs.

Unlike the Cisco Unified Communications Manager (Unified CM) and associated products, MCS servers ordered for Unified ICM/CCE deployments do not include a customized distribution of the operating system. Users ordering MCS for Unified ICM/CCE must also order the appropriate editions of Microsoft Windows Server 2008 R2, and, for database, SQL Server 2008 64-bit. *Unified ICM/CCE MCS customers assume primary maintenance responsibility for their Windows environment.*

Beginning with Release 8.5, a virtualized UCS server solution or an MCS server solution is required for all Cisco Unified Contact Center Enterprise deployments. Only *exact-match* OEM servers from Cisco-selected manufacturers (see http://www.cisco.com/go/swonly for details), or generic hardware for those components specifically indicated, can be substituted for Cisco UCS or MCS servers for Unified Contact Center Enterprise deployments. *This requirement applies to new deployments and expansions on physical servers as well as on ESX server*.

If you have non-MCS hardware, you can upgrade to a 9.0 release and remain on that hardware as long as your hardware specifications comply with Appendix A – Server Classes and your contact center capacity requirements are within the capacity limits listed in Software Constraints and Operating Conditions. For Unified ICME and Unified ICMH customers, non-MCS ("generic") servers that essentially match MCS specifications for a given server class can be deployed; these are separately specified in Appendix A – Server Classes. Note that high-end carrier-class generic servers are specified for specific applications that have no current MCS equivalent.

3.1 Server Hardware Configuration Guidelines

This section provides system integrators and customers with guidelines, supported and unsupported server hardware, and storage configurations. Cisco MCS servers prepackage a number of the specified options; however, Cisco Unified ICM and Unified CCE applications require special consideration to meet the high performance demands of the system. Whether you are acquiring Cisco MCS servers or third-party hardware, take special care to choose the appropriate level of hardware redundancy and a storage solution specific to the application nodes for which the servers are intended. Of particular importance are the storage controller, number (and capacity) of disks, and RAID configuration available. Additional guidelines are provided, for customers with large configurations and those that require long historical data retention periods.

Note that Cisco does not currently fully support deployment of the Unified ICM/CCE solution on a third-party server "blade" chassis form factor.

Note: When you plan a "technology refresh" upgrade for a Peripheral Gateway(PG), ensure at least 40 GB of hard disk space free to ensure that the OPC capture serviceability feature, when enabled, will have sufficient disk space available. This capability is vital for troubleshooting PG-related issues.

4 Supported Redundant Hardware

The following table contains supported and unsupported for redundant hardware.

Table 3-1: Supported and Unsupported Redundant Hardware

Supported Components	Unsupported Components
◆ Power supplies ◆ Fans ◆ Memory ◆ Storage controllers ◆ Disks (RAID)	Redundant network interface cards (NICs). **Caution:** Use of NIC teaming or other forms of redundant Ethernet adapters has been proven to introduce packet delivery/reception problems capable of generating latency sufficient to cause application problems.

4.1.1 CPU

Each individual core in a multicore processor does not count as a processor toward server requirements given in Appendix A – Server Classes. A processor is considered a single physical CPU, regardless of the number of cores.

4.1.2 NIC Speed/Duplex Configuration

The following table contains information on network interface card (NIC) Speed/Duplex Configuration.

Table 3-2: NIC Speed/Duplex Configuration

NIC Capability⇩	Switch Port Capability	
	10/100 MB/s	1000 MB/s
10/100 MB/s	10/100 MB/s Full Duplex	10/100 MB/s Full Duplex
1000 MB/s	10/100 MB/s Full Duplex	Auto

Note: Severe network communication problems are likely when 10/100 MB/s NICs and switch ports are not *both* explicitly set to the capable speed in *Full Duplex* operation. Cisco supports the use of gigabit (1000 MB/s) server network interface cards and gigabit network switches.

4.1.3 Storage Hardware

Cisco Unified ICM and Unified CCE are I/O intensive applications that handle call routing, process logging, and historical archiving. I/O write operation capacity is especially critical. The use of SAS hard disk drives is required unless otherwise specified. Components where Serial or Parallel ATA (Advanced Technology Attachment) drive use is acceptable are explicitly identified in the hardware specifications of the applicable node.

The following table provides information on storage hardware requirements.

Table 3-3: Storage Hardware Requirements

Required controllers	**SAS** • SAS 3.0Gb/s (minimum) • SAS 6.0Gb/s
	ATA • Serial • Parallel
Disk Drives	**SAS** • 3.5 in. Form Factor ▪ 15000 RPM for Cisco Unified ICM and Unified CCE Loggers, Historical Data Servers and other database servers ▪ 10000 RPM (minimum) for all other nodes • 2.5 in. Form Factor ▪ 15000 RPM preferred for database servers ▪ 10000 RPM (standard) for all other nodes
	ATA 7200 RPM
Additional Media	DVD drive (for software installation)

4.1.4 Configuration Guidelines

See the following list for guidelines on storage configuration:

- A dedicated on-board or add-in RAID controller must be used with a minimum of 128 MB of battery backed cache.
- Increasing the number of physical drives may increase the overall fault tolerance of the disk array.
- Use controllers with multiple channels connected to discrete drive bays or backplanes.

Note: Multiple controller channels can be significantly advantageous when there are multiple drive bays and backplane connections. Each channel of the controller can connect to a separate backplane connection, and arrays split between the channels and backplanes can take advantage of the increased throughput as well as increased resiliency.

- Each external storage enclosure has two channels.
- Multiple external storage enclosures are desirable (when needed) for increased performance and fault tolerance.
- External storage enclosures with dedicated RAID controllers are supported with MCS server systems.

4.1.4.1 Supported Configurations

The following list provides information on supported configurations:

- Fibre Channel is supported only in a point-to-point topology deployment.
- Dedicated on-board or add-in RAID controllers are required to use any of the RAID levels supported.
- RAID 1 (Mirroring and Duplexing)–This is the minimum RAID level for all critical Unified ICM and Unified CCE components. See Appendix B – RAID Configuration Requirements for details. Mirroring is typically used for boot drives on all servers to prevent loss of data and downtime in the event of a disk failure.
- RAID 5 (Block-level striping with distributed parity)–This is the minimum RAID level required for medium to large Unified ICM/CCE Rogger, Logger and AW-HDS(-DDS) database components (virtual machine guests) on Cisco Unified Computing System (UCS) hardware; RAID 5 is supported only on UCS.

  Caution: Some disk I/O performance degradation is likely when one disk in a RAID 5 array fails. Replace failed disks at the earliest appropriate opportunity to avoid system impairment or loss of data. A hot-standby may be allocated for a potential disk failure so that a rebuild can be initiated as soon as practical. A disk rebuild *will* degrade disk I/O performance during the actual rebuild (degradation level is dependent on the configured priority of a disk rebuild); choose your rebuild time window accordingly (for example, *not* during busy hours).

- RAID 10 (A Stripe of Mirrors) – This is an additional RAID level option for medium to large Unified ICM/CCE Rogger, Logger and AW-HDS(-DDS) database components (virtual machine guests) on UCS hardware. It is the required RAID level for the same database components, as well as CCMP, on direct-attached storage (that is, local disk) on MCS hardware. RAID 10 offers the highest level of disk I/O performance and redundancy.

4.1.4.2 Unsupported Configurations

The following storage configurations are not supported:

- Fibre Channel Arbitrated Loop (FC-AL) fabric topology
- Software-based RAID provided by the operating system or other software
- Proprietary RAID solutions
- RAID 0 (Striped Disk Array without Fault Tolerance)
- RAID 0+1 (A Mirror of Stripes)

Caution: RAID 0 is not supported due to the lack of fault tolerance. If one drive fails, all data in the array is lost. RAID 0+1 is not supported due to increased risks of data loss or downtime in the event of a failure.

- Network Attached Storage

  Network Attached Storage (NAS) solutions pose unacceptable risk due to the variability of the interface between the server and the NAS device; specifically, latency and bandwidth of the network link can introduce performance delays that put the solution at risk. Because of this variability, Cisco cannot support NAS for Unified ICM or Unified CCE deployments.

4.1.5 Alternative Storage Option

Unified ICM and Unified CCE server components are qualified and tuned for optimal operation on a dedicated storage solution – direct attached (internal/external) SAS. However, recognizing that some deployments have

data retention needs that exceed the storage capabilities of direct attached disk arrays, Cisco does endorse the use of a Storage Area Network (SAN) under the following conditions:

1. A SAN RAID group must be dedicated to Unified ICM/CCE database components; these SAN RAID groups must not be shared by other applications.
2. The SAN host interface (for example, Fibre Channel) must meet or exceed the performance specifications of supported (direct attached) SAS interfaces. See Storage Hardware, Required Controllers.
3. Each individual drive in the SAN array must meet or exceed the performance specifications of supported (direct attached) disk drives. See Storage Hardware, Disk Speed.

Note: SATA drives are not supported with SAN.

4. The SAN disk array must be configured as RAID 5 or RAID 10, for added performance and fault tolerance.

SAN solutions are typically deployed in a shared environment where multiple applications are contending for storage access. Because of the real-time nature of the Unified ICM/CCE application, a shared disk environment cannot be supported (for example, Unified CCE application component sharing a LUN with another application); the conditions listed above are necessary to ensure that the deployment performs within published capacity limits. If the SAN storage deployment is identified as affecting the functions of the Unified CCE solution, you will be required to deploy a direct attached storage solution instead. Moreover, if in the process of troubleshooting, the SAN itself is identified as the problem, contact the system integrator or the SAN vendor for resolution.

4.1.6 Unqualified Backup Options

Backup device/software option decisions (and procedures) are left to the end customer; no backup products are explicitly qualified by Cisco.

Caution: For performance reasons, backups must be performed outside of business hours or during periods of lowest activity. Cisco does not provide recommendations for specific backup devices or products, but internal and other direct-attached devices might have restrictions as to which platforms they are compatible with. Consult your backup product vendor to determine options for internal or external backup storage.

5 Software Upgrade and Installation Considerations

For information about upgrading to Unified ICM/CCE, Release 9.0(1), see the *Upgrade Guide for ICM and CTI OS for Cisco Unified Contact Center Enterprise, Release 9.0(1)*. For additional information on Release 9.0(1) upgrade and installation, see also the *Release Notes for Cisco Unified Contact Center Enterprise, Release 9.0(1)*.

For information about upgrading to Unified ICM/CCE, Release 8.5(2), see the *Upgrade Guide for ICM and CTI OS for Cisco Unified Contact Center Enterprise, Release 8.5(2)*. For additional information on Release 8.5(2) upgrade and installation, see also the *Release Notes for Cisco Unified Contact Center Enterprise, Release 8.5(2)*.

6 Software Scalability, Constraints, and Operating Conditions

6.1 Unified ICM/CCE Configuration Limits and Scalability Constraints

The following tables specify the configuration limits and scalability constraints for the Unified ICM/CCE products. These configuration limits are part of the Unified ICM/CCE product design constraints and were used for system sizing characteristics as tested by Cisco. Most of these system parameters (or combinations of these system parameters) form contribution factors that affect system capacity. When you design your contact center, take special care to ensure your design is deployed within these limits. (See applicable specific comments in the table below for additional detail.) Consult Cisco if you have special configuration requirements that might exceed specific parameters.

The check mark in the table indicates that a given parameter is applicable to the indicated Unified ICM/CCE product edition. See the notes at the end of this table.

Table 5-1: Configuration Limits and Scalability Constraints—Unified ICM, Unified CCE

Maximum Limit	Limit Value		Unified CCE	Unified ICME	Unified CCH	Unified ICMH	Comments
	<=450 agents (Unified CCE only)	>450 - <=12,000 agents					
ECC (Extended Context Call) and User variables size (bytes) [1]	2000	2000	✓	✓	✓	✓	Unified CVP and Outbound Option rely on a subset of this maximum limit for integration with Unified ICM.
Number of Peripheral Variables (Call Variables)	10	10	✓	✓	✓	✓	
Peripheral Variable length (characters)	40	40	✓	✓	✓	✓	40 characters, excluding terminating NULL.
VRU PIMs per VRU PG	N/A	10	✓	✓	✓	✓	7845 class only.
VRU PIMs per Generic PG	2	8	✓	✓	✓	—	7845 class only.
VRU PIMs per System PG	N/A	5	✓	—	—	—	IP-IVR PIMs only.

Maximum Limit	Limit Value		Unified CCE	Unified ICME	Unified CCH	Unified ICMH	Comments
	<=450 agents (Unified CCE only)	>450 - <=12,000 agents					
TDM PIMs per PG	N/A	5	—	✓	—	✓	Multiple PIMs on a PG can affect performance, thus lowering the total number of agents and IVR ports and call volume supported when compared to a single PIM per PG. There is a maximum of one PIM per TDM PG with CTI OS coresident.
MR PIMs per MR PG	1	2	✓	✓	✓	✓	
PGs per server per customer instance	1	2	✓	✓	✓	✓	This is not applicable to multi-instance CTI OS in a Unified CCH environment.
PGs per CICM instance	N/A	80	—	—	✓	—	This is applicable only to Unified CCH with multi-instance CTI OS deployment.
Duplex PGs per ICM instance	1	150	✓	✓	✓	✓	For <= 450 agents with outbound, there will be an additional MR PG.
PIMs per system (total)	4	250	✓	✓	✓	✓	One agent PIM, two VRU PIMs, and one MR PIM (applies to >= 450 agents only).
Configured agents per system (total) [2]	N/A	65,000	—	✓	✓	✓	
Configured agents per system (total)[2]	3000	76,000	✓	—	—	—	
Configured agents per peripheral	3000	2 x agent capacity	✓	✓	✓	✓	Example: For a 2000 agent capacity peripheral gateway, the maximum configured agents for that peripheral is 4000.
Skill groups per peripheral gateway	1500	3000	✓	✓	✓	✓	Configuration of precision queues creates a skill group per agent PG which counts towards the supported number of skill groups per PG.

Maximum Limit	Limit Value		Unified CCE	Unified ICME	Unified CCH	Unified ICMH	Comments
	<=450 agents (Unified CCE only)	>450 - <=12,000 agents					
Skill groups per system	1500	27,000	✓				Configuration of precision queues creates a skill group per agent PG which counts towards the supported number of skill groups per system.
HDS servers per Logger side	2	4	✓	✓	✓	✓	Detailed HDS deployment constraints are described in Chapter 2, "Cisco Unified Contact Center Enterprise 8.5 Solution Reference Network Design (SRND)" See Deployment-specific limits for AW and HDS Servers per Logger Side for deployment-specific limits.
Instances per CICM complex	N/A	25	—	—	✓	✓	This assumes that the total offered load for all instances and their configurations are within the limit of a maximum capacity of a single instance.
CICMs per NAM platform	N/A	75	—	—	✓	✓	The maximum CICM physical servers per NAM is six. Consult your Cisco representative if you need more than six.
CTI OS per PIM	1	1	✓	✓	✓	✓	
Instances per PG/CG/CTI OS/SIP Dialer server	N/A	10	—	—	✓	—	This assumes that the total load is for all instances and that their configurations are within the limit of maximum capacity of a single instance.
HDS instances per Hosted ADS	N/A	10	—	—	✓	✓	This assumes that the total load is for all instances and that their configurations are within the limit of maximum

Maximum Limit	Limit Value		Unified CCE	Unified ICME	Unified CCH	Unified ICMH	Comments
	<=450 agents (Unified CCE only)	>450 - <=12,000 agents					
							capacity of a single instance.
Provisioning operations per hour	30	120	✓	✓	✓	✓	For Configuration Manager, Web reskilling, CCMP, or AAS – maximum number of save operations across all ADSs in the solution in a 1-hour period. 200 changes per provisioning operation.
SCCP dialer ports per dialer	N/A	120	✓	—	✓	—	
SCCP dialers per PG pair (Side A + Side B)	N/A	2	✓	—	✓	—	Only one kind of dialer (SCCP or SIP) can be installed per PG.
SIP dialer ports per dialer	N/A	1500	✓	—	✓	—	This assumes the model is distributed, numbers vary based on deployment.
SIP dialers per PG pair (Side A + Side B)	N/A	1	✓	—	✓	—	Only one kind of dialer (SCCP or SIP) can be installed per PG.
SIP dialer Ports per server (total)	N/A	1500	—	—	✓	—	In multi-instance deployment.
Dialer ports per system (total)	N/A	4000	✓	—	✓	—	
Dialers per system (total)	N/A	32	✓	—	✓	—	***Note**:* When the number of dialer ports per system exceeds 1600, the Logger and HDS must be upgraded to GEN-50-005-Class.
Campaigns per system	N/A	100	✓	—	✓	—	
Campaigns skill groups per system	N/A	100	✓	—	✓	—	Total skill groups from all campaigns.
Campaign skill groups per campaign	N/A	20	✓	—	✓	—	Limitation on skill groups for any given campaign (as long as the maximum

Maximum Limit	Limit Value		Unified CCE	Unified ICME	Unified CCH	Unified ICMH	Comments
	<=450 agents (Unified CCE only)	>450 - <=12,000 agents					
							100 campaign skill groups per system not exceeded).
All-event clients (CTI Server)	1	5	✓	✓	✓	✓	
Dialed numbers per system	1500	240,000	✓				
Labels configured per system	500	160,000	✓				
Call type skill groups per interval	1000	30,000	✓	✓	✓	✓	Total call type skill group records.
Configured call types	500	10,000	✓	✓	✓	✓	Total call types configured.
Active call types	250	8000	✓	✓	✓	✓	
Routing scripts configured per system	500	2000	✓	✓	✓	✓	
Active Routing Scripts at any point in time	250	300	✓				
Precision Routing (PR) Attributes per system	N/A	10,000	✓	—	—	—	
PR Attributes per Agent	N/A	50	✓	—	—	—	
PR Precision Queues (PQ) per system	N/A	2000	✓	—	—	—	
PR PQ Steps per system	N/A	5000	✓	—	—	—	
PR Terms per PQ Step	N/A	10	✓	—	—	—	
PR Steps per PQ	N/A	10	✓	—	—	—	
PR Unique attributes per PQ	N/A	5	✓	—	—	—	

[1]**Note:** The maximum indicated is independent from the number of ECC and user variables used, with each representing approximately 50 bytes additional storage per record. Note also that with the introduction of selective ECC variable persistence in Unified ICM/CCE 7.1, the maximum includes both persistent and nonpersistent variables.

[2]**Note:** Deployments approaching these limits are at risk of performance degradation and failed call routing, especially if one or more contending capacity limitations are themselves approaching maximum thresholds. For this reason, Cisco strongly recommends partner and/or professional services engagement for expert assistance with capacity-related system planning. The set of related parameters which have the greatest impact on performance with large numbers of configured agents includes total number of system peripherals, routes, number of active (versus configured) agents, and overall call load. The points at highest risk for degradation are busy hours and the half-hour update period, during which PG-generated reporting data is sent to the Central Controller. System administrators can lessen their exposure to these issues by purging unused configured agents, retiring inactive peripherals, and maintaining systems at current maintenance release levels.

Note: For Unified CCH running with SCCP dialer, there is only one instance of Outbound Option per CICM platform/complex with a maximum of two dialers per PG pair.

6.1.1 Deployment-specific limits for AW and HDS Servers per Logger Side

Additional AWs can only be deployed by reducing an equal number of AW-HDSs.

Table 5-2: Administration and Data Server Deployment Limits

Component	Capacity (Agents)			
	450	4000	8000	12,000
AW only per logger side	N/A	1	1	2
AW-HDS-DDS per logger side	1	1	N/A	N/A
AW-HDS per logger side	N/A	N/A	3	3
HDS-DDS per logger side	N/A	N/A	1	1

6.2 Unified ICM/Unified CCE Operating Conditions

Except when explicitly specified, the Unified ICM/CCE hardware selection described in this section is based on the following operating conditions. In determining how to size a Unified ICM or Unified CCE software implementation, it is important to consider the factors listed here. While there are additional variables that would affect system capacity, Cisco has chosen a representative subset and provided a set of values on which the sizing limitations herein are based. These values are provided in the following table.

Table 5-3: Operating Conditions, Unified ICM, Unified CCE

Operating Condition	Value		Unified CCE	Unified ICME	Unified CCH	Unified ICMH	Comments
	<=450 agents	>450 - <12,000 agents					
Maximum number of CTI OS Servers per PG	1	1	✓	✓	✓	✓	Simplex CTI OS system (not for production systems)
	2	2	✓	✓	✓	✓	Duplex CTI OS

Operating Condition	Value		Unified CCE	Unified ICME	Unified CCH	Unified ICMH	Comments
	<=450 agents	>450 - <12,000 agents					
							system
Maximum number of Cisco Finesse servers per PG	2	2	✓	✓	✓	✓	
Average skill groups per agent per team	5	5	✓	✓	✓	✓	Does not include default skill group; assumes 17 statistics per skill group enabled
Number of supervisors	10%	10%	✓	—	✓	—	10% of total agent population
Number of teams	Agents/10	10%	✓	—	✓	—	10% of total agent population (9 agents and 1 supervisor per team)
Monitor mode applications (CTI OS)	2	2	✓	✓	—	✓	
	N/A	10	—	—	1 per instance	—	
All-event clients (CTI Server) with single processor server	2	4	✓	✓	✓	✓	
ECC variables	5 scalars	5 scalars	✓	✓	✓	✓	40 bytes each
Call flow traffic on straight calls	85%	85%	✓	✓	✓	✓	
Call flow traffic on transfer calls	10%	10%					
Call flow traffic on conference calls	5%	5%					
Outbound dialer call transfer rate	N/A	30%	✓	—	✓	—	Percentage of the calls transferred to agent or IVR

6.3 Congestion Control

Unified CCE 9.0 introduced the Congestion Control feature, which provides protection to the Central Control Router from overload conditions, due to high call rates. The main objective of congestion control is to keep the system running close to its rated capacity, when faced with extreme overload. The rated capacity of a system is based on the configured deployment type as defined in the "Deployment Types" table that follows.

The GOAL is to give satisfactory service to a smaller percentage of calls (the rated capacity) rather than a highly degraded service to all the calls, during an overloaded condition. This is achieved by restricting capacity on the system by rejection calls by the Routing Clients at the call entry point. Throttling the capacities, ensures the service of those calls routed are successful, meaning no lates or timeouts. This prevents overloading the call router in the

Central Controller, and ensures the designed call processing throughput when the system is subjected to overload conditions. The following table lists the supported deployment types with the maximum supported CPS.

Table 5-4: Deployment Types

Deployment Type	Maximum Calls Per Second
Unified CCE 12,000 Agents Router/Logger	105
Unified CCE 8000 Agents Router/Logger	69
Unified CCE 4000 Agents Rogger	35
Unified CCE 450 Agents Progger	4
HCS-CC 1000 Agents	8
HCS-CC 500 Agents	5
Unified ICM Rogger	58
Unified ICM Router/Logger	115
NAM	300
NAM Rogger	150
Packaged CCE: CCE-PAC-M1	8
Packaged CCE: CCE-PAC-M1 Lab Only	1
IVR-ICM	300

6.4 Unified ICM/Unified CCE Scalability

This section describes the impacts on Unified ICM/Unified CCE scalability and capacity calculations based on the contact center configuration.

6.4.1 CTI OS Security Scalability

Note: Agent capacity is decreased by 25% when CTI OS Security is enabled.

6.4.2 Mobile Agents Scalability

Mobile agents are defined as agents using phones not directly controlled by Unified CCE, irrespective of their physical location. (The term local agent refers to an agent who uses a phone that is under control of Unified CCE, irrespective of physical location.)

Mobile agents can be configured using either of two delivery modes:

- Call by Call – In this mode, the mobile agent's phone is dialed for each incoming call. When the call ends, the mobile agent's phone is disconnected before being made ready for the next call.
- Nailed Connection – In this mode, the agent is called once at login, and the line stays connected through multiple customer calls.

Note: Agent capacity is further decreased for mobile agents. The weighting of the decreased capacity is based on the call delivery mode for the mobile agent.

For more details about sizing mobile agents, see the *Cisco Unified Contact Center Enterprise Solution Reference Network Design (SRND)* at:
http://www.cisco.com/en/US/products/sw/custcosw/ps1844/products_implementation_design_guides_list.html.

6.4.3 Outbound Option Scalability

To estimate Outbound Option agent capacity for Agent PGs, use the following formula:

Max agents = (Maximum PG agent capacity) – (4 x (number of SCCP dialer ports))

or

Max agents = (Maximum PG agent capacity) – (1.33 x (number of SIP dialer ports))

These formulas indicate platform capacity; they are not an indicator of outbound resources in terms of how many agents can be kept busy by the number of dialer ports in the deployment. A quick but inexact estimate is 2 ports required for each outbound agent, but your outbound resources may vary depending on hit rate, abandon limit, and talk time for the campaigns in the deployment. Use the sizing tool to determine outbound resources required for your campaigns.

See the Outbound Option chapter of the SRND at:
http://www.cisco.com/en/US/products/sw/custcosw/ps1844/products_implementation_design_guides_list.html
for more details.

Note: Outbound Option SIP dialer is compatible only with IOS Release 15.2(3)T.

6.4.4 Agent Greeting Scalability

For deployments implementing the Agent Greeting feature, component scalability is affected by this feature. For more details about sizing Agent Greeting deployments, see the *Cisco Unified Contact Center Enterprise Release 9.x Solution Reference Network Design (SRND)* at:
http://www.cisco.com/en/US/products/sw/custcosw/ps1844/products_implementation_design_guides_list.html.

7 Server Hardware Requirements

7.1 Cisco Unified Contact Center Enterprise

This section helps you select the hardware servers for your Unified Contact Center Enterprise solution, including both the Unified CCE and its associated deployment models.

VRU ports for Agent Peripheral Gateway (PG) and System PG should not exceed half of the maximum supported agents listed in the capacity column. You can deploy additional VRU PGs to accommodate a greater number of VRU ports. For VRU PG capacities, see the VRU Peripheral Gateway (PG) section.

Important Notes on Agent Capacity Calculation

For the following sections, the agent count in the capacity specification refers to the number of concurrently logged-in agents. Consider the following factors when sizing call center resources:

- **CTI OS** – For information about CTI OS capacity impact, see the CTI OS Security Scalability section.
- **Outbound Option** – For information about determining Agent PG Outbound Option agent capacity, see the Outbound Option Scalability section.

  Note: All outbound call scenarios are supported when a mobile agent is deployed using nailed connection call delivery mode. Outbound call scenarios are not supported when a mobile agent is deployed using call-by-call call delivery mode.
- **Mobile Agents** – See the Mobile Agents Scalability section for factors that affect scalability.
- **Agent Greeting** – For information about the impact of the Agent Greeting feature on deployment scalability, see the Agent Greeting Scalability section.

7.1.1 Agent PG Configuration Options

The following tables illustrate various configuration options for the Agent PG (they list components that are necessary for each PG configuration). Agent PG capacity varies based on specific component configuration.

Table 6-1: Agent PG Configuration Options with CTI OS, Unified CCE

Unified CM + VRU	With Unified CCE System PG	With Unified CM PG	With Outbound Option
CM PG (CM PIM)	System PG (CM PIM + VRU PIM)	CM PG (CM PIM)	System PG (CM PIM + VRU PIM)
VRU PG (VRU PIM)		CM PG (2) (CM PIM)	
CTI Server	CTI Server	CTI Server	CTI Server
CTI OS	CTI OS	CTI OS	CTI OS
		CTI OS (2)	MR PG
			Dialer

Table 6-2: Agent PG Configuration Options with Cisco Agent Desktop, Unified CCE

Unified CM + VRU	With Unified CCE System PG	With Unified Communications Manager PG	With Outbound Option
CM PG (CM PIM)	System PG (CM PIM + VRU PIM)	CM PG (CM PIM)	System PG (CM PIM + VRU PIM)
VRU PG (VRU PIM)			
CTI Server	CTI Server	CTI Server	CTI Server
CTI OS	CTI OS	CTI OS	CTI OS
			MR PG
			Dialer
CAD Services	CAD Services	CAD Services	CAD Services

Table 6-3: Agent PG Configuration Options with Cisco Finesse, Unified CCE

Unified CM + VRU	With Unified Communications Manager PG	With Outbound Option
CM PG (CM PIM)	CM PG (CM PIM)	System PG (CM PIM + VRU PIM)
VRU PG (VRU PIM)		CTI Server
CTI Server	CTI Server	MR PG
		Dialer

7.1.2 New Deployments and Technology Refresh

Note: The capacities that are listed in this section assume that each agent is handling 30 calls per hour.

7.1.2.1 Option 1: Supports up to 450 Agents

Progger Configuration: The Progger configuration consists of Unified CCE Router, Unified CCE Logger, Agent PG (Unified CM PIM, VRU PIM, CG, CTI OS, and CAD Services when CAD is required) on the same server.

Note: You can also install the Outbound Option on the Progger; however, the number of agents supported will be reduced. For more details, see the Outbound Option Scalability section.

Table 6-4: Progger Servers, Unified CCE, New Deployments and Technology Refresh

Server Class	Capacity (Agents)	
	Progger with CTI OS	Progger with CAD Services
MCS-30-005-Class	100	—
MCS-40-011-Class	450	297

For Progger configuration, select Unified CCE 450 Agents Progger deployment type. Override the CPS capacity using congestion settings when the hardware configuration is lower than the capacity of MCS-40-011 class servers.

Note: Cisco Finesse must be installed in a VMware Virtual Machine, on a separate physical server that meets the requirements of the Finesse OVA template. For more information, see the DocWiki page Virtualization for Cisco Finesse.

7.1.2.2 Option 2: Supports up to 4000 Agents

Rogger Configuration: This server has the Unified CCE Router and Unified CCE Logger collocated. Consider this option if the expected growth of your contact center will not exceed 4000 agents.

Table 6-5: Rogger Servers, Unified CCE, New Deployments and Technology Refresh

Server Class	Capacity (Agents)
	Rogger
MCS-30-005-Class	500
MCS-40-013-Class	4000

For Rogger configuration, select the following deployments:

- Unified CCE 4000 Agents Rogger - If the system is a pure Unified CCE deployment type.
- Unified ICM Rogger - If the system is hybrid with both Unified CCE and TDM Agents.

Override the CPS capacity using congestion settings when the hardware configuration is lower than the capacity of MCS-40-013 class servers.

7.1.2.3 Option 3: Supports up to 8000 Agents

Standalone Router and Standalone Logger: Consider this option if the expected growth of your contact center will exceed 4000 agents.

Table 6-6: Router/Logger Servers, Unified CCE, New Deployments and Technology Refresh

Server Class	Capacity (Agents)	
	Router	Logger
MCS-40-011-Class	8000	—
MCS-40-016-Class	—	6000
GEN-50-005-Class	—	8000

For Standalone Router and Standalone Logger configuration, select the following deployments:

- Unified CCE 8000 Agent Router/Logger - If the system is a pure Unified CCE deployment type.
- Unified ICM Router/Logger - If the system is hybrid with both Unified CCE and TDM Agents.

Override the CPS capacity using congestion settings when the hardware configuration is lower than the capacity of GEN-50-005 class servers.

Table 6-7: Agent PG Servers, Unified CCE, New Deployments and Technology Refresh

Server Class	Capacity (Agents)			Operating Requirements	
	Agent PG with CTI OS	Agent PG with CAD Services	Agent PG with Standalone Cisco Finesse	# of UCM PIMs	# of CTI OS Servers

MCS-30-005-Class	450	297	450	1	1
MCS-40-011-Class	2000	1000	2000	1	1
MCS-40-011-Class	4000	—	—	2–10 [1]	2–10 [2]

Notes:

- [1]A PIM has a maximum agent capacity of 2000 agents.
- [2]The combined agents for all PIMs on a single PG cannot exceed the PG maximum of 4000, nor can any single PIM exceed the maximum of 2000 agents.
- The CAD Server component (if CAD services are required) should be collocated on the Agent PG server. For prior installations where CAD server was installed on a separate server, capacity numbers will remain the same (as shown below) regardless of whether it is collocated or separate.
- For hardware and system software requirements, see Cisco Agent and Supervisor Desktops.
- Cisco Finesse must be installed on a separate physical host that meets the requirements of the Finesse OVA template. The capacity for the Agent PG corresponds to the class of MCS hardware in the preceding table. For more information, see the DocWiki page Virtualization for Cisco Finesse.

7.1.2.4 Option 4: Supports up to 12,000 Agents

New servers released with 8.5(3) enable customers to have up to 12,000 agents on the Router or Logger.

Refer to the virtualization DocWiki for virtualized deployments.

Standalone Router and Standalone Logger: Consider this option if the expected growth of your contact center will exceed 8000 agents.

Table 6-8: Router/Logger Servers, Unified CCE New Deployments

Server Class	Capacity (Agents)	
	Router	Logger
MCS-40-014-Class	12,000	N/A
GEN-50-006-Class	N/A	12,000

Note: Maximum Busy Hour Call Attempts (BHCA) supported for the 12,000 agent deployment is 360,000.

For Standalone Router and Standalone Logger, select the following deployment types:

- 12,000 Agent Router Logger - If the system is a pure Unified CCE deployment type.
- Unified ICM Router Logger - If the system is hybrid with both Unified CCE and TDM Agents.

Override the CPS capacity using congestion settings when the hardware configuration is lower than the capacity of GEN-50-006 class servers.

7.1.3 Common Ground Upgrade

7.1.3.1 Option 1: Supports up to 450 Agents

Progger Configuration: The Progger configuration consists of Unified CCE Router, Unified CCE Logger, Agent PG (Unified CM PIM, VRU PIM, CG, CTI OS, and CAD Services if CAD is required) on the same server.

Note: You can also install the Outbound Option on the Progger. However, the number of agents supported will be reduced. For more details, see the Outbound Option Scalability section.

Table 6-9: Progger Servers, Unified CCE, Common Ground Upgrade

Server Class	Capacity (Agents)

	Progger with CTI OS	Progger with CAD Services
MCS-30-004-Class	100	—
MCS-40-005-Class	450	297

Note: Cisco Finesse must be installed in a VMware virtual machine on a separate physical server that meets the requirements of the Finesse OVA template. For more information, see the DocWiki page Virtualization for Cisco Finesse.

For Progger deployment, select Unified CCE 450 Agents Progger deployment type and override the system capacity based on the server class.

7.1.3.2 Option 2: Supports up to 1275 Agents

Rogger Configuration: This server has the Unified CCE Router collocated with the Unified CCE Logger, and separate agent PGs.

Table 6-10: Rogger Servers, Unified CCE, Common Ground Upgrade

Server Class	Capacity (Agents)
	Rogger
MCS-30-004-Class	425
MCS-40-005-Class	1275

Note: For agent counts exceeding 1275, separate Router and Logger servers are required - Option 3.

For Rogger configuration, select Unified ICM Rogger or Unified CCE 4000 Agents Rogger deployment type and override the system capacity based on the server class.

7.1.3.3 Option 3: Supports up to 5100 Agents

Standalone Router and Standalone Logger: This option has the Unified CCE Router and Unified CCE Logger on separate servers and also separate agent PGs.

Table 6-11: Standalone Router/Logger Servers, Unified CCE, Common Ground Upgrade

Server Class	Capacity (Agents)	
	Router	Logger
MCS-40-005-Class	5100	4250
GEN-50-004-Class	5100	5100

Select one of the following deployments based on agent capacity and agent type:

- Unified CCE 8000 Agent Router/Logger
- Unified CCE 12,000 Agent Router/Logger
- Unified ICM Router/Logger

Override the CPS capacity based on the server class.

7.1.3.4 Agent PGs

The following capacities apply to both Option 2 and Option 3.

Table 6-12: Agent PG Servers, Unified CCE, Common Ground Upgrade

Server Class	Capacity (Agents)	
	Agent PG with CTI OS	Agent PG with CAD Services
MCS-30-004-Class	382	252
MCS-40-005-Class	2000	1000

Note: The CAD Server component (if CAD services are required) should be collocated on the PG/Progger server.
Cisco Finesse must be installed in a VMware virtual machine on a separate physical server that meets the requirements of the Finesse OVA template. For more information, see the DocWiki page Virtualization for Cisco Finesse.

7.1.4 Remote Silent Monitoring

Remote Silent Monitoring (RSM) is available with Cisco Unified Contact Center Enterprise and Unified Contact Center Hosted. The following table defines the system requirements for both the basic and enhanced environments for RSM (the hosting server).

Table 6-13: Remote Silent Monitoring Servers, Unified CCE, Unified CCH

Server Class	Capacity		Other Requirements
	Agents	Monitoring Sessions	
MCS-30-004-Class[1] MCS-30-005-Class	Less than 750	40	4 GB RAM
MCS-40-005-Class MCS-40-011-Class	750 or more	80	2 x 72GB disk drives

[1] An additional 2 GB RAM must be ordered separately. The Remote Silent Monitoring server *must* have 4 GB RAM installed.

Note: When RSM is used with Unified CVP, the gateway 'IVR prompt streaming for HTTP' needs to be enabled. Note that this setting is not supported for other Unified CVP applications. Therefore RSM requires a dedicated VXML gateway. This gateway must not be used for other Unified CVP applications. Also, 1 GB of gateway memory is recommended for use with RSM. This will support up to 40 concurrent monitoring sessions per gateway.

7.2 Unified Contact Center Hosted

This section helps you select hardware servers for Unified CCH, including new deployments and technology refresh and common ground upgrade. (The following tables show minimum requirements.)

Table 6-14: NAM Rogger Servers, Unified CCH

Server Class	Capacity (calls / second)
GEN-50-004-Class	150
GEN-50-005-Class	150

Select NAM Rogger deployment type for the above configuration and override the CPS capacity based on the server class.

Table 6-15: CICM Router/Logger Servers, Unified CCH, New Deployments / Tech. Refresh

Server Class		Capacity	
CICM Router	**CICM Logger**	**Agents**	**Instances**
MCS-40-014-Class	GEN-50-006-Class	12,000	1
MCS-40-011-Class	MCS-40-015-Class	8000	3
	MCS-40-016-Class	6400	10
GEN-50-005-Class	GEN-50-005-Class	6400	25

Table 6-16: CICM Router/Logger Servers, Unified CCH, Common Ground Upgrade

Server Class		Capacity	
CICM Router	**CICM Logger**	**Agents**	**Instances**
MCS-40-005-Class	MCS-40-004-Class	3190	3
MCS-40-005-Class	MCS-40-005-Class	3750	3
MCS-40-005-Class	GEN-50-003-Class	3750	10
GEN-50-004-Class	GEN-50-004-Class	3825	25

Select a valid deployment type for the CICM deployments. When the CICM Router and Logger server are hosting multiple customer instances, override the capacity for each of the instance based on the server class.

Table 6-17: Multi-Instance Agent PG with CTI OS Servers, Unified CCH

Server Class	Capacity (Agents)	Operating Conditions
MCS-40-005-Class	1600	CTI OS Security Disabled
MCS-40-005-Class	1200	CTI OS Security Enabled

Notes:

- See the Mobile Agents Scalability section for factors that affect its scalability.
- See the Outbound Option Scalability section for information about determining Agent PG Outbound Option agent capacity.
- For Unified CCH running with SCCP dialer, there is only one instance of Outbound Option per CICM platform/complex with a maximum of two Dialers per PG pair.
- All outbound call scenarios are supported when a mobile agent is deployed using nailed-connection call delivery mode. Outbound call scenarios are not supported when a mobile agent is deployed using call-by-call call delivery mode.
- Unified Contact Center Hosted supports a NAM deployed either as a Rogger, or as separate Router and Logger servers. For more information on separate servers, please see the Unified ICM Hosted section.

7.3 Unified Contact Center Management Portal

This section helps you select hardware servers for Cisco Unified Contact Center Management Portal (Unified CCMP) for both Contact Center Hosted and Enterprise environments.

Each of the deployment models described in this section assumes the possibility of an n-sided server configuration that replicates data between sites.

With regard to resource management, the best practice is to map folder structure to organizational structure.

7.3.1 Hardware Requirements

Table 6-18: Hardware Requirements, Unified CCMP

Server Class[1]	Capacity				Server Role	Intended Use
	Agents (Concurrent/ Configured)	CCMP Users[2]	Folders	Folder Depth		
MCS-40-012-Class	200/200	5	100	5	Co-Located	Lab or PoC
	1500/1500	150	200	5	Single Server	Standard Deployment
MCS-40-011-Class	8000/48,000	800	—	—	Dual-Server Web Server	Large Systems
MCS-40-015-Class			600	6	Dual-Server DB Server	
MCS-40-011-Class	12,000/76,000[3]	1200	—	—	Dual-Server Web Server	Very Large Systems
MCS-40-015-Class			1000	6	Dual-Server DB Server	

[1]You can upgrade Unified CCMP, Release 7.5 (on existing hardware) to Unified CCMP, Release 8.5.

[2] This number is configured users, not concurrent.

[3]For Very Large Systems, additional server memory is required. See Appendix A – Server Classes for more information.

For general provisioning capacities of Contact Center Enterprise, see Table 5-1: Configuration Limits and Scalability Constraints—Unified ICM, Unified CCE.

In addition to the limitations described in the preceding sections, Large and Very Large systems as defined above should be referred to Cisco via the A2Q process or the Design mentoring process, to ensure an optimal customer experience.

7.3.2 Server Configuration

Table 6-19: Server Configuration, Unified CCMP

Unified CCMP Server Type	Server Configuration
Single Server System	**Disk Configuration – 6 Disks** Disks 1–2: OS, program executables, Windows page file: RAID 1 Disks 3–6: Database files and transaction log: RAID 10
Dual Server System – Web Application Server	**Disk Configuration – 4 Disks** Disks 1–2: OS, program executables, Windows page file: RAID 1

Unified CCMP Server Type	Server Configuration
Dual Server System – Database Server	**Disk Configuration – 6 Disks** Disks 1–2: OS, program executables, Windows page file: RAID 1 Disks 3–6: Database files and transaction log: RAID 10

Note: Resilient systems require duplicate hardware, with identical systems specified on both sides of the deployment.

7.3.3 Drive Partition Layout

Table 6-20: Physical Drive Layout, Unified CCMP

Unified CCMP Server Type	Drive	Disk Array Minimum Size	Function
Single Server System	C:	146 GB	Windows operating system, program executables and Windows page file
	D:	292 GB	Database data files and transaction log
	Z:	—	CD/DVD-ROM
Dual Server System – Web Application Server	C:	146 GB	Windows operating system, program executables and Windows page file
	Z:	—	CD/DVD-ROM
Dual Server System – Database Server	C:	300 GB	Windows operating system, program executables and Windows page file
	D:	600 GB	Database data files and transaction log
	Z:	—	CD/DVD-ROM

7.3.4 Network Recommendations

LAN—Unifed CCMP systems should be connected to Unified ICM/CCE and other servers via gigabit (1000BASE-T) connections.

WAN—Unified CCMP systems connecting to Unified ICM/CCE or a distributed CCMP deployment across a WAN should be allocated a dedicated link of at least 1.5 MB/s capacity.

Load Balancing—Distributed CCMP Systems may use a Load Balancer to distribute load across the sites. We recommend that you do this using a dedicated Load Balancer, rather than using Windows built-in functionality. It is also required that any load balancing solution support sticky connections to maintain web session information between requests.

7.4 Unified ICM Enterprise

This section helps you select hardware servers for Unified ICM Enterprise, including new deployments and technology refresh as well as common ground upgrade.

7.4.1 Note on Agent Capacity

Agent capacity numbers are based on the assumption that "Enable agent reporting" is *unchecked* on the Agent Distribution tab for the PG configuration (which is the default). When "Enable agent reporting" is *checked,* agent capacity numbers for central controller servers are virtually identical to Unified Contact Center Enterprise—the Progger and Standalone Router/Logger capacity tables listed in the previous sections titled, *New Deployments and Technology Refresh* and 6.1.3 *Common Ground Upgrade*. Those sections are applicable instead of those that follow.

7.4.2 New Deployments and Technology Refresh

Table 6-21: Rogger Servers, Unified ICME, New Deployments and Technology Refresh

Server Class	Capacity (Agents)
MCS-40-011-Class	2000

Note: The Rogger server has the Unified ICM Router and Unified ICM Logger collocated.

Select Unified ICM Rogger deployment type for the above configuration and override the CPS capacity based on server class of the deployment.

Table 6-22: Standalone Router/Logger Servers, Unified ICME, New Deployments and Technology Refresh

Server Class		Capacity	
Router	Logger	BHCA	Agents
MCS-30-005-Class	MCS-40-011-Class	30,000	1000
		18,000	1800
		12,000	2400
MCS-40-011-Class	MCS-40-012-Class	150,000	5000
MCS-40-011-Class	GEN-50-005-Class	360,000	12,000
		216,000	21,600
		144,000	28,800

Note: Busy Hour Call Attempts (BHCA) or calls per second (cps) computes the total number of route requests received by the central controller. This can include pre-route requests, new calls arriving into the system, post-route requests, translation route requests, call transfers, or conference calls.

See TDM ACD Peripheral Gateway (PG) for TDM ACD PG server requirements.

7.4.3 Common Ground Upgrade

Table 6-23: Rogger Servers, Unified ICME, Common Ground Upgrade

Server Class	Capacity (Agents)
MCS-40-005-Class	1700

Note: The Rogger server has the Unified ICM Router and Unified ICM Logger collocated.

Select Unified ICM Rogger deployment type for the above configuration and override the CPS capacity based on server class of the deployment.

Table 6-24: Standalone Router/Logger Servers, Unified ICME, Common Ground Upgrade

Server Class		Capacity	
Router	Logger	BHCA	Agents
MCS-30-004-Class	MCS-40-006-Class	25,500	850
		15,300	1530
		10,200	2040
MCS-40-005-Class	MCS-40-006-Class [1]	127,500	4250
MCS-40-005-Class	GEN-50-004-Class	306,000	10,200
		183,600	18,360
		122,400	24,480

[1]Select Unified ICM Router/Logger deployment type for the above configuration and override the CPS capacity based on server class of the deployment.

Table 6-25: Logger on Other Generic Hardware, Unified ICME, Common Ground Upgrade

Server Class	Capacity	
	BHCA	Agents
GEN-40-002-Class	7500	250
GEN-40-003-Class	30,000	1000

See TDM ACD Peripheral Gateway (PG) for TDM ACD PG server requirements.
Select ICM Router/Logger deployment type for the above configuration and override the CPS capacity based on server class of the deployment.

Table 6-26: CTI OS Servers, Unified ICME, Common Ground Upgrade

Server Class	Capacity (Agents)
MCS-30-004-Class	85
MCS-40-005-Class	1600

7.5 Unified ICM Hosted

This section helps you select hardware servers for Unified ICM Hosted*, covering new deployments and technology refresh as well as common ground upgrade. (These are minimum requirements.)

***Note:** The Multiple-NAM deployment model, which provides for NAM pair redundancy for high availability and increased scalability, is outside the scope of this document. Consult Cisco directly for capacity and sizing consultation with Multiple-NAM configurations.

For clarity, only MCS family servers are specified below for the NAM and CICM Router nodes. Where non-MCS hardware is deployed (or being purchased), the equivalent type/number of processors (including speed), available memory (RAM), disk (capacity and controller architecture), and overall server capacity profile must meet or exceed that of the corresponding MCS model. See Appendix A – Server Classes for full server class explanatory detail.

Table 6-27: NAM Router Servers, Unified ICMH

Server Class	Capacity (calls / second)
MCS-40-005-Class MCS-40-011-Class	300

Select NAM deployment type for the above configuration and override the CPS capacity based on server class of the deployment.

Table 6-28: NAM Logger Servers, Unified ICMH

Server Class	Capacity (calls / second)
GEN-50-004-Class	255
GEN-50-005-Class	300

Select NAM deployment type for the above configuration and override the CPS capacity based on server class of the deployment.

Table 6-29: CICM Router and CICM Logger Servers Unified ICMH

Server Class		Capacity (Agents)	
CICM Router	CICM Logger	BHCA	Agents
MCS-40-005-Class MCS-40-011-Class	GEN-50-004-Class	306,000	10,200
		183,600	18,360
		122,400	24,480
	GEN-50-005-Class	360,000	12,000
		216,000	21,600
		144,000	28,800

Select Unified ICM Router/Logger deployment type for the above configuration and override the CPS capacity based on server class of the deployment.

Note: Substitute a quad processor class server for the CICM Router server where greater than ten customer instances are deployed.

7.6 Unified ICM/Unified CCE Common Components

This section describes the Unified ICM/CCE common standalone server requirements. You can use these Unified ICM/CCE components in various Unified ICM/CCE product editions.

7.6.1 Unified ICM/Unified CCE Router

The following table contains the Router hardware requirements for network interface required for pre-routing in Unified ICM Enterprise and Unified ICM Hosted.

Note: As of Unified CCE Release 9.0(3), Sprint NIC is supported.

Stentor NIC is not supported with Microsoft Windows Server 2008 R2.

Table 6-30: Network Interface Requirements, Unified ICM Router Servers

Network Interface	Hardware (For Signaling Access Networks)	
For Ethernet Carrier Network Interfaces (Verizon Business, AT&T, and so on.)	+1 x 10/100/1000 Ethernet port	
SPRINT Network Interface	• 3 (5 if simplexed) x Eiconcard:	
	PCI 2.2	S94 V2 • Motorola Freescale 852 T @ 98 MHz • 16 MB SDRAM • Bus Type: PCI 2.2 64bit / 66 MHz (3.3 V)
	PCIe (PCI Express)	S94 PCI Express • Motorola Freescale 852 T @ 98 MHz • 16 MB SDRAM • PLX 8111 Express Interface • Bus Type: Single lane PCIe 1.0a 2.5Gbit/Sec • Two VHSI connectors
	▪ 5 (10 if simplexed) x VHSI V.35 DCE cable (Eicon #300-076) ▪ Eiconcard Connections for Windows V6R9”	

See the *Hardware and Software Specification for Unified ICM/Contact Center Enterprise & Hosted* for information on Router server selection based on system capacity requirements.

7.6.2 Unified ICM/Unified CCE Logger

See the *Hardware and Software Specification for Unified ICM/Contact Center Enterprise & Hosted* for information on Logger server hardware selection based on capacity requirements. The tables in this section provide Logger server disk configuration information based on the hardware you selected, and other Logger configuration information.

7.6.2.1 New Deployments and Technology Refresh

Table 6-31: Logger Servers, Unified ICM/CCE, New Deployments and Technology Refresh

Server Class	Other Requirements and Remarks
MCS-40-011-Class	**Disk Configuration – 4 disks** Disks 1–2: OS, ICM, SQL Server and other third-party software, ICM Database Transaction Log(s) RAID 1 Disks 3–4: Database files RAID 1 (alternately RAID 10 can be used to gain better write performance by adding additional disks – see below)
MCS-40-012-Class	**Disk Configuration – 6 disks** Disks 1–2: OS, ICM, SQL Server and other third-party software, RAID 1 Disks 3–6: Database files, ICM Database Transaction Log(s), RAID 10
MCS-40-013-Class	**Disk Configuration – 8 disks** Disks 1–2: OS, ICM, SQL Server and other third-party software, RAID 1 Disks 3–8: Database files, ICM Database Transaction Log(s), RAID 10
GEN-50-005-Class	**Disk Configuration – 8 or more disks** Disks 1–2: OS, ICM, SQL Server and other third-party software, RAID 1 Disks 3–8: Database files, ICM Database Transaction Log(s), RAID 10 with dedicated 2 channel external RAID Controller, minimum of 256 MB cache with battery backup
GEN-50-006-Class	**Disk Configuration –10 or more disks** Disks 1–2: OS, ICM, SQL Server and other third-party software, RAID 1 Disks 3–10: Database files, ICM Database Transaction Log(s), RAID 10 with dedicated 2 channel external RAID Controller, minimum of 512 MB cache with battery backup

7.6.2.2 Common Ground Upgrade

Table 6-32: Logger Servers, Unified ICM/CCE, Common Ground Upgrade

Server Class	Other Requirements and Remarks
GEN-30-002-Class MCS-30-004-Class	**Disk Configuration – 2 disks** Disk 1–2: 2 x 72 GB Drives, RAID 1
MCS-40-005-Class	**Disk Configuration – 4 disks** Disks 1–2: 2 x 72 GB Drives: OS, ICM, SQL Server and other third-party software, ICM Database Transaction Log(s) RAID 1 Disks 3–4: 2 x 72 GB Drives: Database files RAID 1
GEN-40-003-Class MCS-40-006-Class MCS-40-009-Class	**Disk Configuration – 6 disks** Disks 1–2: 2 x 72 GB Drives: OS, ICM, SQL Server and other third-party software, RAID 1 Disks 3–6: 4 x 72 GB Drives: Database files, ICM Database Transaction Log(s), RAID 10
GEN-40-003-Class GEN-50-004-Class	**Disk Configuration – 8 or more disks** Disks 1–2: 2 x 72 GB Drives: OS, ICM, SQL Server and other third-party software, RAID 1 Disks 3–*: Database files, ICM Database Transaction Log(s), RAID 10. Dedicated 2 channel external RAID Controller, minimum of 256 MB cache with battery backup

7.6.3 Administration & Data Server

Beginning with Unified CCE 8.0(1), the Distributor AW (with or without HDS) is renamed as Administration & Data Server. The Administration & Data Server now offers several roles (deployments) based on the functionality and amount of reporting data that it can handle. This section specifies the hardware requirements for an Administration & Data Server with the following roles:

- Administration Server and Real-time Data Server
- Configuration-Only Administration Server

Please note that these roles do not include the HDS/DDS. Also, note that you have an option to install the Internet Script Editor (ISE) on this server.

For a detailed description on Administration & Data Server deployment options (roles), see the installation guide and the *Cisco Unified Contact Center Enterprise Solution Reference Network Design (SRND)* at: http://www.cisco.com/en/US/products/sw/custcosw/ps1844/products_implementation_design_guides_list.html

Table 6-33: Administration Server and Real-Time Data Server (AW)

Server Class	Capacity (Administration Clients and/or ISE users)	Other Requirements and Remarks
MCS-20-004-Class MCS-20-005-Class MCS-20-006-Class	25	IIS 7.5 (Required for Internet Script Editor) **Other hardware requirements** Graphics card capable of 1024 x 768 x 64 K color or better 17 inch or larger display
MCS-30-004-Class MCS-30-005-Class	50	

Note: The Script Editor or ISE user is assumed to be monitoring Unified ICM or Unified CCE scripts in real time. The default settings on the server allow for only 10 users to simultaneously reload configuration at the client.

7.6.4 Administration & Data Server – Historical and Detail Data Servers

The Administration & Data Server now offers several roles (also known as deployments) based on the functionality and amount of reporting data that it can handle. This section specifies the hardware requirements for an Administration & Data Server that will be used with a reporting server (Cisco Unified Intelligence Center) including those with the following roles:

- Administration Server, Real-Time and Historical Data Server, and Detail Data Server (AW-HDS-DDS)
- Administration Server and Real-Time and Historical Data Server (AW-HDS)
- Historical Data Server and Detail Data Server (HDS-DDS)

For detailed descriptions of Administration & Data Server deployment options (roles), see the installation guide and the *Cisco Unified Contact Center Enterprise Solution Reference Network Design (SRND)* at: http://www.cisco.com/en/US/products/sw/custcosw/ps1844/products_implementation_design_guides_list.html

Hardware requirements are based on the following usage patterns.

The average reporting user is running:

- Two concurrent real time reports
  - Each report returns less than 50 rows.

- Equivalent to running or monitoring a script via Script Editor or Internet Script Editor.

- One historical report every hour, with each report defined as:
  - Queries working with data set size of 3000 or less. Data sets size is determined by multiplying the number of entities by two times the number of hours chosen by end-user while running the historical report. See table for calculation of data sets.
  - Queries resulting in less than or equal to 800 rows of data on half hour or daily historical reports.

Determine the size of the data set by calculating the number of entities times hours multiplied by 2 (as shown in the following table).

Table 6-34: Reporting Data Set

Report	Calculation	Data Set Size	½ Report, Rows Returned	Daily Report, Rows Returned
Call Type Report: 10 Call Types for 20 hours	10 x 20 x 2	400	160	10
Agent Skill Group Report: 10 Agents, each in 5 Skill Groups for 8 hours	10 x 5 x 8 x 2	800	800	50

Note: Each reporting user is the equivalent of one Script Editor monitoring user (using Internet Script Editor or Administration Client). For sizing of a distributor running only Internet Script Editor Server or serving Administration Clients, see the Administration & Data Server section.

Graphics Card and Monitor for Administration & Data Servers and Administration Clients

- Graphics card capable of 1024 x 768 x 64 K color or better
- 17 inch or larger display

For Unified Contact Center Hosted

Configure this server for a Unified CC Hosted multi-instance environment with up to ten instances with five users per Administration & Data Server.

7.6.4.1 New Deployments and Technology Refresh

Table 6-35: Historical / Detail Data Servers, Unified CCE, 12,000 Agent New Deployments / Technology Refresh

Server Class	Capacity		Other Requirements
	CUIC Reporting Users per Server	Agents (System)	
MCS-40-011-Class MCS-40-014-Class	25	2000	**Disk Configuration – 4 Disks** Disks 1-2: OS, ICM, SQL Server and other third-party software, ICM Database Transaction Log(s); RAID 1 Disks 3-4: Database files; RAID 1
MCS-40-012-Class MCS-40-015-Class	50	4000	**Disk Configuration – 6 (or more) Disks** Disks 1-2: OS, ICM, SQL Server and other

			third-party software, ICM Database Transaction Log(s); RAID 1 Disks 3-6+: Database files; RAID 10
MCS-40-013-Class MCS-40-016-Class	100	8000	**Disk Configuration – 8 (or more) Disks** Disks 1-2: OS, ICM, SQL Server and other third-party software, ICM Database Transaction Log(s); RAID 1 Disks 3-8+: Database files; RAID 10
GEN-50-006-Class	200	12,000	**Disk Configuration – 10 (or more) Disks** Disks 1-2: OS, ICM, SQL Server and other third-party software, ICM Database Transaction Log(s); RAID 1 Disks 3-10+: Database files; RAID 10

7.6.4.2 Common Ground Upgrade

The following table describes Historical/Detail Data Server, common ground upgrade.

Table 6-36: Historical/Detail Data Server, Common Ground Upgrade

Server Class	Capacity CUIC Reporting Users Per AW-HDS	Other Requirements
MCS-40-005-Class MCS-40-008-Class	20	**Disk Configuration – 4 Disks** Disks 1–2: OS, ICM, SQL Server and other third-party software, ICM Database Transaction Log(s); RAID 1 Disks 3–4: Database files; RAID 1
MCS-40-006-Class MCS-40-007-Class	40	**Disk Configuration – 6 (or more) Disks** Disks 1–2: OS, ICM, SQL Server and other third-party software, ICM Database Transaction Log(s); RAID 1 Disks 3–*: Database files; RAID 10
MCS-40-009-Class MCS-40-010-Class	80	**Disk Configuration – 6 (or more) Disks** Disks 1–2: OS, ICM, SQL Server and other third-party software, ICM Database Transaction Log(s); RAID 1 Disks 3–*: Database files; RAID 10
GEN-50-004-Class GEN-50-005-Class	160	**Disk Configuration – 8 (or more) Disks** Disks 1–2: OS, ICM, SQL Server and other third-party software; RAID 1 Disks 3–*: Database files, ICM Database Transaction Log(s); RAID 10. Dedicated 2 channel RAID Controller, min 256 MB cache with battery backup. (Alternately, the ICM Database Transaction Log(s) can be moved to a dedicated drive to limit disk contention.)

7.6.5 Administration Client

Table 6-37: Administration Client

Server Class	Hardware, Software Requirements and Remarks
MCS-20-004-Class MCS-20-005-Class MCS-20-006-Class	**Other hardware requirements** ATA/IDE acceptable Graphics card capable of 1024 x 768 x 64 K color or better 17 inch or larger display **Operating system and other software** Microsoft Windows XP Professional; SP2 Microsoft Windows 7 (Professional, Enterprise, and Ultimate) Microsoft Vista (Business and Enterprise)

7.6.6 Internet Script Editor

Table 6-38: Internet Script Editor Client Hardware/Software Requirements

Server Class	Hardware, Software Requirements and Remarks
GEN-10-005-Class	**Other hardware requirements** Internal CD-ROM or DVD-ROM drive Graphics card capable of 1024 x 768 x 64 K color or better **Note:** ISE is not supported for use on the secondary monitor of a dual-monitor desktop. **Operating system and other software** Microsoft Windows XP Professional; SP2 Microsoft Windows 7 (Professional, Enterprise, and Ultimate) Microsoft Vista (Business and Enterprise) **Note**: In order for ISE to work properly, the "Enable HTTP Keepalive" box on the web site tab of Internet Information Services Manager/Default Web Site Properties needs to be checked.

7.6.7 VRU Peripheral Gateway (PG)

The following VRU PG capacities are based on 5 VRU transactions per port per call.

Table 6-39: VRU PG Servers, New Deployments and Technology Refresh

Server Class	Capacity (ports)	Max VRU PIMs	Max Call Rate (cps)
MCS-30-005-Class	1200	4	10
MCS-40-011-Class	9600	10	40

Table 6-40: VRU PG Servers, Common Ground Upgrade

Server Class	Capacity (ports)	Max VRU PIMs	Max Call Rate (cps)
MCS-30-004-Class	960	3	8
MCS-40-005-Class	7680	8	32

7.6.8 Unified Contact Center Gateway

Unified Contact Center Gateway enables a parent/child deployment model; the parent is Unified ICME and the child can be Unified CCE or Cisco Unified Contact Center Express (Unified CCX). When deployed on a separate server, a Unified CCE Gateway PG can manage multiple child Unified CCE peripherals or multiple child Unified CCX systems, with up to five child systems. Note that the Unified CCE Gateway PG does not support Unified CCE System PG and Unified CCX integration on the same PG instance.

Table 6-41: Unified Contact Center Gateway Servers

Server Class	Capacity (Agents)
MCS-30-004-Class MCS-30-005-Class	450
MCS-40-005-Class MCS-40-008-Class MCS-40-011-Class	2000

7.6.9 TDM ACD Peripheral Gateway (PG)

7.6.9.1 TDM ACD PG

The following information is applicable to Unified ICME and Unified ICMH only.

Note: See CTI OS Security Scalability for information about its capacity impact.

Table 6-42: TDM ACD PG Servers, Unified ICME/H, New Deployments and Technology Refresh

Server Class	Capacity (Agents)		
	TDM ACD PG with MR PG	TDM ACD PG with CTI OS	TDM ACD PG without options
MCS-30-005-Class	100	250	1000
MCS-40-011-Class	200	2000	2000

Table 6-43: TDM ACD PG Servers, Unified ICME/H, Common Ground Upgrade

Server Class	Capacity (Agents)		
	TDM ACD PG with MR PG	TDM ACD PG with CTI OS	TDM ACD PG without options
MCS-30-004-Class	85	200	800
MCS-40-005-Class	170	1600	1600

Table 6-44: Avaya (Definity) TDM ACD PG Servers, Unified ICME/H, New Deployments and Technology Refresh, CTI OS

Server Class	Desktops Connecting to CTI OS	
	Capacity (Agents)	Skill Groups Per Agent
MCS-40-011-Class	3000	5
MCS-40-011-Class	2500	10
MCS-40-011-Class	2000	15
MCS-40-011-Class	1500	20

Note: CTI OS Monitor Mode applications are not supported with Avaya and CTI OS.

Table 6-45: Avaya (Definity) TDM ACD PG Servers, Unified ICME/H, Common Ground Upgrade, No CTI OS

Server Class	Desktops Connecting to CTI Server (without CTI OS)			
	Capacity (Agents)	BHCA	All Events Clients	Skill Groups Per Agent
MCS-40-005-Class	2000	60,000	4	10

7.6.9.2 Other TDM ACD PG Requirements

See the *Cisco Unified ICM Software ACD Supplements and Cisco ICM ACD PG Supportability Matrices* for more information about TDM ACD PG configuration options and limits, available at: http://www.cisco.com/en/US/products/sw/custcosw/ps1844/prod_technical_reference_list.html

Table 6-46: TDM ACD PG Hardware and Software Requirements

Hardware, Software Requirements and Remarks
Avaya (Definity): The Avaya (Definity) PG running on Microsoft Windows Server 2008 R2 requires CVLAN version 6.1, which is integrated with Release 8.5(2). **Aspect Call Center and Aspect Spectrum (Rockwell) are not supported on Microsoft Windows Server 2008** **For Redundant PG Installation** +1 x 100/1000 Ethernet port (if Peripheral does not reside on visible LAN) **For Unified ICM Enterprise: Interfacing with TDM ACDs** *FOR NEC NEAX 2400/7400 INTERFACE* 1 x CTI Dongle (NEC part)

See the *Unified ICM/Contact Center Hardware and Software Requirements* for information on PG server selection based on system capacity for different Unified ICM/CCE product editions.

7.6.10 Unified ICM/CCE SS7 Network Interface Option

For new installations beginning with Release 8.0(1), Cisco has developed Sigtran variants of all supported SS7 Network Gateway interfaces. While not supported on Release 9.0+ (there are no Windows 2008 device drivers for

the SS7 PCI cards), SS7 Network Gateways are still supported in 8.x for upgrade and refresh, and are forward-compatible with 9.0(x) NIC components.

ITU (Sigtran) and ATT (Sigtran) may be deployed coresident on the Router server (Section 6.6.1). INAP (Sigtran) must be deployed on a separate server (see the following table).

Table 6-47: Network Gateway Servers

Server Class	Network Gateway	Requires SS7 Card[1]	May be co-resident with Router/NIC	Associated Network Interface Controller (NIC)
GEN-20-004-Class	ITU (SS7)	Yes	No	SS7InNic
	ITU (Sigtran)	No	Yes	
	INAP (SS7)	Yes	No	TIMNic UnisourceNIC CWCNIC
	INAP (Sigtran)	No	No	
	ATT (SS7)	Yes	No	ATTNic
	ATT (Sigtran)	No	Yes	

SS7 Gateways are bandwidth/cps limited by the TDM SS7 links, and the calculation for required links/bandwidth is deployment specific. The Sigtran Gateways, however, can support the maximum cps (calls/second) for any BOM compliant Router installation.

[1] 1 x 4 port Cisco PCI SS7 card(s)

Many server types require an optional riser card/adaptor to support the 3.3V PCI card.

5 V card has reached End of Sale (with a last sale date of June 30, 2006) but is still supported.

3.3 V card has reached End of Sale (with a last sale date of November, 2009) but is still supported.

A maximum of three cards can be installed on a single server.

SS7 cards are not supported on Microsoft Windows Server 2008.

7.6.11 CTI OS Server

Cisco requires that the CTI OS server component be collocated on the PG according to the Agent PG configuration.

Standalone CTI OS servers are not supported.

See CTI Supported Platforms for system requirements for the CTI OS server.

7.6.12 Silent Monitor Service for CTI OS

The silent monitor service is a single executable that can be deployed in two different ways:

1. Standalone server, which is called Silent Monitor Server
2. Coresident with any CTI OS Client Toolkit application, which is called Silent Monitor Service for Unified CCE Toolkit

7.6.12.1 Silent Monitor Server

The silent monitor server is a standalone server that provides silent monitor functionality for a set of mobile agents. When the silent monitor service is deployed as a standalone server, it must not be collocated with any other CTI OS or Unified CCE components.

See the following table for information on silent monitor service servers.

Table 6-48: Silent Monitor Service Servers

Server Class	Capacity (Sessions)	Server Type	Other Requirements and Remarks
MCS-40-005-Class	40	Silent Monitor Server	See CTI Supported Platforms
MCS-30-004-Class	20		

7.6.12.2 Silent Monitor Service for Unified CC Toolkit

The silent monitor service can also be configured to provide silent monitor functionality for a single Unified CCE agent. In this configuration, the silent monitor service runs on the same computer as the agent or supervisor's desktop. In a Citrix environment, the silent monitor service runs on the same computer as the agent or supervisor's Citrix client.

7.6.13 Citrix MetaFrame Presentation Server

Citrix MetaFrame Presentation server and Microsoft Terminal Services are Server Based Computing (SBC) platforms that enable hosting of Cisco CTI desktops applications and allow the deployment of thin clients rather than the entire Desktop. They provide native support for Citrix MetaFrame Presentation Server 4.0 and 4.5, and Microsoft Terminal Services environments.

The agent desktop application capacity of the Citrix MetaFrame Presentation Server and Microsoft Terminal Services depends on the number and type of applications in use. Consult Citrix Professional Services and a Microsoft Certified IT professional for guidance.

Configuration details and usage limitations for Cisco Agent and CTI Toolkit Desktop with Citrix implementations are documented in the manuals located at:
http://www.cisco.com/en/US/products/sw/custcosw/ps427/products_implementation_design_guides_list.html.

7.6.14 Citrix XenApp Server 5 with Microsoft Windows Server (32-bit and 64-bit R2) Support for CTI OS

Starting with the CTI OS 7.5(9) release, you can access the CTI OS Client with Citrix XenApp Server 5 on Microsoft Windows Server (32-bit or 64-bit R2).

Detailed CTI OS Client installation and configuration instructions are available in the *CTI OS System Manager's Guide* at:
http://www.cisco.com/en/US/products/sw/custcosw/ps1844/prod_installation_guides_list.html

7.6.15 Citrix XenApp Server 5 with Windows 7 Support for CTI OS

Starting with the CTI OS 8.0(1a) release, you can access the CTI OS Client with Citrix XenApp Server 5 on Windows 7 (64-bit).

Detailed CTI OS Client installation and configuration instructions are available in the *CTI OS System Manager's Guide* at:
http://www.cisco.com/en/US/products/sw/custcosw/ps1844/prod_installation_guides_list.html

7.6.16 Windows 7 (64-bit) Support for CTI OS

Starting with CTI OS Release 8.5(2), you can access the CTI OS Client on Windows 7 64-bit.

Detailed CTI OS Client installation and configuration instructions are available in the *CTI OS System Manager's Guide* at:

http://www.cisco.com/en/US/products/sw/custcosw/ps1844/prod_installation_guides_list.html

7.6.17 CTI OS Agent and Supervisor Desktops

The following table provides information on CTI OS agent and supervisor desktop servers.

Table 6-49: CTI OS Agent and Supervisor Desktop Servers

Server Class	Type	Other Requirements and Remarks
GEN-10-005-Class	CTI OS Supervisor Desktop	Windows compatible full-duplex sound card (if using Cisco IP Communicator and/or Silent Monitoring) See CTI Supported Platforms
GEN-10-005-Class	CTI OS Agent Desktop	Windows compatible full-duplex sound card (if using Cisco IP Communicator) See CTI Supported Platforms
GEN-10-005-Class	CTI OS Monitor Mode Application	See CTI Supported Platforms

Note: CTI OS supports the G.711 and G.729 codecs for the MTU soft phone.

Table 6-50: CTI OS Silent Monitoring Hardware Requirements

Compatible Ethernet NIC	See Cisco.com for more information: • Silent Monitoring NIC Compatibility Matrix • Qualifying Ethernet Cards for Cisco Agent Desktop Monitoring

7.6.18 Siebel

7.6.18.1 CTI Driver for Siebel

For supported Siebel versions, see the *Cisco Unified Contact Center Enterprise (Unified CCE) Software Compatibility Guide* at:
http://www.cisco.com/en/US/products/sw/custcosw/ps1844/products_device_support_tables_list.html

The CTI Driver for Siebel is installed on the Siebel Communications Manager Server and must operate standalone from all other Unified ICM/CCE systems. Agent capacity and performance for Siebel Call Centers can vary dramatically based on the deployment topology and configuration of the Siebel components and the complexity of the Siebel applications and scripts in use. For more details on performance tuning Siebel deployments, consult Siebel Technical Support or a Siebel Certified Configuration Engineer.

Table 6-51: CTI Driver for Siebel Servers

Server Class	Capacity * (Agents)	Type	Call Rate (calls/sec)	Other Requirements and Remarks
MCS-40-005-Class	700	Siebel Communications Manager Server (SCM)	3.75	The Siebel deployment model tested had each server component (SCM and OM) installed standalone on its own server host. See CTI Supported Platforms
		Siebel Call Center Object Manager (OM)		

* The capacity was determined on a Siebel environment that met the following configuration conditions:

1) Siebel component groups enabled during the capacity determination:

- System Management
- Siebel Call Canter
- Workflow Management
- Communication Management

The following components in the group were disabled:

- Communications Configuration Manager
- Communications Inbound Processor
- Communications Inbound Receiver
- Communications Outbound Manager
- Smart Answer Manager

2) No Siebel Scripting involved.

3) No activity records being created.

4) No Siebel Workflows activated.

7.6.18.2 Cisco Data Store

The Cisco Data Store server must be deployed standalone and cannot be installed on any Unified ICM or Siebel Communication Server.

Table 6-52: Cisco Data Store Servers

Server Class	Capacity (Agents)	Type	Other Requirements and Remarks
MCS-40-003-Class	20,000	CDS for Siebel	Maximum 50 CTI Drivers for Siebel can connect to the CDS Server See CTI Supported Platforms

7.6.19 CRM Connector

For additional CTI compatibility information, see the *Cisco Unified Contact Center Enterprise (Unified CCE) Software Compatibility Guide* at:
http://www.cisco.com/en/US/products/sw/custcosw/ps1844/products_device_support_tables_list.html

7.6.19.1 CRM Connector for Salesforce.com, PeopleSoft and Microsoft CRM 3.0

7.6.19.1.1 CRM Connector Server

The CRM Connector server provides the Cisco Unified Contact Center Enterprise solution connectivity for CRM Adapters for the Saleforce.com, PeopleSoft and Microsoft CRM 3.0; it must be deployed on a standalone system. It must not be coresident with other Unified CCE solution components.

See CRM Connector Supported Platforms for operating system requirements for the CRM Connector server.

Table 6-53: CRM Connector Server

Server Class	*Capacity (Agents)	Call Rate (calls / sec.)	Other Requirements and Remarks
MCS-30-004-Class MCS-30-005-Class	900	7.5	See CRM Connector Supported Platforms
MCS-40-005-Class MCS-40-011-Class	1800	15	See CRM Connector Supported Platforms

* The above dimensioning guidelines and parameters were developed in a lab testing environment that included a test CRM system setup or an equivalent CRM simulator. Actual quality of service (delays, responsiveness, and so on) experienced by the contact center agents might vary from the above dimensioning guidelines/parameters. These variations include structure and size of the CRM database, overall level of the CRM tuning, intensity of the contact processing workflow(s), as well as other CRM configuration and topology variables outside of the scope of the Cisco connector. It is for this reason that Cisco highly recommends an in-house load test early in a connector deployment project to make sure that the total quality of service under load is satisfactory.

7.6.19.1.2 CRM Connector Server Administration Tool

The Administration Tool is usually installed on the CRM Connector Server. See CRM Connector Server for system requirements.

7.6.19.1.3 CRM Connector Adapter for Salesforce.Com

The Salesforce.com adapter is used in conjunction with the CRM Connector Server, which is a separate component of the Unified CC Enterprise solution. This Adapter is installed on the agent desktop and connects to the CRM Connector Server through .NET remoting.

Table 6-54: CRM Connector Adapter for Salesforce.com

Server Class	Type	Hardware, Software Requirements and Remarks
GEN-10-005-Class	CRM Adapter client	**Operating system and other software** See CRM Connector Supported Platforms **Other hardware Requirements** 100/1000 Ethernet port

For additional information on the Salesforce.com CRM visit the http://www.salesforce.com/ web site.

7.6.19.1.4 CRM Connector Adapter for PeopleSoft

The PeopleSoft adapter is used in conjunction with the CRM Connector Server, which can be a part of the Unified CCE solution configuration. This adapter is installed with the PeopleSoft CRM product.

Table 6-55: CRM Connector Adapter for PeopleSoft

*Server Class	Type	Hardware, Software Requirements and Remarks
MCS-30-004-Class MCS-30-005-Class MCS-40-005-Class MCS-40-011-Class	CRM Adapter Server	**Operating system and other software** See CRM Connector Supported Platforms **Other hardware Requirements** 100/1000 Ethernet port

* The selection of MCS system class should be based on the PeopleSoft server requirements for the given customer's required level of performance. For more information about the PeopleSoft CRM, visit the http://www.oracle.com/applications/peoplesoft-enterprise.html website.

7.6.19.1.5 CRM Connector Adapter for Microsoft CRM 3.0

Microsoft CRM 3.0 adapter is used in conjunction with the CRM Connector Server, which can be a part of the Unified CCE solution configuration. This adapter is installed with the Microsoft CRM 3.0 product.

Table 6-56: CRM Connector Adapter for Microsoft CRM 3.0

*Server Class	Type	Hardware, Software Requirements and Remarks
MCS-30-004-Class MCS-30-005-Class MCS-40-005-Class MCS-40-011-Class	CRM Adapter Server	**Operating system and other software** See CRM Connector Supported Platforms **Other hardware Requirements** 100/1000 Ethernet port

* The selection of the class of MCS server should be based on the Microsoft CRM server requirements for the given customer's required level of performance. For more information about the Microsoft CRM 3.0 product visit the **http://www.microsoft.com/dynamics/crm/default.mspx** website.

7.6.19.2 CRM Connector for SAP

The Cisco Unified CRM Connector for SAP integrates the SAP CRM application with Cisco Unified Contact Center Enterprise; it can be deployed either collocated with other Unified CCE solution components or can be deployed on a standalone system.

The maximum supported Unified CRM Connectors for SAP collocated per PG is 1.

The maximum supported Unified CRM Connectors for SAP on a dedicated server connected to the same PG is 1.

CTI OS Supervisor Desktop should be used for supervisory features. This will require that CTI OS Server is installed on the PG.

Table 6-57: CRM Connector for SAP

Server Class	* Capacity (Agents)	Call Rate (calls / sec)	Hardware, Software Requirements and Remarks
MCS-30-004-Class MCS-30-005-Class	250	3	**Operating system and other software** See CRM Connector Supported Platforms

* The above dimensioning guidelines and parameters were developed in a lab testing environment that included a test CRM system setup or an equivalent CRM simulator. Actual quality of service (delays, responsiveness, etc.) experienced by the contact center agents might vary from the above dimensioning guidelines/parameters. These variations include structure and size of the CRM database, overall level of the

CRM tuning, intensity of the contact processing workflow(s), as well as other CRM configuration and topology variables outside of the scope of the Cisco connector. It is for this reason that Cisco highly recommends an in-house load test early in a connector deployment project to make sure that the total quality of service under load is satisfactory.

7.6.19.3 CRM Connector Supported Platforms

Table 6-58: CRM Connector Supported Platforms and Requirements

CRM Connector		Operating System		Additional Software						
	Windows Server 2008 R2	Windows XP Pro; SP2	Windows Vista	Microsoft .NET Framework V2.0	Microsoft Message Queuing (MSMQ)	Microsoft Internet Information Server (IIS)	Microsoft SQL Server	DCOM	ASP.NET 2.0	JRE 1.6.3
Server	✓	N/A	N/A	✓	✓	✓	N/R	✓	✓	N/R
Server Admin Tool	✓	N/A	N/A	✓	N/R	✓	✓*	✓	✓	N/R
Oracle PeopleSoft Adapter [1]	✓	N/A	N/A	✓	N/R	N/R	N/R	N/R	N/R	✓
Microsoft CRM 3.0 Adapter [1]	✓	N/A	N/A	✓	N/R	✓	✓	N/R	✓	N/R
Salesforce .com Adapter [1]	N/A	✓	✓	✓	N/R	N/R	N/R	✓	N/R	N/R
SAP [2]	✓	N/A	N/A	N/R	N/R	N/R	N/R	N/R	N/R	N/R

* The Admin tool can use Microsoft SQL Server Express, which is available from Microsoft at no charge.

[1] See the *Cisco Unified CRM Connector Implementation and Administration Guide for Microsoft CRM, Oracle PeopleSoft and Salesforce.com* guide for detailed implementation and installation information for these CRM Connector products.

[2] See the *Installation and Configuration Guide: Cisco Unified CRM Connector for SAP, Release 1.0(1)* for the CRM Connector for SAP.

N/A = Not Available

N/R = Not Required

7.6.20 Cisco Agent and Supervisor Desktops

Cisco agent and supervisor desktops are used in conjunction with the CAD server, which can be a part of the Unified CCE solution configuration.

Table 6-59: CAD Agent and Supervisor Desktop Servers

Server Class	Type	Hardware, Software Requirements and Remarks
GEN-10-005-Class	**Cisco Supervisor Desktop (CSD)** Cisco Desktop Administrator (Web Client) (CDA)	**Operating system and other software** Windows compatible full-duplex sound card (if using Cisco IP Communicator and/or Silent Monitor) See CTI Supported Platforms
GEN-10-005-Class	**Cisco Agent Desktop**	**Other hardware Requirements**

Server Class	Type	Hardware, Software Requirements and Remarks
		100/1000 Ethernet port **Operating system and other software** Windows compatible full-duplex sound card (if using Cisco IP Communicator) See CTI Supported Platforms

7.6.21 Cisco Media Blender for Web Collaboration Option

Cisco Unified ICM/CCE Release 9.0(x) is compatible with Cisco Media Blender 7.1 and its latest Service Release. Note that running the Blender on the PG is only possible with Release 6.0 PGs. If you are deploying a new 9.0(x) system or are upgrading to 9.0(x), you cannot collocate the Blender on a PG due to operating system incompatibility—the Media Blender requires Windows 2003 Server and the PG requires Windows Server 2008 R2.

For Cisco Media Blender hardware and software requirements, see the *Cisco Intelligent Contact Management Release 6.0(0) Bill of Materials* at: http://www.cisco.com/en/US/products/sw/custcosw/ps1001/products_user_guide_list.html.

See the *Cisco Media Blender Installation Guide* for detailed information on Cisco Media Blender server configuration, capability, and limitations.

See Chapter 5 of *Cisco Unified Web and E-Mail Interaction Manager Solution Reference Network Design Guide* for detailed information on sizing requirements.

7.6.22 Cisco Unified Web Interaction Manager (Unified WIM)

See the *Hardware and System Software Specification for Cisco Unified Web and E-Mail Interaction Manager* at: http://www.cisco.com/en/US/products/ps7233/prod_technical_reference_list.html for system requirements, server configurations, capabilities, and limitations of the Cisco Unified Web Interaction Manager.

7.6.23 Cisco Unified E-Mail Interaction Manager (Unified EIM)

See the *Hardware and System Software Specification for Cisco Unified Web and E-Mail Interaction Manager* at: http://www.cisco.com/en/US/products/ps7236/prod_technical_reference_list.html for system requirements, server configurations, capabilities, and limitations of the Cisco Unified E-mail Interaction Manager.

7.6.24 Cisco Finesse Server

Cisco Finesse requires Unified Contact Center Enterprise Release 9.0(1) or 9.0(2).

The Cisco Finesse server supports installation only as a virtual machine running under VMware ESXi 5.0. For more information, see the DocWiki page Virtualization for Cisco Finesse.

Finesse can be deployed according to coresidency policies outlined in the Unified Commuications Virtualization DocWiki (http://docwiki.cisco.com/wiki/Unified_Communications_Virtualization).

See CTI Supported Platforms for system requirements for Cisco Finesse clients.

7.6.25 Cisco Finesse Desktops

Cisco Finesse provides a browser-based desktop for agents and supervisors and a browser-based administration console. The following tables list supported operating systems and browsers for Cisco Finesse.

Note: Internet Explorer 9.0, Mac OS X, and Firefox are supported for Cisco Finesse Release 9.1(1) and later only.

Table 6-60: Cisco Finesse Agent Desktop

Client OS	Client Browser
Windows XP Pro SP3 Windows 7 Mac OS X	Internet Explorer 8.0 Internet Explorer 9.0 (IE 8 Compatibility View inside of IE 9) Firefox Version 16 and later

Table 6-61: Cisco Finesse Administration Console

Client OS	Client Browser
Windows XP Pro SP3 Windows 7 Mac OS X	Internet Explorer 8.0 Internet Explorer 9.0 (IE 8.0 Compatibility View inside of IE 9.0) Firefox Version 16 and later

8 System Software Requirements

8.1 Microsoft Windows Server 2008 R2

Microsoft Windows Server 2008 R2 is supported with 8.5(2) and up. You should be aware of the following distinction between the editions.

Special Notes:

- *Currently only SP1 for Microsoft Windows Server 2008 R2 is supported.*

Microsoft Windows Server 2008 Standard Edition

- Supports up to 4 processors on one 64-bit server
- Maximum 32 GB of RAM

Microsoft Windows Server 2008 Enterprise Edition

- Supports up to 8 processors on one 64-bit server
- Maximum 2 Terabytes (TB) of RAM

Note: Unified Intelligent Contact Management running in 64-bit Microsoft Windows Server 2008 R2, Enterprise Edition supports Active Directory for 64-bit Microsoft Windows Server 2008 R2, Enterprise Edition.

Important: Unified ICM/CCE is qualified to work only on a standard retail (or OEM) packaged installation of Microsoft Windows Server 2008 R2 (Standard or Enterprise), with or without Cisco Security

hardening. Cisco provides its own security hardening policy to secure the standard Windows image for Unified ICM/CCE. Cisco does *not* support Unified ICM/CCE on a customized Windows image (for example, a corporate image) or when custom security hardening has been applied. Using a customized image of the Windows operating system or custom security hardening can cause the Unified ICM/CCE application to fail.

8.2 Microsoft SQL Server 2008 R2

Microsoft SQL Server 2008 R2 Standard Edition

- CPU: Supports up to four processors on one server
- RAM: No operating system maximum

Microsoft SQL Server 2008 R2 x64 Standard Edition can run on the following operating systems

- Microsoft Windows Server 2008 R2 64-bit x64 Standard Edition
- Microsoft Windows Server 2008 R2 64-bit x64 Enterprise Edition

Microsoft SQL Server 2008 R2 Enterprise Edition

- CPU: No operating system maximum
- RAM: No operating system maximum

Note: SQL Server Enterprise Edition (rather than SQL Server Standard Edition) is necessary only if performance demands its use.

8.3 Microsoft Windows Localization Support

The following table lists supported localized versions of Microsoft Windows and SQL Server that can be used with Cisco Unified ICM/Unified Contact Center Enterprise and Hosted system components and Unified System Contact Center Enterprise.

For a detailed list of language localizations implemented for different portions of this release, see the *Cisco Unified ICM/Unified Contact Center Product and System Localization Matrix* available at: http://www.cisco.com/en/US/docs/voice_ip_comm/cust_contact/contact_center/icm_enterprise/localization_matrix/guide/G11nMap.xls.

Table 7-1: Supported Microsoft Software Localizations

Microsoft Software	Windows Language	SQL Server Collation Setting
Windows and SQL Server	• Danish • Dutch • English • French • German • Italian • Portuguese (Brazil) • Spanish • Swedish	Latin1_General
	• Russian	Cyrillic General
	• Chinese (Simplified)	Chinese_PRC
	• Chinese (Traditional)	Chinese_Taiwan_Stroke

Microsoft Software	Windows Language	SQL Server Collation Setting
	• Korean	Korean_Wansung
	• Japanese	Japanese
	• Turkish	Turkish
	• Polish	Polish

8.4 Operating System and Database Requirements

The following table present operating system requirements that are specific to Unified ICM/CCE server type. The next table covers those Unified ICM/CCE servers and client desktop deployments that require special consideration.

Table 7-2: Operating System and Database Requirements, Unified ICME/ICMH/CCE/CCH

Unified ICM/CCE Server	Microsoft Windows Server 2008 R2, Standard or Enterprise Edition (SP1)	SQL Server 2008 R2 x64 SP1, Standard or Enterprise Edition
ICM Router NAM Router CICM Router	✓	—
Progger (Unified CCE)	✓	✓
Rogger (Unified CCE)	✓	✓
NAM Rogger (Unified CCH)	✓	✓
Administration & Data Server	✓	✓
All PGs, includes CCE Agent PG TDM ACD PG VRU PG MR PG	✓	—*
Unified CC Enterprise Gateway PG	✓	—
SS7 Gateway	—	—
Sigtran Gateway	✓	—
ICM Logger NAM Logger CICM Logger	✓	✓
HDS & DDS	✓	✓

***Note:** Unless CAD is installed, in which case SQL Server is an option for CAD—not a requirement. By default, CAD uses flat files and data is simultaneously written to both the A and B sides. However, if one side fails, it is possible that it will be missing report data (agent state logs, call logs, and recording data in the Supervisor Record Viewer) upon recovery. Use SQL Server if replication of the report data is desired.

Table 7-3: Special Considerations (OS and DB Requirements), Unified ICME/ICMH/CCE/CCH

Unified ICM/CCE Server	Operating System Requirements
Administration Client	See the section, Administration Client
CUIC Client	See CUIC BOM specification documentation at: http://www.cisco.com/en/US/products/ps9755/products_implementation_design_guides_list.html
Outbound Option Dialer	Go to the following link for Cisco Outbound Option Data Sheet and Cisco Outbound Option Technical Reference. http://www.cisco.com/en/US/partner/products/sw/custcosw/ps524/products_data_sheets_list.html
CTI OS Desktops	See CTI Supported Platforms
CTI OS	See CTI Supported Platforms

8.5 CTI Supported Platforms

Table 7-4: CTI Supported Platforms

CTI Option	Operating System						
	Server Platform	Client Platform					
	Microsoft Windows Server 2008 R2 Standard or Enterprise (SP1)	Windows XP Professional; SP2	Windows XP Professional; SP3	Windows Vista (Business or Enterprise)	Windows 7 (Pro, Enterprise and Ultimate) [1]	Mac OS X	Red Hat Enterprise Linux
CTI OS Server	✓	—	—	—	—	—	—
Cisco Data Store	✓	—	—	—	—	—	—
Silent Monitor Server (Standalone)	✓	—	—	—	—	—	—
Silent Monitor Service for Unified CC Toolkit	—	✓	✓	✓	✓	—	—
CTI Driver for Siebel	✓[2]	—	—	—	—	—	—
CTI OS - CTI toolkit Unified CC Supervisor Desktop	—	✓[3]	✓[3]	✓[3]	✓[3]	—	—
CTI OS - CTI toolkit Agent Desktop [4]	—	✓[3]	✓[3]	✓[3]	✓[3]	—	—
CTI OS - CTI toolkit Combo Desktop .NET	—	✓[3]	✓ [3]	✓[3]	✓[3]	—	—
CTI OS - Custom Apps using C++ or COM CIL	—	✓	✓	✓	✓	—	—
CTI OS - Custom Apps using Java CIL	—	✓	✓	✓	✓	—	✓ v5.0
CTI OS - Custom Apps using .NET CIL	—	✓	✓	✓	✓	—	—
CTI OS – Monitor Mode Apps using C++, COM, or .NET CIL	—	✓	✓	✓	✓	—	—
CTI OS – Monitor Mode Apps using Java CIL	—	✓	✓	✓	✓	—	✓ v5.0
CTI Desktop (GeoDCS) V4.7 only	—	✓	—	—	—	—	—
Custom Apps using GeoDCS or CtiClient32, V4.7 only	—	✓	—	—	—	—	—
CAD[5]	✓	✓	✓	✓	✓[6]	—	✓ v4.0 or 5.0 [7]
Cisco Finesse[8]	—	—	✓	—	✓[9]	✓[10]	—

Notes:

[1] Any customizations to the CTI OS toolkit must be compiled under the development environment supported in Release 9.0(1) and then deployed on Windows 7. For further information, refer to the CTIOS Developer's Guide. Existing customized CTI OS desktops can be moved to Windows 7 without the need for recompilation. Visual Studio 2008 is *not* supported.

[2] The CTI Driver for Siebel is supported only on Microsoft Windows 2003 Server R2.

[3] Also supports 64-bit (WoW only).

[4] VMware View (previously known as Virtual Desktop Infrastructure (VDI)) is supported with CTI OS desktops. However, with VMware View, CTI OS based Silent Monitoring (SM) is not supported due to physical limitations (the agent machine must be connected to the network via the phone hard-set).

[5] CAD supports Internet Explorer 7.0 and 8.0.

[6] CAD supports Windows 7 32-bit and 64-bit (via WoW).

[7] CAD-BE only using Firefox 3.5 or later with JRE 6.0 update 11.

[8] The Cisco Finesse Agent Desktop and Administration Console support Internet Explorer 8.0 and Internet Explorer 9.0 with IE 8.0 Compatibility View. Finesse Release 9.1(1) and later also support Firefox (version 16 or later) for both the Agent Desktop and the Administration Console.

[9] Cisco Finesse supports both Windows 7 32-bit and 64-bit.

[10] Cisco Finesse Release 9.1(1) and later only

8.6 Supported Third-Party Software

Table 7-5: Supported Third-Party Software

Function	Software
Remote Administration	♦ Windows Server 2008 Remote Desktop[1]
Antivirus software	♦ McAfee Virus Scan Enterprise 8.7i / 8.8i ♦ Symantec Endpoint Protection 11.0 / 12.1 ♦ Trend Micro ServerProtect Version 5.7 / 5.8
Internet Browser	♦ Internet Explorer 9.0 For the latest details on browser support see the Unified CCE Browsers http://docwiki.cisco.com/wiki/UCCE_Browsers.

[1]**Note:** Remote Desktop is not supported for software installation or upgrade. For Remote Desktop usage information, see the section "Remote Administration" in *Security Best Practices Guide for Cisco Unified ICM/Contact Center Enterprise & Hosted*.

Remote Management and Support

Remote management capability allows Cisco TAC support or Cisco partners to provide system maintenance and system troubleshooting from a remote site.

You can provide remote management and remote support capability in one of the following two ways:

- Provide secured VPN to your network where your Unified ICM/CCE server resides.

8.7 Server Virtualization

Server virtualization allows customers to reduce data center footprint and introduces VMware deployment and management tools into the contact center. The following sections describe virtualization options for Cisco MCS and UCS series servers. Cisco supports specific Unified ICM/CC components on virtual machines. However, Cisco does not provide technical support for VMware products. Contact VMware or VMware partners for product support and training for all VMware products.

VMware ESXi 5.0 is the only supported hypervisor for Unified Contact Center Enterprise release 9.x.

VMware infrastructure training is required and the necessary knowledge and experience regarding deployment and management of virtual machines must be acquired before attempting to deploy Unified ICM/CC components on VMware virtual machines.

If you desire 24/7 VMware support, subscribe to VMware Platinum Support & Subscription Service from VMware. For more information on VMware support, see:
www.vmware.com (http://www.vmware.com/support/services/Platinum.html)

Caution: Virtual machine snapshots are not supported in production environments because they have significant impact on system performance.

8.7.1 Virtualization with Media Convergence Servers (MCS)

To consolidate servers, you can deploy a virtualization solution with VMware on MCSs. Unified ICM and Unified Contact Center 8.0(1) and later support Administrative Clients and Peripheral Gateways deployed in VMware guests on specific MCSs; supported PGs require TCP/IP (rather than special I/O) to connect to peripherals. The following Peripheral Gateway types are supported virtualized on MCSs:

- Cisco Unified Communications Manager (Unified CM) PG
- Cisco Unified CCE System PG
- Cisco Unified Agent Routing Services (ARS) PG
- Cisco Voice Response Unit (VRU) PG
- Cisco Media Routing (MR) PG (for multichannel applications)
- UCC Enterprise Gateway
- UCC Express Gateway
- Avaya (Definity)
- Avaya Aura CC (Symposium)

Computing Resource Requirements and Capacities

For information about computing resource requirements for PGs see the Unified Communications Virtualization DocWiki at http://docwiki.cisco.com/wiki/Virtualization_for_Unified_CCE_9.x. You may use the published OVAs thereon to create the virtual machines for the PG components listed above on MCS hardware; published agent PG capacities apply to TDM PGs as well (with the exception of the Avaya TDM ACD PG—see below for specific capacity details for Avaya PGs).

Published OVAs for Administrative Clients may also be used for virtualized Admin Clients on MCS hardware. Computing resource requirements and capacity for Admin Clients is published on the Unified Communications Virtualization Doc Wiki as well.

Avaya TDM ACD PG

A single Avaya TDM ACD PG virtual machine (with two virtual CPUs) cannot support as many agents as an Avaya ACD PG on an MCS-40-xxx-Class server. The following table shows the specific capacity limits for Avaya TDM ACD PG virtual machines:

Table 7-6: Virtualized Avaya TDM ACD PG Requirements

Host Server Class	VM Resource Allocation		Desktops Connecting to CTI OS		Additional Requirements
	vCPUs	RAM	Capacity (Agents)	Skill Groups Per Agent	
MCS-40-016-Class	2	4GB	2000	5	**Note:** CTI OS Monitor Mode applications are not supported with Avaya and CTI OS.
	2	4GB	1600	10	
	2	4GB	1300	15	
	2	4GB	1000	20	

Hardware Requirements:

The Unified ICM/Unified CCE virtualization solution for MCS hardware requires the virtual machines to be run on the following Cisco MCS-7845 class server:

MCS-40-016-Class

The MCS-40-016-Class server comes with 8 GB RAM. An additional 16 GB RAM (either one 2 x 8 kit or two 2 x 4 kits) must be added for a total of 24 GB of RAM.

The MCS-40-016-Class server comes with two Ethernet ports. Two additional dual-port gigabit network adapters must be added for a total of six Ethernet ports. For the PGs, one adapter connects to the ICM public network, another one connects to the ICM private network. For the Administration Clients, both of the adapters connect to the ICM public network. An Ethernet port can support up to five Administration Client virtual machines. See Servers for Cisco Contact Center Products for the requirements of using exact-match OEM servers from Cisco-selected manufacturers.

Software Requirements

Refer to the requirements published on the Unified Communications Virtualization DocWiki at: http://docwiki.cisco.com/wiki/Virtualization_for_Unified_CCE_9.x for virtualization software requirements — these VMware software requirements apply to both MCS-based and UCS-based virtualized deployments.

Migration of Virtual Machines from MCS to UCS

Existing TDM PGs and Administrative Clients deployed in VMware virtual machine guests on MCS servers may be migrated to Unified Computing System hardware using the "technology refresh" upgrade method. Upon migrating to UCS, all requirements published on the Unified Communications Virtualization DocWiki at http://docwiki.cisco.com/wiki/Virtualization_for_Unified_CCE_9.x apply to the deployment (for example, hardware/software requirements and computing resource allocation). Refer to this DocWiki for guidance on the migration process.

8.7.2 Virtualization with Cisco UCS

Starting with ICM/CC Release 8.0(2), you can deploy a virtualization solution for certain Unified CCE components on Cisco Unified Computing System (UCS) hardware. Additionally, certain TDM PGs may be deployed virtualized on UCS hardware. For detailed information on Unified Communications applications

running in virtual machines on UCS hardware, see the Unified Communications Virtualization DocWiki page at: http://docwiki.cisco.com/wiki/Virtualization_for_Unified_CCE_9.x.

This DocWiki page contains links to information about the following:

- UCS hardware requirements
- VMware software requirements
- Currently supported and unsupported Unified CCE components running in virtual machines on UCS or MCS hardware
- Migration of existing TDM PGs from MCS to UCS and new deployments of TDM PGs on UCS
- Explanation of hybrid deployment options (for example, deploying nonvirtualized components with virtualized components)
- Unified CCE application capacity information and virtualization sizing guidelines

8.8 Unified Contact Center Management Portal Software Requirements

Note: For a Single Server system, the software prerequisites and Portal components for both Web Application Server and Database Server must be installed on the single server. A Single Server system is not supported for any but the smallest deployments.

Table 7-7: Unified Contact Center Management Portal Software Requirements

Type of Software	Server	Software
Operating System	All	Microsoft Windows Server 2008 R2; SP1
Prerequisite Software	Web Application Server	• Microsoft Windows Configuration: o Application Server Role o File Server Role o Microsoft .NET Framework 3.5 SP1 feature o Web Server IIS Elements ▪ Static Content ▪ Default Document ▪ Directory Browsing ▪ HTTP Errors ▪ ASP .NET ▪ .NET Extensibility ▪ ISAPI Extensions ▪ ISAPI Filters ▪ HTTP Logging ▪ Request Monitor ▪ Basic Authentication ▪ Windows Authentication ▪ Request Filtering ▪ Static Content Compression ▪ IIS Management Compression ▪ IIS 6 Management Compatibility o Web Server (IIS) Tools

Type of Software	Server	Software
	Database Server	• Microsoft Windows Configuration: o Microsoft .NET Framework 3.5 SP1 feature o File Server Role • J2SE Runtime Environment 6.0, update 30 (64-bit) • Microsoft SQL 2008 R2 SP1 Standard or Enterprise Edition: o Database Server Components o Workstation Components
Cisco Unified Contact Center Management Portal Software Components	Web Application Server	• App/Web Server Component
	Database Server	• Database Component

9 Appendix A – Server Classes

The server classes defined in this section are used in various Cisco contact center application deployment options.

Note: The conventions and notes listed at the end of the section. The shading designates End of Sale (EOS) status for selected 7800 Series Media Convergence Server (MCS) models, as indicated on the applicable server status page of Cisco.com: http://www.cisco.com/en/US/products/hw/voiceapp/ps378/prod_eol_notices_list.html.

Processor Types

PD	Intel Pentium D
C2D	Intel Core2 Duo
Xeon	Intel Xeon
IX5	Intel Xeon 5500 or 5600 Series

Table A.0-1: Series '40' of MCS Server Classes (Dual Processor)

Server Class	Model	Proc. Type	CPU Speed (GHz)	CPUs	CPU Cores	RAM (GB)	Disk (GB)	Disk Controller	Net Ports	Notes
MCS-40-005-Class	MCS-7845-H2-CCE1 MCS-7845-I2-CCE1	Xeon	2.33	2	2	4	4 x 72	SAS	2	1,4,7
	MCS-7845-H2-CCE2 MCS-7845-I2-CCE2	Xeon	2.33	2	2	4	4 x 146	SAS	2	1,4,7
MCS-40-006-Class	MCS-7845-H2-CCE1 MCS-7845-I2-CCE1	Xeon	2.33	2	2	4	6 x 72	SAS	2	1,3,7
MCS-40-007-Class	MCS-7845-H2-CCE1 MCS-7845-I2-CCE1	Xeon	2.33	2	2	4	8 x 72	SAS	2	1,3,7
MCS-40-008-Class	MCS-7845-H2-CCE3 MCS-7845-I2-CCE3	Xeon	2.33	2	4	4	4 x 146	SAS	2	1,4,7
MCS-40-009-Class	MCS-7845-H2-CCE3 MCS-7845-I2-CCE3	Xeon	2.33	2	4	4	6 x 146	SAS	2	1,3,7
MCS-40-010-Class	MCS-7845-H2-CCE4 MCS-7845-I2-CCE4	Xeon	2.33	2	4	4	8 x 146	SAS	2	1,3,7,9
MCS-40-011-Class [1]	MCS-7845-I3-IPC2	IX5	2.53	1	4	6	4 x 300	SAS	2	1,3
MCS-40-012-Class	MCS-7845-I3-IPC2	IX5	2.53	1	4	6	6 x 300	SAS	2	1,3
MCS-40-013-Class	MCS-7845-I3-IPC2	IX5	2.53	1	4	6	8 x 300	SAS	2	1,3
MCS-40-014-Class	MCS-7845-I3-CCE2	IX5	2.53	2	4	8	4 x 300	SAS	2	1,3
MCS-40-015-Class [1]	MCS-7845-I3-CCE2	IX5	2.53	2	4	8	6 x 300	SAS	2	1,3
MCS-40-016-Class	MCS-7845-I3-CCE2	IX5	2.53	2	4	8	8 x 300	SAS	2	1,3,9

[1] As a web server/database server for a CCMP deployment with more than 8000 concurrent agents, additional memory should be added for a total of 16 GB per server.

Table A.0-2: Series '30' of MCS Server Classes (Single Processor)

Server Class	Model	Proc. Type	CPU Speed (GHz)	CPUs	CPU Cores	RAM (GB)	Disk (GB)	Disk Controller	Net Ports	Notes
MCS-30-004-Class	MCS-7835-H2-CCE1 MCS-7835-I2-CCE1	Xeon	2.33	1	2	2	2 x 72	SAS	2	1,4,7
	MCS-7835-H2-CCE2 MCS-7835-I2-CCE2	Xeon	2.33	1	2	2	2 x 146	SAS	2	1,4,7
MCS-30-005-Class	MCS-7835-I3-CCE1	IX5	2.0	1	4	4	2 x 146	SAS	2	1,4

Table A.0-3: Series '20' of MCS Server Classes (Single Processor)

Server Class	Model	Proc. Type	CPU Speed (GHz)	CPUs	CPU Cores	RAM (GB)	Disk (GB)	Disk Controller	Net Ports	Notes
MCS-20-004-Class	MCS-7825-I2-CCE1 MCS-7825-H2-CCE1	PD	2.8	1	2	2	2 x 80	SATA	2	6,7
MCS-20-005-Class	MCS-7825-I3-CCE1 MCS-7825-H3-CCE1	Xeon	2.13	1	2	2	2x 160	SATA	2	6,7
MCS-20-006-Class	MCS-7825-I4-CCE1	C2D	3.0	1	2	2	2x 250	SATA	2	6

Table A.0-4: Series '10' of MCS Server Classes (Single Processor Desktops)

Server Class	Model	Proc. Type	CPU Speed (GHz)	CPUs	CPU Cores	RAM (GB)	Disk (GB)	Disk Controller	Net Ports	Notes
MCS-10-004-Class	MCS-7816-I3-CCE1	PD	2.8	1	2	2	1 x 80	SATA	1	6, 7

Table A.0-5: Series '50' of Generic Server Classes (Quad Processor)

Server Class	Model	Proc. Type	CPU Speed (GHz)	CPUs	CPU Cores	RAM (GB)	Disk (GB)	Disk Controller	Net Ports	Notes
GEN-50-004-Class	(Generic)	Xeon	2.6+	4	2	4	8 x 72	SCSI	2	1,4,5,6,8
GEN-50-005-Class	(Generic)	Xeon	2.5+	4	4	4	8 x 72+	SAS	2	1,4,5,6
GEN-50-006-Class	(Generic)	Xeon	2.1+	4	8	8	10 x 146+	SAS	2	1,4,5,6,10

Table A.0-6: Series '40' of Generic Server Classes (Dual Processor)

Server Class	Model	Proc. Type	CPU Speed (GHz)	CPUs	CPU Cores	RAM (GB)	Disk (GB)	Disk Controller	Net Ports	Notes
GEN-40-003-Class	(Generic)	Xeon	2.33	2	2	4	2-8 x 72 GB	SAS	2	1,4,5

Table A.0-7: Series '30' of Generic Server Classes (Single Processor)

Server Class	Model	Proc. Type	CPU Speed	CPUs	CPU Cores	RAM (GB)	Disk (GB)	Disk Controller	Net Ports	Notes

			(GHz)							
GEN-30-002-Class	(Generic)	Xeon	2.33	1	2	4	2-4 x 72 GB	SAS	2	1,4

Table A.0-8: Series '20' of Generic Server Classes (Single Processor)

Server Class	Model	Proc. Type	CPU Speed (GHz)	CPUs	CPU Cores	RAM (GB)	Disk (GB)	Disk Controller	Net Ports	Notes
GEN-20-004-Class	(Generic)	PD, C2D	2.0+	1	2 / 4	2	2 x 80	SATA	2	2,6

Table A.0-9: Generic Server Classes for Client Software (Desktops)

Server Class	Model	Proc. Type	CPU Speed (GHz)	CPUs	CPU Cores	RAM (GB)	Disk (GB)	Disk Controller	Net Ports	Notes
GEN-10-005-Class (Minimum requirements)	(Generic)	P4, PD, C2D	2.0	1	1/2/4	1	10	SATA	1/2	2,6

Notes:

1. Enable processor Hyper-Threading (if possible). (Enable Hyper-Threading only on a Microsoft Windows Server 2008 R2 or Windows XP/Vista.)
2. The disk should have this amount of available disk space for the applications.
3. The MCS base model comes with four or more hard drives. Additional drives must be separately purchased for this server class of hardware.
4. You might need more Ethernet ports for servers that have the Router software component installed. See Unified ICM/CC Router for details.
5. Two disks are sufficient for '40' and '50' class machines used for Routers, PGs, and other database-less processes.
6. Cisco has qualified and now supports multi-core Intel processors on its full range of products. Each individual core in a multi-core processor does not count as a processor towards server requirements given in this appendix. A processor is considered a single physical CPU, regardless of the number of cores.
7. No longer available for purchase (grayed).
8. The GEN-50-004-Class server has been replaced by the GEN-50-005-Class server.
9. As a VMware ESX host machine, an additional 16 GB of RAM (with either one 2 x 8 kit or two 2 x 4 kits, for a total of 20 GB for the MCS-40-010-Class and a total of 24 GB for the MCS-40-016-Class) is required and two additional dual-port gigabit server adapters (for a total of six Ethernet ports).
10. Processor support is limited to Intel Xeon E7-4800/8800 or later series processors of equal or better specifications than indicated
11. For information about supported hardware for Cisco Finesse, see the DocWiki page Virtualization for Cisco Finesse.

Other Server requirements

- All servers must support 100 or 1000 MB/s Ethernet ports.
- All servers should have a DVD drive.

Class Name Convention

The class name contains self-described meaningful information about the server class. This allows you to refer to the class of server without looking up the class table throughout this document and other documents.

The class name has the following format: AAA-BB-CCC-Class, where:

- AAA: a sequence of alphabetic letters that describes the class, such as MCS for Cisco Media Convergence Server, or GEN for Generic.
- BB: digits that associate the performance class, such as 10, 20, 30, 40, and 50. "00" means no performance association.
- CCC: version number for this class, starts with 001, then 002, 003 …
- Class: indicates that this is a server class, not a server model number, nor a part number.

10 Appendix B – RAID Configuration Requirements

Table B.0-1: RAID Configuration Requirements

Unified ICM/CCE Server	RAID Configuration Requirements	
	OS & Application Software	Database
Unified CCE Progger	RAID 1	
Unified CCE Rogger – small deployment	RAID 1	
Unified CCE Rogger – medium deployment [1]	RAID 1	RAID 10
Unified ICM/CCE Router [1]	RAID 1	—
Unified ICM/CCE Logger – small deployment	RAID 1	RAID 1
Unified ICM/CCE Logger – medium/large deployment [1]	RAID 1	RAID 10
Unified ICM/CCE Administration and Data Server – AW-HDS, AW-HDS-DDS, HDS-DDS; small deployment	RAID 1	
Unified ICM/CCE Administration and Data Server – AW-HDS, AW-HDS-DDS, HDS-DDS; medium/large deployment	RAID 1	RAID 10
Unified ICM/CCE Administration Server and Real-Time Data Server [1]	RAID 1	
Unified ICM/CCE Configuration-Only Administration Server [1]	RAID 1	
Peripheral Gateway – Including CCE Agent PG or TDM ACD PG, VRU PG, MR PG, CTI Server, CTI OS Server and optionally CAD Server, Outbound Option Dialer [1]	RAID 1	—
Unified CCMP – Single Server or Dual Server System Database Server	RAID 1	RAID 10
Unified CCMP – Dual Server System Web Application Server	RAID 1	—
Unified CC Gateway	RAID 1	—
CAD Server	RAID 1	—
Unified Expert Advisor Server	RAID 1	—
Remote Silent Monitoring Server	RAID 1	—
Silent Monitor Server	RAID 1	—
Cisco Data Store Server	RAID 1	—
CTI Driver for Siebel Servers	RAID 1	—
CRM Connector Servers	RAID 1	—

[1]**Note:** These components are supported in virtual machine guests on Cisco Unified Computing System hardware on storage configured as a RAID 5 array.

The following Unified ICM/CCE components do not require a system with a RAID controller/array:

- Administration Client
- CTI OS Agent and Supervisor Desktops
- CAD Agent and Supervisor Desktops
- Unified ICM/CCE SS7 or Sigtran Gateway Servers
- CRM Connector Adapter Clients

11 Appendix C – Acronyms and Terms

Table C.0-1: Acronyms and Terms

Acronym or Term	Description
ACD	Automatic Call Distributor
AD	Active Directory
ADS	Administration & Data Server
ATA	Advanced Technology Attachment - internal storage interconnect interface
AW	Administration Workstations
BHCA	Busy Hour Call Attempts
BOM	The Unified ICM/CCE Bill of Materials document that has been renamed to *Hardware and System Software Specification (Bill of Materials)*
CAD	Cisco Agent Desktop
CCE	(Cisco Unified) Contact Center Enterprise
CCH	(Cisco Unified) Contact Center Hosted
CCS	Cisco Collaboration Server
CDA	CAD Desktop Administrator
Central Controller	A Unified ICM/CCE server configuration that contains the Unified ICM Router and Unified ICM Logger
CG	CTI Gateway, also known as CTI Server
CICM	Customer ICM, a software server used in Unified ICM/Contact Center Hosted
CIL	Client Interface Library
CMB	Cisco Media Blender
Common Ground Upgrade	Upgrade software in-place on pre-existing hardware, migrating data in-place
cps	Calls per second
CSD	CAD Supervisor Desktop
CTI	Computer Telephony Interface
CTI OS	(Cisco) CTI Object Server
CVP	(Cisco Unified) Customer Voice Portal
DCA	Dynamic Content Adapter
DDS	Detail Data Server
ECC variables	Expanded Call Context (ECC) variables
EDMT	Enhanced Database Migration Tool
EIM	(Cisco Unified) E-mail Interaction Manager (replacement for CEM)
HDS	Historical Data Server
ICM	(Cisco Unified) Intelligent Contact Management
ICME	(Cisco Unified) Intelligent Contact Management Enterprise
ICMH	(Cisco Unified) Intelligent Contact Management Hosted
ISE	Internet Script Editor
IVR	Interactive Voice Response

Acronym or Term	Description
MCS	(Cisco) Media Convergence Server
MR PG	Media Routing PG
MR-PIM	Media Routing PIM
NAM	(Cisco) Network Applications Manager – Unified ICM/CCE Hosted
NAS	Network Attached Storage
PG	Peripheral Gateway
PIM	Peripheral Interface Manager – a software component in the PG
SAN	Storage Area Network
SATA	Serial ATA
Sigtran	A set of standards to implement SS7 transport functionality over an IP network
SP	Service Pack
SRND	*Solution Reference Network Design Guide*
SS7	Signaling System 7 – a telecommunication protocol
TAC	(Cisco) Technical Assistance Center
Technology Refresh	An installation or upgrade procedure whereby software is installed and configured on newly acquired hardware, migrating historical and configuration data from the prior hardware environment
TDM	Time Division Multiplexing
UCS	(Cisco) Unified Computing System
Unified CM	(Cisco) Unified Communications Manager
VPN	Virtual Private Network
VRU	Voice Response Unit
WIM	(Cisco Unified) Web Interaction Manager (replacement for CCS)