



2

Test Deployment Models and Sites

This topic describes the deployment models and test beds that were designed and tested as part of Cisco Unified Communications System Release 6.0(1) for the contact center family of products.

This topic contains the following sections:

- [Deployment Models and Test Beds](#)
- [Site Relationships and Call Routing](#)
- [Test Bed 1: Unified IP IVR Test Sites](#)
- [Test Bed 2: Parent and Child Test Sites](#)
- [Test Bed 3: Unified CVP Test Sites](#)

In [Test Case Studies](#), we discussed and defined business requirements that would require a contact center system for two fictitious businesses with call centers:

- Financial industry business model—The first sample case study was based on a bank providing call centers for its customers for internet banking.
- Retail industry business model—The second sample case study was based on a business-to-business model for a retail company with a distribution center and retail centers supporting customer sales by phone.

For guidelines, recommendations, and best practices to help you design and deploy enterprise networking solutions based on your specific business needs and requirements, see the Cisco Solution Reference Network Design (SRND) guides, which are available at: <http://www.cisco.com/go/srnd>

Deployment Models and Test Beds

The following four deployment models were implemented to test the contact center solution that was developed from the business case studies:

- [Single-site](#)
- [Multisite Centralized](#)
- [Multisite Distributed](#)
- [Clustering over the WAN](#)

Typically, a model deploying centralized call processing servers or voice gateways is adequate for an enterprise with small remote sites or offices in a metropolitan area. However, a distributed deployment model is more efficient as sites become larger or more geographically disperse.

The sites were configured and deployed based on the customer requirements and testing was done to validate the interoperability of the contact center components.

Three test beds were then set up based on an multisite distributed, Clustering over WAN (CoW) deployment model encompassing one or more multisite centralized deployment models, including two single-site deployment models. For ease of use, we will use Test Bed 1, Test Bed 2, and Test Bed 3 to refer to the three test beds described below and site numbers to refer to sites in each test bed.

The three test beds are:

- Test Bed 1 consisting of eight sites where Customer Response Solutions (CRS), is deployed for call handling and call treatment functions. See [Test Bed 1: Unified IP IVR Test Sites](#) for more information.
- Test Bed 2 consisting of four sites where Cisco Unified Contact Center Gateway Enterprise (Unified CCGE) feature and the parent and child model are implemented. See [Test Bed 2: Parent and Child Test Sites](#) for more information.
- Test Bed 3 consisting of seven sites where Cisco Unified Customer Voice Portal (Unified CVP) is deployed for call handling and call treatment functions. See [Test Bed 3: Unified CVP Test Sites](#) for more information.

Single-site

In the single-site deployment model, all the voice gateways, agents, desktops, Cisco Unified IP Phones (Unified IP Phones), and call processing servers such as Cisco Unified Communications Manager (formerly known as Unified CallManager), Cisco Unified Intelligent Contact Management (Unified ICM), and CRS (Unified IP IVR) and/or Unified CVP are located at the same site and have no WAN connectivity between any Unified Contact Center Enterprise (Unified CCE) software modules.

Multisite Centralized

In the multisite WAN model with centralized call processing, the Unified Communications Manager cluster resides at a central (or hub) campus and communications with remote offices take place over the IP WAN. The central site or data center provides the call processing services and acts as the hub for the remote sites. This deployment model also contains distributed voice gateways for locally dialed calls.

Multisite Distributed

In the multisite WAN model with distributed call processing, typically, some sites have their own Unified Communications Manager cluster and are interconnected with inter-cluster trunks (ICT Trunking). Similar to the multisite centralized deployment model, sites in the multisite WAN distributed model are deployed with distributed voice gateways. Communication between sites takes place over the IP WAN.

Clustering over the WAN

In the Clustering over the WAN (CoW) model, a single Cisco Unified Communications Manager cluster with its subscriber servers and Unified CCE components (such as Central Controller (Call Router and Logger known as Rogger), Peripheral Gateways, Unified Communications Manager, CTI OS and CAD Servers) are split across multiple sites connected via a QoS-enabled WAN. It provides the redundancy of the distributed model with the simplicity of administering a single Unified Communications Manager cluster and Unified CCE installation. In both test beds, a distributed data center is implemented at the data center locations, with CoW for full agent redundancy in the case of a data center outage.

Test Bed Software Implementation

In this section, we discuss how customer contact software, network management, security, CRS (Unified IP IVR), Unified CVP, the Unified CCGE feature, Unified Mobile Agent (Unified MA) and Remote Agent options, and the parent and child model are implemented in the test beds.

For information on installation and configuration documentation on these and other contact center components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Cisco Unified Contact Center Enterprise and Cisco Unified Intelligent Contact Management Enterprise

Unified CCE and Unified ICM, integral components of the Cisco Unified Communications System, provide intelligent routing and call treatment with transparent blending of multiple communication channels, while easing the transition from a traditional automatic call distributor (ACD) to an IP-based ACD.

Unified CCE/Unified ICM are part of a strategic platform that helps customers move into the next phase of customer contact, beyond today's contact center to a Customer Interaction Network. The Customer Interaction Network is a distributed, IP-based customer service infrastructure that comprises a continuously evolving suite of innovative, multichannel services and customer-relationship-management (CRM) applications.

Unified CCE/Unified ICM software is deployed at the test sites in the contact center environment. With Unified CCE/Unified ICM, the call center manager can configure agents to handle inbound and outbound voice, Web collaboration, text chat, and e-mail requests. The agents can switch between these media on a task-by-task basis. Customers can choose the medium that is most comfortable and convenient for them. Unified CCE/Unified ICM can be used in a single-site environment or integrated into a multisite call center.

Cisco Unified Customer Voice Portal

The Cisco Unified Customer Service Portal (Unified CVP) provides interactive voice response and queuing capabilities in a contact center environment and supports automated speech recognition (ASR) and text-to-speech (TTS) capabilities. Unified CVP, which is implemented at this test environment in the comprehensive mode, includes support for agent queuing, multisite call switching, and speech-enabled and touch-tone applications.

Unified CVP Call Server consists of H.323 and/or SIP services and plays media files to the caller and collects information in return. It also interprets messages from Unified ICM and generates VXML documents that it uses to route the call.

Unified CVP also provides the ability, via an Operations Console, to monitor, manage, and configure all Unified CVP solution components from a central, single operations console.

A standalone Unified CVP Reporting Server provides the ability to generate custom reports on the activities of Unified CVP components, Unified CVP IVR applications, and Unified CVP IVR callers. The centralized reporting server aggregates all Unified CVP-related call information into a relational database with associated reporting tools and pre-packaged report templates.

Customer Response Solutions

CRS implementation at the test sites includes the Cisco Unified IP Interactive Voice Response (Unified IP IVR) product. Unified IP IVR is a multimedia (voice, data, and web) IP-enabled interactive voice response solution that automates call handling by autonomously interacting with contacts.

Using Unified IP IVR, one can create applications that answer calls, provide menu choices for callers, obtain caller data such as passwords or account identification, and transfer calls to caller-selected extensions.

Unified IP IVR is a part of the Unified CCE solution, which is capable of distributing calls to multiple sites and performing pre- and post-routing functions. Unified CCE uses Unified ICM software to direct calls to other systems, such as interactive VRUs and ACD systems.

For purposes of this manual, we will refer to this version of the CRS implementation interchangeably as CRS (when referring to the system) or as Unified IP IVR (when referring to the product).

Cisco Unified Mobile Agent

The Cisco Unified Mobile Agent (Unified MA) feature enables Unified CCE/Unified ICM to support agents using phones not directly controlled by Unified CCE/Unified ICM. This could be an agent:

- Outside the call center, using an analog phone at home or a cell phone.
- Inside the call center, using an IP phone connection not controlled by Unified CCE or an associated Unified Communications Manager.

If you plan to configure a mobile agent:

- To use an analog phone or an Cisco Unified IP Phone (Unified IP Phone) *without* the Cisco Business Ready Teleworker setup, use the Mobile Agent option.
- To use the deployment option of Unified IP Phone *with* the Cisco Business Ready Teleworker setup, use the Remote Agent option.

With Unified MA, contact center administrators can easily:

- Enable staff to work from home.
- Add contact center staff during busy periods.
- Hire skilled staff and knowledge workers in other regions.

Unified MA functionality makes this possible without the overhead of additional off-site equipment or extensive on-site configuration and administration.

Security

Security components include firewall and policy enforcement services, antivirus software, and domain and web server hardening. Security is implemented at the various sites as follows:

- Cisco Catalyst 6500 Series Switch Firewall Services Module (FWSM)—The FWSM allows any port on a device to operate as a firewall port and integrates firewall security inside the network infrastructure.
- Cisco Adaptive Security Appliance (ASA) 5540 Services—Policy enforcement services can protect networks from unauthorized access. These services combine with VPN services to enable businesses to securely extend their networks to business partners, remote sites, and mobile workers.
- CiscoWorks Management Center for Cisco Security Agents—The core management software that provides a central means of defining and distributing policies, providing software updates, and maintaining communications to the agents.
- Cisco Security Agents—The core endpoint software that resides on all Unified Communications Manager, Unified ICM, Unified CVP, CRS, Cisco Unified Outbound Dialers (Unified OUTD), CTI OS, and CAD servers. Cisco Security Agent autonomously enforces local policies that prevent attacks.



Note Unified Communications Manager supports Cisco Security Agent as a standalone agent only.

- McAfee Antivirus—Third-party antivirus agents are installed on Windows-based servers like Unified ICM, CRS, and others, but not on non-Windows appliances such as Unified Communications Manager.

Network Management

Network Management is implemented at all the test sites by using the Cisco Unified Operations Manager (Unified Operations Manager). Unified Operations Manager provides a unified view of the entire Cisco Unified Communications System infrastructure and presents the current operational status of each element of the Cisco Unified Communications System network. It continuously monitors the current operational status of different Cisco Unified Communications products such as Unified Communications Manager, Unified CCE, Cisco gateways, routers, and phones and provides diagnostic capabilities for faster trouble isolation and resolution.

Cisco Unified Contact Center Gateway Enterprise Feature

The following is a brief description of the main aspects in the Cisco Unified Contact Center Gateway (Unified CCGE) feature that is part of the Cisco Unified Communications System Release 6.0(1) for Contact Center. This functionality is implemented as part of the Parent and Child deployment.

- Cisco Unified Contact Center Gateway (Unified CCGE) feature—Allows Cisco Unified Contact Center Enterprise (Unified CCE) to appear as an ACD to Unified ICM software
- Cisco Unified System Contact Center Gateway (Unified SCCG)—Combines the Unified Communications Manager Peripheral Gateway (PG) and VRU PG to look like one peripheral
- Cisco Unified System Contact Center (Unified SCC)—Simplifies the deployment of Unified Contact Center Enterprise software with a streamlined installation and web-based administration

- Parent and Child systems—Play different roles in an Unified CCGE deployment, where the parent system acts as the enterprise routing point and the child system as an ACD

Cisco Unified Contact Center Gateway and Cisco Unified System Contact Center Gateway

In an Unified CCGE deployment, Unified CCE appears as a traditional ACD connected to the Cisco Unified Intelligent Contact Management (Unified ICM) system. Unified ICM uses Unified CCGEs to communicate to the CTI server on the Unified SCCG in Unified CCE.

Unified CCGE provides all standard Peripheral Interface Manager (PIM) data and functionality including translation routing, pre- and post-routing, and an auto configuration feature that eliminates repeating configuration tasks between the Unified CCE and Unified ICM systems.

Cisco Unified System Contact Center

Cisco Unified System Contact Center (Unified SCC) is installed at a single-site deployment and participates in the parent and child model. Unified SCC is installed on a single server as an all-in-one implementation (known as the Progger) combining major software processes such as the Peripheral Gateway (PG), Router, Logger, Unified Communications Manager PIM, Unified IP IVR PIMs, CTI Server, Customer Telephony Integration Object Server (CTI OS) and Cisco Agent Desktop (CAD) servers.

The Unified SCC deployment has a streamlined installation and a browser-based interface associated with it. The new Unified CCE Secure Web Administration, available exclusively with this model:

- Reduces complexity for Unified CCE software configuration and administration
- Provides remote administration capability through a browser, and therefore does not require installing additional administration workstations

Parent and Child Model

The Unified CCGE feature and the parent and child model are implemented for testing additional contact center functionality. In the parent and child model, the child system is configured to function completely on its own and does not need the connection to the parent to route calls to agents. This independence provides complete local survivability for mission-critical call centers if the network between the child and parent goes down or if there is a problem with the parent or the gateway connection.

The parent and child model on Test Bed 2 is deployed as a single parent system with multiple child systems. Unified CCGEs are installed at the parent sites and Cisco Unified System Contact Center Gateways (Unified SCCGs) are installed at both the parent and child sites. [Figure 18](#) shows the sites and components participating in the parent and child model in Test Bed 2. [Table 11](#) provides a comprehensive view of the different components deployed at the various parent and child sites.

Parent and Child Systems Relationships

The systems in an Unified CCGE deployment play different roles. The following terms describe the relationship between these roles:

- Parent system—The Unified ICM Enterprise system that serves as the network or enterprise routing point, involving Unified CCGEs.
- Child system—The Unified CCE system that is set up to function as an ACD, involving Unified SCCGs.

The parent system does the following:

- Routes calls between children.
- Uses Unified CVP to provide initial call treatment (prompting) and queuing for Unified CVP Post-Routed calls that come into the test beds.
- Based on Unified ICM call routing logic, routes the call to an available agent in the child system. If no agents are available, does one of the following:
 - Uses Unified CVP to queue it at the VXML gateway in the parent site
 - Queues the call at the local CRS (Unified IP IVR) at the child system

The child system does the following:

- Can receive calls with or without the involvement of the parent system.
- For calls received directly by the child, uses CRS (Unified IP IVR) to provide initial call treatment for Unified Communications Manager Post-Routed calls that come into the test bed.
- Based on Unified ICM call routing logic, routes the call to an available agent at its own site or queues it at the CRS system locally.

The advantage with the parent and child model is that call center operations can continue, even if the WAN connection between the data centers and remote sites is not operational.

For detailed information on the parent and child model, see the *Cisco IPCC Gateway Deployment Guide for Unified ICME, Unified CCE, Unified CCX, Enterprise Release 7.2(1)* at: http://www.cisco.com/en/US/docs/voice_ip_comm/cust_contact/contact_center/icm_enterprise/icm_enterprise_7_2/installation/guide/IPCCGateway72.pdf

Deployment Options for Call Flows in Test Beds

Table 1 provides a brief overview of the deployment options available for the Unified Communications Manager Post-Routed call flow in Test Bed 1, the Parent and Child call flow in Test Bed 2, and Unified CVP Post-Routed call flow in Test Bed 3.

Table 1 Deployment Options in Test Bed 1, 2 and 3

Deployment Options	Unified Communications Manager Post-Routed Call Flow and Unified CVP Post-Routed Call Flow	Parent and Child Call Flow	
		Parent System	Child System
Clustering	Single-site Multisite Centralized Multisite Distributed CoW	Single-site Multisite Centralized Multisite Distributed CoW	Single-site Multisite Centralized Multisite Distributed CoW
Controller	Progger Rogger CallRouter/Logger	Progger Rogger CallRouter/Logger	Progger Rogger CallRouter/Logger
Unified ICM Redundancy	colocated vs. geographically separate	colocated vs. geographically separate	colocated vs. geographically separate

Table 1 Deployment Options in Test Bed 1, 2 and 3 (continued)

Deployment Options	Unified Communications Manager Post-Routed Call Flow and Unified CVP Post-Routed Call Flow	Parent and Child Call Flow	
		Parent System	Child System
PG Redundancy	colocated vs. geographically separate	Unified CCGE located at parent ¹ or child site, but not coresident with Unified SCCG on the same server	Unified SCCG at child sites Unified SCCG deployment at independent single-site
Types of PGs	Generic PG, Unified Communications Manager PG, VRU PG vs. Unified SCCG	Unified CCGE & VRU PG	Unified SCCGs
PSTN Gateways	Centralized vs. distributed	Centralized	Centralized vs. distributed
Number of Unified IP IVR Servers	not applicable	not supported	Maximum five (5)
Desktop	CAD vs. CTI OS	No agents	CAD vs. CTI OS
Miscellaneous Options	Cisco Unified Outbound Dialer supported with Unified SCCG (requires a separate MR PG) Multi-channel	No outbound agents	Cisco Unified Outbound Dialer supported with Unified SCCG (requires a separate MR PG) Multi-channel
Installation	Traditional installation (Unified ICM SetUp and Admin Workstation)	New installation with Unified CCGE -or- Install Unified CCGE after upgrading Unified ICM	New installation based on Unified SCCG -or- Install Unified SCCG after upgrading Unified CCE
Upgrade	Traditional upgrade based on single stage or multi-staged upgrade approaches	No upgrade from non-parent -or - Parent systems first before child systems	No upgrade from non-Uni-fied SCCG -or- Parent systems first before child systems
Call Treatment and Queuing	Unified IP IVR -or- Unified CVP	Unified CVP only	Unified IP IVR only

1. We recommend that Unified CCGE is co-located at the same site as Unified SCCG.

Test Bed 1: Unified IP IVR Test Sites

The following eight sites make up the multisite centralized and multisite distributed deployment models for testing the Unified Communications Manager Post-Routed call flow:

- Canton/[Site1: Data Center Site](#)
- Chicago/[Site2: Remote Site](#)
- Clifton/[Site3: Remote Site](#)
- Clinton/[Site4: Data Center Site](#)

- [Clover/Site5: Branch Office Site](#)
- [Carefree/Site6: Remote Site](#)
- [Unified Mobile Agents/Site7: Virtual Call Center](#)
- [Remote Agent/Site8: Cisco Remote Agent \(Teleworker\) Site](#)

See [Topology of Cisco Unified IP IVR Sites](#) for a complete map of the eight sites, their individual topologies, and the relationship between the sites. See [Table 2](#) for a comprehensive view of the different components deployed at the various Unified IP IVR sites. See [Unified IP IVR Site Definitions](#) for more information on the individual sites in Test Bed 1.

Site Relationships and Call Routing

Listed below are the relationships of the eight sites and the call routing deployed in Test Bed 1.

Multisite Centralized Site Relationships

- Site1 and Site4 are data centers which *share* Unified CCE components over the WAN (CoW).
- Site1 and Site4 participate in one of the multisite centralized configurations and act as the hubs for Site2, Site3, Site7, and Site8.
- Site5 has its own Unified Communications Manager cluster and participates in the other multisite centralized configuration.
- Site6 is a remote of Site5.
- Site7 acts as a virtual call center for mobile agents.
- Site8 is a remote *telecommuter* agent associated with Site2.

Multisite Distributed Site Relationships

- In addition to Site1 and Site4, Site5 has a Unified Communications Manager cluster resident at its site for independent call processing locally.
- Site2, Site3, Site7, and Site8 depend on Site1/Site4 for providing call processing functionality and Site6 depends on Site5 for its call processing.

Call Routing

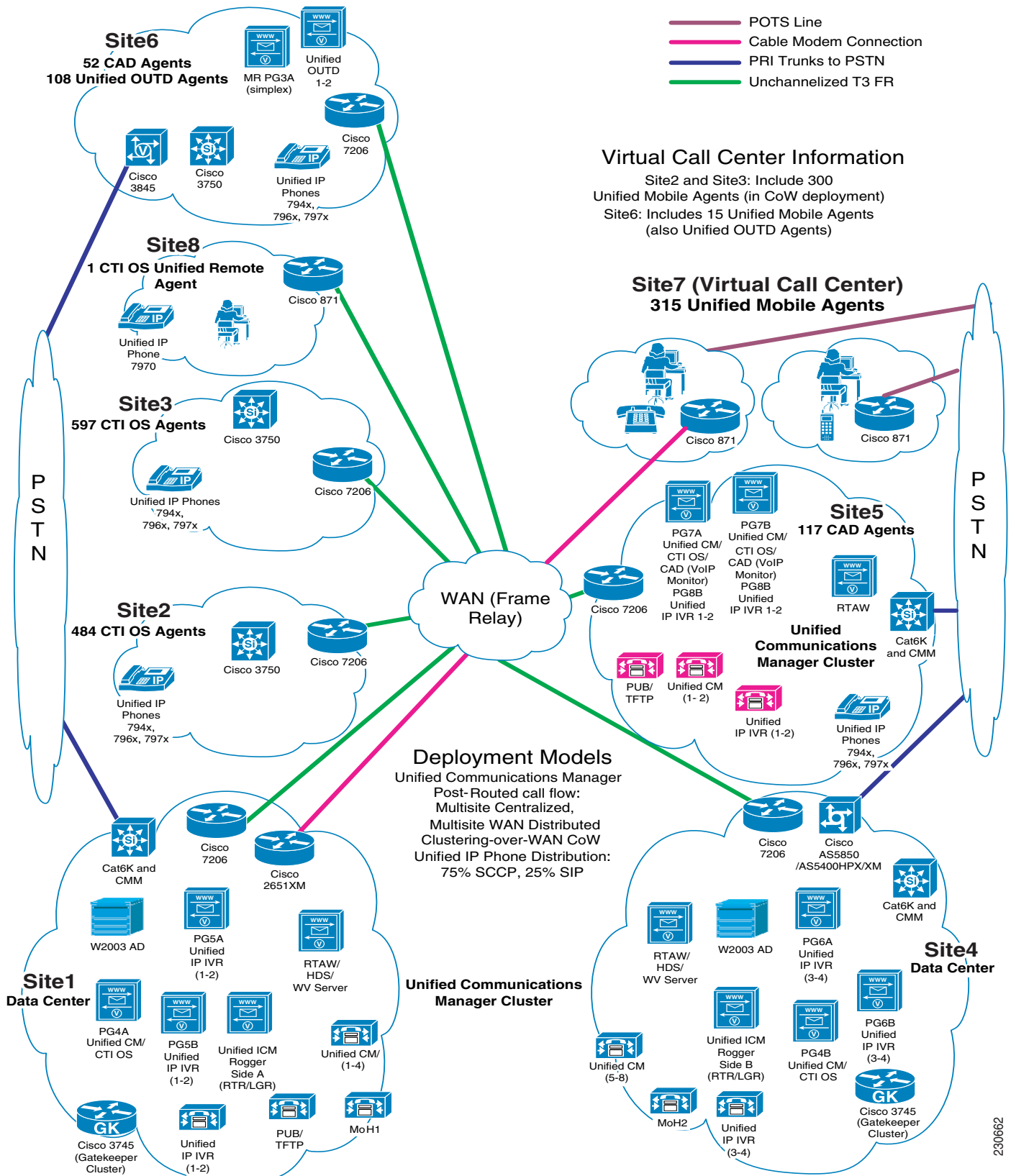
- General call flow—Customer calls come into the data centers (Site1/Site4) and are processed and routed over the WAN to agents in the remote sites.
- Unified Communications Manager Post-Routed Call Flow—Site1 and Site4 participate in this call flow and receive calls from the PSTN. Calls coming into these sites are routed over the WAN to agents at Site2, Site3, and Site8.
- Unified OUTD Call Flow—Site6 with dedicated agents participates in this call flow and the Unified MA call flow.
- Unified MA Call Flow—Site6 and Site7 mobile agents use their regular PSTN or cell phones to handle calls based on their skill groups. Calls are routed via Site1/Site4 gateways to the mobile agents' PSTN or cell phones.

[Tested Call Flows](#) discusses these call flows in greater detail.

Topology of Cisco Unified IP IVR Sites

The topology and relationships of the eight sites where Unified CCE with Unified IP IVR is deployed are shown in [Figure 1](#).

Figure 1 Unified IP IVR Sites in Test Bed 1



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Snapshot of Unified IP IVR Sites Components

Table 2 provides a comprehensive view of the different components deployed at the various Unified IP IVR sites. For specific component names and quantities, see [Unified IP IVR Site Definitions](#) for individual site descriptions and topologies.

Table 2 Comprehensive Unified IP IVR Sites Components List

Components	Site1	Site2	Site3	Site4	Site5	Site6
Hub/Data Center	X			X		
Branch Office					X	
Remote Site		X	X			X
Agents	0	484	597	0	117	160
BHCA	n/a	8,694	10,746	n/a	2,106	2,880
Unified Communications Manager Cluster	X			X	X	
Music On Hold (MoH)	X			X	X	
HW Conference/MTP/Transcoder	X			X	X	
Domain Controller/Windows 2003 Active Directory	X			X		
Unified ICM Rogger	X			X		
RT AW/HDS/WebView	X			X	X	
Unified Communications Manager PG	X			X	X	
VRU PG	X			X	X	
MR PG (coresident on Unified OUTD)						X
Access Switch	X	X	X	X	X	X
Access Router	X					
CMM Gateway: SIP (1) & MGCP (5)	X				X	
AS5850 and AS5400HPX/XM Gateways				X		
IOS (H.323) Gateway				X		
PSTN Gateway	X			X	X	X
VXML Gateway	X			X		
Gatekeeper	X			X		
WAN Router	X	X	X	X	X	X
CRS (Unified IP IVR)	X			X	X	
Unified CVP Call Server	X			X		

Table 2 Comprehensive Unified IP IVR Sites Components List (continued)

Components	Site1	Site2	Site3	Site4	Site5	Site6
CAD Server: coresident on Unified Communications Manager PG					X	
CTI/CTI OS Server: coresident on Unified Communications Manager PG	X			X	X	
CAD Agent/Supervisor Desktop					X	X
CTI OS Agent/Supervisor Desktop		X	X			
Unified Outbound Dialer						X
DHCP Server (on router)	X	X	X	X	X	X
VoIP Monitor Server					X	
Unified IP Phones (SCCP and SIP)	X	X	X	X	X	X
CiscoWorks Management Center for Cisco Security Agent	X					
Cisco Security Agent	X	X	X	X	X	X
Unified Operations Manager				X		
Third-Party Software	X	X	X	X	X	X


Note

Site8 has a Cisco Telecommuter Router 871 and Cisco IP Communicator for connectivity to the data centers. Cisco 7507 is the core switch that provides Frame Relay services to the Unified IP IVR sites. 315 mobile agents in Site6 and Site7 use regular PSTN or cell phones to accept and handle customer calls.

Unified IP IVR Site Definitions

The following section describes the sites that were created for the various deployment models in Test Bed 1 for testing Unified Communications Manager Post-Routed call flows. Each section in this section defines the design characteristics of an individual site and includes logical and physical topology maps and a site equipment table.

Site1: Data Center Site

Site Profile

Site1 is the hub and the data center in a multisite distributed WAN configuration with Site4 as its backup hub. This site acts as the hub for Site2, Site3, Site7, and Site8 remote sites.

The test site is deployed as follows:

- Agents:
 - There are no agents and ingress calls are not answered at this site.
 - Site1 manages and services the agents located in Site2, Site3, Site7, and Site8.

- With the Unified MA option, two CTI ports are provided for each mobile agent, which adds up to 600 CTI ports for the 300 mobile agents associated with Site7.
- Call Flows:
 - CRS is used for menu prompting and call queue management of the Unified Communications Manager Post-Routed call flow and load sharing at Site1.
 - The Cisco SIP Catalyst CMM acts as a gateway into this site and is used to terminate the traffic originating from the PSTN simulators.
- Call Processing/Routing:
 - A Unified ICM Router and Logger (Rogger) provide enterprise-wide Unified ICM capability by distributing voice and data from multiple channels to enterprise resources.
 - A Unified ICM Rogger (Side A) is located at this hub. There is a dedicated private and separate visible WAN connection to the Rogger (Side B) at Site4.
 - The central database is associated with the Logger. The Historical Database Server (HDS) and WebView Server (WVS) are installed on the Real-Time Admin Workstation (RT AW).
 - CRS provides call treatment and queuing based on the type of post-routed calls coming into Site1.
- Infrastructure:
 - A Unified Communications Manager cluster has 1 first node and 4 subsequent nodes and a Music-on-Hold (MoH) server.
 - There are 2 types of Peripheral Gateways (PGs) implemented at Site1.
The Unified Communications Manager PG supports 1 Peripheral Interface Manager (PIMs) and communicates with the Unified Communications Manager cluster and CTI OS servers.
There is a duplexed VRU PG, which supports 2 PIMs, and communicates with the local CRS servers.
 - The SIP Catalyst CMM acts as the voice gateway connected directly to the WAN and indirectly to the PSTN simulators.
 - The gatekeepers are implemented in GUP cluster models.
 - A WAN router and DS3 link provide clustering over the WAN (CoW) private connectivity to the backup data center in Site4.
 - A DHCP Server (on the router) provides IP addresses to the admin Unified IP Phones that are needed for basic functionality testing.
 - Windows 2003 Active Directory provides the active directory structure and DNS services.
- Unified IP Phones:
 - There are 50 admin phones at this site.
- Network Management:
 - Perfmon and WebView are installed at this site to provide reporting and troubleshooting information.
- Redundancy and Failover:
 - The Unified Communications Manager cluster has been set up in 1:1 load sharing mode.
 - Failover capabilities are in place in Site4 for Unified Communications Manager.
 - The second Rogger at Site4 provides data center redundancy for this site.
 - Gatekeepers are implemented in GUP cluster models.

- Security:
 - Core management security is implemented with CiscoWorks Management Center.
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - McAfee Antivirus is installed on all the Window-based servers.

Figure 2 shows the logical topology of Site1.

Figure 2 Site1 Logical Topology

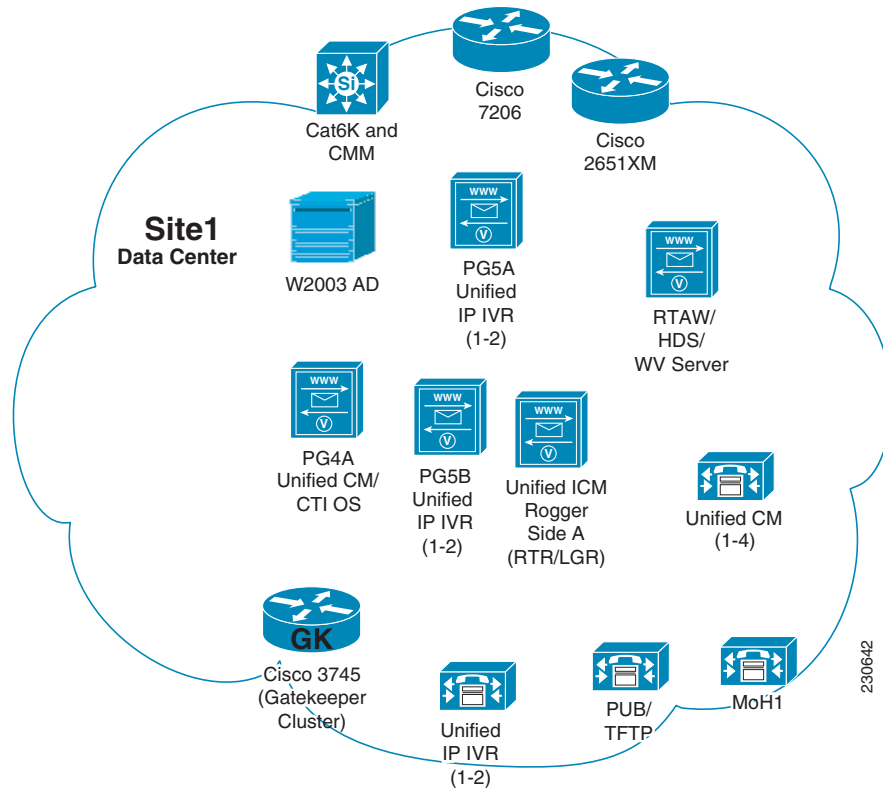


Table 3 lists the equipment and hardware platforms used in Site1. Use the reference information in the table to access corresponding software versions and model numbers.

Table 3 Site1 Equipment List

Component	Hardware Platform
Access Switch	Catalyst 6509
Access Router	Cisco 2651XM
Unified Communications Manager	MCS-7845-H1-IPC1
Cisco CMM Gateway (SIP)	Catalyst 6500 (CMM)
CRS (Unified IP IVR)	MCS-7845H-2.4-EVV1
Domain Controller/Windows 2003 Active Directory	MCS-7845H-3000

Table 3 **Site1 Equipment List (continued)**

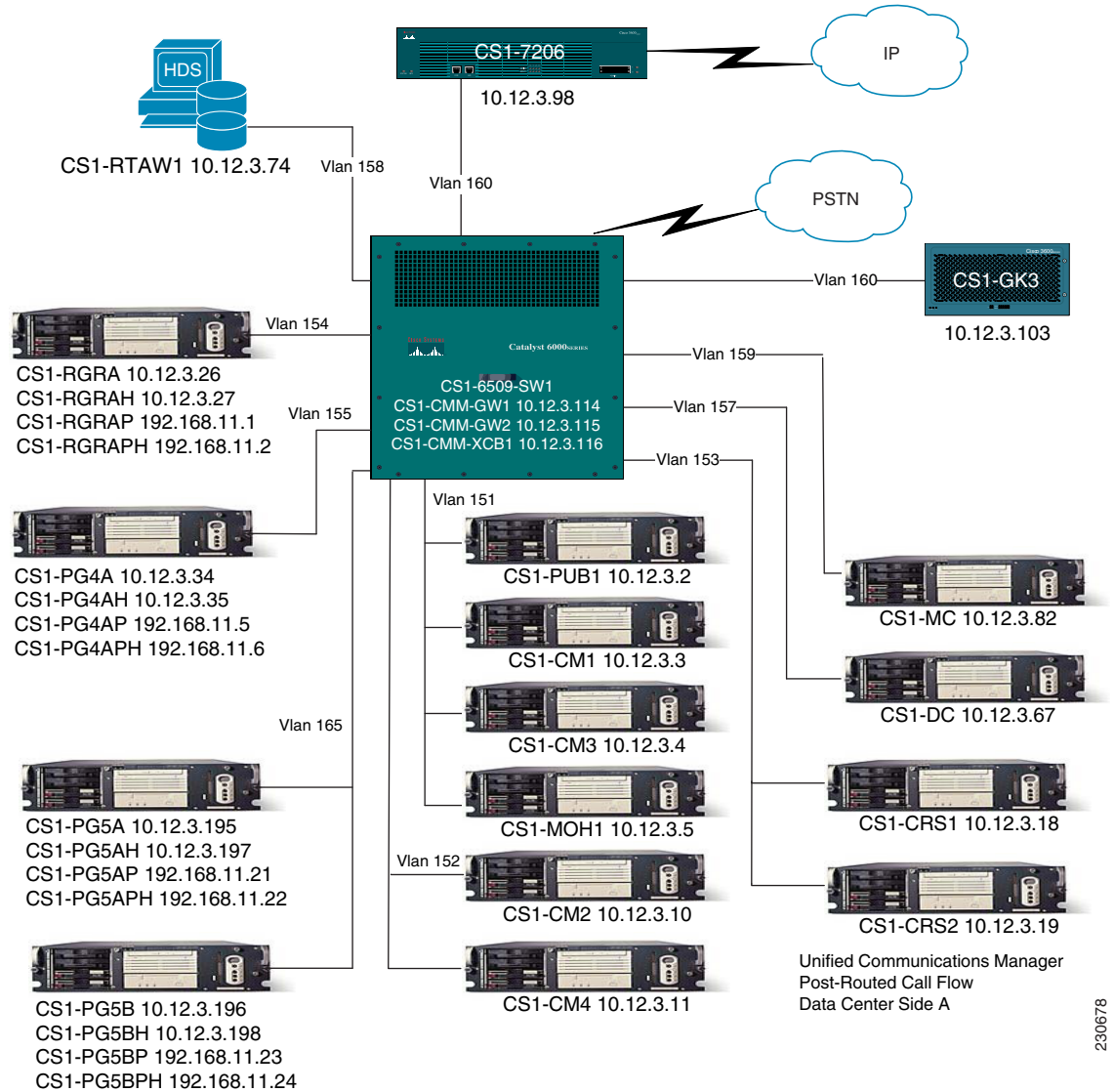
Component	Hardware Platform
Gatekeeper (GUP cluster)	Cisco 3745
HW Conference/MTP/Transcoder	Catalyst 6509 CMM (ACT)
Music on Hold (MoH)	MCS-7845-H1-IPC1
Peripheral Gateway	MCS-7845-H1-CC1
Rogger	MCS-7845-H1-CC1
RT AW/HDS/WebView	MCS-7845-H1-CC1
Unified IP Phones	Unified IP Phones (SCCP) 794x/796x/797x
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 3 shows the physical topology of Site1 displaying the equipment listed in Table 2-3.

Figure 3 Site1 Physical Topology



230678

Site2: Remote Site

Site Profile

Site2 is a small remote office of Site1 in the multisite centralized configuration. It participates in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - 484 agents use CTI OS Desktop Application for call control functions.
 - Calls arriving and being processed here have a BHCA of 8,694.

- Teleworker agent (in Site8) is associated with this site.
- Call Flows:
 - Agents receive Unified Communications Manager Post-Routed call flows.
 - Agents in this site receive transfers and conferences from Site3 and from mobile agents in Site7.
 - Silent monitoring and recording is done by Unified Communications Manager and Witness Impact 360 Server (third-party product).
- Infrastructure:
 - A WAN router and DS3 link provide connectivity to other sites through a Frame Relay cloud.
 - A DHCP Server (on the router) provides IP addresses to the Unified IP Phones at the site.
- Unified IP Phones:
 - 366 SCCP phones are located at this site.
 - 118 agent and 16 admin SIP phones are located at this site.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - McAfee Antivirus is installed on all the Windows-based servers and the agent desktops.

Figure 4 shows the logical topology of Site2.

Figure 4 Site2 Logical Topology

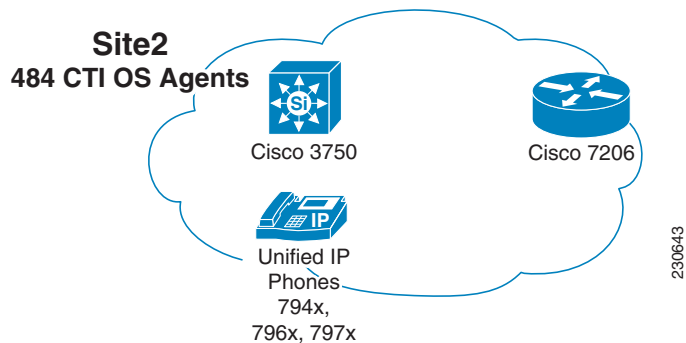


Table 4 lists the equipment and hardware platforms used in Site2. Use the reference information in the table to access corresponding software versions and model numbers.

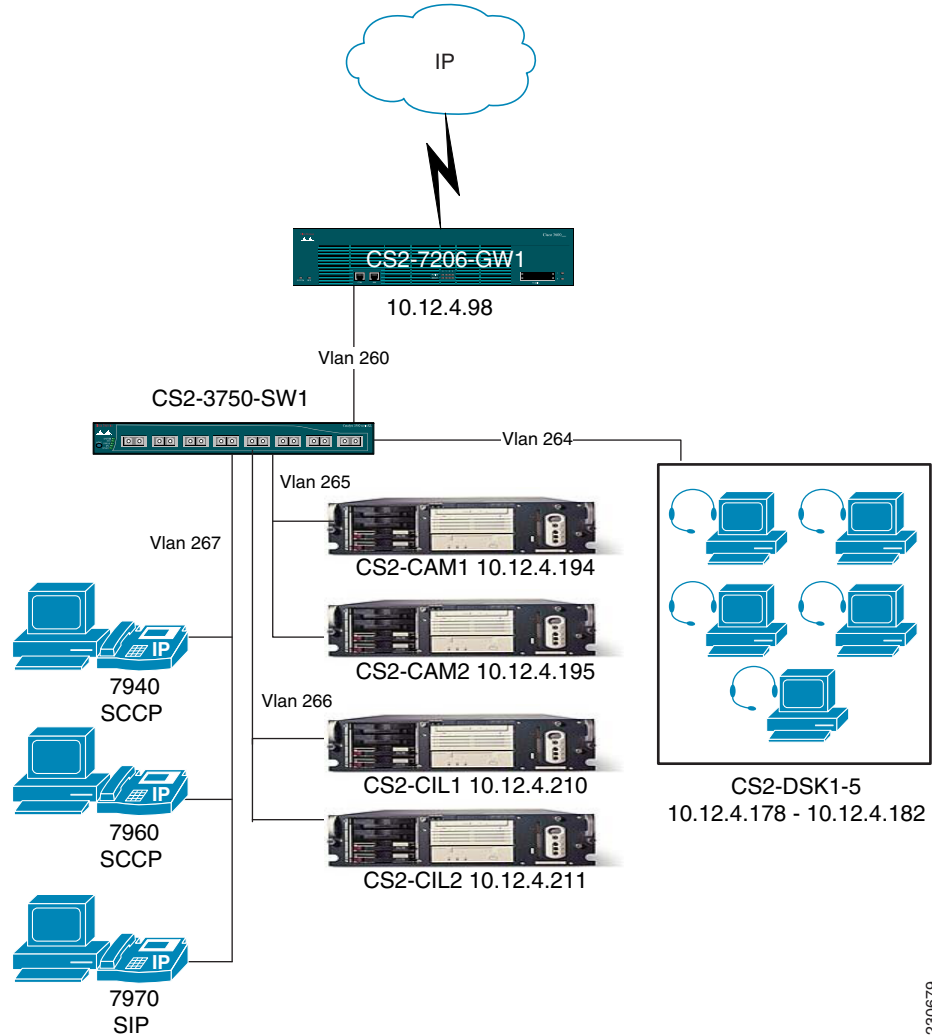
Table 4 Site2 Equipment List

Component	Hardware Platform
Access Switch	Catalyst 3750
CTI OS Agent and Supervisor Desktop	Pentium IV Desktop
Unified IP Phones	Unified IP Phones (SCCP and SIP) 794x/796x/797x
WAN Router	Cisco 7206VXR
Witness Impact 360 Server	MCS-7845H-3.0-ECS2

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:
http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 5 shows the physical topology of Site2 displaying the equipment listed in Table 2-4.

Figure 5 Site2 Physical Topology



Site3: Remote Site

Site Profile

Site3 is a medium remote site of Site1 in the multisite distributed configuration. It participates in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - 597 agents use CTI OS Desktop Application for call control functions
 - Calls arriving and being processed here have a BHCA of 10,746.
- Call Flows:
 - Agents receive Unified Communications Manager Post-Routed call flows.
 - Agents in this site receive transfers and conferences from Site2 and from mobile agents in Site7.
- Infrastructure:
 - A WAN router and DS3 link provide connectivity to other sites through a Frame Relay cloud.
 - A DHCP Server (on the router) provides IP addresses to the Unified IP Phones at the site.
- Unified IP Phones:
 - 432 SCCP phones are located at this site.
 - 165 agent and 29 admin SIP phones are located at this site.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - McAfee Antivirus is installed on all the Windows-based servers and the agent desktops.

Figure 6 shows the logical topology of Site3.

Figure 6 Site3 Logical Topology

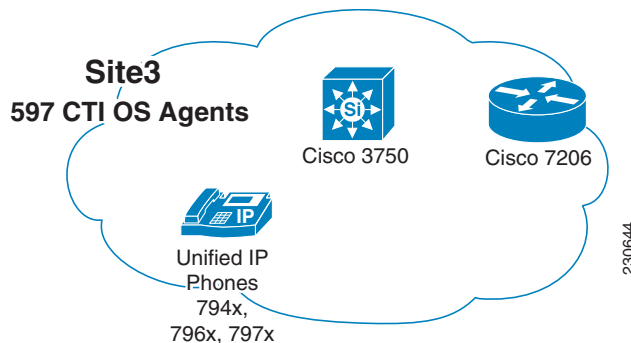


Table 5 shows the equipment and hardware platforms used in Site3. Use the reference information in the table to access corresponding software versions and model numbers.

Table 5 **Site3 Equipment List**

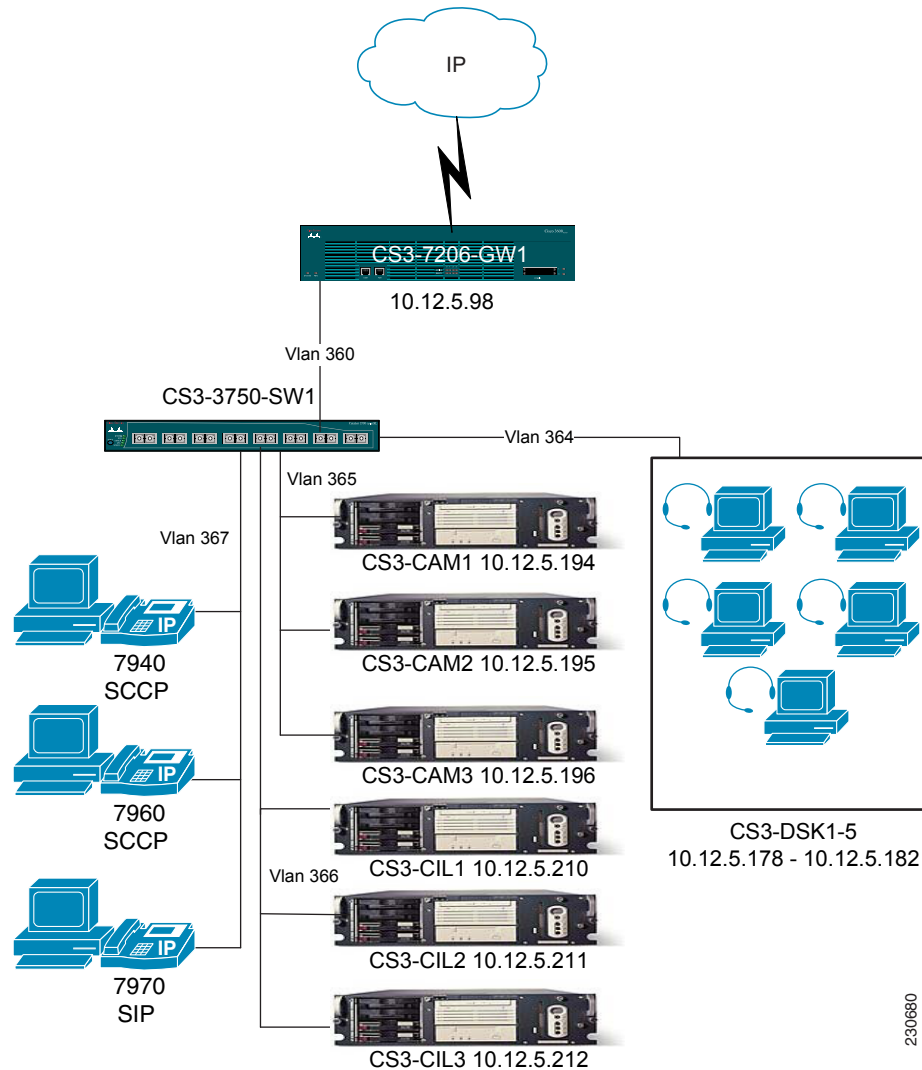
Component	Hardware Platform
Access Switch	Catalyst 3750
CTI OS Agent and Supervisor Desktop	Pentium IV Desktop
Unified IP Phones	Unified IP Phones (SCCP and SIP) 794x/796x/797x
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 7 shows the physical topology of Site3 displaying the equipment listed in Table 2-5.

Figure 7 Site3 Physical Topology



Site4: Data Center Site

Site Profile

Site4 is a redundant hub and the backup data center for Site1 with which it participates in a multisite centralized configuration for Site2, Site3, and Site8. It also participates in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - There are no agents and ingress calls are not answered at this site.
 - Two CTI ports are provided for each mobile agent, which adds up to 600 CTI ports for the 300 mobile agents in Site7.
- Call Flows:
 - This site acts as a backup to Site1 and helps Site1 manage and service the agents at Site2, Site3, Site7, and Site8.
 - CRS is used for menu prompting, call queue management, and load sharing of the Unified Communications Manager Post-Routed call flow at Site1.
 - Cisco AS5850 gateway acts as a H.323 gateway into this site and is used to terminate the traffic originating from the PSTN simulators.
 - Cisco AS5400HPX/XM gateway originates outbound calls to mobile agents.
- Call Processing/Routing:
 - A Unified ICM Rogger (Side B) is located at this hub. There is a dedicated private and separate visible WAN connection to the other Rogger (Side A) in Site1.
 - HDS and WVS are installed on the RT AW.
 - CRS provides call treatment and queuing to the post-routed calls coming into Site4.
- Infrastructure:
 - A Unified Communications Manager cluster has 4 subsequent nodes and a Music-on-Hold server.
 - There are 2 types of PGs implemented at Site4.

The Unified Communications Manager PG supports 1 Peripheral Interface Manager (PIMs) and communicates with the Unified Communications Manager cluster and CTI OS servers.

There is a duplexed VRU PG, which supports 2 PIMs, and communicates with the local CRS servers.
 - The SIP Catalyst CMM acts as the voice gateway connected directly to the WAN and indirectly to the PSTN simulators.
 - Two gatekeepers are implemented GUP cluster models.
 - A WAN router and DS3 link provide connectivity to other sites through a Frame Relay cloud.
 - A DHCP Server (on the router) provides IP addresses to the Unified IP Phones at the site.
 - Windows 2003 Active Directory provides the active directory structure and DNS services.
- Unified IP Phones:
 - There are 45 admin phones at this site.
- Network Management:
 - Perfmon, Cisco Unified Operations Manager, and WebView are installed at this site to provide reporting and troubleshooting information.
- Redundancy and Failover:
 - The Unified Communications Manager cluster has been set up in 1:1 load sharing mode.
 - Failover capabilities are in place in Site1 for Unified Communications Manager.
 - Redundancy Rogger is in place with the other Rogger (Side A) located in Site1.

- Gatekeepers are implemented GUP cluster models.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - McAfee Antivirus is installed on all the Windows-based servers.

Figure 8 is a logical topology of Site4.

Figure 8 Site4 Logical Topology

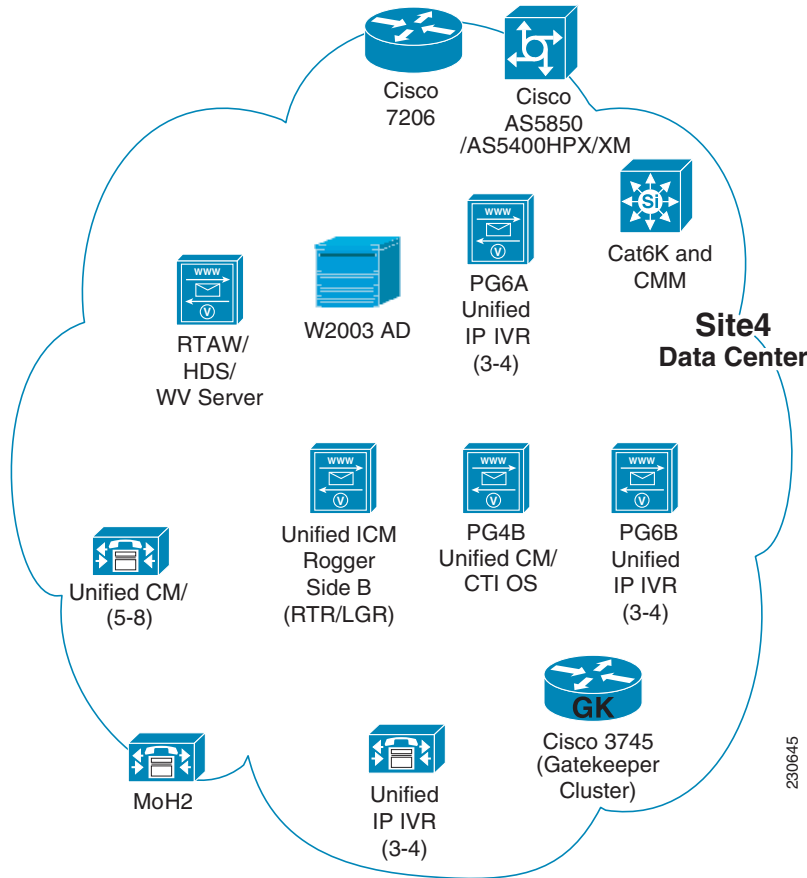


Table 6 lists the equipment and hardware platforms used in Site4. Use the reference information in the table to access corresponding software versions and model numbers.

Table 6 Site4 Equipment List

Component	Hardware Platform
Access Switch	Catalyst 6509
CRS (Unified IP IVR)	MCS-7845H-2.4-EVV1
Domain Controller/Windows 2003 Active Directory	MCS-7845H-3000
Gatekeeper (GUP cluster)	Cisco 3745

Table 6 **Site4 Equipment List (continued)**

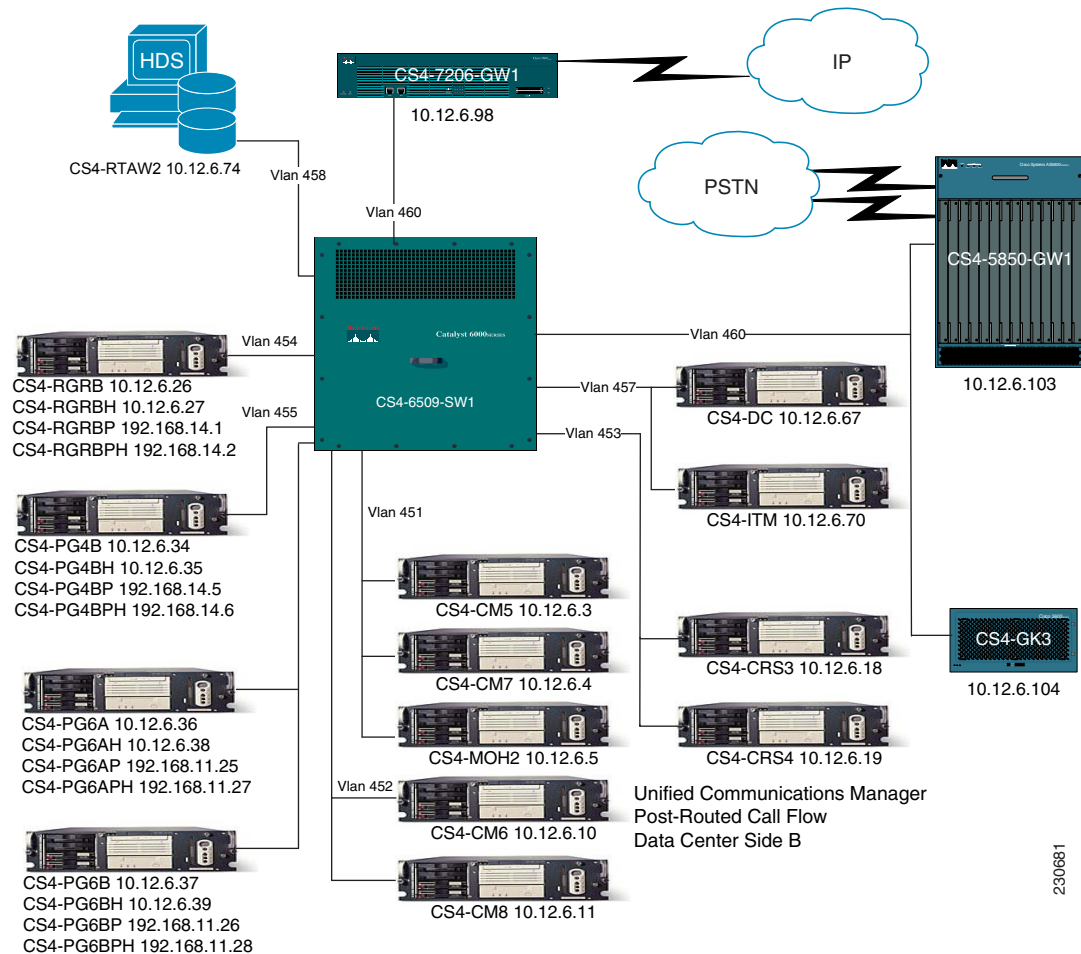
Component	Hardware Platform
Gateway (H.323)	Cisco AS5850
Gateway (H.323)	Cisco AS5400HPX/XM
HW Conference/MTP/Transcoder	Catalyst 6509 CMM (ACT)
Music on Hold (MoH)	MCS-7845-H1-IPC1
Peripheral Gateways	MCS-7845-H1-CC1
Rogger	MCS-7845-H1-CC1
RT AW/HDS/WebView	MCS-7845-H1-CC1
Unified Communications Manager	MCS-7845-H1-IPC1
Unified IP Phones	Unified IP Phones (SCCP) 794x/796x/797x
Unified Operations Manager	MCS-7845H-2.4-EVV1
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 9 shows the physical topology of Site4 displaying the equipment listed in Table 2-6.

Figure 9 Site4 Physical Topology



Site5: Branch Office Site

Site Profile

Site5 is a medium remote branch office in a multisite centralized configuration for Site6. It also participates in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - 117 agents use Cisco Agent Desktop (CAD) Application for call control functions.
 - Calls arriving and being processed at this site have a BHCA of 2,106.
- Call Flows:
 - Agents receive Unified Communications Manager Post-Routed call flows.
 - Agents in this site receive transfers and conferences from Site6 and from mobile agents in Site7.

- CRS servers at Site5 provide local call treatment, management, and queuing.
- The Catalyst CMM (MGCP) is the voice gateway that is used to accept calls originating from the PSTN simulators. It routes the calls to the local agents or to the WAN gateway for other sites if the local agents are not available.
- Call Processing/Routing:
 - A RT AW/HDS/WVS is located at this site.
- Infrastructure:
 - A small Unified Communications Manager cluster has 1 first node and 2 subsequent nodes and one MoH server.

The Unified Communications Manager PG supports 1 Peripheral Interface Manager (PIMs) and communicates with the Unified Communications Manager cluster, CAD servers, and the Unified OUTD in Site6.

There is a duplexed VRU PG, which supports 2 PIMs, and communicates with the local CRS servers.
 - A WAN router and DS3 link provide connectivity to other sites through a Frame Relay cloud.
 - A DHCP Server (on the router) provides IP addresses to the Unified IP Phones at the site.
 - A VoIP Monitor provides SPAN monitoring services.
- Unified IP Phones:
 - 88 SCCP phones are located at this site.
 - 29 agent and 5 admin SIP phones are located at this site.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - McAfee Antivirus is installed on all the Windows-based servers and the agent desktops.

Figure 10 shows the logical topology of Site5.

Figure 10 Site5 Logical Topology

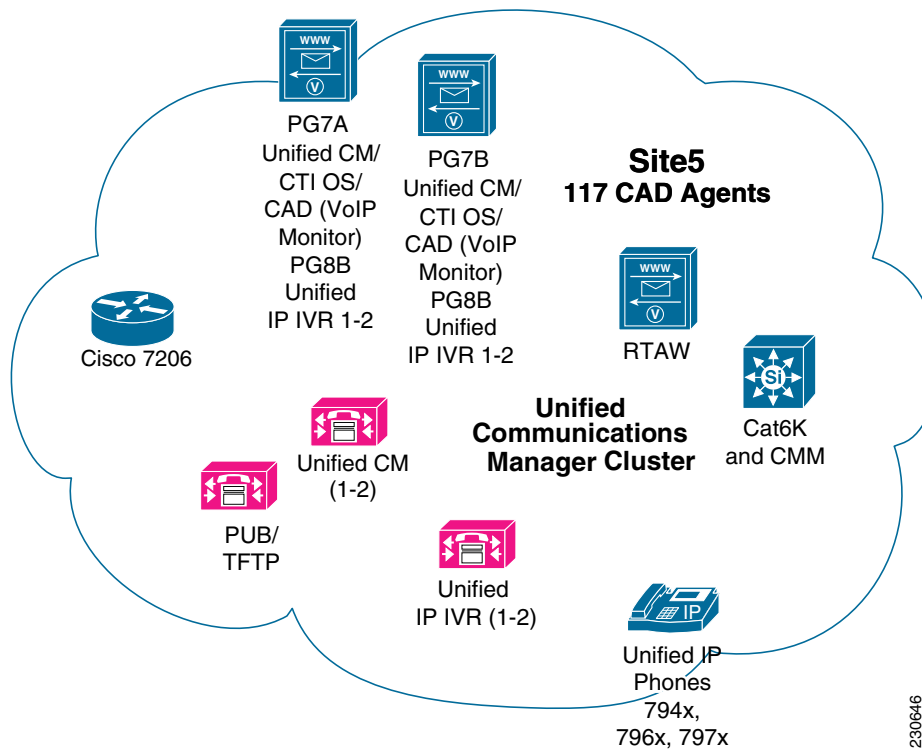


Table 7 lists the equipment and hardware platforms used in Site5. Use the reference information in the table to access corresponding software versions and model numbers.

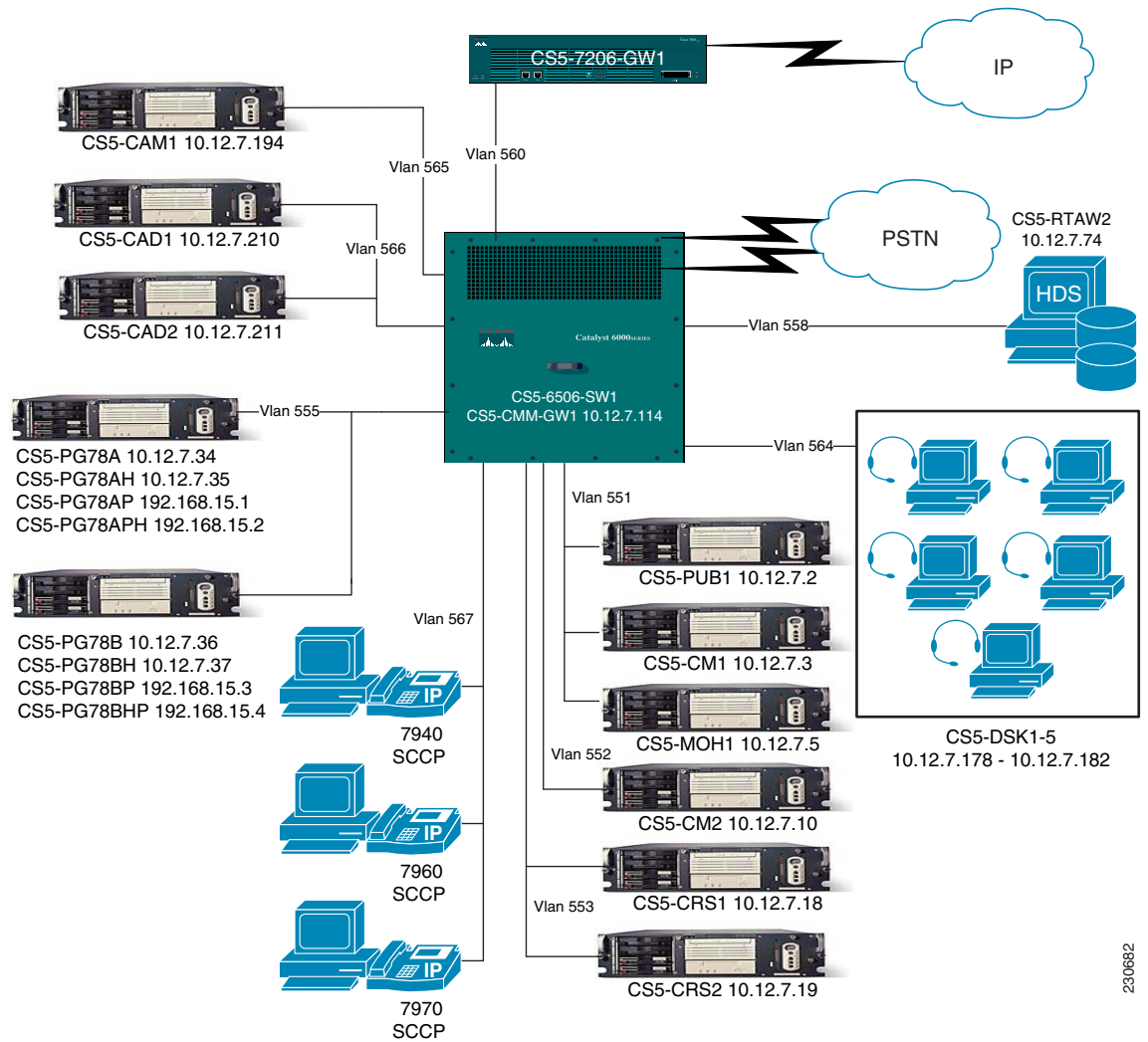
Table 7 Site5 Equipment List

Component	Hardware Platform
Access Switch	Catalyst 6506
Cisco Agent and Supervisor Desktop	Pentium IV Desktop
Cisco CMM Gateway (MGCP)	Catalyst 6500 (CMM)
CRS (Unified IP IVR)	MCS-7845-H1-IPC1
Music On Hold (MoH)	MCS-7845-H1-IPC1
RT AW	MCS-7845-H1-CC1
Unified Communications Manager	MCS-7845-H1-IPC1
Unified Communications Manager/VRU PG	MCS-7845-H1-CC1
Unified IP Phones	Unified IP Phones (SCCP and SIP) 794x/796x/797x
VoIP Monitor	MCS-7845-H1-CC1
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:
http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 11 shows the physical topology of Site5 displaying the equipment listed in Table 2-7.

Figure 11 Site5 Physical Topology



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Site6: Remote Site

Site Profile

Site6 is a small remote office of Site5 which participates in the multisite centralized configuration. It also participates in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - A total of 160 agents use Cisco Agent Desktop (CAD) Application for call control functions.
 - 52 agents handle inbound calls only.
 - 108 agents (including 15 mobile agents) handle only outbound credit card collections calls.
 - Calls arriving and being processed at this site have a BHCA of 2,880.
 - Outbound calls at this site have a BHCA of 6,480.
 - Mobile agents use their regular PSTN and cell phones to make outbound calls.
- Call Flows:
 - Agents receive Unified Communications Manager Post-Routed call flows.
 - Unified OUTDs perform outbound call campaigns.
 - Agents in this site receive transfers and conferences from Site5 and from mobile agents in Site7.
- Infrastructure:
 - A WAN router and DS3 link provide connectivity to other sites through a Frame Relay cloud.
 - A DHCP Server (on the router) provides IP addresses to the Unified IP Phones at the site.
- Unified IP Phones:
 - 120 SCCP phones are located at this site.
 - 40 agent and 8 admin SIP phones are located at this site.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - McAfee Antivirus is installed on all the Windows-based servers and the agent desktops.

Figure 12 shows the logical topology of Site6.

Figure 12 Site6 Logical Topology

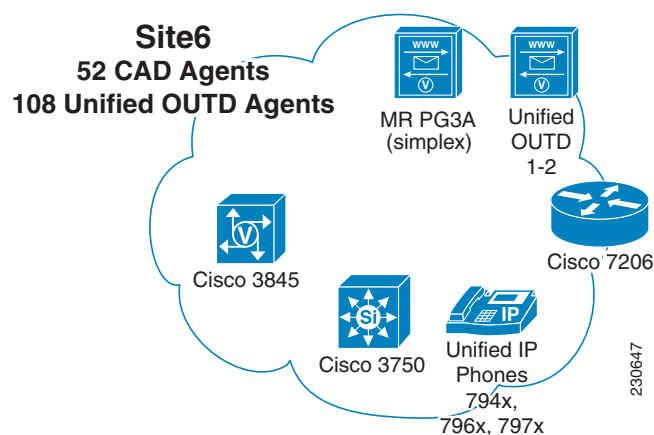


Table 8 lists the equipment and hardware platforms used in Site6. Use the reference information in the table to access corresponding software versions and model numbers.

Table 8 **Site6 Equipment List**

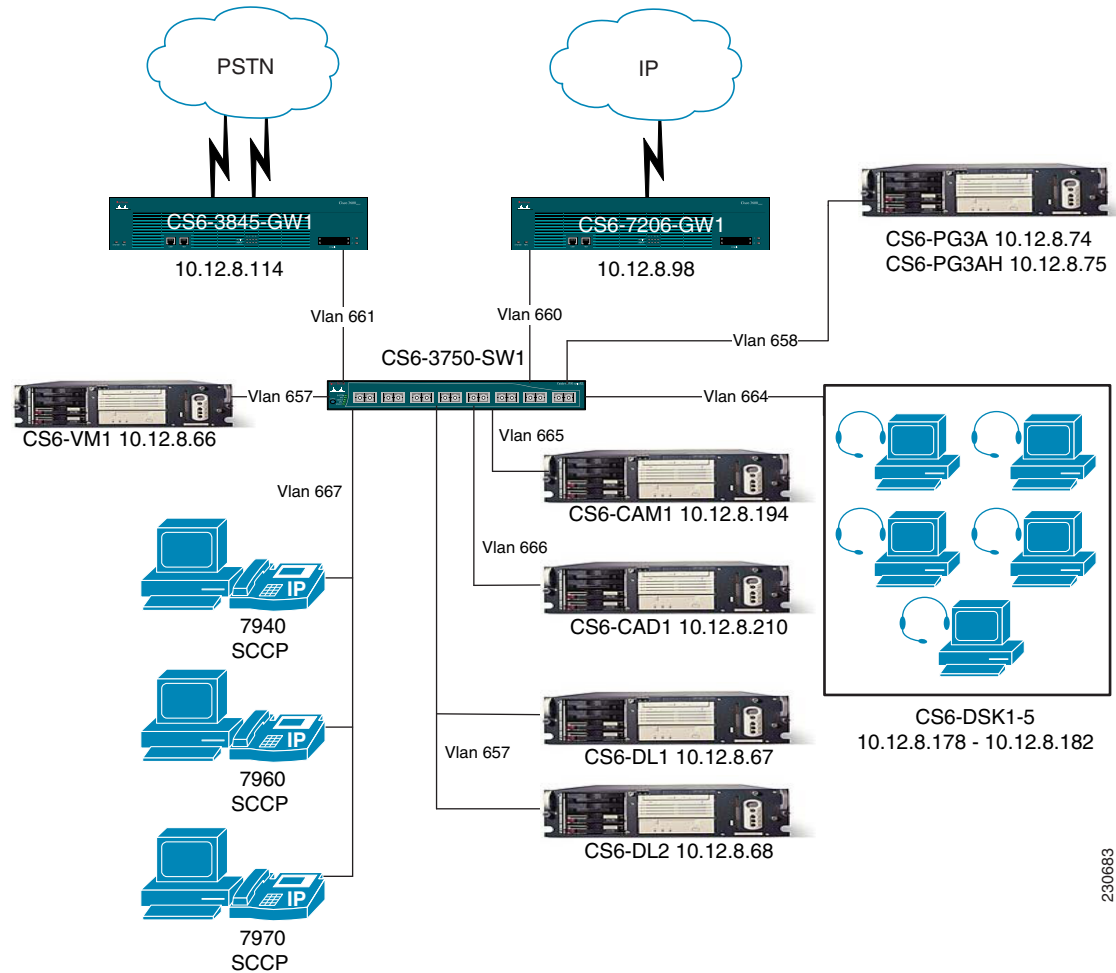
Component	Hardware Platform
Access Switch	Catalyst 3750
Cisco Agent and Supervisor Desktop	Pentium IV Desktop
Cisco Gateway (MGCP)	Cisco 3845
Peripheral Gateway (MR PG)	MCS-7845-H1-CC1
Unified IP Phones	Unified IP Phones (SCCP and SIP) 794x/796x/797x
Unified OUTD	MCS-7835H-3.0-CC1
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 13 shows the physical topology of Site6 displaying the equipment listed in Table 2-8.

Figure 13 Site6 Physical Topology



Site7: Virtual Call Center

Site Profile

Site7 is the virtual site of mobile agents. Site7 participate in the multisite centralized configuration with Site1/Site4 and in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - There are 315 mobile agents logically grouped in Site7 who use their regular PSTN and cell phones to handle customer calls.

- 300 of these mobile agents are associated with agents in Site2 and Site3. 15 mobile agents participate along with local agents at Site6 in making outbound calls to customers.
- Calls arriving and being processed at this site have a BHCA of 5,400.
- Agents in this site transfer and conference calls to agents in Site2, Site3, Site5, and Site6.
- Infrastructure:
 - A WAN router and DS3 link provide connectivity to other sites through a Frame Relay cloud.
- Remote Phones:
 - Mobile agents use regular PSTN and cell phones that are not controlled by Unified CCE.

Figure 14 shows the logical topology of Site7.

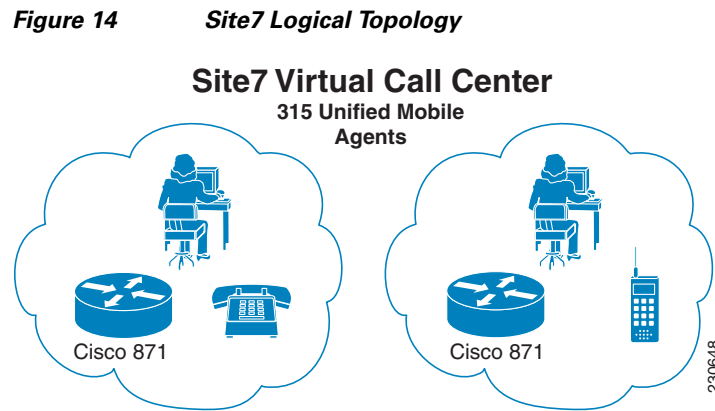


Table 10 lists the equipment and hardware platforms used in Site7. Use the reference information in the table to access corresponding software versions and model numbers.

Table 9 Site7 Equipment Table

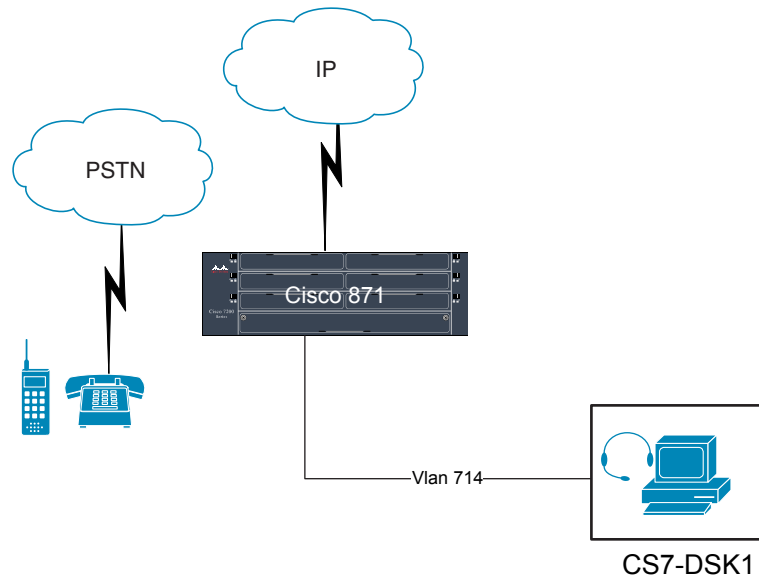
Component	Hardware Platform
Teleworker Access Router	Cisco Teleworker 871

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 15 shows the physical topology of Site7 displaying the equipment listed in Table 2-9.

Figure 15 Site7 Physical Topology



Site8: Cisco Remote Agent (Teleworker) Site

Site Profile

Site8 is the site of the remote agent who uses the Unified CCE Home Agent with Broadband solution in the Cisco Remote Agent model. Site8 is associated with Site2 and participates in the multisite centralized configuration with Site1/Site4 and in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - The remote agent is associated with Site2 and can handle calls meant for Site2 based on the skill group assignment.
- Infrastructure:
 - A Cisco Teleworker router at this site provides connectivity to the data centers (Site1/Site4).
- Unified IP Phones:
 - 1 SIP phone is located at this site.

Figure 16 shows the logical topology of Site8.

Figure 16 Site8 Logical Topology

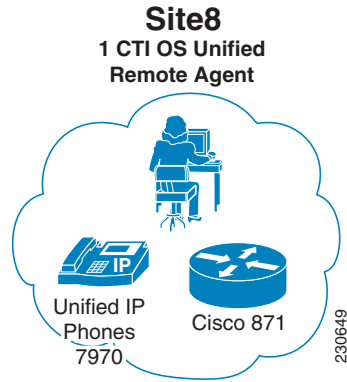


Table 10 lists the equipment and hardware platforms used in Site8. Use the reference information in the table to access corresponding software versions and model numbers.

Table 10 Site8 Equipment Table

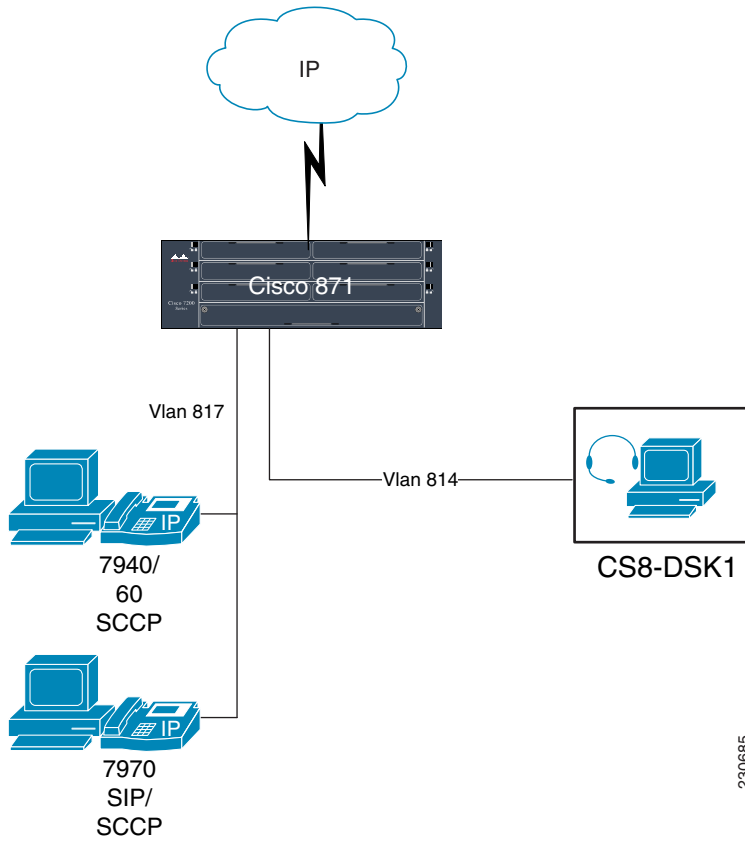
Component	Hardware Platform
Unified IP Phones	Unified IP Phones (SIP) 7970
Teleworker Access Router	Cisco Teleworker 871

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 17 shows the physical topology of Site8 displaying the equipment listed in Table 2-10.

Figure 17 Site8 Physical Topology



Test Bed 2: Parent and Child Test Sites

The following four sites make up the single-site, multisite centralized, and multisite distributed deployment models for testing the parent and child call flow:

- Canton/[Site1: Data Center Site](#)
- Clinton/[Site4: Data Center Site](#)
- Clover/[Site5: Branch Office Site](#)
- Carson City/[Site9: Branch Office Site](#)

See [Topology of Parent and Child Sites](#) for a complete map of the four sites, their individual topologies, and the relationship between the sites. See [Table 11](#) for a comprehensive view of the different components deployed at the various Unified IP IVR sites. See [Parent and Child Test Site Definitions](#) for more information on the individual sites and topologies in Test Bed 2.

Site Relationships and Call Routing

Listed below are the relationships of the four sites and the call routing deployed in Test Bed 2.

Multisite Centralized Site Relationships

- Site1 and Site4 are data centers which *share* Unified CCE components over the WAN.
- Site1 and Site4 participate in one of the multisite centralized configurations.
- Site5 and Site 9 have their own Unified Communications Manager clusters and operate as independent single-site deployments. They are also referred to as the Unified SCC implementation in the parent and child model.

Multisite Distributed Site Relationships

- In addition to Site1 and Site4, Site5 and Site9 also have Unified Communications Manager clusters resident at their sites for independent call processing locally.
- Site5 and Site9 depend on Site1/Site4 for providing call treatment and processing.

Parent Sites:

- Site1 and Site4 are parent sites.
- Both Site1 (Side A) and Site4 (Side B) have the following component configuration for the parent system:
 - Central Controller (Rogger) components for parent systems
 - Unified CVP systems that service Unified CVP Post-Routed calls
 - Unified CCGE

Child Sites:

- Child sites include Site5 and Site9.
- Site5 has its own duplex Rogger system (Side A and Side B) for built-in redundancy.
- Site9 has its own duplex Progger system (Side A and Side B) for built-in redundancy.

Parent and Child Call Routing

The parent systems in Site1/Site4 route calls to the two child systems in Site5 and Site9. Calls are also routed directly to these child systems. Calls in the parent and child model are routed in one of the following ways:

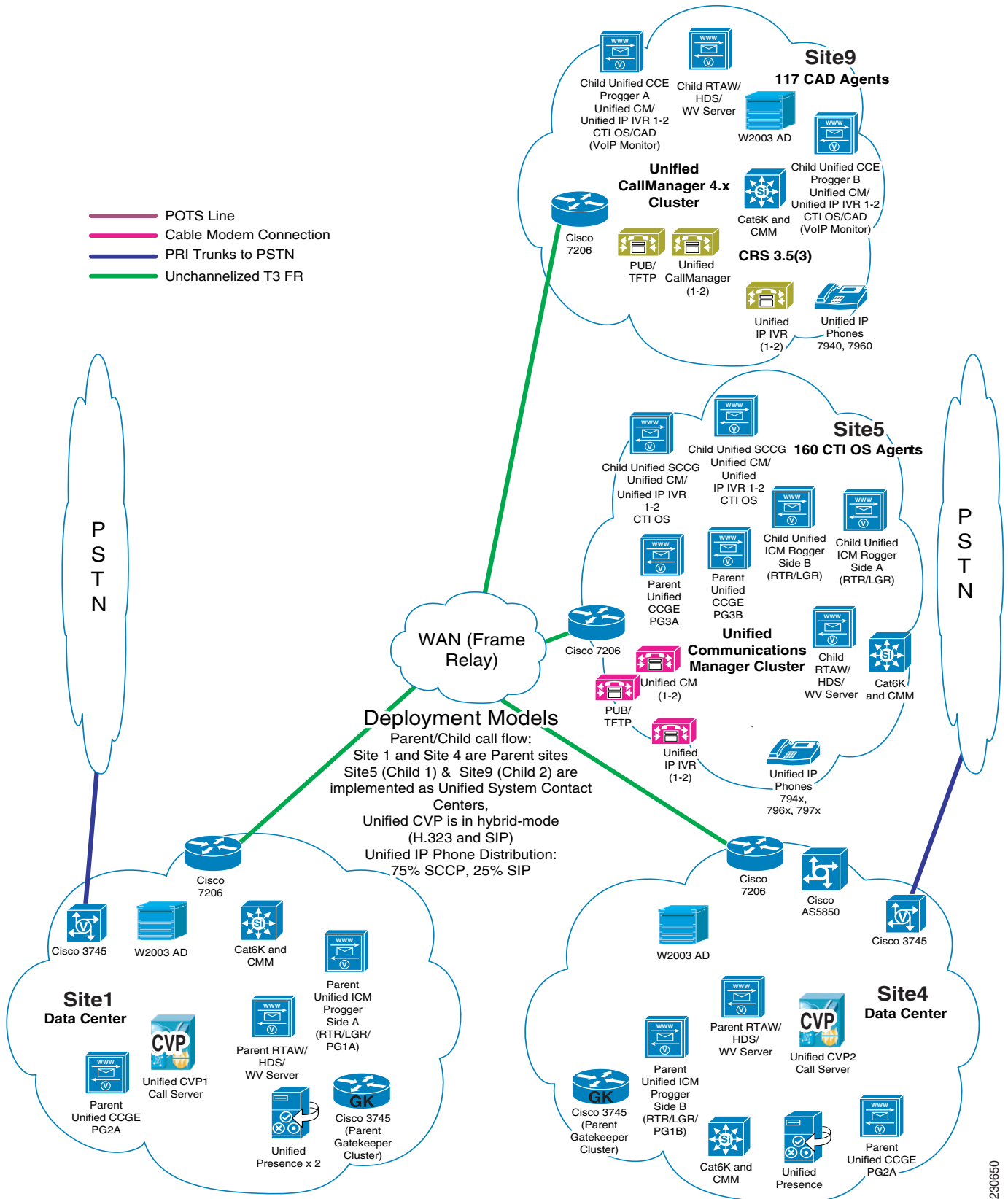
- Calls can be translation-routed from the parent Unified ICM Enterprise system (with Unified CCGE) to either of the two child Unified CCE systems (with Unified SCCG). Each child system is treated as a separate ACD by the parent system. The Unified CVP system at the data centers performs the initial call treatment at the parent site and CRS systems provide queuing capabilities locally at the child sites.
- Calls can be both post- and translation-routed from one child to another through the parent including transfers, consults, and others.
- Each child system can route calls incoming to those sites through voice gateways that are not related to the parent system, thereby ensuring that call center operations can continue even if the WAN connection is not reliable.

[Tested Call Flows](#) discusses these call flows in greater detail.

Topology of Parent and Child Sites

The topology and relationships of the four sites in Test Bed 2 configured in the parent and child model and participating components are shown in [Figure 18](#)

Figure 18 Parent and Child Sites in Test Bed 2



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Snapshot of Parent and Child Sites Components

Table 11 provides a comprehensive view of the different components deployed at the various parent and child sites. For specific component names and quantities, see the individual site descriptions in this section.

Table 11 Comprehensive Parent and Child Sites Components List

Components	Site1	Site4	Site5	Site9
Parent Site	X	X		
Child Site			X	X
Outsourcer Agents	0	0	160	117
Outsourcer BHCA	n/a	n/a	2,880	2,106
Unified Communications Manager Cluster	X	X	X	X
Music On Hold (MoH)	X	X	X	X
HW Conference/MTP/Transcoder	X	X	X	X
Unified ICM Rogger	X	X	X	
Unified ICM Progger				X
RT AW/HDS/WebView	X	X	X	X
Domain Controller/Windows 2003 Active Directory	X	X		X
Unified Contact Center Gateway Enterprise (Unified CCGE)	X	X	X	
Unified System Contact Center Gateway (Unified SCCG)			X	X
Access Switch	X	X	X	X
CMM Gateway: SIP	X			
IOS (H.323) Gateway		X		
PSTN Gateway	X	X		
VXML Gateway	X	X		
Gatekeeper	X	X		X
WAN Router	X	X	X	X
Unified Presence (as a SIP Proxy Server)	X	X		
CRS (Unified IP IVR)			X	X
Unified CVP Call Server	X	X		
CAD Server: coresident on Progger				X
CTI/CTI OS Server: coresident on Unified SCCG			X	X

Table 11 *Comprehensive Parent and Child Sites Components List (continued)*

Components	Site1	Site4	Site5	Site9
CAD Agent/Supervisor Desktop				X
CTI OS Agent/Supervisor Desktop			X	
DHCP Server (on router)			X	X
VoIP Monitor				X
Unified IP Phones (SCCP and SIP)			X	X
CiscoWorks Management Center for Cisco Security Agent	X			
Cisco Security Agent	X	X	X	X
Unified Operations Manager		X		
Third-Party Software	X	X	X	X

Parent and Child Test Site Definitions

The following section describes the sites that were created for the various deployment models in Test Bed 2 for testing Parent and Child call flows. Each topic defines the design characteristics of an individual site and includes logical and physical topology maps and a site equipment table.

For testing the [Single-site](#) deployment models and the [Cisco Unified System Contact Center](#) implementation, Unified CVP Post-Routed traffic is directed into this test bed. The [Cisco Unified Contact Center Gateway Enterprise Feature](#) is implemented as a parent and child model (see [Figure 18](#)) in Test Bed 2.

Site1: Data Center Site

Site Profile

Site1 is the hub and the data center in a multisite distributed WAN configuration with Site4 as its backup hub. This site participates as the parent, along with Site4, in the parent and child model.

The test site is deployed as follows:

- Agents:
 - There are no agents and ingress calls are not answered at this site.
- Call Flows:
 - Unified CVP at Site1/Site4 (parent sites) is used to provide the initial call treatment (prompting) and queuing for the Unified CVP Post-Routed call flow. CRS (Unified IP IVR) can also provide subsequent queuing at the child sites.
 - The Cisco Catalyst CMM acts as a SIP gateway into this site and is used to terminate the traffic originating from the PSTN simulators.
- Call Processing/Routing:
 - A Router and Logger (Rogger) provides enterprise-wide Unified ICM capability by distributing voice and data from multiple channels to enterprise resources.

- An Rogger (Side A) is located at this hub. There is a dedicated private and separate visible WAN connection to the Rogger (Side B) at Site4.
- The central database is associated with the Logger. The Historical Database Server (HDS) and WebView Server (WVS) are installed on the Real-Time Admin Workstation (RT AW). There is one RT AW/HDS/WVS (Side A parent) located at this site.
- Both Unified CVP systems provide call treatment and queuing based on the type of post-routed calls coming into Site1.
- Infrastructure:
 - The Peripheral Gateway (PG), which is a VRU PG, provides communications between the Unified CVP and Unified ICM systems.
 - The SIP Catalyst CMM acts as the voice gateway connected directly to the WAN and indirectly to the PSTN simulators.
 - The gatekeepers are implemented in GUP cluster models.
 - A WAN router and DS3 link provide clustering over the WAN (CoW) private connectivity to the backup data center in Site4.
 - Windows 2003 Active Directory provides the active directory structure and DNS services.
- Network Management:
 - Perfmon and WebView are installed at this site to provide reporting and troubleshooting information.
- Redundancy and Failover:
 - The Unified Communications Manager cluster has been set up in 1:1 load sharing mode.
 - Failover capabilities are in place in Site4 for Unified CVP.
 - The second Rogger at Site4 provides data center redundancy for this site.
 - Gatekeepers are implemented in GUP cluster models.
- Security:
 - Core management security is implemented with CiscoWorks Management Center.
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - McAfee Antivirus is installed on all the Windows-based servers.

Figure 19 shows the logical topology of Site1.

Figure 19 Site1 Logical Topology

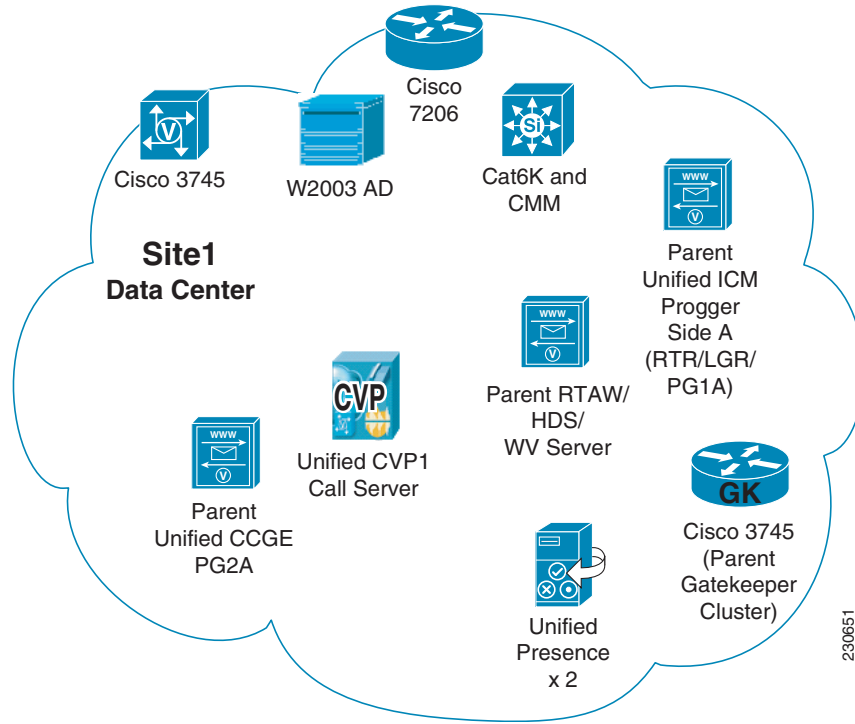


Table 12 lists the equipment and hardware platforms used in Site1. Use the reference information in the table to access corresponding software versions and model numbers.

Table 12 Site1 Equipment List

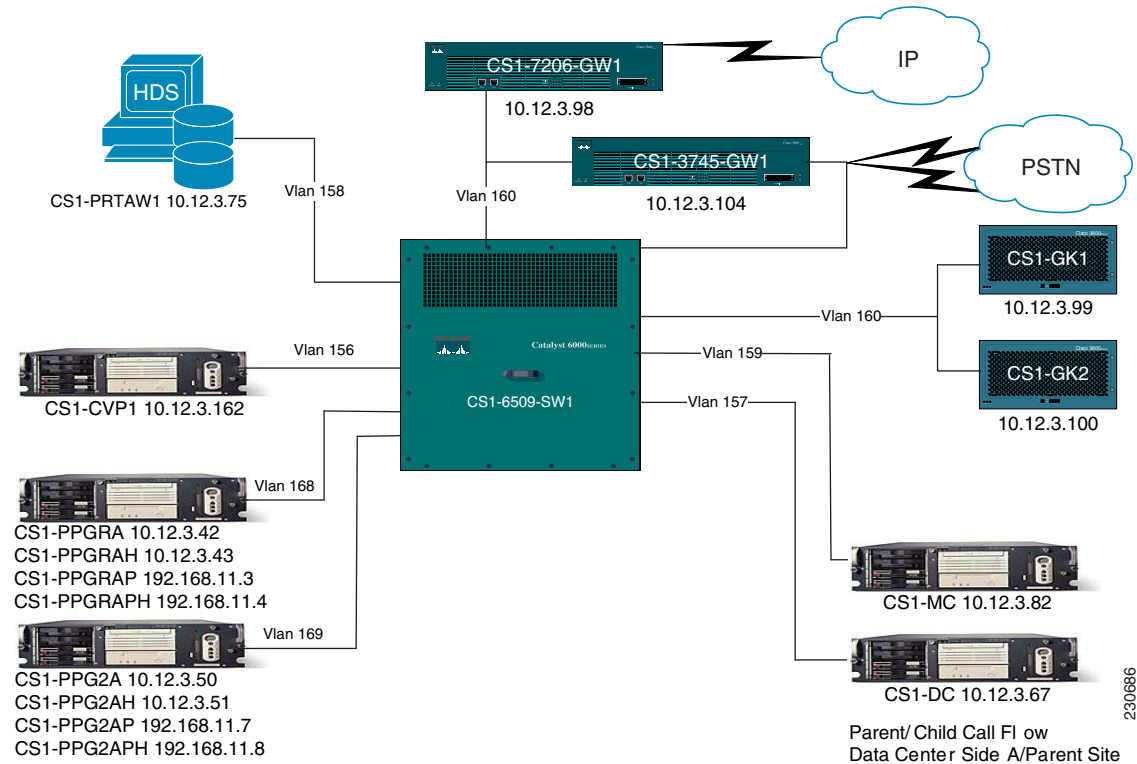
Component	Hardware Platform
Access Switch	Catalyst 6509
Cisco CMM Gateway (SIP)	Catalyst 6500
Domain Controller/Windows 2003 AD	MCS-7845H-3000
Gatekeeper (GUP cluster)	Cisco 3745
HW Conference/MTP/Transcoder	Catalyst 6509 CMM (ACT)
PSTN/VXML Gateway	Cisco 3745
Progger (Parent)	MCS-7845H-2.4-EVV1
RT AW/HDS/WebView (Parent)	MCS-7845H-2.4-EVV1
Unified CCGE (Parent)	MCS-7845-H1-IPC1
Unified CVP Call Server	MCS-7845H-2.4-EVV1
Unified IP Phones	Unified IP Phones (SCCP) 794x/796x/797x
Unified Presence	MCS-7845-H1-IPC1
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 20 shows the physical topology of Site1 displaying the equipment listed in Table 2-12.

Figure 20 Site1 Physical Topology



Site4: Data Center Site

Site Profile

Site4 is a redundant hub and the backup data center for Site1. This site participates as the backup parent, for Site1, in the parent and child model. It also participates in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - There are no agents and ingress calls are not answered at this site.
- Call Flows:
 - Unified CVP at Site1/Site4 (parent sites) is used to provide the initial call treatment (prompting) and queuing for the Unified CVP Post-Routed call flow. CRS (Unified IP IVR) can also provide subsequent queuing at the child sites.
 - Cisco AS5850 gateway acts as a H.323 gateway into this site and is used to terminate the traffic originating from the PSTN simulators.

- Call Processing/Routing:
 - An Unified ICM Rogger (Side B) is located at this hub. There is a dedicated private and separate visible WAN connection to the other Unified ICM Rogger (Side A) in Site1.
 - HDS and WVS are installed on RT AWs. There is one RT AW/HDS/WVS (Side B parent) located at this site.
 - Unified CVP provides call treatment and queuing based on the type of post-routed calls coming into Site4.
- Infrastructure:
 - The Peripheral Gateway, which is a VRU PG, provides communications between the Unified CVP and Unified ICM systems.
 - Two gatekeepers are implemented in GUP cluster models.
 - A WAN router and DS3 link provide connectivity to other sites through a Frame Relay cloud.
 - Windows 2003 Active Directory provides the active directory structure and DNS services.
- Network Management:
 - Perfmon, Cisco Unified Operations Manager (Unified Operations Manager), and WebView are installed at this site to provide reporting and troubleshooting information.
- Redundancy and Failover:
 - Failover capabilities are in place in Site1 for Unified CVP.
 - Redundancy for the Rogger is in place with the Rogger (Side A) located in Site1.
 - Gatekeepers are implemented in GUP cluster models.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - McAfee Antivirus is installed on all the Windows-based servers.

Figure 21 is a logical topology of Site4.

Figure 21 Site4 Logical Topology

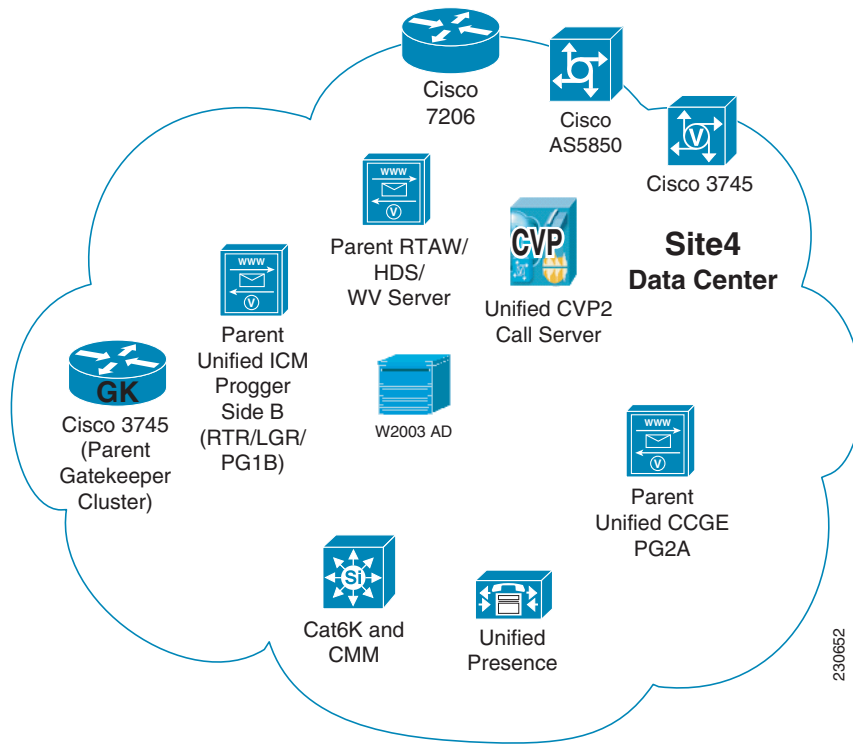


Table 13 lists the equipment and hardware platforms used in Site4. Use the reference information in the table to access corresponding software versions and model numbers.

Table 13 Site4 Equipment List

Component	Hardware Platform
Access Switch	Catalyst 6509
Domain Controller/Windows 2003 AD	MCS-7845H-3000
Gatekeeper (GUP cluster)	Cisco 3745
Gateway (H.323)	Cisco AS5850
HW Conference/MTP/Transcoder	Catalyst 6509 CMM (ACT)
PSTN/VXML Gateway	Cisco 3745
Progger (Parent)	MCS-7845H-2.4-EVV1
RT AW/HDS/WebView (Parent)	MCS-7845H-2.4-EVV1
Unified CCGE (Parent)	MCS-7845-H1-IPC1
Unified CVP Call Server	MCS-7845H-2.4-EVV1
Unified IP Phones	Unified IP Phones (SCCP) 794x/796x/797x
Unified Operations Manager	MCS-7845H-2.4-EVV1

Table 13 Site4 Equipment List (continued)

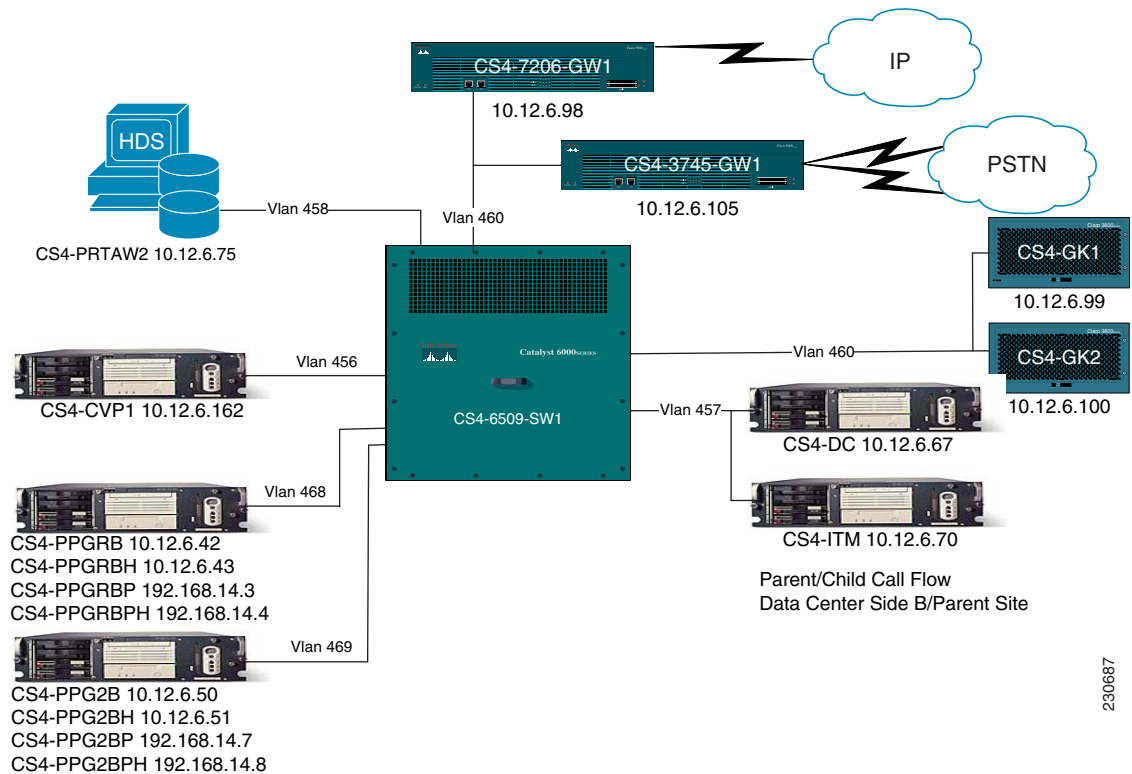
Component	Hardware Platform
Unified Presence	MCS-7845-H1-IPC1
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 22 shows the physical topology of Site4 displaying the equipment listed in Table 2-13.

Figure 22 Site4 Physical Topology



Site5: Branch Office Site

Site Profile

Site5 is a branch office, single-site deployment participating as a child in the multisite distributed WAN configuration and parent and child model. This is also the site where Unified SCC is implemented.

The test site is deployed as follows:

- Agents:
 - 160 agents use CTI OS Agent Desktop Application for call control functions.

- Calls arriving and being processed at this site have a BHCA of 2,880.
 - Agents in this site only handle outsourced calls.
- Call Flows:
 - CRS servers at Site5 provide local call treatment, management, and queuing.
 - The Cisco Catalyst CMM (MGCP) is the voice gateway that is used to accept calls originating from the PSTN simulators. It routes the calls to the local agents or to the WAN gateway for other sites if the local agents are not available.
- Call Processing/Routing:
 - Child Unified ICM Roggers, each of which contains the Router, Logger, CTI OS, and CAD on one device, are located at this site.
 - A child RT AW/HDS/WVS is located at this site.
- Infrastructure:
 - A small Unified Communications Manager cluster has 1 first node and 2 subsequent nodes.
 - Parent Unified CCGE support two Peripheral Interface Manager (PIMs) to provide connectivity to the peripherals or child systems at the remote sites.
 - Child Unified SCCGs are used to communicate with the local Unified Communications Manager cluster, the CRS system, and CTI OS servers.
 - A WAN router and DS3 link provide connectivity to other sites through a Frame Relay cloud.
 - A DHCP Server (on the router) provides IP addresses to the Unified IP Phones at the site.
- Unified IP Phones:
 - 126 SCCP phones are located at this site.
 - 34 agent and 8 admin SIP phones are located at this site.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - McAfee Antivirus is installed on all the Windows-based servers and the agent desktops.

Figure 23 shows the logical topology of Site5.

Figure 23 Site5 Logical Topology

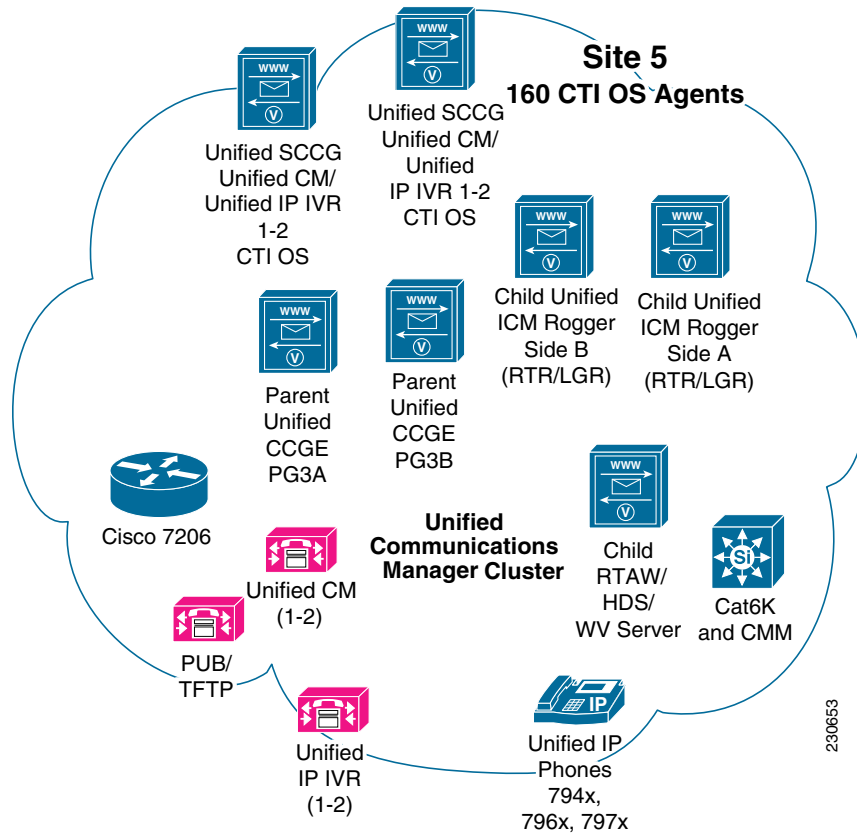


Table 14 lists the equipment and hardware platforms used in Site5. Use the reference information in the table to access corresponding software versions and model numbers.

Table 14 Site5 Equipment List

Component	Hardware Platform
Access Switch	Catalyst 6506
Cisco CMM Gateway	Catalyst 6500
CRS (Unified IP IVR)	MCS-7845-H1-IPC1
CTI OS Agent and Supervisor Desktop	Pentium IV Desktop
Rogger (Child)	MCS-7845-H1-CC1
RT AW/ HDS/ WVS (Child)	MCS-7845-H1-CC1
Unified CCGE (Parent)	MCS-7845-H1-CC1
Unified Communications Manager	MCS-7845-H1-IPC1
Unified SCCG (Child)	MCS-7845-H1-CC1

Table 14 Site5 Equipment List (continued)

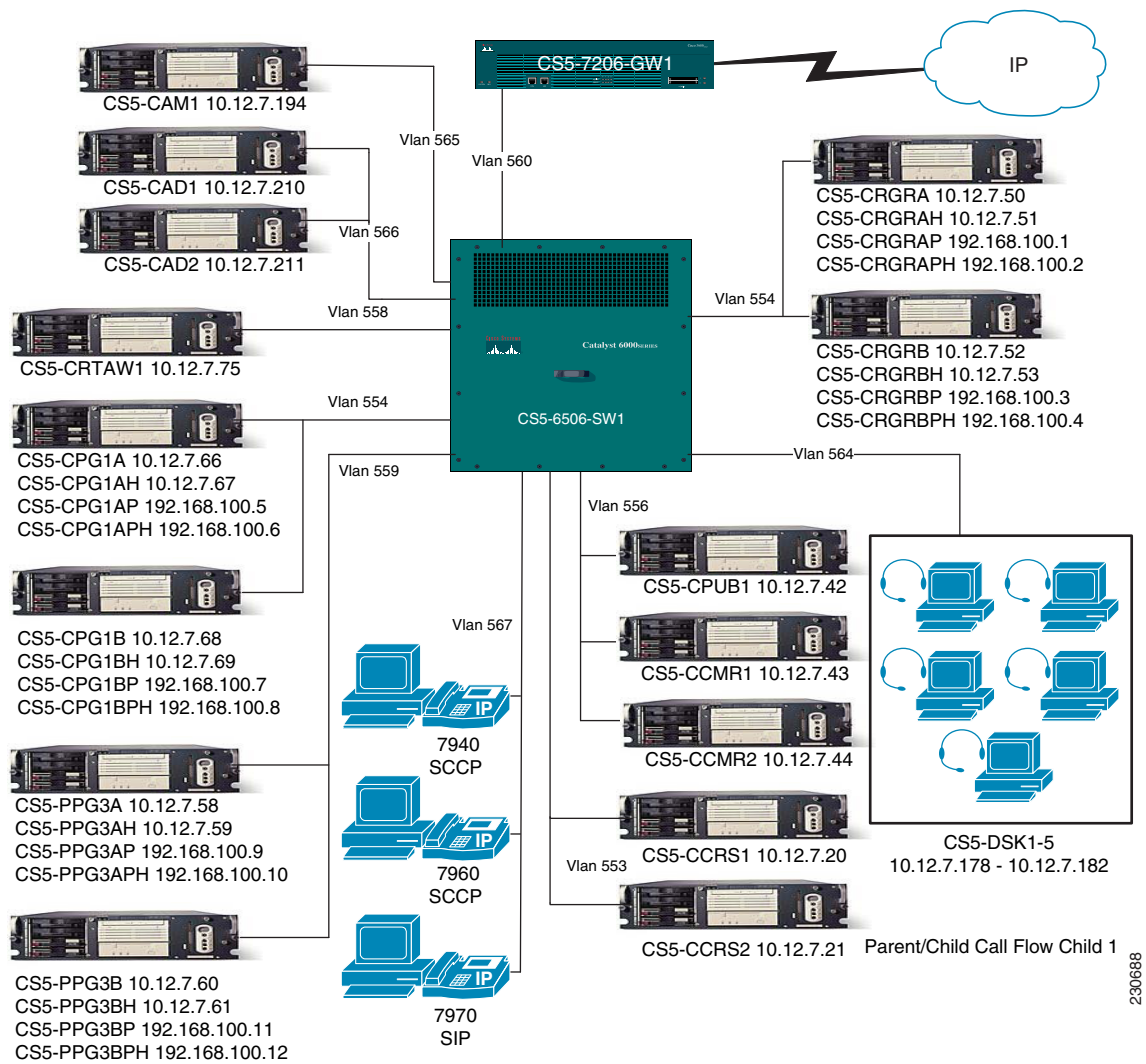
Component	Hardware Platform
Unified IP Phones	Unified IP Phones (SCCP and SIP) 794x/796x/797x
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 24 shows the physical topology of Site5 displaying the equipment listed in Table 2-14.

Figure 24 Site5 Physical Topology



Site9: Branch Office Site

Site Profile

Site9 is a branch office, single-site deployment in the multisite centralized configuration. It also participates in the multisite distributed WAN configuration. This is also the site where Unified SCC is implemented.

The test site is deployed as follows:

- Agents:
 - 117 agents use Cisco Agent Desktop (CAD) Application for call control functions.
 - Calls arriving at this site have a BHCA of 2,106.
 - Agents in this site only handle outsourced calls.
- Call Flows:
 - CRS servers at this site provide local call treatment, management, and queuing.
- Call Processing/Routing:
 - Child Unified ICM Progners, each of which contains the PG, Router, Logger, CTI OS, and CAD, VoIP Monitor on one device, are located at this site.
 - One Child RT AW/HDS/WVS is located at this site.
- Infrastructure:
 - A Unified Communications Manager cluster (running a previous version of the software to verify interoperability) has 1 first node and 2 subsequent nodes.
 - A WAN router and DS3 link provide connectivity to other sites through a Frame Relay cloud.
 - A DHCP Server (on the router) provides IP addresses to the Unified IP Phones at the site.
 - A VoIP Monitor (coresident on the Progger) provides SPAN monitoring services.
 - Windows 2003 provides the active directory structure and DNS services.
- Unified IP Phones:
 - 117 SCCP phones are located at this site.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - McAfee Antivirus is installed on all the Windows-based servers and the agent desktops.

Figure 25 shows the logical topology of Site9.

Figure 25 Site9 Logical Topology

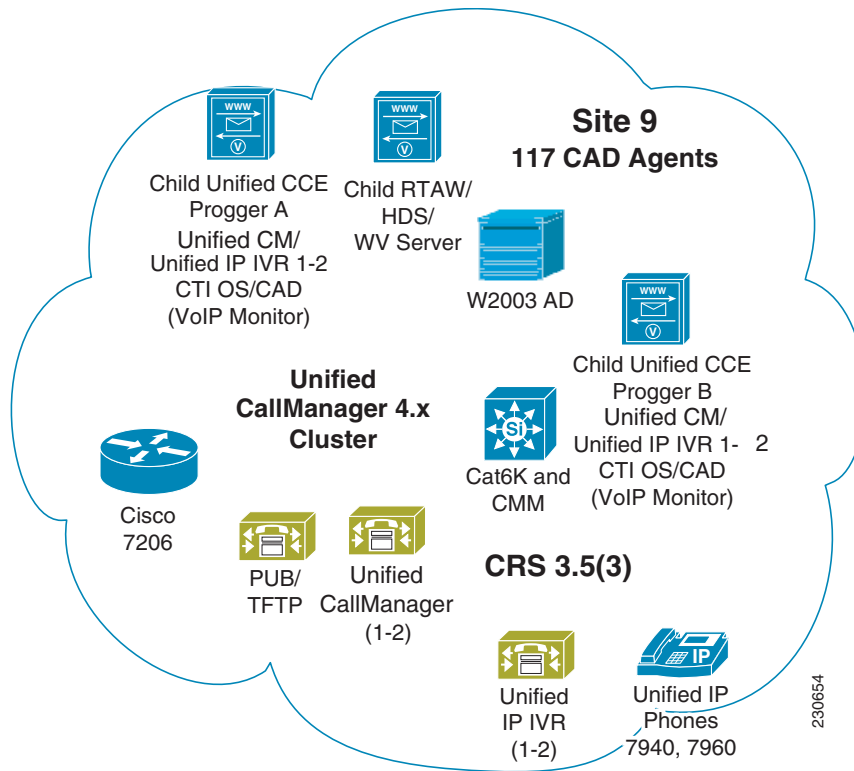


Table 15 lists the equipment and hardware platforms used in Site9. Use the reference information in the table to access corresponding software versions and model numbers.

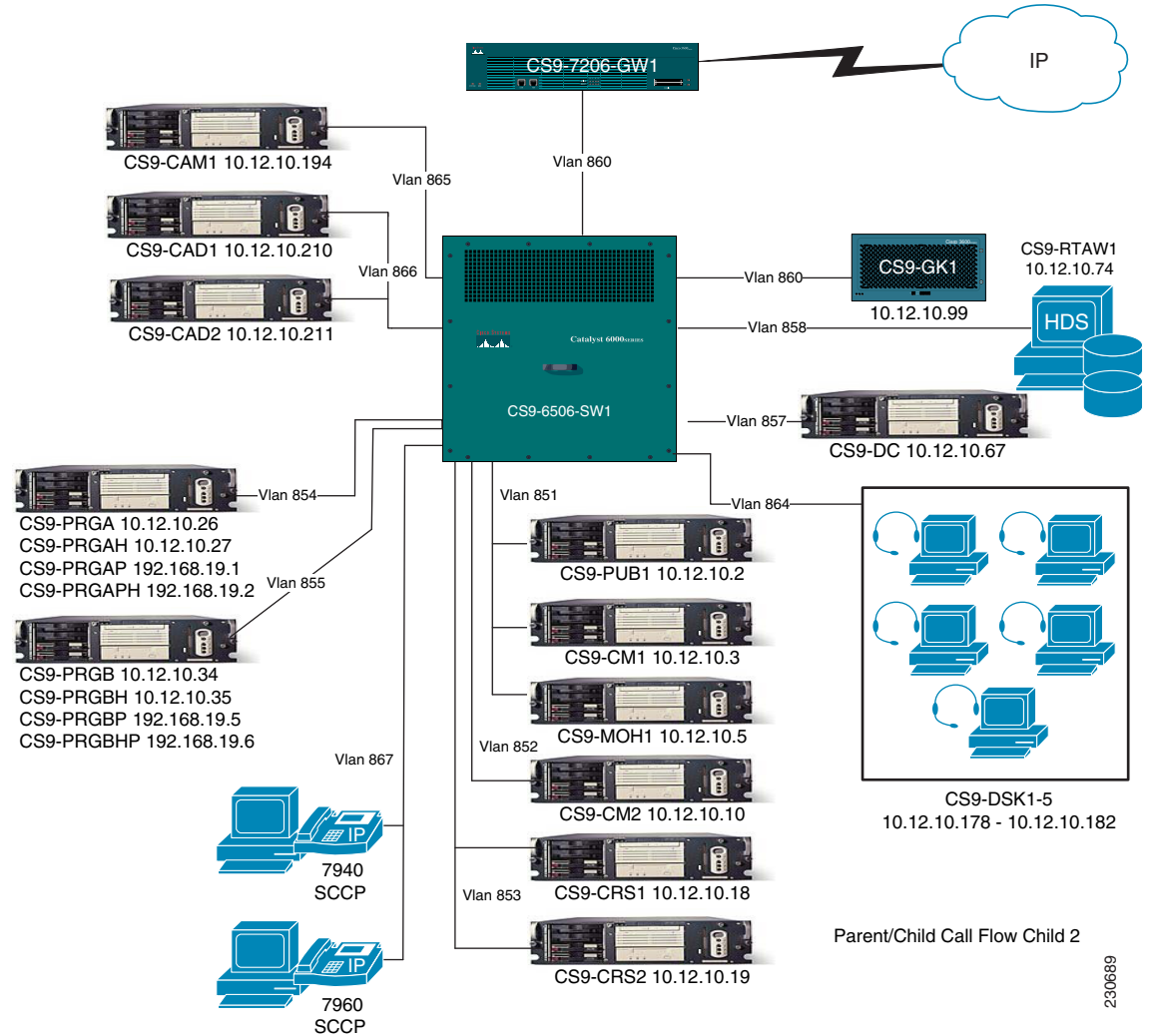
Table 15 Site9 Equipment Table

Component	Hardware Platform
Access Switch	Catalyst 6506
Cisco Agent and Supervisor Desktop	Pentium IV Desktop
CRS (Unified IP IVR)	MCS-7835H-2.4-EVV1
Domain Controller/Windows 2003 AD	MCS-7845H-3000
Progger (Child)	MCS-7845-H1-CC1
RT AW/HDS/WVS (Child)	MCS-7835H-2.4-EVV1
Unified Communications Manager	MCS-7845H-2.4-EVV1
Unified IP Phones	Unified IP Phones (SCCP) 794x/796x/797x
VoIP Monitor (coresident on Progger)	MCS-7845-H1-CC1
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at: http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 26 shows the physical topology of Site9 displaying all the equipment listed in Table 2-15.

Figure 26 Site9 Physical Topology



Test Bed 3: Unified CVP Test Sites

The following seven sites make up the multisite centralized and multisite distributed configurations for testing Unified CVP call flows in Test Bed 3:

- Chicago Distribution Center/[Site1: Data Center](#)
- Unified Mobile Agents/[Site2: Virtual Call Center](#)
- Central Branch/[Site3: Distribution Center](#)
- Dallas Distribution Center/[Site5: Data Center](#)
- Mid-Atlantic Retail Center/[Site6: Mid-Atlantic Retail Center](#)
- North Central Retail Center/[Site7: North-Central Retail Center](#)
- South Central Retail Center/[Site8: South-Central Retail Center](#)

See [Topology of Unified CVP Sites](#) for a complete map of the six sites, their individual topologies, and the relationship between the sites. See [Table 16](#) for a comprehensive view of the different components deployed at the various Unified CVP sites. See [Unified CVP Site Definitions](#) for more information on the individual sites and topologies in Test Bed 3.

Site Relationships and Call Routing

Listed below are the relationships of the seven sites and the call routing deployed in Test Bed 3.

Multisite Centralized Site Relationships

- Site1 and Site5 participate in the multisite centralized configuration and *share* several contact center components over the WAN (CoW).
- Site1 and Site5 are data centers and act as hubs for Site6 and Site8.
- Site3 and Site7 have their own Unified Communications Manager clusters for call processing.
- Site2 acts as a virtual call center for mobile agents.

Multisite Distributed Site Relationships

- In addition to Site1 and Site5, Site3 (distribution center/branch office) and Site7 (retail center) have Unified Communications Manager clusters resident at their sites for independent call processing locally and are connected by ICT trunks to the data centers.
- Site7 handles conferences/ transfers for Site6 and Site8.

Call Routing

- General call flow—Customer calls come in from the gateways in the remote sites, get sent to the data centers (Site1/Site5) for processing, and then routed to agents at the appropriate remote sites.
- Unified CVP Post-Routed Call Flow—Site1 and Site5 participate in this type of call flow.
- Unified OUTD Call Flow—Site6 with blended agents participates in this call flow and the Unified MA call flow.
- Unified MA Call Flow—Site3 and Site6 mobile agents use their PSTN or cell phones to handle calls based on their skill groups. Calls are routed via Site1/Site5 gateways to mobile agents' phones.

[Tested Call Flows](#) discusses these call flows in greater detail.

Topology of Unified CVP Sites

The topology and relationships of the seven Unified CVP sites where Unified CCE with Unified CVP is deployed are shown in [Figure 27](#).

Snapshot of Unified CVP Sites Components

Table 16 provides a comprehensive view of the different components deployed at the various Unified CVP sites. For specific component names and quantities, see the individual site descriptions in this section.

Table 16 *Comprehensive Unified CVP Sites Components List*

Components	Site1	Site3	Site5	Site6	Site7	Site8
Hub/Data Center	X		X			
Distribution Center		X				
Retail Center				X	X	X
Agents	0	300	0	683	691	637
BHCA	n/a	5,400	n/a	12,490	12,518	11,284
Unified Communications Manager Cluster	X	X	X		X	
HW Conference/MTP/Transcoder	X	X	X		X	
Unified ICM Rogger	X		X			
RT AW/HDS/Webview	X		X			
Domain Controller/Windows 2003 Active Directory	X		X			
Generic Peripheral Gateway (PG)	X	X	X		X	
Hybrid IOS (H.323 and SIP) Gateway		X		X	X	X
Unified CVP (VXML) Gateway		X		X	X	X
H.323 Gatekeeper	X		X			
Cisco Unified Presence (as SIP Proxy Server)	X		X			
Access Switch	X	X	X	X	X	X
Access Router	X					
Cisco Content Switch	X		X			
CTI/CTI OS Servers (coresident on Generic PG)	X	X	X		X	
CAD Server (coresident on Generic PG)		X				
MR PG (coresident on Generic PG)	X		X			
DHCP Server (on router)	X	X	X	X	X	X
Unified CVP Servers (Call/Web/Media)	X		X			
ASR/TTS				X		
Unified Outbound Dialer				X		

Table 16 Comprehensive Unified CVP Sites Components List (continued)

Components	Site1	Site3	Site5	Site6	Site7	Site8
VoIP Monitor Server		X				
Cisco Unified IP Phones (SCCP and SIP)	X	X	X	X	X	X
CAD Agent/Supervisor Desktop		X				
CTI OS Agent/ Supervisor Desktop				X	X	X
CiscoWorks Management Center for Cisco Security Agent	X					
Cisco Security Agent	X	X	X	X	X	X
Cisco Unified Operations Manager			X			
WAN Router	X	X	X	X	X	X
Third-Party Software	X	X	X	X	X	X



Note Cisco 7507 is the core switch that provides Frame Relay services Test Bed 3 sites. 215 mobile agents in Site3 and Site6 use regular PSTN or cell phones to accept and handle customer calls.

Unified CVP Site Definitions

The following section describes the sites that were created to deploy the various test deployment models in Test Bed 3 for testing Unified CVP Post-Routed call flows. Each topic in this section defines the design characteristics of an individual site and includes logical and physical topology maps and a site equipment table.

Side A:

- Participating sites include Site1, Site2, and Site3.
- Site1 has the following configuration:
 - Side A of the Unified ICM Rogger.
 - Unified CVP systems that service this side of the test bed.
 - PGs of which PG1, PG2 and PG3 also service Side B of the test bed.
 - A Unified Communications Manager cluster has 4 subsequent nodes for Side A (the first node and TFTP server are in Side B).
- Site2 acts as a virtual call center for mobile agents.
- Site3 has its own Unified Communications Manager cluster for call processing, but uses Unified CVP in Site1/Site5 for call treatment and queuing. Agents in Site3 use CAD Agent Desktop applications. Site3 also has 200 mobile agents associated with it.

Side B:

- Participating sites include Site5, Site6, Site7, and Site8.

- Site5 has the following configuration:
 - Side B of the Unified ICM Rogger.
 - Unified CVP systems that service this side of the test bed.
 - PGs of which PG1, PG2 and PG3 also service Side A of the test bed.
 - A Unified Communications Manager cluster has a first node/TFTP and 4 subsequent nodes for Side B.
- Site6 has Unified OUTD with ASR/TTS capabilities and mobile agents are associated with this site.
- Site7 has its own Unified Communications Manager cluster (running a previous version of the software to verify interoperability) for call processing, but uses Unified CVP in Site1/Site5 for call treatment and queuing.
- Agents in this part of the test bed use CTI OS Agent Desktop applications.

Site1: Data Center

Site Profile

Site1 is the hub and the data center in a multisite centralized configuration along with Site5 as its backup data center and redundant hub. It also participates in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - There are no agents in this site and ingress calls are not answered.
- Call Flows:
 - The Unified CVP Call servers and Unified CVP Voice Browsers are co-located on a single Unified CVP server. Additionally, there are separate Unified CVP Web and HTTP Media Servers.
 - Two of the Unified CVP Call servers are configured in a comprehensive mode to provide call treatment and queuing functionality.
 - The third Unified CVP Call server is used to support transfer to IVR outbound campaigns and warm consultative transfers.
- Call Processing/Routing:
 - The CallRouter and Logger are coresident (known as a Rogger) on Unified ICM and provide enterprise-wide Unified ICM capability by distributing voice and data from multiple channels to enterprise resources.
 - Unified ICM Rogger (Side A) is located at this hub. There is a dedicated private WAN connection used for clustering over the WAN (CoW) to Site5. In addition, there is also a visible WAN connection to the other sites.
 - The central database is associated with the Logger. The Historical Database Server (HDS) and the WebView Server (WVS) are installed on the Real-Time Admin Workstation (RT AW).
- Infrastructure:
 - The Unified Communications Manager cluster has 4 subsequent nodes (the first node/TFTP server is in the other data center Site5).
 - The gatekeepers are in a GUP cluster model to handle the transfers done by Unified CVP.

- The PGs in this data center are configured as follows:
 - a. PG1 is configured with the Unified Communications Manager PIM and the CTI/CTI OS server which handles 1,320 agents (at Site6 and Site8).
 - b. PG2 is configured to handle the IVR PIMs for which the Unified CVP servers are the peripherals.
 - c. PG3 is configured as a Media Routing Peripheral Gateway (MR PG) to handle the Unified OUTDs located in Site6.
- One Catalyst switch acts as a Layer2 access switch for Site1.
- A WAN router and DS3 link provide clustering over the WAN (CoW) private connectivity to the backup data center in Site5.
- A DHCP Server (on the router) provides IP addresses to the Unified IP Phones.
- Windows 2003 Active Directory provides the active directory structure and DNS services.
- Unified IP Phones:
 - There are 20 admin phones at this site.
- Network Management:
 - Perfmon is used for network reporting.
- Redundancy and Failover:
 - For the Unified Communications Manager cluster in Side A, there are 4 subsequent nodes in a 1:1 load sharing mode.
 - The second Rogger at Site5 provides data center redundancy for this site.
 - Side B PGs located in Site5 also provide data center redundancy for this site.
 - Failover capabilities are in place for the Unified Communications Manager and the generic PG systems.
 - A Content Switch is used for load-balancing the Unified CVP servers.
 - Gatekeepers are implemented in a GUP cluster model.
- Security:
 - Core management security is implemented with CiscoWorks Management Center.
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - Cisco Catalyst Switch Firewall Services Module (FWSM) is implemented to provide integrated firewall security inside the network infrastructure.
 - McAfee Antivirus is installed on all the Windows-based servers.

Figure 28 shows the logical topology of Site1.

Figure 28 Site1 Logical Topology

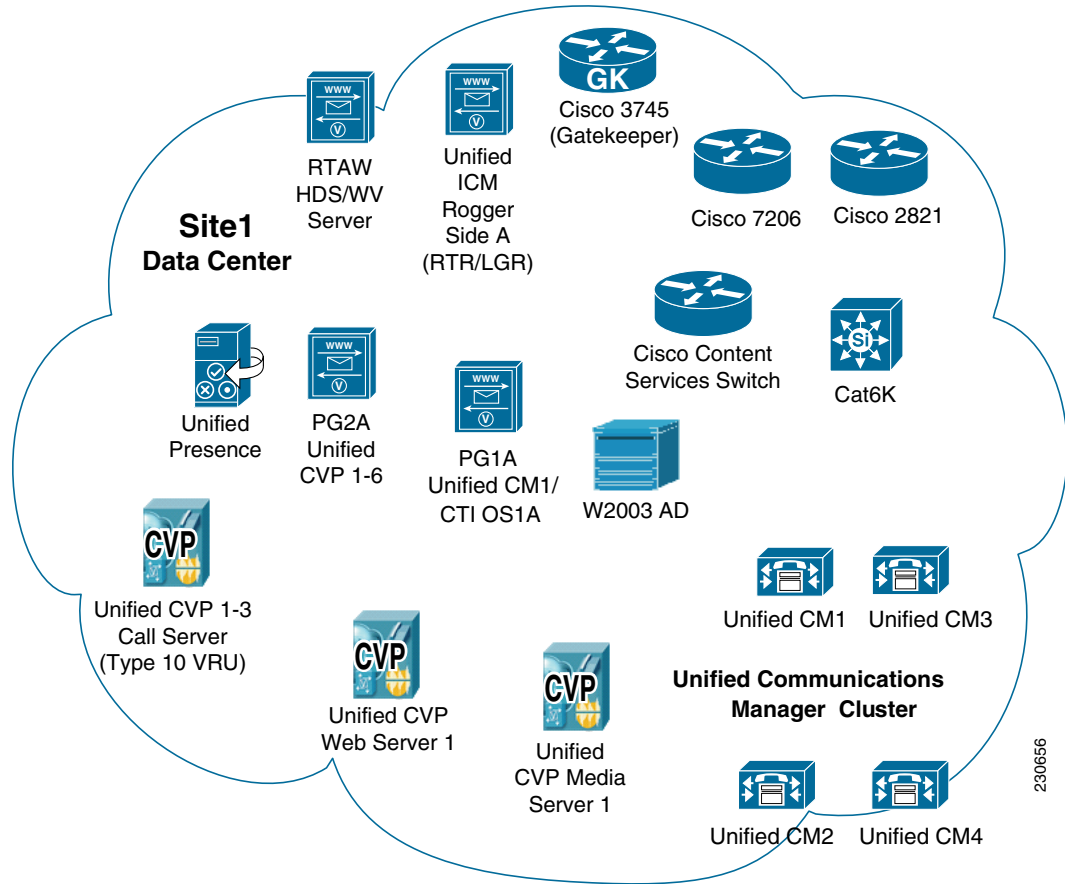


Table 17 lists the equipment and hardware platforms used in Site1. Use the reference information in the table to access corresponding software versions and model numbers.

Table 17 Site1 Equipment List

Component	Hardware Platform
Access Switch	Catalyst 6509
Access Router (IPSec)	Cisco 2821
Cisco Content Switch (CSS)	CSS 11500
Cisco CMM Gateway (SIP)	Catalyst 6500 (CMM)
CiscoWorks Management Center	MCS-7835-2.4-EVV1
Domain Controller/Windows 2003 Active Directory	MCS-7845H-3000
Gatekeeper (GUP cluster)	Cisco 3745
Generic PG	MCS-7845-H1-CC1

Table 17 **Site1 Equipment List (continued)**

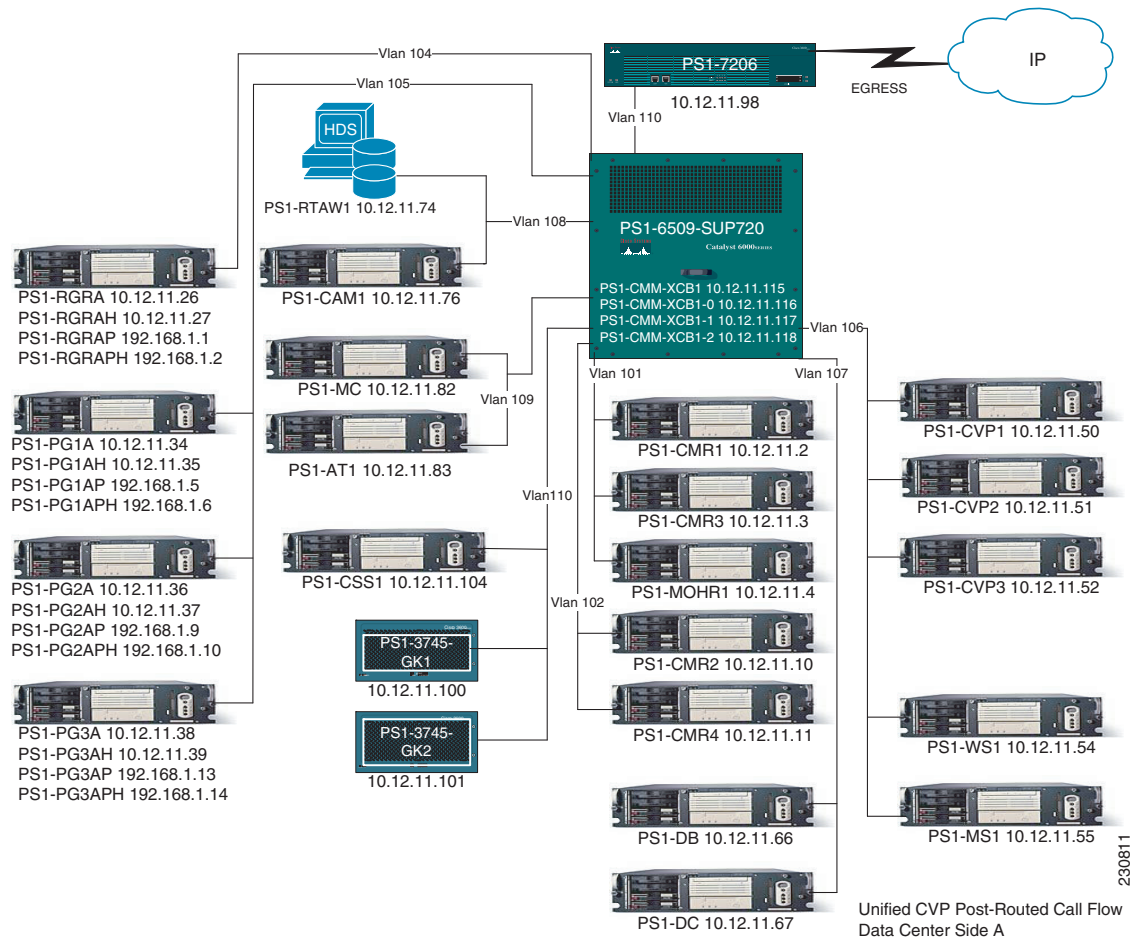
Component	Hardware Platform
Rogger	MCS-7845-H1-CC1
RT AW/HDS/WebView	MCS-7835-2.4-EVV1
Unified Communications Manager	MCS-7845-H1-IPC1
Unified CVP Call Server	MCS-7845-H1-CC1
Unified CVP Web Server/HTTP Media Server	MCS-7835-2.4-EVV1
Unified IP Phones	Unified IP Phones (SCCP) 794x/796x/797x
Unified Presence	MCS-7845-H1-IPC1
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 29 shows the physical topology of Site1 displaying the equipment listed in Table 2-17.

Figure 29 Site1 Physical Topology



Site2: Virtual Call Center

Site Profile

Site2 is the virtual site of mobile agents. Site2 participates in the multisite centralized configuration with Site1 and in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - There are 215 mobile agents that are logically grouped in Site2 who use their regular PSTN and cell phones to handle customer calls.
 - 200 of these mobile agents are associated with agents in Site3. 15 mobile agents participate in making outbound calls along with local agents at Site6.
 - Calls arriving and being processed at Site2 have a BHCA of 3,600.
- Infrastructure:

- A WAN router and DS3 link provide connectivity to other sites through a Frame Relay cloud.
- Remote Phones:
 - Mobile agents use regular PSTN and cell phones that are not controlled by Unified CCE.

Figure 30 shows the logical topology of Site2.

Figure 30 **Site2 Logical Topology**



Table 18 lists the equipment and hardware platforms used in Site2. Use the reference information in the table to access corresponding software versions and model numbers.

Table 18 **Site2 Equipment Table**

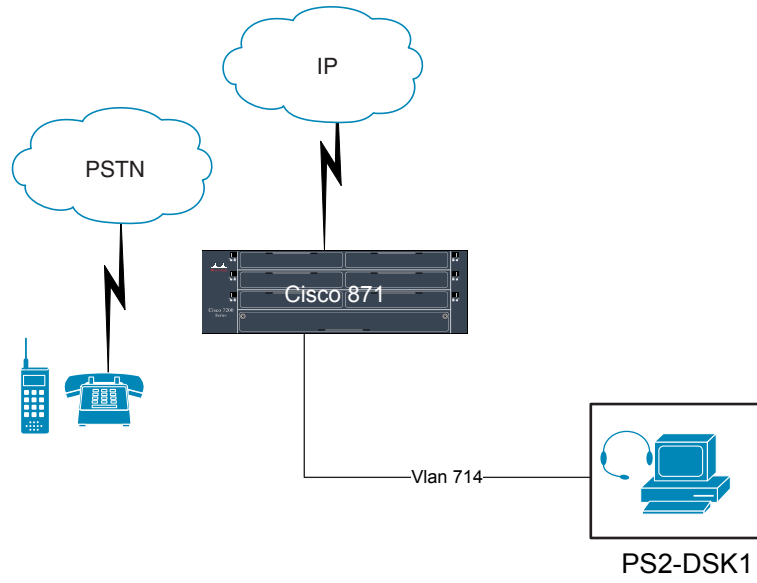
Component	Hardware Platform
Teleworker Access Router	Cisco Teleworker 871

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 31 shows the physical topology of Site2 displaying the equipment listed in Table 2-18.

Figure 31 *Site2 Physical Topology*



Site3: Distribution Center

Site Profile

Site3 is a distribution center in the multisite centralized configuration of this test bed. It participates in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - 300 agents use Cisco Agent Desktop (CAD) application for call control.
 - Calls arriving at Site3 have a BHCA of 5,400.
 - 200 mobile agents in Site2 are associated with this site.
- Call Flows:
 - The Unified CVP PSTN gateways are used to terminate the Unified CVP Post-Routed traffic from the PSTN.
 - The Unified CVP (VXML) gateways are used to process the Unified CVP Post-Routed traffic from the PSTN gateways and provide menu prompting and call queuing functionality.
- Call Processing/Routing:
 - For call control and processing, this site communicates with the data centers (Site1/Site5) over the WAN link.
- Infrastructure:
 - A Unified Communications Manager cluster consisting of 1 first node/TFTP server and 4 subsequent nodes is used for ICT transfers.
 - A Generic PG provides the Unified Communications Manager PIM for the Unified Communications Manager cluster at this site, and CTI OS and CAD services. It communicates with the Central Controller (Rogger) at the data centers (Site1/Site5) over the WAN.
 - A WAN router and DS3 link provided connectivity for call processing at Site1.
 - A DHCP Server (on the router) provides IP addresses to the Unified IP Phones.
 - A VoIP Monitor Server is used by supervisors to perform ad-hoc monitoring of calls to agents.
 - The CAD Desktop application communicates with the CAD services located in the PG at this site.
 - CAD Desktop administrator tool is loaded on the Windows XP machine.
- Unified IP Phones:
 - 375 SCCP phones are located at this site.
 - 125 agent and 25 admin SIP phones are located at this site.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - Cisco Adaptive Security Appliance (ASA) 5540 Services provide policy enforcement services to prevent unauthorized access to the network.
 - McAfee Antivirus is installed on all the Windows-based servers and the agent desktops.

Figure 32 shows the logical topology of Site3.

Figure 32 Site3 Logical Topology

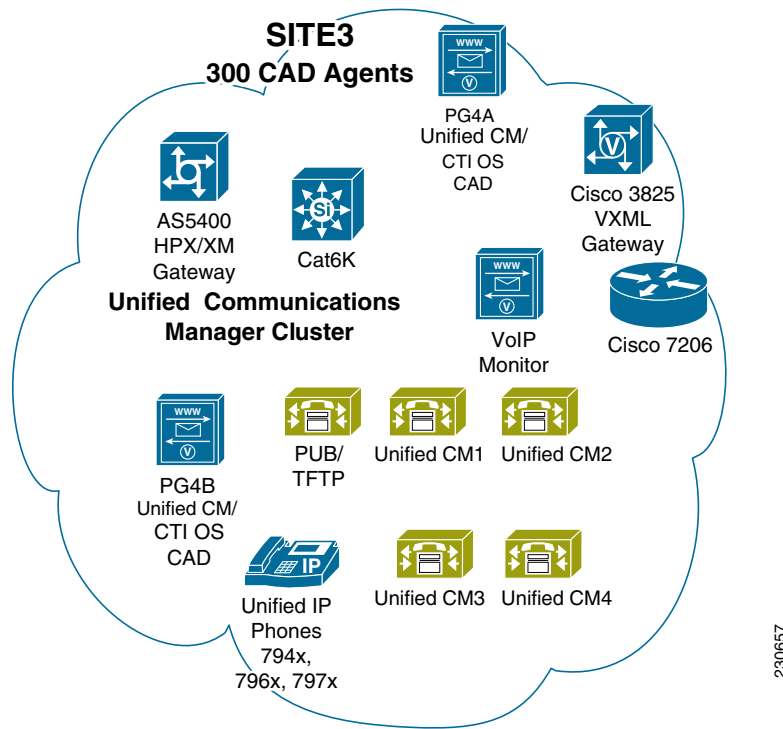


Table 19 shows the equipment and hardware platforms used in Site3. Use the reference information in the table to access corresponding software versions and model numbers.

Table 19 Site3 Equipment List

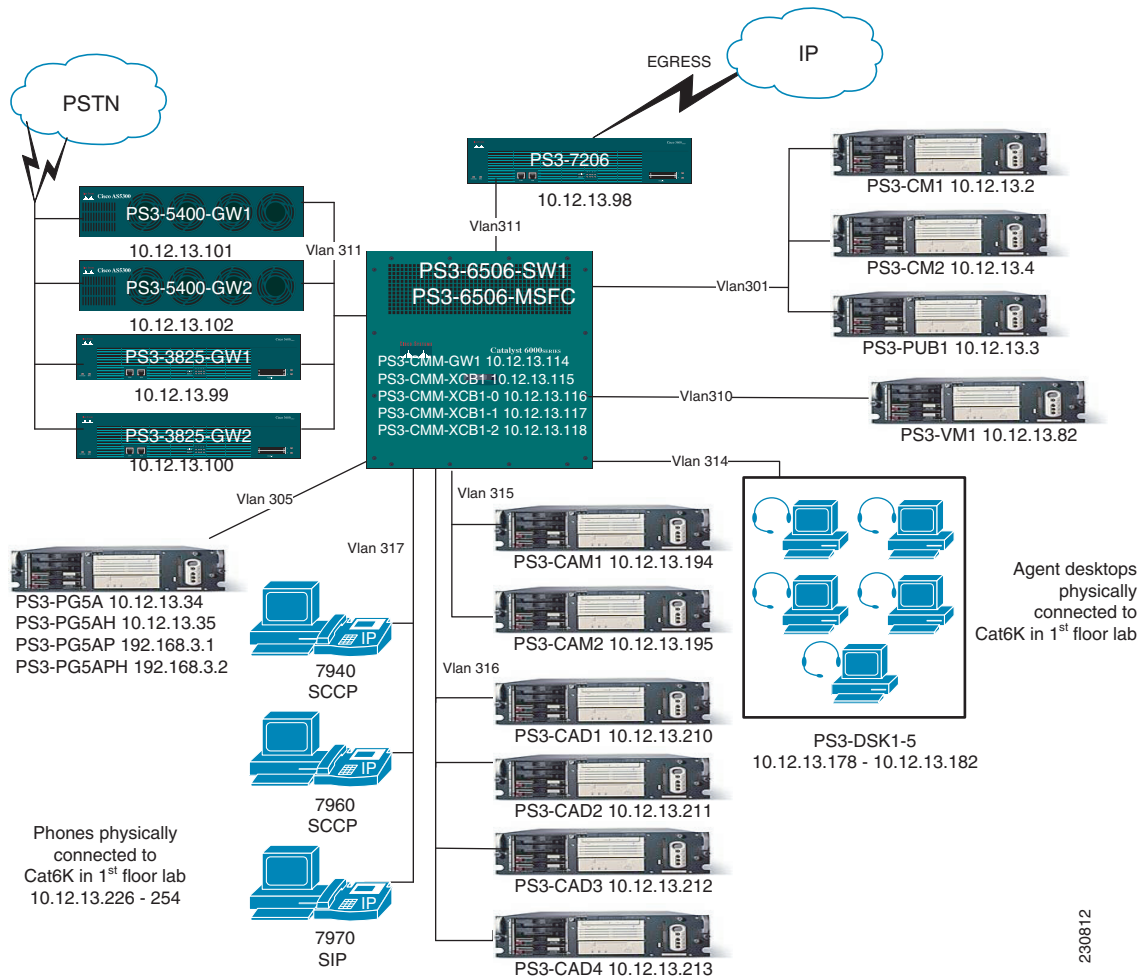
Component	Hardware Platform
Access Switch	Catalyst 6506
CAD Agent and Supervisor Desktop	Pentium IV Desktop
Unified Communications Manager	MCS-7845H-2.4-EVV1
Unified CVP PSTN Gateway	Cisco AS5400HPX/XM
Unified CVP VXML Gateway	Cisco 3825
Generic PG	MCS-7835-H1-CC1
Unified IP Phones	Unified IP Phones (SCCP and SIP) 794x/796x/797x
VoIP Monitor	MCS-7845H-2.4-EVV1
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 33 shows the physical topology of Site3 displaying the equipment listed in Table 2-19.

Figure 33 Site3 Physical Topology



Site5: Data Center

Site Profile

Site5 is the backup data center and hub of Site1 in a multisite centralized configuration. It participates in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - No agents are located at this site and no calls are answered at this site.

- Call Flows:
 - The Unified CVP Call server and Unified CVP Voice Browser are co-located on a single Unified CVP server. Additionally, there are separate Unified CVP Web and HTTP Media Servers.
 - Two Unified CVP Call servers are configured in a comprehensive mode to provide call treatment and queuing functionality at Site5's remote branches (Site6, Site7, and Site8).
 - The third Unified CVP Call server is used to support transfer to IVR outbound campaigns and warm consultative transfers.
- Call Processing/Routing:
 - Unified ICM Rogger (Side B) is located at this hub. There is a dedicated private WAN connection used for clustering over the WAN (CoW) to Site1. In addition, there is also a visible WAN connection to the other sites.
 - The central database is associated with the Logger. The Historical Database Server (HDS) and WebView Server (WVS) are installed on the Real-Time Admin Workstation (RT AW).
- Infrastructure:
 - The Unified Communications Manager cluster has 1 first node/ TFTP and 4 subsequent nodes (this first node/ TFTP also supports the Site1 data center).
 - The gatekeepers are implemented in an GUP cluster to handle transfers by Unified CVP.
 - The PGs in this data center are configured as follows:
 - a. PG1 is configured with the first Unified Communications Manager PIM and the CTI/CTI OS server which handles 1,320 agents (at Site6 and Site8).
 - a. PG2 is configured to handle the IVR PIMs for which the Unified CVP servers are the peripherals.
 - a. PG3 is configured as a Media Routing Peripheral Gateway (MR PG) to handle the Unified OUTDs located in Site6.
 - One Catalyst switch acts as a Layer2 access switch for Site5.
 - A WAN router and DS3 link provide clustering over the WAN (CoW) private connectivity to the backup data center in Site5.
 - A DHCP Server (on the router) provides IP addresses to the Unified IP Phones.
 - Windows 2003 Active Directory provides the active directory structure and DNS services.
- Unified IP Phones:
 - There are 30 admin phones at this site.
- Network Management:
 - Perfmon and Unified Operations Manager are used for network reporting.
- Redundancy and Failover:
 - For the Unified Communications Manager cluster in Side B, there are 1 first node/TFTP and 4 subsequent nodes in a 1:1 load-sharing mode.
 - Failover capabilities are in place for the Unified Communications Manager and the Generic PG systems.
 - The Rogger located in Site1 provides redundancy for the Rogger in this site.
 - Side A PGs located in Site1 also provide data center redundancy for this site.
 - A Content Switch is used for load-balancing the Unified CVP Servers.

- Gatekeepers are implemented in an GUP cluster model.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - McAfee Antivirus is installed on all the Windows-based servers.

Figure 34 shows the logical topology of Site5.

Figure 34 Site5 Logical Topology

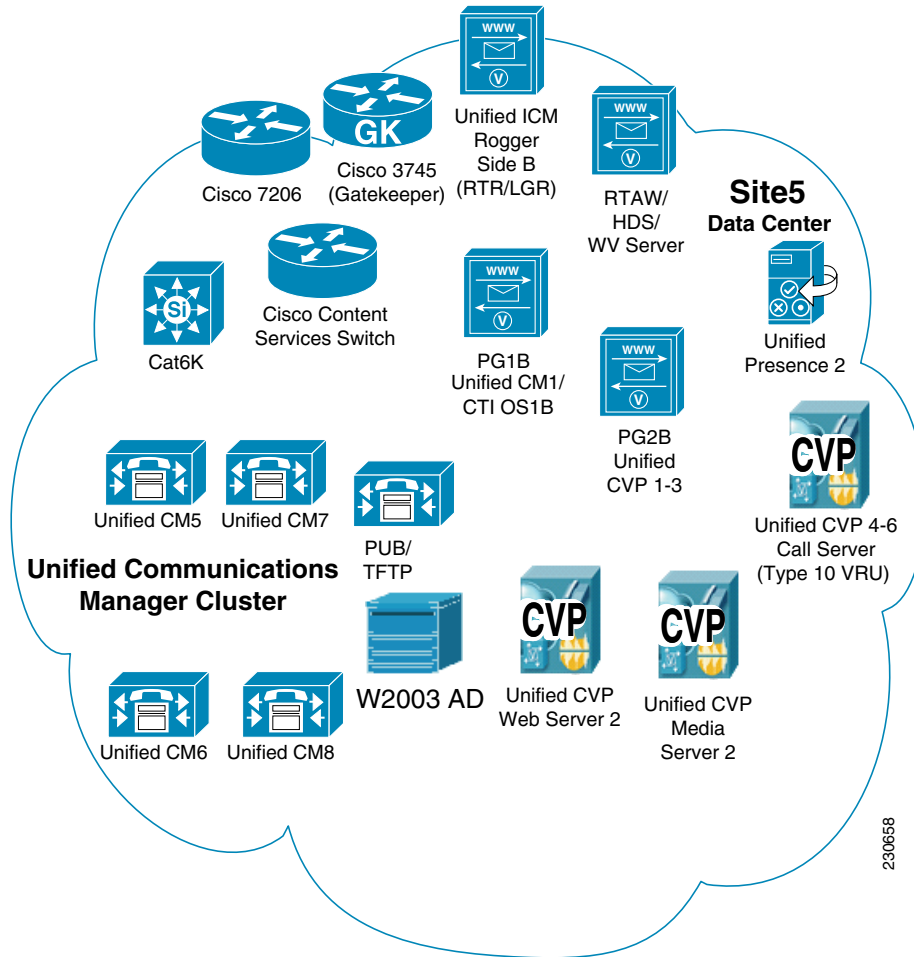


Table 20 lists the equipment and hardware platforms used in Site5. Use the reference information in the table to access corresponding software versions and model numbers.

Table 20 Site5 Equipment List

Component	Hardware Platform
Access Switch	Catalyst 6509
Cisco Content Switch (CSS)	CSS 11500
Cisco CMM Gateway (SIP)	Catalyst 6500 (CMM)

Table 20 **Site5 Equipment List (continued)**

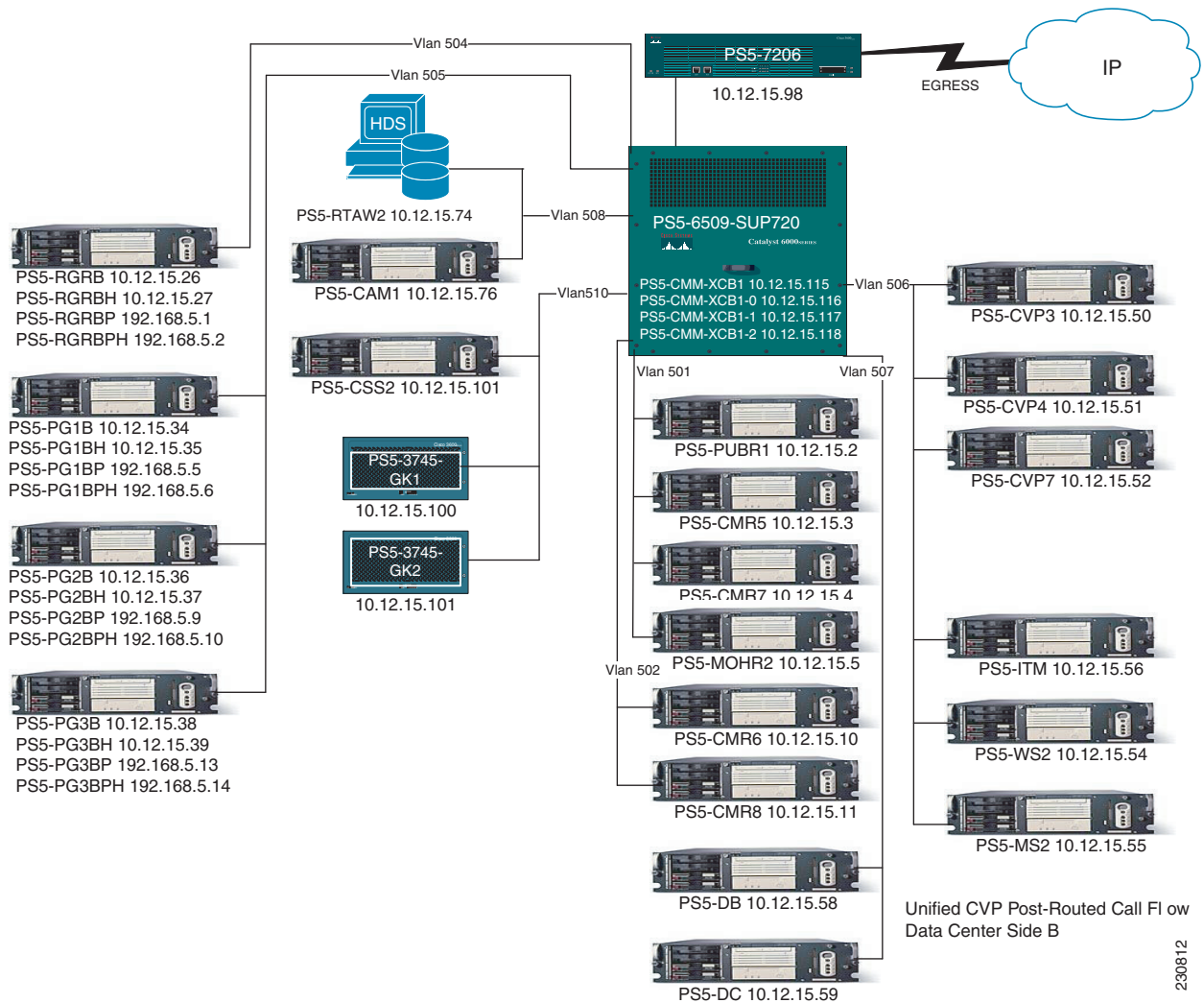
Component	Hardware Platform
Domain Controller/Windows 2003 Active Directory	MCS-7845H-3000
Gatekeeper (GUP cluster)	Cisco 3745
Generic PG	MCS-7845-H1-CC1
Rogger	MCS-7845-H1-CC1
RT AW/HDS/WebView	MCS-7835-2.4-EVV1
Unified Communications Manager	MCS-7845-H1-IPC1
Unified CVP Call Server	MCS-7845-H1-CC1
Unified CVP Web Server/HTTP Media Server	MCS-7835-2.4-EVV1
Unified IP Phones	Unified IP Phones 7960
Unified Operations Manager	MCS-7835-2.4-EVV1
Unified Presence	MCS-7845-H1-IPC1
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 35 shows the physical topology of Site5 displaying the equipment listed in Table 2-20.

Figure 35 Site5 Physical Topology



Site6: Mid-Atlantic Retail Center

Site Profile

Site6 is a remote retail site in a multisite centralized configuration in this test bed. It participates in the multisite distributed WAN configuration. The test site is deployed as follows:

- Agents:
 - 683 agents use CTI OS Agent Desktop application for call control functions to handle both inbound calls from the PSTN and Unified ICM-initiated outbound calls.
 - 610 agents handle the inbound calls and 73 blended agents (including 15 mobile agents) handle both inbound retail and outbound credit collections calls.
 - Mobile agents use their regular PSTN and cell phones to make outbound calls.

- Calls arriving at this site have a BHCA of 12,490 and outbound calls leaving Site6 have a BHCA of 4,380.
- Call Flows:
 - The Unified CVP PSTN gateways are used to terminate the Unified CVP Post-Routed traffic from the PSTN.
 - The Unified CVP (VXML) gateways are used to process the Unified CVP Post-Routed traffic from the PSTN gateways and provide menu prompting and call queuing functionality.
- Call Processing/Routing:
 - For call control and processing, this site communicates with the data center (Site1/Site5) over the WAN link.
- Infrastructure:
 - A WAN router and DS3 link provide connectivity for call processing at Site1/Site5.
 - A DHCP Server (on the router) provides IP addresses to the Unified IP Phones.
 - Unified OUTDs are installed at this site to provide required outbound campaigns.
 - ASR/TTS is installed at this site to provide the required Automated Speech Recognition and Text to Speech functionality.
- Unified IP Phones:
 - 512 SCCP phones are located at this site.
 - 171 agent and 34 admin SIP phones are located at this site.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on the Unified OUTDs and all the servers.
 - Cisco Adaptive Security Appliance (ASA) Services provide policy enforcement services to prevent unauthorized access to the network.
 - McAfee Antivirus is installed on all the Windows-based servers and the agent desktops.

Figure 36 shows the logical topology of Site6.

Figure 36 Site6 Logical Topology

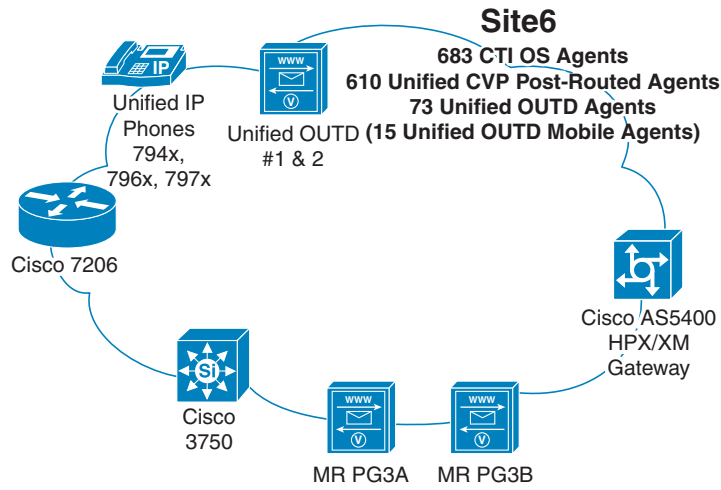


Table 21 lists the equipment and hardware platforms used in Site6. Use the reference information in the table to access corresponding software versions and model numbers.

Table 21 Site6 Equipment List

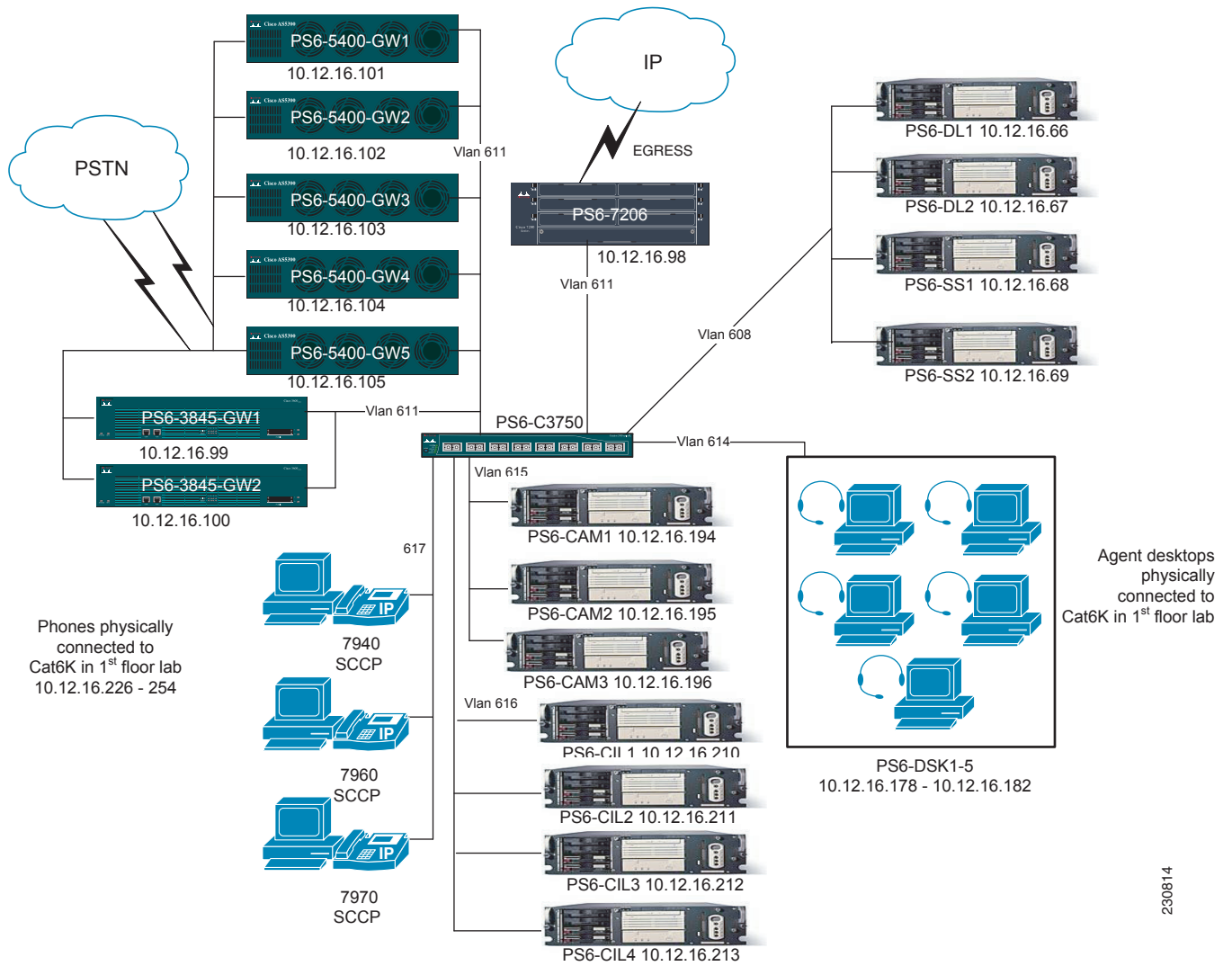
Component	Hardware Platform
Access Switch	Catalyst 3750
CTI OS Agent and Supervisor Desktop	Pentium IV Desktop
Media Routing Peripheral Gateway (MR PG)	MCS-7845-H1-CC1
Speechify Server	MCS-7845H-2.4-EVV1
Unified CVP PSTN Gateway	Cisco AS5400HPX/XM
Unified CVP VXML Gateway	Cisco 3845
Unified IP Phones	Unified IP Phones (SCCP and SIP) 794x/796x/797x
Unified OUTD	MCS-7835-H1-CC1
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 37 shows the physical topology of Site6 displaying the equipment listed in Table 2-21.

Figure 37 Site6 Physical Topology



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Site7: North-Central Retail Center

Site Profile

Site7 is a medium remote retail site in a multisite centralized configuration in this test bed. It participates in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - 691 agents use CTI OS Desktop applications for call control functions.
 - Calls arriving at this site have a BHCA of 12,518.
 - Agents in this site receive transfers and conferences from Site6 and Site8.
- Call Flows:
 - The Unified CVP PSTN gateway is used to terminate the Unified CVP Post-Routed traffic from the PSTN.
 - The Unified CVP VXML Gateway is used to process the Unified CVP Post-Routed traffic from the PSTN gateway. It also provides the menu prompting and call queuing functionality for the local site.
- Infrastructure:
 - A Unified Communications Manager cluster (running a previous release of the software to verify interoperability) consisting of 1 first node/TFTP server and 1 subsequent node handles the ICT transfers.
 - A Generic PG server provides the Unified Communications Manager PIM for the Unified Communications Manager cluster and CTI OS server at this site. It communicates with the Central Controller (Rogger) at the data centers (Site1/Site5) over the WAN link.
 - The CTI OS Desktop applications communicate with the CTI services located on the PG at this site and the data centers.
 - A WAN router and DS3 link provide connectivity for call processing at Site1/Site5.
 - A DHCP Server (on the router) provides IP addresses to the Unified IP Phones.
- Unified IP Phones:
 - 518 SCCP phones are located at this site.
 - 173 agent and 34 admin SIP phones are located at this site.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - Cisco Adaptive Security Appliance (ASA) Services provide policy enforcement services to prevent unauthorized access to the network.
 - McAfee Antivirus is installed on all the Windows-based servers and the agent desktops.

Figure 38 shows the logical topology of Site7.

Figure 38 Site7 Logical Topology

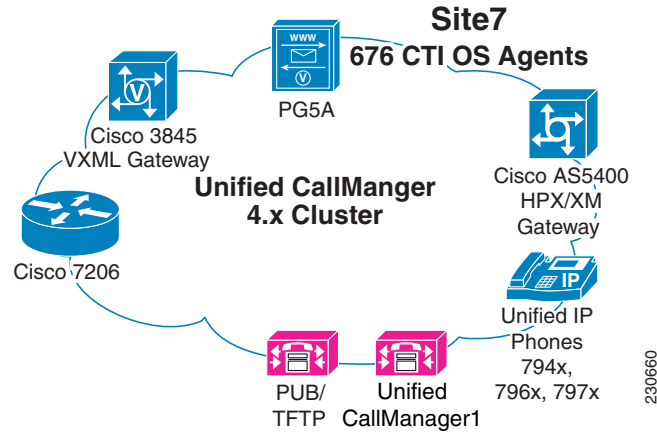


Table 22 lists the equipment and hardware platforms used in Site7. Use the reference information in the table to access corresponding software versions and model numbers.

Table 22 Site7 Equipment Table

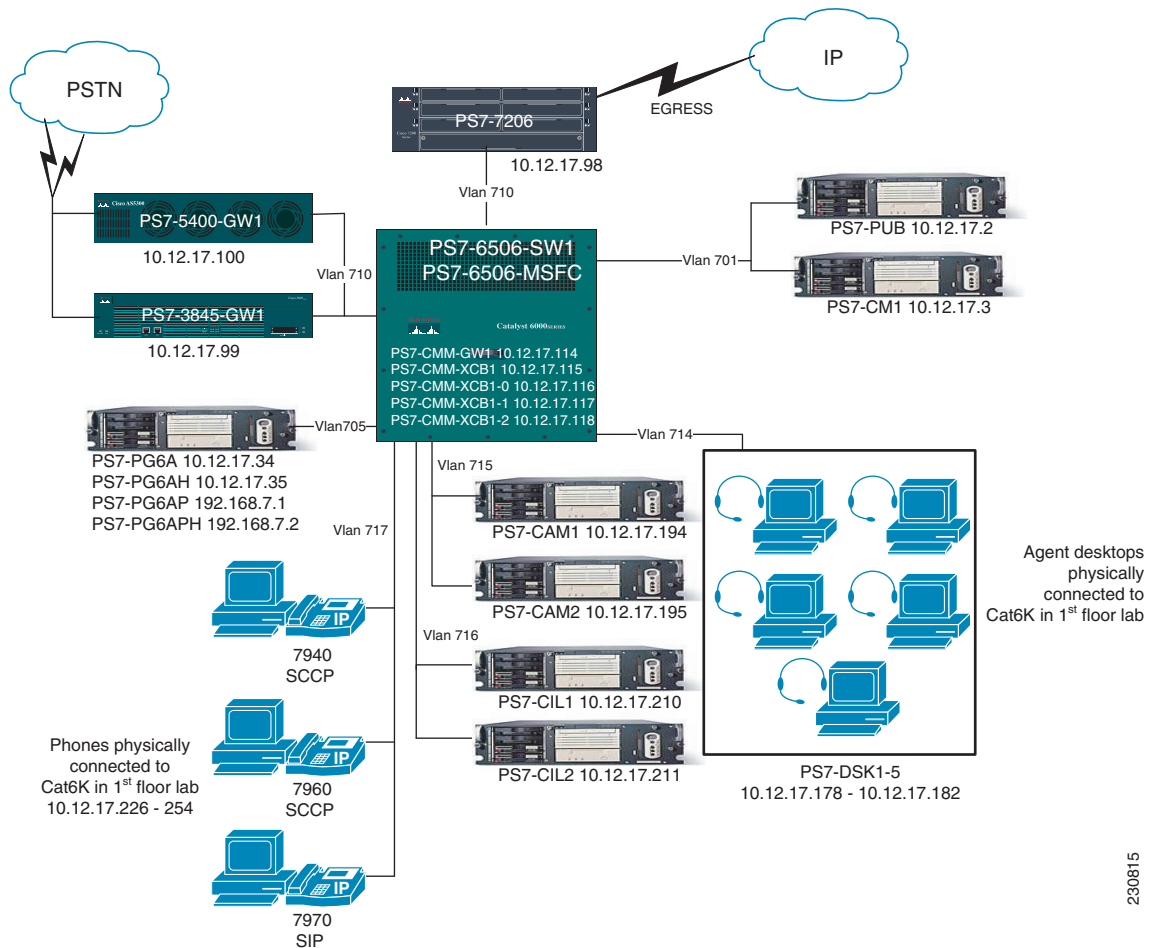
Component	Hardware Platform
Access Switch	Cisco 6506
CTI OS Agent and Supervisor Desktop	Pentium IV Desktop
Generic PG	MCS-7835-H1-CC1
Unified Communications Manager	MCS-7845H-2.4-EVV1
Unified CVP PSTN Gateway	Cisco AS5400HPX/XM
Unified CVP VXML Gateway	Cisco 3845
Unified IP Phones	Unified IP Phones (SCCP and SIP) 794x/796x/797x
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 39 shows the physical topology of Site7 displaying all the equipment listed in Table 2-21.

Figure 39 Site7 Physical Topology



Site8: South-Central Retail Center

Site Profile

Site8 is a remote retail site in a multisite centralized configuration in this test bed. It participates in the multisite distributed WAN configuration.

The test site is deployed as follows:

- Agents:
 - 637 agents use CTI OS Desktop applications for call control functions.
 - Calls arriving at this site have a BHCA of 11,284.
 - Agents in this site receive transfers and conferences from Site6 and Site7.
- Call Flows:
 - The Unified CVP PSTN gateways are used to terminate the Unified CVP Post-Routed traffic from the PSTN.

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- The Unified CVP VXML Gateway is used to process the Unified CVP Post-Routed traffic from the PSTN gateways. It also provides the menu prompting and call queuing functionality for the local site.
- Call Processing/Routing:
 - For call control and processing, this site communicates with the data centers (Site1/Site5) over the WAN link.
- Infrastructure:
 - A WAN router and DS3 link provide connectivity for call processing at Site5.
 - A DHCP Server (on the router) provides IP addresses to the Unified IP Phones at the site.
- Unified IP Phones:
 - 477 SCCP phones are located at this site.
 - 160 agent and 31 admin SIP phones are located at this site.
- Security:
 - Cisco Security Agent is implemented as core endpoint security on all the servers.
 - Cisco Adaptive Security Appliance (ASA) Services provide policy enforcement services to prevent unauthorized access to the network.
 - McAfee Antivirus is installed on all the Windows-based servers and the agent desktops.

Figure 40 shows the logical topology of Site8.

Figure 40 Site8 Logical Topology

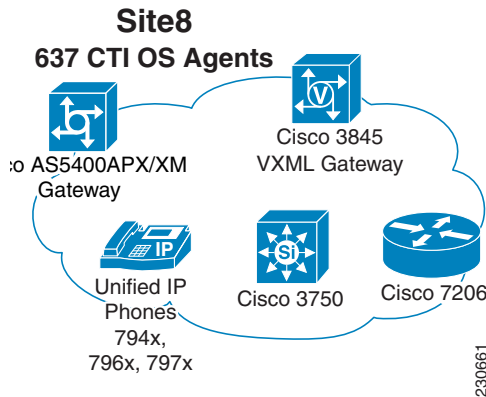


Table 23 lists the equipment and hardware platforms used in Site8. Use the reference information in the table to access corresponding software versions and model numbers.

Table 23 Site8 Equipment Table

Component	Hardware Platform
Access Switch	Catalyst 3750
CTI OS Agent and Supervisor Desktop	Pentium IV Desktop
Unified CVP PSTN Gateway	Cisco AS5400HPX/XM
Unified CVP VXML Gateway	Cisco 3845

Table 23 Site8 Equipment Table (continued)

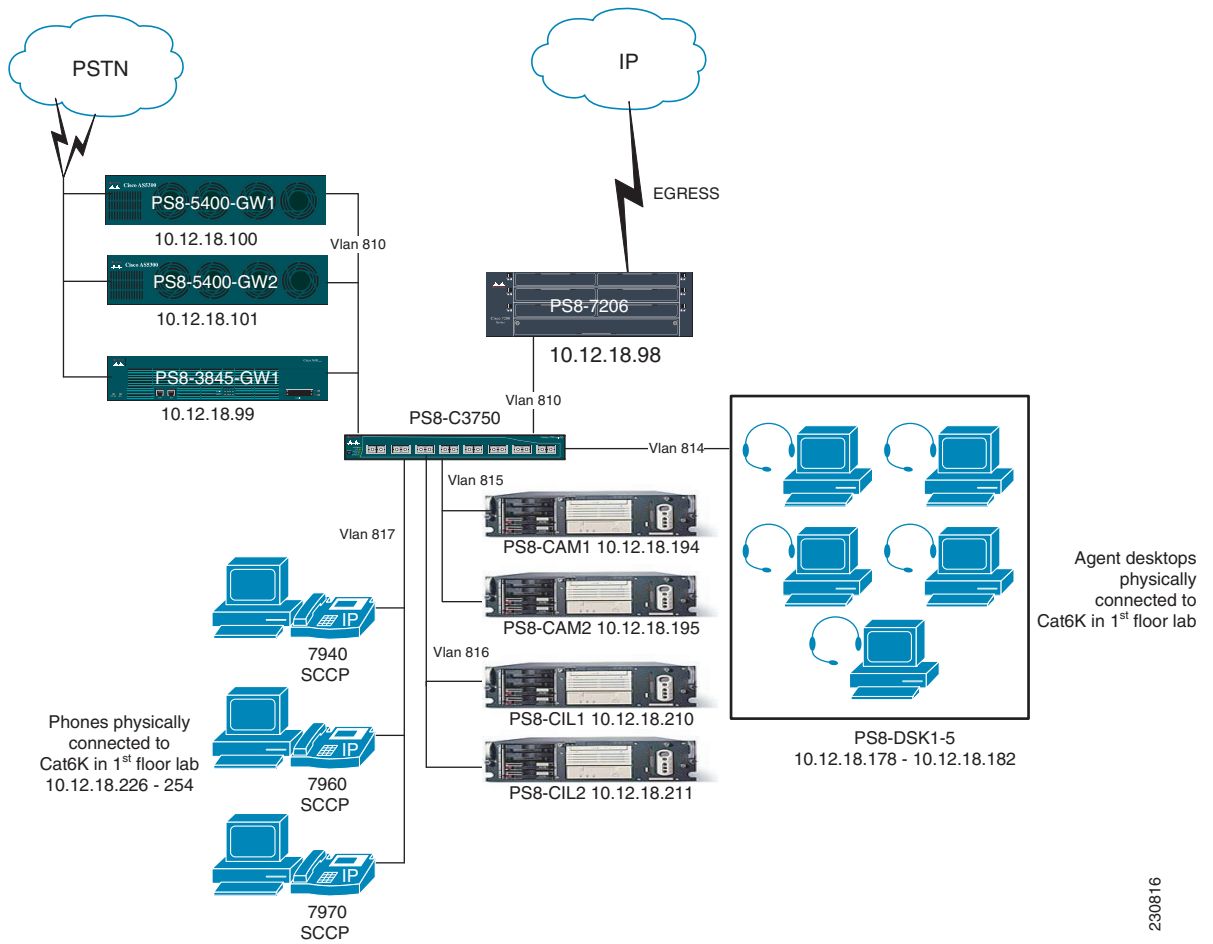
Unified IP Phones	Unified IP Phones (SCCP and SIP) 794x/796x/797x
WAN Router	Cisco 7206VXR

For installation and configuration documentation on these components, see Components Installation and Configuration Guides at:

http://www.cisco.com/cisco/web/docs/iam/unified/ipcc601/Component_Installation_and_Configuration_Guides.html

Figure 41 shows the physical topology of Site8 displaying all the equipment listed in Table 2-22.

Figure 41 Site8 Physical Topology



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